# POLITICAL TRANSFORMATIONS AND PUBLIC FINANCES

## Europe, 1650–1913

MARK DINCECCO

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## Political Transformations and Public Finances

How did today's rich states first establish modern fiscal systems? To answer this question, this book examines the evolution of political regimes and public finances in Europe over the long term. The book argues that the emergence of efficient fiscal institutions was the result of two fundamental political transformations that resolved long-standing problems of fiscal fragmentation and absolutism. States gained tax force through fiscal centralization and restricted the power of rulers through parliamentary limits, which enabled them to gather large tax revenues and channel funds toward public services with positive economic benefits. Using a novel combination of descriptive, case-study, and statistical methods, the book pursues this argument through a systematic investigation of a new panel database that spans eleven countries and four centuries. The book's findings are significant for our understanding of economic history and have important consequences for current policy debates.

Mark Dincecco is Assistant Professor in the Research Area of Economics and Institutional Change at IMT Institute for Advanced Studies in Lucca, Tuscany. His research focuses on economic history, political economy, and public economics. He holds a Ph.D. in economics from the University of California, Los Angeles, and has published in several academic journals.

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*IMT Lucca Institute for Advanced Studies*

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# 1

# Weak and Strong States in Historical Perspective

Powerful fiscal states underlie today's advanced economies in the West and beyond. Wealthy governments typically gather large tax revenues as shares of GDP and spend great sums on the military, infrastructure, and social programs. How rich European countries first established modern systems of public finance is a fundamental question in economic history. It is the key question that this book tackles.

The answer, which involves centuries of political reforms, wars, revolutions, defaults, technological change, and economic growth, has profound implications for current political debates. The financial meltdowns of the late 1990s in East and Southeast Asia and Latin America illustrate the vital links between fiscal policy and development. Beyond financial crisis, emerging economies also face fiscal problems resulting from the lack of tax resources available to provide basic public goods like transportation infrastructure. Yet fiscal troubles do not affect developing countries alone. One of the most pressing issues that advanced nations must confront over the coming decades is how to keep entitlement programs solvent. No country is immune to fiscal imperatives.

To meet fiscal challenges, political regimes will have to evolve. The process of institutional transformation finds crucial antecedents in history. Links between politics, taxation, and public spending and debt are long-standing. Today's world certainly differs from that of the past. However, it is clear that a solid understanding of the establishment of modern systems of public finance will enrich current debates about how to best design and implement efficient fiscal institutions, for both emerging and developed nations.

### 1.1. Fiscal Fundamentals

A large literature in economics emphasizes the negative effect of executive predation on economic growth.[1] This view suggests that institutional constraints such as parliamentary control over government finances protect property rights and encourage investment by limiting the ability of rulers to expropriate. Figure 1.1 plots the average score of constraints on the executive from 1995 to 2004 from the Polity IV Database of Marshall and Jaggers (2008) against average log real GDP per capita over the same years from the Penn World Tables of Heston, Summers, and Aten (2006) for nearly 100 countries. Consistent with arguments that link predatory states with poor economic performance, there is a clear increasing relationship between ruler limits and income.

Though illustrative, Figure 1.1 masks the role of history. Many of today's rich states were not established with parliamentary institutions intact. Rather, executive constraints are the culmination of a long and arduous historical process. The political transformation from absolutist to parliamentary regimes and its fiscal effects are among the main themes of this book.

The literature's focus on executive predation, moreover, discounts the positive economic roles that robust governments may play. Political scientists argue that traditional local elites such as bosses, chiefs, clan leaders, landlords, and rich peasants in parts of sub-Saharan Africa oppose fiscal control by national governments, leading weak states to underinvest in public services that increase productivity. The successful development experiences of Asian Tiger nations, by contrast, took place under powerful fiscal states.[2] Figure 1.2 plots the average share of total taxes collected by central governments as a percentage of GDP from 1995 to 2004 from the Government Financial Statistics Database of the IMF against average log real per capita GDP for the same set of countries as before. There is a strong positive correlation between

[1] For theory, see North and Thomas (1973), Brennan and Buchanan (1980), North (1981), Levi (1988), McGuire and Olson (1996), and North, Wallis, and Weingast (2009). For empirics, see De Long and Shleifer (1993), Knack and Keefer (1995), and Acemoglu, Johnson, and Robinson (2001, 2002, 2005).

[2] For Africa, see Migdal (1988), Herbst (2000), and Bates (2001). For East Asia, see Wade (1990) and Kang (2002). There is also a recent related literature in economics. See Acemoglu, Robinson, and Verdier (2004), Glaeser et al. (2004), Acemoglu (2005), Besley and Persson (2008, 2009, 2010), Acemoglu, Ticchi, and Vindigni (2011), and Dincecco and Prado (2011). Finally, Lindert (2004, 2009) argues that social spending on public services like mass formal education is a major determinant of long-run economic growth.

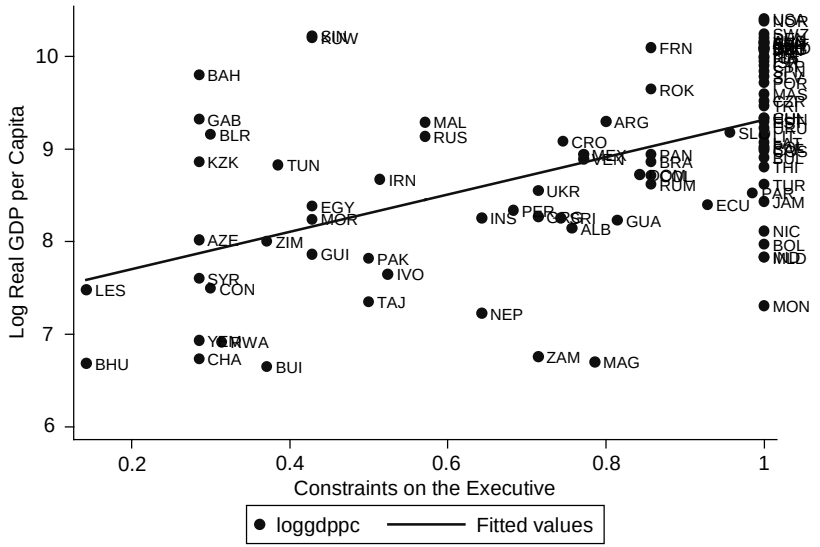


FIGURE 1.1. Constraints on the executive and income, 1995–2004. Constraints on the executive are the average constraints on the executive index normalized from 0 to 1 between 1995 and 2004 from the Polity IV Database. Log real GDP per capita is the average log GDP per capita over the same years in constant U.S. dollars expressed in international prices, base year 2000, from the Penn World Tables, Version 6.2. The set of 96 sample countries is from Dincecco and Prado (2011).
*Sources*: Penn World Tables, Version 6.2, of Heston et al. (2006), Polity IV Database of Marshall and Jaggers (2008).

tax revenues and income, which is consistent with claims relating fiscal strength to better economic outcomes.[3]

However instructive, Figure 1.2 also neglects history. Fiscal prowess did not always characterize wealthy states. Instead, fiscal strength is the result of a deep process of political transformation. The establishment of robust tax systems and their effects on public finances is another of this book's core themes.

Overall, today's advanced economies strike a balance between weak and strong fiscal elements. Rich states typically possess a set of political institutions that link powerful centralized tax structures with parliaments that limit executive control over public finances. They are thus able to gather large tax revenues and can channel funds toward public services with positive economic benefits.[4]

[3] Excluding the outlier countries Bahrain (BAH), Croatia (CRO), Kuwait (KUW), Lesotho (LES), and Madagascar (MAG) only strengthens this correlation.

[4] Acemoglu (2005) refers to this type of outcome as a "consensually strong state."

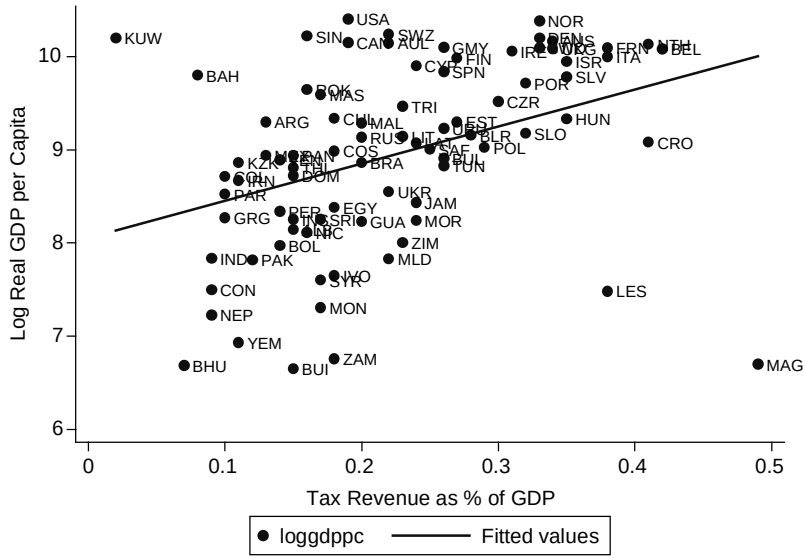


FIGURE 1.2. Tax revenue and income, 1995–2004. Tax revenue collected by central governments as a percentage of GDP is the average between 1995 and 2004 from the Government Financial Statistics Database. Log real GDP per capita is the average log GDP per capita over the same years in constant U.S.dollars expressed in international prices, base year 2000, from the Penn World Tables, Version 6.2. The set of 96 sample countries is from Dincecco and Prado (2011). *Sources*: Government Financial Statistics Database of the IMF (2010), Penn World Tables, Version 6.2, of Heston et al. (2006).

But how did wealthy countries achieve regimes that are both fiscally centralized and politically limited? Many of today's advanced economies were not "born" with efficient fiscal and political institutions. To answer, this book examines the evolution of political regimes and public finances in Europe over the long term, from the height of the Old Regime in 1650 to the eve of World War I in 1913. Sovereign governments in Old Regime Europe generally faced two key political problems: fiscal fragmentation and absolutism. Though rulers exercised weak authority over taxation, they wielded strong control over spending. Under this equilibrium, executives were typically starved for revenues and often spent available funds on foreign military adventures rather than public services like roads that would most benefit society. To improve fiscal outcomes, states had to gain force by implementing uniform tax systems at the national level. They also had to restrict power by establishing parliaments that could monitor government expenditures at regular intervals. This book argues that the

emergence of modern systems of public finance is the result of the resolution of these two fundamental political problems.[5]

By adopting a long-run perspective, this book enhances both historical and current debates over weak and strong states. The study of the development of public finance systems over the long term is valuable in its own right. Knowledge of the long-run process of fiscal change also has major implications beyond economic history. A proper understanding of the European experience translates into useful lessons for today's emerging and advanced countries, not the least because governments around the world have implemented European forms of fiscal governance.[6] Fiscal challenges from development policy to entitlement reform are with us to stay. To guide the course of future debates in useful ways, we must understand the past.

## 1.2. The Approach

Two seminal works form the core of this investigation. The first is North and Weingast (1989).[7] They claim that institutional reforms in England with the Glorious Revolution of 1688 enabled the king to make a credible commitment to responsible fiscal policies. Since the new constitution granted the national parliament the regular right to audit government finances, the ruler could keep promises to execute fiscal plans in time-consistent ways. By tying its hands, the executive was able to borrow much larger sums. The second seminal work is Epstein (2000).[8] He argues that institutional fragmentation within European polities, and not fiscal abuse by rulers, was the key source of fiscal troubles prior to the nineteenth century. Since provincial elites had strong incentives to oppose fiscal reforms that threatened

[5] The term "state," which is used interchangeably with "polity" throughout the text, has no normative connation.

[6] See La Porta et al. (1997, 1998, 1999), La Porta, Lopez-de-Silanes, and Shleifer (2008), and Nunn (2009).

[7] Also see Dickson (1967), Jones (1972), Stone (1979), Hill (1980), Brewer (1989), and Schultz and Weingast (1998). Scholars disagree over the fiscal impact of the Glorious Revolution. Clark (1996) argues that there were secure property rights in England from 1600 onward. O'Brien (2001) claims that England made key constitutional and administrative reforms in the 1640s. Stasavage (2003) highlights the development of cohesive English political parties in the 1690s. Sussman and Yafeh (2006) argue that the parliamentary innovations of 1688 did not lower British capital costs over the next century. Finally, Drelichman and Voth (2008) claim that fiscal repression rather than political change enabled England to sustain large debts.

[8] Also see Henshall (1992), Hoffman and Norberg (1994b), Hoffman and Rosenthal (1997, 2000), Rosenthal (1998), and O'Brien (2001).

traditional tax rights, there was a classic public goods problem whereby each locale wished to free-ride on the tax contributions of others. By establishing national tax systems with (high) equalized rates across provinces, states could gather much greater revenues. England – whose fiscal revolution epitomizes North and Weingast's argument – had centralized fiscal and political institutions from medieval times, making it exceptional.

The book claims that the political transformations that North and Weingast and Epstein identify are complementary components, and not competing or contradictory ones, of sound public finances. The book's long periodization makes it possible to fuse the arguments for fiscal centralization and parliamentary reforms into an integrated analysis of institutional change. Many studies of European fiscal history (including that of Epstein) finish with the fall of the Old Regime at the end of the 1700s.[9] These works often focus on weak-state problems of jurisdiction fragmentation. Other studies concentrate exclusively on the institutional shifts that took place during French revolutionary and Napoleonic times from 1789 to 1815.[10] Finally, studies of the nineteenth century after 1815 tend to emphasize the growing role of parliament.[11] The total result is to downplay or miss the key links between these diverse eras.

By contrast, the period under analysis in this book (1650–1913) spans fundamental transformations in political systems, as European states moved from fiscally fragmented and absolutist regimes to fiscally centralized and politically limited ones. The book thus examines the fiscal effects of both institutional changes, and not just one or the other. The findings support the argument that fiscal centralization and limited government alike led to major improvements in public finances. The results also indicate that the establishment of modern fiscal systems provided a solid institutional basis on which national governments could play positive economic roles, both during the Industrial Revolution over the late nineteenth century and during the rise of the welfare state over the twentieth century.

The book uses systematic methods of analysis to test for the impacts of political transformations both within and across European countries over time. Since North and Weingast focus on seventeenth-century England, and Epstein draws heavily from medieval Italy, one may worry that characteristics particular to those polities and eras drive their findings. The investigation in this book, by contrast, is general and applies the same set

[9] Also see Hoffman and Norberg (1994a) and Bonney (1995, 1999).
[10] See Godechot, Hyslop, and Dowd (1971), Woolf (1991), and Grab (2003).
[11] See Carstairs (1980), Flora (1983), and Cardoso and Lains (2010a).

of analytic tools to nearly a dozen sample countries. There is an intrinsic trade-off between historical breadth and depth. The broad scope of this book's inquiry compensates for any (necessary) loss of specific details. In this regard, the investigation complements works that rely upon chapter-by-chapter case studies.[12]

Most long-run comparative analyses of European fiscal history are qualitatively oriented.[13] This book constructs a new yearly database for three key fiscal indicators: free-market yields on long-term sovereign bonds, per capita revenues collected by national governments, and ratios of budget deficits to revenues. It also assembles new datasets for external and internal conflicts, economic growth, fiscal and monetary policies, and other elements. These data are used in a variety of ways. The book first characterizes fiscal time trends with respect to political transformations and other economic and political factors by country. It then subjects the data to a standard battery of rigorous tests. The book employs two distinct statistical procedures: structural breaks tests and regressions that exploit the panel nature of the data. The breaks tests assume no a priori knowledge of major turning points in the different fiscal series but let the data speak for themselves. The panel regressions incorporate a wide-ranging set of control variables to evaluate the fiscal effects of political transformations. In total, the empirical inquiry indicates that the resolution of weak- and strong-state problems – that is, the establishment of political regimes that were both fiscally centralized and politically limited – had significant positive fiscal effects.

Finally, the book moves beyond the analysis of sovereign credit risk alone. The fiscal history literature typically focuses on the links between

[12] See Hoffman and Norberg (1994a), Bonney (1999), Bordo and Cortés-Conde (2001), and Cardoso and Lains (2010a). This book also analyzes case histories.

[13] See Tilly (1990), Bonney (1995), O'Brien (2001), and Karaman and Pamuk (2010). Two econometric exceptions for the period before 1800 are Stasavage (2005, 2011). There is also an econometric literature on sovereign debt for the classic gold standard era from 1870 to 1913. See Bordo and Rockoff (1996), Obstfeld and Taylor (2003), Flandreau and Zumer (2004), Ferguson (2006), Ferguson and Shularick (2006), and Accominotti et al. (2010). Similarly, Lindert (1994) performs an econometric investigation of the rise of social spending in industrial nations from 1880 to 1913, while Aidt, Dutta, and Loukoianova (2006) and Aidt and Jensen (2009) examine the fiscal consequences of democratization from the 1800s to 1938. Other works that employ historical data series to test for the fiscal impacts of economic and political variables include Neal (1990), Willard, Guinnane, and Rosen (1996), Brown and Burdekin (2000), Frey and Kucher (2000), Sussman and Yafeh (2000), Mauro, Sussman, and Yafeh (2002), Reinhart, Rogoff, and Savastano (2003), Mitchener and Weidenmier (2005), Brown, Burdekin, and Weidenmier (2006), Tomz (2007), and Reinhart and Rogoff (2009).

parliamentary reforms and public debts.[14] In turn, it tends to overlook the direct impacts of institutional reforms on state budgets. This book analyzes two key channels through which political changes reduced credit risk: increases in government revenues per head and improvements in fiscal prudence. The investigation thus accounts for the precise ways in which fiscal centralization and limited government transformed public finances.

### 1.3. Overview of Contents

Chapter 2 examines the shift from fiscally fragmented to fiscally centralized regimes, the first fundamental transformation that European states underwent. Tax centralization granted new fiscal authority to national governments. However, the problem of executive discretion remained, since rulers could still use public funds as they pleased (e.g., on foreign military adventures). Chapter 3 examines the second fundamental transformation, the shift from absolutism to limited government.

Taken in combination, these two chapters demonstrate how institutional transformations resolved the Old Regime political problems of fiscal fragmentation and absolutism. European states gained tax force through fiscal centralization, and restricted executive power through limited government. The end result was a set of balanced fiscal and political institutions that had major implications for public finances. The rest of the book pursues this argument using a combination of qualitative and statistical methods.

The set of sample countries is inspired by, and overlaps with, those used in previous studies of European fiscal history.[15] For clarity, sample states are divided into two distinct groups. Group 1 countries were typically core powers. They are also characterized by long data series over a variety of political regimes. The Group 1 countries are Austria, England, France, the Netherlands, Prussia, and Spain. Group 2 countries, by contrast, were generally peripheral players, with relatively short data series. They are Belgium, Denmark, Italy, Portugal, and Sweden. In total, this set of sample states well captures the diversity of the European historical experience.

[14] See Epstein (2000, ch. 2), Sussman and Yafeh (2000, 2006), Quinn (2001), Stasavage (2003, 2005, 2011), and Summerhill (2011), as well as the citations listed in the preceding note.

[15] These works typically focus on Western Europe. See Hoffman and Norberg (1994a), Bonney (1995, 1999), Bordo and Cortés-Conde (2001), and Cardoso and Lains (2010a).

Chapter 4 examines sovereign credit, a vital statistic of the fiscal health of nations. The descriptive and case study evidence suggests that political transformations typically led to notable improvements in yield levels on government bonds. But by what means? Chapter 5 identifies two precise mechanisms by which fiscal centralization and limited government generated credit gains. It examines the evolution of public revenues and budget deficit-to-revenue ratios, where the latter measure fiscal prudence. Here the descriptive and case study evidence suggests that improvements in revenue collection and fiscal prudence were important channels through which political transformations reduced sovereign credit risk. Both fiscal centralization and limited government generally led to notable increases in government revenues and reductions in deficit ratios.

The findings in these two chapters are then subjected to a battery of rigorous statistical tests. Chapter 6 describes the results of structural breaks tests, which assume no a priori knowledge of key turning points in the different fiscal series. When the data speak for themselves through the breaks methodology, they typically identify political transformations as major turning points. These breaks generally led to significant increases in government revenues and improvements in fiscal prudence, coupled with significant reductions in sovereign credit risk.

Historical factors beyond political transformations, however, also affected public finances. To account for the impacts of conflict, growth, fiscal and monetary policies, country- and time-specific effects, and other elements, a regression analysis is undertaken in Chapter 7. The key strength of this approach is the ability to systematically disentangle the role of political regimes from other potentially relevant factors through the use of control variables. The econometric evidence confirms that political transformations led to significant improvements in public finances even after accounting for other important historical factors.

Overall, the qualitative and quantitative findings provide robust support for the argument that political transformations enhanced public finances. The final chapter examines the implications of fiscally centralized and politically limited regimes for the changing economic role of the state. It also draws historical lessons for today's emerging and advanced economies.

# 2

# Gaining Force

## *From Fragmentation to Centralization*

Fiscal fragmentation and absolutism plagued Old Regime states. This chapter examines fiscal centralization, the first fundamental political transformation that European states underwent. It begins by characterizing the problem of fiscal fragmentation in both qualitative and quantitative terms. It then describes the coding process for institutional reform and identifies the dates for fiscal centralization for each sample country.

### 2.1. The Fragmented Old Regime

Most polities in Europe were fiscally fragmented before the nineteenth century. Contrary to the conventional wisdom, early modern monarchs confronted a host of incumbent local institutions that reduced their fiscal powers.[1] To illustrate, this section examines France, Spain, the Netherlands, and England, four of the most celebrated cases in the literature on state formation in Europe.

Modern France inherited the territorial borders set under Louis XI during the late 1400s. As the state expanded, it was forced to superimpose control on top of entrenched regional institutions. The fiscal implications of this political arrangement, which Brewer (1989, p. 6) describes as "particularistic," were harsh. Since the French Crown had to negotiate independently over tax amounts with local authorities, tax rates were

[1] In the words of Epstein (2000, p. 13): "[D]ecades of research on pre-modern political practices … has shown how 'absolutism' was a largely propagandistic device devoid of much practical substance." Also see Henshall (1992), Hoffman and Norberg (1994b), Hoffman and Rosenthal (1997), Rosenthal (1998), O'Brien (2001, pp. 14–24), and Magnusson (2009, ch. 2).

uneven. Whole towns and provinces avoided certain duties. From the fifteenth century onward, nobles in central and northern France were exempt from the land tax (*taille*), the most valuable direct tax. Nobles in the south paid the *taille* for only certain holdings. Fiscal fragmentation, moreover, was persistent.[2] The ultimate "success" of Finance Minister Colbert's reforms in the 1660s, for instance, was to carve France into eight distinct tariff areas. In the aftermath, there were still local excises, including five within the Five Great Farms, the largest French customs zone.[3] Shapiro and Markoff (1998) argue that the bewildering variety of taxes, levied at diverse local rates, was a key complaint on the eve of the French Revolution.[4]

The Spanish kingdoms of Castile and Aragon (including Catalonia and Valencia) were united in 1497. The subsequent conquest of a large portion of the Basque Country gave Spain its modern contours by the start of the sixteenth century. Repeated attempts to forge tax agreements among the five kingdoms united under the Spanish Crown were unsuccessful. Seventeenth-century efforts by Count-Duke Olivares to implement structural fiscal changes were a failure, for instance, and so the national government had to impose new royal taxes on top of traditional local ones. The Bourbon tax reforms of the early 1700s also fell short. Unable to extend the Castilian tax system eastward, the Crown was again forced to superimpose additional duties. The incongruous names of the new tax, called the *contribución única* in Aragon, the *catastro* in Catalonia, and the *equivalente* in Valencia, reflected the disparities in tax rates that remained. As in France, fiscal fragmentation in Spain was chronic. Comín (1990, p. 86) claims that the first genuine reform of the Spanish tax system did not take place until the middle of the nineteenth century.[5]

[2] In the words of White (2001, p. 66): "Several times an invigorated Crown initiated new reforms to centralize and simplify the tax system, but in the long run the government had limited success in altering the basic tax structure."

[3] Johnson (2006) analyzes the fiscal effects of Colbert's reforms.

[4] Also see Sutherland (1986), Rosenthal (1992), Hoffman (1994), Major (1994), and Sargent and Velde (1995).

[5] In the words of Tortella (2000, pp. 174–5): "Until 1845 the Spanish taxation system was a disorganized and unsystematic mosaic … not only were the privileged classes virtually exempt from taxation, but the Church and the nobility often had quasi-fiscal prerogatives, since they collected in their own names rents which looked very much like taxes. The tax burden varied from region to region and there were even specific taxes for particular cities or districts.… The total taxation picture was a hodgepodge of incomplete and variable components." Also see Elliot (1986), Lynch (1989), and Tortella and Comín (2001).

The borders of the Dutch Republic, which officially declared its independence from Spain in 1581, correspond to those of the modern Netherlands. The Republic was a confederation composed of seven sovereign provinces.[6] Each province had separate public finances, and no unified tax system was ever implemented. To fund common costs of warfare and administration, there was a quota system in which the seven provinces promised to pay fixed amounts.[7] The largest share of the burden (almost 60 percent of the total) fell to Holland, the most populated and wealthiest province. Van Zanden and van Riel (2004, chs. 1, 2) argue that fiscal fragmentation weakened the Republic's ability to raise funds and service debts, since other provinces typically shirked their obligations and free-rode on Holland's payments. Provincial elites, moreover, resisted calls for fundamental tax reforms. Van Zanden and van Riel claim that, over the long term, this political stalemate created an untenable fiscal situation.

One general feature of fragmented states, whether in France, Spain, or the Dutch Republic, was the close relationship between local tax control and political autonomy. Provincial elites had strong incentives to oppose fiscal reforms that threatened traditional tax rights. The result was a classic public goods problem. Since each local authority attempted to free-ride on the tax contributions of others, the revenues that national governments could gather on a per capita basis were low.

England was exceptional in this regard. The Norman Conquest of 1066 established a uniformity of laws and customs that other European states did not achieve until much, much later.[8] Furthermore, Brewer (1989, p. 4) argues that the development of a strong national parliament paralleled the emergence of a powerful, centralized monarchy. The English king thus avoided costly, drawn-out tax negotiations with provincial elites.[9]

[6] The Republic also included the sparsely populated rural lordship of Drenthe and, after the Peace of Westphalia in 1648, the Generality Lands.

[7] See t'Hart (1997) and Fritschy (2007).

[8] See Brewer (1989, pp. 3–7), Sacks (1994, pp. 14–23), and Hoffman and Norberg (1994b).

[9] Also see Epstein (2000, ch. 2) and O'Brien (2001, pp. 14–24). We must distinguish between English fiscal and political institutions and those for the British Isles as a whole. In the words of Brewer (1989, pp. 5–6): "There was certainly an English medieval state, made from a Norman template, but not a British one.... Nevertheless the English core of what was eventually to become the British state was both geographically larger and better administrated than its French equivalent." For consistency, the term "England" is used throughout the text. Appendix 2 documents the construction methods of the English time series for the various fiscal indicators.

To resolve the problem of local tax free-riding elsewhere in Europe, executives had to gain the fiscal authority to impose standard tax menus rather than bargain place by place over individual rates. So long as states equalized rates across provinces at relatively high levels, government revenues per head rose. Hoffman and Rosenthal (2000) argue that both executives and local elites may have preferred centralized fiscal regimes as part of power-sharing agreements in which the former received larger funds and the latter, which coordinated efforts through representative bodies, could finance a larger portion of the public services that they desired. Chapter 3 further examines this possibility.

## 2.2. Quantitative Analysis

### 2.2.1. *Research Design*

A simple quantitative analysis that examines changes in fragmented authority over time complements the qualitative accounts of fiscal fragmentation. The focus is again on France, Spain, the Netherlands, and England, four of the most prominent cases in the historical literature on state formation in Europe.[10] The sub-period under study, from 1700 to 1815, captures the critical institutional crossroads that occurred with the French Revolution (1789–99).

Although an ideal test of fiscal fragmentation would be to measure the size of fiscal zones within states and record institutional changes one by one as they occurred over time, data sufficiently comprehensive for such a study to be undertaken do not exist. Given the lack of systematic information that is available prior to the nineteenth century, any alternative indicator should provide a succinct measure of institutional fragmentation that is comparable across states.

Internal customs borders are one unique source of data that satisfy this condition. Domestic tariffs, in the words of Adam Smith, obstructed the most important branch of commerce, the interior trade of a country.[11] Trade barriers hampered the legitimate market exchange of goods and services. Major rivers and roads typically crossed multiple customs frontiers where holdups occurred and tariffs had to be paid. In this way, trade barriers encouraged black market traffic. The administration of customs was also expensive and prone to inefficiency. Epstein

[10] Dincecco (2010b) examines a larger set of sample states.

[11] See Smith (2003, p. 1135). The description attributed by Henderson (1939, pp. 22–3) to an influential merchant union was more vivid: customs barriers "cripple trade and produce the same effect as ligatures which prevent the free circulation of blood."

(2000, chs. 1, 2) argues that the total effect of internal barriers was to impose costs, delays, and risks that atomized domestic economies and restricted growth.

Domestic tariffs were also part of a larger problem of fragmented sovereignty. As described in the preceding section, towns and provinces often had distinct economic and political institutions, including local customs, tax privileges, weights and measures, and monopolist guilds. Furthermore, centralizing reforms like the unification of domestic tariffs, the establishment of national tax systems and central banks, the standardization of weights and measures, and the abolition of guilds often took place in one fell swoop.[12]

A focus on major internal customs facilitates the analysis. This simplification suggests that some of the smaller steps toward centralization were missed. For instance, for tractability the Five Great Farms in France is recorded as a unified zone from the 1660s onward, though at least five local tariffs remained. Systematic underestimation of the true extent of divided authority biases the analysis against finding evidence of institutional fragmentation. Any results that still indicate the presence of divided authority will thus be stronger than otherwise.

As described in the preceding section, sovereign borders for France, Spain, and the Netherlands were put in place by the 1600s and remained relatively stable thereafter. Net growth in physical size from 1700 to 1815 was small. Though France conquered the Netherlands in 1795, it became independent by the end of the Napoleonic era. Since the analysis focuses on changes in fragmented authority in 1815 relative to the Old Regime, this set of events did not have a significant effect.

Across the English Channel, however, we must discriminate between English and British customs institutions.[13] As described in the preceding section, the unification of internal tariffs in England occurred during the eleventh century. England conjoined with Wales in 1536. The Scottish and English Crowns were united in 1603, but it was not until the 1707 Act of Union that the internal customs border separating the two territories was eliminated. A similar Act of Union conjoined Ireland in 1800.[14] Although net gains in physical size for countries like France were small from 1700 to 1815, growth in the size of the British state was large and permanent. The present investigation concerns fragmented authority within polities rather

[12] See Dincecco (2010b, table 1).
[13] See Brewer (1989, pp. 3–7) for a general discussion of this point.
[14] The Irish Free State was established in 1922.

than state consolidation. To avoid confounding the effects of internal and external fragmentation, the analysis is restricted to England (including Wales).[15] However, the use of Britain (England, Scotland, and Wales), which was already established and was free of internal customs by the start of the 1700s, generates results similar to those obtained for England itself.

The sample consists of all 175 cities in England, France, the Netherlands, and Spain with at least 10,000 inhabitants in 1800 from De Vries (1984, app. 1). Each polity is well represented: there are 44 English, 19 Dutch, 78 French, and 34 Spanish sample cities. Since the investigation focuses on the Continent, where rapid urbanization did not begin until after the end of the Napoleonic Wars (1803–15), the use of 1800 as the base year mitigates problems of sample bias.[16]

Although it would be useful to evaluate the economic impact of differences in marginal tax rates across internal customs zones, systematic information does not exist. Data for physical sizes and urban populations, however, are available. Employing both measures ensures that the results are not contingent upon a particular approach. The first method estimates the sizes of the regions in square kilometers within which goods from sample cities could travel duty free. Historical accounts were used to characterize major internal customs borders for each country. Dincecco (2010b) documents the sources and construction methods. Since the analysis concerns the centralization of authority within European states themselves, only domestic sovereign areas are considered.[17]

The analysis used changes (if any) in internal tariff borders to calculate the area of the customs zone that surrounded each sample city at different points in time. Dincecco (2010b) provides the details. The chosen breaks were 1700, 1750, 1788 (just before the French Revolution), and 1815 (marking the end of the Napoleonic era). The unification of domestic customs took place when the final internal tariff barrier was eliminated. To compare levels of internal fragmentation across countries of different physical sizes, customs zones were calculated as percentages of total sovereign areas.

De Vries (1984, app. 1) provides urban populations at 50-year intervals over the eighteenth century. The second method summed the populations

[15] By the same logic, territories east of the Rhine River, which constitutes part of the eastern border of France, were not examined, since there were major changes in sovereign borders over time. Dincecco (2010b) tests state consolidation in the German and Italian territories over the nineteenth century.

[16] See Hohenberg and Lees (1985), Bairoch (1988), and Mokyr (1998).

[17] Colonial goods typically faced customs taxes at home ports. See Bordo and Cortés-Conde (2001).

TABLE 2.1. *Average Internal Customs Zones as Percentages of Sovereign Areas, 1700–1815*

| | 1700 (%) | 1750 (%) | 1788 (%) | 1815 (%) |
|---|---|---|---|---|
| England | 100 | 100 | 100 | 100 |
| France | 22 | 22 | 22 | 100 |
| Netherlands | 14 | 14 | 14 | 100 |
| Spain | 61 | 94 | 94 | 94 |

*Note*: For example, the size of the average customs zone in France in 1700 was 22% of total sovereign area.
*Source*: Dincecco (2010b).

of all sample cities contained within each customs zone in 1700, 1750, and 1800. These sums were then divided by total urban populations among sample cities within each country. Dincecco (2010b) describes the details. This technique produces reliable estimates so long as one assumes that internal tariffs had the largest effect on urban merchants, since rural populations typically produced subsistence goods.

### 2.2.2. *Results*

Table 2.1 indicates that, notwithstanding England, which was centralized from medieval times, there was a remarkable difference between the size of internal customs zones surrounding sample cities and total sovereign areas under the Old Regime. The average customs zone in France constituted just 22 percent of its total area. This result is consistent with Nye (2007, pp. 56–7), who argues that cumbersome tariffs created a virtual autarky between French regions. Similarly, the average customs zone in the Dutch Republic was only 14 percent of its total area. This finding concurs with Griffiths (1982, pp. 514–17), who claims that internal barriers created isolated economic Dutch sub-units. Finally, note that the use of the median or the largest customs zones was also indicative of internal fragmentation.

Spain was exceptional in this regard. The average Spanish customs zone, at 61 percent of total sovereign area in 1700, increased to 94 percent by 1750 due to the abolition of internal customs by Bourbon reformers in the 1710s. Prior to the eighteenth century, there were internal customs borders between Castile, Aragon, Catalonia, Valencia, and the Basque Country. Basque customs were restored in 1722 and lasted until 1839, when internal tariffs were finally abolished.[18]

[18] See Tortella and Comín (2001, pp. 155–65).

TABLE 2.2. *Cumulative Percentage of Sample Cities Surrounded by Internal Customs Zones of Various Sizes, 1700–1815*

| Size (km²) | 1700 (%) | 1750 (%) | 1788 (%) | 1815 (%) |
|---|---|---|---|---|
| < 50,000 | 32 | 29 | 29 | 11 |
| < 100,000 | 39 | 36 | 36 | 11 |
| < 150,000 | 39 | 36 | 36 | 11 |
| < 200,000 | 65 | 61 | 61 | 37 |
| < 250,000 | 85 | 81 | 81 | 37 |
| < 300,000 | 85 | 81 | 81 | 37 |
| < 350,000 | 85 | 81 | 81 | 37 |
| < 400,000 | 100 | 81 | 81 | 37 |
| < 450,000 | 100 | 81 | 81 | 37 |
| < 500,000 | 100 | 100 | 100 | 55 |
| < 550,000 | 100 | 100 | 100 | 100 |

*Note*: 175 cities with at least 10,000 inhabitants in 1800 in England, France, the Netherlands, and Spain were included. For example, 32% of sample cities in 1700 were surrounded by a customs zone of less than 50,000 square kilometers.
*Source*: Dincecco (2010b).

By nearly all other fragmentation measures, however, Spain was worse off than other Old Regime states. Centralizing reforms like the establishment of a national tax system and central bank, the standardization of weights and measures, and the abolition of local guilds did not occur until the 1830s or later.[19] Poor transportation networks also hindered economic development. In 1800, there were nearly 30,000 kilometers of English roads but fewer than 5,000 kilometers of Spanish ones, though Spain was more than three times as large as England.[20] The calculations that use internal customs are thus strong underestimates of the true extent of divided authority in early modern Spain.

Other measures also suggest that internal customs zones were generally small before 1789. Table 2.2 indicates that more than 25 percent of sample cities were surrounded by a customs zone of less than 50,000 square kilometers, more than 60 percent were surrounded by a customs zone of less than 200,000 square kilometers, and more than 80 percent were surrounded by a customs zone of less than 250,000 square kilometers. Furthermore, Table 2.3 indicates that the average customs zone in

[19] See Dincecco (2010b, table 1).

[20] The Spanish estimate is from Vicens Vive (1969, pp. 679–81). Also see Ringrose (1968, 1970) and Tortella (2000, pp. 115–20). The English estimate is from Bogart (2005, p. 440).

TABLE 2.3. *Average Sizes of Internal Customs Zones, 1700–1815*

| Size (km²) | 1700 | 1750 | 1788 | 1815 |
|---|---|---|---|---|
| England | 151,000 | 151,000 | 151,000 | 151,000 |
| France | 118,000 | 118,000 | 118,000 | 544,000 |
| Netherlands | 5,000 | 5,000 | 5,000 | 34,000 |
| Spain | 302,000 | 467,000 | 467,000 | 467,000 |
| Overall | 150,000 | 182,000 | 182,000 | 375,000 |

*Source*: Dincecco (2010b).

1788 was just 182,000 square kilometers. A comparison of France and England is particularly noteworthy, since the average pre-1789 French customs zone was 33,000 square kilometers smaller than England, the only sample polity free of internal tariffs. If France had been centralized, its free customs area would have been more than three and a half times as large as that of its English counterpart.

Table 2.4, which displays the results of the calculations for urban populations within customs zones as percentages of total urban populations over time, also indicates that domestic free-trade areas were fragmented under the Old Regime. The number of urban residents within customs zones was typically less than 10 percent of total urban populations. Exceptions included the Five Great Farms in France, where urban inhabitants made up 55 percent of the total, and the Dutch province of Holland, where they were 75 percent. However, at least five local customs remained within the Five Great Farms after Colbert's 1660s reforms. By restricting the analysis to major internal borders, the French calculations systematically underestimate the true extent of fragmented authority. The same logic holds for the Dutch Republic, where cities, towns, and provinces were largely autonomous.[21] In Spain, urban residents of the Kingdom of Castile constituted 77 percent of the total urban population in 1700, and 98 percent by 1750. As already described, however, the use of internal customs significantly underestimates eighteenth-century institutional fragmentation in Spain.

## 2.3. Centralization after 1789

Although the process of fiscal centralization in Europe took centuries, the evidence shown in the preceding two sections indicates that it was largely unfinished through the late 1700s. Fundamental changes to tax systems

[21] See van Zanden and van Riel (2004, pp. 32–40).

TABLE 2.4. *Urban Populations within Internal Customs Zones as Percentages of Total Urban Populations, 1700–1800*

| Customs Zone | 1700 (%) | 1750 (%) | 1800 (%) |
|---|---|---|---|
| **Panel A: France** | | | |
| Effectively Foreign 1 | 4 | 5 | |
| Effectively Foreign 2 | 1 | 1 | |
| Five Great Farms | 55 | 55 | |
| Reputedly Foreign 1A | 8 | 7 | |
| Reputedly Foreign 1B | 6 | 7 | |
| Reputedly Foreign 1C | 8 | 8 | 100 |
| Reputedly Foreign 1D | 7 | 7 | |
| Reputedly Foreign 2 | 3 | 3 | |
| Reputedly Foreign 3 | 1 | 1 | |
| Reputedly Foreign 4 | 6 | 6 | |
| **Panel B: Netherlands** | | | |
| Friesland | 2 | 2 | |
| Gelderland | 3 | 3 | |
| Generality Lands | 6 | 5 | |
| Groningen | 3 | 4 | |
| Holland | 75 | 75 | 100 |
| Overijssel | 2 | 2 | |
| Utrecht | 5 | 4 | |
| Zeeland | 4 | 4 | |
| **Panel C: Spain** | | | |
| Aragon | 5 | | |
| Castile | 77 | 98 | 99 |
| Catalonia | 8 | | |
| Valencia | 9 | | |
| Basque Country | 1 | 2 | 1 |

*Source*: Dincecco (2010b).

were in several cases the result of radical, exogenously imposed administrative reforms by French revolutionary or Napoleonic armies.[22] More generally, fiscal reforms often took place in the context of large-scale administrative reforms that established new government bureaucracies. We may thus typically identify fiscal centralization as part of a structural shift in the institutional basis of states that occurred from 1789 onward.

The quantitative analysis supports this interpretation of the timing of fiscal changes. Whether measured by physical area or urban population, there

[22] See Godechot et al. (1971), Woolf (1991), Grab (2003), and Acemoglu et al. (2009a).

was a significant increase in the size of internal customs zones after the fall of the Old Regime. The Revolution eliminated major internal customs in France. In the Netherlands, customs unification occurred after the French conquest in 1795. Table 2.1 indicates that domestic customs zones and total sovereign areas coincided in both countries by 1815, and Table 2.4 suggests a one-to-one correspondence between urban populations within customs zones and urban population totals by the start of the 1800s.

Furthermore, Tables 2.2 and 2.3 indicate that internal customs unification took place from 1789 onward. Neither the cumulative percentage of cities surrounded by customs zones of various sizes nor the average size of customs zones in Europe changed much from 1700 to 1788. However, Table 2.2 shows that customs zones grew quickly over the next two and a half decades. Nearly 30 percent of cities were surrounded by a customs zone of 50,000 square kilometers or less in 1788, whereas in 1815 only about 10 percent of cities were surrounded by one of that size. More than 80 percent of cities were surrounded by a customs zone smaller than 450,000 square kilometers in 1788, while in 1815 this figure was less than 40 percent. Likewise, Table 2.3 indicates that the overall average customs zone surrounding sample cities more than doubled in size, from 182,000 square kilometers in 1788 to 375,000 square kilometers in 1815.[23]

## 2.4. Coding Centralization

A clear and simple definition of fiscal centralization facilitates comparison across states. The process of fiscal centralization was completed the year that the national government first secured its revenues through a standard tax system with uniform rates throughout the country.[24] All precentralized regimes were classified as entirely fragmented, even for states where fiscal divisions were relatively small. This choice implies that some regimes counted as fully fragmented will encompass data associated with

[23] These results are consistent with the literature on the integration of domestic European grain markets. Persson (1999), Jacks (2005), and Keller and Shiue (2007) find that Old Regime markets were inefficient but that there were significant reductions in price dispersions after 1815. British markets, which were efficient by the late 1700s, were exceptional.

[24] This definition does not imply that central governments became tax monopolists. The history of the United States just after the Revolution of 1776 illustrates this point. Under the Articles of Confederation, the first U.S. constitution, Congress could only request tax funds from states. Fiscal centralization took place in 1788, when the new constitution granted Congress the legal power to ensure that states complied with national tax standards. However, states could still levy local taxes. Also see Edling (2003).

better fiscal outcomes (e.g., higher per capita revenues). Average improvements after fiscal centralization will therefore be smaller than otherwise. Systematic underestimation of the fiscal effects of centralization biases the data against the hypothesis that fiscal centralization improved public finances. The results of the empirical analysis in Chapters 4 to 7 will thus be stronger than otherwise if they still indicate that fiscally centralized regimes had significant positive effects on the various fiscal indicators.

Table 2.5 displays the dates of fiscal centralization for Group 1 and Group 2 countries. As described in Section 2.1, England had centralized institutions from very early on. In many parts of continental Europe, structural fiscal changes took place swiftly and permanently after the fall of the Old Regime. With the start of the Revolution (1789–99), the National Assembly transformed the tax system in France by eliminating traditional privileges. Napoleon completed this process upon taking power in 1799. The First French Republic conquered the Low Countries in 1795, and the Southern Netherlands including Belgium became standard French departments. The Batavian Republic, the successor to the Dutch Republic, established a national system of taxation under French rule in 1806. Napoleonic conquest at the start of the 1800s was also the major catalyst for fiscal change on the Italian peninsula. However, the unification of tax systems among pre-unitary Italian states did not occur until after the establishment of the Kingdom of Italy in 1861. Finally, Prussia undertook major administrative reforms, including fiscal centralization, after its loss to France in the Battle of Jena-Auerstedt in 1806.[25]

Although Napoleon defeated Austria in 1805 and invaded Portugal in 1807 and Spain in 1808, he failed to implement lasting administrative changes in those territories. Fiscal centralization did not take place in the Austrian Empire until after the Revolutions of 1848, which had important implications for bureaucratic structures. Most notably, the central government in Vienna began to implement an effective Cisleithanian tax system in Hungary.[26] Fiscal centralization also occurred in the 1840s in

[25] For France, see Bordo and White (1991, pp. 314–16) and White (1995, pp. 234–41). For Belgium, see Holtman (1967, p. 100) and Sutherland (1986, pp. 344–6). For the Netherlands, see Fritschy and van der Voort (1997, pp. 78–82) and van Zanden and van Riel (2004, pp. 40–51). For Italy, see Cohen and Federico (2001, ch. 3) and Federico (2010, pp. 192–3). For Prussia, see Kiser and Schneider (1994, pp. 200–1), Breuilly (2003, pp. 131–2), and Ziblatt (2006, pp. 114–15).

[26] Austria and Hungary were the largest territories of the Austrian Empire (1804–67). The Compromise of 1867 led to the establishment of the Austro-Hungarian Empire (1867–1918). For consistency, the term "Austria" is used throughout the text. Also see Pammer (2010, pp. 132–3).

TABLE 2.5. *Dates of Fiscal Centralization in Europe*

| | Year | Event |
|---|---|---|
| **Group 1** | | |
| England | 1066 | Norman Conquest and erosion of provincial authority |
| France | 1790 | Administrative reforms after Revolution of 1789 |
| Netherlands | 1806 | Administrative reforms under French control |
| Prussia | 1806 | Administrative reforms after French defeat in battle |
| Spain | 1845 | Administrative reforms during Moderate Decade |
| Austria | 1848 | Administrative reforms during Year of Revolutions |
| **Group 2** | | |
| Belgium | 1795 | Administrative reforms after French annexation |
| Portugal | 1859 | Centralization and regulation of government accounts |
| Italy | 1861 | Establishment of kingdom and tax unification |
| Sweden | 1861 | Abolition of pre-modern tax system |
| Denmark | 1903 | Abolition of pre-modern tax system |

*Note*: Group 1 includes core powers and has long data series over diverse political regimes. Group 2 includes peripheral powers and has shorter data series. The second column indicates the year that the process of fiscal centralization as defined in the text was completed. The final column offers brief explanations for these dates, which the text elaborates upon.
*Source*: See text.

Spain during a decade of major institutional reforms. Significant changes in public finances in Portugal took place in the 1850s, after the end of the revolutionary era (1820–51). The 1859 reform led to the centralization and regulation of government accounts.[27]

Pre-modern fiscal structures remained in Scandinavia through much of the 1800s. Major tax changes did not occur until the second half of the nineteenth century or later. The 1861 reform in Sweden abolished the ancient system of dividing tax subjects into different classes, with many sub-groups and different rules for fixed contributions for each of

[27] For Austria, see Pammer (2010, pp. 136–9, 156–7). For Spain, see Tortella (2000, pp. 173–92) and Comín (2010, pp. 220–6). For Portugal, see Cardoso and Lains (2010b, pp. 261–4). Because of new evidence published in Cardoso and Lains (2010a), the coding for Denmark, Portugal, Spain, and Sweden was updated from Dincecco (2009a).

them. Similarly, the 1903 reform in Denmark eliminated traditional tax structures and introduced a modern income tax with standard, country-wide rates.[28]

Fiscal prowess is a key factor that characterizes today's rich countries. Yet many advanced economies were not "born" with strong tax institutions. To understand how wealthy states gained tax force, we must look to the past. This chapter has examined fiscal centralization, the first fundamental political transformation that European states underwent. Both the qualitative and quantitative evidence indicates that the establishment of national tax systems was the result of a long and difficult historical process and was not typically completed until after the fall of the Old Regime at the end of the eighteenth century.

Although fiscal centralization granted new fiscal authority to European states, the problem of executive discretion remained, since rulers could still use government funds as they wished (e.g., on foreign military adventures). The focus now turns to the second fundamental political transformation in European fiscal history, the shift from absolutist to parliamentary regimes.

[28] For Sweden, see Schön (2010, pp. 169–78). Hans Christian Johansen provided the account for Denmark. Also see the preceding footnote.

# 3

# Restricting Power

## *From Absolutism to Limited Government*

By eliminating local tax free-riding, fiscal centralization should have increased the ability of national governments to collect greater revenues. Since rulers retained control over state expenditures, however, the consolidation of fiscal powers may have exacerbated problems of executive discretion. Spending constraints were thus necessary.

This chapter examines the second fundamental political transformation that European states underwent, from absolutism to limited government, which restricted the ways in which rulers could use public funds. It begins by characterizing the problem of unconstrained absolutism. It then describes the coding process for political change and identifies the dates for constitutional reform across sample countries.

### 3.1. Predatory Kings

Two well-known cases illustrate the importance of regular institutional limits on executive spending: King William I of the Netherlands and King Charles I of England.

The Kingdom of the United Netherlands (including Belgium) was established at the end of the Napoleonic Wars (1803–15).[1] Its new constitution bestowed hereditary autocratic powers on the new king, William I (r. 1815–40). Although a national parliament was granted the constitutional right to audit state finances, there were 10-year budgets for recurrent expenditures. Parliament could therefore exercise its authority only

[1] The account of William I is based on van Zanden and van Riel (2004, pp. 85–106, 171–8). Also see van Zanden (1996), Fritschy, t'Hart, and Horlings (2002, pp. 22–3), and van Zanden and van Riel (2010, pp. 58–72).

once per decade. The consequences of repeated budget rejections were also vague, in part because finance ministers were not forced to step down if their proposals were not approved. For these reasons, parliamentary oversight was greatly diminished.

William I spent heavily on the military, on infrastructure, and on the monarchy itself. Although fiscal centralization in 1806 had roughly doubled the size of the Dutch tax base, interest payments had fallen, and Europe was politically stable, the king could not balance the national accounts. By 1840, public debt had risen to more than 200 percent of GDP, a ratio comparable to that during the height of the Napoleonic Wars. William I also resorted to semi-legal means to hide the true state of public finances.[2]

William I's reckless fiscal policy came apart at the end of the 1830s. Parliamentary debate and a special inquiry made clear that the state was bankrupt, and the constitution was amended in 1839 to limit executive fiscal powers. Two-year budgets took the place of 10-year ones. Public finances also became more transparent. It is likely that William I abdicated in 1840 at least in part because of the greater institutional limits that had been imposed on him. A new constitution, promulgated in 1848, marked the establishment of a truly liberal era in the Netherlands. Now the king had to submit annual budgets to parliament for approval. By implementing a firm check on executive spending, this reform became what van Zanden and van Riel (2004, p. 175) call the "cornerstone" of parliamentary power.

Although rulers spent government revenues as they pleased, representative bodies exercised tax authority.[3] Executives thus made attempts to evade parliament in the never-ending search for greater funds. The familiar example of King Charles I of England (r. 1625–49) demonstrates this phenomenon.[4] One major source of revenues for Charles I was forced loans, which he repaid in ways that were unpredictable and in terms that were altered

[2] In the words of van Zanden and van Riel (2004, p. 97): "The perhaps most striking aspect of William's financial policy consisted of his attempts to reduce the influence of parliament on fiscal policy and to suppress public debate in general on issues of government finance … he unchangingly found himself in the situation where the creation of one fiscal hole was used to fill the next, leading to a situation that became more and more difficult to control. As a result, it became increasingly less attractive to be candid about the true state of government finance."

[3] With the exception of England, representative bodies in Old Regime Europe were not national parliaments, but culled delegates from particular provinces and social groups. Also see Chapter 2. Stasavage (2011) and van Zanden, Buringh, and Bosker (2011) examine the fiscal and economic effects of medieval parliaments.

[4] This account is based on North and Weingast (1989, pp. 808–17). Also see Ashton (1960, pp. 31–67, 154–84), Hirst (1986, pp. 126–59), Cust (1987, pp. 39–71, 99–149), and Sacks (1994, pp. 53–6).

from the original agreements. Other measures to skirt parliament included customs impositions and the sale of government lands, monopolies, and offices. The king also seized private goods such as bullion. Finally, Charles I kept parliament in the dark about the true state of public finances.

Predatory fiscal practices by English rulers continued through the Glorious Revolution of 1688, in which King James II (r. 1685–8) was overthrown. The Revolution Settlement reaffirmed parliament's exclusive authority to levy new taxes and curtailed the executive's capacity to pursue independent revenue sources. Soon after, parliament gained for the first time the annual right to veto expenditures and audit government finances. The ability to monitor the budget at regular intervals established what North and Weingast (1989, p. 816) call parliament's "supreme" role in fiscal matters.

### 3.2. The Fiscal Supremacy of Parliament

The type of equilibrium that we observe in England before 1688 and the Netherlands before 1848, which Hoffman and Rosenthal (1997, 2000) characterize as "divided fiscal authority," left states locked in a vicious circle.[5] Since parliamentary elites feared that executives would spend additional funds in wasteful ways (e.g., on foreign military adventures), they demanded the power of budgetary oversight before raising new taxes.[6] Rulers thus resorted to fiscal predation, which reinforced parliaments' worry that they could not be trusted. In turn, parliaments fervently resisted tax requests and revenues were low.

Regular parliamentary control over state budgets, which typically emerged over the nineteenth century, firmly established the fiscal supremacy of national parliaments. In turn, the likelihood of poor spending choices by executives fell. Just as rulers and parliaments each had reasons to favor fiscal centralization (see Chapter 2), they both had incentives to set new rules over government expenditures. Structural tax reforms implied that rulers would receive greater revenues. The surrender of budgetary control, however, was the only credible way for executives

[5] Also see Rosenthal (1998).

[6] Hoffman (2009) and Cox (2011) examine the royal moral hazard problem in warfare. In the words of Hoffman (2009, p. 24), monarchs "overspent on the military and provided more defense than their citizens likely desired. But they had little reason not to. Victory.... won them glory, enhanced reputations, and resources.... Losses never cost them their throne, at least for the major powers and as long as they faced no civil war." Cox (2011) argues that the establishment of ministerial responsibility after the Glorious Revolution in England resolved the Crown's moral hazard problem.

to guarantee that a portion of the new funds would be spent on public services that parliamentary elites desired. So long as rulers and parliaments struck deals, regimes with low taxation and expenditures were less attractive.[7] It is a well-established fact that tax burdens in polities with representative institutions like eighteenth-century England or Holland were notably higher than in absolutist ones like France and Spain.[8]

Hoffman and Rosenthal (2000) argue that limited government emerged after 1800 due to an important change in the nature of warfare. For the first time, kings who were defeated on the battlefield also faced the risk of losing their thrones. The advantages of greater tax revenues to wage successful wars thus began to outweigh the benefits of absolute control over spending. Furthermore, Acemoglu and Robinson (2000) claim that rulers also gained from expenditures on non-military public services that prevented social unrest.

Hoffman and Rosenthal (2000) explain the shift from absolutist to parliamentary regimes in broad strokes. They suggest that fiscal centralization and limited government took place simultaneously. Although it is true that each political transformation complemented the other (see Chapter 1), political transformations did not typically occur in one fell swoop. Structural changes in tax systems, which were in several cases imposed "exogenously" by French revolutionary or Napoleonic armies, generally took place decades before the establishment of stable national parliaments. The present analysis thus distinguishes between the fiscal effects of fiscal centralization and those of limited government.

Political transformations, moreover, were typically the result of a conflux of diverse economic, geographical, political, and social factors.[9] There was also a crucial element of chance. The establishment of the 1848 constitution in the Netherlands, for instance, took place during an economic downturn and related wave of political revolutions across Europe. Similarly, the Glorious Revolution in England occurred in the context of international tensions and the start of the War of the Grand Alliance (1688–97). Critical junctures in history exerted a significant influence on the precise scope and timing of institutional reforms that most likely dominated any premeditated bargains between rulers and elites. The discussion of the regression framework in Chapter 7 further examines this point.

[7] Van Zanden and Prak (2006) also make an argument for the economic role of citizenship along such lines in the context of the Dutch Republic.

[8] See Mathias and O'Brien (1976) and Hoffman and Norberg (1994b).

[9] See Moore (1966), Acemoglu et al. (2009b), and Dincecco, Federico, and Vindigni (2011).

### 3.3. Coding Limited Government

A valid depiction of parliamentary authority must capture parliament's real power to act on the budget. It must also be clear and simple enough to apply across states. The substance of the definition used here derives from the original spirit of constitutional reform as expressed by North and Weingast (1989). Limited government was established the year that parliament gained the stable constitutional right to control the national budget on an annual basis. The requirement that parliament's power of the purse held for at least two consecutive decades ensures the stability condition. To make the coding as objective as possible, years and regimes for which there are widespread academic consensus were selected. There is a close correspondence between the present classification scheme and those of De Long and Shleifer (1993), Acemoglu et al. (2005), and the Polity IV Database of Marshall and Jaggers (2008), though none of them fit the particular demands of this analysis.[10] In total, these three features – a regular right by parliament to manage budgets, regime stability, and scholarly agreement – imply that the coding of limited government parallels the standard that North and Weingast first introduced.

Selecting early dates to define political regimes as limited implies that average outcomes under parliamentary regimes will be worse than otherwise. For example, say that a stable form of limited government did not truly emerge in Germany until after World War II (recall that the Weimar Republic endured for only 14 years, from 1918 to 1933) or in Spain until after the death of Franco in 1975. If that were the case, then the correct coding would be to categorize pre-twentieth-century Prussian and Spanish regimes as absolutist. Since public finances in Europe have typically improved over time, the selection of early dates implies that some regimes classified as limited will encompass data associated with poorer fiscal outcomes. Average improvements after parliamentary reforms will therefore be smaller than otherwise. Systematic underestimation of the fiscal impacts of limited government biases the data against the hypothesis

[10] De Long and Shleifer (1993) use three measures: a binary indicator of absolutist versus non-absolutist regimes, an eight-point constitutional scale, and Tilly's (1990) categories of capital versus coercion. However, they code political regimes at 150-year intervals. Acemoglu et al. (2005) use two measures: categories of executive constraints and protection for capital, both from the Polity IV Database. However, they code political regimes at 50- or 100-year internals. Though Marshall and Jaggers (2008) classify executive constraints at yearly intervals, their database does not start until the 1800s.

that parliamentary reforms improved public finances. Any results of the empirical analysis in Chapters 4 to 7 that still indicate that limited government had significant positive effects on the fiscal variables of interest will thus be stronger than otherwise.

There were also some instances of switching back and forth between absolutism and limited government over the 1800s. As described earlier, the definition sets a stability threshold by requiring that parliamentary budgetary authority held for at least two straight decades. Furthermore, the regression analysis in Chapter 7 allows for uncertainty among investors and taxpayers over how long newly established limited regimes would last by lagging the start dates by five years.[11]

Nineteenth-century France illustrates the coding methodology.[12] The Bourbon monarchy was restored after the final defeat of Napoleon in 1815. This regime was constitutional, though in name only. In 1830, King Charles X (r. 1824–30) dissolved parliament, manipulated the electorate in favor of his supporters, placed the press under government control, and called for new elections. These measures incited the July Revolution the next day. King Louis Philip (r. 1830–48), the replacement for the deposed monarch, agreed to follow constitutional principles, but his tenure was beset by the economic crisis of the mid-1840s and ended with the Revolution of 1848. Since the reign of Louis Philip endured for less than two decades, the benchmark scheme does not code the July regime as limited. However, the empirical analysis undertaken later in the book explicitly accounts for its fiscal effects. Napoleon III, who was elected president of the Second Republic in 1848, staged a successful coup in 1851 and established an authoritarian regime (called the Second Empire) that lasted nearly 20 years.[13] The emperor was captured during the Franco-Prussian War (1870–1), and the provisional government of the Third Republic was quickly formed. This regime was consolidated in the aftermath of the conflict, which France lost, and endured for 70 years until the German invasion of 1940. Since the Third Republic best satisfied the triple criteria of parliamentary regularity, stability, and scholarly consensus described earlier, the coding methodology dated the emergence of limited government in France to 1870.

[11] Neal (2010, pp. 289, 299) also argues that parliamentary fiscal control had to persist long enough to create legitimacy.

[12] This account is based on Jackson (1974, pp. 143–4, 150–1) and Price (1993, pp. 157–65, 177–9, 188–91).

[13] The First Republic endured from 1792 to 1804, and the First Empire from 1804 to 1815.

Table 3.1 displays the dates of limited government for Group 1 and Group 2 countries. As described in the preceding section, parliamentary reforms typically occurred decades after fiscal centralization. Modern Belgium was established as a constitutional monarchy after declaring independence from the Netherlands in 1830. In Prussia, King Frederick William IV granted a liberal constitution after the political revolutions of 1848. Tilly (1966, 1967) argues that there were binding fiscal constraints from that year onward, although the government operated without legislative approval of its military budgets during the 1860s. Chapter 5 examines the Prussian case in detail. In Italy, the constitution first endorsed by King Charles Albert of Piedmont during the political revolutions of 1848 was extended to the entire kingdom in 1861. In Austria, the Compromise of 1867, which established Austria and Hungary as distinct political entities, marked the start of the constitutional era. Spain fought several civil wars over the 1800s. After decades of failed attempts, a stable parliamentary regime was established in 1876.[14]

By contrast, limited government and fiscal centralization took place within a decade of each other in Sweden and Portugal. Although Sweden enacted a constitution in 1809, the executive retained absolute veto authority, and parliament met only once every five years. The parliamentary reform of 1866, which replaced the traditional Diet of Estates with a modern bicameral legislature, established limited government in Sweden. This institutional change occurred five years after fiscal centralization in 1861. Like Spain, Portugal fought a series of civil wars over the nineteenth century. A stable constitutional regime was established in 1851, eight years before fiscal centralization in 1859.[15]

Finally, there are two cases in which limited government was implemented well in advance of fiscal centralization. In Denmark, King Frederick VII renounced his absolutist powers and established a two-chamber parliament after the political revolutions of 1848. Fiscal centralization did not take place in Denmark until 1903.[16] Although

[14] For Belgium, see Cook (2002, pp. 49–50). For Prussia, see Tilly (1966, 1967), Ziblatt (2006, pp. 113–16), and Spoerer (2010, p. 107). For Italy, see Federico (2010, pp. 186–93, 199–203). For Austria, see Pammer (2010, pp. 132–3). For Spain, see Tortella (2000, pp. 27–32) and Comín (2010, pp. 214–15).

[15] For Sweden, see Magnusson (2000, pp. 67–70), Nordstrom (2002, pp. 66–7), and Schön (2010, pp. 176–7). For Portugal, see Cardoso and Lains (2010b, pp. 261–4).

[16] However, the constitutional revision of 1866 restricted the suffrage in ways that favored the conservative and the wealthy. Hans Christian Johansen provided the basis for the Danish account. Also see Carstairs (1980, pp. 75–8). In light of that work, the coding for Denmark was updated from Dincecco (2009a).

TABLE 3.1. *Dates of Limited Government in Europe*

| | Year | Event |
|---|---|---|
| **Group 1** | | |
| Netherlands | 1572 | Establishment of Dutch Republic (1572–1795) |
| | 1848 | Implementation of new constitution |
| England | 1688 | Establishment of constitutional monarchy |
| Prussia | 1848 | Establishment of constitutional monarchy |
| Austria | 1867 | Establishment of constitutional monarchy |
| France | 1870 | Establishment of stable constitutional regime |
| Spain | 1876 | Establishment of stable constitutional monarchy |
| **Group 2** | | |
| Belgium | 1831 | Established as constitutional monarchy |
| Denmark | 1848 | Establishment of constitutional monarchy |
| Portugal | 1851 | Establishment of stable constitutional monarchy |
| Italy | 1861 | Established as constitutional monarchy |
| Sweden | 1866 | Introduction of bicameral legislature |

*Note*: Group 1 includes core powers and has long data series over diverse political regimes. Group 2 includes peripheral powers and has shorter data series. The second column displays the year that limited government as defined in the text was established. The final column offers brief explanations for these dates, which the text elaborates upon.
*Source*: See text.

the Dutch Republic (1572–1795) was not limited in the sense of a parliament that monitored executive spending, Tilly (1990), De Long and Shleifer (1993), Acemoglu et al. (2005), and Stasavage (2005) code it as constitutional. Recall from Chapter 2, however, that the Republic was fiscally fragmented at the national level. Chapters 4 and 5 examine the Dutch case in detail.

Representative government is a key feature of today's wealthy countries. Although the link between parliaments and prosperity may seem obvious in hindsight, the establishment of constitutional regimes took a very long time. To understand how rich states restricted executive power, we must turn to history. This chapter has examined limited government, the second fundamental political transformation that European states underwent. The evidence indicates that the establishment of spending constraints on rulers by national parliaments was the result of a deep process of institutional change and did not typically occur until the nineteenth century. After this point, most states were fiscally centralized and politically limited. The remainder of the book tests the effects of political transformations on public finances.

# 4

# Political Regimes and Credit Risk

Fiscal fragmentation and absolutism characterized the Old Regime. Fundamental political transformations resolved weak- and strong-state fiscal problems: European states gained tax force through fiscal centralization, and restricted executive power through limited government. The final result was institutional balance. By the eve of World War I in 1913, states could gather large tax revenues, and rulers faced parliamentary spending constraints. This claim guides the rest of the inquiry, which the book now pursues through a rigorous examination of the new database, using a combination of descriptive, case-study, and statistical methods.

The empirical investigation of the effects of political transformations on public finances starts with sovereign credit. The ability of governments to tap the resources of society to fund expenditures through borrowing is important in its own right. Furthermore, like an electrocardiogram, which documents the activity of the human heart, we may think of free-market long-term rates of interest on government bonds as vital signs of the fiscal health of nations.[1] When these rates are charted as time series, the impacts of political reforms, wars, revolutions, defaults, and other events are evident. This chapter first characterizes the theoretical links between political change and credit risk. It then describes the yield data and examines the times series for select Group 1 countries. In turn, we gain a basic understanding of the fiscal effects of political transformations.

[1] See Homer and Sylla (2005, p. 3).

### 4.1. Regimes and Risk: Theory

By establishing parliament's power of the purse, limited government reduced the likelihood of poor spending decisions by executives. Rather than using funds for foreign military adventures or other ill-advised items, states should have devoted greater amounts to fiscally prudent policies like debt service. Limited government should have thus improved sovereign credit risk relative to absolutist regimes. Chapter 5 considers two explicit mechanisms through which credit reductions may have occurred.

The relationship between fiscal centralization and sovereign credit risk is more ambiguous than that of limited government. By resolving the problem of local tax free-riding, centralization enabled states to gather larger revenues. It should have thus been easier for responsible governments to follow sound fiscal policies, decreasing credit risk. However, there was always the chance that rulers would waste the new funds on reckless wars or the monarchy itself. The consolidation of fiscal powers may have thus exacerbated problems of executive control. If so, then credit risk should have risen after fiscal centralization.

Table 4.1 summarizes the sovereign credit risk characteristics of the four possible political regimes: fragmented and absolutist, centralized and absolutist, fragmented and limited, and centralized and limited. Credit risk under centralized and limited regimes should have been lower than that under fragmented and absolutist ones. By eliminating local tax free-riding, fiscal centralization implied an increase in public funds. Similarly, limited government placed spending constraints on executives, suggesting an improvement in fiscal prudence. The combination of greater revenues and parliamentary control should have improved credit risk.

By this logic, sovereign credit risk should have decreased under fragmented and limited regimes relative to fragmented and absolutist ones. Theory cannot predict whether there was an improvement in credit risk under centralized and absolutist versus fragmented and absolutist regimes, since fiscal centralization generated new funds that executives could have used to repay debts responsibly or spent recklessly. We may definitively say, however, that credit risk under centralized and limited regimes should have been the lowest of all, since both weak- and strong-state fiscal problems had been resolved.

A final point: although the theoretical predictions are in ceteris paribus terms, factors beyond political regimes also influenced sovereign credit

TABLE 4.1. *Sovereign Credit Risk Characteristics of Political Regimes*

| | |
|---|---|
| Fragmented and absolutist | High due to free-riding and lack of credible commitment |
| Centralized and absolutist | Fall due to resolution of free-riding, but rise due to executive consolidation of fiscal powers |
| Fragmented and limited | Fall due to credible commitment, but still-free riding |
| Centralized and limited | Low due to resolution of free-riding and credible commitment |

risk. The regression analysis in Chapter 7 explicitly controls for the yield effects of a wide variety of political and economic variables, including large debt burdens.

## 4.2. The Data

The analysis uses a new database for free-market yields on long-term government bonds from 1750 to 1913. Unlike nominal yields, which simply report the government's stated rate of interest, market-determined yields provide direct measures of investor perceptions of sovereign credit risk. Appendix A.1 displays the time series data.

These data are from a variety of primary and secondary sources. Appendix A.2 describes the data sources and construction methods. One key source was the Global Financial Database (GFD), which offered high-frequency (i.e., weekly or monthly) data. Comparison of the GFD time series with data, typically low frequency (i.e., yearly), from Homer and Sylla (2005) indicate that these series were generally similar.

Since bond prices often exhibited high volatility, the use of annual data (one observation per year) increased the likelihood of misrepresenting yield trends. To mitigate this possibility, yearly averages of weekly or monthly data were calculated. Appendix A.2 documents the details.

Homer and Sylla (2005, pp. 1–13) discuss the limitations of the historical yield data. Demand for sovereign bonds was not integrated or elastic, and governments faced different domestic and foreign opportunities to market their debts. Bonds for Group 1 countries were typically traded on home exchanges, while those for Group 2 countries were traded in London. Before the nineteenth century, moreover, most governments did not offer a public asset comparable to the British consol, which was perpetual, widely used, easily negotiated, and relatively risk free, but

issued a multitude of debt instruments, each subject to different terms and conditions. In these cases, the sovereign bond that best captured long-term yield levels was chosen. Appendix A.2 provides the details.

Table 4.2 displays the descriptive statistics for the panel of government bond yields. There are 1,027 observations: 108 for fragmented and absolutist regimes, 186 for centralized and absolutist ones, 74 for fragmented and limited ones, and 659 for centralized and limited ones. Average yields for centralized and absolutist (5.77 percent), fragmented and limited (4.26 percent), and centralized and limited (4.24 percent) regimes were low relative to those for fragmented and absolutist ones (6.59 percent).[2] These trends also hold within Groups 1 and 2, and within individual countries. In France, for instance, average yields fell from 6.11 percent under the fragmented and absolutist regime to 5.30 percent under the centralized and absolutist one and to 3.57 under the centralized and limited one.

## 4.3. Regimes and Risk: Case-Study Evidence

To see how sovereign credit risk evolved with political regimes, this section examines the time series for three Group 1 countries: France, the Netherlands, and Spain. Austria is omitted from the analysis, because the available yield data do not start until 1874, seven years after the establishment of a centralized and limited regime.[3] Due to the unusual fiscal patterns that it displays, the investigation of credit risk in Prussia is postponed until the next chapter, when Prussian revenues and deficits are also examined.

[2] Following Ferguson and Schularick (2006), 16 observations with yields of 20% or more were excluded. These were the Netherlands, 1811 and 1813, and Spain, 1824–33 and 1876–9. However, the inclusion of such observations only strengthened the regression results described in Chapter 7.

[3] Homer and Sylla (2005, p. 529) note that the history of Austrian interest rates over the nineteenth and early twentieth centuries resembled that of Germany but was comparatively brief. Ferguson (2006, fig. 1) collected yield data for Austria from 1843 onward. Those data, which are discontinuous, reveal that yield spreads were around 100 basis points at the start of the 1840s but rose to 200 to 400 points during the late 1840s, when Austria fought the First Italian War of Independence (1848–9). Spreads rose even further with the Franco-Austrian War (1859), the Second Italian War of Independence (1859–61), the Second Schleswig-Holstein War (1864), and the Austro-Prussian War (1866). The GFD series that begins in 1874 indicates that spreads also spiked with the Austrian conquest of Bosnia in 1878. Thereafter, spreads fell to around 100 basis points through 1913. Pammer (2010, p. 152) notes that the major increase in public debt in Austria took place during the 1850s, just after fiscal centralization in 1848. In response to the new loan (called the National Loan), the long-term public debt grew by half of its previous value.

TABLE 4.2. *Descriptive Statistics for Sovereign Bond Yields*

| | | All Regimes | Fragmented and Absolutist | Centralized and Absolutist | Fragmented and Limited | Centralized and Limited |
|---|---|---|---|---|---|---|
| Totals | Obs | 1,027 | 108 | 186 | 74 | 659 |
| | Mean | 4.76 | 6.59 | 5.77 | 4.26 | 4.24 |
| | St dev | 1.95 | 2.92 | 2.16 | 1.25 | 1.39 |
| | Min | 2.41 | 3.27 | 3.45 | 2.41 | 2.45 |
| | Max | 16.19 | 15.65 | 16.19 | 8.93 | 16.15 |
| **Group 1** | | | | | | |
| Totals | Obs | 670 | 54 | 186 | 16 | 414 |
| | Mean | 4.74 | 7.65 | 5.77 | 3.09 | 3.95 |
| England | Obs | 164 | | | | 164 |
| | Mean | 3.58 | | | | 3.58 |
| France | Obs | 157 | 40 | 73 | | 44 |
| | Mean | 5.02 | 6.11 | 5.30 | | 3.57 |
| Netherlands | Obs | 131 | | 49 | 16 | 66 |
| | Mean | 4.36 | | 5.60 | 3.09 | 3.74 |
| Spain | Obs | 79 | 14 | 31 | | 34 |
| | Mean | 7.98 | 12.06 | 8.52 | | 5.80 |
| Austria | Obs | 40 | | | | 40 |
| | Mean | 4.67 | | | | 4.67 |
| Prussia | Obs | 99 | | 33 | | 66 |
| | Mean | 4.14 | | 4.50 | | 3.96 |
| **Group 2** | | | | | | |
| Totals | Obs | 357 | 54 | | 58 | 245 |
| | Mean | 4.82 | 5.53 | | 4.58 | 4.72 |
| Belgium | Obs | 82 | | | | 82 |
| | Mean | 3.96 | | | | 3.96 |
| Denmark | Obs | 88 | 27 | | 50 | 11 |
| | Mean | 4.16 | 4.34 | | 4.16 | 3.71 |
| Italy | Obs | 52 | | | | 52 |
| | Mean | 5.32 | | | | 5.32 |
| Portugal | Obs | 89 | 27 | | 8 | 54 |
| | Mean | 6.44 | 6.71 | | 7.20 | 6.19 |
| Sweden | Obs | 46 | | | | 46 |
| | Mean | 3.91 | | | | 3.91 |

*Note*: Sovereign bond yields are expressed as percentages per year.

*Source*: See Appendix A.2.

Recall from Chapters 2 and 3 that England had a centralized and limited regime from 1688 onward. British consols thus function as the benchmark bond.[4] For each case, yield spreads over consols, the difference between the yield on a country's bonds and that of consols, were computed. This method is standard for historical financial market investigations.

The case studies of France, the Netherlands, and Spain provide a first test of the theoretical predictions that relate political transformations to improvements in sovereign credit risk. The findings suggest that fiscal centralization and limited government alike typically led to notable reductions in yield spreads. They also highlight the impacts of external and internal conflicts and other factors on credit risk.

### 4.3.1. *France*

Figure 4.1, which plots French yield spreads from 1750 to 1913, indicates that spreads averaged more than 150 basis points under the fragmented and absolutist regime that lasted through 1789. The two peaks, occurring around 1760 and 1770, represent default episodes.[5] The French Revolution led to the establishment of a national tax system with uniform rates. In the short run, domestic upheaval reduced the tax base, and the government turned to confiscation, capital levies, and an inflation tax to fund expenditures, including the War of the First Coalition (1792–7). At war's end, the government reduced the value of interest payments on the public debt by two-thirds, ruining France's reputation as a borrower. Though Napoleon lacked access to credit, Bordo and White (1991) argue that major tax reforms like fiscal centralization enabled him to gather enough in revenues to fund war efforts. Indeed, France never again defaulted on its public debt.[6]

French yield spreads remained high through the end of the Napoleonic Wars in 1815, but fell in the aftermath. Though the Bourbon monarchy was restored, the next decades saw intense fights between liberal and royal forces (see Chapter 3). The July Revolution of 1830 established a short-lived constitutional regime. After an initial spike, spreads stayed around 60 basis points or fewer. Spreads peaked once more during the Year of Revolutions in 1848 and the start of the First Italian War of

[4] The British consol was created in 1751 (Ferguson, 2006, p. 76).

[5] See Sargent and Velde (1995). According to Reinhart et al. (2003, table 2), France defaulted eight times on its external debt from 1500 to 1789: in 1558, 1624, 1648, 1661, 1701, 1715, 1770, and 1788.

[6] See Bonney (2010a, pp. 88–9, 98–9).

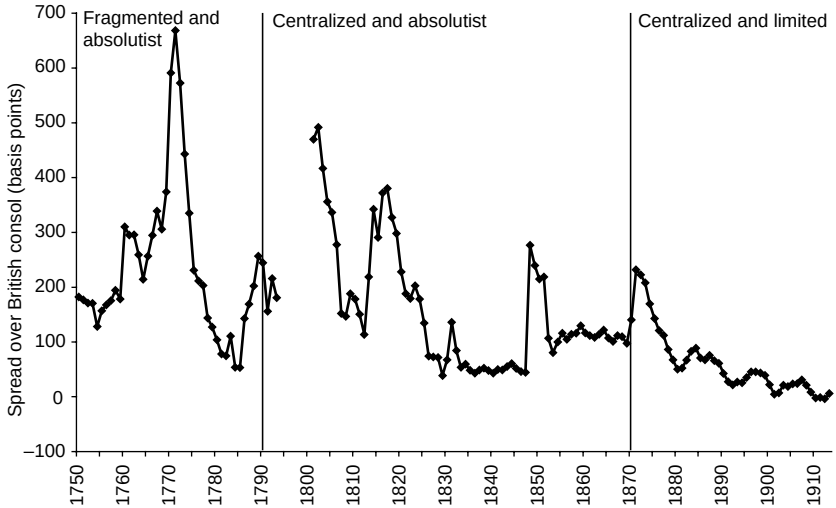


FIGURE 4.1. Yield spreads, France, 1750–1913.
*Source*: See Appendix A.2.

Independence (1848–9). Under Napoleon III, who established an authoritarian regime in 1851, spreads doubled from July regime levels to more than 100 basis points.

Yield spreads spiked again during the Franco-Prussian War (1870–1), which France lost. In the aftermath, Napoleon III was deposed, and the Third Republic, a stable centralized and limited regime, was established. Spreads fell steadily over the 1870s and 1880s. By the start of the 1890s, French yields had reached near parity with those of the British consol, where they stayed through 1913.

The evolution of sovereign credit risk over French political regimes fits with the theoretical predictions. The evidence suggests that both fiscal centralization and limited government led to fiscal improvements. Wars and political turmoil also affected French credit risk.

### 4.3.2. *The Netherlands*

The Dutch Republic (1572–1795) is typically classified as a constitutional regime, although it was not limited in the nineteenth-century sense of a parliament that regularly monitored executive spending.[7] By investing heavily in government bonds, ruling elites aligned lender and borrower

[7] For instance, the coding schemes of Tilly (1990), De Long and Shleifer (1993), Acemoglu et al. (2005), and Stasavage (2005) characterize the Dutch Republic as constitutional.

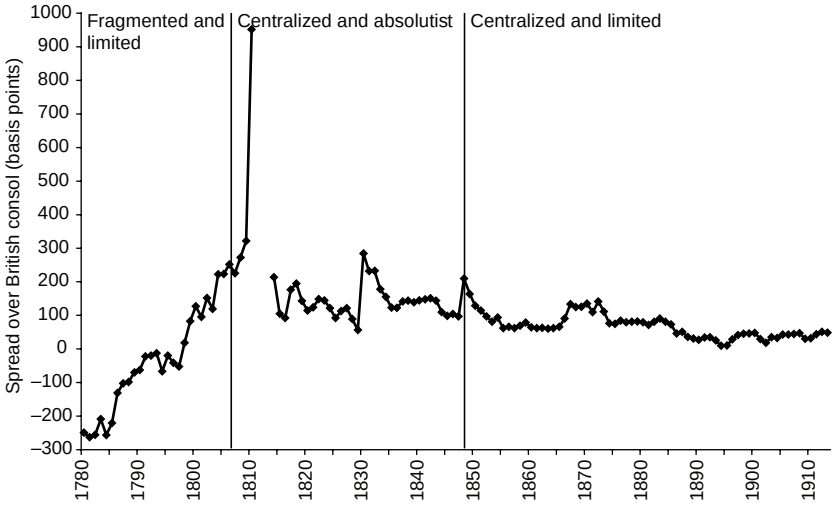


FIGURE 4.2. Yield spreads, Netherlands, 1780–1913.
*Source*: See Appendix A.2.

incentives and provided a credible commitment to repay debts.[8] Figure 4.2, which plots Dutch yield spreads from 1780 to 1913, highlights the success of this mechanism. Since the Republic received loans at lower rates of interest than England, spreads were negative through the 1790s.

Fiscal institutions in the Dutch Republic were fragmented, however, because each of the seven provinces had separate tax systems. As described in Chapter 2, van Zanden and van Riel (2004, chs. 1–2) argue that fiscal fragmentation weakened the Republic's ability to raise funds and service debts over the long term. Although each province was required to pay a fixed amount toward collective military and administrative expenditures, other provinces typically shirked their obligations and free-rode on Holland, the most populated and wealthiest province, whose quota was almost 60 percent of the total burden. This institutional deficiency not only created an unsustainable financial situation, but weakened the Dutch military. Indeed, spreads rose rapidly in the years before French conquest in 1795.

Dutch yield spreads rose once more with the start of the War of the Second Coalition (1798–1801). Though fiscal centralization occurred in

[8] See Tracy (1986), t'Hart (1997), van Zanden and van Riel (2004, chs. 1, 2), and Fritschy (2007). Gelderblom and Jonker (2011) highlight the role of private savings as a necessary complement to credible fiscal institutions in the Republic.

1806, spreads remained high throughout the Napoleonic Wars. The major spike in 1810 corresponds to Napoleon's tiërcering of the public debt, which reduced all interest payments to one-third of previous amounts.

The Constitution of 1815 granted absolutist power to William I, who became king at the end of the Napoleonic era. Promulgated at 10-year intervals, parliamentary authority over government expenditures was ineffective (see Chapter 3). William I spent heavily on the military, infrastructure, and the monarchy itself, and budget deficits rose through the 1820s. Yield spreads spiked with the Belgian Revolt of 1830 and subsequent War of Independence. Though an armistice was declared in 1833, William I continued to spend large sums on the military. The loss of tax revenues from the now-independent southern provinces, including Belgium, also aggravated Dutch finances.[9] During the late 1830s, spreads were nearly three times those of the constitutionally limited July regime in France. This result suggests that, in the absence of effective parliamentary constraints, fiscal consolidation may have exacerbated problems of executive control.

Throughout his reign, William I used a variety of semi-legal tactics to hide the true state of public finances. When fiscal troubles finally became public in 1839, the parliament vetoed the upcoming 10-year budget, and William I was forced to abdicate. The constitutional reform of 1840 granted parliament the right to monitor the budget every two years. Dutch yield spreads fell by the mid-1840s. The Year of Revolutions in 1848 led to the establishment of a stable centralized and limited regime, with parliamentary budget authority coming at annual intervals. After an initial spike, spreads averaged fewer than 70 basis points through 1913.

The ways in which sovereign credit risk evolved with political transformations in the Netherlands are also consistent with the theoretical predictions, though with a twist. As for France, the evidence suggests that limited government reduced Dutch yield spreads. This finding bolsters the case that parliamentary reforms had positive effects on credit risk.

Recall from Section 4.1 that theory could not predict with certainty how fiscal centralization would affect yield spreads. If the ruler spent the new revenues generated by centralization on responsible debt service, then sovereign credit risk should have fallen. The evidence described in the preceding section suggests that the establishment of a national tax system in France had a positive fiscal effect by curtailing the likelihood of default. If the ruler impulsively spent the new funds, however, then centralization

[9] See Fritschy et al. (2001, pp. 20–2).

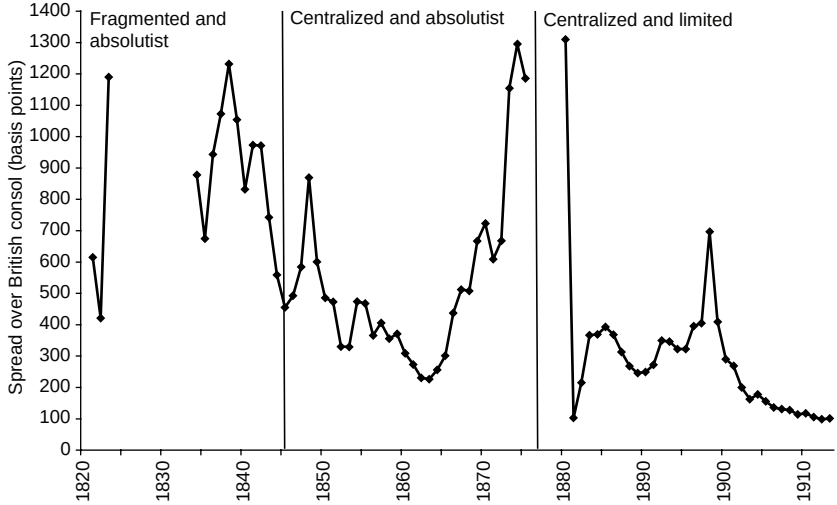


FIGURE 4.3. Yield spreads, Spain, 1821–1913.
*Source*: See Appendix A.2.

should have increased credit risk. The evidence for the Netherlands suggests that this outcome occurred during the reign of William I, when yield spreads rose dramatically as a result of reckless fiscal policies. The Dutch case thus illustrates a diverse theoretical implication of fiscal centralization.

### 4.3.3. *Spain*

In contrast to France or the Netherlands, Spain saw three major civil conflicts over the nineteenth century: the First (1833–9), Second (1847–9), and Third (1872–6) Carlist Wars. Figure 4.3, which plots Spanish yield spreads from 1821 to 1913, indicates that each of these conflicts led to large spikes in yield spreads of 1,000 basis points or more.

Nonetheless, we may still characterize the impact of political transformations on Spanish sovereign credit risk. Unlike France or the Netherlands, fiscal centralization did not take place in Spain until the mid-1840s (see Chapter 2). Although Spanish absolutists had often previously neglected responsible debt payments, Comín (2010, pp. 236–7) shows that debt service soon became a key spending item. Debt payments rose from less than 10 percent of total state expenditures during the first half of the 1800s to more than 50 percent from the end of the 1840s to 1870. After peaking with the Second Carlist War, yield spreads fell steadily to a little more than 200 basis points by the mid-1860s. Overall, average spreads under the

centralized and absolutist regime were more than 300 basis points fewer than those under the fragmented and absolutist one. This finding suggests that fiscal centralization had a positive effect on Spanish credit risk.

Political instability continued to plague Spain, however. The late 1860s saw the Spanish Glorious Revolution, and the 1870s the Third Carlist War. A stable centralized and limited regime was established at war's end in 1876. Yield spreads fluctuated between 200 and 400 basis points through the 1890s. Though large, these levels represented an improvement in Spanish credit risk relative to earlier periods: average spreads under the centralized and limited regime were more than 200 basis points less than those under the centralized and absolutist one, and roughly 600 basis points less than those under the fragmented and absolutist one. With the exception of 1882, moreover, Spain no longer defaulted on its external debt, something it had done six times since the end of the Napoleonic Wars in 1815.[10] Spreads spiked once more during the Spanish-American War (1898), which Spain lost. Thereafter, they fell to around 100 basis points through 1913.

As for the French and Dutch cases, the evolution of sovereign credit risk over Spanish political regimes corresponds to the theoretical predictions. The evidence suggests that limited government led to an improvement in Spanish yield spreads. This result reinforces the argument that constitutional change had positive fiscal impacts. As with France (but not the Netherlands), the evidence suggests that fiscal centralization in Spain also generated a reduction in yield spreads. Taken in combination, these findings suggest that the establishment of national tax systems with uniform rates had positive net effects on credit risk. Finally, the Spanish case highlights the negative impact of prolonged domestic turmoil on yield spreads.

Sovereign credit is a vital sign of the fiscal health of nations. This chapter has examined the effects of political transformations on yield spreads of long-term government bonds. Both the descriptive and case-study evidence indicates that fiscal centralization and limited government typically led to notable improvements in yield spreads. The next chapter takes the empirical investigation further by examining two specific channels through which political reforms actually reduced credit risk.

[10] See Reinhart et al. (2003, table 2). Also see Chapter 5.

# 5

# Two Mechanisms

Political transformations had important effects on sovereign credit risk. Both fiscal centralization and limited government typically led to notable improvements in yield spreads. But by what means? So far, the analysis does not identify the precise mechanisms by which institutional changes led to credit gains. This chapter analyzes two channels through which risk reductions occurred: increases in government revenues per head and improvements in fiscal prudence.

Ferguson (2006) argues that there is a dearth of information about European macroeconomic conditions before the 1870s. Budgetary figures are one unique source of data that are readily available across countries. The first mechanism concerns the amount of tax revenues that national governments collected on a per capita basis. The key conceptual reason to scale by population rather than by some measure of national production is to capture the state's ability to extract tax revenues per head, and not government size relative to that of the economy. There is, moreover, an issue of feasibility. As Ferguson (2006) notes, nineteenth-century GDP measures were still in their infancy, and modern reconstructions of pre-1815 GDP levels tend toward educated guesses at best (see Acemoglu et al., 2005).

Data limitations also preclude scaling by wages or export earnings. Furthermore, Rosenthal (2010, pp. 243–4) raises important conceptual issues regarding the use of wage data as proxies for past development levels. It is not obvious, for instance, that high wages in London in 1750 were truly representative of the whole of England or (the even larger) United Kingdom. Similar difficulties arise if wages in Paris are used to stand for the whole of France or those in Madrid to stand for the whole

of Spain. Mokyr (2010, p. 513, n. 5) also warns that data on real wages for select workers are dubious proxies for income growth.

The econometric framework in Chapter 7 accounts for income effects in two ways. Since there was a close relationship between city growth and economic performance in European history, urbanization rates are included as a control variable. To mitigate the impact of the Second Industrial Revolution, which took place in continental Europe and North America at the end of the nineteenth century (see Mokyr, 1998), regressions were also performed for the period before 1870.

The second mechanism concerns the state's ability to pursue responsible fiscal policies and incorporates government expenditures to compute budget deficits. The question of scaling also arises in this context. Given the lack of macroeconomic information before the 1870s, Ferguson and Schularick (2006) argue that the main problem of early investors was how to make accurate assessments of fundamental resources within countries. To deflate budget estimates over time, sophisticated analyses of government finances employed public revenues. Indeed, Cain and Hopkins (1994, chs. 4–7) claim that calculating budget deficit-to-revenue ratios was the method most preferred by investors to evaluate macroeconomic policies.[1] Following the "gentlemanly capitalists" of London, this analysis also uses deficit ratios as an effective summary statistic of fiscal prudence.

This chapter first characterizes the theoretical relationships between political regimes and government revenues and fiscal prudence. It then describes the data and investigates the time series for Group 1 countries. In turn, we gain a better understanding of the mechanisms by which political transformations led to improvements in sovereign credit risk.

## 5.1. Regimes, Revenues, and Prudence: Theory

Since executives could make credible commitments to spend new funds on public services rather than on ill-advised wars or the monarchy itself, limited government made parliaments more willing to submit to greater tax burdens. Hence, it should have increased revenues per capita relative to absolutist regimes. By reducing the likelihood of bad spending choices by executives, parliamentary power of the purse should have also improved fiscal prudence, as measured by a decrease in deficit ratios. It is important to note that, although the theoretical predictions are in ceteris paribus terms, the regression analysis in Chapter 7 explicitly accounts

[1] Also see Flandreau and Zumer (2004).

for the effects of warfare and other political and economic variables on government revenues and fiscal prudence.

Fiscal centralization should have increased the amount of revenues that governments collected per head by eliminating local tax free-riding. As for sovereign credit risk, however, the relationship between fiscal centralization and fiscal prudence is more ambiguous than that for limited government. Although larger revenues should have made it easier for executives to pursue responsible fiscal policies, the consolidation of fiscal powers may have had an adverse impact on public finances through wasted spending. Whether deficit ratios ultimately fell or rose under centralized versus fragmented regimes depends on which effect won out.

Table 5.1 summarizes the revenue and deficit ratio characteristics of the four possible types of political regime and (building on Table 4.1) relates the two mechanisms to sovereign credit risk. Revenues should have been higher, and deficit ratios lower, under fragmented and limited regimes in comparison with fragmented and absolutist ones. Sovereign credit risk should have improved as a result. Revenues should have also been greater under centralized and absolutist regimes than under fragmented and absolutist ones. The effect on fiscal prudence, however, was contingent upon the ways in which executives spent new funds (i.e., to balance budgets or recklessly). Credit risk may have thus increased or decreased depending on the relative magnitudes of the impacts of these competing elements. Revenues should have been the largest, and fiscal prudence the best, under centralized and limited regimes, due to the resolution of local tax free-riding and a credible commitment to prudent fiscal policies. Credit risk under this regime type should have therefore been the lowest of all. As already noted, the regression analysis in Chapter 7 explicitly controls for the fiscal impacts of historical factors beyond political regimes.

England, which had a centralized and limited regime from 1688 onward, illustrates these arguments. The next section describes the English data. Figure 5.1, which plots English revenues from 1650 to the end of the Old Regime in 1788, indicates that average revenues more than doubled to nearly six gold grams per head in the years after the establishment of limited government but before the onset of the British Industrial Revolution in 1750 (see Mokyr, 1999).

Figure 5.2, which plots English deficit ratios from 1692 to 1913, resembles a tax-smoothing simulation.[2] Barro (1979, 1987, 1989) argues that, to

[2] As first noted by Sargent and Velde (1995).

TABLE 5.1. *Revenue and Deficit Ratio Characteristics of Political Regimes*

| | | | | |
|---|---|---|---|---|
| Fragmented and absolutist | | Low revenues, prudence | | High credit risk |
| Centralized and absolutist | → | Revenues rise, prudence rises or falls | → | Credit risk falls or rises |
| Fragmented and limited | | Both revenues, prudence rise | | Credit risk falls |
| Centralized and limited | | High revenues, prudence | | Low credit risk |

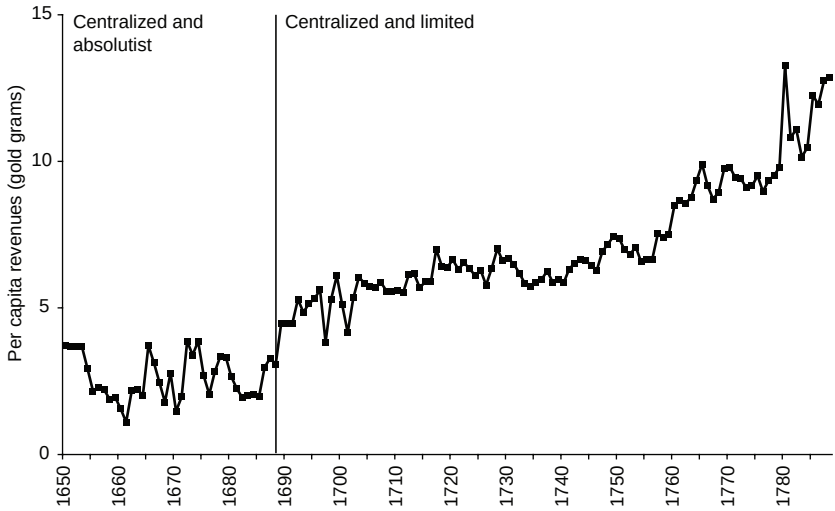


FIGURE 5.1. Per capita revenues, England, 1650–1788.
*Source*: See Appendix A.2.

minimize supply-side disincentives caused by sudden changes in taxation, governments should finance large temporary increases in spending, such as those for wars, with loans funded by peacetime surpluses. The effect of external conflicts on English public finances is clear. Deficit ratios increased with the War of the Grand Alliance (1688–97), the War of the Spanish Succession (1701–14), the War of the Austrian Succession (1740–8), the Seven Years' War (1756–63), the War of American Independence (1775–83), the Wars of the First and Second Coalitions (1792–1801), and the Napoleonic Wars (1803–15), but they always fell at war's end. In peacetime, the government generated small but effective surpluses. There

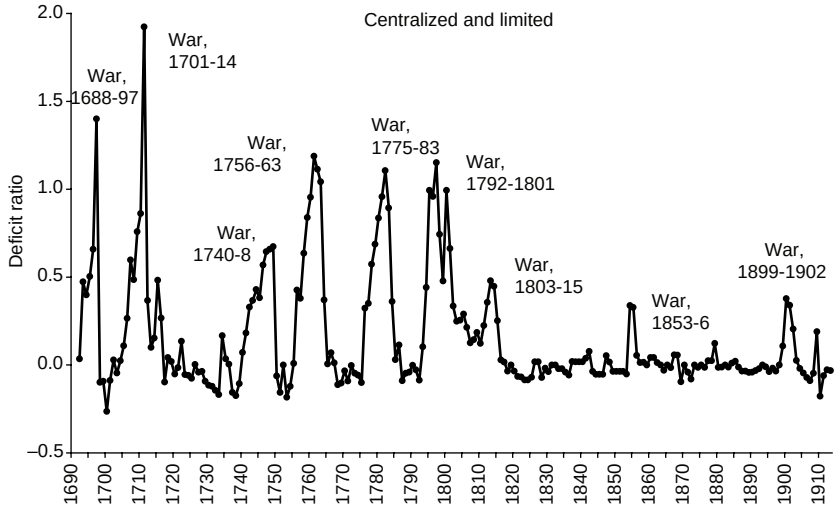


FIGURE 5.2. Deficit ratios, England, 1692–1913.
*Sources*: See Appendix A.2 for deficit ratios and Clodfelter (2002) for wars.

were no defaults.[3] Although the number of external conflicts fell during the post-Napoleonic period, deficit ratios increased once more with the Crimean War (1853–6) and the South African War (1899–1902).

The sound nature of English public finances was reflected in low sovereign credit risk. Recall from Chapter 4 that the British consol was the standard against which the performance of other European government bonds was measured over the eighteenth and nineteenth centuries. More generally, England played the leading role in the development of modern financial markets.[4]

## 5.2. The Data

The database on government revenues and expenditures from 1650 to 1913 is from a variety of secondary sources. Appendix A.1 displays the time series data, and Appendix A.2 describes the data sources and construction methods. Two key sources were the European State Finance Database (ESFDB), created by Bonney and administered by Coffman and

[3] The last default took place in 1672, sixteen years before the establishment of limited government. See Jones (1994, p. 94) and Reinhart et al. (2003, table 2).

[4] See Homer and Sylla (2005, chs. 11, 13). In their words (p. 178–9): "British supremacy was generally acknowledged.... Many countries imitated British monetary and financial techniques and British interest rate policies.... The rules of the game were set in London."

Murray (2010), for the pre-1800 period, and International Historical Statistics of Mitchell (2003) for the post-1800 period.

Bonney (1995, pp. 423–506) discusses the limitations of the historical budgetary data. European states did not maintain detailed fiscal records during the seventeenth and eighteenth centuries. National governments may have calculated yearly budgets in a variety of ways. For instance, some states computed budgets with revenues that they intended to raise, even if the funds did not enter government coffers until years later. Insofar as possible, the revenues used here were tax receipts for national governments in a given year. Ordinary and extraordinary (when given) figures were summed, and loan incomes were subtracted. Since the different ways in which Old Regime governments tabulated yearly revenues suggest that they typically overestimated the amounts of resources available to them, average revenues under fragmented and absolutist regimes should have been larger (at least on paper) than otherwise. Furthermore, government accounting practices have typically improved over time, reducing the number and magnitude of misestimates. These features thus bias the data against the hypothesis that political transformations led to greater tax incomes.

The expenditures used here were total spending by national governments, including debt service, and incorporated loan amounts when given. By virtue of reducing (at least on paper) budget deficits under fragmented and absolutist regimes, the overestimation of revenues by Old Regime governments also biases the data against the hypothesis that political transformations had positive impacts on fiscal prudence. The fact that early data were more likely to be missing during periods of political instability, when deficits were presumably high, works in the same direction.

To make revenue and expenditure calculations comparable across countries, all currency units were transformed into gold grams. This conversion reduced inflation effects. The cumulative world gold stock was relatively stable through the 1840s, when there were large discoveries of gold in California (1848) and Australia (1851). The regression analysis in Chapter 7 explicitly controls for the fiscal impacts of gold stock changes.

The years between missing revenue observations were interpolated. Population figures were also interpolated between census years. Since there were few major one-off fiscal changes (or population shocks such as plague) from 1650 to 1913 besides the two political transformations, the interpolated data should provide reasonable estimates. The linkages between tax bases and government spending were weaker than those for revenues, particularly during wars. Hence, the years between missing expenditure observations were not interpolated.

Tables 5.2 and 5.3 display the descriptive statistics for the revenue and deficit panels, respectively. For revenues, there are 1,739 observations, 624 for fragmented and absolutist regimes, 260 for centralized and absolutist ones, 123 for fragmented and limited ones, and 732 for centralized and limited ones. Average per capita revenues for centralized and absolutist (7.05 gold grams), fragmented and limited (10.66 gold grams), and centralized and limited (13.33 gold grams) regimes were high relative to those for fragmented and absolutist ones (2.43 gold grams). These trends also hold within Groups 1 and 2, and within individual countries. In France, for instance, average revenues rose from 3.32 gold grams per head under the fragmented and absolutist regime to 11.11 under the centralized and absolutist one, and to 30.19 under the centralized and limited one.

For deficit ratios, there are 1,470 observations, 468 for fragmented and absolutist regimes, 201 for centralized and absolutist ones, 121 for fragmented and limited ones, and 680 for centralized and limited ones. The data, which show that average deficit ratios for centralized and absolutist regimes (0.29) were greater than those for fragmented and absolutist regime ones (0.15), suggest that fiscal centralization exacerbated deficits. Although the difference between average deficit ratios under fragmented and absolutist regimes and centralized and limited ones was negligible for Groups 1 and 2 together, average deficit ratios were smaller under the latter regime type for Group 1 countries (0.18 vs. 0.16). The key outlier was Prussia, which nearly achieved a balanced budget under the fragmented and absolutist regime (average deficit ratios were 0.01). Since it was a regular borrower, this outcome did not occur because Prussia was excluded from credit markets.[5] Section 5.4 considers the Prussian case in detail.

## 5.3. Regimes, Revenues, and Prudence: Case-Study Evidence

To gain a clearer picture of the ways in which government revenues and deficits changed over political regimes, this section examines the time series for Group 1 countries France, the Netherlands, Spain, Austria, and Prussia. These case studies provide a first test of the theoretical predictions that relate political transformations to improvements in the ability of governments to collect greater funds and pursue prudent fiscal

[5] Generally speaking, deficit ratios were not equal to zero simply because governments chose never to borrow any funds. See Homer and Sylla (2005, chs. 11–15).

TABLE 5.2. *Descriptive Statistics for Per Capita Revenues*

| | | All Regimes | Fragmented and Absolutist | Centralized and Absolutist | Fragmented and Limited | Centralized and Limited |
|---|---|---|---|---|---|---|
| Totals | Obs | 1,739 | 624 | 260 | 123 | 732 |
| | Mean | 8.29 | 2.43 | 7.05 | 10.66 | 13.33 |
| | St dev | 7.35 | 1.54 | 4.80 | 3.04 | 7.78 |
| | Min | 0.28 | 0.28 | 1.10 | 0.89 | 0.99 |
| | Max | 42.04 | 10.07 | 24.38 | 15.29 | 42.04 |
| **Group 1** | | | | | | |
| Totals | Obs | 1,245 | 430 | 255 | 76 | 484 |
| | Mean | 8.70 | 2.64 | 7.12 | 12.15 | 14.38 |
| England | Obs | 264 | | 38 | | 226 |
| | Mean | 12.18 | | 2.61 | | 13.79 |
| France | Obs | 264 | 140 | 80 | | 44 |
| | Mean | 10.16 | 3.32 | 11.11 | | 30.19 |
| Netherlands | Obs | 187 | | 45 | 76 | 66 |
| | Mean | 12.43 | | 10.88 | 12.15 | 13.82 |
| Spain | Obs | 211 | 142 | 31 | | 38 |
| | Mean | 1.71 | 1.00 | 2.44 | | 3.74 |
| Austria | Obs | 93 | 30 | 19 | | 44 |
| | Mean | 9.07 | 3.16 | 5.50 | | 14.64 |
| Prussia | Obs | 226 | 118 | 42 | | 66 |
| | Mean | 6.23 | 3.66 | 3.77 | | 12.40 |
| **Group 2** | | | | | | |
| Totals | Obs | 494 | 194 | 5 | 47 | 248 |
| | Mean | 7.27 | 1.98 | 3.63 | 8.25 | 11.29 |
| Belgium | Obs | 82 | | | | 82 |
| | Mean | 15.13 | | | | 15.13 |
| Denmark | Obs | 50 | | | 39 | 11 |
| | Mean | 10.92 | | | 9.75 | 15.04 |
| Italy | Obs | 52 | | | | 52 |
| | Mean | 14.95 | | | | 14.95 |
| Portugal | Obs | 146 | 83 | | 8 | 55 |
| | Mean | 1.46 | 0.73 | | 0.94 | 2.60 |
| Sweden | Obs | 164 | 111 | 5 | | 48 |
| | Mean | 4.95 | 2.89 | 3.63 | | 9.85 |

*Note*: Per capita revenues are tax revenues collected by national governments and are expressed in gold grams.

*Source*: See Appendix A.2.

policies. The findings suggest that both fiscal centralization and limited government typically led to notable fiscal improvements. They therefore clarify the precise ways in which political reforms reduced sovereign credit risk.

TABLE 5.3. *Descriptive Statistics for Deficit Ratios*

| | | All Regimes | Fragmented and Absolutist | Centralized and Absolutist | Fragmented and Limited | Centralized and Limited |
|---|---|---|---|---|---|---|
| Totals | Obs | 1,470 | 468 | 201 | 121 | 680 |
| | Mean | 0.17 | 0.15 | 0.29 | 0.16 | 0.16 |
| | St dev | 0.35 | 0.44 | 0.45 | 0.19 | 0.26 |
| | Min | –0.89 | –0.89 | –0.41 | –0.16 | –0.41 |
| | Max | 2.93 | 2.77 | 2.93 | 0.93 | 1.92 |
| **Group 1** | | | | | | |
| Totals | Obs | 1,017 | 311 | 196 | 75 | 435 |
| | Mean | 0.19 | 0.18 | 0.29 | 0.19 | 0.16 |
| England | Obs | 249 | | 27 | | 222 |
| | Mean | 0.16 | | 0.14 | | 0.16 |
| France | Obs | 213 | 98 | 71 | | 44 |
| | Mean | 0.16 | 0.29 | 0.08 | | –0.00 |
| Netherlands | Obs | 186 | | 45 | 75 | 66 |
| | Mean | 0.38 | | 0.79 | 0.19 | 0.30 |
| Spain | Obs | 94 | 28 | 28 | | 38 |
| | Mean | 0.07 | 0.21 | 0.06 | | –0.03 |
| Austria | Obs | 133 | 67 | 19 | | 47 |
| | Mean | 0.34 | 0.31 | 0.53 | | 0.31 |
| Prussia | Obs | 142 | 118 | 6 | | 18 |
| | Mean | 0.01 | 0.01 | 0.08 | | –0.03 |
| **Group 2** | | | | | | |
| Totals | Obs | 453 | 157 | 5 | 46 | 245 |
| | Mean | 0.13 | 0.09 | 0.33 | 0.10 | 0.16 |
| Belgium | Obs | 81 | | | | 81 |
| | Mean | 0.16 | | | | 0.16 |
| Denmark | Obs | 50 | | | 39 | 11 |
| | Mean | 0.09 | | | 0.09 | 0.08 |
| Italy | Obs | 50 | | | | 50 |
| | Mean | 0.19 | | | | 0.19 |
| Portugal | Obs | 98 | 36 | | 7 | 55 |
| | Mean | 0.19 | 0.13 | | 0.18 | 0.22 |
| Sweden | Obs | 174 | 121 | 5 | | 48 |
| | Mean | 0.09 | 0.07 | 0.33 | | 0.10 |

*Note*: Deficit ratios are ratios of budget deficits to tax revenues for national governments.
*Source*: See Appendix A.2.

### 5.3.1. *France*

Figure 5.3, which plots French revenues from 1650 to 1913, indicates that revenues were low, averaging slightly more than 3 gold grams per capita, under the fragmented and absolutist regime that lasted through 1789. Deficit ratios, which Figure 5.4 plots, were also high, averaging 0.29 (i.e., deficits were roughly three times greater than revenues). Moreover, unlike

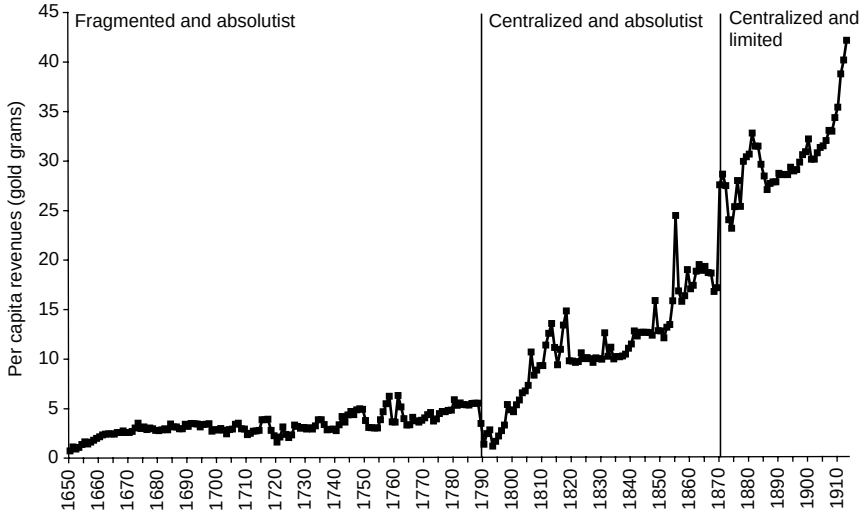


FIGURE 5.3. Per capita revenues, France, 1650–1913.
*Source*: See Appendix 2.

England, which pursued effective tax-smoothing policies over the 1700s (see Figure 5.2), France defaulted repeatedly (see Chapter 4). Given this combination of weak revenue collection and poor fiscal prudence, it is not surprising that sovereign credit risk was high in Old Regime France (see Figure 4.1).

There was a sharp increase in French revenues, which roughly doubled to 10 gold grams per head, in the two decades after fiscal centralization in 1790. Deficit ratios also fell, even during the Napoleonic Wars (1803–15). This result is consistent with Bordo and White's (1991) claim that tax reforms enabled Napoleon to gather enough to fund war efforts without resorting to major borrowing (see Chapter 4).

French revenues leveled out, but never fell, in the decades just after the Napoleonic era. In the 1840s, they began to increase once more, reaching more than 16 gold grams per capita by the end of the 1860s. The establishment of a stable centralized and limited regime took place in the aftermath of the Franco-Prussian War (1870–1). This set of events was associated with a sharp jump in revenues, which more than doubled to over 40 gold grams per head by 1913. A balanced budget also became the norm. In response, French sovereign credit risk levels came to resemble those of England (see Figure 4.1).

The evolution of revenues and deficit ratios over French political regimes is consistent with the theoretical predictions. The evidence

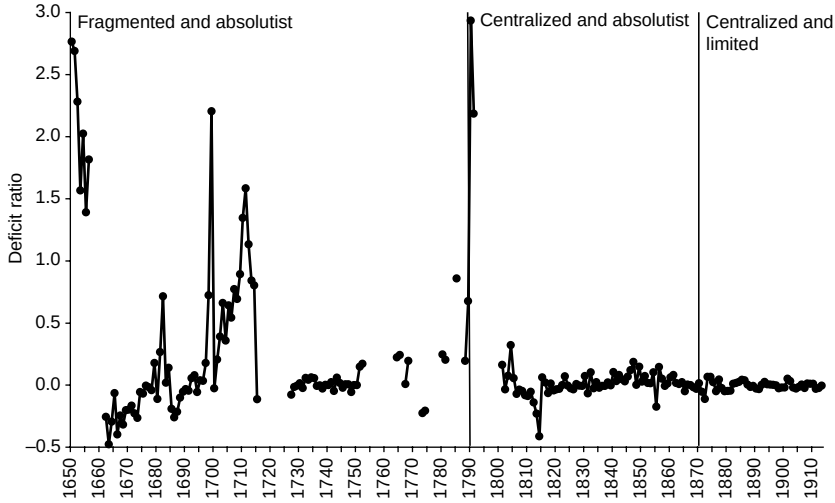


FIGURE 5.4. Deficit ratios, France, 1650–1913.
*Source*: See Appendix 2.

suggests that both fiscal centralization and limited government led to greater revenues and lower deficits. As a result of political transformations, French sovereign credit risk fell.

### 5.3.2. *The Netherlands*

Recall from Chapter 4 that the Dutch Republic (1572–1795) was classified as a fragmented and limited regime. The fragmented nature of fiscal institutions at the national level contrasted with fiscal institutions in Holland, the most populated and wealthiest province. By extending common taxes from urban to rural areas in 1574, the Hollandish provincial government established a uniform tax system that reduced local tax free-riding and significantly increased revenues.[6]

Figure 5.5 plots Dutch revenues for both the Republic as a whole and Holland itself from 1720 to 1795, and for the Netherlands from 1796 to 1913. Two points stand out. First, the Republic benefited from limited government: average Dutch revenues at the national level exceeded those of absolutist France by roughly 9 gold grams per capita over the eighteenth century. Second, Holland benefited from fiscal centralization: eighteenth-century Hollandish revenues per head were on average roughly 7 gold grams higher than for the Republic as a whole.

[6] See Fritschy (2003) and van Zanden and Prak (2006).

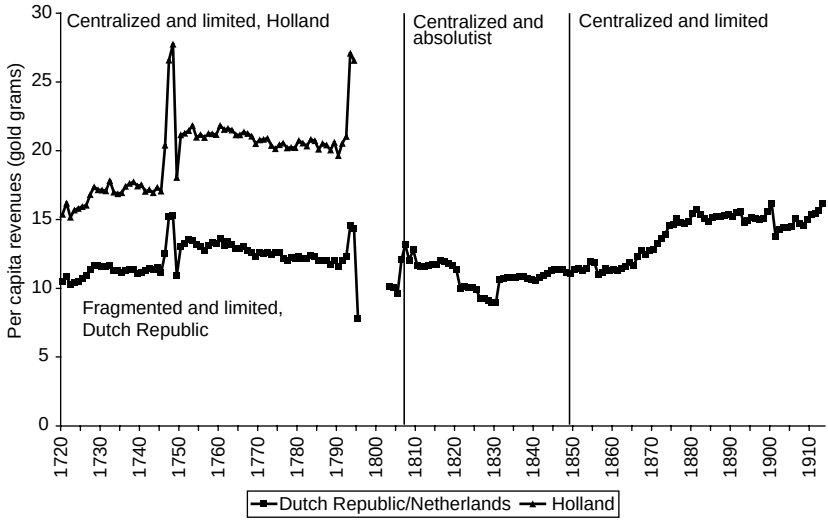


FIGURE 5.5. Per capita revenues, Netherlands, 1720–1913.
*Source*: See Appendix 2.

How about fiscal prudence? Figure 5.6, which plots Dutch deficit ratios from 1720 to 1913, indicates that ratios were small through the 1770s, though they increased with the War of the Austrian Succession (1740–8).[7] Taken together, large revenues and fiscal prudence help explain why Dutch sovereign credit risk was so low through much of the eighteenth century (see Figure 4.2).

Deficit ratios began to rise from the 1780s onward, however. This finding is consistent with van Zanden and van Riel's (2004) claim that fiscal fragmentation hindered the Republic's long-term ability to raise funds and service debts (see Chapter 4). Although each province was required to pay a fixed amount toward collective military expenditures, most shirked their obligations and free-rode on Holland, which had to cover shortfalls. This institutional deficiency not only created an untenable fiscal situation, but undermined the strength of the Dutch military. Indeed, the rapid increase in Dutch yields in the years before French conquest in 1795 reflected mounting fiscal woes (see Figure 4.2).

Fiscal centralization took place at the national level in 1806, and an absolutist regime led by William I was established at the end of the

[7] Since deficit ratios for Holland were similar to those of the Republic, the Hollandish figures are not reported in Figure 5.6.

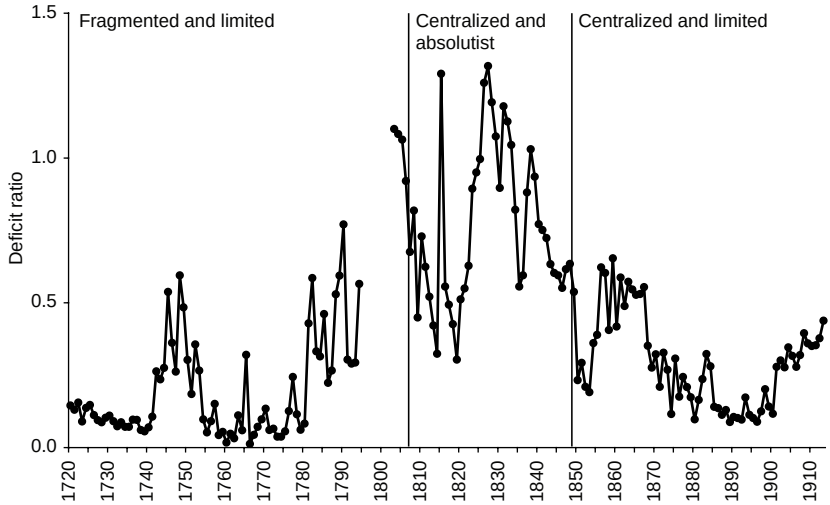


FIGURE 5.6. Deficit ratios, Netherlands, 1720–1913.
*Source*: See Appendix 2.

Napoleonic Wars in 1815 (see Chapter 4). The shift to absolutism appears to have offset any gains from centralization. Average revenues, at nearly 11 gold grams per head, were about 1 gold gram less than during the eighteenth century. Deficit ratios, moreover, were high throughout William I's tenure, averaging 0.79 (i.e., deficits were roughly eight times greater than revenues). Thus, in contrast to France, the Dutch case suggests that centralization in the absence of parliamentary budget authority had a negative effect on fiscal prudence. The notable increase in Dutch sovereign credit risk during this period likely reflected this concern (see Figure 4.2).

A stable centralized and limited regime was established in 1848. After a lag, Dutch revenues began to grow in the 1860s, reaching roughly 15 gold grams per capita by the following decade. Deficit ratios, which first fell with the abdication of William I and related constitutional reform of 1840, steadily decreased to near zero. Dutch sovereign credit risk levels came to resemble those of England (see Figure 4.2).

As for France, the ways in which revenues and deficit ratios evolved with political transformations in the Netherlands correspond to the theoretical predictions. The evidence suggests that limited government led to greater revenues and lower deficits. This result bolsters the case that constitutional changes had positive fiscal effects.

While fiscal centralization also generated higher revenues in the Netherlands, it increased deficit ratios. Recall from Section 5.1 that the

theoretical relationship between fiscal centralization and fiscal prudence depended on two effects. In the French case, the positive impact of the new revenues from fiscal centralization outweighed the negative effect of the consolidation of fiscal powers by Napoleon. In the Dutch case, by contrast, the opposite outcome occurred: the negative impact of fiscal consolidation by William I was greater than the positive effect of the new funds. Thus, the Dutch case again illustrates a diverse theoretical implication of fiscal centralization (also see Chapter 4). Finally, both political transformations had notable implications for Dutch sovereign credit risk.

### 5.3.3. *Spain*

Figure 5.7 plots Spanish revenues from 1703 to 1913. Revenues were very low, averaging roughly 1 gold gram, through the first half of the nineteenth century.[8] Since expenditure data were not available until 1801, Figure 5.8 plots Spanish deficit ratios from that year onward. Deficit ratios were high, averaging 0.21 (i.e., deficits were more than two times greater than revenues). Spain was also a serial defaulter.[9] It is thus not surprising that Spanish yield spreads were very high under the fragmented and absolutist regime (see Figure 4.3).

There was a steady increase in Spanish revenues after fiscal centralization, which took place in 1845. Under the centralized and absolutist regime, they averaged 2.44 gold grams per capita, more than double those under the fragmented and absolutist one. As for France, centralization also had a positive effect on Spanish deficit ratios, which fell markedly.

Spanish revenues peaked at more than 5 gold grams per head under the centralized and limited regime established in 1876.[10] Surprisingly, given its rocky past, Spain also stayed largely in the black through 1913. In turn, there was a notable improvement in Spanish sovereign credit risk (see Figure 4.3).

[8] Drelichman and Voth (2010) argue that short-term liquidity crises led to repeated defaults by King Philip II (r. 1554–98). Divided fiscal authority was an important source of the ruler's fiscal problems. Also see Chapters 2 and 3.

[9] See Reinhart et al. (2003, table 2). However, Spain defaulted only once on its external debts after the establishment of a centralized and limited regime in 1876. Also see Chapter 4.

[10] Though political transformations led to marked increases in per capita revenues in Spain, they were still decidedly lower in absolute levels than those for most other European countries. The fact that Portuguese revenues were also small overall suggests that this phenomenon was particular to the Iberian Peninsula. The econometric framework in Chapter 7 explicitly accounts for geographical factors.

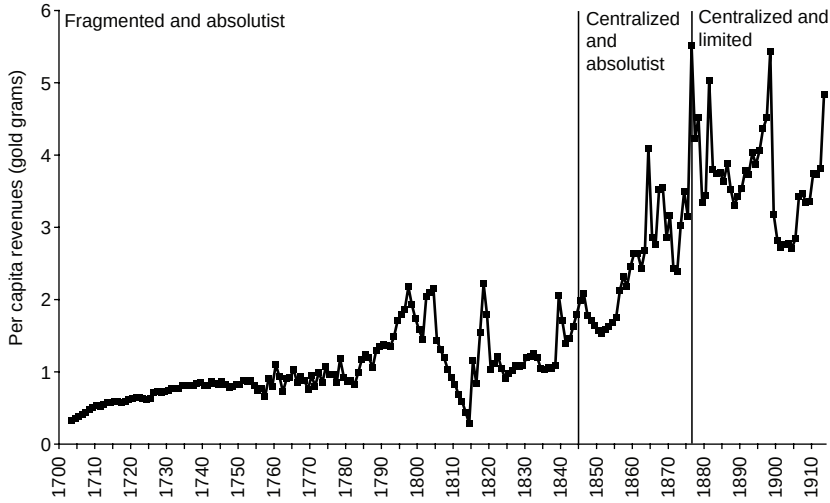


FIGURE 5.7. Per capita revenues, Spain, 1703–1913.
*Source*: See Appendix 2.

As for the French and Dutch cases, the evolution of revenues and deficit ratios over Spanish political regimes fits with the theoretical predictions. The evidence suggests that limited government led to greater revenues and lower deficits. This finding bolsters the argument that parliamentary reforms had positive impacts on public finances. As with France, the evidence suggests that fiscal centralization in Spain generated higher revenues and (unlike the case of the Netherlands) smaller deficits. These findings provide additional evidence that the establishment of standardized national tax systems had positive net fiscal effects. As a result of both political transformations, Spanish sovereign credit risk fell.

### 5.3.4. *Austria*

Recall from Chapter 4 that Austrian yield spreads were not analyzed because the available data did not start until after both political transformations had already occurred. Nonetheless, it is useful to examine the Austrian data for revenues and deficit ratios, which span three different political regimes.

Figure 5.9, which plots Austrian revenues from 1818 to 1910, indicates that revenues were low, at slightly more than 3 gold grams per capita, under the fragmented and absolutist regime that lasted through

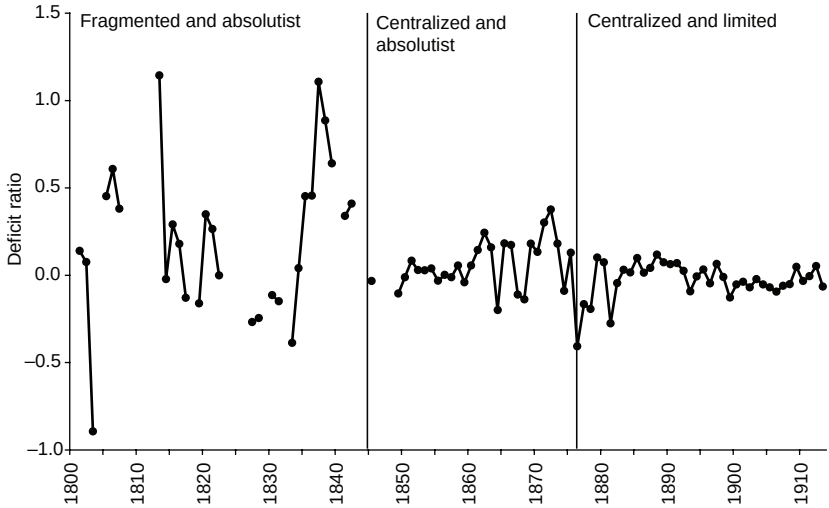


FIGURE 5.8. Deficit ratios, Spain, 1801–1913.
*Source*: See Appendix A.2.

the 1840s.[11] Moreover, deficit ratios, which Figure 5.10 plots from 1780 onward, were high.

Though a liberal revolution failed in 1848, this event was the catalyst for the creation of uniform fiscal institutions throughout the Austrian Empire. There was a trend break in the Austrian revenue series, which began to increase steadily from that year forward. Revenues averaged 5.50 gold grams per head under the centralized and absolutist regime, nearly double those under the fragmented and absolutist one. Unlike France or Spain (but like the Netherlands), however, deficit ratios in Austria rose with fiscal centralization, increasing from 0.31 to 0.53 (i.e., in the latter case, deficits were more than five times greater than revenues). External conflicts account at least in part for this outcome. Austria, which did not enter any major wars from 1815 to 1847, participated in five such conflicts from 1848 to 1866: the First Italian War of Independence (1848–9), the Franco-Austrian War (1859), the Second Italian War of Independence (1859–61), the Second Schleswig-Holstein War (1864), and the Austro-Prussian War (1866).

[11] Though budgetary figures exist for Austria from the late 1700s, the time series for population did not begin until 1818. Furthermore, the population series ends in 1910 (the Austro-Hungarian Empire was dissolved at the end of World War I in 1918). Pammer (2010, p. 133) provides a brief description of the availability of historical economic and social data for Austria.

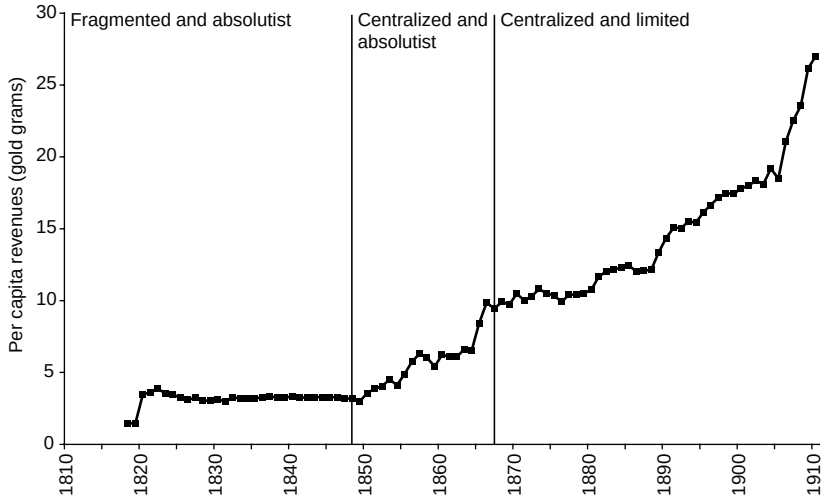


FIGURE 5.9. Per capita revenues, Austria, 1818–1910.
*Source*: See Appendix A.2.

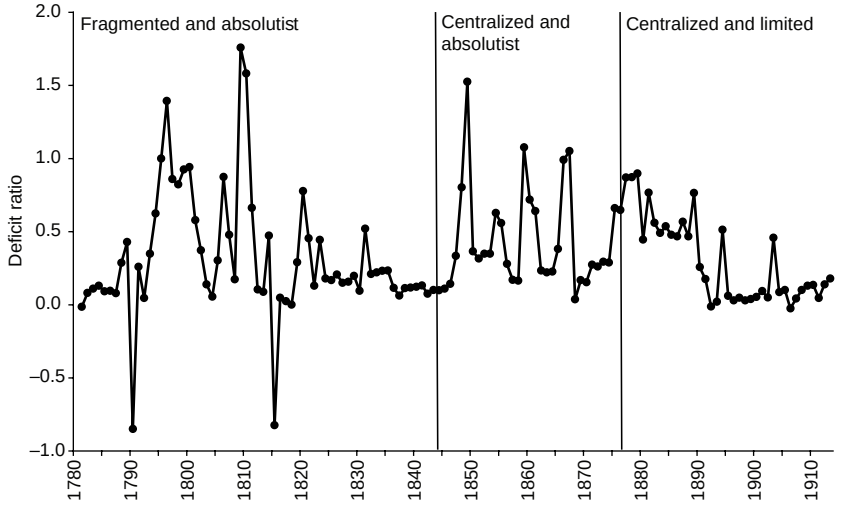


FIGURE 5.10. Deficit ratios, Austria, 1781–1913.
*Source*: See Appendix A.2.

The 1867 Compromise, which established Austria and Hungary as distinct political units, signaled the start of the constitutional era. From that point onward, both states had parliaments that exercised regular budget authority. Austrian revenues continued to rise, reaching roughly

27 gold grams per capita by 1910. Deficit ratios also fell, achieving near-zero levels by 1890. After spiking at more than 400 basis points during the conquest of Bosnia (1878), Austrian yield spreads fell to fewer than 150 basis points by the late 1880s and to around 100 basis points by 1900 (see Appendix A.1).

As for the French, Dutch, and Spanish cases, the ways in which revenues and deficit ratios evolved over Austrian political regimes are consistent with the theoretical predictions. The evidence suggests that limited government generated greater revenues and lower deficits. This finding reinforces the claim that constitutional change had positive fiscal effects. The evidence also suggests that fiscal centralization generated higher revenues. As with the Netherlands, however, the data suggest that centralization increased deficits in Austria.

### 5.4. Prussia as an Anomaly

As described in Chapter 4, the unusual nature of public finances in Prussia led to the postponement of the analysis of sovereign credit risk until now, when revenues and deficit ratios could also be examined.

Figure 5.11, which plots Prussian yield spreads from 1815 to 1913, indicates that spreads fell in the aftermath of the Napoleonic Wars in 1815, reaching fewer than 50 basis points by the start of the 1840s, but peaked during the Year of Revolutions in 1848. Though limited government was established in that year, spreads did not fall to previous lows until after 1900. Over the second half of the nineteenth century, they averaged 102 basis points.

External conflicts account for at least part of this discrepancy. Prussia, which did not fight any major wars from 1815 to 1847, entered four such conflicts from 1848 to 1871: the First and Second Schleswig-Holstein Wars (1848–9, 1864), the Austro-Prussian War (1866), and the Franco-Prussian War (1870–1). It is also important to note that, since monthly or weekly data were not available from 1842 to 1869, the present analysis used data from Homer and Sylla (2005), who computed yearly averages over infrequent intervals. There is thus the chance that trends in Prussian yields are not accurately portrayed over this period.

Historical accounts, moreover, suggest a positive role for limited government. Ferguson (1998) claims that Rothschild lenders urged King Frederick William II (r. 1786–97) to implement constitutional reforms as a credible way to reduce sovereign credit risk. Likewise, Tilly (1966, 1967) argues that the establishment of limited government in 1848

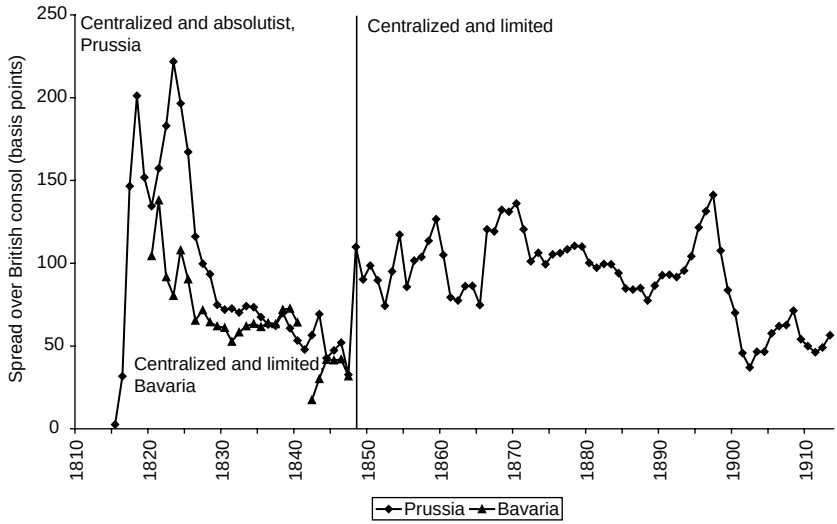


FIGURE 5.11. Yield spreads, Prussia, 1815–1913.
*Source*: See Appendix A.2.

strengthened the ability of the Prussian parliament to pursue sound fiscal policies.[12]

A quantitative comparison of sovereign credit risk across German polities is also useful here. Figure 5.11 includes yield spreads for Bavaria, which adopted a liberal constitution in 1818, from Homer and Sylla (2005). Through 1848, Bavarian spreads were on average 30 basis points fewer than Prussian ones. This finding suggests that limited government did in fact have a positive effect on credit risk within the German territories.

How about revenues and prudence? Figure 5.12, which plots Prussian revenues from 1688 to 1913, indicates that revenues were low, averaging less than 4 gold grams per capita, under the fragmented and absolutist regime that lasted through the early 1800s. Fiscal centralization took place in 1806, after Prussia's loss to France in the Battle of Jena-Auerstedt. Revenues rose through the end of the Napoleonic Wars in 1815 but were not notably higher over the next three decades than during much of the eighteenth century.

[12] It is also possible that the political regime in Prussia was never truly constitutional, even after 1848. For instance, the Polity IV Database of Marshall and Jaggers (2008) codes nineteenth-century Prussia as absolutist. As described in Chapter 3, however, the selection of early dates to define political regimes as limited biases the data against the hypothesis that constitutional reforms improved public finances. Indeed, the classification of post-1848 Prussia as centralized and absolutist rather than centralized and limited only strengthened the regression results presented in Chapter 7.

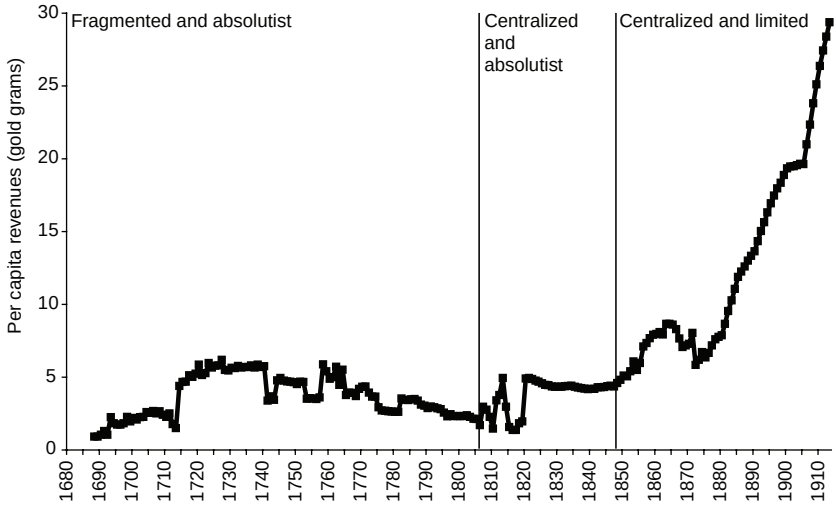


FIGURE 5.12. Per capita revenues, Prussia, 1688–1913.
*Source*: See Appendix A.2.

Revenues began to increase after the establishment of limited government in 1848, averaging more than 7 gold grams per head over the next two decades. As already noted, Prussia fought four wars from 1848 to 1871. The political unification of Germany took place in the aftermath of Prussia's defeat of France in the Franco-Prussian War (1870–1). Revenues continued to grow rapidly, reaching nearly 30 gold grams per capita by 1913.

As for yields, Prussian deficit ratios also showed surprising features. Figure 5.13, which plots this fiscal indicator from 1688 to 1913, indicates that ratios rose with the War of the Grand Alliance (1688–97) and the War of the Spanish Succession (1701–14). However, Prussia stayed in the black over the tumultuous eighteenth century, even during its participation in major conflicts like the Great Northern War (1700–21), the War of the Austrian Succession (1740–8), the Seven Years' War (1756–63), and the Wars of the First and Second Coalitions (1792–1801). This display of fiscal prudence may have reflected unusual fiscal discipline: Kiser and Schneider (1994) argue that the Prussian tax system was among the most efficient in Europe at the time. Nevertheless, the fact that Prussia made significant tax changes in 1806 suggests that it was aware of the importance of institutional reforms. Though the post-1806 expenditure data are sporadic, the existing observations indicate that Prussia continued to follow prudent fiscal policies through 1913.

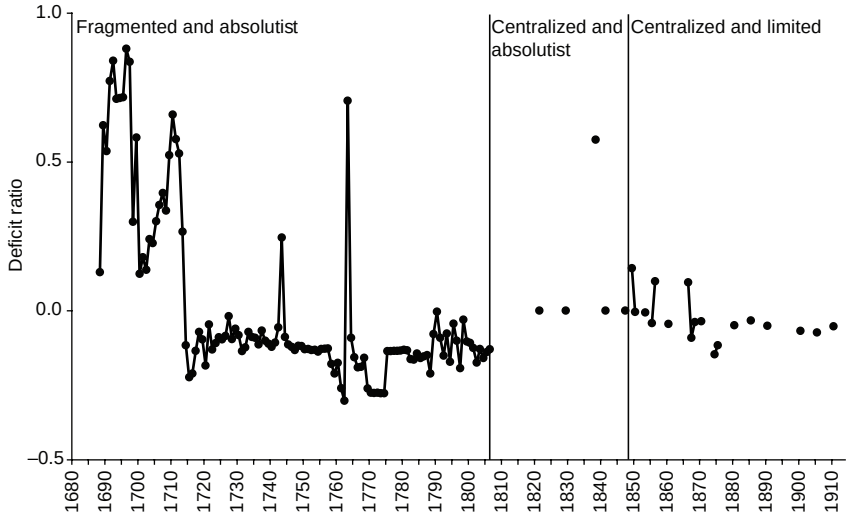


FIGURE 5.13. Deficit ratios, Prussia, 1688–1913.
*Source*: See Appendix A.2.

Unlike the French, Dutch, Spanish, and Austrian cases, the Prussian case highlights the effects of (idiosyncratic) historical factors beyond political regimes on public finances. Although the evidence suggests that political transformations in Prussia had certain notable fiscal effects, they did not always correspond to the theoretical predictions.

Other anomalies in the fiscal data also bear mention at this juncture. Table 4.2 indicates that yield spreads for Denmark and Portugal fell little from the fragmented and absolutist regime to the centralized and limited one. Similarly, Table 5.3 shows that deficit ratios for Portugal and Sweden actually increased from the fragmented and absolutist regime to the centralized and limited one. The regression analysis in Chapter 7 explicitly accounts for country-specific effects, as well as the impacts of a wide variety of other political and economic variables.

By what means did political transformations improve sovereign credit risk? This chapter has identified two precise mechanisms through which fiscal centralization and limited government led to credit gains: increases in government revenues per head and improvements in fiscal prudence. The findings also indicate the importance of controlling for historical factors besides political regimes. To rigorously characterize the fiscal impacts of political transformations, the next two chapters exploit the data using a set of powerful statistical tools.

# 6

# Letting the Data Speak for Themselves

Improvements in revenue collection and fiscal prudence were two channels through which political transformations reduced sovereign credit risk. Both fiscal centralization and limited government generally led to increases in government revenues and reductions in deficit ratios. To complete the analogy described at the start of Chapter 4, if long-term sovereign bond yields represent the heartbeat of a nation's fiscal health, then revenues and fiscal prudence represent elements of pulmonary circulation like the lungs and blood vessels that underlie its strength.

To fully characterize the fiscal effects of political transformations, the data are now subjected to a battery of rigorous tests. The statistical analysis begins with structural breaks tests, which assume no a priori knowledge of major turning points in the fiscal series, but let the data speak for themselves.[1] So long as these tests identify fiscal centralization and limited government as key breaks, we can have even greater confidence that political transformations improved public finances. In this chapter the breaks setup is first described. Then the results of the breaks tests for sovereign credit risk are reported, followed by those for government revenues and fiscal prudence.

## 6.1. Structural Breaks Basics

The structural breaks methodology is from Bai and Perron (2003).[2] A program created by Doan (2010) for the Regression Analysis of Time

[1] For historical applications, see Willard et al. (1996), Brown and Burdekin (2000), Sussman and Yafeh (2000), Mauro et al. (2002), and Dincecco (2009a).

[2] This methodology identifies multiple structural changes in means while allowing for serial correlation. It thus improves upon the "moving windows" technique that relies upon sequential single structural change methods.

Series (RATS) software implements the Bai–Perron procedure by estimating the following regression equation for each sample country:

$$F_t = \alpha + \Sigma_{l=1,\ldots,L}\, \beta_l\, F_{t-1} + \varepsilon_t, \qquad (1)$$

where $F_t$ is the fiscal indicator in year $t$, $\beta_l$ through $\beta_L$ are parameters to be estimated, and $\varepsilon_t$ is the disturbance term.[3] Depending on the specification, $F_t$ represents yield spreads (against British consols, in basis points), per capita revenues (in gold grams), or budget deficit-to-revenue ratios. The RATS routine uses a dynamic programming algorithm to evaluate which final partitioning of the time series data achieves a global minimization of the overall sum of squared residuals. It then returns the optimal set of break points.

The RATS procedure requires the user to select a maximum number of "best" turning points in each time series subject to a minimum number of observations between data segments. Willard et al. (1996) discuss the trade-off that occurs when one chooses parameter values. A minimum space of two observations sharply reduces the chance of confounding the effects of different events but ends up analyzing blips (false positives that characterize certain events as "long lasting" that were really not) rather than turning points. Longer periods of analysis, however, increase the likelihood of missing important shifts (false negatives).

Testing a wide variety of parameter values minimizes the likelihood of generating false positives or negatives.[4] Table 6.1 compares the turning points that the RATS routine identifies for yield spreads over different combinations of maximum breaks and minimum observations. Tables 6.2 and 6.3 do the same for per capita revenues and deficit ratios, respectively. The results are very stable. For each fiscal indicator, there is at least one common break (i.e., within 10 years or less) among different sets of parameter values for each sample country nearly 100 percent of the time. There are at least two common breaks around 95 percent of the time and at least three common breaks more than 90 percent of the time. We may thus be confident that the turning points identified by the breaks tests are robust to diverse parameter values.[5]

[3] Up to five significant yearly lags of the dependent variable (i.e., $L \leq 5$) were allowed.

[4] Many time series display data gaps before the nineteenth century. For time series that became continuous after 1815, the best one, two, or three structural breaks with at least 5, 10, or 15 observations (i.e., 5, 10, or 15 years) per segment were selected. For time series that were continuous from the seventeenth or eighteenth century onward, the best three, four, or five breaks with at least 15, 20, or 25 observations (i.e., 15, 20, or 25 years) per segment were selected.

[5] The do-file for the structural breaks tests in this chapter is available at the website http://sites.google.com/site/mdincecco/.

TABLE 6.1. *Comparison of Best Breaks in Time Series for Yield Spreads with Different Minimum Observations per Segment*

| Best 1 | | | Best 2 | | | Best 3 | | |
|---|---|---|---|---|---|---|---|---|
| 5 | 10 | 15 | 5 | 10 | 15 | 5 | 10 | 15 |
| **Panel A: France, 1816–1913** | | | | | | | | |
| **1873** | **1873** | **1873** | 1852 | 1857 | **1871** | 1852 | 1857 | **1871** |
| | | | 1847 | 1847 | 1847 | 1847 | 1847 | 1847 |
| | | | | | | 1824 | 1825 | 1831 |
| **Panel B: Denmark, 1864–1913** | | | | | | | | |
| **1900** | **1900** | 1878 | **1900** | **1900** | **1898** | | | |
| | | | 1870 | 1878 | 1878 | | | |
| **Panel C: Netherlands, 1816–1913** | | | | | | | | |
| 1830 | 1830 | 1830 | 1829 | 1830 | 1830 | 1829 | 1829 | 1830 |
| | | | 1834 | **1849** | **1849** | **1850** | **1850** | **1848** |
| | | | | | | 1834 | 1839 | 1885 |
| **Panel D: Portugal, 1823–1902** | | | | | | | | |
| 1836 | **1848** | **1848** | 1895 | **1849** | **1848** | **1849** | **1848** | **1848** |
| | | | 1836 | 1839 | **1863** | 1844 | **1863** | **1863** |
| | | | | | | 1895 | 1836 | 1887 |
| **Panel E: Prussia, 1816–1913** | | | | | | | | |
| 1823 | 1825 | 1830 | 1825 | 1825 | 1830 | 1824 | 1825 | 1830 |
| | | | **1849** | **1849** | 1897 | 1847 | **1847** | **1847** |
| | | | | | | 1866 | 1866 | 1866 |
| **Panel F: Spain, 1821–1913** | | | | | | | | |
| 1831 | 1832 | **1835** | 1831 | 1832 | **1835** | 1833 | 1832 | **1835** |
| | | | 1825 | **1880** | **1879** | **1880** | **1881** | **1879** |
| | | | | | | 1825 | **1871** | 1864 |

*Note*: Yield spreads are against the British consol. Panels A to F display the best one, two, or three structural breaks with 5, 10, or 15 minimum observations per segment. Since there were fewer than 50 observations for Denmark, the analysis is limited to the best one or two breaks. Years in boldface identify breaks within 10 years or less of fiscal centralization or limited government. For further details, see Tables 2.5 and 3.1.
*Source*: See text.

## 6.2. Sovereign Credit Risk: Results

Table 6.4 shows the findings of the structural breaks tests for yield spreads for Group 1 countries plus select Group 2 ones (Denmark and Portugal) from 1816 to 1913. It displays the combination of the best two breaks with 15 minimum observations per segment, because this set of

TABLE 6.2. *Comparison of Best Breaks in Time Series for Per Capita Revenues with Different Minimum Observations per Segment*

| Best 3 | | | Best 4 | | | Best 5 | | |
|---|---|---|---|---|---|---|---|---|
| 15 | 20 | 25 | 15 | 20 | 25 | 15 | 20 | 25 |
| **Panel A: England, 1650–1913** | | | | | | | | |
| 1797 | 1797 | 1797 | 1802 | 1797 | 1797 | 1802 | 1797 | 1797 |
| 1816 | 1817 | 1822 | 1817 | 1817 | 1822 | 1818 | 1818 | 1822 |
| 1898 | 1893 | 1888 | 1898 | 1893 | 1888 | 1898 | 1893 | 1888 |
| | | | 1787 | 1777 | 1853 | 1787 | 1777 | **1688** |
| | | | | | | 1856 | 1856 | 1714 |
| **Panel B: France, 1650–1913** | | | | | | | | |
| 1895 | 1893 | **1797** | **1797** | 1893 | **1795** | 1805 | **1796** | **1795** |
| **1869** | **1869** | **1877** | **1869** | **1869** | **1877** | **1869** | **1869** | **1877** |
| 1854 | 1847 | 1852 | 1854 | 1839 | 1852 | 1854 | 1839 | 1852 |
| | | | 1895 | 1818 | 1820 | 1820 | 1818 | 1820 |
| | | | | | | 1895 | 1893 | 1740 |
| **Panel C: Portugal, 1762–1913** | | | | | | | | |
| 1832 | 1798 | 1798 | 1798 | 1798 | 1798 | 1798 | 1798 | 1787 |
| **1847** | **1847** | **1854** | **1847** | **1851** | **1855** | **1847** | **1851** | **1863** |
| 1898 | 1893 | 1888 | 1898 | 1893 | 1888 | 1898 | 1893 | 1888 |
| | | | 1832 | 1831 | 1830 | 1832 | 1831 | 1838 |
| | | | | | | 1880 | 1871 | 1812 |
| **Panel D: Prussia, 1688–1913** | | | | | | | | |
| 1713 | 1713 | 1713 | 1713 | 1713 | 1713 | 1713 | 1713 | 1713 |
| 1765 | 1765 | 1765 | 1764 | 1764 | 1771 | 1771 | 1771 | 1771 |
| 1740 | 1740 | 1740 | 1819 | 1819 | 1820 | 1819 | 1819 | 1819 |
| | | | 1834 | **1839** | 1740 | 1834 | **1839** | **1847** |
| | | | | | | 1740 | 1740 | 1740 |
| **Panel E: Spain, 1703–1913** | | | | | | | | |
| 1860 | **1853** | **1841** | **1838** | **1853** | **1838** | **1841** | **1853** | **1838** |
| **1875** | **1873** | **1872** | **1875** | **1873** | 1863 | **1875** | **1873** | 1863 |
| 1898 | 1893 | 1814 | 1898 | 1893 | 1888 | 1898 | 1893 | 1888 |
| | | | 1858 | 1814 | 1804 | 1814 | 1814 | 1804 |
| | | | | | | 1860 | 1779 | 1779 |
| **Panel F: Sweden, 1740–1913** | | | | | | | | |
| 1802 | **1864** | **1864** | 1802 | **1864** | **1863** | **1864** | **1867** | **1863** |
| 1787 | 1789 | 1787 | 1787 | 1789 | 1787 | 1787 | 1789 | 1787 |
| 1817 | 1812 | 1812 | 1817 | 1812 | 1812 | 1817 | 1812 | 1812 |
| | | | 1893 | 1893 | 1888 | 1893 | 1893 | 1888 |
| | | | | | | 1802 | 1847 | 1837 |

(*continued*)

TABLE 6.2 *(continued)*

| Best 1 | | | Best 2 | | | Best 3 | | |
|---|---|---|---|---|---|---|---|---|
| 5 | 10 | 15 | 5 | 10 | 15 | 5 | 10 | 15 |
| **Panel G: Austria, 1818–1910** | | | | | | | | |
| 1822 | 1827 | 1832 | 1822 | 1827 | 1832 | 1822 | 1827 | 1832 |
| | | | 1827 | 1837 | **1847** | 1827 | **1847** | **1847** |
| | | | | | | 1832 | 1837 | **1862** |
| **Panel H: Denmark, 1864–1913** | | | | | | | | |
| 1874 | 1874 | 1883 | 1874 | 1873 | 1879 | | | |
| | | | **1907** | **1903** | **1894** | | | |
| **Panel I: Netherlands, 1816–1913** | | | | | | | | |
| 1873 | 1873 | 1873 | 1900 | 1865 | 1865 | 1900 | 1873 | 1881 |
| | | | 1908 | 1830 | 1830 | 1821 | 1830 | 1830 |
| | | | | | | 1908 | **1841** | 1861 |

*Note*: Per capita revenues are tax revenues collected by national governments. Panels A to F display the best three, four, or five structural breaks with 15, 20, or 25 minimum observations per segment. Panels G to I display the best one, two, or three breaks with 5, 10, or 15 minimum observations per segment. Since there were fewer than 50 observations for Denmark, the analysis is limited to the best one or two breaks. Years in boldface identify breaks within 10 years or less of fiscal centralization or limited government. For further details, see Tables 2.5 and 3.1.
*Source*: See text.

parameter values is representative of the general patterns that the breaks tests identify (see Table 6.1). Austria was omitted, since the available yield data do not begin until after the establishment of a centralized and limited regime (see Chapter 4). However, Portugal was included because the available yield data span both political transformations, and Denmark because they span fiscal centralization.

A gap in the French yield data during the Revolution (1789–99) precluded structural breaks tests near the time of fiscal centralization. The breaks analysis for France thus runs from the end of the revolutionary and Napoleonic era (1789–1815) onward. The 1871 break coincided with the establishment of a stable centralized and limited regime in 1870 and the Franco-Prussian War (1870–1). The fact that this set of events led to a small rise in yield spreads over the following decade suggests that France's loss to Prussia offset the positive effects of constitutional change in the short term. Recall from Figure 4.1, however, that French spreads fell steadily from 1871 onward. The 1847 break coincided with the tumultuous end of the constitutional July regime (1830–48) and the

TABLE 6.3. *Comparison of Best Breaks in Time Series for Deficit Ratios with Different Minimum Observations per Segment*

| Best 3 | | | Best 4 | | | Best 5 | | |
|---|---|---|---|---|---|---|---|---|
| 15 | 20 | 25 | 15 | 20 | 25 | 15 | 20 | 25 |
| **Panel A: Austria, 1781–1913** | | | | | | | | |
| **1846** | **1846** | **1846** | **1849** | **1846** | **1838** | **1849** | **1849** | **1855** |
| 1810 | 1810 | 1810 | 1810 | 1810 | 1810 | 1810 | 1809 | 1805 |
| 1889 | 1889 | 1888 | 1889 | 1889 | 1888 | 1889 | 1889 | 1880 |
| | | | 1834 | **1868** | **1863** | 1834 | **1869** | 1830 |
| | | | | | | 1795 | 1829 | 1880 |
| **Panel B: England, 1692–1913** | | | | | | | | |
| 1711 | 1711 | 1716 | 1711 | 1711 | 1716 | 1711 | 1711 | 1716 |
| 1738 | 1738 | 1741 | 1737 | 1739 | 1741 | 1737 | 1739 | 1741 |
| 1797 | 1797 | 1797 | 1797 | 1797 | 1797 | 1797 | 1797 | 1797 |
| | | | 1753 | 1759 | 1766 | 1753 | 1759 | 1766 |
| | | | | | | 1814 | 1817 | 1869 |
| **Panel C: Sweden, 1740–1913** | | | | | | | | |
| **1856** | **1856** | **1853** | **1853** | 1831 | **1853** | **1853** | **1856** | **1853** |
| 1785 | 1781 | 1785 | 1779 | 1788 | 1785 | 1779 | 1788 | 1775 |
| 1800 | 1801 | 1810 | 1809 | 1811 | 1810 | 1809 | 1810 | 1800 |
| | | | 1794 | 1763 | 1879 | 1763 | 1763 | 1825 |
| | | | | | | 1794 | 1879 | 1879 |
| **Best 1** | | | **Best 2** | | | **Best 3** | | |
| 5 | 10 | 15 | 5 | 10 | 15 | 5 | 10 | 15 |
| **Panel D: Denmark, 1864–1913** | | | | | | | | |
| 1876 | 1876 | 1878 | **1893** | 1887 | 1878 | | | |
| | | | **1898** | **1898** | **1895** | | | |
| **Panel E: France, 1816–1913** | | | | | | | | |
| **1864** | **1864** | **1864** | 1839 | 1839 | 1839 | 1839 | **1861** | **1870** |
| | | | 1856 | 1856 | 1856 | 1856 | 1851 | 1854 |
| | | | | | | 1851 | 1839 | 1839 |
| **Panel F: Netherlands, 1816–1913** | | | | | | | | |
| 1820 | 1825 | 1839 | 1838 | **1838** | **1848** | **1840** | **1838** | **1853** |
| | | | 1821 | 1825 | 1833 | 1822 | **1858** | 1831 |
| | | | | | | 1833 | 1825 | 1868 |
| **Panel G: Spain, 1849–1913** | | | | | | | | |
| **1873** | **1873** | **1873** | **1873** | **1873** | **1873** | **1873** | **1873** | **1880** |
| | | | **1868** | **1883** | 1888 | **1882** | **1883** | 1898 |
| | | | | | | **1868** | 1859 | 1865 |

*Note*: Deficit ratios are ratios of budget deficits to tax revenues for national governments. Panels A to C display the best three, four, or five structural breaks with 15, 20, or 25 minimum observations per segment. Panels D to G display the best one, two, or three breaks with 5, 10, or 15 minimum observations per segment. Since there were fewer than 50 observations for Denmark, the analysis is limited to the best one or two breaks. Years in boldface identify breaks within 10 years or less of fiscal centralization or limited government. For further details, see Tables 2.5 and 3.1.

*Source*: See text.

TABLE 6.4. *Major Breaks in Time Series for Yield Spreads*

| Year | Percent Change | Event |
|---|---|---|
| **Panel A: France, 1816–1913** | | |
| 1847 | +198%*** | End of constitutional regime (1830–48) / start of First Italian War of Independence (1848–9) |
| | (3.97) | |
| 1871 | +26% | **Limited government (1870)** / Franco-Prussian War (1870–1) |
| | (1.38) | |
| **Panel B: Denmark, 1864–1913** | | |
| 1878 | −19%*** | Railway nationalizations (1878–82) |
| | (3.04) | |
| 1898 | −5% | **Fiscal centralization (1903)** |
| | (0.61) | |
| **Panel C: Netherlands, 1816–1913** | | |
| 1830 | +56%*** | Start of Belgian War of Independence (1830–3) |
| | (3.20) | |
| 1849 | −30%*** | **Limited government (1848)** |
| | (2.69) | |
| **Panel D: Portugal, 1823–1902** | | |
| 1848 | +10% | Third Civil War (1846–7) / **limited government (1851)** |
| | (0.50) | |
| 1863 | +20% | **Fiscal centralization (1859)** |
| | (1.69) | |
| **Panel E: Prussia, 1816–1913** | | |
| 1830 | −53%*** | First *Zollverein* Customs Union (1834) |
| | (4.92) | |
| 1897 | −29%** | *Weltpolitik* of Emperor Wilhelm II (1890s) |
| | (2.42) | |
| **Panel F: Spain, 1821–1913** | | |
| 1835 | −72%*** | End of First Carlist War (1833–9) / **fiscal centralization (1845)** |
| | (5.82) | |
| 1879 | −56%*** | **Limited government (1876)** / end of Third Carlist War (1872–6) |
| | (2.73) | |

*Note*: Yield spreads are against the British consol. The first column shows the years for the two best structural breaks with 15 minimum observations according to the algorithm described in the text. The second column shows the percent change in average yield spreads for the decades before and after each break. *T*-statistics in absolute values are in parentheses. The final column offers brief explanations for the turning points, which the text elaborates upon. Breaks are counted for fiscal centralization or limited government (in boldface) if they coincide by 10 years or less.

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

*Source*: See text.

start of the First Italian War of Independence (1848–9). This set of events led to a significant increase in yield spreads of nearly 200 percent.

As for France, a data gap during the Napoleonic Wars (1803–15) precluded structural breaks tests near the time of fiscal centralization for the Netherlands. The breaks analysis for Dutch yield spreads thus runs from 1816 onward. The 1849 break coincided with the establishment of a centralized and limited regime in 1848. Over the following decade, there was a significant decrease in spreads of 30 percent. The 1830 break coincided with the Belgian Revolt (1830) and subsequent War of Independence (1830–3). This set of events led to a significant increase in yield spreads of more than 50 percent.

A lack of continuous Danish yield data before 1864 precluded structural breaks tests near the time of the establishment of limited government. The breaks analysis for Denmark thus runs from that year onward. The 1898 break coincided with fiscal centralization in 1903. There was a small decrease in spreads of 5 percent over the following decade. The 1878 break coincided with railway nationalizations during the late 1870s and early 1880s. Surprisingly, these nationalizations led to a significant decrease in yield spreads of 20 percent.

Since the available yield data for Spain start before fiscal centralization and limited government took place, structural breaks tests for both political transformations can be performed.[6] The 1835 break coincided with internal conflict (the First Carlist War, 1833–9) and came 10 years before fiscal centralization in 1845. With the notable exception of the Second Carlist War (1847–9), Spanish spreads fell steadily through the 1850s and 1860s (see Figure 4.3). The 1879 break coincided with the establishment of a stable centralized and limited regime in 1876 and the end of the Third Carlist War (1872–6). This set of events led to a significant decrease in yield spreads of more than 50 percent.

As for Spain, the available yield data for Portugal start before fiscal centralization and limited government occurred. Structural breaks tests for both political transformations can thus be performed. The 1848 break coincided with the Third Civil War (1846–7) and the establishment of a stable centralized and limited regime in 1851. During the 1850s, yield spreads fell by more than 200 basis points. The 1863 break coincided with fiscal centralization in 1859. Thereafter, spreads decreased steadily,

[6] Recall from Chapter 4 that 14 observations for Spain with yields of 20% or more were excluded from the regression analysis. To ensure continuous data, however, these observations are included for the breaks tests.

although they were punctuated with spikes due to political instability at the end of the 1860s and financial crisis at the start of the 1890s.

The available yield data for Prussia do not start until nearly one decade after fiscal centralization took place in 1806. The Prussian breaks analysis thus runs from the end of the Napoleonic Wars (1803–15) onward. The 1830 break coincided with the establishment of the first *Zollverein* Customs Union in 1834 and led to a significant reduction in spreads of 53 percent over the following decade. The 1897 break coincided with the resignation of Chancellor Bismarck in 1890 and the adoption of an aggressive foreign policy known as *Weltpolitik* by the new emperor, Wilhelm II. Spreads rose over the 1890s but fell significantly by the start of the 1900s (see Figure 5.11). Although the establishment of limited government in 1848 did not coincide with a major turning point for the combination of the best two breaks with at least 15 observations per segment, several other sets of parameter values identified that year or ones nearby (see Table 6.1). Surprisingly, spreads did not decrease in the aftermath of constitutional reform. Chapter 5 examines the anomalous Prussian case.

In total, the results of this set of structural breaks tests provide statistical proof that political transformations reduced sovereign credit risk. Major turning points in the time series for yield spreads typically coincided with fiscal centralization and limited government. These findings thus serve as a rigorous counterpart to the descriptive and case-study evidence from Chapter 4. They also highlight the impacts of external and internal conflicts on public finances.

## 6.3. Two Mechanisms: Results

We now turn to the findings of the breaks tests for two mechanisms through which credit reductions occurred: increases in government revenues per head and improvements in fiscal prudence.

Tables 6.5 and 6.6 show the results of the structural breaks tests for per capita revenues and deficit ratios for Group 1 countries plus select Group 2 ones (Denmark, Portugal, and Sweden). For time series that were continuous from the seventeenth or eighteenth century onward, they display the combination of the best four breaks with 25 minimum observations per segment. For time series that did not become continuous until after 1815, they display the combination of the best two breaks with at least 15 observations per segment. Both sets of parameter values are representative of the general patterns that the breaks tests identify (see Tables 6.2

TABLE 6.5. *Major Breaks in Time Series for Per Capita Revenues*

| Year | Percent Change | Event |
|---|---|---|
| **Panel A: England, 1650–1913** | | |
| 1797 | +58%*** | Start of War of the Second Coalition |
| | (7.18) | (1798–1801) |
| 1822 | −18%*** | End of Napoleonic Wars (1803–15) |
| | (5.05) | |
| 1853 | +15%*** | Start of Crimean War (1853–6) |
| | (7.24) | |
| 1888 | +10%*** | Start of South African War (1899–1902) |
| | (4.08) | |
| **Panel B: France, 1650–1913** | | |
| 1795 | +37% | French Revolution (1789–99) / **fiscal** |
| | (1.68) | **centralization (1790)** |
| 1820 | −15%** | End of Napoleonic Wars (1803–15) / |
| | (2.77) | Monarchy restored (1814–15) |
| 1852 | +32%*** | Coup by Napoleon III (1851) / start of |
| | (3.83) | Crimean War (1853–6) |
| 1877 | +26%*** | **Limited government (1870)** / |
| | (2.93) | Franco-Prussian War (1870–1) |
| **Panel C: Portugal, 1762–1913** | | |
| 1798 | +41%*** | French Revolutionary Wars (1792–1801) |
| | (5.73) | |
| 1830 | −8% | Second Civil War (1832–4) |
| | (0.87) | |
| 1855 | +20%*** | **Limited government (1851) / fiscal** |
| | (5.58) | **centralization (1859)** |
| 1888 | +63%*** | Financial crisis (1891) |
| | (5.63) | |
| **Panel D: Prussia, 1688–1913** | | |
| 1713 | +94%*** | Entrance into Great Northern War |
| | (5.88) | (1700–21) |
| 1740 | −22%*** | Start of War of Austrian Succession |
| | (5.20) | (1740–8) |
| 1771 | −28%*** | End of Seven Years' War (1756–63) |
| | (4.11) | |
| 1820 | +88%*** | End of Napoleonic Wars (1803–15) |
| | (5.47) | |
| **Panel E: Spain, 1703–1913** | | |
| 1804 | −42%*** | Start of Napoleonic Wars (1803–15) |
| | (4.50) | |
| 1838 | +51%*** | First Carlist War (1833–9) / **fiscal** |
| | (5.53) | **centralization (1845)** |

(*continued*)

TABLE 6.5 *(continued)*

| Year | Percent Change | Event |
|---|---|---|
| 1863 | +39%** | Start of Naval War with Peru (1865–6) |
| | (4.00) | |
| 1888 | +0% | Unidentified event |
| | (0.02) | |
| **Panel F: Sweden, 1740–1913** | | |
| 1787 | +57%*** | Russo-Swedish War of 1788–90 |
| | (2.93) | |
| 1812 | −13% | End of Russo-Swedish War of 1808–9 / |
| | (0.69) | constitutional adoption (1809) |
| 1863 | +16% | **Fiscal centralization (1861) / limited** |
| | (1.65) | **government (1866)** |
| 1888 | +22%** | Railway nationalization (1896) |
| | (4.62) | |
| **Panel G: Austria, 1818–1910** | | |
| 1832 | 0% | Unidentified event |
| | (0.14) | |
| 1847 | +22%** | **Fiscal centralization (1848) / start of** |
| | (2.66) | First Italian War of Independence |
| | | (1848–9) |
| **Panel H: Denmark, 1864–1913** | | |
| 1879 | +19%*** | Railway nationalizations (1878–82) |
| | (7.25) | |
| 1894 | +12%*** | **Fiscal centralization (1903)** |
| | (5.07) | |
| **Panel I: Netherlands, 1816–1913** | | |
| 1830 | +8%** | Start of Belgian War of Independence |
| | (2.65) | (1830–3) |
| 1865 | +14%*** | Liberal economic reforms (1850s, |
| | (5.64) | 1860s) |

*Note*: Per capita revenues are tax revenues collected by national governments. The first column shows the years for the four (two, panels G to I) best structural breaks with 25 (15, panels G to I) minimum observations according to the algorithm described in the text. The second column shows the percent change in average per capita revenues for the decades before and after each break. *T*-statistics in absolute values are in parentheses. The final column offers brief explanations for the turning points, which the text elaborates upon. Breaks are counted for fiscal centralization or limited government (in boldface) if they coincide by 10 years or less.

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

*Source*: See text.

TABLE 6.6. *Major Breaks in Time Series for Deficit Ratios*

| Year | Percent Change | Event |
|---|---|---|
| **Panel A: Austria, 1781–1913** | | |
| 1810 | −57% | End of Napoleonic Wars |
| | (1.28) | (1803–15) |
| 1838 | −34% | **Fiscal centralization (1848) /** |
| | (1.52) | First Italian War of Independence (1848–9) |
| 1863 | −22% | Second Schleswig-Holstein War |
| | (0.73) | (1864) **/ limited government (1867)** |
| 1888 | −62%*** | Railway nationalizations |
| | (3.77) | (1880s) |
| **Panel B: England, 1692–1913** | | |
| 1716 | −98%*** | End of War of Spanish |
| | (3.46) | Succession (1701–14) |
| 1741 | +814%*** | Start of War of Austrian |
| | (5.72) | Succession (1740–8) |
| 1766 | −107%*** | End of Seven Years' War |
| | (5.92) | (1756–63) |
| 1797 | +143%* | Start of War of the Second |
| | (1.84) | Coalition (1798–1801) |
| **Panel C: Sweden, 1740–1913** | | |
| 1785 | +3,528%* | Russo-Swedish War of 1788–90 |
| | (1.80) | |
| 1810 | −118% | End of Russo-Swedish War |
| | (0.96) | of 1808–9 / constitutional adoption (1809) |
| 1853 | +8,831%*** | First Schleswig-Holstein |
| | (3.20) | War (1848–9) **/ fiscal centralization (1861)** |
| 1879 | −52% | Unidentified event |
| | (1.34) | |
| **Panel D: Denmark, 1864–1913** | | |
| 1878 | −141%** | Railway nationalizations |
| | (2.73) | (1878–82) |
| 1895 | +56% | **Fiscal centralization (1903)** |
| | (0.49) | |
| **Panel E: France, 1816–1913** | | |
| 1839 | +629%** | End of constitutional regime |
| | (2.41) | (1830–47) / First Italian War of Independence (1848–9) |

(*continued*)

TABLE 6.6 *(continued)*

| Year | Percent Change | Event |
|---|---|---|
| 1856 | −33%<br>(0.64) | End of Crimean War (1853–6) |
| **Panel F: Netherlands, 1816–1913** | | |
| 1833 | −25%***<br>(3.92) | End of Belgian War of Independence (1830–3) |
| 1848 | −43%***<br>(4.17) | **Limited government (1848)** |
| **Panel G: Spain, 1849–1913** | | |
| 1873 | −165%*<br>(2.04) | **Limited government (1876) /** end of Third Carlist War (1872–6) |
| 1888 | +324%<br>(0.98) | Unidentified event |

*Note*: Deficit ratios are ratios of budget deficits to tax revenues for national governments. The first column shows the years for the four (two, panels D to G) best structural breaks with 25 (15, panels D to G) minimum observations according to the algorithm described in the text. The second column shows the percent change in average deficit ratios for the decades before and after each break. *T*-statistics in absolute values are in parentheses. The final column offers brief explanations for the turning points, which the text elaborates upon. Breaks are counted for fiscal centralization or limited government (in boldface) if they coincide by 10 years or less.
*Significant at 10%; **Significant at 5%; ***Significant at 1%.
*Source*: See text.

and 6.3). Portugal and Sweden were included because the available budgetary data span both political transformations, and Denmark because they span fiscal centralization.

England, which had a centralized and limited regime from 1688 onward, pursued a successful tax-smoothing policy over the eighteenth century and beyond (see Chapter 5). The major turning points identified by the structural breaks tests highlight this fiscal strategy. Breaks coincided with the onset of the War of the Austrian Succession (1740–8, deficit ratios), the War of the Second Coalition (1798–1801, revenues and deficit ratios), the Crimean War (1853–6, revenues), and the South African War (1899–1902, revenues). In each case, the start of external conflicts led to significant increases in the relevant fiscal indicator. The remaining breaks coincided with the end of the War of the Spanish Succession (1701–14, deficit ratios), the Seven Years' War (1756–63, deficit ratios), and the Napoleonic Wars (1803–15, revenues). In those cases, the end of external conflicts led to significant decreases in the fiscal variables of interest.

A data gap for expenditures during the Glorious Revolution of 1688 precluded structural breaks tests for deficit ratios near the establishment of limited government in England. Although breaks tests for revenues can be performed from 1650 onward, limited government did not coincide with a major turning point for the combination of the best four breaks with at least 25 observations per segment. However, Figure 5.1 indicates that there was a significant increase in revenues of 91 percent over the 1690s. The combination of the best five breaks with at least 25 observations per segment, moreover, identified 1688 as a major turning point (see Table 6.2).

For France, the 1793 break in the time series for revenues coincided with fiscal centralization and the French Revolution (1789–99). Although domestic political turmoil offset some of the positive effects of fiscal change in the short term, Figure 5.3 indicates that French revenues grew rapidly over the next two decades. The 1877 break coincided with the establishment of a stable centralized and limited regime and the Franco-Prussian War (1870–1). During the 1870s, there was a significant increase in revenues of 26 percent. The other best breaks in the French revenue series coincided with the end of the Napoleonic Wars (1803–15) and the restoration of the Bourbon monarchy (1814–15), and with the coup by Napoleon III (1851) and the start of the Crimean War (1853–6). Whereas the former set of events led to a significant decrease in revenues, the latter led to a significant increase.

As for French yield spreads, a data gap for French expenditures during the Revolution (1789–99) precluded structural breaks tests in the time series for deficit ratios near the year of fiscal centralization in France. The breaks analysis for French deficit ratios thus runs from the end of the revolutionary and Napoleonic era (1789–1815) onward. The 1839 break was within 10 years of the end of the July regime in 1848, the same year as the start of the First Italian War of Independence (1848–9). This set of events led to a significant increase in deficit ratios of more than 600 percent. The 1856 break coincided with the end of the Crimean War (1853–6) and led to an insignificant decrease in deficit ratios. Although the establishment of limited government in 1870 did not coincide with a major turning point for the combination of the best two breaks with at least 15 observations per segment, several other sets of parameter values identified that year or ones nearby (see Table 6.3). Furthermore, Figure 5.4 indicates that deficit ratios decreased by 165 percent over the 1870s.

For the Netherlands, gaps in the budgetary data during the Napoleonic Wars (1803–15) precluded structural breaks tests near the time of fiscal centralization. The breaks analysis for revenues and deficit ratios thus

runs from 1816 onward. The 1848 break for deficit ratios coincided with the establishment of a centralized and limited regime, and the 1833 break coincided with the end of the Belgian War of Independence (1830–3). Both events led to significant decreases in deficit ratios over the decades that followed.

The 1830 break for Dutch revenues, by contrast, coincided with the Belgian Revolt (1830) and the start of the War of Independence (1830–3), and led to a significant rise in revenues. The 1865 break coincided with the liberal era of economic reforms during the 1850s and 1860s.[7] Although the establishment of limited government in 1848 did not coincide with a major turning point in the time series for revenues for the combination of the best four breaks with at least 25 observations per segment, Figure 5.5 indicates that, after a lag, Dutch revenues grew steadily over the 1860s and 1870s. Moreover, the combination of the best three breaks with at least 10 observations per segment identified 1841, the year after the constitutional reform of 1840, as a major turning point (see Table 6.2).

As for yield spreads, the lack of budgetary data before 1864 precluded structural breaks tests near the time of the establishment of limited government in Denmark. The breaks analysis for Danish revenues and deficit ratios thus runs from that year onward. The 1894 break for revenues and the 1895 break for deficit ratios each came within 10 years of fiscal centralization. Over the following decade, there were significant increases in both fiscal indicators. The 1879 break for revenues and the 1878 break for deficit ratios coincided with railway nationalizations, which led to a significant increase in the former variable and a significant decrease in the latter.

For Spain, the 1838 break in the time series for revenues coincided with the end of the First Carlist War (1833–9) and fiscal centralization in 1845. This set of events led to a significant increase in revenues of 51 percent over the following decade. Although the establishment of limited government in 1876 did not coincide with a major turning point for the combination of the best four breaks with at least 25 observations per segment, several other sets of parameter values identified nearby years (see Table 6.2). Furthermore, Figure 5.7 indicates that there was a significant increase in revenues of 35 percent over the late 1870s and early 1880s. The other best breaks in the revenue series coincided with the start of the Napoleonic Wars (1803–15) and the Naval War with Peru

[7] See van Zanden and van Riel (2010, pp. 65–79).

(1865–6), and with an unidentified event in 1888. Surprisingly, the onset of the Napoleonic Wars led to a significant decrease in revenues.

Since the lack of continuous expenditure data for Spain before 1849 precluded structural breaks tests for deficit ratios near the time of fiscal centralization, the breaks analysis runs from that year onward. The 1873 break coincided with the end of the Third Carlist War (1872–6) and the establishment of a stable centralized and limited regime in 1876. This set of events led to a significant decrease in deficit ratios of 165 percent. The second break coincided with an unidentified event in 1888.

Recall from the preceding section that structural breaks tests for yield spreads for Austria were not performed because the available data did not begin until after the establishment of a centralized and limited regime. Since the available budgetary data span both political transformations, however, breaks tests can be performed for Austrian revenues and deficit ratios. The 1838 break in the time series for deficit ratios came within 10 years of fiscal centralization and the First Italian War of Independence (1848–9), and the 1863 break coincided with the establishment of a stable centralized and limited regime and the Second Schleswig-Holstein War (1864). Both political transformations (along with external conflicts, which may have had offsetting effects) led to small decreases in deficit ratios over the decades that followed. The other best breaks coincided with the end of the Napoleonic Wars (1803–15) and the railway nationalizations during the 1880s. Each set of events led to decreases in deficit ratios.

Though budgetary figures exist for Austria from the late 1700s, the population data were not available until 1818 (see Chapter 5). The breaks analysis for Austrian revenues thus runs from 1816 onward. As for deficit ratios, the 1847 break in the time series for revenues coincided with fiscal centralization and the First Italian War of Independence (1848–9). This set of events led to a significant increase in revenues of 22 percent. The other best break in the revenue series coincided with an unidentified event in 1832 and had an insignificant effect. Although the establishment of limited government in 1867 did not coincide with a major turning point for the combination of the best two breaks with at least 15 observations per segment, Figure 5.9 indicates that there was a significant increase in revenues of 55 percent over the late 1860s and early 1870s. Moreover, the combination of the best three breaks with at least 15 observations per segment identified 1862 as a major turning point (see Table 6.2).

For Sweden, the 1863 break in the time series for revenues occurred between fiscal centralization in 1861 and the establishment of limited government in 1866. This set of political transformations led to a small

increase in revenues over the following decade. The 1853 break in the time series for deficit ratios coincided with the start of the Crimean War (1853–6) and came within 10 years of fiscal centralization. This set of events, coupled with a new expansionary fiscal policy, led to a significant increase in deficit ratios.[8] Although the establishment of limited government did not coincide with a break for the time series for deficit ratios, they fell by 40 percent over the late 1860s and early 1870s. Furthermore, the 1810 break for deficit ratios (and the 1812 break for revenues) coincided with the constitutional change of 1809 and the end of the Russo-Swedish War of 1808–9. After this political reform, the executive kept absolute veto authority, and parliament met only once every five years (see Chapter 3). Although this set of events led to a decrease in deficit ratios of 118 percent over the 1810s, it had a negligible effect on revenues. Other best breaks coincided with the start of the Russo-Swedish War of 1788–90 (revenues and deficit ratios) and the railway nationalization of 1896 (revenues). Both events led to significant increases in the relevant fiscal indicators. The remaining break for deficit ratios coincided with an unidentified event in 1879 and had an insignificant impact.

Large gaps in the pre-1851 expenditure data for Portugal precluded structural breaks tests for deficit ratios. The breaks analysis thus centers on Portuguese revenues. The 1855 break fell between fiscal centralization in 1851 and the establishment of limited government in 1859. This set of political transformations led to a significant increase in revenues of 20 percent over the following decade. Other best breaks coincided with the French revolutionary wars (1792–1801), the Second Civil War (1832–4), and the financial crisis of 1891. Whereas the first and third events led to significant increases in revenues, the second had an insignificant effect.

As for Portugal, large gaps in the post-1806 expenditure data for Prussia precluded structural breaks tests for deficit ratios. The breaks analysis thus centers on Prussian revenues. The 1713 break coincided with Prussia's entrance into the Great Northern War (1700–21) and led to a significant increase in revenues. By contrast, the 1771 break coincided with the end of the Seven Years' War (1756–63), and led to a significant decrease. The other two best breaks coincided with the start of the War of Austrian Succession (1740–8) and the end of the Napoleonic Wars (1803–15). Surprisingly, the former turning point led to a significant decrease in revenues, but the latter one led to a significant increase. Recall from Chapter 5 that Prussian

[8] Though Sweden did not participate in the Crimean War, the conflict stimulated new demands for its exports. See Schön (2010, pp. 174–8).

revenues rose through the end of the Napoleonic Wars in 1815 but were not notably higher over the next three decades than during much of the eighteenth century. It is thus not surprising that fiscal centralization in 1806 did not coincide with a major turning point. Although the establishment of limited government in 1848 did not coincide with a major turning point for the combination of the best four breaks with at least 25 observations per segment, other parameter values identified nearby years (see Table 6.2). Furthermore, Figure 5.12 indicates that there was a notable increase in revenues over the 1850s and early 1860s.

In summary, the findings of this set of structural breaks tests offer statistical proof that increases in government revenues and improvements in fiscal prudence were two channels through which political transformations enhanced public finances. As for yield spreads, major turning points in the time series for revenues and deficit ratios generally coincided with fiscal centralization and limited government. These results thus bolster the descriptive and case-study evidence from Chapter 5. They also underscore the links between public finances and wars and political turmoil. Finally, the findings show the fiscal effects of major economic interventions like railway nationalizations.

To rigorously characterize the fiscal effects of political transformations, this chapter has reported the results of structural breaks tests, which assumed no a priori knowledge of major turning points in the fiscal series, but let the data speak for themselves. The results of the breaks tests, which typically identified fiscal centralization and limited government as key turning points, provide a statistical counterpart to the descriptive and case-study evidence from previous chapters. We can thus be even more confident that political transformations led to fiscal improvements. The findings also indicate the important effects of external and internal conflicts and other historical factors on public finances. To explicitly control for the fiscal effects of political and economic variables beyond political regimes, the next chapter uses econometric methods.

# 7

# Estimating the Fiscal Effects of Political Regimes

When the data speak for themselves through the structural breaks analysis, they typically identify political transformations as major turning points in the time series for the various fiscal indicators. These breaks generally led to significant increases in government revenues and improvements in fiscal prudence, coupled with significant reductions in sovereign credit risk. The breaks tests thus provide rigorous proof that political transformations led to large improvements in public finances.

Like the case studies before them, however, the breaks tests also reveal the impact of historical factors besides political regimes on public finances. To account for the effects of external and internal conflicts, income growth, fiscal and monetary policies, country- and time-specific effects, and other elements, econometric techniques that exploit the panel nature of the data are now employed. Estimations of panel data increase informative content by combining variations across time and country. The key strength of this approach is the ability to systematically disentangle the role of political regimes from other potentially relevant factors through the use of control variables. By explicitly accounting for historical features beyond political regimes, the econometric analysis can either ratify or reject the findings of the case studies and structural breaks tests.

This chapter first describes the regression setup, including the panel specification, the control variables, and the issue of reverse causation. It then reports the results of the regressions for sovereign credit risk, followed by those for government revenues and fiscal prudence.

## 7.1. Econometric Basics

### 7.1.1. *Panel Specification*

The econometric method follows Beck and Katz (1995) and uses ordinary least squares with panel-corrected standard errors (PCSE). This technique, which is standard for panel datasets, corrects for any instances of contemporaneously correlated errors or panel heteroskedasticity and includes a common AR1 term to control for the possibility of serial correlation.[1]

Beck and Katz (1995) show that PCSE is superior to another technique, feasible generalized least squares (FGLS), which typically generates poor estimates of standard errors. The fact that ordinary least squares is less efficient than FGLS implies that the regression results will be stronger if the fiscal indicators still display significant coefficients. Beck and Katz (1995) also demonstrate that the use of a common AR1 term is superior to the use of country-specific ones. The inclusion of a lagged dependent variable is another way to control for serial correlation (see Beck and Katz, 1996). This approach delivers results that are similar to those reported later.[2]

The basic econometric specification is

$$F_{it} = \alpha + \beta_1 CA_{it} + \beta_2 FL_{it} + \beta_3 CL_{it} + \gamma' \mathbf{X}_{it} + \beta_4 \mu_i + \beta_5 \tau + \varepsilon_{it}. \qquad (2)$$

Here $F_{it}$ is the fiscal indicator for country $i$ in year $t$. Depending on the specification, it represents yield spreads (against British consols, in basis points), per capita revenues (natural logarithms, in gold grams), or budget deficit-to-revenue ratios.[3] $\mathbf{X}_{it}$ is a vector of control variables, $\mu_i$ are country-specific fixed effects, $\tau$ is a binary variable for the Old Regime (to be described later) and $\varepsilon_{it}$ is the disturbance term.

The binary variable $CA_{it}$ ($FL_{it}$, $CL_{it}$) takes the value of 1 for each sample year that a country had a centralized and absolutist (fragmented

[1] Contemporaneously correlated errors, panel heteroskedasticity, and serial correlation are three econometric modeling concerns particular to panel data. Contemporaneously correlated errors occur if the standard errors for one country are associated with those for another country. Panel heteroskedasticity occurs if the variances of the standard errors differ by country. Finally, serial correlation occurs if the standard errors are temporally dependent. Also see Beck and Katz (1995, p. 636).

[2] A third method is first-differencing. However, Wooldridge (2003, chs. 13, 14) argues that this approach significantly reduces the variation in the independent variables, and discourages the use of first differences for time series that are very long.

[3] Wooldridge (2003, p. 189) provides rules of thumb for taking natural logarithms. The use of natural logs of average annual yields as the dependent variable in the regressions for sovereign credit risk generated results that were similar to those presented later.

and limited, centralized and limited) regime.[4] These dummies represent a clear, concise, and intuitive way to measure the fiscal impacts of political arrangements. Recall from Chapter 2 that, although fragmentation levels varied across pre-centralized states, all pre-centralized regimes were classified as entirely fragmented. Since fiscal divisions in some pre-centralized states were relatively small, this choice implies that some regimes counted as fully fragmented will encompass data associated with better fiscal outcomes like higher per capita revenues (see Chapters 2 and 5). Average improvements after fiscal centralization will therefore be smaller than otherwise. Systematic underestimation of the fiscal effects of centralization biases the data against the hypothesis that fiscal centralization improved public finances. The results of the regression analysis will thus be stronger than otherwise if they still indicate that fiscally centralized regimes had significant positive impacts on the fiscal variables of interest.

Similarly, recall from Chapter 3 that early years were always selected to date limited government. Since public finances in Europe have typically improved over time, this choice implies that some regimes classified as limited will encompass data associated with poorer fiscal outcomes. Average improvements after parliamentary reforms will therefore be smaller than otherwise. Systematic underestimation of the fiscal impacts of limited government biases the data against the hypothesis that constitutional change improved public finances. Any findings that still indicate that limited government had significant positive effects on the various fiscal indicators will thus be stronger than otherwise. At the same time, a robustness check also allows for uncertainty among investors and taxpayers about how long newly established parliamentary regimes would last by lagging the start dates by five years.

### 7.1.2. *Accounting for Conflict, Growth, and Other Factors*

Both the case-study evidence in Chapters 4 and 5 and the breaks tests in Chapter 6 indicate that external conflicts had important effects on public finances. Indeed, Hoffman and Rosenthal (1997) argue that the one true goal of absolutist monarchs was to wage war for personal glory and for homeland defense. In the short run, warfare had negative fiscal impacts due to the destruction of human and physical capital. Over the long term, however, Tilly (1990), Hoffman and Norberg (1994a), Hoffman and Rosenthal (2000), O'Brien (2001, 2005) Hoffman (2009), Karaman and

[4] The benchmark case of the fragmented and absolutist regime, $FA_{it}$, is omitted from the regression analysis.

Pamuk (2010), and Rosenthal and Wong (2011) argue that military competition fostered fiscal innovations that improved public finances.

External conflicts differed by characteristics such as magnitude and enemy strength. To evaluate the impact of wars on public finances, a new dataset based on Clodfelter (2002) was assembled. It includes all external conflicts fought in Western and Eastern Europe from 1650 to 1913 that involved at least one sample country. To calculate the scope of war, average military deaths per conflict year sustained by participant countries were computed. At times, sample countries simultaneously fought multiple wars. Non-overlapping average military deaths were summed in these cases. Appendix A.3 lists the concise details of all the control variables.

Since one of the core purposes of monarchs was to fight, rulers nearly always wished to go to battle. Indeed, military spending was by far the largest component of national budgets through the 1800s.[5] Financial conditions, however, were also relevant. One factor that influenced the decision to enter combat was an opponent's fiscal might. To proxy for enemy strength, coalition populations were calculated as sums of (available) total populations for coalition countries in the years that conflicts began. Non-overlapping coalition populations were summed if sample countries simultaneously fought multiple conflicts.

Financial factors also influenced the composition of military coalitions. Tilly (1990) argues that England, the Dutch Republic (i.e., the Netherlands before 1795), and France were the major European powers over the seventeenth to nineteenth centuries. Other states were available for hire as mercenaries. A binary variable that takes the value of 1 for each year that a country fought as part of an alliance with England, the Dutch Republic, or France accounts for this effect.

Financial conditions affected postwar outcomes as well. Data limitations preclude the use of figures for debt levels or currency debasements. However, systematic information is available for defaults, an extreme reaction to fiscal crisis that caused widespread damage to the financial sector and to the economy as a whole. Hoffman and Rosenthal (1997) argue that monarchs resorted to default as a way to handle large debt burdens accumulated during wars. A binary variable that takes the value of 1 for each episode of default on external debt according to Reinhart et al. (2003, table 2) measures this effect.[6]

[5] See Hoffman and Rosenthal (1997), Rosenthal (1998), and Lindert (2004, ch. 2). Also see Chapter 8.

[6] This source was supplemented with others. See Appendix 3.

Table 7.1 lists combatants, coalitions, and deaths for external conflicts in Europe from 1650 to 1913. On average, warfare led to more than 50,000 military deaths per conflict year and involved coalition populations of more than 25 million.[7] The least deadly conflict was the Spanish War (1727–9), with a yearly average of 269 military deaths. The deadliest year took place in 1809, when 600,000 soldiers died on the peninsular and Austrian fronts of the Napoleonic Wars (1803–15). The populations of Bosnia and Herzegovina made up the smallest coalition, at slightly more than 1 million inhabitants, during the Austrian conquest (1878). The largest coalition was Austria, France, and Spain, at 88 million inhabitants, during the First Italian War of Independence (1848–9). On average, countries formed military alliances with England, the Dutch Republic, or France in 10 percent of the years from 1650 to 1913. Spain fought most often (11 times) as an ally of one of the major European powers. The average government defaulted in 1 percent of the years from 1650 to 1913. France and Spain tied for the most default episodes over this period (7 times each). Nearly all French and Spanish defaults were related to armed conflicts.

We must also consider the fiscal impact of internal conflicts, which disrupted tax flows. A binary variable that takes the value of 1 for each year of civil war, coup, or revolution according to Clodfelter (2002) and the *Encyclopedia Britannica* (2010) accounts for this factor. Table 7.2 lists internal conflicts in Europe from 1650 to 1913. On average, states experienced domestic turmoil in 3 percent of the years from 1650 to 1913. Not surprisingly, England had the fewest internal conflicts over this period (2 events), while Portugal and Spain had the most (11 and 10 events, respectively).

Mokyr (1998, 1999) characterizes the Industrial Revolution as having had two phases. The first took place in Britain from around 1750 to 1825, and the second in continental Europe and North America from around 1870 to 1913.[8] As described in Chapter 5, systematic data for export earnings, wages, or measures of national production are not available, and modern reconstructions of pre-1815 GDP data tend toward educated guesses at best. Hohenberg and Lees (1985), Bairoch (1988), and Acemoglu et al. (2005), however, argue that there was a close relationship between urbanization rates and economic performance. A variable that calculated urban populations as fractions of total populations from

[7] Table 7.3 displays the descriptive statistics for the conflict-related controls.

[8] Old Regime economies were relatively stagnant. See Rosenthal (1992), Hoffman and Norberg (1994a), and Hoffman and Rosenthal (1997).

TABLE 7.1. *External Conflicts in Europe, 1650–1913*

| Conflict | Years | Combatants and Coalitions | Deaths/Year |
|---|---|---|---|
| Franco-Spanish War | 1648–59 | Fra vs. Spa | 0.007 |
| First Anglo-Dutch War | 1652–4 | Eng vs. Fra, Net | 0.017 |
| First Northern War | 1655–60 | Aus, Den, Pol, Rus vs. Swe | NA |
| Anglo-Spanish War | 1655–9 | Eng vs. Spa | NA |
| Portuguese-Spanish War | 1661–8 | Por vs. Spa | NA |
| Habsburg-Ottoman War | 1663–4 | Aus vs. Tur | 0.085 |
| Second Anglo-Dutch War | 1665–7 | Eng vs. Den, Fra, Net | 0.049 |
| War of Devolution | 1667–8 | Eng, Net, Spa, Swe vs. Fra | 0.020 |
| Third Anglo-Dutch War | 1672–4 | Eng, Fra vs. Net | 0.023 |
| Franco-Dutch War | 1672–9 | Eng, Fra, Swe vs. Den, Net, Spa | 0.045 |
| Habsburg-Ottoman War | 1683–9 | Aus, Pol vs. Tur | 0.125 |
| French conquest of Luxembourg | 1684 | Fra, Net vs. Spa | 0.020 |
| War of Grand Alliance | 1688–97 | Aus, Eng, Net, Por, Spa vs. Fra | 0.081 |
| Great Northern War | 1700–21 | Den, Pru, Pol, Rus vs. Swe | 0.318 |
| War of Spanish Succession | 1701–14 | Aus, Eng, Net, Por, Pru vs. Fra, Spa | 0.162 |
| Venetian-Austrian-Turkish War | 1714–18 | Aus vs. Tur | 0.280 |
| War of Quadruple Alliance | 1718–20 | Aus, Eng, Fra, Net vs. Spa | 0.150 |
| Spanish War | 1727–9 | Eng, Fra vs. Spa | 0.003 |
| War of Polish Succession | 1733–5 | Aus, Rus vs. Fra, Pru, Spa | 0.313 |
| Austro-Russian-Turkish War | 1735–9 | Aus, Rus vs. Tur | 0.240 |
| War of Austrian Succession | 1740–8 | Aus, Eng, Net, Rus vs. Fra, Pru, Spa | 0.289 |
| Russo-Swedish War | 1741–3 | Rus vs. Swe | 0.019 |
| Seven Years' War | 1756–63 | Aus, Fra, Rus, Spa, Swe vs. Eng, Por, Pru | 0.858 |
| Corsican War | 1768–9 | Cor vs. Fra | 0.050 |
| War of Bavarian Succession | 1778–89 | Aus vs. Pru | 0.016 |
| Russo-Swedish War | 1788–90 | Rus vs. Swe | 0.033 |
| War of the First Coalition | 1792–7 | Aus, Eng, Net, Por, Pru, Spa vs. Fra | 0.325 |
| War of the Second Coalition | 1798–1801 | Aus, Eng, Pru, Rus, Tur vs. Fra, Net | 0.386 |

(*continued*)

TABLE 7.1 *(continued)*

| Conflict | Years | Combatants and Coalitions | Deaths/Year |
|---|---|---|---|
| Napoleonic Wars | 1803–15 | | |
| War of the Third Coalition | 1805–7 | Aus, Eng, Pru, Rus, Swe vs. Fra, Net, Pol | 2.333 |
| Peninsular War | 1807–14 | Eng, Por, Spa vs. Fra, Net | 3.000 |
| Austrian War | 1809 | Aus vs. Fra, Net | 3.000 |
| Russian Campaign | 1812 | Aus, Den, Rus vs. Fra, Net, Pol | 1.500 |
| Leipzig Campaign | 1813 | Eng, Pru, Rus, Swe vs. Fra, Net | Included in Russian Campaign total. |
| Campaign in France | 1814 | Eng, Net, Rus, Pru, Swe vs. Fra | Included in Russian Campaign total. |
| Austrian Campaign | 1815 | Aus vs. Fra | 0.600 |
| Waterloo Campaign | 1815 | Aus, Eng, Net, Por, Pru, Spa vs. Fra | Included in Austrian Campaign total. |
| Russo-Swedish War | 1808–9 | Rus vs. Swe | 0.031 |
| Riego Rebellion | 1823 | Fra vs. Spa | 0.065 |
| Belgian War of Independence | 1830–3 | Bel. Eng, Fra vs. Net | 0.007 |
| Austro-Sardo War | 1848–9 | Aus vs. Sar | 0.100 |
| First Italian War of Independence | 1848–9 | Aus, Fra, Spa vs. Ita | 0.055 |
| First Schleswig-Holstein War | 1848–9 | Den, Swe vs. Pru | 0.030 |
| Crimean War | 1853–6 | Eng, Fra, Tur vs. Rus | 1.538 |
| Franco-Austrian War | 1859 | Aus vs. Fra | 0.196 |
| Second Italian War of Independence | 1859–61 | Aus vs. Ita | 0.010 |
| Second Schleswig-Holstein War | 1864 | Aus, Pru vs. Den | 0.042 |
| Austro-Prussian War | 1866 | Aus vs. Ita, Pru | 0.164 |
| Battle of Mentana | 1867 | Fra vs. Ita | 0.013 |
| Franco-Prussian War | 1870–1 | Fra vs. Pru | 0.918 |
| Austrian conquest of Bosnia | 1878 | Aus vs. Bos | 0.035 |

*Note*: Average war deaths per year of conflict are in hundreds of thousands. Country abbreviations are Austria (Aus), Belgium (Bel), Bosnia (Bos), Corsica (Cor), Denmark (Den), England (Eng), France (Fra), Italy (Ita), the Netherlands (Net), Poland (Pol), Portugal (Por), Prussia (Pru), Russia (Rus), Sardinia (Sar), Spain (Spa), Sweden (Swe), and Turkey (Tur). For further details, see text and Appendix A.3.
*Source*: Clodfelter (2002).

TABLE 7.2. *Internal Conflicts in Europe, 1650–1913*

| | Years | Event |
|---|---|---|
| Austria | 1848 | Year of Revolutions |
| Belgium | 1789–90 | Brabant Revolution |
| | 1830 | Belgian Revolution |
| Denmark | 1848 | Year of Revolutions |
| England | 1649–51 | Third English Civil War |
| | 1688 | Glorious Revolution |
| France | 1789–99 | French Revolution |
| | 1799 | Coup by Napoleon I |
| | 1815 | Bourbon Restoration |
| | 1830 | July Revolution |
| | 1848 | Year of Revolutions |
| | 1851 | Coup by Napoleon III |
| | 1870 | Fall of Second Empire |
| | 1871 | Paris Commune |
| Italy | | No internal conflicts from 1861 to 1913 |
| Netherlands | 1785 | Batavian Revolution |
| | 1814–15 | Establishment of Dutch Kingdom |
| | 1830 | Belgian Revolution |
| | 1848 | Year of Revolutions |
| Portugal | 1808 | Revolution of 1808 |
| | 1820 | Revolution of 1820 |
| | 1820–3 | First Civil War of Portuguese Revolution |
| | 1823 | Coup of 1823 |
| | 1827–8 | Miguelite Insurrection |
| | 1832–4 | Second Civil War of Portuguese Revolution |
| | 1836 | Coup of 1836 |
| | 1846–7 | Third Civil War of Portuguese Revolution |
| | 1849 | Costa Cabral coup |
| | 1851 | Saldanha coup |
| | 1910 | Establishment of First Portuguese Republic |
| Prussia | 1848 | Year of Revolutions |
| Spain | 1820 | Coup of 1820 |
| | 1823 | Restoration of 1823 |
| | 1833–9 | First Carlist War |
| | 1843 | Moderate coup |
| | 1847–9 | Matiners' (Second Carlist) War |
| | 1854 | Rebellion of 1854 |
| | 1863 | Government collapse of 1863 |

(*continued*)

TABLE 7.2 *(continued)*

| | Years | Event |
|---|---|---|
| | 1868–70 | Glorious Revolution |
| | 1872–6 | Third Carlist War (including Restoration of 1874) |
| | 1909 | La Semana Trágica |
| Sweden | 1772 | Coup of 1772 |
| | 1792 | Assassination of Gustav III |
| | 1809 | Coup against Gustav IV |

*Note*: All internal conflicts listed as civil wars, coups, or revolutions are included.
*Source*: See Appendix A.3.

De Vries (1984) proxies for income growth. This variable also captures country-specific rates of technological innovation and adoption. In addition, to further diminish the impact of the Second Industrial Revolution in continental Europe, regressions were performed for the period before 1870.

Beck (2008) argues that well-specified models often do not require fixed effects by unit or time. Rather than conclude that public finances were poor in Old Regime France simply because it was Old Regime France, for instance, or that 1789 was a volatile year simply because it was 1789, one wishes to explain fiscal effects in terms of substantive variables. The econometric framework spans four centuries of politics, external and internal conflicts, income growth, fiscal and monetary policies, and other elements. To round out this analysis, country fixed effects were introduced to capture constant but unmeasured features of states (e.g., culture, geography) that remained.

The database typically has observations for several centuries for Group 1 (and certain Group 2) countries. Greene (2000) and Wooldridge (2003) argue that fixed effects impose large costs in terms of lost degrees of freedom when time spans are long. Furthermore, Wooldridge claims that time dummies work best when the ratio of annual observations per country is small relative to the total number of countries. Since these ratios are very large here, the fixed-effects approach is problematic.

Focusing on the inclusion of substantive variables is thus the best econometric strategy in this context. Old Regime economies were typically agricultural and subsistence based. Persson (1999), Jacks (2005), and Keller and Shiue (2007) argue that market integration at both the national and international levels was poor. Warfare was by far the most

salient type of widespread shock during a given year. The regression setup includes four war-related variables: battle deaths, coalition populations, mercenary status, and defaults. A binary variable for the Old Regime that captures the basic environmental differences between the period before the French Revolution and the nineteenth century supplements these and other substantive controls. This variable, which took the value of 1 for each year through 1788, not only conserved the maximum degrees of freedom, but divided the sample into two parts with roughly equal amounts of observations between them. As described in Chapter 3, Hoffman and Rosenthal (2000) argue that a fundamental shift in the nature of warfare took place around 1800, and there were fewer wars during the nineteenth century than before. Furthermore, Persson (1999), Jacks (2005), and Keller and Shiue (2007) claim that there were dramatic improvements in market integration over the 1800s. The Second Industrial Revolution also occurred during the latter part of the nineteenth century.[9] Thus, 1789 represents a natural cutoff year.

Some controls apply to only certain fiscal outcome variables. Bordo and Rockoff (1996) and Obstfeld and Taylor (2003) argue that adherence to the classic gold standard was a valuable signal of fiscal prudence. A binary variable that takes the value of 1 for each year that a country was on gold in the regressions for yield spreads and deficit ratios controls for this effect. Since states like Spain shadowed the gold standard but never made an official commitment to it, the coding for this variable is subjective. The present analysis uses the years in which currencies became de facto and de jure convertible into gold according to Meissner (2005, table 1). Bordo and Rockoff (1996) and Obstfeld and Taylor (2003) also control for "global" interest rate shocks that affected yield spreads in European asset markets in a given year. To account for systematic risk, an average yield spread was computed using the available data for all sample countries over the "safe" British consol in the regressions for yield spreads.

Another control is particular to the regressions for per capita revenues. The conversion of currency units into gold grams reduced inflation effects. Although the world gold stock was relatively stable through the early 1800s, large discoveries of gold in California and Australia around 1850 led to a dramatic increase. A variable from Velde and Weber (2000) that calculates the yearly change in the cumulative world gold stock measures this impact.

[9] As noted earlier, the data are also restricted to the period before 1870 to reduce the effects of this event.

TABLE 7.3. *Descriptive Statistics for Control Variables*

| | Obs | Mean | Std Dev | Min | Max |
|---|---|---|---|---|---|
| War deaths | 2,574 | 0.51 | 0.89 | 0.003 | 6 |
| Enemy coalition size | 2,574 | 2.64 | 1.64 | 00.12 | 8.76 |
| Mercenary dummy | 2,574 | 0.10 | 0.30 | 0 | 1 |
| Default dummy | 2,574 | 0.01 | 0.10 | 0 | 1 |
| Internal war dummy | 2,574 | 0.03 | 0.16 | 0 | 1 |
| Urbanization rate | 2,574 | 0.14 | 0.10 | 0.02 | 0.46 |
| Old Regime dummy | 2,574 | 0.49 | 0.50 | 0 | 1 |
| Gold standard dummy | 2,574 | 0.17 | 0.38 | 0 | 1 |
| Average credit risk | 1,674 | 227 | 183 | −101 | 948 |
| Change in gold stock | 2,565 | 2.96 | 4.88 | 0.23 | 22.67 |
| Railway nationalization dummy | 2,574 | 0.01 | 0.11 | 0 | 1 |

*Note*: See text and Appendix A.3 for details about the control variables.
*Source*: See Appendix A.3.

A final control pertains to the regressions for deficit ratios. As already noted, military spending dominated national budgets through at least 1815. One of the key types of non-military public goods that nineteenth-century governments began to provide was transportation infrastructure, and above all railway networks.[10] The state operation of railways was typically a major undertaking, with notable implications for government budgets. A binary variable that takes the value of 1 for each year that a nationalization occurred according to Bogart (2009, table 1) accounts for this effect.

Table 7.3 displays the descriptive statistics for the controls. Mean urban populations constituted 14 percent of total populations. The lowest urbanization rates were 2 percent for Austria in the 1650s, while the highest were more than 40 percent for England from the 1870s onward. The average country was on the gold standard for 17 percent of sample years. England adhered to gold for the longest time, from 1774 to 1797 and from 1821 onward. Mean systematic risk was 227 basis points. Driven by the Dutch Republic, the lowest "global" spreads were during the 1780s and were negative (−101 basis points). The highest (948 basis points) took place during the Napoleonic Wars in 1811. The average

[10] Chapter 8 returns to this theme.

yearly increase in the cumulative world gold stock was nearly 3 million troy ounces. The smallest annual change (230,000 troy ounces) occurred from 1650 to 1651, and the largest (22.67 million troy ounces) from 1911 to 1912. On average, railway nationalizations took place in 1 percent of sample years. Austria, Belgium, and Germany tied for the most nationalization events over this period (six times each).

The econometric framework assumes that is possible to systematically disentangle the fiscal effects of political transformations from external and internal conflicts, economic growth, fiscal and monetary policies, country- and time-specific effects, and other elements. Since political regimes influenced each of these factors, coefficients on the controls rather than on the regime variables themselves may capture some of the positive effects of institutional change. In turn, the regime coefficients are likely to be underestimates of the total impact of political transformations. The results of the regression analysis will thus be stronger than otherwise if they still indicate that political transformations had significant positive effects on the fiscal variables of interest.

### 7.1.3. *Reverse Causation?*

Before describing the results of the econometric analysis, it is useful to consider the possibility of reverse causation from fiscal outcomes back to political transformations.[11] For instance, did high yield spreads affect government decisions to implement centralized tax institutions or limited government?

Endogeneity poses an econometric problem that is notoriously difficult to resolve. Political transformations, however, were largely exogenous to the various fiscal indicators. As described in Chapter 2, the establishment of uniform tax systems was often the result of radical, externally imposed reform. In the German territories, in the Low Countries, and on the Italian (and to a lesser extent, the Iberian) peninsula, fiscal centralization was the result of French conquest from 1792 onward.[12] Indeed, Acemoglu et al. (2009a) study this case as a quasi-natural experiment to test the long-term economic effects of the French Revolution.

Elsewhere, fiscal centralization often took place in the midst of large-scale administrative reforms that established new state bureaucracies.

[11] Reverse causation is one instance of simultaneity problems, which also include selection bias and measurement error. For an overview, see Persson and Tabellini (2003, chs. 5, 8).

[12] A similar argument holds for the establishment of uniform institutions in England after the Norman Conquest of 1066. See Brewer (1989, pp. 3–7).

Major institutional changes, moreover, typically occurred during times of economic, political, and social upheaval. The establishment of a uniform tax system in France itself during the Revolution (1789–99) illustrates the confluence of such factors, as does the case of Prussia during the Napoleonic Wars (1803–15), Austria during the Year of Revolutions (1848), and Portugal and Spain near times of civil wars.

A similar claim can be made with respect to the establishment of limited government. Berger and Spoerer (2001) examine the causes of the 1848 Year of Revolutions across 27 European countries. They argue that short-term grain shocks, and not the lack of representative institutions (or by extension, poor fiscal policies), were the key source of upheaval. More generally, Acemoglu et al. (2009b) find that economic development does not cause transitions to democracy. Rather, important historical junctures, such as the French Revolution or the Revolutions of 1848, set countries on divergent politico-economic paths.[13]

The last point relates to the exact timing of institutional change. The historical evidence suggests that states did not undertake political transformations in response to fiscal indicators, but that reforms were the result of exogenous shocks or the confluence of particular economic, geographical, political, and social factors. Even if political reforms did occur due to the state of public finances, however, the precise date of institutional change was unpredictable and subject to chance.

The Glorious Revolution of 1688 in England illustrates this argument.[14] Upon the death of Charles II in 1685, James II became king. Protestant elites were greatly troubled by the fact that James II was a devout Catholic with strong ties to France. The year 1688 was also the start of the War of the Grand Alliance, fought between France and a European-wide coalition including William III of Orange (who was crowned king of England alongside Queen Mary in 1689, after James II was deposed). One can argue that the coming together of particular events at a certain point in time (or, in a nutshell, chance) brought about limited government in England in 1688, but not before. Several previous attempts at institutional change failed, including the 1685 rebellion led by the duke of Monmouth. By this logic, one can also make the case that constitutional reform in England could have occurred on any number of occasions from 1640 to 1700, or not at all. Indeed, Pincus (2009) claims that

[13] Also see Moore (1966).

[14] Holmes (1993) and Smith (1997) provide general descriptions of English political events over the sixteenth and seventeenth centuries. Also see the citations listed in Chapter 3. Thanks to Daniel Bogart for insights on this topic.

the Glorious Revolution was contingent and not pre-ordained.[15] Similar arguments apply to France in 1789, the Year of Revolutions in 1848, and other critical junctures (see the earlier discussion). Highlighting the key role that chance plays in the particular timing of institutional change thus strengthens the argument that political transformations were largely exogenous to public finances.

### 7.2. Sovereign Credit Risk: Results

Sovereign credit functions as a concise statistic of a country's fiscal health. To assess the broad ways in which political regimes affected public finances, this section discusses the findings for the regressions that use yield spreads on government bonds as the dependent variable.[16]

Table 7.4 displays the results of this analysis. Column (1) includes the standard set of control variables. The findings indicate that political transformations had significant positive effects on credit risk for Group 1 countries. The move from the fragmented and absolutist regime to the centralized and absolutist one decreased yield spreads by more than 180 basis points, the move to the fragmented and limited one by nearly 370 basis points, and the move to the centralized and limited one by more than 200 basis points. Each coefficient is significant at the 1 percent level.

How about the controls? Enemy coalition size had a significant negative impact on credit risk. This finding suggests that spreads rose when states faced larger opponents, as the likelihood of defeat was higher. Facing the largest coalition (87.6 million) versus the smallest (1.2 million) increased spreads by almost 80 basis points. Surprisingly, war deaths had a significant positive effect on credit risk.[17] Due to their destructive impact, internal conflicts had a significant negative effect, increasing spreads by more than 90 basis points relative to periods of internal peace. Common shocks to European asset markets also led to significant increases in credit risk. Although adherence to the gold standard was associated with a large significant decrease in spreads, this result was not robust across specifications. Finally, mercenary status, defaults, and urbanization rates typically had negligible impacts on credit risk.

[15] Also see Mokyr (2010).

[16] The do-file for the regressions in this chapter is available at the website http://sites.google.com/site/mdincecco/.

[17] However, the use of a binary variable that does not distinguish between coalition populations and military deaths but simply takes the value of 1 for years of external conflicts had a significant negative effect on credit risk. See Dincecco (2009b).

TABLE 7.4. *Regression Results for Political Regimes and Sovereign Credit Risk*

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Centralized and absolutist regimes | −184*** | −172** | −170*** | −190*** | −56 | −165** |
| | (62.22) | (78.02) | (68.80) | (55.90) | (62.48) | (79.74) |
| Fragmented and limited regimes | −369*** | −275*** | −306*** | −293*** | −55 | −269*** |
| | (64.78) | (63.05) | (56.89) | (46.29) | (52.08) | (65.91) |
| Centralized and limited regimes | −203*** | −214** | −361*** | −185*** | −58 | −196** |
| | (64.35) | (88.53) | (80.03) | (59.12) | (66.47) | (88.89) |
| War deaths | −22*** | −18*** | −19*** | −14*** | −27*** | −20*** |
| | (3.65) | (3.26) | (3.41) | (3.71) | (2.84) | (3.12) |
| Enemy coalition size | 9*** | 11*** | 12*** | 11*** | 14*** | 12*** |
| | (2.24) | (2.04) | (2.06) | (1.90) | (1.88) | (1.86) |
| Mercenary dummy | 18 | 19 | 14 | 25 | 0.61 | 12 |
| | (47.55) | (45.32) | (39.72) | (32.63) | (36.45) | (38.41) |
| Default dummy | 54 | 51 | 48 | 126*** | 20 | 48 |
| | (47.44) | (45.96) | (40.15) | (30.85) | (33.27) | (45.56) |
| Internal war dummy | 91*** | 71*** | 59*** | 70*** | 28 | 68*** |
| | (28.40) | (27.80) | (23.28) | (20.36) | (22.45) | (27.60) |
| Urbanization rate | −33 | −567* | 86 | −564* | −654* | −373 |
| | (110.00) | (340.33) | (311.55) | (330.17) | (344.60) | (275.78) |
| Gold standard dummy | −82*** | 43 | 85*** | | 3 | −12 |
| | (25.94) | (28.08) | (26.56) | | (20.10) | (15.38) |
| Average credit risk | 0.25*** | 0.28*** | 0.26*** | 0.21*** | 0.30*** | 0.28*** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |

(*continued*)

| | | | | | | |
|---|---|---|---|---|---|---|
| Old Regime dummy | | −87* | −80** | −114*** | −45* | −80* |
| | | (45.19) | (39.53) | (33.13) | (27.11) | (26.50) |
| Country fixed effects | No | Yes | Yes | Yes | Yes | Yes |
| Groups | 1 | 1 | 1 | 1 | 1 and 2 | 1 and 2, excluding Denmark, Portugal |
| Years | 1750–1913 | 1750–1913 | 1750–1913 | 1750–1869 | 1750–1913 | 1750–1913 |
| Regimes | Standard | Standard | Five-year lag | Standard | Standard | Standard |
| Observations | 506 | 506 | 506 | 294 | 863 | 686 |
| *R*-squared | 0.24 | 0.40 | 0.43 | 0.52 | 0.23 | 0.38 |

*Note*: The dependent variable is the yearly yield spread against the British consol in basis points. The estimation technique is ordinary least squares with panel-corrected standard errors. A common AR1 term corrects for serial correlation. Standard errors are in parentheses. Group 1: Austria, France, the Netherlands, Prussia, and Spain. Group 2: Belgium, Denmark, Italy, Portugal, and Sweden. For further details, see text.
*Significant at 10%; **Significant at 5%; ***Significant at 1%.
*Source*: See text.

Column (2) adds the fixed effects by country and the dummy variable for the Old Regime. The impacts of the moves to the centralized and absolutist regime and the centralized and limited one on credit risk are similar in magnitude and significance to those shown in Column (1). Although the effect of the move to the fragmented and limited one falls by nearly 100 basis points, it remains highly significant. Surprisingly, the Old Regime is associated with a significant reduction in yield spreads. The Dutch Republic, which received loans at very low rates of interest, drives this result (see Chapter 4).

To allow for uncertainty among investors and taxpayers over whether new constitutions would last, Column (3) lags the start years of limited regimes by five years. The effects of the moves to the centralized and absolutist regime and the fragmented and limited one on credit risk remain similar in magnitude and significance to those shown in Column (2). The move to the centralized and limited regime now leads to a reduction in yield spreads of more than 360 basis points.

Recall from Section 7.1.2 that urbanization rates control for income effects. The impact of this variable on yield spreads is not robust across specifications. To further mitigate the impact of the Second Industrial Revolution, Column (4) restricts the data to the period before 1870. The effects of political transformations on credit risk are again similar in magnitude and significance to those shown in Column (2). Notably, defaults had a significant negative effect for the pre-1870 period, increasing spreads by nearly 130 basis points.

Column (5) adds Group 2 countries in the full specification that includes the standard set of controls plus the country fixed effects and the Old Regime dummy. Although the effects of political regimes on credit risk are positive, they are insignificant. This finding suggests that political transformations had larger fiscal impacts for core states, but weaker effects for the periphery. However, recall the anomalous nature of Danish and Portuguese yield spreads, which did not decrease by much over political regimes (see Table 4.2). Column (6) excludes the Danish and Portuguese data. This change restores the results from Columns (1) to (4). Once more, political transformations have significant positive effects, decreasing yield spreads by 165 to 270 basis points.

In total, this set of econometric tests provides further statistical proof that political transformations led to significant reductions in sovereign credit risk. The positive impact on yield spreads is typically large and robust to the specification. By explicitly controlling for historical factors beyond political regimes, the regression results bolster those of the case

studies and structural breaks tests. Likewise, the findings verify the effects of external and internal conflicts and other elements on credit risk.

## 7.3. Two Mechanisms: Results

We now turn to the results of the econometric tests for two mechanisms through which credit reductions occurred: increases in government revenues per head and improvements in fiscal prudence.

### 7.3.1. *Government Revenues*

Table 7.5 displays the results for the regressions that use per capita revenues as the dependent variable. Column (1) includes the standard set of control variables. The findings indicate that political transformations had significant positive effects on revenues for Group 1 and 2 countries. The move from the fragmented and absolutist regime to the centralized and absolutist one increased revenues per head by 10 percent, the move to the fragmented and limited one by more than 30 percent, and the move to the centralized and limited one by 40 percent. Each coefficient is highly significant.

How about the controls? Enemy coalition size had a significant positive effect on per capita revenues. This finding suggests that states responded to opponent strength. Facing the largest coalition (87.6 million) versus the smallest (1.2 million) increased revenues by almost 20 percent. Income growth also had a significant positive impact. Moving from the smallest urbanization rate (0.02) to the largest (0.49) increased revenues by nearly 190 percent. Changes in the world gold stock led to significant increases in revenues as well. By contrast, internal conflicts had a significant negative impact, decreasing revenues by 6 percent. Finally, war deaths and mercenary status had negligible impacts on revenues.[18]

Column (2) adds the fixed effects by country and the dummy variable for the Old Regime. The effects of political transformations on per capita revenues are similar in magnitude and significance to those shown in Column (1). Not surprisingly, the Old Regime had a significant negative impact, decreasing revenues by 18 percent relative to the nineteenth century. Column (3) lags the start years of limited regimes by five years to allow for uncertainty among investors and taxpayers over whether new constitutions would last. The revenue effects of political transformations remain similar in magnitude and significance to those shown in Columns (1) and (2).

[18] Since defaults could be endogenous to revenue levels, they were omitted as a control from this set of regressions.

TABLE 7.5. *Regression Results for Political Regimes and Per Capita Revenues*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Centralized and absolutist regimes | 0.10** | 0.11*** | 0.13*** | 0.04 | 0.15** | 0.06 | 0.23*** |
| | (0.05) | (0.04) | (0.04) | (0.06) | (0.07) | (0.06) | (0.06) |
| Fragmented and limited regimes | 0.33*** | 0.36*** | 0.35*** | 0.19*** | 0.34*** | 0.48*** | 0.75*** |
| | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.10) | (0.09) |
| Centralized and limited regimes | 0.40*** | 0.44*** | 0.41*** | 0.18** | 0.35*** | 0.40*** | 0.65*** |
| | (0.06) | (0.05) | (0.05) | (0.08) | (0.09) | (0.07) | (0.07) |
| War deaths | −0.01 | −0.01 | −0.01 | −0.01 | −0.01 | −0.01 | −0.02* |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Enemy coalition size | 0.02*** | 0.01*** | 0.01*** | 0.01*** | 0.02*** | 0.01*** | 0.02*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Mercenary dummy | −0.03 | −0.03 | −0.03 | −0.03 | −0.03 | −0.03 | −0.03 |
| | (0.02) | (0.02) | (0.02) | (0.03) | (0.04) | (0.03) | (0.04) |
| Internal war dummy | −0.06*** | −0.06*** | −0.04** | −0.07*** | −0.08*** | −0.06*** | −0.07*** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Urbanization rate | 4.27*** | 3.42*** | 3.40*** | 4.47*** | 4.77*** | 3.70*** | 3.44*** |
| | (0.28) | (0.31) | (0.31) | (0.48) | (0.49) | (0.37) | (0.32) |
| Change in gold stock | 0.03*** | 0.03*** | 0.03*** | 0.04*** | 0.02* | 0.02*** | 0.01*** |
| | (0.00) | (0.00) | (0.00) | (0.01) | (0.01) | (0.01) | (0.00) |
| Old Regime dummy | | −0.18*** | −0.18*** | −0.21*** | −0.29*** | −0.15*** | −0.27*** |
| | | (0.04) | (0.04) | (0.03) | (0.03) | (0.04) | (0.05) |

(*continued*)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Country fixed effects | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Groups | 1 and 2 | 1 and 2 | 1 and 2 | 1 and 2 | 1 and 2, excluding Prussia | 1 | 1, excluding Prussia |
| Years | 1650–1913 | 1650–1913 | 1650–1913 | 1650–1869 | 1650–1869 | 1650–1913 | 1650–1913 |
| Regimes | Standard | Standard | Five-year lag | Standard | Standard | Standard | Standard |
| Observations | 1,737 | 1,737 | 1,737 | 1,257 | 1,075 | 1,243 | 1,017 |
| *R*-squared | 0.13 | 0.44 | 0.45 | 0.50 | 0.62 | 0.31 | 0.48 |

*Note*: The dependent variable is the natural logarithm of yearly per capita revenues in gold grams. The estimation technique is ordinary least squares with panel-corrected standard errors. A common AR1 term corrects for serial correlation. Standard errors are in parentheses. Group 1: Austria, England, France, the Netherlands, Prussia, and Spain. Group 2: Belgium, Denmark, Italy, Portugal, and Sweden. For further details, see text.
*Significant at 10%; **Significant at 5%; ***Significant at 1%.
*Source*: See text.

As already described, income growth as captured by urbanization rates had a significant positive impact on per capita revenues. To further diminish the impact of the Second Industrial Revolution, Column (4) limits the data to the period before 1870. The revenue effects of the moves to the fragmented and limited regime and the centralized and limited one fall by 16 to 23 percentage points relative to those shown in Column (3) but remain highly significant. Although the impact of the move to the centralized and absolutist regime is positive, it becomes insignificant. Given the anomalous nature of public finances in Prussia (see Chapter 5), Column (5) excludes the Prussian revenue data for the regression on the pre-1870 panel. This change restores the significance (at the 5 percent level) of the impact of the move to the centralized and absolutist regime. The magnitudes of the effects of political transformations on per capita revenues are similar to those shown in the first three columns.

Column (6) restricts the sample to Group 1 countries in the full specification that includes the standard set of controls plus the country fixed effects and the Old Regime dummy. The revenue effects of the moves to the fragmented and limited regime and the centralized and limited one remain similar in magnitude and significance to those shown in Columns (1) to (3). Although the impact of the move to the centralized and absolutist regime remains positive, it becomes insignificant. Recall that Prussian public finances were anomalous (see earlier discussion and Chapter 5). Column (7) excludes the Prussian revenue data from the Group 1 sample. This change restores the significance (at the 1 percent level) of the revenue effect of the move to the centralized and absolutist regime. Indeed, political transformations have the strongest impacts yet. Now the shift from the fragmented and absolutist regime to the centralized and absolutist one leads to an increase in revenues per head of more than 20 percent, the shift to the fragmented and limited one by 75 percent, and the shift to the centralized and limited one by 65 percent.

Overall, this set of regressions offers additional statistical proof that increases in government funds were one channel through which political transformations improved public finances. The positive effect on per capita revenues is generally large and robust to the specification. By explicitly accounting for historical factors beyond political regimes, the econometric findings reinforce those of the case studies and structural breaks tests. Similarly, the results confirm the impacts of external and internal conflicts and income growth on government revenues.

### 7.3.2. *Deficit Ratios*

Table 7.6. displays the results for the regressions that use deficit ratios as the dependent variable.[19] Column (1) includes the standard set of control variables. The findings indicate that political transformations had significant positive effects on deficit ratios for Group 1 countries. The move from the fragmented and absolutist regime to the fragmented and limited one decreased deficit ratios by 0.21, and the move to the centralized and limited one by 0.07, both significant at the 1 percent level.

Although the move to the centralized and absolutist regime also has a positive effect on deficit ratios, it is insignificant. This result captures the tension between the pro and con impacts of fiscal centralization. Recall from Chapter 5 that larger revenues should have made it easier to pursue sound fiscal policies (e.g., France under Napoleon), but the consolidation of fiscal powers by executives may have had an adverse fiscal effect through wasted spending (e.g., the Netherlands under William I). Column (2) excludes the anomalous Prussian deficit data from the Group 1 sample (see the preceding section and Chapter 5). The impact of the move to the centralized and absolutist regime on deficit ratios is now significant at the 10 percent level. Furthermore, the fiscal effects of the moves to the fragmented and limited regime and the centralized and limited one are similar in magnitude and significance to those shown in Column (1).

How about the controls? Enemy coalition size had a significant negative impact on deficit ratios. This finding, like that for per capita revenues, suggests that states responded to opponent strength. Facing the largest coalition (87.6 million) versus the smallest (1.2 million) increased deficit ratios by 0.52. The result for war deaths is again surprising. As for sovereign credit risk, they had a significant positive effect on deficit ratios. Mercenary status also had a significant positive effect on deficit ratios, but only for the specifications that excluded the Prussian data. Internal conflicts had a significant negative impact, increasing deficit ratios by more than 0.10. By contrast, adherence to the gold standard led to a significant decrease in deficit ratios of 0.20 or more. Although urbanization rates were associated with a significant increase in deficit ratios, this result was not robust across specifications. Finally, defaults and railway nationalizations had negligible impacts on deficit ratios.

Column (3) adds the fixed effects by country and the dummy variable for the Old Regime. The positive impact of the move to the centralized

[19] Since serial correlation is not a major concern here, the AR1 term is omitted from this set of regressions. Also see Dincecco (2010a).

TABLE 7.6. *Regression Results for Political Regimes and Deficit Ratios*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Centralized and absolutist regimes | 0.00 | −0.05* | −0.03 | −0.06* | −0.04 | −0.07*** | −0.03 | −0.07* | 0.03 | −0.00 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.04) | (0.02) | (0.03) |
| Fragmented and limited regimes | −0.21*** | −0.23*** | −0.44*** | −0.44*** | −0.43*** | −0.44*** | −0.53*** | −0.54*** | −0.24*** | −0.27*** |
| | (0.05) | (0.05) | (0.05) | (0.04) | (0.05) | (0.05) | (0.06) | (0.06) | (0.03) | (0.04) |
| Centralized and limited regimes | −0.07*** | −0.11*** | −0.08*** | −0.10*** | −0.07** | −0.09** | −0.03 | −0.11** | −0.02 | −0.06** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.05) | (0.05) | (0.02) | (0.03) |
| War deaths | −0.06*** | −0.09*** | −0.05*** | −0.07*** | −0.05*** | −0.07*** | −0.06*** | −0.07*** | −0.06*** | −0.06*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) | (0.02) | (0.01) | (0.01) |
| Enemy coalition size | 0.06*** | 0.06*** | 0.06*** | 0.06*** | 0.05*** | 0.06*** | 0.06*** | 0.06*** | 0.06*** | 0.05*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.00) | (0.00) |
| Mercenary dummy | −0.01 | −0.31*** | 0.01 | 0.15*** | 0.01 | 0.16*** | −0.02 | −0.09 | −0.01 | −0.02 |
| | (0.04) | (0.07) | (0.04) | (0.06) | (0.04) | (0.06) | (0.05) | (0.07) | (0.03) | (0.03) |
| Default dummy | −0.05 | −0.12 | −0.09 | −0.10 | −0.09 | −0.10 | −0.11 | −0.12 | −0.04 | −0.05 |
| | (0.09) | (0.08) | (0.08) | (0.07) | (0.08) | (0.07) | (0.10) | (0.09) | (0.06) | (0.06) |
| Internal war dummy | 0.15*** | 0.11** | 0.26*** | 0.24*** | 0.26*** | 0.25*** | 0.34*** | 0.33*** | 0.26*** | 0.23*** |
| | (0.06) | (0.05) | (0.05) | (0.04) | (0.05) | (0.05) | (0.07) | (0.07) | (0.04) | (0.04) |
| Urbanization rate | 0.99*** | 0.71*** | -0.13 | −0.16 | −0.16 | -0.19 | −1.16*** | −1.37*** | −0.60*** | −0.58*** |
| | (0.13) | (0.13) | (0.13) | (0.14) | (0.14) | (0.14) | (0.28) | (0.30) | (0.12) | (0.13) |
| Gold standard dummy | −0.23*** | −0.20*** | −0.09*** | −0.10*** | −0.09*** | −0.11*** | 0.10*** | 0.12*** | -0.01 | −0.02 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.04) | (0.02) | (0.02) |
| RR nationalization dummy | 0.03 | 0.02 | −0.04 | −0.06 | −0.05 | −0.07 | | | −0.01 | −0.00 |
| | (0.10) | (0.10) | (0.08) | (0.09) | (0.08) | (0.09) | | | (0.04) | (0.04) |
| Old Regime dummy | | | 0.03 | 0.01 | 0.03 | 0.01 | −0.03 | −0.00 | −0.03 | −0.03 |
| | | | (0.02) | (0.03) | (0.03) | (0.03) | (0.03) | (0.04) | (0.02) | (0.02) |

(*continued*)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country fixed effects | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Groups | 1 | 1, excluding Prussia | 1 | 1, excluding Prussia | 1 | 1, excluding Prussia | 1 | 1, excluding Prussia | 1 and 2 | 1 and 2, excluding Sweden |
| Years | 1650–1913 | 1650–1913 | 1650–1913 | 1650–1913 | 1650–1913 | 1650–1913 | 1650–1869 | 1650–1869 | 1650–1913 | 1650–1913 |
| Regimes | Standard | Standard | Standard | Standard | Five-year lag | Five-year lag | Standard | Standard | Standard | Standard |
| Observations | 1,017 | 875 | 1,017 | 875 | 1,017 | 875 | 788 | 655 | 1,470 | 1,296 |
| *R*-squared | 0.09 | 0.12 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.21 | 0.19 | 0.19 |

*Notes:* The dependent variable is the yearly budget deficit-to-revenue ratio. The estimation technique is ordinary least squares with panel-corrected standard errors. Standard errors are in parentheses. Group 1: Austria, England, France, the Netherlands, Prussia, and Spain. Group 2: Belgium, Denmark, Italy, Portugal, and Sweden. For further details, see text.

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

*Source*: See text.

and limited regime on deficit ratios remains similar as before, while the positive effect of the move to the fragmented and limited one doubles in magnitude. Column (4) excludes the anomalous Prussia deficit data from this specification, and the negative coefficient on the centralized and absolutist regime from Column (3) becomes significant at the 10 percent level. The Old Regime had a negligible impact on deficit ratios.

Column (5) lags the start years of limited regimes by five years to allow for uncertainty among investors and taxpayers over whether new constitutions would last. The effects of the moves to the fragmented and limited regime and the centralized and limited one on deficit ratios are similar to those shown in Columns (3) and (4). Furthermore, the negative coefficient on the centralized and absolutist regime gains significance at the 1 percent level once the Prussia data are excluded (see Column (6)).

Recall from Section 7.1.2 that urbanization rates proxy for income effects. This variable does not display a consistent impact on deficit ratios. To further reduce the impact of the second Industrial Revolution, Column (7) restricts the data to the period before 1870. The effect of the move to the fragmented and limited regime on deficit ratios is greater than those shown in Columns (4) and (5). Although the impact of the move to the centralized and absolutist regime on deficit ratios is positive, it is again insignificant. For the first time, the positive effect of the move to the centralized and limited regimes on deficit ratios also loses significance. Column (8) excludes the anomalous Prussian deficit data, which restores the previous significant results. Now the move from the fragmented and absolutist regime to the fragmented and limited one leads to a decrease in deficit ratios of 0.54 (significant at the 1 percent level), the move to the centralized and limited one by 0.11 (significant at the 5 percent level), and the move to the centralized and absolutist one by 0.07 (significant at the 10 percent level).

Column (9) adds Group 2 countries in the full specification that includes the standard set of controls plus the country fixed effects and the Old Regime dummy. Although the impact of the move to the fragmented and limited regime on deficit ratios remains highly significant, the effects of the moves to the centralized and absolutist regime and the centralized and limited one are insignificant. This finding, which resembles that for sovereign credit risk, reinforces the argument that political transformations had larger fiscal impacts for core states, but weaker effects for the periphery. However, recall the anomalous nature of Swedish deficit ratios, which actually increased from the fragmented and absolutist regime to the centralized

and limited one (see Table 5.3). Column (10) excludes the Swedish data. This change helps restore the previous set of results. The move to the centralized and limited regime again has a significant positive effect on deficit ratios. Although the effect of the move to the centralized and absolutist regime on deficit ratios remains insignificant, it regains the negative sign.

In summary, this set of econometric tests provides further statistical proof that improvements in fiscal prudence were another channel by which political transformations enhanced public finances. The positive impact on deficit ratios is typically large and robust to the specification. By explicitly accounting for historical factors beyond political regimes, the regression results bolster those of the case studies and structural breaks tests. One caveat concerns fiscal centralization. Although the econometric analysis indicates that the positive effect of new funds generally outweighed the negative effect of the executive consolidation of fiscal powers (see Chapter 5), this finding is stronger for core Group 1 countries. Finally, the regression results highlight the impacts of external and internal conflicts, economic growth, and gold standard adherence on deficit ratios.

The econometric analysis performed in this chapter offers rigorous statistical proof that political transformations led to significant improvements in public finances, even after controlling for the effects of external and internal conflicts, economic growth, fiscal and monetary policies, country- and time-specific effects, and other elements. The first set of regressions shows that levels of sovereign credit risk under fragmented and absolutist regimes were significantly higher than those under regimes that were centralized or limited. How so? The second and third sets indicate that fragmented and absolutist regimes collected lower revenues and pursued less prudent fiscal policies than other regime types. By explicitly accounting for historical features beyond political regimes, the regression analysis serves as a statistical "seal of approval" that ratifies the results of the cases studies and structural breaks tests.

Taken in combination, the descriptive, case-study, structural breaks, and econometric evidence provides powerful support for the argument that fiscal centralization and limited government had major positive effects on public finances. The final chapter assesses the book's key findings in light of the previous literature. It also examines how political transformations changed the ways in which states spent public funds and draws historical lessons for today's emerging and advanced economies.

# 8

# The Institutional Balance of Modern Fiscal States

The qualitative and quantitative investigation performed in this book strongly indicates that political transformations had profound fiscal effects. The main findings are now assessed in light of the previous literature. The analysis then concludes by examining how political transformations changed the ways in which states spent public funds and by drawing historical lessons for today's emerging and advanced economies.

## 8.1. Assessment of Findings

Chapters 2 and 3 characterized the two fundamental political transformations that European states experienced in the past. Most Old Regime states were fiscally fragmented, or weak, in 1650. Local tax free-riding reduced the ability of national governments to gather revenues. Fiscal centralization, which generally took place after the fall of the Old Regime at the end of the eighteenth century, was the first fundamental political transformation that states underwent. However, the consolidation of fiscal powers may have exacerbated problems of executive control. Since strong rulers could still use government funds as they pleased, spending constraints were necessary. The establishment of parliamentary limits, which typically occurred during the nineteenth century, was the second fundamental political transformation that states experienced. By the eve of World War I in 1913, European states could gather large tax revenues, and rulers faced parliamentary spending constraints. The end result was a set of balanced fiscal and political institutions of the sort that characterizes modern systems of public finance in wealthy countries.

Most previous studies examine either the Old Regime (before 1789), French revolutionary and Napoleonic times (1789–1815), or the post-1815 period in isolation.[1] This parcelization overlooks the critical factors that link these different eras. The present analysis took a broad periodization that spanned the mid–seventeenth to the early twentieth centuries. This new perspective allowed the fusion of arguments for fiscal centralization and parliamentary reforms into an integrated analysis of long-run institutional change, a process that culminated in the resolution of weak- and strong-state problems alike, and not just one or the other.

The use of systematic methods of analysis was another distinguishing factor of the present investigation. Most previous works focus on particular polities or periods. This approach may overemphasize institutional features that could in reality be idiosyncratic or inconsequential. The present inquiry applied the same set of analytic tools to a new database that covered nearly a dozen sample countries. It was thus able to systematically test for the impacts of fiscal centralization and limited government both within and across European states over time.

Chapter 4 examined sovereign credit, a summary statistic of a nation's fiscal health. The descriptive and case-study evidence indicated that political transformations typically led to notable improvements in yield levels on government bonds. But how? Most previous studies analyze sovereign credit risk alone. This focus tends to neglect the direct effect of institutional changes on public finances. Chapter 5 identified two key mechanisms by which political transformations reduced credit risk: increases in government revenues per head and improvements in fiscal prudence. The inquiry was thus able to pinpoint the precise ways in which fiscal centralization and limited government affected public finances.

Case studies are by and large the dominant mode of analysis in European fiscal history. The comparative investigations that do exist are typically qualitatively oriented. This approach tends to disregard the powerful statistical tools that are available to social scientists. In Chapters 6 and 7 the data were subjected to a standard battery of rigorous tests. Structural breaks tests assumed no a priori knowledge of major turning points in the fiscal series, but let the data speak for themselves. The breaks tests provided statistical proof that political transformations were key turning points that led to significant improvements in public finances.

Generally speaking, the comparative literature does not rigorously disentangle the role of political regimes from other potential factors that

[1] See the citations listed in Chapter 1.

could affect fiscal outcomes. To systematically control for the effects of external and internal conflicts, income growth, fiscal and monetary policies, country- and time-specific effects, and other elements, regressions that exploited the panel nature of the data were performed. The results of the econometric analysis confirmed that, even after other important factors were accounted for, political transformations led to significant improvements in sovereign credit risk, government revenues, and fiscal prudence.

In total, the book's findings powerfully support the argument that fiscal centralization and limited government had major positive impacts on public finances. The final part of the analysis examines how political transformations changed the ways in which states spent public funds. It also draws historical lessons for today's emerging and advanced economies.

## 8.2. The Changing Role of Government

Advanced modern economies with balanced fiscal systems are able to gather large revenues and can channel funds toward public services with positive economic benefits. By the second half of the nineteenth century, most European states had undergone both political transformations. How did the composition of public expenditures change with the establishment of fiscally centralized and politically limited regimes? To answer, this section examines the evolution of central government spending from 1816 to 1913 for three Group 1 countries: France, the Netherlands, and Spain.[2]

Military expenditures were by far the largest component of national budgets through much of the 1800s (see Chapter 7). Spending by central governments on public services such as poor relief, unemployment compensation, health, housing, and education remained low through the start of World War I. Lindert (1994, 2004, ch. 2) attributes much of the growth in social spending to major suffrage reforms, which typically took place near the start or end of World War I (1914–18) and World War II (1939–45).[3] Although most of the regimes classified here as limited were elite democracies, parliamentary power of the purse had clear implications

[2] Cardoso and Lains (2010a) provide an overview of nineteenth-century trends in expenditure patterns in Europe.

[3] Also see Aidt et al. (2006) and Aidt and Jensen (2008) for Europe, and Husted and Kenny (1997) and Kenny and Lott (1999) for the United States. Ticchi and Vindigni (2009) claim that there is a fundamental relationship between war and suffrage.

for the composition of public expenditures.[4] Relative to absolutist regimes, limited governments should have spent smaller shares on foreign military adventures and royal consumption and greater amounts on public goods that would most benefit society. The present focus is on two non-military public services for which data are available: education and public works (e.g., transportation infrastructure).

Figure 8.1 plots the share of French government funds spent on education and public works from 1816 to 1913.[5] This share doubled from 5 to 10 percent under the short-lived centralized and limited July regime (1830–48). Napoleon III, who was first elected president in 1848, established an authoritarian regime in 1851 (see Chapters 3, 4, and 5). True to form, the share of military spending rose, peaking at 42 percent during the Crimean War (1853–6), while the share of expenditures on education and public works fell to 6 percent. Although non-military spending made a small comeback at the start of the 1860s, it fell to its lowest point (4 percent) with the onset of the Franco-Prussian War (1870–1), the second major conflict that Napoleon III fought. In the aftermath of this war, which France lost, Napoleon III was deposed and a stable centralized and limited regime was established. There was a rapid jump in the share of expenditures on education and public works, which reached 9 percent of total spending by the start of the 1880s. This share continued to increase, though at a slower rate, through 1913.

The Dutch case is similar to the French one. Figure 8.2 plots the share of government expenditures on education and public works in the Netherlands from 1816 to 1913.[6] Like Napoleon III, the absolutist ruler William I had a penchant for warfare (also see Chapters 3, 4, and 5). Although the king spent 10 percent of government funds on education and public works over the 1820s, this share was halved to 5 percent with the start of the Belgian War of Independence (1830–3). Military expenditures peaked at 46 percent during this conflict. William I also spent relatively large sums on the monarchy itself, amounting to nearly 3 percent of total yearly expenditures through 1830. When his fiscal troubles became public in 1839, William I was soon forced to abdicate. A stable

[4] Also see Chapters 3, 4, and 5. Carstairs (1980) and Flora (1983) provide time lines of franchise reforms in Europe over the nineteenth and twentieth centuries.

[5] Fontvieille (1976) provides disaggregated French data for expenditures on defense, education, public works, and other categories. Also see Figure 8.1.

[6] Van Zanden (1996) provides disaggregated Dutch data for expenditures on defense, education, public works, the monarchy, and other categories from 1816 to 1850, and van Zanden and van Riel (2010) do so from 1850 to 1913. Also see Figure 8.2.

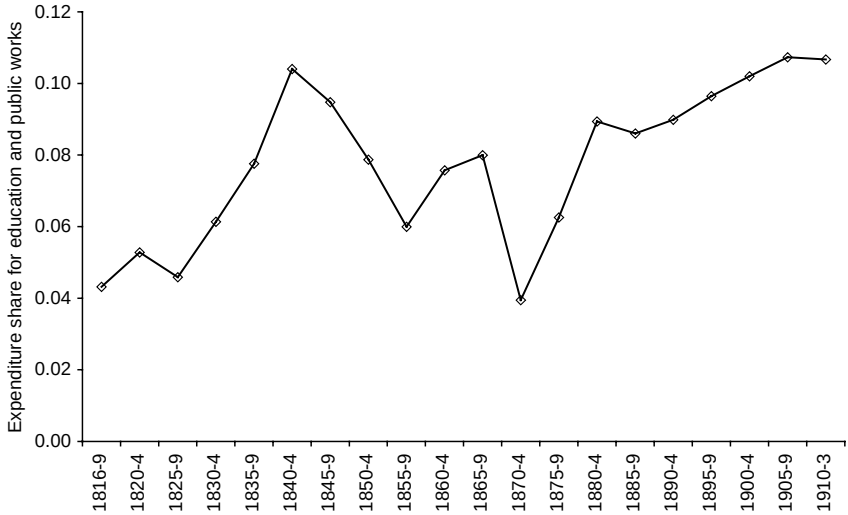


FIGURE 8.1. Expenditure share for education and public works, France, 1816–1913. Fontvieille (1976, tables 116–35) provides yearly data for total expenditures (*dépenses fonctionnelles de l'Etat*) and expenditures on education and on public works (*travaux publics*) for 1816–1913. Four-year averages for 1816–19 and 1910–13 and five-year averages for 1820–4, 1825–9, and so on through 1905–9 are computed.
*Source*: Fontvieille (1976).

centralized and limited regime was established in 1848, and there was a large rise in non-military spending during the liberal era of economic reforms of the 1850s and 1860s. By 1870, the share of expenditures on education and public works was nearly 20 percent of total spending. This share averaged 18 percent from 1880 to the start of World War I.

The trends in the Spanish data resemble those for France and the Netherlands. Figure 8.3 plots the share of government funds spent on education and public works in Spain from 1816 to 1913.[7] Military expenditures were very high (56 percent) at the start of the period. After peaking at more than 70 percent at the end of the 1820s, military spending fell steadily through the middle of the century. This share averaged 23 percent from the 1850s to the start of World War I. The share of expenditures on education and public works, by contrast, was very low at 3 percent or less through the end of the First Carlist War (1833–9). Major reforms in public finance, including fiscal centralization, were important markers of

[7] Carreras and Tafunell (2006) provide disaggregated Spanish data for expenditures on defense (Ministerio de Guerra plus Ministerio de Marina), education, public works, and other categories. Also see Figure 8.3.

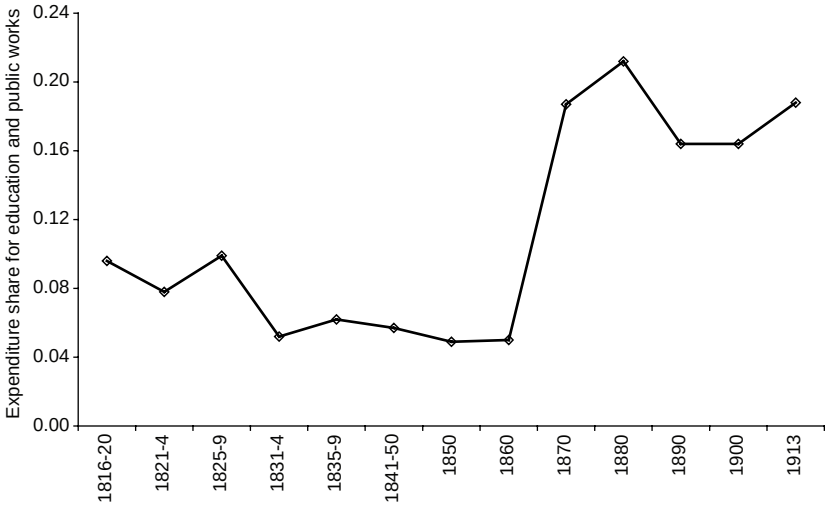


FIGURE 8.2. Expenditure share for education and public works, Netherlands, 1816–1913. Expenditure shares for 1816–50 are from van Zanden (1995, table 4), who provides four- or five-year averages for 1816–20, 1821–4, 1825–9, 1831–4, 1835–9, and 1841–50. The category for home affairs, which includes education and public works, is used. Expenditure shares for 1850–1913 are from van Zanden and van Riel (2010, table 2.3), who provide yearly shares for 1850, 1860, 1870, 1880, 1890, 1900, and 1913. The (explicit) categories for education and for infrastructure are used.
*Sources*: van Zanden (1996), van Zanden and van Riel (2010).

the consolidation of the liberal state in the 1840s. Non-military spending rose dramatically, from 1 percent at the start of that decade to 11 percent by the start of the 1860s, though it then fell back to 5 percent. A stable centralized and limited regime was established in the aftermath of the Third Carlist War (1872–6), and the share of expenditures on education and public works began to increase once more. By 1913, this share amounted to 15 percent of total spending.

Overall, the evolution of nineteenth-century expenditures in France, the Netherlands, and Spain fits the theoretical predictions. The establishment of centralized and limited regimes coincided with a broad shift in the composition of government expenditures away from defense and toward public services like education and public works. This result is consistent with the modern evidence, which indicates that governments in rich states play important economic roles.

One of the major types of public works that nineteenth-century governments spent funds on was transportation infrastructure, and in

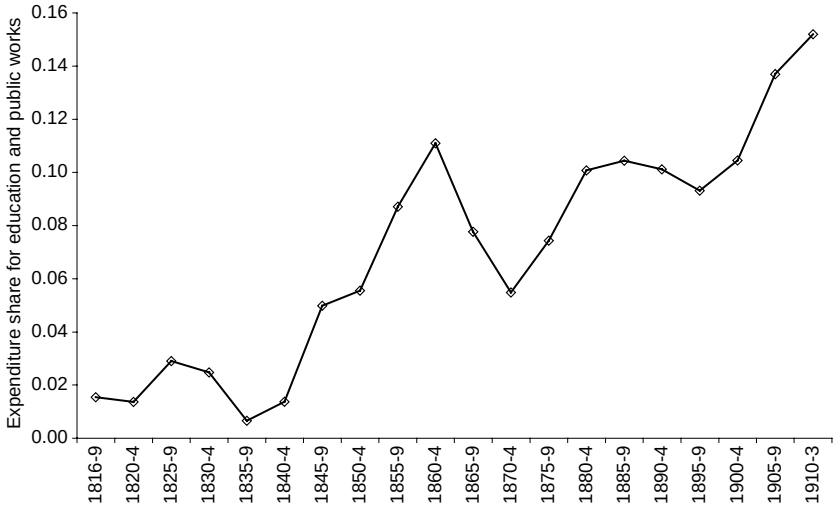


FIGURE 8.3. Expenditure share for education and public works, Spain, 1816–1913. Carreras and Tafunell (2006, table 12.8) provide yearly data, with some missing observations, for 1816–42. The category for home affairs (Ministerio de Estado), which includes education and public works, is used. Education expenditures (*gastos para instrucción pública*) are explicitly incorporated in 1842. Carreras and Tafunell (2006, table 12.13) provide yearly data for 1845 and 1849–99. The (new) category for the Ministerio de Fomento, which includes education and public works, is used. Carreras and Tafunell (2006, table 12.14) disaggregate the expenditures for the Ministerio de Fomento for 1900–13. The (explicit) categories for education (Ministerio de Educación y Ciencia) and public works (Ministerio de Obras Públicas), are used. Four-year averages for 1816–19 and 1910–13 and five-year averages for 1820–4, 1825–9, and so on through 1905–9 are computed. *Source*: Carreras and Tafunell (2006).

particular railway networks.[8] Fortunately, data for this outcome variable are readily available. Figure 8.4 plots cumulative railway kilometers per square kilometer of domestic territory from 1830 to 1913 for France, the Netherlands, and Spain. There was steady growth in railway networks in all three countries from the 1850s onward. By the start of World War I, the Netherlands was first, with 0.10 railway kilometer per square kilometer of territory, followed by France, with 0.07 railway kilometer per square kilometer of territory. Spain was relatively far behind, with 0.03 railway kilometer per square kilometer of territory. Again, the timing of transportation improvements broadly overlapped with the establishment of centralized and limited regimes.

[8] See O'Brien (1983), Bogart (2009), and Cardoso and Lains (2010a) for overviews.

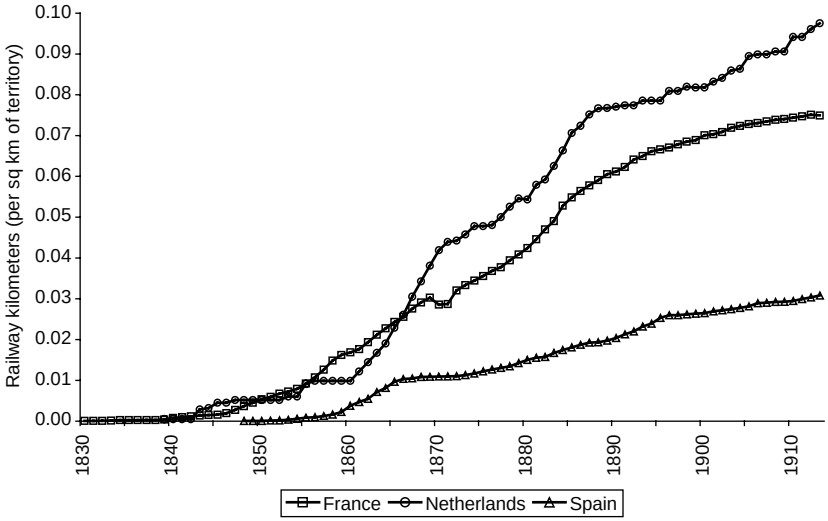


FIGURE 8.4. Cumulative railway kilometers, France, Netherlands, and Spain, 1830–1913. Mitchell (2003) provides the cumulative lengths in kilometers of open railway line for 1825–1913, which are scaled by total domestic areas in square kilometers from Dincecco (2010b).
*Sources*: Mitchell (2003), Dincecco (2010b).

The development of extensive railway networks is one way in which European states, equipped with new fiscal and political institutions designed to productively raise and use large tax funds, stimulated economic growth. An effective division of labor, mass production, and technological progress all required vast market access, which in turn called for efficient and expansive transportation networks.[9] We may view this argument as a nineteenth-century adaptation of Epstein's (2000) claim that early modern (i.e., pre-1800) growth was the result of reductions in jurisdictional fragmentation within polities, which created barriers to demand-side growth. For the post-1815 environment, one may argue that regular parliamentary control over budgets enabled states to guide tax funds – now large due to fiscal centralization – toward transportation infrastructure and other productive investments that further reduced transaction costs and generated greater development opportunities.

[9] In the words of Adam Smith, "The division of labor is limited by the extent of the market." This quotation is borrowed from Tortella (2000, p. 115), who provides a brief description of the links between transportation networks and Smithian growth in history. Also see O'Brien (1983). Bogart (2009), however, argues that nineteenth-century nationalizations reduced the development of railway networks.

The relationship between fiscally centralized and politically limited regimes and economic growth in European history is complex, and further research is required to establish clear causal links. Yet the findings suggest that sustained development was more likely in states where governments were able to solve two key political problems: fiscal fragmentation and absolutism. England possessed a centralized and limited regime before industrial takeoff during the middle of the eighteenth century. Likewise, most countries in continental Europe implemented modern fiscal systems before undergoing industrialization during the second half of the 1800s. The results thus point to the establishment of centralized and limited regimes as solid institutional foundations upon which European states could successfully pursue long-run growth.[10]

## 8.3. Historical Lessons for Development

The observation just made enables us to draw some simple lessons from history. Since diverse sets of economic, political, and social factors influence the particular nature of different eras, we must be cautious about the maps from historical to current environments. Yet the main point from the past bears upon the present, that fiscally centralized and politically limited regimes form part of a basic set of politico-economic institutions that underlie economic success over the long term. To illustrate, this section examines three modern cases that roughly correspond to the various historical regime types: North Korea (centralized and absolutist), Guatemala (fragmented and limited), and South Korea (centralized and limited).[11]

There are many recent instances of poor economic performance in states that loosely proxy for the notion of centralized and absolutist regimes. The example of North Korea under Kim Jong-Il (leader, 1994 to the present) provides concreteness.[12] North Korea is racially homogeneous,

[10] Similarly, Magnusson (2009) argues that nineteenth-century European states pursued large-scale investment policies that promoted industrialization.

[11] A modern proxy for the fragmented and absolutist regime could be a convex combination of the North Korean and Guatemalan cases, where class or ethnic divisions create internal fragmentation. Also see the later discussion in this chapter.

[12] The data for constraints on the executive for North Korea are taken from the Polity IV Database of Marshall and Jaggers (2008), the ethnic and GDP data from the World Factbook of the Central Intelligence Agency (2010), the military data from the World Factbook of the Central Intelligence Agency (2010), the U.S. Department of State (2010), and the Stockholm International Peace Research Institute (2010), and the personal data from Jin (2005).

and its political regime is authoritarian and highly centralized.[13] Per capita GDP was only US$1,900 in 2009, making North Korea one of the world's poorest countries. Like Napoleon III of France, William I of the Netherlands, and other powerful rulers from Europe's past, King Jong-Il spends large sums on the military. Defense expenditures constitute up to 25 percent of North Korean's GDP, and there are well over 1 million active duty military personnel. By contrast, defense spending in South Korea is less than 3 percent of GDP, and there are fewer than 700,000 active duty military personnel. Kim Jong-Il also engages in lavish spending beyond the military. According to one defector, he owns 17 personal residences. It is thus probable that parliamentary control over the budgetary process in North Korea would improve the allocation of state resources toward public services that would most benefit society.

Parliamentary power of the purse, however, is not always sufficient to ensure economic success. Weak fiscal states that are unable to raise enough in tax resources may underinvest in basic public services that promote growth (see Chapter 1). Guatemala is a rough proxy for the notion of fragmented and limited regimes.[14] Unlike North Korea, Guatemala is a constitutional democratic republic. Yet per capita GDP was only US$5,200 in 2009. Like traditional elites in Old Regime Europe, conservative oligarchs in present-day Guatemala oppose structural reforms to the tax system.[15] Between 2001 and 2003, the Supreme Court received more than 50 appeals from conservative interest groups to clarify, eliminate, or reduce taxes. As key taxes were overturned, the share of total taxes collected by the central government fell from the target of 12 percent of GDP.[16] Tax revenues, which rely heavily on indirect taxes, continue to sum to less than 10 percent of GDP.[17] By contrast, tax shares in rich countries are typically more than 20 percent of GDP, and in many cases more than 30 percent (see Figure 1.2). Underfunding contributes to the lack of public services in Guatemala such as transportation

[13] Myers (2010) provides an overview of the North Korean regime.

[14] The court and tax data for Guatemala are taken from the International Monetary Fund (2005) and the *Economist* (2006), the democracy and GDP data from the World Factbook of the Central Intelligence Agency (2010), and the road data from the World Development Indicators of the World Bank (2009).

[15] Ethnic rather than class divisions are another possible source of internal fragmentation. See Alesina et al. (2002).

[16] This target was established with the Peace Accords of 1996, which ended a long-standing guerrilla war.

[17] This trend is persistent. A 1952 study by Adler, Schlesinger, and Olson found that total taxation in Guatemala was too low and that the share of indirect taxes was too high.

infrastructure.[18] Only 35 percent of Guatemalan roads were paved in 2001, and there was only 0.13 road kilometer per square kilometer of territory, compared with 0.87 road kilometer per square kilometer of territory for (similarly sized) South Korea. It is thus likely that greater fiscal prowess by the central government in Guatemala would enable its parliament to implement new and better public services that would foster development.

South Korea is one recent example that roughly corresponds to the notion of centralized and limited regimes.[19] Unlike its counterpart in the North, it is a constitutional democratic republic, and unlike Guatemala, it is a powerful fiscal state. Furthermore, the evolution of fiscal institutions in South Korea loosely resembles the patterns that we observe in Europe's past, even if the timing of the Korean process was compressed. South Korea was exceptionally poor before the Korean War (1950–3). A highly centralized authoritarian regime was established in the aftermath of this conflict. Unlike the dictatorship in North Korea, which chose socialism, the one in South Korea chose a form of state capitalism. Large tax resources were used to promote industrialization in association with business conglomerates (*chaebol*), most notably by General Park Chung-Hee (leader, 1963–79). By 1980, when South Korea began to transform itself into a democracy, per capita GDP had reached nearly US$1,600, roughly twice that of the North. Democratic reform in South Korea roughly corresponds to the institutional shift from the centralized and absolutist regime to the centralized and limited one in European history. South Korea's fast economic development has continued to the present. It became a member of the Organisation for Economic Co-operation and Development (OECD) in 1996, and its economy is among the world's 20 largest. By 2009 per capita GPD was US$28,000. The education index for South Korea, which measures literacy and school enrollment from kindergarten to university, is also ranked among the world's top 10. Moreover, South Korea has an extensive transportation network of air, bus, ferry, highway, and rail routes. The evidence thus suggests that

[18] According to the *Economist* (2006), underfunding is also the key reason that the criminal justice system in Guatemala, which has long had one of the world's highest murder rates, functions so badly.

[19] The South Korean account is based on Glaeser et al. (2004) and Acemoglu (2005). Also see Wade (1990), Herbst (2000), and Kang (2002). The data for constraints on the executive are from the Polity IV Database of Marshall and Jaggers (2008), the economic and transportation data from the World Factbook of the Central Intelligence Agency (2010), and the education data from the Human Development Index of the United Nations (2010).

the centralized and limited regime in South Korea not only is able to gather large tax resources, but employs funds in productive ways that stimulate growth.

In sum, the results of the long-run historical analysis undertaken in this book lend new, rigorous credence to arguments that praise institutions like parliament that limit fiscal discretion by executives. Yet the findings also highlight what we may call the "opposite" problem. Fragmentation led to poor fiscal outcomes in Old Regime states, and parliamentary institutions did not become the principal mechanism by which to constrain rulers until after the establishment of national tax systems with uniform rates. Before then, local tax control by provincial elites restricted the fiscal authority of executives. This study indicates that fiscal centralization was just as important as limited government in developing modern systems of public finance. Indeed, it is the institutional balance between weak and strong fiscal elements that distinguishes the fiscal structures of today's advanced countries. To lay the proper institutional foundations for growth, emerging economies like Guatemala and North Korea must seek to overcome both types of fiscal problems, just as European states once did.

## 8.4. The Future of Entitlements

Most developed countries have long resolved the weak- and strong-state problems that many emerging economies still confront. Advanced economies, however, face daunting fiscal challenges of their own. A key fiscal problem concerns pay-as-you-go pension systems, whereby current workers pay for retired ones. The French case illustrates this phenomenon.[20] Like many advanced economies, France has an aging population and a long life expectancy. The French pension system, which accounts for 65 percent of all social spending, is very generous.[21] France's 5 million civil servants and public sector workers receive pensions based on salaries for their last six months of work, which are typically the highest of one's career. Furthermore, workers with very high seniority are often granted a final promotion, called the "tip of the hat" (*coup de chapeau*), to further increase pension income. Other perks abound. For instance, a mother of three who works in the public sector for 15 years can retire at nearly full

[20] This account is based on Hollinger (2010). Thanks to Jean-Laurent Rosenthal for insights on this topic.

[21] Social spending includes aid for the poor and unemployed, retirement pensions, expenditures on health and education, and housing subsidies. See Lindert (2004, p. 6).

pay in her mid-40s or early 50s. These factors all make for an untenable fiscal situation: in the absence of significant reforms, even optimistic forecasts indicate that there will be a funding shortfall of 72 to 115 billion euros by 2050.

Pension troubles are not unique to France. A 2008 report by the OECD estimates that, due to major demographic changes, most developed nations must make quick, dramatic reforms to strengthen their pay-as-you-go systems. British Prime Minister David Cameron recently proposed an austerity budget that would implement across-the-board cuts of 25 percent to reduce social spending and other government costs.[22] Similarly, U.S. Federal Reserve Chairman Ben Bernanke has argued that the overhaul of major entitlement programs, including Social Security, is vital to addressing long-term fiscal problems.[23] Pension reform has also become a priority for emerging countries in Asia, Eastern Europe, and Latin America.[24]

The pension debate not only is contentious, but will be with us for a long time. To paraphrase Lindert (2004, p. 4), although new information will not end this debate, it can enrich the level of discourse. This investigation establishes two key facts in this regard. First, modern fiscal systems strike an institutional balance that enables states to gather large tax amounts and employ funds in productive ways. Second, this outcome is the result of a deep process of institutional transformation that involved centuries of political reforms, wars, revolutions, defaults, technological change, and economic growth. The parallels between past and present are never absolute. Now the high costs of welfare, and not just warfare alone, drive policy debates. Yet the state's fundamental problem of how to best achieve fiscal objectives remains. To cope with new challenges, political regimes will have to undergo further institutional change. A proper understanding of the ways in which advanced economies first achieved modern systems of public finance allows us to chart a brighter fiscal future.

[22] See Burns (2010). In the words of Prime Minister Cameron (2010): "I have spent much of [my time in office] discussing … the most urgent issue facing Britain today: our massive deficit and growing debt. How we deal with these things will affect our economy, our society – indeed our whole way of life.… And the effects of those decisions will stay with us for years, perhaps decades to come." For clarity, the words in brackets were simplified.

[23] See Bernanke (2006).

[24] See Queisser (1999).

# Appendices

These data can be downloaded from the website http://sites.google.com/site/mdincecco/.

## A.1. Database of Fiscal Indicators, 1650–1913

### A.1.1. *Group 1*

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Austria | 1781 | | 55930696 | 55083261 | | | | −0.02 |
| Austria | 1782 | | 63557609 | 68642217 | | | | 0.08 |
| Austria | 1783 | | 54235826 | 60167870 | | | | 0.11 |
| Austria | 1784 | | 57559359 | 65067102 | | | | 0.13 |
| Austria | 1785 | | 64232908 | 70072264 | | | | 0.09 |
| Austria | 1786 | | 61730327 | 67569683 | | | | 0.09 |
| Austria | 1787 | | 61035257 | 65853830 | | | | 0.08 |
| Austria | 1788 | | 69869307 | 89946695 | | | | 0.29 |
| Austria | 1789 | | 67460021 | 96371458 | | | | 0.43 |
| Austria | 1790 | | 69066212 | 10440241 | | | | −0.85 |
| Austria | 1791 | | 71475498 | 89946695 | | | | 0.26 |
| Austria | 1792 | | 69869307 | 73081689 | | | | 0.05 |
| Austria | 1793 | | 69066212 | 93159077 | | | | 0.35 |
| Austria | 1794 | | 74687880 | 121267419 | | | | 0.62 |
| Austria | 1795 | | 54610493 | 109220986 | | | | 1.00 |
| Austria | 1796 | | 51718612 | 123811223 | | | | 1.39 |
| Austria | 1797 | | 55678836 | 103515582 | | | | 0.86 |
| Austria | 1798 | | 56893081 | 103654518 | | | | 0.82 |
| Austria | 1799 | | 57879949 | 111418902 | | | | 0.93 |
| Austria | 1800 | | 58609768 | 113811991 | | | | 0.94 |
| Austria | 1801 | | 65188496 | 102929204 | | | | 0.58 |
| Austria | 1802 | | 56878349 | 78042385 | | | | 0.37 |
| Austria | 1803 | | 61553044 | 70085149 | | | | 0.14 |
| Austria | 1804 | | 64101539 | 67662736 | | | | 0.06 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Austria | 1805 | 64639037 | 84261602 | | | 0.30 |
| Austria | 1806 | 39786692 | 74542883 | | | 0.87 |
| Austria | 1807 | 53200091 | 78660134 | | | 0.48 |
| Austria | 1808 | 54222549 | 63594347 | | | 0.17 |
| Austria | 1809 | 24690000 | 68092421 | | | 1.76 |
| Austria | 1810 | 21602704 | 55754038 | | | 1.58 |
| Austria | 1811 | 25097248 | 41710919 | | | 0.66 |
| Austria | 1812 | 32532278 | 35897687 | | | 0.10 |
| Austria | 1813 | 47895798 | 52121898 | | | 0.09 |
| Austria | 1814 | 26013375 | 38335500 | | | 0.47 |
| Austria | 1815 | 21333225 | 3777759 | | | −0.82 |
| Austria | 1816 | 29762207 | 31190793 | | | 0.05 |
| Austria | 1817 | 29261421 | 29963695 | | | 0.02 |
| Austria | 1818 | 38721390 | 38721390 | 26451783 | 1.46 | 0.00 |
| Austria | 1819 | 39422880 | 50868232 | 26859193 | 1.47 | 0.29 |
| Austria | 1820 | 95060712 | 168909530 | 27266603 | 3.49 | 0.78 |
| Austria | 1821 | 99541117 | 144645686 | 27674014 | 3.60 | 0.45 |
| Austria | 1822 | 108232522 | 122248244 | 28072091 | 3.86 | 0.13 |
| Austria | 1823 | 100978797 | 145686966 | 28470168 | 3.55 | 0.44 |
| Austria | 1824 | 99101781 | 116909132 | 28868244 | 3.43 | 0.18 |
| Austria | 1825 | 95633411 | 111699824 | 29285321 | 3.27 | 0.17 |
| Austria | 1826 | 91886143 | 110870883 | 29702398 | 3.09 | 0.21 |
| Austria | 1827 | 97772722 | 112400137 | 30119475 | 3.25 | 0.15 |
| Austria | 1828 | 92573142 | 107109421 | 30484885 | 3.04 | 0.16 |
| Austria | 1829 | 93571409 | 111978899 | 30850296 | 3.03 | 0.20 |
| Austria | 1830 | 96760199 | 105975456 | 31215706 | 3.10 | 0.10 |
| Austria | 1831 | 94633934 | 143874355 | 31460283 | 3.01 | 0.52 |
| Austria | 1832 | 103560614 | 125362849 | 31704860 | 3.27 | 0.21 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Austria | 1833 | | 102327750 | 124980458 | 31965099 | | 3.20 | 0.22 |
| Austria | 1834 | | 102131344 | 125700115 | 32122283 | | 3.18 | 0.23 |
| Austria | 1835 | | 103626326 | 127779830 | 32603625 | | 3.18 | 0.23 |
| Austria | 1836 | | 108324272 | 120704189 | 32950321 | | 3.29 | 0.11 |
| Austria | 1837 | | 110999593 | 117937068 | 33259452 | | 3.34 | 0.06 |
| Austria | 1838 | | 109252184 | 121562289 | 33678847 | | 3.24 | 0.11 |
| Austria | 1839 | | 111560329 | 124639816 | 34093563 | | 3.27 | 0.12 |
| Austria | 1840 | | 114099969 | 128071394 | 34506298 | | 3.31 | 0.12 |
| Austria | 1841 | | 112554011 | 127404888 | 34928755 | | 3.22 | 0.13 |
| Austria | 1842 | | 115887665 | 124618928 | 35351212 | | 3.28 | 0.08 |
| Austria | 1843 | | 117468080 | 129214888 | 35791607 | | 3.28 | 0.10 |
| Austria | 1844 | | 119360705 | 131062734 | 36237702 | | 3.29 | 0.10 |
| Austria | 1845 | | 120523698 | 133828262 | 36695741 | | 3.28 | 0.11 |
| Austria | 1846 | | 121306319 | 138523990 | 37153780 | | 3.26 | 0.14 |
| Austria | 1847 | | 116962346 | 155949795 | 36847771 | | 3.17 | 0.33 |
| Austria | 1848 | | 72071447 | 129871320 | 22645932 | | 3.18 | 0.80 |
| Austria | 1849 | | 67593060 | 170655744 | 22616994 | | 2.99 | 1.52 |
| Austria | 1850 | | 127140864 | 173608591 | 35780055 | | 3.55 | 0.37 |
| Austria | 1851 | | 138553238 | 182274481 | 35916403 | | 3.86 | 0.32 |
| Austria | 1852 | | 146274439 | 197152505 | 36238634 | | 4.04 | 0.35 |
| Austria | 1853 | | 165065116 | 222629841 | 36558615 | | 4.52 | 0.35 |
| Austria | 1854 | | 151766404 | 247075705 | 36896509 | | 4.11 | 0.63 |
| Austria | 1855 | | 181486614 | 282811295 | 37176795 | | 4.88 | 0.56 |
| Austria | 1856 | | 215313451 | 275452726 | 37457080 | | 5.75 | 0.28 |
| Austria | 1857 | | 237612842 | 278089478 | 37737366 | | 6.30 | 0.17 |
| Austria | 1858 | | 229408594 | 267279219 | 38000366 | | 6.04 | 0.17 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Austria | 1859 | | 191955976 | 398621223 | 35441160 | | 5.42 | 1.08 |
| Austria | 1860 | | 222125781 | 381619375 | 35704160 | | 6.22 | 0.72 |
| Austria | 1861 | | 219694269 | 360154540 | 35967160 | | 6.11 | 0.64 |
| Austria | 1862 | | 220421675 | 272083005 | 36230160 | | 6.08 | 0.23 |
| Austria | 1863 | | 241332826 | 294880839 | 36493160 | | 6.61 | 0.22 |
| Austria | 1864 | | 240220769 | 294718615 | 36756160 | | 6.54 | 0.23 |
| Austria | 1865 | | 311740698 | 430997207 | 37019160 | | 8.42 | 0.38 |
| Austria | 1866 | | 344421448 | 685924070 | 34941000 | | 9.86 | 0.99 |
| Austria | 1867 | | 332412403 | 681445426 | 35204000 | | 9.44 | 1.05 |
| Austria | 1868 | | 351349492 | 364125838 | 35467000 | | 9.91 | 0.04 |
| Austria | 1869 | | 347800508 | 406003858 | 35730000 | | 9.73 | 0.17 |
| Austria | 1870 | | 376179823 | 434162427 | 35925727 | | 10.47 | 0.15 |
| Austria | 1871 | | 362103121 | 461250405 | 36121455 | | 10.02 | 0.27 |
| Austria | 1872 | | 373833048 | 471758722 | 36317182 | | 10.29 | 0.26 |
| Austria | 1873 | | 394938351 | 511096690 | 36512909 | | 10.82 | 0.29 |
| Austria | 1874 | 590 | 384959853 | 495729829 | 36708636 | 266 | 10.49 | 0.29 |
| Austria | 1875 | 594 | 382903656 | 635499785 | 36904364 | 274 | 10.38 | 0.66 |
| Austria | 1876 | 698 | 367277213 | 605196809 | 37100091 | 382 | 9.90 | 0.65 |
| Austria | 1877 | 737 | 388895541 | 727245173 | 37295818 | 422 | 10.43 | 0.87 |
| Austria | 1878 | 725 | 389785868 | 729844390 | 37491545 | 410 | 10.40 | 0.87 |
| Austria | 1879 | 717 | 395554561 | 750718507 | 37687273 | 409 | 10.50 | 0.90 |
| Austria | 1880 | 542 | 407805943 | 589218752 | 37883000 | 237 | 10.76 | 0.44 |
| Austria | 1881 | 506 | 446750244 | 789286189 | 38223300 | 205 | 11.69 | 0.77 |
| Austria | 1882 | 509 | 463810527 | 723494626 | 38563600 | 211 | 12.03 | 0.56 |
| Austria | 1883 | 488 | 473585054 | 706120368 | 38903900 | 191 | 12.17 | 0.49 |
| Austria | 1884 | 475 | 481969857 | 740435134 | 39244200 | 178 | 12.28 | 0.54 |
| Austria | 1885 | 465 | 492247494 | 727402827 | 39584500 | 162 | 12.44 | 0.48 |
| Austria | 1886 | 438 | 480915927 | 705822896 | 39924800 | 141 | 12.05 | 0.47 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Austria | 1887 | 455 | 487141263 | 763505733 | 40265100 | 161 | 12.10 | 0.57 |
| Austria | 1888 | 456 | 492544972 | 722544936 | 40605400 | 158 | 12.13 | 0.47 |
| Austria | 1889 | 435 | 546483141 | 964388927 | 40945700 | 146 | 13.35 | 0.76 |
| Austria | 1890 | 429 | 592354902 | 744464954 | 41286000 | 144 | 14.35 | 0.26 |
| Austria | 1891 | 426 | 628579916 | 738813636 | 41675100 | 139 | 15.08 | 0.18 |
| Austria | 1892 | 423 | 633314218 | 624813356 | 42064200 | 139 | 15.06 | –0.01 |
| Austria | 1893 | 420 | 659063030 | 672526522 | 42453300 | 140 | 15.52 | 0.02 |
| Austria | 1894 | 410 | 660202120 | 998148891 | 42842400 | 137 | 15.41 | 0.51 |
| Austria | 1895 | 396 | 698787741 | 741570664 | 43231500 | 137 | 16.16 | 0.06 |
| Austria | 1896 | 391 | 726459634 | 748100136 | 43620600 | 143 | 16.65 | 0.03 |
| Austria | 1897 | 388 | 755753557 | 791066323 | 44009700 | 144 | 17.17 | 0.05 |
| Austria | 1898 | 398 | 776065139 | 798307130 | 44398800 | 150 | 17.48 | 0.03 |
| Austria | 1899 | 405 | 780552448 | 811414983 | 44787900 | 148 | 17.43 | 0.04 |
| Austria | 1900 | 415 | 803890676 | 846530278 | 45177000 | 139 | 17.79 | 0.05 |
| Austria | 1901 | 407 | 821423750 | 897660070 | 45605100 | 116 | 18.01 | 0.09 |
| Austria | 1902 | 398 | 843754508 | 885458706 | 46033200 | 106 | 18.33 | 0.05 |
| Austria | 1903 | 398 | 841656385 | 1227579259 | 46461300 | 113 | 18.12 | 0.46 |
| Austria | 1904 | 402 | 899724099 | 977448164 | 46889400 | 114 | 19.19 | 0.09 |
| Austria | 1905 | 402 | 875061279 | 963866255 | 47317500 | 123 | 18.49 | 0.10 |
| Austria | 1906 | 408 | 1005384609 | 981325151 | 47745600 | 125 | 21.06 | –0.02 |
| Austria | 1907 | 416 | 1085611253 | 1131157185 | 48173700 | 119 | 22.54 | 0.04 |
| Austria | 1908 | 414 | 1144156109 | 1258963451 | 48601800 | 123 | 23.54 | 0.10 |
| Austria | 1909 | 412 | 1282820894 | 1450421081 | 49029900 | 114 | 26.16 | 0.13 |
| Austria | 1910 | 413 | 1335306403 | 1516135413 | 49458000 | 105 | 27.00 | 0.14 |
| Austria | 1911 | 413 | 1440363684 | 1505670604 | | 98 | | 0.05 |
| Austria | 1912 | 427 | 1491276313 | 1698922382 | | 99 | | 0.14 |
| Austria | 1913 | 457 | 1591253390 | 1876931932 | | 118 | | 0.18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| England | 1650 | 19307789 | | 5221000 | 3.70 | |
| England | 1651 | 19307789 | | 5228000 | 3.69 | |
| England | 1652 | 19307789 | | 5240000 | 3.68 | |
| England | 1653 | 19307789 | | 5234000 | 3.69 | |
| England | 1654 | 15336092 | | 5219000 | 2.94 | |
| England | 1655 | 11364394 | | 5246000 | 2.17 | |
| England | 1656 | 12157065 | | 5281000 | 2.30 | |
| England | 1657 | 11639743 | | 5284000 | 2.20 | |
| England | 1658 | 9845804 | | 5206000 | 1.89 | |
| England | 1659 | 10004338 | | 5136000 | 1.95 | |
| England | 1660 | 8026834 | | 5130000 | 1.56 | |
| England | 1661 | 5671247 | 8729770 | 5141000 | 1.10 | 0.54 |
| England | 1662 | 11131289 | 13652811 | 5116000 | 2.18 | 0.23 |
| England | 1663 | 11316208 | 11135072 | 5105000 | 2.22 | −0.02 |
| England | 1664 | 10347565 | 10595838 | 5129000 | 2.02 | 0.02 |
| England | 1665 | 18988474 | 21424826 | 5110000 | 3.72 | 0.13 |
| England | 1666 | 15836541 | 15427305 | 5067000 | 3.13 | −0.03 |
| England | 1667 | 12438604 | 11395768 | 5059000 | 2.46 | −0.08 |
| England | 1668 | 8979165 | 15519257 | 5047000 | 1.78 | 0.73 |
| England | 1669 | 13991508 | 12041653 | 5037000 | 2.78 | −0.14 |
| England | 1670 | 7426262 | 12601336 | 5022000 | 1.48 | 0.70 |
| England | 1671 | 9763305 | 16983507 | 4983000 | 1.96 | 0.74 |
| England | 1672 | 19219104 | 16373585 | 4973000 | 3.86 | −0.15 |
| England | 1673 | 16935874 | 22392032 | 4993000 | 3.39 | 0.32 |
| England | 1674 | 19349794 | 15464967 | 5008000 | 3.86 | −0.20 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| England | 1675 | | 13453373 | 10211540 | 5009000 | | 2.69 | −0.24 |
| England | 1676 | | 10232251 | 12628427 | 5003000 | | 2.05 | 0.23 |
| England | 1677 | | 14199074 | 16928679 | 5021000 | | 2.83 | 0.19 |
| England | 1678 | | 16951249 | 21839990 | 5056000 | | 3.35 | 0.29 |
| England | 1679 | | 16605306 | 16826840 | 5024000 | | 3.31 | 0.01 |
| England | 1680 | | 13099741 | 13757488 | 4949000 | | 2.65 | 0.05 |
| England | 1681 | | 11039453 | 9526379 | 4930000 | | 2.24 | −0.14 |
| England | 1682 | | 9455799 | 8963644 | 4900000 | | 1.93 | −0.05 |
| England | 1683 | | 9893995 | 9773745 | 4886000 | | 2.02 | −0.01 |
| England | 1684 | | 9963183 | 11793526 | 4888000 | | 2.04 | 0.18 |
| England | 1685 | | 9701804 | 12788638 | 4871000 | | 1.99 | 0.32 |
| England | 1686 | | 14468141 | 16563946 | 4865000 | | 2.97 | 0.14 |
| England | 1687 | | 16028732 | 17119693 | 4879000 | | 3.29 | 0.07 |
| England | 1688 | | 15052402 | | 4897000 | | 3.07 | |
| England | 1689 | | 22071219 | | 4917000 | | 4.49 | |
| England | 1690 | | 22071219 | | 4916000 | | 4.49 | |
| England | 1691 | | 22071219 | | 4931000 | | 4.48 | |
| England | 1692 | | 31603894 | 32710915 | 5967941 | | 5.30 | 0.04 |
| England | 1693 | | 29082348 | 42866289 | 5996725 | | 4.85 | 0.47 |
| England | 1694 | | 30781317 | 43066168 | 5984510 | | 5.14 | 0.40 |
| England | 1695 | | 31780710 | 47817130 | 5986294 | | 5.31 | 0.50 |
| England | 1696 | | 33706809 | 55896135 | 5998078 | | 5.62 | 0.66 |
| England | 1697 | | 23048944 | 55316067 | 6014863 | | 3.83 | 1.40 |
| England | 1698 | | 31994562 | 28842629 | 6035647 | | 5.30 | −0.10 |
| England | 1699 | | 36929276 | 33546715 | 6053431 | | 6.10 | −0.09 |
| England | 1700 | | 31065216 | 22891288 | 6066216 | | 5.12 | −0.26 |

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|---|---|---|---|---|---|---|
| England | 1701 | 26953223 | 24614750 | 6484636 | 4.16 | −0.09 |
| England | 1702 | 34819645 | 35827977 | 6523463 | 5.34 | 0.03 |
| England | 1703 | 39768340 | 37994819 | 6570291 | 6.05 | −0.04 |
| England | 1704 | 38574074 | 39525196 | 6598118 | 5.85 | 0.02 |
| England | 1705 | 37844642 | 41999543 | 6612946 | 5.72 | 0.11 |
| England | 1706 | 37787431 | 47856452 | 6632773 | 5.70 | 0.27 |
| England | 1707 | 39124723 | 62552359 | 6654601 | 5.88 | 0.60 |
| England | 1708 | 37243933 | 55365309 | 6675428 | 5.58 | 0.49 |
| England | 1709 | 37229631 | 65505842 | 6690256 | 5.56 | 0.76 |
| England | 1710 | 37529985 | 69882434 | 6708083 | 5.59 | 0.86 |
| England | 1711 | 37036546 | 108306330 | 6704911 | 5.52 | 1.92 |
| England | 1712 | 41105631 | 56237767 | 6697738 | 6.14 | 0.37 |
| England | 1713 | 41334473 | 45496525 | 6709566 | 6.16 | 0.10 |
| England | 1714 | 38338081 | 44230746 | 6731393 | 5.70 | 0.15 |
| England | 1715 | 39668221 | 58840838 | 6740221 | 5.89 | 0.48 |
| England | 1716 | 39918517 | 50602548 | 6775048 | 5.89 | 0.27 |
| England | 1717 | 47692660 | 43087397 | 6813875 | 7.00 | −0.10 |
| England | 1718 | 43995122 | 45902300 | 6852703 | 6.42 | 0.04 |
| England | 1719 | 44044324 | 44965264 | 6891530 | 6.39 | 0.02 |
| England | 1720 | 45646541 | 43329201 | 6876358 | 6.64 | −0.05 |
| England | 1721 | 43426220 | 42835436 | 6873185 | 6.32 | −0.01 |
| England | 1722 | 44992943 | 51050529 | 6881013 | 6.54 | 0.13 |
| England | 1723 | 43761986 | 41410683 | 6903840 | 6.34 | −0.05 |
| England | 1724 | 42224906 | 39774647 | 6925668 | 6.10 | −0.06 |
| England | 1725 | 43613176 | 40364141 | 6948495 | 6.28 | −0.07 |
| England | 1726 | 40416816 | 40599929 | 6997323 | 5.78 | 0.00 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| England | 1727 | | 44701672 | 42921809 | 7032150 | | 6.36 | −0.04 |
| England | 1728 | | 48982500 | 47260374 | 6981978 | | 7.02 | −0.04 |
| England | 1729 | | 45532310 | 41314748 | 6897805 | | 6.60 | −0.09 |
| England | 1730 | | 45635082 | 40408252 | 6835633 | | 6.68 | −0.11 |
| England | 1731 | | 44397276 | 39044776 | 6834460 | | 6.50 | −0.12 |
| England | 1732 | | 42354682 | 36304013 | 6860287 | | 6.17 | −0.14 |
| England | 1733 | | 40256493 | 33498476 | 6891115 | | 5.84 | −0.17 |
| England | 1734 | | 39763624 | 46420089 | 6948942 | | 5.72 | 0.17 |
| England | 1735 | | 41088640 | 42542590 | 6999770 | | 5.87 | 0.04 |
| England | 1736 | | 42055433 | 42281694 | 7045597 | | 5.97 | 0.01 |
| England | 1737 | | 44333732 | 37417757 | 7081425 | | 6.26 | −0.16 |
| England | 1738 | | 41749084 | 34510921 | 7109252 | | 5.87 | −0.17 |
| England | 1739 | | 42568674 | 38107008 | 7147080 | | 5.96 | −0.10 |
| England | 1740 | | 42039882 | 45084024 | 7179907 | | 5.86 | 0.07 |
| England | 1741 | | 45466729 | 53796956 | 7195735 | | 6.32 | 0.18 |
| England | 1742 | | 46642730 | 62032796 | 7140562 | | 6.53 | 0.33 |
| England | 1743 | | 47507258 | 64956246 | 7141390 | | 6.65 | 0.37 |
| England | 1744 | | 47450951 | 67813875 | 7182217 | | 6.61 | 0.43 |
| England | 1745 | | 46733310 | 64619613 | 7242045 | | 6.45 | 0.38 |
| England | 1746 | | 45727976 | 71742212 | 7278872 | | 6.28 | 0.57 |
| England | 1747 | | 50640257 | 83318901 | 7306699 | | 6.93 | 0.65 |
| England | 1748 | | 52543746 | 87169045 | 7322527 | | 7.18 | 0.66 |
| England | 1749 | | 54864266 | 91835782 | 7361354 | | 7.45 | 0.67 |
| England | 1750 | 300 | 54563839 | 51151316 | 7402182 | | 7.37 | −0.06 |
| England | 1751 | 298 | 51933341 | 43905882 | 7440009 | | 6.98 | −0.15 |
| England | 1752 | 288 | 51092857 | 51151316 | 7486106 | | 6.83 | 0.00 |
| England | 1753 | 287 | 53395367 | 43659336 | 7538203 | | 7.08 | −0.18 |
| England | 1754 | 290 | 49922337 | 43874912 | 7589301 | | 6.58 | −0.12 |

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|---|---|---|---|---|---|---|---|
| England | 1755 | 313 | 50781784 | 51235585 | 7639398 | 6.65 | 0.01 |
| England | 1756 | 336 | 51279501 | 73193693 | 7700154 | 6.66 | 0.43 |
| England | 1757 | 334 | 58300612 | 80475182 | 7738911 | 7.53 | 0.38 |
| England | 1758 | 325 | 57523417 | 94110801 | 7767667 | 7.41 | 0.64 |
| England | 1759 | 363 | 58559340 | 107711845 | 7802424 | 7.51 | 0.84 |
| England | 1760 | 368 | 66636653 | 130276937 | 7852180 | 8.49 | 0.96 |
| England | 1761 | 392 | 68575822 | 150103425 | 7907937 | 8.67 | 1.19 |
| England | 1762 | 397 | 68033048 | 143848289 | 7944693 | 8.56 | 1.11 |
| England | 1763 | 336 | 69677946 | 142301533 | 7944449 | 8.77 | 1.04 |
| England | 1764 | 353 | 74583083 | 102158611 | 7988206 | 9.34 | 0.37 |
| England | 1765 | 337 | 79742093 | 80267480 | 8049962 | 9.91 | 0.01 |
| England | 1766 | 336 | 74114935 | 79336735 | 8091719 | 9.16 | 0.07 |
| England | 1767 | 337 | 70794648 | 71741638 | 8120475 | 8.72 | 0.01 |
| England | 1768 | 330 | 72883206 | 64746704 | 8150232 | 8.94 | −0.11 |
| England | 1769 | 339 | 79064185 | 71037003 | 8104988 | 9.76 | −0.10 |
| England | 1770 | 362 | 80993886 | 78337531 | 8262745 | 9.80 | −0.03 |
| England | 1771 | 344 | 78496600 | 71444980 | 8316501 | 9.44 | −0.09 |
| England | 1772 | 339 | 78861480 | 78625603 | 8378258 | 9.41 | 0.00 |
| England | 1773 | 316 | 76794372 | 73228161 | 8442014 | 9.10 | −0.05 |
| England | 1774 | 340 | 77882091 | 73383672 | 8502771 | 9.16 | −0.06 |
| England | 1775 | 338 | 81659546 | 73487713 | 8585527 | 9.51 | −0.10 |
| England | 1776 | 356 | 77720605 | 102882798 | 8662284 | 8.97 | 0.32 |
| England | 1777 | 383 | 81608105 | 110231569 | 8741040 | 9.34 | 0.35 |
| England | 1778 | 472 | 84040548 | 132277883 | 8825797 | 9.52 | 0.57 |
| England | 1779 | 488 | 87187394 | 147114475 | 8903553 | 9.79 | 0.69 |
| England | 1780 | 490 | 92144878 | 169221670 | 6954310 | 13.25 | 0.84 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| England | 1781 | 519 | 97707121 | 191294062 | 9045066 | | 10.80 | 0.96 |
| England | 1782 | 515 | 101155836 | 213114367 | 9113454 | | 11.10 | 1.11 |
| England | 1783 | 472 | 92743990 | 175582216 | 9141843 | | 10.14 | 0.89 |
| England | 1784 | 529 | 96695388 | 131717647 | 9224231 | | 10.48 | 0.36 |
| England | 1785 | 501 | 113942827 | 117413874 | 9306619 | | 12.24 | 0.03 |
| England | 1786 | 407 | 112171895 | 125076887 | 9399007 | | 11.93 | 0.12 |
| England | 1787 | 401 | 121052354 | 110361959 | 9500395 | | 12.74 | −0.09 |
| England | 1788 | 401 | 123450887 | 117719423 | 9591784 | | 12.87 | −0.05 |
| England | 1789 | 391 | 122641566 | 117719423 | 9707172 | | 12.63 | −0.04 |
| England | 1790 | 389 | 125179891 | 125076887 | 9809560 | | 12.76 | 0.00 |
| England | 1791 | 358 | 136157227 | 132434351 | 9921948 | | 13.72 | −0.03 |
| England | 1792 | 333 | 136900331 | 125076887 | 10027336 | | 13.65 | −0.09 |
| England | 1793 | 396 | 133398178 | 147149278 | 10125725 | | 13.17 | 0.10 |
| England | 1794 | 445 | 137820014 | 198651526 | 10212113 | | 13.50 | 0.44 |
| England | 1795 | 452 | 140181760 | 279583629 | 10319501 | | 13.58 | 0.99 |
| England | 1796 | 488 | 142668583 | 279583629 | 10416889 | | 13.70 | 0.96 |
| England | 1797 | 591 | 157042513 | 337883798 | 10541277 | | 14.90 | 1.15 |
| England | 1798 | 593 | 197367075 | 344253415 | 10653665 | | 18.53 | 0.74 |
| England | 1799 | 509 | 233180302 | 344821892 | 10769054 | | 21.65 | 0.48 |
| England | 1800 | 470 | 230369020 | 459498124 | 10837442 | | 21.26 | 0.99 |
| England | 1801 | 490 | 283416787 | 471321986 | 10911830 | | 25.97 | 0.66 |
| England | 1802 | 423 | 296783681 | 396499768 | 16060000 | | 18.48 | 0.34 |
| England | 1803 | 514 | 304205162 | 379880157 | 16255000 | | 18.71 | 0.25 |
| England | 1804 | 525 | 357792530 | 448968836 | 16477000 | | 21.71 | 0.25 |
| England | 1805 | 507 | 392177841 | 505980752 | 16716000 | | 23.46 | 0.29 |
| England | 1806 | 489 | 423145924 | 514107790 | 16952000 | | 24.96 | 0.21 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| England | 1807 | 477 | 451245760 | 508010741 | 17185000 | 26.26 | 0.13 |
| England | 1808 | 452 | 468865856 | 536444051 | 17410000 | 26.93 | 0.14 |
| England | 1809 | 438 | 470204809 | 557420765 | 17639000 | 26.66 | 0.19 |
| England | 1810 | 441 | 490663497 | 551156257 | 17867000 | 27.46 | 0.12 |
| England | 1811 | 467 | 425125144 | 520927994 | 18102000 | 23.48 | 0.23 |
| England | 1812 | 501 | 397552958 | 539536158 | 18367000 | 21.64 | 0.36 |
| England | 1813 | 511 | 404737116 | 599010932 | 18645000 | 21.71 | 0.48 |
| England | 1814 | 452 | 465336658 | 674141569 | 18923000 | 24.59 | 0.45 |
| England | 1815 | 504 | 492364729 | 617014028 | 19218000 | 25.62 | 0.25 |
| England | 1816 | 481 | 491840477 | 506096722 | 19520000 | 25.20 | 0.03 |
| England | 1817 | 399 | 416197508 | 423373327 | 19814000 | 21.01 | 0.02 |
| England | 1818 | 385 | 420744081 | 406719278 | 20105000 | 20.93 | −0.03 |
| England | 1819 | 427 | 413715596 | 413715596 | 20389000 | 20.29 | 0.00 |
| England | 1820 | 438 | 439265537 | 424623352 | 20686000 | 21.23 | −0.03 |
| England | 1821 | 400 | 453907721 | 424623352 | 21008000 | 21.61 | −0.06 |
| England | 1822 | 376 | 440405948 | 411045551 | 21339000 | 20.64 | −0.07 |
| England | 1823 | 375 | 434090371 | 397303052 | 21666000 | 20.04 | −0.08 |
| England | 1824 | 318 | 441134752 | 404373522 | 21978000 | 20.07 | −0.08 |
| England | 1825 | 338 | 425223951 | 395898161 | 22281000 | 19.08 | −0.07 |
| England | 1826 | 377 | 404660516 | 412017980 | 22576000 | 17.92 | 0.02 |
| England | 1827 | 354 | 404660516 | 412017980 | 22872000 | 17.69 | 0.02 |
| England | 1828 | 348 | 418879962 | 389484877 | 23190000 | 18.06 | −0.07 |
| England | 1829 | 337 | 403229609 | 395898161 | 23505000 | 17.16 | −0.02 |
| England | 1830 | 337 | 395804855 | 381145416 | 23815000 | 16.62 | −0.04 |
| England | 1831 | 368 | 373551578 | 373551578 | 24135000 | 15.48 | 0.00 |
| England | 1832 | 357 | 373903819 | 373903819 | 24373000 | 15.34 | 0.00 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| England | 1833 | 339 | 366572372 | 359240924 | 24602000 | | 14.90 | −0.02 |
| England | 1834 | 330 | 366658807 | 359325631 | 24862000 | | 14.75 | −0.02 |
| England | 1835 | 328 | 366658807 | 351992455 | 25134000 | | 14.59 | −0.04 |
| England | 1836 | 331 | 388383600 | 366399623 | 25406000 | | 15.29 | −0.06 |
| England | 1837 | 329 | 366658807 | 373991983 | 25651000 | | 14.29 | 0.02 |
| England | 1838 | 320 | 373903819 | 381235266 | 25904000 | | 14.43 | 0.02 |
| England | 1839 | 325 | 380607202 | 387926571 | 26199000 | | 14.53 | 0.02 |
| England | 1840 | 333 | 381145416 | 388475136 | 26488000 | | 14.39 | 0.02 |
| England | 1841 | 336 | 381325159 | 395991511 | 26751000 | | 14.25 | 0.04 |
| England | 1842 | 327 | 373991983 | 403324688 | 27004000 | | 13.85 | 0.08 |
| England | 1843 | 315 | 417991040 | 403324688 | 27256000 | | 15.34 | −0.04 |
| England | 1844 | 302 | 425324216 | 403324688 | 27525000 | | 15.45 | −0.05 |
| England | 1845 | 305 | 417991040 | 395991511 | 27776000 | | 15.05 | −0.05 |
| England | 1846 | 314 | 425324216 | 403324688 | 28002000 | | 15.19 | -0.05 |
| England | 1847 | 343 | 410657864 | 432657392 | 27972000 | | 14.68 | 0.05 |
| England | 1848 | 350 | 425324216 | 432657392 | 27820000 | | 15.29 | 0.02 |
| England | 1849 | 323 | 417991040 | 403324688 | 27669000 | | 15.11 | −0.04 |
| England | 1850 | 311 | 417991040 | 403324688 | 27524000 | | 15.19 | −0.04 |
| England | 1851 | 309 | 410657864 | 395991511 | 27393000 | | 14.99 | −0.04 |
| England | 1852 | 302 | 417991040 | 403324688 | 27448000 | | 15.23 | −0.04 |
| England | 1853 | 307 | 432657392 | 410657864 | 27542000 | | 15.71 | −0.05 |
| England | 1854 | 327 | 454656921 | 608653619 | 27658000 | | 16.44 | 0.34 |
| England | 1855 | 331 | 513322330 | 681985381 | 27822000 | | 18.45 | 0.33 |
| England | 1856 | 322 | 527988682 | 557321386 | 28011000 | | 18.85 | 0.06 |
| England | 1857 | 326 | 491322801 | 498655977 | 28187000 | | 17.43 | 0.01 |
| England | 1858 | 310 | 469323273 | 476656449 | 28390000 | | 16.53 | 0.02 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| England | 1859 | 316 | 513322330 | 513322330 | 28591000 | 17.95 | 0.00 |
| England | 1860 | 319 | 513322330 | 535321858 | 28778000 | 17.84 | 0.04 |
| England | 1861 | 328 | 505989154 | 527988682 | 28976000 | 17.46 | 0.04 |
| England | 1862 | 323 | 505989154 | 513322330 | 29245000 | 17.30 | 0.01 |
| England | 1863 | 324 | 498655977 | 498655977 | 29471000 | 16.92 | 0.00 |
| England | 1864 | 333 | 505989154 | 491322801 | 29681000 | 17.05 | −0.03 |
| England | 1865 | 335 | 483989625 | 483989625 | 29925000 | 16.17 | 0.00 |
| England | 1866 | 342 | 498655977 | 491322801 | 30148000 | 16.54 | −0.01 |
| England | 1867 | 323 | 498655977 | 527988682 | 30409000 | 16.40 | 0.06 |
| England | 1868 | 320 | 520655506 | 549988210 | 30690000 | 16.96 | 0.06 |
| England | 1869 | 323 | 542655034 | 491322801 | 30978000 | 17.52 | −0.09 |
| England | 1870 | 325 | 498655977 | 498655977 | 31257000 | 15.95 | 0.00 |
| England | 1871 | 323 | 535321858 | 513322330 | 31556000 | 16.96 | −0.04 |
| England | 1872 | 324 | 549858557 | 505869873 | 31874000 | 17.25 | −0.08 |
| England | 1873 | 324 | 549858557 | 549858557 | 32177000 | 17.09 | 0.00 |
| England | 1874 | 324 | 542655034 | 535321858 | 32501000 | 16.70 | −0.01 |
| England | 1875 | 320 | 549858557 | 549858557 | 33199000 | 16.56 | 0.00 |
| England | 1876 | 316 | 564521452 | 557190005 | 33200000 | 17.00 | −0.01 |
| England | 1877 | 315 | 571718124 | 586377563 | 33576000 | 17.03 | 0.03 |
| England | 1878 | 315 | 593707283 | 608366722 | 33943000 | 17.49 | 0.02 |
| England | 1879 | 308 | 535321858 | 601320443 | 34304000 | 15.61 | 0.12 |
| England | 1880 | 305 | 601178689 | 593847242 | 34623000 | 17.36 | −0.01 |
| England | 1881 | 300 | 615696441 | 608366722 | 34935000 | 17.62 | −0.01 |
| England | 1882 | 298 | 637685600 | 637685600 | 35206000 | 18.11 | 0.00 |
| England | 1883 | 296 | 630504479 | 623173032 | 35450000 | 17.79 | −0.01 |
| England | 1884 | 297 | 645167374 | 652498821 | 35724000 | 18.06 | 0.01 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| England | 1885 | 302 | 659830269 | 674493164 | 36015000 | | 18.32 | 0.02 |
| England | 1886 | 297 | 667319029 | 659985852 | 36313000 | | 18.38 | −0.01 |
| England | 1887 | 294 | 659985852 | 637986324 | 36598000 | | 18.03 | −0.03 |
| England | 1888 | 297 | 659830269 | 637835926 | 36881000 | | 17.89 | −0.03 |
| England | 1889 | 289 | 696651733 | 667319029 | 37178000 | | 18.74 | −0.04 |
| England | 1890 | 285 | 710982795 | 681663917 | 37485000 | | 18.97 | −0.04 |
| England | 1891 | 287 | 724958794 | 702990346 | 37802000 | | 19.18 | −0.03 |
| England | 1892 | 284 | 717804993 | 703155911 | 38134000 | | 18.82 | −0.02 |
| England | 1893 | 280 | 717467043 | 717467043 | 38490000 | | 18.64 | 0.00 |
| England | 1894 | 272 | 747807638 | 740476190 | 38859000 | | 19.24 | −0.01 |
| England | 1895 | 259 | 799316199 | 769983494 | 39221000 | | 20.38 | −0.04 |
| England | 1896 | 248 | 820348563 | 805699482 | 39599000 | | 20.72 | −0.02 |
| England | 1897 | 245 | 848647377 | 819383674 | 39987000 | | 21.22 | −0.03 |
| England | 1898 | 248 | 863888889 | 863888889 | 40381000 | | 21.39 | 0.00 |
| England | 1899 | 257 | 953088166 | 1055728430 | 40774000 | | 23.37 | 0.11 |
| England | 1900 | 276 | 1025677267 | 1413969376 | 41155000 | | 24.92 | 0.38 |
| England | 1901 | 291 | 1120918728 | 1501884570 | 41540000 | | 26.98 | 0.34 |
| England | 1902 | 291 | 1180084846 | 1421965590 | 41893000 | | 28.17 | 0.20 |
| England | 1903 | 284 | 1106005652 | 1135303815 | 42247000 | | 26.18 | 0.03 |
| England | 1904 | 289 | 1120918728 | 1098939929 | 42611000 | | 26.31 | −0.02 |
| England | 1905 | 278 | 1128776809 | 1077468772 | 42981000 | | 26.26 | −0.05 |
| England | 1906 | 283 | 1135571260 | 1054982332 | 43361000 | | 26.19 | −0.07 |
| England | 1907 | 297 | 1150223793 | 1047656066 | 43737000 | | 26.30 | −0.09 |
| England | 1908 | 290 | 1113330193 | 1062058408 | 44124000 | | 25.23 | −0.05 |
| England | 1909 | 298 | 967751061 | 1151037247 | 44520000 | | 21.74 | 0.19 |
| England | 1910 | 308 | 1495967932 | 1231973591 | 44916000 | | 33.31 | −0.18 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| England | 1911 | 315 | 1356637585 | 1275972648 | 45268000 | 29.97 | −0.06 |
| England | 1912 | 328 | 1385970290 | 1349304409 | 45436000 | 30.50 | −0.03 |
| England | 1913 | 339 | 1451968875 | 1407969818 | 45648000 | 31.81 | −0.03 |
| France | 1650 | | 13694541 | 51577244 | 18500000 | 0.74 | 2.77 |
| France | 1651 | | 20883827 | 77046448 | 18580000 | 1.12 | 2.69 |
| France | 1652 | | 17123299 | 56195956 | 18660000 | 0.92 | 2.28 |
| France | 1653 | | 20305692 | 52145970 | 18740000 | 1.08 | 1.57 |
| France | 1654 | | 25843014 | 78206251 | 18820000 | 1.37 | 2.03 |
| France | 1655 | | 31250324 | 74728747 | 18900000 | 1.65 | 1.39 |
| France | 1656 | | 27213113 | 76680452 | 18980000 | 1.43 | 1.82 |
| France | 1657 | | 30822997 | | 19060000 | 1.62 | |
| France | 1658 | | 34432881 | | 19140000 | 1.80 | |
| France | 1659 | | 38042765 | | 19220000 | 1.98 | |
| France | 1660 | | 41652649 | | 19300000 | 2.16 | |
| France | 1661 | | 45262533 | | 19380000 | 2.34 | |
| France | 1662 | | 47079548 | 35023088 | 19460000 | 2.42 | −0.26 |
| France | 1663 | | 47779805 | 25014601 | 19540000 | 2.45 | −0.48 |
| France | 1664 | | 47960915 | 33893838 | 19620000 | 2.44 | −0.29 |
| France | 1665 | | 47536892 | 44536393 | 19700000 | 2.41 | −0.06 |
| France | 1666 | | 51429486 | 31086243 | 19780000 | 2.60 | −0.40 |
| France | 1667 | | 51362243 | 38768630 | 19860000 | 2.59 | −0.25 |
| France | 1668 | | 54965102 | 37519618 | 19940000 | 2.76 | −0.32 |
| France | 1669 | | 51390188 | 40995186 | 20020000 | 2.57 | −0.20 |
| France | 1670 | | 51774443 | 41546707 | 20100000 | 2.58 | −0.20 |
| France | 1671 | | 54025155 | 45076428 | 20200000 | 2.67 | −0.17 |
| France | 1672 | | 61182506 | 47254499 | 20300000 | 3.01 | −0.23 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| France | 1673 | | 71537503 | 52768002 | 20400000 | | 3.51 | −0.26 |
| France | 1674 | | 61004621 | 57640128 | 20500000 | | 2.98 | −0.06 |
| France | 1675 | | 64539765 | 60115953 | 20600000 | | 3.13 | −0.07 |
| France | 1676 | | 59353131 | 59154527 | 20700000 | | 2.87 | 0.00 |
| France | 1677 | | 63269843 | 62189606 | 20800000 | | 3.04 | −0.02 |
| France | 1678 | | 61609217 | 59078782 | 20900000 | | 2.95 | −0.04 |
| France | 1679 | | 58451341 | 68916306 | 21000000 | | 2.78 | 0.18 |
| France | 1680 | | 58007433 | 51574985 | 21100000 | | 2.75 | −0.11 |
| France | 1681 | | 59848632 | 75797665 | 21150000 | | 2.83 | 0.27 |
| France | 1682 | | 62564212 | 107282153 | 21200000 | | 2.95 | 0.71 |
| France | 1683 | | 60662285 | 61856165 | 21250000 | | 2.85 | 0.02 |
| France | 1684 | | 72886425 | 83110350 | 21300000 | | 3.42 | 0.14 |
| France | 1685 | | 66799614 | 54086022 | 21350000 | | 3.13 | −0.19 |
| France | 1686 | | 67167746 | 49728160 | 21400000 | | 3.14 | −0.26 |
| France | 1687 | | 63034991 | 49489996 | 21450000 | | 2.94 | −0.21 |
| France | 1688 | | 63271993 | 56920791 | 21500000 | | 2.94 | −0.10 |
| France | 1689 | | 73523267 | 69698775 | 21550000 | | 3.41 | −0.05 |
| France | 1690 | | 68842335 | 66597192 | 21600000 | | 3.19 | −0.03 |
| France | 1691 | | 74548428 | 71124526 | 21440000 | | 3.48 | −0.05 |
| France | 1692 | | 73363797 | 77470162 | 21280000 | | 3.45 | 0.06 |
| France | 1693 | | 72111179 | 77856493 | 21120000 | | 3.41 | 0.08 |
| France | 1694 | | 65261375 | 61740005 | 20960000 | | 3.11 | −0.05 |
| France | 1695 | | 70078395 | 72795931 | 20800000 | | 3.37 | 0.04 |
| France | 1696 | | 70161108 | 72638746 | 20640000 | | 3.40 | 0.04 |
| France | 1697 | | 70653809 | 83243737 | 20480000 | | 3.45 | 0.18 |
| France | 1698 | | 54706314 | 94353821 | 20320000 | | 2.69 | 0.72 |

| | | | | | | |
|---|---|---|---|---|---|---|
| France | 1699 | 57464007 | 184174677 | 20160000 | 2.85 | 2.21 |
| France | 1700 | 55966340 | 54513391 | 20000000 | 2.80 | −0.03 |
| France | 1701 | 58749519 | 70916968 | 19840000 | 2.96 | 0.21 |
| France | 1702 | 54894821 | 7637860l | 19680000 | 2.79 | 0.39 |
| France | 1703 | 47402049 | 78794259 | 19520000 | 2.43 | 0.66 |
| France | 1704 | 55176079 | 74957299 | 19360000 | 2.85 | 0.36 |
| France | 1705 | 55646506 | 91434794 | 19200000 | 2.90 | 0.64 |
| France | 1706 | 64672761 | 99866456 | 19040000 | 3.40 | 0.54 |
| France | 1707 | 66154365 | 117319978 | 18880000 | 3.50 | 0.77 |
| France | 1708 | 54995339 | 93151812 | 18720000 | 2.94 | 0.69 |
| France | 1709 | 53691702 | 101639526 | 18560000 | 2.89 | 0.89 |
| France | 1710 | 43094016 | 101179582 | 18400000 | 2.34 | 1.35 |
| France | 1711 | 45746624 | 118277752 | 18570000 | 2.46 | 1.59 |
| France | 1712 | 50451968 | 107690216 | 18740000 | 2.69 | 1.13 |
| France | 1713 | 51522240 | 94840557 | 18910000 | 2.72 | 0.84 |
| France | 1714 | 53041408 | 95661274 | 19080000 | 2.78 | 0.80 |
| France | 1715 | 74178496 | 65776964 | 19250000 | 3.85 | −0.11 |
| France | 1716 | 74178492 | | 19365300 | 3.83 | |
| France | 1717 | 75891200 | | 19480600 | 3.90 | |
| France | 1718 | 53855700 | | 19595900 | 2.75 | |
| France | 1719 | 44205067 | | 19711200 | 2.24 | |
| France | 1720 | 31409419 | | 19826500 | 1.58 | |
| France | 1721 | 41851764 | | 19941800 | 2.10 | |
| France | 1722 | 62605767 | | 20057100 | 3.12 | |
| France | 1723 | 47649214 | | 20172400 | 2.36 | |
| France | 1724 | 41061676 | | 20287700 | 2.02 | |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| France | 1725 | | 46701470 | | 20403000 | | 2.29 | |
| France | 1726 | | 68392827 | | 20647400 | | 3.31 | |
| France | 1727 | | 66234194 | 61156452 | 20891800 | | 3.17 | −0.08 |
| France | 1728 | | 62529677 | 61635484 | 21136200 | | 2.96 | −0.01 |
| France | 1729 | | 65627419 | 65340000 | 21380600 | | 3.07 | 0.00 |
| France | 1730 | | 62497742 | 63423871 | 21625000 | | 2.89 | 0.01 |
| France | 1731 | | 65467742 | 63934839 | 21620000 | | 3.03 | −0.02 |
| France | 1732 | | 62465806 | 66042581 | 21615000 | | 2.89 | 0.06 |
| France | 1733 | | 69268065 | 72238065 | 21610000 | | 3.21 | 0.04 |
| France | 1734 | | 82744839 | 87822581 | 21605000 | | 3.83 | 0.06 |
| France | 1735 | | 82393548 | 87024194 | 21600000 | | 3.81 | 0.06 |
| France | 1736 | | 74090323 | 73611290 | 22200000 | | 3.34 | −0.01 |
| France | 1737 | | 63775161 | 63711290 | 22800000 | | 2.80 | 0.00 |
| France | 1738 | | 66681290 | 64924839 | 23400000 | | 2.85 | −0.03 |
| France | 1739 | | 68980645 | 69172258 | 24000000 | | 2.87 | 0.00 |
| France | 1740 | | 67351935 | 67415806 | 24600000 | | 2.74 | 0.00 |
| France | 1741 | | 81180000 | 83032258 | 24600000 | | 3.30 | 0.02 |
| France | 1742 | | 102449032 | 97690645 | 24600000 | | 4.16 | −0.05 |
| France | 1743 | | 87982258 | 93347419 | 24600000 | | 3.58 | 0.06 |
| France | 1744 | | 106185484 | 107910000 | 24600000 | | 4.32 | 0.02 |
| France | 1745 | | 114712258 | 112380968 | 24600000 | | 4.66 | −0.02 |
| France | 1746 | | 106951935 | 107654516 | 24580000 | | 4.35 | 0.01 |
| France | 1747 | | 118320968 | 119151290 | 24560000 | | 4.82 | 0.01 |
| France | 1748 | | 121035484 | 114392903 | 24540000 | | 4.93 | −0.05 |
| France | 1749 | | 119374839 | 119470645 | 24520000 | | 4.87 | 0.00 |
| France | 1750 | 482 | 91750645 | 91782581 | 24500000 | 182 | 3.74 | 0.00 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| France | 1751 | 475 | 74824839 | 85938387 | 24600000 | 177 | 3.04 | 0.15 |
| France | 1752 | 459 | 74633226 | 87439355 | 24700000 | 171 | 3.02 | 0.17 |
| France | 1753 | 457 | 74250000 | | 24800000 | 170 | 2.99 | |
| France | 1754 | 418 | 74345806 | | 24900000 | 128 | 2.99 | |
| France | 1755 | 470 | 95338065 | | 25000000 | 157 | 3.81 | |
| France | 1756 | 504 | 116330323 | | 25140000 | 168 | 4.63 | |
| France | 1757 | 510 | 137322581 | | 25280000 | 175 | 5.43 | |
| France | 1758 | 519 | 157186452 | | 25420000 | 194 | 6.18 | |
| France | 1759 | 542 | 92133871 | | 25560000 | 178 | 3.60 | |
| France | 1760 | 678 | 91510171 | | 25700000 | 310 | 3.56 | |
| France | 1761 | 687 | 161689355 | | 25780000 | 295 | 6.27 | |
| France | 1762 | 693 | 131909516 | | 25860000 | 296 | 5.10 | |
| France | 1763 | 595 | 102129677 | | 25940000 | 259 | 3.94 | |
| France | 1764 | 567 | 84756774 | 103694516 | 26020000 | 214 | 3.26 | 0.22 |
| France | 1765 | 593 | 86449355 | 107399032 | 26100000 | 256 | 3.31 | 0.24 |
| France | 1766 | 630 | 106440968 | | 26200000 | 295 | 4.06 | |
| France | 1767 | 675 | 96892577 | 97722581 | 26300000 | 339 | 3.68 | 0.01 |
| France | 1768 | 636 | 94529032 | 112955806 | 26400000 | 306 | 3.58 | 0.19 |
| France | 1769 | 714 | 99594000 | | 26500000 | 374 | 3.76 | |
| France | 1770 | 953 | 106315355 | | 26600000 | 591 | 4.00 | |
| France | 1771 | 1012 | 113036710 | | 26200000 | 668 | 4.31 | |
| France | 1772 | 912 | 119758065 | | 26400000 | 573 | 4.54 | |
| France | 1773 | 759 | 97339355 | 75527419 | 26600000 | 443 | 3.66 | −0.22 |
| France | 1774 | 675 | 103886129 | 82553226 | 26800000 | 335 | 3.88 | −0.21 |
| France | 1775 | 569 | 119528129 | | 27000000 | 231 | 4.43 | |
| France | 1776 | 568 | 120837484 | | 26100000 | 212 | 4.63 | |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| France | 1777 | 586 | 122181968 | | 26462500 | 203 | 4.62 | |
| France | 1778 | 615 | 127435355 | | 26825000 | 144 | 4.75 | |
| France | 1779 | 615 | 129888000 | | 27187500 | 127 | 4.78 | |
| France | 1780 | 594 | 160092581 | 199596774 | 27550000 | 104 | 5.81 | 0.25 |
| France | 1781 | 597 | 139526129 | 168172258 | 26600000 | 78 | 5.25 | 0.21 |
| France | 1782 | 590 | 147554710 | | 26862500 | 75 | 5.49 | |
| France | 1783 | 582 | 144393097 | | 27125000 | 111 | 5.32 | |
| France | 1784 | 582 | 145019032 | | 27387500 | 54 | 5.30 | |
| France | 1785 | 554 | 146072903 | 271451613 | 27650000 | 53 | 5.28 | 0.86 |
| France | 1786 | 550 | 147181065 | | 27100000 | 143 | 5.43 | |
| France | 1787 | 571 | 149183419 | | 27350000 | 169 | 5.45 | |
| France | 1788 | 602 | 150863226 | 180499355 | 27600000 | 202 | 5.47 | 0.20 |
| France | 1789 | 647 | 95231613 | 159741290 | 27850000 | 256 | 3.42 | 0.68 |
| France | 1790 | 634 | 36828000 | 144906300 | 28100000 | 244 | 1.31 | 2.93 |
| France | 1791 | 514 | 65799871 | 209587790 | 27500000 | 156 | 2.39 | 2.19 |
| France | 1792 | 549 | 76929387 | | 27650000 | 216 | 2.78 | |
| France | 1793 | 577 | 31467310 | | 27800000 | 181 | 1.13 | |
| France | 1794 | | 45597115 | | 27950000 | | 1.63 | |
| France | 1795 | | 60352020 | | 28100000 | | 2.15 | |
| France | 1796 | | 75730771 | | 28100000 | | 2.70 | |
| France | 1797 | | 91734247 | | 28132500 | | 3.26 | |
| France | 1798 | | 151040486 | | 28455000 | | 5.31 | |
| France | 1799 | | 137631888 | | 28777500 | | 4.78 | |
| France | 1800 | | 133837307 | | 29100000 | | 4.60 | |
| France | 1801 | 960 | 152547338 | 177496039 | 28800000 | 470 | 5.30 | 0.16 |
| France | 1802 | 914 | 167216059 | 161451488 | 28975000 | 492 | 5.77 | −0.03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| France | 1803 | 931 | 189618299 | 204190306 | 29150000 | 417 | 6.50 | 0.08 |
| France | 1804 | 881 | 196361028 | 259785616 | 29325000 | 356 | 6.70 | 0.32 |
| France | 1805 | 843 | 213957228 | 226060167 | 29500000 | 336 | 7.25 | 0.06 |
| France | 1806 | 766 | 313513157 | 291342626 | 29500000 | 278 | 10.63 | −0.07 |
| France | 1807 | 628 | 245404458 | 236305758 | 29625000 | 152 | 8.28 | −0.04 |
| France | 1808 | 599 | 261971439 | 249552483 | 29750000 | 147 | 8.81 | −0.05 |
| France | 1809 | 626 | 276697644 | 254072320 | 29875000 | 188 | 9.26 | −0.08 |
| France | 1810 | 619 | 277957122 | 253529849 | 30000000 | 178 | 9.27 | −0.09 |
| France | 1811 | 618 | 341124792 | 322943095 | 30100000 | 151 | 11.33 | −0.05 |
| France | 1812 | 615 | 377197535 | 324885275 | 30150000 | 114 | 12.51 | −0.14 |
| France | 1813 | 730 | 408135484 | 315015811 | 30200000 | 219 | 13.51 | −0.23 |
| France | 1814 | 794 | 334756354 | 196799786 | 30250000 | 342 | 11.07 | −0.41 |
| France | 1815 | 794 | 282898152 | 300660022 | 30300000 | 291 | 9.34 | 0.06 |
| France | 1816 | 853 | 333600217 | 341027909 | 30600000 | 372 | 10.90 | 0.02 |
| France | 1817 | 779 | 410137731 | 383979340 | 30762500 | 380 | 13.33 | −0.06 |
| France | 1818 | 712 | 456641537 | 463100399 | 30925000 | 327 | 14.77 | 0.01 |
| France | 1819 | 725 | 302371620 | 289357013 | 31087500 | 298 | 9.73 | −0.04 |
| France | 1820 | 666 | 303178978 | 292909387 | 31250000 | 228 | 9.70 | −0.03 |
| France | 1821 | 588 | 301984088 | 293232331 | 31600000 | 188 | 9.56 | −0.03 |
| France | 1822 | 556 | 306634469 | 306472997 | 31787500 | 179 | 9.65 | 0.00 |
| France | 1823 | 577 | 336829648 | 361050381 | 31975000 | 202 | 10.53 | 0.07 |
| France | 1824 | 497 | 319487604 | 318421892 | 32162500 | 178 | 9.93 | 0.00 |
| France | 1825 | 472 | 325623523 | 317130120 | 32350000 | 135 | 10.07 | −0.03 |
| France | 1826 | 451 | 326915295 | 315515404 | 32900000 | 74 | 9.94 | −0.03 |
| France | 1827 | 427 | 315612287 | 318744835 | 33000000 | 73 | 9.56 | 0.01 |
| France | 1828 | 419 | 332146974 | 330693730 | 33100000 | 72 | 10.03 | 0.00 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| France | 1829 | 376 | 329886372 | 327787242 | 33200000 | 39 | 9.94 | −0.01 |
| France | 1830 | 405 | 329401957 | 353622689 | 33300000 | 68 | 9.89 | 0.07 |
| France | 1831 | 505 | 421763682 | 393667633 | 33600000 | 136 | 12.55 | −0.07 |
| France | 1832 | 441 | 343417688 | 379135194 | 33700000 | 84 | 10.19 | 0.10 |
| France | 1833 | 393 | 375259877 | 366217470 | 33800000 | 54 | 11.10 | −0.02 |
| France | 1834 | 389 | 335602465 | 343611453 | 33900000 | 60 | 9.90 | 0.02 |
| France | 1835 | 377 | 345000109 | 338121421 | 34000000 | 48 | 10.15 | −0.02 |
| France | 1836 | 374 | 346291881 | 344257340 | 34250000 | 43 | 10.11 | −0.01 |
| France | 1837 | 378 | 351039145 | 348455600 | 34412500 | 49 | 10.20 | −0.01 |
| France | 1838 | 373 | 359112722 | 366863356 | 34575000 | 53 | 10.39 | 0.02 |
| France | 1839 | 373 | 381492679 | 380749909 | 34737500 | 48 | 10.98 | 0.00 |
| France | 1840 | 376 | 398511780 | 440494382 | 34900000 | 43 | 11.42 | 0.11 |
| France | 1841 | 386 | 445984415 | 46019391l | 35000000 | 50 | 12.74 | 0.03 |
| France | 1842 | 376 | 429740377 | 465361000 | 35175000 | 49 | 12.22 | 0.08 |
| France | 1843 | 370 | 445015585 | 466652773 | 35350000 | 55 | 12.59 | 0.05 |
| France | 1844 | 363 | 447243893 | 461162740 | 35525000 | 61 | 12.59 | 0.03 |
| France | 1845 | 356 | 449892026 | 480862269 | 35700000 | 52 | 12.60 | 0.07 |
| France | 1846 | 360 | 451958862 | 506051830 | 36000000 | 46 | 12.55 | 0.12 |
| France | 1847 | 388 | 443271693 | 526397245 | 36087500 | 44 | 12.28 | 0.19 |
| France | 1848 | 627 | 570963393 | 571932222 | 36175000 | 276 | 15.78 | 0.00 |
| France | 1849 | 563 | 462454513 | 531564335 | 36262500 | 240 | 12.75 | 0.15 |
| France | 1850 | 526 | 462454513 | 475695179 | 36350000 | 215 | 12.72 | 0.03 |
| France | 1851 | 528 | 439299493 | 471819862 | 36550000 | 219 | 12.02 | 0.07 |
| France | 1852 | 409 | 480216383 | 488612903 | 36662500 | 107 | 13.10 | 0.02 |
| France | 1853 | 387 | 492165277 | 499915912 | 36775000 | 80 | 13.38 | 0.02 |
| France | 1854 | 427 | 581943458 | 642010874 | 36887500 | 100 | 15.78 | 0.10 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| France | 1855 | 447 | 901980065 | 745675607 | 37000000 | 116 | 24.38 | −0.17 |
| France | 1856 | 427 | 618113084 | 709183037 | 36900000 | 105 | 16.75 | 0.15 |
| France | 1857 | 441 | 580974628 | 611331279 | 37000000 | 114 | 15.70 | 0.05 |
| France | 1858 | 426 | 604226531 | 600351214 | 37100000 | 116 | 16.29 | −0.01 |
| France | 1859 | 445 | 703693005 | 713058354 | 37200000 | 130 | 18.92 | 0.01 |
| France | 1860 | 436 | 633614353 | 673013411 | 37300000 | 116 | 16.99 | 0.06 |
| France | 1861 | 439 | 647823849 | 701109460 | 37400000 | 112 | 17.32 | 0.08 |
| France | 1862 | 431 | 703370062 | 714673070 | 37533400 | 108 | 18.74 | 0.02 |
| France | 1863 | 438 | 731466111 | 738570859 | 37666800 | 114 | 19.42 | 0.01 |
| France | 1864 | 454 | 711766582 | 728882566 | 37800200 | 122 | 18.83 | 0.02 |
| France | 1865 | 443 | 729528452 | 693358826 | 37933600 | 107 | 19.23 | −0.05 |
| France | 1866 | 442 | 708214208 | 711443639 | 38067000 | 101 | 18.60 | 0.00 |
| France | 1867 | 435 | 700140631 | 700786517 | 37739667 | 112 | 18.55 | 0.00 |
| France | 1868 | 429 | 624894889 | 614560710 | 37412333 | 109 | 16.70 | −0.02 |
| France | 1869 | 420 | 633614353 | 614883653 | 37085000 | 97 | 17.09 | −0.03 |
| France | 1870 | 465 | 1009197173 | 1024698441 | 36757667 | 140 | 27.46 | 0.02 |
| France | 1871 | 555 | 1039876767 | 984007611 | 36430333 | 232 | 28.54 | −0.05 |
| France | 1872 | 547 | 988851758 | 879374049 | 36103000 | 223 | 27.39 | −0.11 |
| France | 1873 | 532 | 869265930 | 928138456 | 36303750 | 208 | 23.94 | 0.07 |
| France | 1874 | 494 | 842267887 | 898427691 | 36504500 | 170 | 23.07 | 0.07 |
| France | 1875 | 463 | 926846684 | 948160928 | 36705250 | 143 | 25.25 | 0.02 |
| France | 1876 | 436 | 1029219645 | 978840522 | 36906000 | 121 | 27.89 | −0.05 |
| France | 1877 | 427 | 935243204 | 977548750 | 37006000 | 112 | 25.27 | 0.05 |
| France | 1878 | 401 | 1107048931 | 1081213483 | 37106000 | 86 | 29.83 | −0.02 |
| France | 1879 | 375 | 1127394346 | 1072816963 | 37206000 | 67 | 30.30 | −0.05 |
| France | 1880 | 355 | 1140312070 | 1086703516 | 37306000 | 50 | 30.57 | −0.05 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| France | 1881 | 353 | 1222339616 | 1167762233 | 37406000 | 52 | 32.68 | −0.04 |
| France | 1882 | 365 | 1176804639 | 1190691192 | 37510800 | 67 | 31.37 | 0.01 |
| France | 1883 | 379 | 1179711127 | 1199733599 | 37615600 | 83 | 31.36 | 0.02 |
| France | 1884 | 386 | 1113830736 | 1142895614 | 37720400 | 89 | 29.53 | 0.03 |
| France | 1885 | 373 | 1072494020 | 1119643711 | 37825200 | 71 | 28.35 | 0.04 |
| France | 1886 | 364 | 1023406669 | 1063774556 | 37930000 | 67 | 26.98 | 0.04 |
| France | 1887 | 370 | 1047304458 | 1053117434 | 37970600 | 76 | 27.58 | 0.01 |
| France | 1888 | 363 | 1055378036 | 1040199710 | 38011200 | 66 | 27.76 | −0.01 |
| France | 1889 | 350 | 1056346865 | 1048596231 | 38051800 | 61 | 27.76 | −0.01 |
| France | 1890 | 328 | 1089932947 | 1060868068 | 38092400 | 43 | 28.61 | −0.03 |
| France | 1891 | 315 | 1086380573 | 1052148605 | 38133000 | 28 | 28.49 | −0.03 |
| France | 1892 | 306 | 1088318231 | 1091547662 | 38160200 | 22 | 28.52 | 0.00 |
| France | 1893 | 306 | 1087026459 | 1114476622 | 38187400 | 27 | 28.47 | 0.03 |
| France | 1894 | 298 | 1116737224 | 1123841972 | 38214600 | 25 | 29.22 | 0.01 |
| France | 1895 | 294 | 1103173614 | 1108986589 | 38241800 | 35 | 28.85 | 0.01 |
| France | 1896 | 294 | 1109632476 | 1112538963 | 38269000 | 45 | 29.00 | 0.00 |
| France | 1897 | 290 | 1139343240 | 1138051468 | 38305400 | 45 | 29.74 | 0.00 |
| France | 1898 | 292 | 1169054005 | 1139343240 | 38341800 | 44 | 30.49 | −0.03 |
| France | 1899 | 296 | 1181002900 | 1159042769 | 38378200 | 39 | 30.77 | −0.02 |
| France | 1900 | 298 | 1232027909 | 1210067778 | 38414600 | 22 | 32.07 | −0.02 |
| France | 1901 | 296 | 1154844509 | 1212974266 | 38451000 | 5 | 30.03 | 0.05 |
| France | 1902 | 298 | 1156782167 | 1194566510 | 38529800 | 7 | 30.02 | 0.03 |
| France | 1903 | 305 | 1184555274 | 1161626314 | 38608600 | 21 | 30.68 | −0.02 |
| France | 1904 | 308 | 1207484233 | 1175189924 | 38687400 | 19 | 31.21 | −0.03 |
| France | 1905 | 302 | 1216203697 | 1197150054 | 38766200 | 23 | 31.37 | −0.02 |
| France | 1906 | 307 | 1239132657 | 1243976803 | 38845000 | 24 | 31.90 | 0.00 |

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|---|---|---|---|---|---|---|---|---|
| France | 1907 | 328 | 1281438202 | 1253019210 | 38914400 | 31 | 32.93 | −0.02 |
| France | 1908 | 312 | 1280792316 | 1298554186 | 38983800 | 21 | 32.85 | 0.01 |
| France | 1909 | 307 | 1337307358 | 1351839797 | 39053200 | 9 | 34.24 | 0.01 |
| France | 1910 | 306 | 1380258789 | 1395760058 | 39122600 | −2 | 35.28 | 0.01 |
| France | 1911 | 313 | 1514280174 | 1468745198 | 39192000 | −1 | 38.64 | −0.03 |
| France | 1912 | 324 | 1568534614 | 1531719101 | 39152600 | −4 | 40.06 | −0.02 |
| France | 1913 | 345 | 1644426241 | 1636352664 | 39113200 | 6 | 42.04 | 0.00 |
| Netherlands | 1720 | | 19977281 | 22885834 | 1900000 | | 10.51 | 0.15 |
| Netherlands | 1721 | | 20639390 | 23337968 | 1900000 | | 10.86 | 0.13 |
| Netherlands | 1722 | | 19512904 | 22541142 | 1900000 | | 10.27 | 0.16 |
| Netherlands | 1723 | | 19795403 | 21595891 | 1900000 | | 10.42 | 0.09 |
| Netherlands | 1724 | | 19977857 | 22730023 | 1900000 | | 10.51 | 0.14 |
| Netherlands | 1725 | | 20350270 | 23357455 | 1900000 | | 10.71 | 0.15 |
| Netherlands | 1726 | | 20783895 | 23121971 | 1900000 | | 10.94 | 0.11 |
| Netherlands | 1727 | | 21531422 | 23561603 | 1900000 | | 11.33 | 0.09 |
| Netherlands | 1728 | | 22086869 | 24012653 | 1900000 | | 11.62 | 0.09 |
| Netherlands | 1729 | | 22063798 | 24352119 | 1900000 | | 11.61 | 0.10 |
| Netherlands | 1730 | | 22032979 | 24470065 | 1900000 | | 11.60 | 0.11 |
| Netherlands | 1731 | | 21953172 | 23961468 | 1900000 | | 11.55 | 0.09 |
| Netherlands | 1732 | | 22138735 | 23763684 | 1900000 | | 11.65 | 0.07 |
| Netherlands | 1733 | | 21371815 | 23248235 | 1900000 | | 11.25 | 0.09 |
| Netherlands | 1734 | | 21405273 | 22943032 | 1900000 | | 11.27 | 0.07 |
| Netherlands | 1735 | | 21238532 | 22759456 | 1900000 | | 11.18 | 0.07 |
| Netherlands | 1736 | | 21390457 | 23451864 | 1900000 | | 11.26 | 0.10 |
| Netherlands | 1737 | | 21579696 | 23636897 | 1900000 | | 11.36 | 0.10 |
| Netherlands | 1738 | | 21604369 | 22920230 | 1900000 | | 11.37 | 0.06 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Netherlands | 1739 | | 21096331 | 22289210 | 1900000 | | 11.10 | 0.06 |
| Netherlands | 1740 | | 21234507 | 22719418 | 1900000 | | 11.18 | 0.07 |
| Netherlands | 1741 | | 21421473 | 23711322 | 1900000 | | 11.27 | 0.11 |
| Netherlands | 1742 | | 21694525 | 27417607 | 1900000 | | 11.42 | 0.26 |
| Netherlands | 1743 | | 21544545 | 26631130 | 1900000 | | 11.34 | 0.24 |
| Netherlands | 1744 | | 21847941 | 27859346 | 1900000 | | 11.50 | 0.28 |
| Netherlands | 1745 | | 21106346 | 32465024 | 1900000 | | 11.11 | 0.54 |
| Netherlands | 1746 | | 23820620 | 32445007 | 1900000 | | 12.54 | 0.36 |
| Netherlands | 1747 | | 28872428 | 36454324 | 1900000 | | 15.20 | 0.26 |
| Netherlands | 1748 | | 29052044 | 46327231 | 1900000 | | 15.29 | 0.59 |
| Netherlands | 1749 | | 20811318 | 30896127 | 1900000 | | 10.95 | 0.48 |
| Netherlands | 1750 | | 24733362 | 32225393 | 1900000 | | 13.02 | 0.30 |
| Netherlands | 1751 | | 25214420 | 29879226 | 1900000 | | 13.27 | 0.19 |
| Netherlands | 1752 | | 25846699 | 35052085 | 1908000 | | 13.55 | 0.36 |
| Netherlands | 1753 | | 25821481 | 32705929 | 1912000 | | 13.50 | 0.27 |
| Netherlands | 1754 | | 25248528 | 27723131 | 1916000 | | 13.18 | 0.10 |
| Netherlands | 1755 | | 25023182 | 26343567 | 1920000 | | 13.03 | 0.05 |
| Netherlands | 1756 | | 24557572 | 26809340 | 1924000 | | 12.76 | 0.09 |
| Netherlands | 1757 | | 25255010 | 29068249 | 1928000 | | 13.10 | 0.15 |
| Netherlands | 1758 | | 25760795 | 26892388 | 1932000 | | 13.33 | 0.04 |
| Netherlands | 1759 | | 25635500 | 27018772 | 1936000 | | 13.24 | 0.05 |
| Netherlands | 1760 | | 26387503 | 26860787 | 1940000 | | 13.60 | 0.02 |
| Netherlands | 1761 | | 25530025 | 26756710 | 1944000 | | 13.13 | 0.05 |
| Netherlands | 1762 | | 26135425 | 26976608 | 1948000 | | 13.42 | 0.03 |
| Netherlands | 1763 | | 25668041 | 28516124 | 1952000 | | 13.15 | 0.11 |
| Netherlands | 1764 | | 25243298 | 26770055 | 1956000 | | 12.91 | 0.06 |

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|---|---|---|---|---|---|---|---|---|
| Netherlands | 1765 | | 25285204 | 33382337 | 1960000 | | 12.90 | 0.32 |
| Netherlands | 1766 | | 25623663 | 25951682 | 1964000 | | 13.05 | 0.01 |
| Netherlands | 1767 | | 25044252 | 26157920 | 1968000 | | 12.73 | 0.04 |
| Netherlands | 1768 | | 24805779 | 26588452 | 1972000 | | 12.58 | 0.07 |
| Netherlands | 1769 | | 24382262 | 26758215 | 1976000 | | 12.34 | 0.10 |
| Netherlands | 1770 | | 25033761 | 28403774 | 1980000 | | 12.64 | 0.13 |
| Netherlands | 1771 | | 24898318 | 26424278 | 1984000 | | 12.55 | 0.06 |
| Netherlands | 1772 | | 25022261 | 26645911 | 1988000 | | 12.59 | 0.06 |
| Netherlands | 1773 | | 24865207 | 25795030 | 1992000 | | 12.48 | 0.04 |
| Netherlands | 1774 | | 25148282 | 26087757 | 1996000 | | 12.60 | 0.04 |
| Netherlands | 1775 | | 25202809 | 26618466 | 2000000 | | 12.60 | 0.06 |
| Netherlands | 1776 | | 24361617 | 27426882 | 2004000 | | 12.16 | 0.13 |
| Netherlands | 1777 | | 24115359 | 30003061 | 2008000 | | 12.01 | 0.24 |
| Netherlands | 1778 | | 24679234 | 27516811 | 2012000 | | 12.27 | 0.11 |
| Netherlands | 1779 | | 24487626 | 26004614 | 2016000 | | 12.15 | 0.06 |
| Netherlands | 1780 | 241 | 24933000 | 26996642 | 2020000 | −249 | 12.34 | 0.08 |
| Netherlands | 1781 | 257 | 24615385 | 35187064 | 2024000 | −262 | 12.16 | 0.43 |
| Netherlands | 1782 | 260 | 24722048 | 39188465 | 2028000 | −256 | 12.19 | 0.59 |
| Netherlands | 1783 | 263 | 25153653 | 33519705 | 2032000 | −208 | 12.38 | 0.33 |
| Netherlands | 1784 | 272 | 25008485 | 32896915 | 2036000 | −256 | 12.28 | 0.32 |
| Netherlands | 1785 | 280 | 24445035 | 35714336 | 2040000 | −221 | 11.98 | 0.46 |
| Netherlands | 1786 | 277 | 24583449 | 30097154 | 2044000 | −131 | 12.03 | 0.22 |
| Netherlands | 1787 | 299 | 24611847 | 31175130 | 2048000 | −102 | 12.02 | 0.27 |
| Netherlands | 1788 | 302 | 24032027 | 36763506 | 2052000 | −98 | 11.71 | 0.53 |
| Netherlands | 1789 | 322 | 24782182 | 39497507 | 2056000 | −69 | 12.05 | 0.59 |
| Netherlands | 1790 | 327 | 23875227 | 42272469 | 2060000 | −62 | 11.59 | 0.77 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Netherlands | 1791 | 336 | 24736223 | 32248144 | 2064000 | −22 | 11.98 | 0.30 |
| Netherlands | 1792 | 314 | 25476112 | 32867083 | 2068000 | −19 | 12.32 | 0.29 |
| Netherlands | 1793 | 384 | 30130393 | 38970571 | 2072000 | −13 | 14.54 | 0.29 |
| Netherlands | 1794 | 379 | 29760031 | 46602480 | 2076000 | −66 | 14.34 | 0.57 |
| Netherlands | 1795 | 433 | 16144935 | | 2080000 | −20 | 7.76 | |
| Netherlands | 1796 | 447 | | | 2084000 | −41 | | |
| Netherlands | 1797 | 539 | | | 2088000 | −52 | | |
| Netherlands | 1798 | 612 | | | 2092000 | 19 | | |
| Netherlands | 1799 | 592 | | | 2096000 | 83 | | |
| Netherlands | 1800 | 598 | | | 2100000 | 127 | | |
| Netherlands | 1801 | 586 | | | 2118000 | 96 | | |
| Netherlands | 1802 | 574 | | | 2136000 | 152 | | |
| Netherlands | 1803 | 634 | 21775693 | 45728956 | 2154000 | 120 | 10.11 | 1.10 |
| Netherlands | 1804 | 748 | 21767438 | 45338464 | 2172000 | 222 | 10.02 | 1.08 |
| Netherlands | 1805 | 730 | 21083792 | 43492852 | 2190000 | 223 | 9.63 | 1.06 |
| Netherlands | 1806 | 741 | 26646515 | 51171294 | 2208000 | 252 | 12.07 | 0.92 |
| Netherlands | 1807 | 703 | 29357964 | 49202940 | 2226000 | 226 | 13.19 | 0.68 |
| Netherlands | 1808 | 725 | 27028022 | 49141859 | 2244000 | 273 | 12.04 | 0.82 |
| Netherlands | 1809 | 760 | 28972936 | 41989762 | 2262000 | 322 | 12.81 | 0.45 |
| Netherlands | 1810 | 1393 | 26623177 | 46030727 | 2280000 | 952 | 11.68 | 0.73 |
| Netherlands | 1811 | | 26530730 | 43085661 | 2298000 | | 11.55 | 0.62 |
| Netherlands | 1812 | | 26811991 | 40798201 | 2316000 | | 11.58 | 0.52 |
| Netherlands | 1813 | | 27098137 | 38528734 | 2334000 | | 11.61 | 0.42 |
| Netherlands | 1814 | 666 | 27533703 | 36466860 | 2352000 | 214 | 11.71 | 0.32 |
| Netherlands | 1815 | 609 | 24715198 | 56610147 | 2100000 | 105 | 11.77 | 1.29 |
| Netherlands | 1816 | 574 | 24564915 | 38227947 | 2047000 | 93 | 12.00 | 0.56 |

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|---|---|---|---|---|---|---|---|---|
| Netherlands | 1817 | 576 | 24892689 | 37176096 | 2090538 | 177 | 11.91 | 0.49 |
| Netherlands | 1818 | 580 | 25173637 | 35908758 | 2134077 | 195 | 11.80 | 0.43 |
| Netherlands | 1819 | 570 | 25396786 | 33111552 | 2177615 | 143 | 11.66 | 0.30 |
| Netherlands | 1820 | 552 | 25139766 | 37998578 | 2221154 | 114 | 11.32 | 0.51 |
| Netherlands | 1821 | 524 | 22613274 | 35040495 | 2264692 | 124 | 9.99 | 0.55 |
| Netherlands | 1822 | 525 | 23427897 | 38154003 | 2308231 | 149 | 10.15 | 0.63 |
| Netherlands | 1823 | 520 | 23668135 | 44826935 | 2351769 | 145 | 10.06 | 0.89 |
| Netherlands | 1824 | 440 | 24094905 | 46997966 | 2395308 | 122 | 10.06 | 0.95 |
| Netherlands | 1825 | 430 | 24175421 | 48253115 | 2438846 | 92 | 9.91 | 1.00 |
| Netherlands | 1826 | 490 | 22999416 | 51961643 | 2482385 | 113 | 9.27 | 1.26 |
| Netherlands | 1827 | 476 | 23271439 | 53933545 | 2525923 | 122 | 9.21 | 1.32 |
| Netherlands | 1828 | 437 | 23351698 | 51203464 | 2569462 | 89 | 9.09 | 1.19 |
| Netherlands | 1829 | 394 | 23405748 | 48565415 | 2613000 | 57 | 8.96 | 1.07 |
| Netherlands | 1830 | 622 | 23568942 | 44720557 | 2637800 | 285 | 8.94 | 0.90 |
| Netherlands | 1831 | 600 | 28381348 | 61828613 | 2662600 | 232 | 10.66 | 1.18 |
| Netherlands | 1832 | 590 | 28764609 | 61150706 | 2687400 | 233 | 10.70 | 1.13 |
| Netherlands | 1833 | 517 | 29203405 | 59737011 | 2712200 | 178 | 10.77 | 1.05 |
| Netherlands | 1834 | 485 | 29431917 | 53600771 | 2737000 | 155 | 10.75 | 0.82 |
| Netherlands | 1835 | 452 | 29852376 | 46458594 | 2761800 | 123 | 10.81 | 0.56 |
| Netherlands | 1836 | 453 | 30336560 | 48392588 | 2786600 | 122 | 10.89 | 0.60 |
| Netherlands | 1837 | 471 | 30459332 | 57317259 | 2811400 | 142 | 10.83 | 0.88 |
| Netherlands | 1838 | 464 | 30361848 | 61636376 | 2836200 | 144 | 10.71 | 1.03 |
| Netherlands | 1839 | 465 | 30345046 | 58744116 | 2861000 | 140 | 10.61 | 0.94 |
| Netherlands | 1840 | 478 | 30520998 | 54069262 | 2880600 | 145 | 10.60 | 0.77 |
| Netherlands | 1841 | 484 | 31146802 | 54531275 | 2900200 | 148 | 10.74 | 0.75 |
| Netherlands | 1842 | 478 | 31843375 | 54877196 | 2919800 | 151 | 10.91 | 0.72 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Netherlands | 1843 | 459 | 32547004 | 53171449 | 2939400 | 144 | 11.07 | 0.63 |
| Netherlands | 1844 | 413 | 33376796 | 53495485 | 2959000 | 110 | 11.28 | 0.60 |
| Netherlands | 1845 | 403 | 33899742 | 54057981 | 2978600 | 99 | 11.38 | 0.59 |
| Netherlands | 1846 | 418 | 33977078 | 52725144 | 2998200 | 104 | 11.33 | 0.55 |
| Netherlands | 1847 | 441 | 34226691 | 55312777 | 3017800 | 97 | 11.34 | 0.62 |
| Netherlands | 1848 | 560 | 33851778 | 55332271 | 3037400 | 210 | 11.14 | 0.63 |
| Netherlands | 1849 | 487 | 33720816 | 51868746 | 3057000 | 164 | 11.03 | 0.54 |
| Netherlands | 1850 | 440 | 35076276 | 43260740 | 3082200 | 129 | 11.38 | 0.23 |
| Netherlands | 1851 | 424 | 35562987 | 45982318 | 3107400 | 115 | 11.44 | 0.29 |
| Netherlands | 1852 | 399 | 35360898 | 42805298 | 3132600 | 97 | 11.29 | 0.21 |
| Netherlands | 1853 | 388 | 36193674 | 43120394 | 3157800 | 81 | 11.46 | 0.19 |
| Netherlands | 1854 | 421 | 37882136 | 51582842 | 3183000 | 94 | 11.90 | 0.36 |
| Netherlands | 1855 | 394 | 38115709 | 52987084 | 3208200 | 62 | 11.88 | 0.39 |
| Netherlands | 1856 | 388 | 35543029 | 57679477 | 3233400 | 66 | 10.99 | 0.62 |
| Netherlands | 1857 | 389 | 36214012 | 58067296 | 3258600 | 62 | 11.11 | 0.60 |
| Netherlands | 1858 | 379 | 37681815 | 53005753 | 3283800 | 69 | 11.48 | 0.41 |
| Netherlands | 1859 | 394 | 37229612 | 61586612 | 3309000 | 79 | 11.25 | 0.65 |
| Netherlands | 1860 | 384 | 37839133 | 53668504 | 3336100 | 65 | 11.34 | 0.42 |
| Netherlands | 1861 | 390 | 38030162 | 60349503 | 3363200 | 63 | 11.31 | 0.59 |
| Netherlands | 1862 | 386 | 38901229 | 57912635 | 3390300 | 63 | 11.47 | 0.49 |
| Netherlands | 1863 | 385 | 39573610 | 62249917 | 3417400 | 61 | 11.58 | 0.57 |
| Netherlands | 1864 | 395 | 40745198 | 62998345 | 3444500 | 63 | 11.83 | 0.55 |
| Netherlands | 1865 | 401 | 40546694 | 61942873 | 3471600 | 66 | 11.68 | 0.53 |
| Netherlands | 1866 | 432 | 43146573 | 66033017 | 3498700 | 91 | 12.33 | 0.53 |
| Netherlands | 1867 | 457 | 44913261 | 69833883 | 3525800 | 134 | 12.74 | 0.55 |
| Netherlands | 1868 | 445 | 44124044 | 59660680 | 3552900 | 125 | 12.42 | 0.35 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Netherlands | 1869 | 449 | 45630565 | 58240633 | 3580000 | 126 | 12.75 | 0.28 |
| Netherlands | 1870 | 460 | 46575172 | 61572378 | 3623300 | 136 | 12.85 | 0.32 |
| Netherlands | 1871 | 433 | 48483342 | 58677275 | 3666600 | 110 | 13.22 | 0.21 |
| Netherlands | 1872 | 466 | 50610411 | 67213095 | 3709900 | 142 | 13.64 | 0.33 |
| Netherlands | 1873 | 435 | 52316707 | 66411443 | 3753200 | 111 | 13.94 | 0.27 |
| Netherlands | 1874 | 401 | 55186611 | 61573376 | 3796500 | 77 | 14.54 | 0.12 |
| Netherlands | 1875 | 395 | 56269053 | 73551690 | 3839800 | 75 | 14.65 | 0.31 |
| Netherlands | 1876 | 401 | 58608059 | 68894994 | 3883100 | 85 | 15.09 | 0.18 |
| Netherlands | 1877 | 394 | 57984106 | 72144435 | 3926400 | 79 | 14.77 | 0.24 |
| Netherlands | 1878 | 397 | 58465286 | 70676005 | 3969700 | 82 | 14.73 | 0.21 |
| Netherlands | 1879 | 390 | 59683313 | 70097442 | 4013000 | 82 | 14.87 | 0.17 |
| Netherlands | 1880 | 384 | 62728380 | 68848965 | 4062800 | 79 | 15.44 | 0.10 |
| Netherlands | 1881 | 372 | 64535769 | 75190259 | 4112600 | 72 | 15.69 | 0.17 |
| Netherlands | 1882 | 379 | 63926941 | 79086758 | 4162400 | 81 | 15.36 | 0.24 |
| Netherlands | 1883 | 387 | 63318113 | 83774734 | 4212200 | 91 | 15.03 | 0.32 |
| Netherlands | 1884 | 379 | 63318113 | 81126332 | 4262000 | 81 | 14.86 | 0.28 |
| Netherlands | 1885 | 376 | 65144597 | 74337900 | 4311800 | 74 | 15.11 | 0.14 |
| Netherlands | 1886 | 343 | 66362253 | 75433790 | 4361600 | 46 | 15.22 | 0.14 |
| Netherlands | 1887 | 346 | 66971081 | 74581431 | 4411400 | 52 | 15.18 | 0.11 |
| Netherlands | 1888 | 334 | 68188737 | 77077626 | 4461200 | 36 | 15.28 | 0.13 |
| Netherlands | 1889 | 320 | 69406393 | 75525114 | 4511000 | 31 | 15.39 | 0.09 |
| Netherlands | 1890 | 312 | 69406393 | 76742770 | 4570300 | 28 | 15.19 | 0.11 |
| Netherlands | 1891 | 322 | 71841705 | 79208524 | 4629600 | 35 | 15.52 | 0.10 |
| Netherlands | 1892 | 320 | 73059361 | 80091324 | 4688900 | 35 | 15.58 | 0.10 |
| Netherlands | 1893 | 306 | 70015221 | 82130898 | 4748200 | 26 | 14.75 | 0.17 |
| Netherlands | 1894 | 282 | 71841705 | 80000000 | 4807500 | 10 | 14.94 | 0.11 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Netherlands | 1895 | 270 | 73668189 | 81187215 | 4866800 | 11 | 15.14 | 0.10 |
| Netherlands | 1896 | 278 | 74051593 | 80698027 | 4926100 | 29 | 15.03 | 0.09 |
| Netherlands | 1897 | 287 | 74658574 | 84036419 | 4985400 | 42 | 14.98 | 0.13 |
| Netherlands | 1898 | 293 | 75872534 | 91198786 | 5044700 | 45 | 15.04 | 0.20 |
| Netherlands | 1899 | 304 | 79514416 | 90773900 | 5104000 | 47 | 15.58 | 0.14 |
| Netherlands | 1900 | 324 | 83763278 | 93566009 | 5179400 | 48 | 16.17 | 0.12 |
| Netherlands | 1901 | 321 | 72376944 | 92599914 | 5254800 | 30 | 13.77 | 0.28 |
| Netherlands | 1902 | 310 | 76103501 | 99025875 | 5330200 | 19 | 14.28 | 0.30 |
| Netherlands | 1903 | 320 | 77929985 | 99512938 | 5405600 | 36 | 14.42 | 0.28 |
| Netherlands | 1904 | 321 | 79147641 | 106605784 | 5481000 | 33 | 14.44 | 0.35 |
| Netherlands | 1905 | 321 | 80365297 | 105814307 | 5556400 | 43 | 14.46 | 0.32 |
| Netherlands | 1906 | 326 | 84627093 | 108249619 | 5631800 | 43 | 15.03 | 0.28 |
| Netherlands | 1907 | 342 | 83922208 | 110740826 | 5707200 | 45 | 14.70 | 0.32 |
| Netherlands | 1908 | 337 | 84242424 | 117515152 | 5782600 | 47 | 14.57 | 0.39 |
| Netherlands | 1909 | 329 | 87878788 | 119575758 | 5858000 | 31 | 15.00 | 0.36 |
| Netherlands | 1910 | 340 | 91515152 | 123575758 | 5949545 | 32 | 15.38 | 0.35 |
| Netherlands | 1911 | 359 | 93333333 | 126303030 | 6041091 | 44 | 15.45 | 0.35 |
| Netherlands | 1912 | 379 | 95757576 | 131939394 | 6132636 | 51 | 15.61 | 0.38 |
| Netherlands | 1913 | 388 | 100606061 | 144666667 | 6224182 | 49 | 16.16 | 0.44 |
| Prussia | 1688 | | 1106662 | 1250441 | 1214111 | | 0.91 | 0.13 |
| Prussia | 1689 | | 1128661 | 1831874 | 1235695 | | 0.91 | 0.62 |
| Prussia | 1690 | | 1301659 | 1999121 | 1257662 | | 1.03 | 0.54 |
| Prussia | 1691 | | 1665943 | 2951140 | 1280020 | | 1.30 | 0.77 |
| Prussia | 1692 | | 1363949 | 2509459 | 1302775 | | 1.05 | 0.84 |
| Prussia | 1693 | | 2982989 | 5107443 | 1325934 | | 2.25 | 0.71 |
| Prussia | 1694 | | 2473161 | 4240888 | 1349506 | | 1.83 | 0.71 |

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|---|---|---|---|---|---|---|
| Prussia | 1695 | 2386606 | 4099170 | 1373496 | 1.74 | 0.72 |
| Prussia | 1696 | 2414777 | 4539832 | 1397913 | 1.73 | 0.88 |
| Prussia | 1697 | 2595821 | 4765989 | 1422764 | 1.82 | 0.84 |
| Prussia | 1698 | 3283096 | 4264235 | 1448057 | 2.27 | 0.30 |
| Prussia | 1699 | 2888561 | 4568878 | 1473799 | 1.96 | 0.58 |
| Prussia | 1700 | 3297987 | 3707930 | 1499999 | 2.20 | 0.12 |
| Prussia | 1701 | 3155588 | 3722588 | 1510826 | 2.09 | 0.18 |
| Prussia | 1702 | 3432254 | 3904200 | 1521731 | 2.26 | 0.14 |
| Prussia | 1703 | 3471636 | 4308133 | 1532715 | 2.27 | 0.24 |
| Prussia | 1704 | 4004260 | 4914423 | 1543778 | 2.59 | 0.23 |
| Prussia | 1705 | 3952068 | 5139913 | 1554921 | 2.54 | 0.30 |
| Prussia | 1706 | 4193280 | 5681522 | 1566144 | 2.68 | 0.35 |
| Prussia | 1707 | 3941004 | 5498431 | 1577449 | 2.50 | 0.40 |
| Prussia | 1708 | 4205240 | 5619218 | 1588835 | 2.65 | 0.34 |
| Prussia | 1709 | 3872381 | 5897468 | 1600303 | 2.42 | 0.52 |
| Prussia | 1710 | 3662090 | 6075423 | 1611854 | 2.27 | 0.66 |
| Prussia | 1711 | 4050211 | 6385091 | 1623488 | 2.49 | 0.58 |
| Prussia | 1712 | 2891346 | 4417667 | 1635207 | 1.77 | 0.53 |
| Prussia | 1713 | 2462404 | 3116704 | 1647010 | 1.50 | 0.27 |
| Prussia | 1714 | 7281287 | 6439180 | 1658898 | 4.39 | −0.12 |
| Prussia | 1715 | 7804747 | 6061120 | 1670872 | 4.67 | −0.22 |
| Prussia | 1716 | 7901385 | 6235428 | 1682932 | 4.70 | −0.21 |
| Prussia | 1717 | 8673225 | 7504068 | 1695080 | 5.12 | −0.13 |
| Prussia | 1718 | 8556377 | 7950639 | 1707315 | 5.01 | −0.07 |
| Prussia | 1719 | 9001158 | 8140786 | 1719638 | 5.23 | −0.10 |
| Prussia | 1720 | 10153951 | 8284284 | 1732050 | 5.86 | −0.18 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Prussia | 1721 | | 8989599 | 8577196 | 1744552 | | 5.15 | −0.05 |
| Prussia | 1722 | | 9242054 | 8036938 | 1757145 | | 5.26 | −0.13 |
| Prussia | 1723 | | 10581749 | 9425619 | 1769827 | | 5.98 | −0.11 |
| Prussia | 1724 | | 10091549 | 9190971 | 1782602 | | 5.66 | −0.09 |
| Prussia | 1725 | | 10379885 | 9378785 | 1795469 | | 5.78 | −0.10 |
| Prussia | 1726 | | 10474618 | 9588389 | 1808429 | | 5.79 | −0.08 |
| Prussia | 1727 | | 11286343 | 11079788 | 1821482 | | 6.20 | −0.02 |
| Prussia | 1728 | | 10072407 | 9111295 | 1834629 | | 5.49 | −0.10 |
| Prussia | 1729 | | 10071332 | 9466685 | 1847872 | | 5.45 | −0.06 |
| Prussia | 1730 | | 10480046 | 9624656 | 1861210 | | 5.63 | −0.08 |
| Prussia | 1731 | | 10537373 | 9106786 | 1874644 | | 5.62 | −0.14 |
| Prussia | 1732 | | 10880328 | 9536401 | 1888175 | | 5.76 | −0.12 |
| Prussia | 1733 | | 10747533 | 9988883 | 1901804 | | 5.65 | -0.07 |
| Prussia | 1734 | | 10908812 | 9945551 | 1915531 | | 5.69 | −0.09 |
| Prussia | 1735 | | 10994583 | 9997380 | 1929357 | | 5.70 | −0.09 |
| Prussia | 1736 | | 11281493 | 10001193 | 1943283 | | 5.81 | −0.11 |
| Prussia | 1737 | | 11062970 | 10329751 | 1957310 | | 5.65 | −0.07 |
| Prussia | 1738 | | 11535004 | 10371087 | 1971438 | | 5.85 | −0.10 |
| Prussia | 1739 | | 11326643 | 10076126 | 1985667 | | 5.70 | −0.11 |
| Prussia | 1740 | | 11491289 | 10094953 | 2000000 | | 5.75 | −0.12 |
| Prussia | 1741 | | 11871166 | 10601508 | 3500000 | | 3.39 | −0.11 |
| Prussia | 1742 | | 13001010 | 12276255 | 3526933 | | 3.69 | −0.06 |
| Prussia | 1743 | | 12254263 | 15270712 | 3554073 | | 3.45 | 0.25 |
| Prussia | 1744 | | 17093711 | 15587340 | 3581423 | | 4.77 | −0.09 |
| Prussia | 1745 | | 17812066 | 15794165 | 3608983 | | 4.94 | −0.11 |
| Prussia | 1746 | | 17304592 | 15208350 | 3636755 | | 4.76 | −0.12 |

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|---|---|---|---|---|---|---|
| Prussia | 1747 | 17264517 | 14988990 | 3664741 | 4.71 | −0.13 |
| Prussia | 1748 | 17283793 | 15254031 | 3692943 | 4.68 | −0.12 |
| Prussia | 1749 | 17303177 | 15258579 | 3721361 | 4.65 | −0.12 |
| Prussia | 1750 | 16949352 | 14754133 | 3749998 | 4.52 | −0.13 |
| Prussia | 1751 | 17649106 | 15381475 | 3761540 | 4.69 | −0.13 |
| Prussia | 1752 | 17645254 | 15309773 | 3773118 | 4.68 | −0.13 |
| Prussia | 1753 | 13314197 | 11563124 | 3784732 | 3.52 | −0.13 |
| Prussia | 1754 | 13435334 | 11586586 | 3796381 | 3.54 | −0.14 |
| Prussia | 1755 | 13437793 | 11708858 | 3808067 | 3.53 | −0.13 |
| Prussia | 1756 | 13339218 | 11644861 | 3819788 | 3.49 | −0.13 |
| Prussia | 1757 | 13848868 | 12104260 | 3831546 | 3.61 | −0.13 |
| Prussia | 1758 | 22604094 | 18559107 | 3843339 | 5.88 | −0.18 |
| Prussia | 1759 | 20804010 | 16424192 | 3855169 | 5.40 | −0.21 |
| Prussia | 1760 | 18887690 | 15592284 | 3867035 | 4.88 | −0.17 |
| Prussia | 1761 | 19330069 | 14303995 | 3878939 | 4.98 | −0.26 |
| Prussia | 1762 | 22219465 | 15503886 | 3890878 | 5.71 | −0.30 |
| Prussia | 1763 | 17439387 | 29749763 | 3902854 | 4.47 | 0.71 |
| Prussia | 1764 | 21573721 | 19622180 | 3914867 | 5.51 | −0.09 |
| Prussia | 1765 | 14773560 | 12469927 | 3926917 | 3.76 | −0.16 |
| Prussia | 1766 | 15491533 | 12542606 | 3939004 | 3.93 | −0.19 |
| Prussia | 1767 | 15456246 | 12545904 | 3951129 | 3.91 | −0.19 |
| Prussia | 1768 | 14689537 | 12371039 | 3963290 | 3.71 | −0.16 |
| Prussia | 1769 | 16685185 | 12331361 | 3975489 | 4.20 | −0.26 |
| Prussia | 1770 | 17303381 | 12537387 | 3987726 | 4.34 | −0.28 |
| Prussia | 1771 | 17431194 | 12620385 | 4000000 | 4.36 | −0.28 |
| Prussia | 1772 | 17098841 | 12402003 | 4337887 | 3.94 | −0.27 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Prussia | 1773 | | 17253914 | 12479258 | 4704315 | | 3.67 | −0.28 |
| Prussia | 1774 | | 18697630 | 13514054 | 5101696 | | 3.66 | −0.28 |
| Prussia | 1775 | | 16195984 | 14007567 | 5532645 | | 2.93 | −0.14 |
| Prussia | 1776 | | 16248651 | 14050551 | 5999997 | | 2.71 | −0.14 |
| Prussia | 1777 | | 16281663 | 14094965 | 6058083 | | 2.69 | −0.13 |
| Prussia | 1778 | | 16279751 | 14092140 | 6116730 | | 2.66 | −0.13 |
| Prussia | 1779 | | 16315427 | 14129580 | 6175946 | | 2.64 | −0.13 |
| Prussia | 1780 | | 16292081 | 14162646 | 6235736 | | 2.61 | −0.13 |
| Prussia | 1781 | | 16486596 | 14298291 | 6296104 | | 2.62 | −0.13 |
| Prussia | 1782 | | 22464692 | 18816637 | 6357057 | | 3.53 | −0.16 |
| Prussia | 1783 | | 22156160 | 18506671 | 6418600 | | 3.45 | −0.16 |
| Prussia | 1784 | | 22187560 | 19011691 | 6480739 | | 3.42 | −0.14 |
| Prussia | 1785 | | 22669433 | 19081226 | 6543479 | | 3.46 | −0.16 |
| Prussia | 1786 | | 23106949 | 19558291 | 6606826 | | 3.50 | −0.15 |
| Prussia | 1787 | | 22645562 | 19271690 | 6670787 | | 3.39 | −0.15 |
| Prussia | 1788 | | 20981902 | 16556106 | 6735368 | | 3.12 | −0.21 |
| Prussia | 1789 | | 20629173 | 19015705 | 6800573 | | 3.03 | −0.08 |
| Prussia | 1790 | | 19675259 | 19611662 | 6866408 | | 2.87 | 0.00 |
| Prussia | 1791 | | 20589124 | 18723460 | 6932882 | | 2.97 | −0.09 |
| Prussia | 1792 | | 20470236 | 17377464 | 6999999 | | 2.92 | −0.15 |
| Prussia | 1793 | | 20926925 | 19325571 | 7348155 | | 2.85 | −0.08 |
| Prussia | 1794 | | 21604236 | 17890957 | 7713625 | | 2.80 | −0.17 |
| Prussia | 1795 | | 20778674 | 19886266 | 8097271 | | 2.57 | −0.04 |
| Prussia | 1796 | | 19526438 | 17561899 | 8500001 | | 2.30 | −0.10 |
| Prussia | 1797 | | 21147563 | 17072852 | 8622337 | | 2.45 | −0.19 |
| Prussia | 1798 | | 20252948 | 19651007 | 8746434 | | 2.32 | −0.03 |

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|---|---|---|---|---|---|---|---|---|
| Prussia | 1799 | | 20554757 | 18424979 | 8872316 | | 2.32 | −0.10 |
| Prussia | 1800 | | 20916044 | 18666285 | 9000010 | | 2.32 | −0.11 |
| Prussia | 1801 | | 21251159 | 18599902 | 9113066 | | 2.33 | −0.12 |
| Prussia | 1802 | | 21933305 | 18110020 | 9227541 | | 2.38 | −0.17 |
| Prussia | 1803 | | 21106940 | 18394045 | 9343455 | | 2.26 | −0.13 |
| Prussia | 1804 | | 20339428 | 17108149 | 9460825 | | 2.15 | −0.16 |
| Prussia | 1805 | | 20326904 | 17499080 | 9579669 | | 2.12 | −0.14 |
| Prussia | 1806 | | 16413396 | 14296362 | 9700006 | | 1.69 | −0.13 |
| Prussia | 1807 | | 14543259 | | 4899999 | | 2.97 | |
| Prussia | 1808 | | 13606782 | | 4916526 | | 2.77 | |
| Prussia | 1809 | | 11184295 | | 4933109 | | 2.27 | |
| Prussia | 1810 | | 7213886 | | 4949747 | | 1.46 | |
| Prussia | 1811 | | 16895120 | | 4966441 | | 3.40 | |
| Prussia | 1812 | | 18763031 | | 4983193 | | 3.77 | |
| Prussia | 1813 | | 24679715 | | 5000000 | | 4.94 | |
| Prussia | 1814 | | 18804805 | | 6372052 | | 2.95 | |
| Prussia | 1815 | 506 | 12737883 | | 8120609 | 3 | 1.57 | |
| Prussia | 1816 | 513 | 14214883 | | 10348991 | 32 | 1.37 | |
| Prussia | 1817 | 546 | 14533104 | | 10528851 | 147 | 1.38 | |
| Prussia | 1818 | 586 | 19654666 | | 10711838 | 201 | 1.83 | |
| Prussia | 1819 | 579 | 21251894 | | 10897980 | 152 | 1.95 | |
| Prussia | 1820 | 572 | 54386082 | | 11087382 | 134 | 4.91 | |
| Prussia | 1821 | 557 | 55686715 | 55686715 | 11280075 | 157 | 4.94 | 0.00 |
| Prussia | 1822 | 559 | 55868296 | | 11476118 | 183 | 4.87 | |
| Prussia | 1823 | 596 | 55417001 | | 11675568 | 222 | 4.75 | |
| Prussia | 1824 | 515 | 55771918 | | 11878484 | 196 | 4.70 | |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Prussia | 1825 | 505 | 55220711 | | 12084898 | 167 | 4.57 | |
| Prussia | 1826 | 493 | 54919122 | | 12294928 | 116 | 4.47 | |
| Prussia | 1827 | 454 | 55786332 | | 12508609 | 100 | 4.46 | |
| Prussia | 1828 | 441 | 55547775 | | 12726002 | 93 | 4.36 | |
| Prussia | 1829 | 412 | 55795851 | 55795851 | 12853429 | 75 | 4.34 | 0.00 |
| Prussia | 1830 | 409 | 56330399 | | 12982131 | 72 | 4.34 | |
| Prussia | 1831 | 441 | 56901915 | | 13112153 | 73 | 4.34 | |
| Prussia | 1832 | 427 | 58058723 | | 13243446 | 70 | 4.38 | |
| Prussia | 1833 | 413 | 58716129 | | 13376054 | 74 | 4.39 | |
| Prussia | 1834 | 403 | 59529690 | | 13509989 | 73 | 4.41 | |
| Prussia | 1835 | 396 | 59510187 | | 13704052 | 68 | 4.34 | |
| Prussia | 1836 | 394 | 59565976 | | 13900903 | 63 | 4.29 | |
| Prussia | 1837 | 391 | 59808131 | | 14100581 | 62 | 4.24 | |
| Prussia | 1838 | 390 | 60161342 | 94760925 | 14303127 | 70 | 4.21 | 0.58 |
| Prussia | 1839 | 386 | 60626975 | | 14508583 | 61 | 4.18 | |
| Prussia | 1840 | 386 | 61633250 | | 14716990 | 53 | 4.19 | |
| Prussia | 1841 | 384 | 62537842 | 62537842 | 14928391 | 48 | 4.19 | 0.00 |
| Prussia | 1842 | 383 | 65055327 | | 15117083 | 56 | 4.30 | |
| Prussia | 1843 | 384 | 65710607 | | 15308196 | 69 | 4.29 | |
| Prussia | 1844 | 345 | 66980859 | | 15501688 | 43 | 4.32 | |
| Prussia | 1845 | 352 | 68719893 | | 15704966 | 47 | 4.38 | |
| Prussia | 1846 | 366 | 70245476 | | 15910946 | 52 | 4.41 | |
| Prussia | 1847 | 376 | 70105529 | 70105529 | 16119590 | 33 | 4.35 | 0.00 |
| Prussia | 1848 | 460 | 74740820 | | 16250922 | 110 | 4.60 | |
| Prussia | 1849 | 413 | 78819982 | 90094367 | 16383323 | 90 | 4.81 | 0.14 |
| Prussia | 1850 | 410 | 84423162 | 84086670 | 16516803 | 99 | 5.11 | 0.00 |

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|---|---|---|---|---|---|---|---|---|
| Prussia | 1851 | 399 | 84166037 | | 16651371 | 90 | 5.05 | |
| Prussia | 1852 | 376 | 90657119 | | 16787035 | 74 | 5.40 | |
| Prussia | 1853 | 402 | 102934626 | 102306829 | 16923805 | 95 | 6.08 | −0.01 |
| Prussia | 1854 | 444 | 93661480 | | 17054422 | 117 | 5.49 | |
| Prussia | 1855 | 417 | 102706266 | 98500380 | 17186008 | 86 | 5.98 | -0.04 |
| Prussia | 1856 | 424 | 122903640 | 135041092 | 17319685 | 102 | 7.10 | 0.10 |
| Prussia | 1857 | 430 | 128113775 | | 17454403 | 104 | 7.34 | |
| Prussia | 1858 | 423 | 134814461 | | 17590169 | 113 | 7.66 | |
| Prussia | 1859 | 442 | 140299631 | | 17726990 | 126 | 7.91 | |
| Prussia | 1860 | 424 | 143044573 | 136757396 | 17972976 | 105 | 7.96 | −0.04 |
| Prussia | 1861 | 407 | 147407486 | | 18222334 | 79 | 8.09 | |
| Prussia | 1862 | 400 | 146632504 | | 18475194 | 77 | 7.94 | |
| Prussia | 1863 | 410 | 162189211 | | 18736178 | 86 | 8.66 | |
| Prussia | 1864 | 419 | 164452505 | | 19000805 | 86 | 8.66 | |
| Prussia | 1865 | 410 | 165681589 | | 19269214 | 75 | 8.60 | |
| Prussia | 1866 | 462 | 179361141 | 196417227 | 21620276 | 120 | 8.30 | 0.10 |
| Prussia | 1867 | 442 | 183571053 | 166950416 | 23971337 | 119 | 7.66 | −0.09 |
| Prussia | 1868 | 452 | 170518913 | 164026139 | 24170368 | 132 | 7.05 | −0.04 |
| Prussia | 1869 | 454 | 175052172 | | 24369399 | 131 | 7.18 | |
| Prussia | 1870 | 461 | 178904323 | 172526000 | 24568430 | 136 | 7.28 | −0.04 |
| Prussia | 1871 | 444 | 199199968 | | 24783861 | 120 | 8.04 | |
| Prussia | 1872 | 426 | 146133076 | | 24999291 | 101 | 5.85 | |
| Prussia | 1873 | 430 | 155849587 | | 25214722 | 106 | 6.18 | |
| Prussia | 1874 | 424 | 171154599 | 146145978 | 25430152 | 99 | 6.73 | −0.15 |
| Prussia | 1875 | 425 | 163653344 | 144610505 | 25742404 | 105 | 6.36 | −0.12 |
| Prussia | 1876 | 422 | 173742921 | | 26049745 | 106 | 6.67 | |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Prussia | 1877 | 423 | 189412551 | | 26357087 | 108 | 7.19 | |
| Prussia | 1878 | 425 | 202469712 | | 26664428 | 110 | 7.59 | |
| Prussia | 1879 | 418 | 209637010 | | 26971770 | 110 | 7.77 | |
| Prussia | 1880 | 405 | 214950067 | 204524875 | 27279111 | 100 | 7.88 | −0.05 |
| Prussia | 1881 | 397 | 238001268 | | 27486983 | 97 | 8.66 | |
| Prussia | 1882 | 398 | 264258929 | | 27694855 | 100 | 9.54 | |
| Prussia | 1883 | 396 | 286425426 | | 27902726 | 99 | 10.27 | |
| Prussia | 1884 | 391 | 311083286 | | 28110598 | 94 | 11.07 | |
| Prussia | 1885 | 387 | 336260947 | 325498374 | 28318470 | 85 | 11.87 | −0.03 |
| Prussia | 1886 | 381 | 350929940 | | 28645832 | 84 | 12.25 | |
| Prussia | 1887 | 379 | 365279711 | | 28973194 | 85 | 12.61 | |
| Prussia | 1888 | 375 | 380975609 | | 29300557 | 77 | 13.00 | |
| Prussia | 1889 | 375 | 394875859 | | 29627919 | 86 | 13.33 | |
| Prussia | 1890 | 378 | 409027332 | 388238923 | 29955281 | 93 | 13.65 | −0.05 |
| Prussia | 1891 | 380 | 435232656 | | 30335249 | 93 | 14.35 | |
| Prussia | 1892 | 376 | 461733264 | | 30715218 | 92 | 15.03 | |
| Prussia | 1893 | 375 | 486378660 | | 31095186 | 96 | 15.64 | |
| Prussia | 1894 | 376 | 513787443 | | 31475155 | 104 | 16.32 | |
| Prussia | 1895 | 381 | 539826996 | | 31855123 | 122 | 16.95 | |
| Prussia | 1896 | 380 | 565807118 | | 32378600 | 131 | 17.47 | |
| Prussia | 1897 | 386 | 591494258 | | 32902077 | 141 | 17.98 | |
| Prussia | 1898 | 356 | 613574124 | | 33425555 | 108 | 18.36 | |
| Prussia | 1899 | 341 | 641060752 | | 33949032 | 84 | 18.88 | |
| Prussia | 1900 | 346 | 666529490 | 621724418 | 34472509 | 70 | 19.34 | −0.07 |
| Prussia | 1901 | 337 | 682287998 | | 35036672 | 46 | 19.47 | |
| Prussia | 1902 | 328 | 694080108 | | 35600835 | 37 | 19.50 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prussia | 1903 | 331 | 707168013 | | 36164998 | 46 | 19.55 | |
| Prussia | 1904 | 335 | 721539480 | | 36729161 | 46 | 19.64 | |
| Prussia | 1905 | 336 | 731925645 | 678339784 | 37293324 | 58 | 19.63 | −0.07 |
| Prussia | 1906 | 345 | 794811187 | | 37867703 | 62 | 20.99 | |
| Prussia | 1907 | 360 | 858846293 | | 38442082 | 63 | 22.34 | |
| Prussia | 1908 | 362 | 928958210 | | 39016461 | 71 | 23.81 | |
| Prussia | 1909 | 352 | 994429579 | | 39590840 | 54 | 25.12 | |
| Prussia | 1910 | 358 | 1059474565 | 1004172762 | 40165219 | 50 | 26.38 | −0.05 |
| Prussia | 1911 | 361 | 1116609467 | | 40709991 | 46 | 27.43 | |
| Prussia | 1912 | 377 | 1171084676 | | 41254763 | 49 | 28.39 | |
| Prussia | 1913 | 395 | 1227707892 | | 41799535 | 57 | 29.37 | |
| Spain | 1703 | | 2458176 | | 7517647 | | 0.33 | |
| Spain | 1704 | | 2681107 | | 7523529 | | 0.36 | |
| Spain | 1705 | | 2904039 | | 7529412 | | 0.39 | |
| Spain | 1706 | | 3126971 | | 7535294 | | 0.41 | |
| Spain | 1707 | | 3349903 | | 7541176 | | 0.44 | |
| Spain | 1708 | | 3572834 | | 7547059 | | 0.47 | |
| Spain | 1709 | | 3795766 | | 7552941 | | 0.50 | |
| Spain | 1710 | | 4018698 | | 7558824 | | 0.53 | |
| Spain | 1711 | | 3976529 | | 7564706 | | 0.53 | |
| Spain | 1712 | | 4185527 | | 7570588 | | 0.55 | |
| Spain | 1713 | | 4320649 | | 7576471 | | 0.57 | |
| Spain | 1714 | | 4300196 | | 7582353 | | 0.57 | |
| Spain | 1715 | | 4448973 | | 7588235 | | 0.59 | |
| Spain | 1716 | | 4490667 | | 7594118 | | 0.59 | |
| Spain | 1717 | | 4387372 | | 7600000 | | 0.58 | |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Spain | 1718 | | 4561941 | | 7651515 | | 0.60 | |
| Spain | 1719 | | 4794566 | | 7703030 | | 0.62 | |
| Spain | 1720 | | 4915983 | | 7754545 | | 0.63 | |
| Spain | 1721 | | 5022365 | | 7806061 | | 0.64 | |
| Spain | 1722 | | 5023094 | | 7857576 | | 0.64 | |
| Spain | 1723 | | 4958577 | | 7909091 | | 0.63 | |
| Spain | 1724 | | 4903874 | | 7960606 | | 0.62 | |
| Spain | 1725 | | 5076259 | | 8012121 | | 0.63 | |
| Spain | 1726 | | 5725123 | | 8063636 | | 0.71 | |
| Spain | 1727 | | 5891364 | | 8115152 | | 0.73 | |
| Spain | 1728 | | 5873726 | | 8166667 | | 0.72 | |
| Spain | 1729 | | 6008685 | | 8218182 | | 0.73 | |
| Spain | 1730 | | 6198205 | | 8269697 | | 0.75 | |
| Spain | 1731 | | 6408930 | | 8321212 | | 0.77 | |
| Spain | 1732 | | 6400533 | | 8372727 | | 0.76 | |
| Spain | 1733 | | 6521543 | | 8424242 | | 0.77 | |
| Spain | 1734 | | 6909345 | | 8475758 | | 0.82 | |
| Spain | 1735 | | 6967212 | | 8527273 | | 0.82 | |
| Spain | 1736 | | 6914096 | | 8578788 | | 0.81 | |
| Spain | 1737 | | 6976897 | | 8630303 | | 0.81 | |
| Spain | 1738 | | 7270431 | | 8681818 | | 0.84 | |
| Spain | 1739 | | 7375739 | | 8733333 | | 0.84 | |
| Spain | 1740 | | 7145914 | | 8784848 | | 0.81 | |
| Spain | 1741 | | 7221192 | | 8836364 | | 0.82 | |
| Spain | 1742 | | 7743667 | | 8887879 | | 0.87 | |

| | | | | |
|---|---|---|---|---|
| Spain | 1743 | 7512734 | 8939394 | 0.84 |
| Spain | 1744 | 7378654 | 8990909 | 0.82 |
| Spain | 1745 | 7819675 | 9042424 | 0.86 |
| Spain | 1746 | 7524354 | 9093939 | 0.83 |
| Spain | 1747 | 7197564 | 9145455 | 0.79 |
| Spain | 1748 | 7366681 | 9196970 | 0.80 |
| Spain | 1749 | 7672812 | 9248485 | 0.83 |
| Spain | 1750 | 7734454 | 9300000 | 0.83 |
| Spain | 1751 | 7808228 | 8914444 | 0.88 |
| Spain | 1752 | 7733600 | 8928889 | 0.87 |
| Spain | 1753 | 7903719 | 8943333 | 0.88 |
| Spain | 1754 | 7291799 | 8957778 | 0.81 |
| Spain | 1755 | 6683463 | 8972222 | 0.74 |
| Spain | 1756 | 6969726 | 8986667 | 0.78 |
| Spain | 1757 | 5909843 | 9001111 | 0.66 |
| Spain | 1758 | 8123116 | 9015556 | 0.90 |
| Spain | 1759 | 7260617 | 9030000 | 0.80 |
| Spain | 1760 | 9941137 | 9044444 | 1.10 |
| Spain | 1761 | 8528025 | 9058889 | 0.94 |
| Spain | 1762 | 6588936 | 9073333 | 0.73 |
| Spain | 1763 | 8199513 | 9087778 | 0.90 |
| Spain | 1764 | 8426282 | 9102222 | 0.93 |
| Spain | 1765 | 9415378 | 9116667 | 1.03 |
| Spain | 1766 | 7755333 | 9131111 | 0.85 |
| Spain | 1767 | 8575051 | 9145556 | 0.94 |
| Spain | 1768 | 8099378 | 9160000 | 0.88 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Spain | 1769 | | 7032384 | | 9256842 | | 0.76 | |
| Spain | 1770 | | 8846251 | | 9353684 | | 0.95 | |
| Spain | 1771 | | 7595468 | | 9450526 | | 0.80 | |
| Spain | 1772 | | 9529998 | | 9547368 | | 1.00 | |
| Spain | 1773 | | 8254034 | | 9644211 | | 0.86 | |
| Spain | 1774 | | 10487363 | | 9741053 | | 1.08 | |
| Spain | 1775 | | 9413468 | | 9837895 | | 0.96 | |
| Spain | 1776 | | 9586187 | | 9934737 | | 0.96 | |
| Spain | 1777 | | 8500555 | | 10031579 | | 0.85 | |
| Spain | 1778 | | 11988991 | | 10128421 | | 1.18 | |
| Spain | 1779 | | 9481622 | | 10225263 | | 0.93 | |
| Spain | 1780 | | 8983009 | | 10322105 | | 0.87 | |
| Spain | 1781 | | 9160397 | | 10418947 | | 0.88 | |
| Spain | 1782 | | 8616044 | | 10515789 | | 0.82 | |
| Spain | 1783 | | 10544381 | | 10612632 | | 0.99 | |
| Spain | 1784 | | 12529672 | | 10709474 | | 1.17 | |
| Spain | 1785 | | 13400914 | | 10806316 | | 1.24 | |
| Spain | 1786 | | 13047384 | | 10903158 | | 1.20 | |
| Spain | 1787 | | 11683960 | | 11000000 | | 1.06 | |
| Spain | 1788 | | 14309747 | | 11050000 | | 1.29 | |
| Spain | 1789 | | 14926224 | | 11100000 | | 1.34 | |
| Spain | 1790 | | 15419756 | | 11150000 | | 1.38 | |
| Spain | 1791 | | 15325445 | | 11200000 | | 1.37 | |
| Spain | 1792 | | 15182265 | | 11250000 | | 1.35 | |
| Spain | 1793 | | 16817972 | | 11300000 | | 1.49 | |
| Spain | 1794 | | 19485777 | | 11350000 | | 1.72 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Spain | 1795 | 20410317 | | 11400000 | 1.79 | |
| Spain | 1796 | 21248469 | | 11450000 | 1.86 | |
| Spain | 1797 | 25049230 | | 11500000 | 2.18 | |
| Spain | 1798 | 22321132 | | 11566038 | 1.93 | |
| Spain | 1799 | 20286296 | | 11632075 | 1.74 | |
| Spain | 1800 | 18518783 | | 11698113 | 1.58 | |
| Spain | 1801 | 17069253 | 19441215 | 11764151 | 1.45 | 0.14 |
| Spain | 1802 | 24122713 | 25948091 | 11830189 | 2.04 | 0.08 |
| Spain | 1803 | 24953255 | 2675254 | 11896226 | 2.10 | −0.89 |
| Spain | 1804 | 25721137 | | 11962264 | 2.15 | |
| Spain | 1805 | 17354686 | 25214880 | 12028302 | 1.44 | 0.45 |
| Spain | 1806 | 15769948 | 25354677 | 12094340 | 1.30 | 0.61 |
| Spain | 1807 | 14529573 | 20058526 | 12160377 | 1.19 | 0.38 |
| Spain | 1808 | 12628188 | | 12226415 | 1.03 | |
| Spain | 1809 | 11323400 | | 12292453 | 0.92 | |
| Spain | 1810 | 10280031 | | 12358491 | 0.83 | |
| Spain | 1811 | 8504854 | | 12424528 | 0.68 | |
| Spain | 1812 | 7463021 | | 12490566 | 0.60 | |
| Spain | 1813 | 5570008 | 1194471 1 | 12556604 | 0.44 | 1.14 |
| Spain | 1814 | 3562629 | 3485181 | 12622642 | 0.28 | −0.02 |
| Spain | 1815 | 14650460 | 18910391 | 12688679 | 1.15 | 0.29 |
| Spain | 1816 | 10731038 | 12655224 | 12754717 | 0.84 | 0.18 |
| Spain | 1817 | 19901781 | 17350270 | 12820755 | 1.55 | −0.13 |
| Spain | 1818 | 28610598 | | 12886792 | 2.22 | |
| Spain | 1819 | 23148320 | 19430905 | 12952830 | 1.79 | −0.16 |
| Spain | 1820 | 13406123 | 18085619 | 13018868 | 1.03 | 0.35 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Spain | 1821 | 1015 | 14593377 | 18449153 | 13084906 | 615 | 1.12 | 0.26 |
| Spain | 1822 | 797 | 16007322 | 16007322 | 13150943 | 421 | 1.22 | 0.00 |
| Spain | 1823 | 1565 | 13929587 | | 13216981 | 1190 | 1.05 | |
| Spain | 1824 | | 11989332 | | 13283019 | | 0.90 | |
| Spain | 1825 | | 13087861 | | 13349057 | | 0.98 | |
| Spain | 1826 | | 13646031 | | 13415094 | | 1.02 | |
| Spain | 1827 | | 14602469 | 10687874 | 13481132 | | 1.08 | −0.27 |
| Spain | 1828 | | 14571615 | 10990040 | 13547170 | | 1.08 | −0.25 |
| Spain | 1829 | | 14901610 | | 13613208 | | 1.09 | |
| Spain | 1830 | | 16360726 | 14502109 | 13679245 | | 1.20 | −0.11 |
| Spain | 1831 | | 16739090 | 14242493 | 13745283 | | 1.22 | −0.15 |
| Spain | 1832 | | 17411320 | | 13811321 | | 1.26 | |
| Spain | 1833 | | 16687808 | 10234874 | 13877358 | | 1.20 | −0.39 |
| Spain | 1834 | 1207 | 14569537 | 15159875 | 13943396 | 877 | 1.04 | 0.04 |
| Spain | 1835 | 1003 | 14514764 | 21088821 | 14009434 | 674 | 1.04 | 0.45 |
| Spain | 1836 | 1275 | 14970144 | 21776918 | 14075472 | 944 | 1.06 | 0.45 |
| Spain | 1837 | 1401 | 14720403 | 31011658 | 14141509 | 1072 | 1.04 | 1.11 |
| Spain | 1838 | 1552 | 15517740 | 29271002 | 14207547 | 1232 | 1.09 | 0.89 |
| Spain | 1839 | 1379 | 29384387 | 48203600 | 14273585 | 1054 | 2.06 | 0.64 |
| Spain | 1840 | 1165 | 24577374 | | 14339623 | 832 | 1.71 | |
| Spain | 1841 | 1309 | 19995165 | 26805639 | 14405660 | 973 | 1.39 | 0.34 |
| Spain | 1842 | 1298 | 21063889 | 29700563 | 14471698 | 971 | 1.46 | 0.41 |
| Spain | 1843 | 1057 | 23665115 | | 14537736 | 743 | 1.63 | |
| Spain | 1844 | 861 | 26262433 | | 14603774 | 559 | 1.80 | |
| Spain | 1845 | 759 | 29275302 | 28318593 | 14669811 | 455 | 2.00 | −0.03 |
| Spain | 1846 | 806 | 30630870 | | 14735849 | 492 | 2.08 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spain | 1847 | 928 | 26339461 | | 14801887 | 584 | 1.78 | |
| Spain | 1848 | 1219 | 25545496 | | 14867925 | 869 | 1.72 | |
| Spain | 1849 | 923 | 24528343 | 21953940 | 14933962 | 600 | 1.64 | −0.10 |
| Spain | 1850 | 797 | 23479445 | 23194846 | 15000000 | 486 | 1.57 | −0.01 |
| Spain | 1851 | 782 | 22975086 | 24883785 | 15065000 | 472 | 1.53 | 0.08 |
| Spain | 1852 | 632 | 23925803 | 24633667 | 15130000 | 330 | 1.58 | 0.03 |
| Spain | 1853 | 636 | 24738708 | 25441512 | 15195000 | 329 | 1.63 | 0.03 |
| Spain | 1854 | 800 | 25732504 | 26719504 | 15260000 | 473 | 1.69 | 0.04 |
| Spain | 1855 | 800 | 26839460 | 25991898 | 15325000 | 468 | 1.75 | −0.03 |
| Spain | 1856 | 688 | 32696106 | 32767339 | 15390000 | 366 | 2.12 | 0.00 |
| Spain | 1857 | 732 | 35849881 | 35417086 | 15455000 | 406 | 2.32 | -0.01 |
| Spain | 1858 | 666 | 33932712 | 35805856 | 15518333 | 356 | 2.19 | 0.06 |
| Spain | 1859 | 686 | 38345110 | 36780003 | 15581667 | 371 | 2.46 | −0.04 |
| Spain | 1860 | 628 | 41213587 | 43487440 | 15645000 | 309 | 2.63 | 0.06 |
| Spain | 1861 | 601 | 41392967 | 47337316 | 15702471 | 273 | 2.64 | 0.14 |
| Spain | 1862 | 553 | 38367622 | 47690596 | 15759941 | 231 | 2.43 | 0.24 |
| Spain | 1863 | 550 | 42357610 | 49117568 | 15817412 | 226 | 2.68 | 0.16 |
| Spain | 1864 | 589 | 64992312 | 52067705 | 15874882 | 256 | 4.09 | −0.20 |
| Spain | 1865 | 636 | 45544448 | 53865782 | 15932353 | 301 | 2.86 | 0.18 |
| Spain | 1866 | 779 | 44205679 | 51863952 | 15989824 | 438 | 2.76 | 0.17 |
| Spain | 1867 | 835 | 56482949 | 50247347 | 16047294 | 512 | 3.52 | −0.11 |
| Spain | 1868 | 828 | 57289586 | 49354942 | 16104765 | 508 | 3.56 | −0.14 |
| Spain | 1869 | 990 | 46270762 | 54637331 | 16162235 | 667 | 2.86 | 0.18 |
| Spain | 1870 | 1047 | 51253317 | 58120828 | 16219706 | 723 | 3.16 | 0.13 |
| Spain | 1871 | 933 | 39491415 | 51382078 | 16277176 | 609 | 2.43 | 0.30 |
| Spain | 1872 | 992 | 38958671 | 53614201 | 16334647 | 668 | 2.39 | 0.38 |

(*continued*)

A.1.1 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Spain | 1873 | 1478 | 49500006 | 58466325 | 16392118 | 1154 | 3.02 | 0.18 |
| Spain | 1874 | 1619 | 57470264 | 52306055 | 16449588 | 1295 | 3.49 | −0.09 |
| Spain | 1875 | 1505 | 52090639 | 58788007 | 16507059 | 1185 | 3.16 | 0.13 |
| Spain | 1876 | | 91366408 | 54239505 | 16564529 | | 5.52 | −0.41 |
| Spain | 1877 | | 70227107 | 58585180 | 16622000 | | 4.22 | −0.17 |
| Spain | 1878 | | 75591258 | 60999513 | 16714800 | | 4.52 | −0.19 |
| Spain | 1879 | | 56124840 | 61833707 | 16807600 | | 3.34 | 0.10 |
| Spain | 1880 | 1615 | 58171787 | 62497381 | 16900400 | 1310 | 3.44 | 0.07 |
| Spain | 1881 | 403 | 85589746 | 62073562 | 16993200 | 103 | 5.04 | −0.27 |
| Spain | 1882 | 513 | 64890724 | 61996537 | 17086000 | 215 | 3.80 | −0.04 |
| Spain | 1883 | 663 | 64286781 | 66257838 | 17178800 | 367 | 3.74 | 0.03 |
| Spain | 1884 | 666 | 64938686 | 66010787 | 17271600 | 369 | 3.76 | 0.02 |
| Spain | 1885 | 695 | 63108386 | 69296981 | 17364400 | 393 | 3.63 | 0.10 |
| Spain | 1886 | 665 | 67839705 | 68826188 | 17457200 | 368 | 3.89 | 0.01 |
| Spain | 1887 | 607 | 61809289 | 64403753 | 17550000 | 313 | 3.52 | 0.04 |
| Spain | 1888 | 565 | 58159834 | 65033971 | 17605900 | 268 | 3.30 | 0.12 |
| Spain | 1889 | 534 | 60664093 | 65120089 | 17661800 | 246 | 3.43 | 0.07 |
| Spain | 1890 | 534 | 62754517 | 66766954 | 17717700 | 249 | 3.54 | 0.06 |
| Spain | 1891 | 559 | 67216894 | 71876345 | 17773600 | 272 | 3.78 | 0.07 |
| Spain | 1892 | 634 | 66593506 | 68291864 | 17829500 | 350 | 3.74 | 0.03 |
| Spain | 1893 | 626 | 72146037 | 65490498 | 17885400 | 346 | 4.03 | −0.09 |
| Spain | 1894 | 595 | 69413890 | 68897162 | 17941300 | 323 | 3.87 | −0.01 |
| Spain | 1895 | 582 | 73132623 | 75477195 | 17997200 | 322 | 4.06 | 0.03 |
| Spain | 1896 | 644 | 78865192 | 75251667 | 18053100 | 396 | 4.37 | −0.05 |
| Spain | 1897 | 650 | 81744517 | 87040098 | 18109000 | 405 | 4.51 | 0.06 |
| Spain | 1898 | 945 | 99353630 | 98411394 | 18270667 | 697 | 5.44 | −0.01 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spain | 1899 | 666 | 58575914 | 51157037 | 18432333 | 409 | 3.18 | −0.13 |
| Spain | 1900 | 566 | 52369557 | 49593597 | 18594000 | 291 | 2.82 | −0.05 |
| Spain | 1901 | 560 | 50947251 | 49100974 | 18727300 | 269 | 2.72 | −0.04 |
| Spain | 1902 | 492 | 52011084 | 48404846 | 18860600 | 200 | 2.76 | −0.07 |
| Spain | 1903 | 447 | 52846259 | 51674163 | 18993900 | 163 | 2.78 | −0.02 |
| Spain | 1904 | 467 | 51741235 | 49046899 | 19127200 | 178 | 2.71 | −0.05 |
| Spain | 1905 | 434 | 54698942 | 50866867 | 19260500 | 156 | 2.84 | −0.07 |
| Spain | 1906 | 419 | 66429356 | 60237298 | 19393800 | 136 | 3.43 | −0.09 |
| Spain | 1907 | 428 | 67641302 | 63633385 | 19527100 | 131 | 3.46 | −0.06 |
| Spain | 1908 | 418 | 65734295 | 62322691 | 19660400 | 128 | 3.34 | −0.05 |
| Spain | 1909 | 412 | 66524121 | 69709783 | 19793700 | 114 | 3.36 | 0.05 |
| Spain | 1910 | 425 | 74606474 | 72125952 | 19927000 | 117 | 3.74 | −0.03 |
| Spain | 1911 | 420 | 74905495 | 74461892 | 20064600 | 105 | 3.73 | −0.01 |
| Spain | 1912 | 426 | 76970596 | 81025067 | 20202200 | 98 | 3.81 | 0.05 |
| Spain | 1913 | 440 | 98427756 | 91984980 | 20339800 | 101 | 4.84 | −0.07 |

*Note*: From left to right, the columns display countries, years, yields on long-term government bonds in basis points (Yield), gross government revenues and expenditures in gold grams (Revenue, Expenditure), populations, yield spreads against the British consol in basis points (Spread w/Consol), per capita government revenues in gold grams (Rev/Pop), and budget deficit-to-revenue ratios (Def/Rev).

*Source*: See Appendix 2.

## A.1.2. *Group 2*

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Belgium | 1831 | | 38753171 | 38430228 | 4090000 | | 9.48 | |
| Belgium | 1832 | 600 | 51025009 | 52962668 | 4106467 | 243 | 12.43 | 0.04 |
| Belgium | 1833 | 494 | 30033708 | 31325480 | 4122933 | 156 | 7.28 | 0.04 |
| Belgium | 1834 | 455 | 32617253 | 32617253 | 4139400 | 125 | 7.88 | 0.00 |
| Belgium | 1835 | 445 | 30356651 | 29064879 | 4155867 | 116 | 7.30 | −0.04 |
| Belgium | 1836 | 439 | 34231968 | 33263139 | 4172333 | 107 | 8.20 | −0.03 |
| Belgium | 1837 | 441 | 33586082 | 34231968 | 4188800 | 112 | 8.02 | 0.02 |
| Belgium | 1838 | 438 | 40367887 | 39076115 | 4205267 | 118 | 9.60 | −0.03 |
| Belgium | 1839 | 441 | 37461399 | 40044944 | 4221733 | 116 | 8.87 | 0.07 |
| Belgium | 1840 | 442 | 54577383 | 53608554 | 4238200 | 109 | 12.88 | −0.02 |
| Belgium | 1841 | 443 | 32617253 | 37138456 | 4254667 | 107 | 7.67 | 0.14 |
| Belgium | 1842 | 436 | 33586082 | 41659659 | 4271133 | 109 | 7.86 | 0.24 |
| Belgium | 1843 | 431 | 33909025 | 38753171 | 4287600 | 116 | 7.91 | 0.14 |
| Belgium | 1844 | 432 | 35523740 | 62973904 | 4304067 | 130 | 8.25 | 0.77 |
| Belgium | 1845 | 451 | 36492570 | 43274375 | 4320533 | 146 | 8.45 | 0.19 |
| Belgium | 1846 | 461 | 36492570 | 39722001 | 4337000 | 147 | 8.41 | 0.09 |
| Belgium | 1847 | 482 | 36492570 | 41336716 | 4356300 | 139 | 8.38 | 0.13 |
| Belgium | 1848 | 580 | 35200797 | 43597318 | 4375600 | 230 | 8.04 | 0.24 |
| Belgium | 1849 | 545 | 36815513 | 36169627 | 4394900 | 222 | 8.38 | −0.02 |
| Belgium | 1850 | 498 | 37784342 | 38430228 | 4414200 | 187 | 8.56 | 0.02 |
| Belgium | 1851 | 484 | 38107285 | 38430228 | 4433500 | 175 | 8.60 | 0.01 |
| Belgium | 1852 | 478 | 39722001 | 42628489 | 4452800 | 176 | 8.92 | 0.07 |
| Belgium | 1853 | 461 | 41336716 | 43597318 | 4472100 | 154 | 9.24 | 0.05 |
| Belgium | 1854 | 493 | 42628489 | 46180863 | 4491400 | 167 | 9.49 | 0.08 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Belgium | 1855 | 480 | 44889090 | 47472635 | 4510700 | 149 | 9.95 | 0.06 |
| Belgium | 1856 | 468 | 45857920 | 48441464 | 4530000 | 145 | 10.12 | 0.06 |
| Belgium | 1857 | 461 | 47149692 | 47149692 | 4559800 | 135 | 10.34 | 0.00 |
| Belgium | 1858 | 454 | 50056180 | 46826749 | 4589600 | 145 | 10.91 | −0.06 |
| Belgium | 1859 | 452 | 50379123 | 49410294 | 4619400 | 137 | 10.91 | −0.02 |
| Belgium | 1860 | 449 | 50056180 | 51347952 | 4649200 | 130 | 10.77 | 0.03 |
| Belgium | 1861 | 442 | 50379123 | 52639725 | 4679000 | 114 | 10.77 | 0.04 |
| Belgium | 1862 | 437 | 51993838 | 57160928 | 4708800 | 114 | 11.04 | 0.10 |
| Belgium | 1863 | 410 | 52639725 | 60390359 | 4738600 | 86 | 11.11 | 0.15 |
| Belgium | 1864 | 426 | 52962668 | 60067416 | 4768400 | 93 | 11.11 | 0.13 |
| Belgium | 1865 | 425 | 54577383 | 61036245 | 4798200 | 90 | 11.37 | 0.12 |
| Belgium | 1866 | 436 | 54577383 | 65557448 | 4828000 | 94 | 11.30 | 0.20 |
| Belgium | 1867 | 443 | 55869155 | 62005074 | 4877429 | 120 | 11.45 | 0.11 |
| Belgium | 1868 | 423 | 56837985 | 62005074 | 4926857 | 103 | 11.54 | 0.09 |
| Belgium | 1869 | 402 | 59744473 | 64588619 | 4976286 | 79 | 12.01 | 0.08 |
| Belgium | 1870 | 402 | 61682131 | 70078652 | 5025714 | 77 | 12.27 | 0.14 |
| Belgium | 1871 | 404 | 67172164 | 76860457 | 5075143 | 81 | 13.24 | 0.14 |
| Belgium | 1872 | 391 | 68786879 | 81381660 | 5124571 | 67 | 13.42 | 0.18 |
| Belgium | 1873 | 387 | 73308083 | 113353026 | 5174000 | 63 | 14.17 | 0.55 |
| Belgium | 1874 | 408 | 78475172 | 97528815 | 5223429 | 84 | 15.02 | 0.24 |
| Belgium | 1875 | 408 | 79444001 | 94299384 | 5272857 | 88 | 15.07 | 0.19 |
| Belgium | 1876 | 408 | 82350489 | 94945270 | 5322286 | 92 | 15.47 | 0.15 |
| Belgium | 1877 | 398 | 83319319 | 124656035 | 5371714 | 83 | 15.51 | 0.50 |
| Belgium | 1878 | 397 | 83965205 | 112707140 | 5421143 | 82 | 15.49 | 0.34 |
| Belgium | 1879 | 381 | 87194636 | 111092425 | 5470571 | 73 | 15.94 | 0.27 |
| Belgium | 1880 | 365 | 94299384 | 123687206 | 5520000 | 60 | 17.08 | 0.31 |
| Belgium | 1881 | 356 | 95914099 | 129823124 | 5574900 | 56 | 17.20 | 0.35 |
| Belgium | 1882 | 356 | 97205872 | 136604929 | 5629800 | 58 | 17.27 | 0.41 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Belgium | 1883 | 358 | 97851758 | 131114897 | 5684700 | 62 | 17.21 | 0.34 |
| Belgium | 1884 | 356 | 98820587 | 116905401 | 5739600 | 59 | 17.22 | 0.18 |
| Belgium | 1885 | 343 | 101081189 | 113353026 | 5794500 | 41 | 17.44 | 0.12 |
| Belgium | 1886 | 321 | 102050018 | 113030083 | 5849400 | 24 | 17.45 | 0.11 |
| Belgium | 1887 | 328 | 104633563 | 111738311 | 5904300 | 34 | 17.72 | 0.07 |
| Belgium | 1888 | 329 | 107540051 | 114967742 | 5959200 | 31 | 18.05 | 0.07 |
| Belgium | 1889 | 325 | 109154766 | 120457775 | 6014100 | 36 | 18.15 | 0.10 |
| Belgium | 1890 | 327 | 110123596 | 134990214 | 6069000 | 42 | 18.15 | 0.23 |
| Belgium | 1891 | 319 | 111738311 | 129823124 | 6131500 | 32 | 18.22 | 0.16 |
| Belgium | 1892 | 312 | 112061254 | 131114897 | 6194000 | 27 | 18.09 | 0.17 |
| Belgium | 1893 | 306 | 113675970 | 127562523 | 6256500 | 26 | 18.17 | 0.12 |
| Belgium | 1894 | 310 | 117228344 | 130146067 | 6319000 | 38 | 18.55 | 0.11 |
| Belgium | 1895 | 306 | 120457775 | 132406669 | 6381500 | 46 | 18.88 | 0.10 |
| Belgium | 1896 | 323 | 125624864 | 141449076 | 6444000 | 74 | 19.49 | 0.13 |
| Belgium | 1897 | 311 | 139188474 | 165023922 | 6506500 | 66 | 21.39 | 0.19 |
| Belgium | 1898 | 301 | 141772019 | 224122508 | 6569000 | 53 | 21.58 | 0.58 |
| Belgium | 1899 | 305 | 151460312 | 184077564 | 6631500 | 48 | 22.84 | 0.22 |
| Belgium | 1900 | 315 | 159533889 | 185369337 | 6694000 | 39 | 23.83 | 0.16 |
| Belgium | 1901 | 308 | 161794491 | 195057630 | 6767000 | 17 | 23.91 | 0.21 |
| Belgium | 1902 | 301 | 162763320 | 198610004 | 6840000 | 10 | 23.80 | 0.22 |
| Belgium | 1903 | 301 | 165992751 | 202808264 | 6913000 | 17 | 24.01 | 0.22 |
| Belgium | 1904 | 301 | 172128670 | 222184850 | 6986000 | 12 | 24.64 | 0.29 |
| Belgium | 1905 | 301 | 187629938 | 202162378 | 7059000 | 23 | 26.58 | 0.08 |
| Belgium | 1906 | 301 | 192797028 | 249312070 | 7132000 | 18 | 27.03 | 0.29 |
| Belgium | 1907 | 307 | 199578833 | 248020297 | 7205000 | 10 | 27.70 | 0.24 |
| Belgium | 1908 | 317 | 199255890 | 248666183 | 7278000 | 27 | 27.38 | 0.25 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Belgium | 1909 | 315 | 208298296 | 253833273 | 7351000 | 17 | 28.34 | 0.22 |
| Belgium | 1910 | 320 | 220247191 | 267719826 | 7424000 | 12 | 29.67 | 0.22 |
| Belgium | 1911 | 334 | 224445451 | 261906850 | 7422200 | 19 | 30.24 | 0.17 |
| Belgium | 1912 | 362 | 243822037 | 289357013 | 7420400 | 33 | 32.86 | 0.19 |
| Belgium | 1913 | 391 | | | 7418600 | 52 | | |
| Denmark | 1821 | 676 | | | | 276 | | |
| Denmark | 1822 | 564 | | | | 187 | | |
| Denmark | 1823 | 579 | | | | 204 | | |
| Denmark | 1824 | 497 | | | | 178 | | |
| Denmark | 1825 | 478 | | | | 141 | | |
| Denmark | 1826 | 530 | | | | 153 | | |
| Denmark | 1827 | 484 | | | | 129 | | |
| Denmark | 1828 | 485 | | | | 137 | | |
| Denmark | 1829 | 438 | | | | 101 | | |
| Denmark | 1830 | 435 | | | | 98 | | |
| Denmark | 1831 | 487 | | | | 119 | | |
| Denmark | 1832 | 437 | | | | 80 | | |
| Denmark | 1833 | 406 | | | | 68 | | |
| Denmark | 1834 | 398 | | | | 69 | | |
| Denmark | 1835 | 390 | | | | 61 | | |
| Denmark | 1836 | 394 | | | | 63 | | |
| Denmark | 1837 | 410 | | | | 81 | | |
| Denmark | 1838 | 400 | | | | 80 | | |
| Denmark | 1839 | 398 | | | | 72 | | |
| Denmark | 1840 | 384 | | | | 51 | | |
| Denmark | 1841 | 378 | | | | 42 | | |
| Denmark | 1842 | 362 | | | | 36 | | |
| Denmark | 1843 | 346 | | | | 31 | | |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Denmark | 1844 | 339 | | | | 37 | | |
| Denmark | 1845 | 337 | | | | 32 | | |
| Denmark | 1846 | 340 | | | | 26 | | |
| Denmark | 1847 | 351 | | | | 8 | | |
| Denmark | 1848 | 406 | | | | 56 | | |
| Denmark | 1849 | 430 | | | | 107 | | |
| Denmark | 1850 | 409 | | | 2344000 | 97 | | |
| Denmark | 1851 | 388 | | | 2370400 | 79 | | |
| Denmark | 1852 | 440 | | | 2396800 | 138 | | |
| Denmark | 1853 | 475 | | | 2423200 | 168 | | |
| Denmark | 1854 | 510 | | | 2449600 | 183 | | |
| Denmark | 1855 | 499 | | | 2476000 | 168 | | |
| Denmark | 1856 | 480 | | | 2503200 | 158 | | |
| Denmark | 1857 | 489 | | | 2530400 | 162 | | |
| Denmark | 1858 | 489 | | | 2557600 | 180 | | |
| Denmark | 1859 | | | | 2584800 | | | |
| Denmark | 1860 | | | | 2612000 | | | |
| Denmark | 1861 | | | | 2631200 | | | |
| Denmark | 1862 | | | | 2650400 | | | |
| Denmark | 1863 | | | | 2669600 | | | |
| Denmark | 1864 | 449 | 15582892 | 15982454 | 2688800 | 117 | 5.80 | 0.03 |
| Denmark | 1865 | 442 | 11430345 | 18963982 | 1696500 | 106 | 6.74 | 0.66 |
| Denmark | 1866 | 458 | 15333281 | 13886745 | 1714200 | 116 | 8.94 | −0.09 |
| Denmark | 1867 | 455 | 14507578 | 15099724 | 1731900 | 132 | 8.38 | 0.04 |
| Denmark | 1868 | 458 | 16868049 | 14250593 | 1749600 | 138 | 9.64 | −0.16 |
| Denmark | 1869 | 475 | 13596059 | 17221674 | 1767300 | 152 | 7.69 | 0.27 |
| Denmark | 1870 | 482 | 13769842 | 15888279 | 1785000 | 157 | 7.71 | 0.15 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Denmark | 1871 | 473 | 15721470 | 16818317 | 1803400 | 149 | 8.72 | 0.07 |
| Denmark | 1872 | 448 | 15126918 | 15487082 | 1821800 | 123 | 8.30 | 0.02 |
| Denmark | 1873 | 436 | 15298389 | 16721495 | 1840200 | 112 | 8.31 | 0.09 |
| Denmark | 1874 | 432 | 16699123 | 17425172 | 1858600 | 107 | 8.98 | 0.04 |
| Denmark | 1875 | 433 | 16854111 | 22823275 | 1877000 | 113 | 8.98 | 0.35 |
| Denmark | 1876 | 435 | 16700284 | 17063334 | 1895400 | 119 | 8.81 | 0.02 |
| Denmark | 1877 | 445 | 17695501 | 19234240 | 1913800 | 131 | 9.25 | 0.09 |
| Denmark | 1878 | 450 | 17587536 | 17587536 | 1932200 | 135 | 9.10 | 0.00 |
| Denmark | 1879 | 430 | 18546307 | 16933585 | 1950600 | 122 | 9.51 | −0.09 |
| Denmark | 1880 | 415 | 19730471 | 17717157 | 1969000 | 111 | 10.02 | −0.10 |
| Denmark | 1881 | 406 | 20488640 | 19283426 | 1989300 | 106 | 10.30 | −0.06 |
| Denmark | 1882 | 406 | 21046367 | 20236892 | 2009600 | 108 | 10.47 | -0.04 |
| Denmark | 1883 | 405 | 21764607 | 20555462 | 2029900 | 109 | 10.72 | −0.06 |
| Denmark | 1884 | 402 | 22180678 | 20164253 | 2050200 | 105 | 10.82 | −0.09 |
| Denmark | 1885 | 400 | 20998167 | 19382923 | 2070500 | 97 | 10.14 | −0.08 |
| Denmark | 1886 | 392 | 20606384 | 20202338 | 2090800 | 95 | 9.86 | −0.02 |
| Denmark | 1887 | 357 | 20580087 | 23404805 | 2111100 | 62 | 9.75 | 0.14 |
| Denmark | 1888 | 356 | 21863587 | 24292874 | 2131400 | 59 | 10.26 | 0.11 |
| Denmark | 1889 | 354 | 22655720 | 24273986 | 2151700 | 65 | 10.53 | 0.07 |
| Denmark | 1890 | 359 | 22609466 | 25031909 | 2172000 | 74 | 10.41 | 0.11 |
| Denmark | 1891 | 370 | 22613107 | 26651161 | 2197273 | 83 | 10.29 | 0.18 |
| Denmark | 1892 | 374 | 22268418 | 26317221 | 2222545 | 89 | 10.02 | 0.18 |
| Denmark | 1893 | 371 | 23034737 | 25459446 | 2247818 | 91 | 10.25 | 0.11 |
| Denmark | 1894 | 359 | 23501188 | 25121960 | 2273091 | 87 | 10.34 | 0.07 |
| Denmark | 1895 | 343 | 25184923 | 24778714 | 2298364 | 84 | 10.96 | −0.02 |
| Denmark | 1896 | 349 | 25898287 | 29944894 | 2323636 | 101 | 11.15 | 0.16 |
| Denmark | 1897 | 350 | 27497824 | 26689065 | 2348909 | 105 | 11.71 | −0.03 |
| Denmark | 1898 | 350 | 28118910 | 54229327 | 2374182 | 102 | 11.84 | 0.93 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Denmark | 1899 | 362 | 27774680 | 30592402 | 2399455 | 105 | 11.58 | 0.10 |
| Denmark | 1900 | 378 | 26960000 | 31386269 | 2424727 | 102 | 11.12 | 0.16 |
| Denmark | 1901 | 363 | 26695642 | 31953874 | 2450000 | 71 | 10.90 | 0.20 |
| Denmark | 1902 | 354 | 29869247 | 31080162 | 2477800 | 63 | 12.05 | 0.04 |
| Denmark | 1903 | 353 | 31835484 | 31432503 | 2505600 | 68 | 12.71 | −0.01 |
| Denmark | 1904 | 359 | 38754491 | 31891717 | 2533400 | 70 | 15.30 | −0.18 |
| Denmark | 1905 | 355 | 35030402 | 39862182 | 2561200 | 77 | 13.68 | 0.14 |
| Denmark | 1906 | 356 | 40914102 | 34095085 | 2589000 | 73 | 15.80 | −0.17 |
| Denmark | 1907 | 363 | 38366749 | 45560515 | 2586200 | 66 | 14.84 | 0.19 |
| Denmark | 1908 | 370 | 37439779 | 37842358 | 2583400 | 80 | 14.49 | 0.01 |
| Denmark | 1909 | 368 | 33031893 | 43505421 | 2580600 | 70 | 12.80 | 0.32 |
| Denmark | 1910 | 374 | 36669617 | 53594056 | 2577800 | 65 | 14.23 | 0.46 |
| Denmark | 1911 | 375 | 41100374 | 56009333 | 2575000 | 61 | 15.96 | 0.36 |
| Denmark | 1912 | 393 | 45804864 | 43394082 | 2644200 | 65 | 17.32 | −0.05 |
| Denmark | 1913 | 419 | 49723247 | 42505356 | 2713400 | 80 | 18.33 | −0.15 |
| Italy | 1862 | 739 | 155012686 | 302274737 | 25195400 | 417 | 6.15 | 0.95 |
| Italy | 1863 | 722 | 169222182 | 295815875 | 25373800 | 398 | 6.67 | 0.75 |
| Italy | 1864 | 770 | 186338166 | 313577746 | 25552200 | 437 | 7.29 | 0.68 |
| Italy | 1865 | 800 | 208944183 | 318744835 | 25730600 | 464 | 8.12 | 0.53 |
| Italy | 1866 | 944 | 199255890 | 442754984 | 25909000 | 602 | 7.69 | 1.22 |
| Italy | 1867 | 990 | 230904313 | 308733599 | 26087400 | 667 | 8.85 | 0.34 |
| Italy | 1868 | 954 | 241561435 | 364602755 | 26265800 | 634 | 9.20 | 0.51 |
| Italy | 1869 | 832 | 281283436 | 356852120 | 26444200 | 509 | 10.64 | 0.27 |
| Italy | 1870 | 835 | 279668721 | 385916999 | 26622600 | 510 | 10.50 | 0.38 |
| Italy | 1871 | 734 | 311963030 | 364925698 | 26801000 | 411 | 11.64 | 0.17 |
| Italy | 1872 | 607 | 326172526 | 382041682 | 26966900 | 283 | 12.10 | 0.17 |

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|---|---|---|---|---|---|---|---|---|
| Italy | 1873 | 635 | 338121421 | 397865893 | 27132800 | 311 | 12.46 | 0.18 |
| Italy | 1874 | 635 | 347809714 | 379135194 | 27298700 | 310 | 12.74 | 0.09 |
| Italy | 1875 | 596 | 353945632 | 390761145 | 27464600 | 276 | 12.89 | 0.10 |
| Italy | 1876 | 593 | 362665096 | 410783617 | 27630500 | 278 | 13.13 | 0.13 |
| Italy | 1877 | 597 | 401418267 | 423701341 | 27796400 | 283 | 14.44 | 0.06 |
| Italy | 1878 | 568 | 384625227 | 406908300 | 27962300 | 253 | 13.76 | 0.06 |
| Italy | 1879 | 522 | 394959406 | 408523016 | 28128200 | 214 | 14.04 | 0.03 |
| Italy | 1880 | 492 | 394636462 | 407231243 | 28294100 | 187 | 13.95 | 0.03 |
| Italy | 1881 | 497 | 412721276 | 420794853 | 28460000 | 197 | 14.50 | 0.02 |
| Italy | 1882 | 503 | 419826024 | 651376223 | 28660750 | 205 | 14.65 | 0.55 |
| Italy | 1883 | 505 | 430483146 | 446307358 | 28861500 | 208 | 14.92 | 0.04 |
| Italy | 1884 | 467 | 438664371 | | 29062250 | 170 | 15.09 | |
| Italy | 1885 | 461 | 446845596 | | 29263000 | 159 | 15.27 | |
| Italy | 1886 | 446 | 455026821 | 473757521 | 29463750 | 149 | 15.44 | 0.04 |
| Italy | 1887 | 451 | 469236318 | 484091700 | 29664500 | 157 | 15.82 | 0.03 |
| Italy | 1888 | 457 | 484414643 | 518646611 | 29865250 | 160 | 16.22 | 0.07 |
| Italy | 1889 | 464 | 484737586 | 570963393 | 30066000 | 175 | 16.12 | 0.18 |
| Italy | 1890 | 465 | 504437115 | 540929685 | 30266750 | 180 | 16.67 | 0.07 |
| Italy | 1891 | 477 | 497332367 | 535116709 | 30467500 | 190 | 16.32 | 0.08 |
| Italy | 1892 | 471 | 493457050 | 520907213 | 30668250 | 187 | 16.09 | 0.06 |
| Italy | 1893 | 470 | 500884741 | 533824937 | 30869000 | 190 | 16.23 | 0.07 |
| Italy | 1894 | 505 | 489904676 | 562889815 | 31069750 | 233 | 15.77 | 0.15 |
| Italy | 1895 | 439 | 507020660 | 534470823 | 31270500 | 180 | 16.21 | 0.05 |
| Italy | 1896 | 439 | 527366075 | 557722726 | 31471250 | 191 | 16.76 | 0.06 |
| Italy | 1897 | 421 | 521553099 | 533501993 | 31672000 | 176 | 16.47 | 0.02 |
| Italy | 1898 | 411 | 526074302 | 532210221 | 31872750 | 163 | 16.51 | 0.01 |
| Italy | 1899 | 406 | 535439652 | 532856107 | 32073500 | 148 | 16.69 | 0.00 |
| Italy | 1900 | 409 | 539637912 | 535762595 | 32274250 | 133 | 16.72 | −0.01 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Italy | 1901 | 403 | 555785067 | 546419717 | 32475000 | 111 | 17.11 | −0.02 |
| Italy | 1902 | 396 | 563212758 | 584204059 | 32694600 | 105 | 17.23 | 0.04 |
| Italy | 1903 | 397 | 579682856 | 579036970 | 32914200 | 112 | 17.61 | 0.00 |
| Italy | 1904 | 396 | 577099311 | 573546937 | 33133800 | 107 | 17.42 | −0.01 |
| Italy | 1905 | 388 | 598413556 | 587756433 | 33353400 | 110 | 17.94 | −0.02 |
| Italy | 1906 | 380 | 628447264 | 779584632 | 33573000 | 97 | 18.72 | 0.24 |
| Italy | 1907 | 373 | 631030808 | 671398695 | 33792600 | 76 | 18.67 | 0.06 |
| Italy | 1908 | 370 | 628447264 | 703693005 | 34012200 | 80 | 18.48 | 0.12 |
| Italy | 1909 | 366 | 689160565 | 785074665 | 34231800 | 68 | 20.13 | 0.14 |
| Italy | 1910 | 366 | 722423704 | 790564697 | 34451400 | 57 | 20.97 | 0.09 |
| Italy | 1911 | 371 | 776032258 | 855799203 | 34671000 | 56 | 22.38 | 0.10 |
| Italy | 1912 | 364 | 799284161 | 917481334 | 34844500 | 36 | 22.94 | 0.15 |
| Italy | 1913 | 362 | 816723088 | 1013072490 | 35018000 | 23 | 23.32 | 0.24 |
| Portugal | 1762 | | 977846 | 896903 | | | | −0.08 |
| Portugal | 1763 | | 1506255 | 1184309 | | | | −0.21 |
| Portugal | 1764 | | 1583591 | 1338973 | | | | −0.15 |
| Portugal | 1765 | | 1505181 | 1409829 | | | | −0.06 |
| Portugal | 1766 | | 1764966 | 1586206 | | | | −0.10 |
| Portugal | 1767 | | 1484665 | 1343931 | | | | −0.09 |
| Portugal | 1768 | | 1631709 | 1489663 | 2410000 | | 0.68 | −0.09 |
| Portugal | 1769 | | 1498008 | 1356201 | 2425818 | | 0.62 | −0.09 |
| Portugal | 1770 | | 1466322 | 1383680 | 2441636 | | 0.60 | −0.06 |
| Portugal | 1771 | | 1334370 | 1271435 | 2457455 | | 0.54 | −0.05 |
| Portugal | 1772 | | 1351419 | 1274349 | 2473273 | | 0.55 | −0.06 |
| Portugal | 1773 | | 1397499 | 1319325 | 2489091 | | 0.56 | −0.06 |
| Portugal | 1774 | | 1563760 | 1393675 | 2504909 | | 0.62 | −0.11 |

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|---|---|---|---|---|---|---|
| Portugal | 1775 | 1592369 | 1464070 | 2520727 | 0.63 | −0.08 |
| Portugal | 1776 | 1799677 | 1628164 | 2536545 | 0.71 | −0.10 |
| Portugal | 1777 | 1795684 | | 2552364 | 0.70 | |
| Portugal | 1778 | 1791690 | | 2568182 | 0.70 | |
| Portugal | 1779 | 1787697 | | 2584000 | 0.69 | |
| Portugal | 1780 | 1783703 | | 2599818 | 0.69 | |
| Portugal | 1781 | 1779710 | | 2615636 | 0.68 | |
| Portugal | 1782 | 1775716 | | 2631455 | 0.67 | |
| Portugal | 1783 | 1771723 | | 2647273 | 0.67 | |
| Portugal | 1784 | 1767730 | | 2663091 | 0.66 | |
| Portugal | 1785 | 1763736 | | 2678909 | 0.66 | |
| Portugal | 1786 | 1759743 | | 2694727 | 0.65 | |
| Portugal | 1787 | 1755749 | | 2710545 | 0.65 | |
| Portugal | 1788 | 1751756 | | 2726364 | 0.64 | |
| Portugal | 1789 | 1747762 | | 2742182 | 0.64 | |
| Portugal | 1790 | 1743769 | | 2758000 | 0.63 | |
| Portugal | 1791 | 1739776 | | 2773818 | 0.63 | |
| Portugal | 1792 | 1735782 | | 2789636 | 0.62 | |
| Portugal | 1793 | 1731789 | | 2805455 | 0.62 | |
| Portugal | 1794 | 1727795 | | 2821273 | 0.61 | |
| Portugal | 1795 | 1723802 | | 2837091 | 0.61 | |
| Portugal | 1796 | 1719808 | | 2852909 | 0.60 | |
| Portugal | 1797 | 1715815 | | 2868727 | 0.60 | |
| Portugal | 1798 | 1711509 | | 2884545 | 0.59 | |
| Portugal | 1799 | 2038968 | | 2900364 | 0.70 | |
| Portugal | 1800 | 3001910 | 3380432 | 2916182 | 1.03 | 0.13 |
| Portugal | 1801 | 2763025 | 3646386 | 2932000 | 0.94 | 0.32 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Portugal | 1802 | | 2427102 | 2572815 | 2936700 | | 0.83 | 0.06 |
| Portugal | 1803 | | 2931532 | | 2941400 | | 1.00 | |
| Portugal | 1804 | | 2873553 | | 2946100 | | 0.98 | |
| Portugal | 1805 | | 2715466 | | 2950800 | | 0.92 | |
| Portugal | 1806 | | 2557378 | | 2955500 | | 0.87 | |
| Portugal | 1807 | | 2399291 | | 2960200 | | 0.81 | |
| Portugal | 1808 | | 2241204 | | 2964900 | | 0.76 | |
| Portugal | 1809 | | 2083116 | | 2969600 | | 0.70 | |
| Portugal | 1810 | | 1925029 | | 2974300 | | 0.65 | |
| Portugal | 1811 | | 1766941 | | 2979000 | | 0.59 | |
| Portugal | 1812 | | 1608854 | 1588449 | 2983700 | | 0.54 | −0.01 |
| Portugal | 1813 | | 1912139 | | 2988400 | | 0.64 | |
| Portugal | 1814 | | 2215423 | | 2993100 | | 0.74 | |
| Portugal | 1815 | | 2518708 | | 2997800 | | 0.84 | |
| Portugal | 1816 | | 2821992 | | 3002500 | | 0.94 | |
| Portugal | 1817 | | 3125277 | 3453797 | 3007200 | | 1.04 | 0.11 |
| Portugal | 1818 | | 2946975 | | 3011900 | | 0.98 | |
| Portugal | 1819 | | 2768674 | | 3016600 | | 0.92 | |
| Portugal | 1820 | | 2590372 | | 3021300 | | 0.86 | |
| Portugal | 1821 | | 2412070 | 2489171 | 3026000 | | 0.80 | 0.03 |
| Portugal | 1822 | | 2408811 | | 3028571 | | 0.80 | |
| Portugal | 1823 | | 2405552 | | 3031143 | | 0.79 | |
| Portugal | 1824 | 334 | 2402293 | | 3033714 | 15 | 0.79 | |
| Portugal | 1825 | 351 | 2399033 | | 3036286 | 13 | 0.79 | |
| Portugal | 1826 | 401 | 2395774 | | 3038857 | 24 | 0.79 | |
| Portugal | 1827 | 414 | 2392515 | 3231692 | 3041429 | 59 | 0.79 | 0.35 |

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|---|---|---|---|---|---|---|---|---|
| Portugal | 1828 | 503 | 4220617 | 5697259 | 3044000 | 156 | 1.39 | 0.35 |
| Portugal | 1829 | 642 | 3849257 | | 3046571 | 305 | 1.26 | |
| Portugal | 1830 | 533 | 3477896 | | 3049143 | 196 | 1.14 | |
| Portugal | 1831 | 637 | 3106536 | | 3051714 | 268 | 1.02 | |
| Portugal | 1832 | 595 | 2735175 | | 3054286 | 238 | 0.90 | |
| Portugal | 1833 | 487 | 2363815 | | 3056857 | 148 | 0.77 | |
| Portugal | 1834 | 383 | 1992454 | 3395558 | 3059429 | 53 | 0.65 | 0.70 |
| Portugal | 1835 | 327 | 2529980 | 4417562 | 3062000 | −1 | 0.83 | 0.75 |
| Portugal | 1836 | 414 | 2237068 | 3659139 | 3116000 | 83 | 0.72 | 0.64 |
| Portugal | 1837 | 752 | 2963099 | 3387069 | 3170000 | 423 | 0.93 | 0.14 |
| Portugal | 1838 | 933 | 2144966 | 2607902 | 3224000 | 613 | 0.67 | 0.22 |
| Portugal | 1839 | 915 | 2246313 | 2208235 | 3395000 | 589 | 0.66 | −0.02 |
| Portugal | 1840 | 876 | 2311823 | 2519740 | 3566000 | 544 | 0.65 | 0.09 |
| Portugal | 1841 | 931 | 2270800 | 2808029 | 3737000 | 595 | 0.61 | 0.24 |
| Portugal | 1842 | 836 | 2875236 | 4700161 | 3745231 | 510 | 0.77 | 0.63 |
| Portugal | 1843 | 724 | 2592221 | 4640842 | 3753462 | 409 | 0.69 | 0.79 |
| Portugal | 1844 | 626 | 3195266 | 3888289 | 3761692 | 324 | 0.85 | 0.22 |
| Portugal | 1845 | 481 | 2920434 | 3635649 | 3769923 | 176 | 0.77 | 0.24 |
| Portugal | 1846 | 605 | 3023062 | | 3778154 | 291 | 0.80 | |
| Portugal | 1847 | 1070 | 3125689 | 3592879 | 3786385 | 727 | 0.83 | 0.15 |
| Portugal | 1848 | 1457 | 3203726 | | 3794615 | 1106 | 0.84 | |
| Portugal | 1849 | 1012 | 3281762 | | 3802846 | 689 | 0.86 | |
| Portugal | 1850 | 883 | 3359799 | | 3811077 | 572 | 0.88 | |
| Portugal | 1851 | 893 | 3437835 | | 3819308 | 583 | 0.90 | |
| Portugal | 1852 | 809 | 3515872 | 3413568 | 3827538 | 507 | 0.92 | −0.03 |
| Portugal | 1853 | 726 | 3554514 | 4173553 | 3835769 | 419 | 0.93 | 0.17 |
| Portugal | 1854 | 779 | 3437717 | 3579489 | 3844000 | 453 | 0.89 | 0.04 |
| Portugal | 1855 | 684 | 3599968 | 4439165 | 3863750 | 352 | 0.93 | 0.23 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Portugal | 1856 | 580 | 3613190 | 4289328 | 3883500 | 258 | 0.93 | 0.19 |
| Portugal | 1857 | 640 | 3792223 | 4789411 | 3903250 | 314 | 0.97 | 0.26 |
| Portugal | 1858 | 647 | 4186522 | 5894947 | 3923000 | 338 | 1.07 | 0.41 |
| Portugal | 1859 | 672 | 4118723 | 5791626 | 3960333 | 356 | 1.04 | 0.41 |
| Portugal | 1860 | 674 | 3967763 | 5091534 | 3997667 | 355 | 0.99 | 0.28 |
| Portugal | 1861 | 644 | 4213692 | 5061459 | 4035000 | 316 | 1.04 | 0.20 |
| Portugal | 1862 | 644 | 4467066 | 6724381 | 4086000 | 321 | 1.09 | 0.51 |
| Portugal | 1863 | 618 | 4650128 | 7040249 | 4137000 | 294 | 1.12 | 0.51 |
| Portugal | 1864 | 625 | 5023077 | 6817349 | 4188000 | 293 | 1.20 | 0.36 |
| Portugal | 1865 | 634 | 5819842 | 6801206 | 4213929 | 299 | 1.38 | 0.17 |
| Portugal | 1866 | 677 | 5070382 | 6861739 | 4239857 | 336 | 1.20 | 0.35 |
| Portugal | 1867 | 736 | 4848204 | 7390485 | 4265786 | 413 | 1.14 | 0.52 |
| Portugal | 1868 | 765 | 5331044 | 9715473 | 4291714 | 446 | 1.24 | 0.82 |
| Portugal | 1869 | 862 | 5333547 | 6896326 | 4317643 | 539 | 1.24 | 0.29 |
| Portugal | 1870 | 954 | 5545457 | 10619097 | 4343571 | 630 | 1.28 | 0.91 |
| Portugal | 1871 | 850 | 5555320 | 6848518 | 4369500 | 527 | 1.27 | 0.23 |
| Portugal | 1872 | 725 | 5952383 | 7993659 | 4395429 | 400 | 1.35 | 0.34 |
| Portugal | 1873 | 718 | 6638468 | 7757768 | 4421357 | 394 | 1.50 | 0.17 |
| Portugal | 1874 | 643 | 7614894 | 8914233 | 4447286 | 318 | 1.71 | 0.17 |
| Portugal | 1875 | 583 | 7798686 | 9577304 | 4473214 | 263 | 1.74 | 0.23 |
| Portugal | 1876 | 564 | 8533920 | 10450742 | 4499143 | 248 | 1.90 | 0.22 |
| Portugal | 1877 | 584 | 8684892 | 12117115 | 4525071 | 269 | 1.92 | 0.40 |
| Portugal | 1878 | 596 | 8562207 | 11416616 | 4551000 | 281 | 1.88 | 0.33 |
| Portugal | 1879 | 580 | 9223328 | 11546581 | 4593417 | 272 | 2.01 | 0.25 |
| Portugal | 1880 | 575 | 7770537 | 10456571 | 4635833 | 271 | 1.68 | 0.35 |
| Portugal | 1881 | 565 | 8570384 | 11288909 | 4678250 | 265 | 1.83 | 0.32 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Portugal | 1882 | 564 | 9691224 | 12151800 | 4720667 | 266 | 2.05 | 0.25 |
| Portugal | 1883 | 563 | 9220421 | 11272492 | 4763083 | 266 | 1.94 | 0.22 |
| Portugal | 1884 | 603 | 9712772 | 11497158 | 4805500 | 306 | 2.02 | 0.18 |
| Portugal | 1885 | 660 | 10275004 | 13104594 | 4847917 | 358 | 2.12 | 0.28 |
| Portugal | 1886 | 601 | 10321495 | 13465123 | 4890333 | 304 | 2.11 | 0.30 |
| Portugal | 1887 | 534 | 11152709 | 13505941 | 4932750 | 239 | 2.26 | 0.21 |
| Portugal | 1888 | 481 | 12252977 | 14519956 | 4975167 | 184 | 2.46 | 0.19 |
| Portugal | 1889 | 451 | 12558948 | 16527110 | 5017583 | 162 | 2.50 | 0.32 |
| Portugal | 1890 | 488 | 12738524 | 17393192 | 5060000 | 203 | 2.52 | 0.37 |
| Portugal | 1891 | 706 | 14255355 | 18335967 | 5096300 | 419 | 2.80 | 0.29 |
| Portugal | 1892 | 1179 | 16309789 | 22911763 | 5132600 | 895 | 3.18 | 0.40 |
| Portugal | 1893 | 1370 | 17015264 | 19283322 | 5168900 | 1090 | 3.29 | 0.13 |
| Portugal | 1894 | 1271 | 19068105 | 18869650 | 5205200 | 999 | 3.66 | −0.01 |
| Portugal | 1895 | 1020 | 18649364 | 19170198 | 5241500 | 761 | 3.56 | 0.03 |
| Portugal | 1896 | 377 | 22036752 | 21087189 | 5277800 | 129 | 4.18 | −0.04 |
| Portugal | 1897 | 446 | 23137607 | 26742945 | 5314100 | 201 | 4.35 | 0.16 |
| Portugal | 1898 | 488 | 25132070 | 29035878 | 5350400 | 240 | 4.70 | 0.16 |
| Portugal | 1899 | 396 | 23141465 | 24823236 | 5386700 | 139 | 4.30 | 0.07 |
| Portugal | 1900 | 414 | 23577343 | 27073743 | 5423000 | 138 | 4.35 | 0.15 |
| Portugal | 1901 | 390 | 24545774 | 24097223 | 5471636 | 99 | 4.49 | −0.02 |
| Portugal | 1902 | 336 | 21223035 | 22472539 | 5520273 | 45 | 3.84 | 0.06 |
| Portugal | 1903 | | 21306374 | 22377819 | 5568909 | | 3.83 | 0.05 |
| Portugal | 1904 | 498 | 21531996 | 22281484 | 5617545 | 209 | 3.83 | 0.03 |
| Portugal | 1905 | 433 | 20010270 | 19835762 | 5666182 | 155 | 3.53 | −0.01 |
| Portugal | 1906 | 424 | 19554923 | 19700938 | 5714818 | 141 | 3.42 | 0.01 |
| Portugal | 1907 | 443 | 19399624 | 19731366 | 5763455 | 146 | 3.37 | 0.02 |
| Portugal | 1908 | 479 | 25630515 | 27029361 | 5812091 | 189 | 4.41 | 0.05 |
| Portugal | 1909 | 480 | 25446066 | 26335972 | 5860727 | 182 | 4.34 | 0.03 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Portugal | 1910 | 448 | 24923372 | 25186967 | 5909364 | 140 | 4.22 | 0.01 |
| Portugal | 1911 | 449 | 23545353 | 22704253 | 5958000 | 134 | 3.95 | −0.04 |
| Portugal | 1912 | 457 | 22494361 | 23588240 | 5972333 | 129 | 3.77 | 0.05 |
| Portugal | 1913 | 471 | 30960407 | 29520941 | 5986667 | 132 | 5.17 | −0.05 |
| Sweden | 1740 | | 2762236 | 2223853 | | | | −0.19 |
| Sweden | 1741 | | 3518053 | 3522058 | | | | 0.00 |
| Sweden | 1742 | | 3206324 | 3125126 | | | | −0.03 |
| Sweden | 1743 | | 2816845 | 2851986 | | | | 0.01 |
| Sweden | 1744 | | 3060722 | 2595464 | | | | −0.15 |
| Sweden | 1745 | | 2498944 | 2145173 | | | | −0.14 |
| Sweden | 1746 | | 3040586 | 2674571 | | | | −0.12 |
| Sweden | 1747 | | 2733309 | 3216751 | | | | 0.18 |
| Sweden | 1748 | | 3117034 | 2754706 | | | | −0.12 |
| Sweden | 1749 | | 3370764 | 2686654 | | | | −0.20 |
| Sweden | 1750 | | 4751489 | 3613233 | 1781000 | | 2.67 | −0.24 |
| Sweden | 1751 | | 3459140 | 4028444 | 1795300 | | 1.93 | 0.16 |
| Sweden | 1752 | | 3788248 | 4302157 | 1809600 | | 2.09 | 0.14 |
| Sweden | 1753 | | 4157156 | 3871686 | 1823900 | | 2.28 | −0.07 |
| Sweden | 1754 | | 4201455 | 3894985 | 1838200 | | 2.29 | −0.07 |
| Sweden | 1755 | | 3738046 | 3752182 | 1852500 | | 2.02 | 0.00 |
| Sweden | 1756 | | 3819330 | 3664391 | 1866800 | | 2.05 | −0.04 |
| Sweden | 1757 | | 3506768 | 4094929 | 1881100 | | 1.86 | 0.17 |
| Sweden | 1758 | | 3422517 | 4854030 | 1895400 | | 1.81 | 0.42 |
| Sweden | 1759 | | 3267354 | 3747680 | 1909700 | | 1.71 | 0.15 |
| Sweden | 1760 | | 3079434 | 3941902 | 1924000 | | 1.60 | 0.28 |
| Sweden | 1761 | | 3003844 | 3677949 | 1935900 | | 1.55 | 0.22 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sweden | 1762 | 1820077 | 2229394 | 1947800 | 0.93 | 0.22 |
| Sweden | 1763 | 2195312 | 3879294 | 1959700 | 1.12 | 0.77 |
| Sweden | 1764 | 2284744 | 2569173 | 1971600 | 1.16 | 0.12 |
| Sweden | 1765 | 2062139 | 2400309 | 1983500 | 1.04 | 0.16 |
| Sweden | 1766 | 3520117 | 2550528 | 1995400 | 1.76 | −0.28 |
| Sweden | 1767 | 3967079 | 3653669 | 2007300 | 1.98 | −0.08 |
| Sweden | 1768 | 4896196 | 4342762 | 2019200 | 2.42 | −0.11 |
| Sweden | 1769 | 4423939 | 3759972 | 2031100 | 2.18 | −0.15 |
| Sweden | 1770 | 2615568 | 2797478 | 2043000 | 1.28 | 0.07 |
| Sweden | 1771 | 3499388 | 3312634 | 2050500 | 1.71 | −0.05 |
| Sweden | 1772 | 3767904 | 3484334 | 2058000 | 1.83 | −0.08 |
| Sweden | 1773 | 2836819 | 3470312 | 2065500 | 1.37 | 0.22 |
| Sweden | 1774 | 3724864 | 3637038 | 2073000 | 1.80 | −0.02 |
| Sweden | 1775 | 3796687 | 3420252 | 2080500 | 1.82 | −0.10 |
| Sweden | 1776 | 3696129 | 4339301 | 2088000 | 1.77 | 0.17 |
| Sweden | 1777 | 3792571 | 4190469 | 2095500 | 1.81 | 0.10 |
| Sweden | 1778 | 5913092 | 4075350 | 2103000 | 2.81 | −0.31 |
| Sweden | 1779 | 3978069 | 4281294 | 2110500 | 1.88 | 0.08 |
| Sweden | 1780 | 3724193 | 4238234 | 2118000 | 1.76 | 0.14 |
| Sweden | 1781 | 3811710 | 4077322 | 2124400 | 1.79 | 0.07 |
| Sweden | 1782 | 4182090 | 4347028 | 2130800 | 1.96 | 0.04 |
| Sweden | 1783 | 5129399 | 4613961 | 2137200 | 2.40 | −0.10 |
| Sweden | 1784 | 4071557 | 4191309 | 2143600 | 1.90 | 0.03 |
| Sweden | 1785 | 4048430 | 4515802 | 2150000 | 1.88 | 0.12 |
| Sweden | 1786 | 3931782 | 4575647 | 2157600 | 1.82 | 0.16 |
| Sweden | 1787 | 4388845 | 4895474 | 2165200 | 2.03 | 0.12 |
| Sweden | 1788 | 4416470 | 4924259 | 2172800 | 2.03 | 0.11 |
| Sweden | 1789 | 4969278 | 16771670 | 2180400 | 2.28 | 2.38 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Sweden | 1790 | | 12408291 | 13225762 | 2188000 | | 5.67 | 0.07 |
| Sweden | 1791 | | 9955223 | 10539227 | 2206600 | | 4.51 | 0.06 |
| Sweden | 1792 | | 7791998 | 15833940 | 2225200 | | 3.50 | 1.03 |
| Sweden | 1793 | | 5601810 | 6213677 | 2243800 | | 2.50 | 0.11 |
| Sweden | 1794 | | 5470034 | 6836142 | 2262400 | | 2.42 | 0.25 |
| Sweden | 1795 | | 7325816 | 7507339 | 2281000 | | 3.21 | 0.02 |
| Sweden | 1796 | | 7509368 | 9411862 | 2294200 | | 3.27 | 0.25 |
| Sweden | 1797 | | 5697480 | 6010619 | 2307400 | | 2.47 | 0.05 |
| Sweden | 1798 | | 6265049 | 6393383 | 2320600 | | 2.70 | 0.02 |
| Sweden | 1799 | | 7202240 | 8008156 | 2333800 | | 3.09 | 0.11 |
| Sweden | 1800 | | 7303488 | 8459029 | 2347000 | | 3.11 | 0.16 |
| Sweden | 1801 | | 6855618 | 7609176 | 2363000 | | 2.90 | 0.11 |
| Sweden | 1802 | | 10479476 | 8706992 | 2379000 | | 4.40 | −0.17 |
| Sweden | 1803 | | 24121248 | 9795517 | 2395000 | | 10.07 | −0.59 |
| Sweden | 1804 | | 10103138 | 10635202 | 2411000 | | 4.19 | 0.05 |
| Sweden | 1805 | | 11162362 | 10917388 | 2427000 | | 4.60 | −0.02 |
| Sweden | 1806 | | 10243678 | 9799079 | 2420800 | | 4.23 | −0.04 |
| Sweden | 1807 | | 9550781 | 9762355 | 2414600 | | 3.96 | 0.02 |
| Sweden | 1808 | | 16305087 | 24507227 | 2408400 | | 6.77 | 0.50 |
| Sweden | 1809 | | 7161454 | 18083591 | 2402200 | | 2.98 | 1.53 |
| Sweden | 1810 | | 7497813 | 10974779 | 2396000 | | 3.13 | 0.46 |
| Sweden | 1811 | | 6132363 | 6581754 | 2409800 | | 2.54 | 0.07 |
| Sweden | 1812 | | 11319787 | 6687007 | 2423600 | | 4.67 | −0.41 |
| Sweden | 1813 | | 17756232 | 18270734 | 2437400 | | 7.28 | 0.03 |
| Sweden | 1814 | | 17632153 | 18300931 | 2451200 | | 7.19 | 0.04 |
| Sweden | 1815 | | 9810290 | 6771042 | 2465000 | | 3.98 | −0.31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sweden | 1816 | 6851063 | 6662404 | 2489000 | 2.75 | −0.03 |
| Sweden | 1817 | 8084722 | 7584795 | 2513000 | 3.22 | −0.06 |
| Sweden | 1818 | 8753754 | 8239587 | 2537000 | 3.45 | −0.06 |
| Sweden | 1819 | 7712969 | 7597971 | 2561000 | 3.01 | −0.01 |
| Sweden | 1820 | 6552622 | 6248789 | 2585000 | 2.53 | −0.05 |
| Sweden | 1821 | 6800623 | 7373561 | 2622200 | 2.59 | 0.08 |
| Sweden | 1822 | 7138108 | 7168425 | 2659400 | 2.68 | 0.00 |
| Sweden | 1823 | 6918370 | 6487876 | 2696600 | 2.57 | −0.06 |
| Sweden | 1824 | 6825025 | 7095141 | 2733800 | 2.50 | 0.04 |
| Sweden | 1825 | 7270957 | 7046723 | 2771000 | 2.62 | −0.03 |
| Sweden | 1826 | 7997332 | 7527346 | 2794400 | 2.86 | −0.06 |
| Sweden | 1827 | 7170121 | 7377742 | 2817800 | 2.54 | 0.03 |
| Sweden | 1828 | 7330416 | 7286348 | 2841200 | 2.58 | −0.01 |
| Sweden | 1829 | 8875538 | 5335918 | 2864600 | 3.10 | −0.40 |
| Sweden | 1830 | 8319721 | 8901124 | 2888000 | 2.88 | 0.07 |
| Sweden | 1831 | 8239298 | 8374684 | 2915400 | 2.83 | 0.02 |
| Sweden | 1832 | 7570683 | 7556901 | 2942800 | 2.57 | 0.00 |
| Sweden | 1833 | 7547093 | 7427887 | 2970200 | 2.54 | −0.02 |
| Sweden | 1834 | 8088789 | 8260364 | 2997600 | 2.70 | 0.02 |
| Sweden | 1835 | 8769035 | 8650922 | 3025000 | 2.90 | -0.01 |
| Sweden | 1836 | 9486402 | 9606750 | 3047800 | 3.11 | 0.01 |
| Sweden | 1837 | 9860986 | 10461479 | 3070600 | 3.21 | 0.06 |
| Sweden | 1838 | 9947941 | 9810895 | 3093400 | 3.22 | −0.01 |
| Sweden | 1839 | 9861171 | 9871000 | 3116200 | 3.16 | 0.00 |
| Sweden | 1840 | 9674364 | 9695392 | 3139000 | 3.08 | 0.00 |
| Sweden | 1841 | 9786217 | 9677698 | 3174600 | 3.08 | −0.01 |
| Sweden | 1842 | 9433355 | 9645554 | 3210200 | 2.94 | 0.02 |
| Sweden | 1843 | 9093597 | 9003771 | 3245800 | 2.80 | −0.01 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Sweden | 1844 | | 8462414 | 8446235 | 3281400 | | 2.58 | 0.00 |
| Sweden | 1845 | | 9528463 | 9458612 | 3317000 | | 2.87 | −0.01 |
| Sweden | 1846 | | 10466239 | 10225306 | 3347800 | | 3.13 | −0.02 |
| Sweden | 1847 | | 10322639 | 10169435 | 3378600 | | 3.06 | −0.01 |
| Sweden | 1848 | | 10348299 | 10105034 | 3409400 | | 3.04 | −0.02 |
| Sweden | 1849 | | 10757611 | 10580063 | 3440200 | | 3.13 | −0.02 |
| Sweden | 1850 | | 11022209 | 11014021 | 3471000 | | 3.18 | 0.00 |
| Sweden | 1851 | | 11473264 | 11616675 | 3505000 | | 3.27 | 0.01 |
| Sweden | 1852 | | 11100804 | 11768003 | 3539000 | | 3.14 | 0.06 |
| Sweden | 1853 | | 11778365 | 11376882 | 3573000 | | 3.30 | −0.03 |
| Sweden | 1854 | | 12760054 | 13261118 | 3607000 | | 3.54 | 0.04 |
| Sweden | 1855 | | 14071110 | 14344912 | 3641000 | | 3.86 | 0.02 |
| Sweden | 1856 | | 15856787 | 16118063 | 3684800 | | 4.30 | 0.02 |
| Sweden | 1857 | | 15108175 | 17283255 | 3728600 | | 4.05 | 0.14 |
| Sweden | 1858 | | 13630962 | 21150568 | 3772400 | | 3.61 | 0.55 |
| Sweden | 1859 | | 13903847 | 20751719 | 3816200 | | 3.64 | 0.49 |
| Sweden | 1860 | | 14901737 | 21629324 | 3860000 | | 3.86 | 0.45 |
| Sweden | 1861 | | 16165406 | 19907290 | 3890900 | | 4.15 | 0.23 |
| Sweden | 1862 | | 14467362 | 18551878 | 3921800 | | 3.69 | 0.28 |
| Sweden | 1863 | | 12288877 | 16137758 | 3952700 | | 3.11 | 0.31 |
| Sweden | 1864 | | 10102640 | 14619736 | 3983600 | | 2.54 | 0.45 |
| Sweden | 1865 | | 18784828 | 25958272 | 4014500 | | 4.68 | 0.38 |
| Sweden | 1866 | | 17378882 | 27876835 | 4045400 | | 4.30 | 0.60 |
| Sweden | 1867 | | 17112722 | 21336150 | 4076300 | | 4.20 | 0.25 |
| Sweden | 1868 | 551 | 16415662 | 22250142 | 4107200 | 232 | 4.00 | 0.36 |
| Sweden | 1869 | 513 | 16673413 | 22253089 | 4138100 | 190 | 4.03 | 0.33 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sweden | 1870 | 499 | 21781191 | 23436870 | 4169000 | 175 | 5.22 | 0.08 |
| Sweden | 1871 | 486 | 25184607 | 23858299 | 4208700 | 163 | 5.98 | -0.05 |
| Sweden | 1872 | 479 | 26164846 | 26864316 | 4248400 | 155 | 6.16 | 0.03 |
| Sweden | 1873 | 479 | 29688893 | 29359618 | 4288100 | 155 | 6.92 | −0.01 |
| Sweden | 1874 | 475 | 32935578 | 38975172 | 4327800 | 150 | 7.61 | 0.18 |
| Sweden | 1875 | 474 | 32431091 | 39471464 | 4367500 | 154 | 7.43 | 0.22 |
| Sweden | 1876 | 466 | 34595589 | 40923444 | 4407200 | 150 | 7.85 | 0.18 |
| Sweden | 1877 | 470 | 33947939 | 40926720 | 4446900 | 155 | 7.63 | 0.21 |
| Sweden | 1878 | 469 | 32792842 | 43548835 | 4486600 | 154 | 7.31 | 0.33 |
| Sweden | 1879 | 421 | 29445867 | 39070956 | 4526300 | 114 | 6.51 | 0.33 |
| Sweden | 1880 | 395 | 33457434 | 35974686 | 4566000 | 90 | 7.33 | 0.08 |
| Sweden | 1881 | 396 | 35618987 | 36568365 | 4587900 | 96 | 7.76 | 0.03 |
| Sweden | 1882 | 395 | 35443621 | 33463974 | 4609800 | 97 | 7.69 | −0.06 |
| Sweden | 1883 | 397 | 36039032 | 35125174 | 4631700 | 101 | 7.78 | −0.03 |
| Sweden | 1884 | 395 | 36368789 | 35044060 | 4653600 | 98 | 7.82 | −0.04 |
| Sweden | 1885 | 390 | 36334162 | 36778118 | 4675500 | 87 | 7.77 | 0.01 |
| Sweden | 1886 | 381 | 34908798 | 40031144 | 4697400 | 84 | 7.43 | 0.15 |
| Sweden | 1887 | 382 | 32966939 | 40573631 | 4719300 | 88 | 6.99 | 0.23 |
| Sweden | 1888 | 380 | 38183850 | 38467862 | 4741200 | 83 | 8.05 | 0.01 |
| Sweden | 1889 | 380 | 40109392 | 39013897 | 4763100 | 92 | 8.42 | −0.03 |
| Sweden | 1890 | 383 | 41885758 | 39933308 | 4785000 | 99 | 8.75 | −0.05 |
| Sweden | 1891 | 388 | 40288037 | 43998120 | 4820200 | 101 | 8.36 | 0.09 |
| Sweden | 1892 | 383 | 39497995 | 43749109 | 4855400 | 98 | 8.13 | 0.11 |
| Sweden | 1893 | 378 | 41090665 | 44149179 | 4890600 | 99 | 8.40 | 0.07 |
| Sweden | 1894 | 371 | 47116197 | 44205671 | 4925800 | 99 | 9.57 | −0.06 |
| Sweden | 1895 | 301 | 49360999 | 42776069 | 4961000 | 42 | 9.95 | −0.13 |
| Sweden | 1896 | 295 | 50275591 | 54364634 | 4996200 | 47 | 10.06 | 0.08 |
| Sweden | 1897 | 294 | 56277614 | 48126215 | 5031400 | 50 | 11.19 | −0.14 |

(*continued*)

A.1.2 (*continued*)

| Country | Year | Yield | Revenue | Expenditure | Population | Spread w/Consol | Rev/Pop | Def/Rev |
|---|---|---|---|---|---|---|---|---|
| Sweden | 1898 | 303 | 58759693 | 51378415 | 5066600 | 55 | 11.60 | −0.13 |
| Sweden | 1899 | 318 | 62798568 | 57846673 | 5101800 | 61 | 12.31 | −0.08 |
| Sweden | 1900 | 333 | 61785744 | 64661927 | 5137000 | 57 | 12.03 | 0.05 |
| Sweden | 1901 | 333 | 58142012 | 69940749 | 5175500 | 42 | 11.23 | 0.20 |
| Sweden | 1902 | 321 | 60637447 | 74497389 | 5214000 | 30 | 11.63 | 0.23 |
| Sweden | 1903 | 317 | 75263502 | 74544849 | 5252500 | 32 | 14.33 | −0.01 |
| Sweden | 1904 | 327 | 76737932 | 82073138 | 5291000 | 38 | 14.50 | 0.07 |
| Sweden | 1905 | 340 | 80590375 | 83904265 | 5329500 | 62 | 15.12 | 0.04 |
| Sweden | 1906 | 343 | 78599340 | 85933611 | 5368000 | 60 | 14.64 | 0.09 |
| Sweden | 1907 | 352 | 86354641 | 94495827 | 5406500 | 55 | 15.97 | 0.09 |
| Sweden | 1908 | 360 | 81509997 | 108510667 | 5445000 | 70 | 14.97 | 0.33 |
| Sweden | 1909 | 350 | 86668670 | 111276701 | 5483500 | 52 | 15.81 | 0.28 |
| Sweden | 1910 | 359 | 98446586 | 108785888 | 5522000 | 50 | 17.83 | 0.11 |
| Sweden | 1911 | 365 | 97451268 | 108866834 | 5560200 | 51 | 17.53 | 0.12 |
| Sweden | 1912 | 382 | 100146499 | 102157473 | 5598400 | 54 | 17.89 | 0.02 |
| Sweden | 1913 | 406 | 106451398 | 104435273 | 5636600 | 67 | 18.89 | −0.02 |

*Note*: From left to right, the columns display countries, years, yields on long-term government bonds in basis points (Yield), gross government revenues and expenditures in gold grams (Revenue, Expenditure), populations, yield spreads against the British consol in basis points (Spread w/Consol), per capita government revenues in gold grams (Rev/Pop), and budget deficit-to-revenue ratios (Def/Rev).

*Source*: See Appendix 2.

## A.2. Fiscal Data Sources

The composite time series for revenues, populations, and expenditures are typically composed of hosts of shorter series. The sub-series for revenues are abbreviated as R1, R2, and so forth, those for populations as P1, P2, and so forth, and those for expenditures as E1, E2, and so forth. Similarly, British Historical Statistics (Mitchell, 1988) is abbreviated as BHS, the Global Financial Database as GFD, and International Historical Statistics (Mitchell, 2003) as IHS. For further details, see Chapters 4 and 5.

### A.2.1. *Group 1*

*Austria*. Austrian data on 10-year government bonds are from the GFD. For 1874–9, the silver 5s bond is used; for 1880–1913, the gold 4s bond. For 1874–9, monthly data are used to compute yearly averages; for 1880–1913, weekly data. Yields are for bonds traded in London.

R1 is central government revenue in Austria, 1781–1913, from IHS. This series covers Austria-Hungary (i.e., Cisleithania plus Transleithania) through 1847 and for 1850–67 and Cisleithania only for 1848–9 and for 1868–1913. Lombardy is included through 1858 and Venetia through 1865. Total revenues are for fiscal receipts only through 1864 and for ordinary receipts for 1865–75. They include certain extraordinary receipts for 1876–1913. Since the IHS data include cash saldi and loan proceeds for 1875–90, updated figures without saldi or loan proceeds from Michael Pammer were used for those years.[1] R2 is central government revenue in Transleithania, 1868–1913, from IHS. The composite series for central government revenues is R1, 1781–1867, and R1 plus R2, 1868–1913.

P1 is the population of Austria for 1818, 1821, 1824, 1827, 1830, 1834, 1837, 1840, 1843, 1846, 1851, 1857, 1869, 1880, 1890, 1900, and 1910 from IHS. Data are for the civil population of Cisleithania only. P2 is the population of Lombardy for 1832–40, 1842–4, and 1846–54, from Michael Pammer. P3 is the population of Venetia for 1832–40, 1842–4, and 1846–54, also from Michael Pammer. For P2 and P3, the years 1841, 1845, and 1849–50 are interpolated. Due to lack of data, the 1832 figures are used for 1818–31, and the 1854 figures are used for 1855–8 for Lombardy and 1855–65 for Venetia. P4 is the population of Hungary for 1787, 1793, 1804, 1817, 1843, 1846, 1850, 1857, 1869, 1880, 1890,

[1] Thanks to Michael Pammer for help with the Austrian budgetary data.

1900, and 1910 from IHS. Data are for Transleithania. The composite population series is P1 plus P2 plus P3 plus P4 for 1818–47 and 1850–8, P1 plus P2 plus P3 for 1848–9, P1 plus P3 plus P4 for 1859–65, and P1 plus P4 for 1866–1910. All intermediate years are interpolated.

The gulden became the general monetary unit in Austria after the War of the Austrian Succession and was set at the Convention of 1753 with 1 gulden equal to 60 kreuzer. Austria decimalized in 1857, adopting a system of 1 gulden to 100 kreuzer. Revenues in gulden were converted into revenues in kreuzer by multiplying by 60. Since 1 pre-1858 gulden was equal to 1.05 gulden from 1858 onward, the pre-1858 gulden series was multiplied by 1.05. Revenues in kreuzer were then converted into revenues in silver grams for 1781–1878 by multiplying by the yearly exchange rate from Giovanni Federico and Michael Pammer. The original source is Pribram (1938, pp. 76–82). Revenues in silver grams were then converted into revenues in gold grams by dividing by the silver for gold price ratio, also from Pribram (1938, pp. 76–82). Since Pribram's data were not available for 1795–1809, the silver for gold price ratio from Officer (2010) was used for those years. These two series are nearly identical from the eighteenth century to the 1870s. The kreuzer–silver exchange rate series ended in 1878, and the krone–pound one began. This exchange rate series is also from Giovanni Federico and Michael Pammer. Revenues in gulden were converted into revenues in kronen by multiplying by 2 for 1879–1913. Revenues in kronen were then converted into revenues in pounds by multiplying by the yearly exchange rate. Revenues in pounds were then converted into revenues in gold troy ounces by dividing by the London market price of gold from Officer (2010). Revenues in gold troy ounces were then converted into revenues in gold grams by multiplying by 31.10.

E1 is central government expenditure, 1781–1913, from IHS. This series covers Austria-Hungary (i.e., Cisleithania plus Transleithania) through 1867 and Cisleithania from 1868 onward. Data do not include expenditures on tax collection through 1864. Total expenditures through 1874 are for cash payments made by the Treasury. They include obligations undertaken and the change in the Treasury's cash balance for 1875–1913. E2 is central government revenue in Transleithania, 1868–1913, from IHS. The composite series for central government expenditures is E1, 1781–1867, and E1 plus E2, 1868–1913. The same conversion process into gold grams was used for expenditures as for revenues.

*England*. British data on perpetual government bonds are from the GFD. For 1750–3, the 3 percent yield on annuities is used. For 1754–1913, the

British consol is used, which paid 3 percent through 1888, 2.75 percent for 1889–1906, and 2.5 percent for 1907–13. For 1750–1879, monthly data are used to compute yearly averages, for 1880–1913, weekly data. Yields are for bonds traded in London.

R1 is total revenue to the English Crown, 1650–1824, from O'Brien (2010). R2 is net receipts of the public income for Great Britain, 1692–1801, from BHS. R3 is central government revenue for Great Britain, 1750–1801, and for the United Kingdom, 1802–1913, from IHS. The composite series for central government revenues is R1, 1650–91; R2, 1692–1749; and R3, 1750–1913. The years 1654 and 1660 are interpolated.

P1 is the population of England from BHS. These figures do not include Wales (see Wrigley and Schofield, 1981, p. 10). P2 is the population of Wales for 1701, 1751, 1781, 1801, and 1831, from Deane and Cole (1967). P3 is the population of Scotland. The 1650 figure is from De Vries (1984), the 1701 figure from Brown (1991, p. 33), and the 1755 figure from BHS. All intermediate years for Wales and Scotland are interpolated. P4 is the estimated mid-year home population of the British Isles from BHS. The composite population series is P1, 1650–91; P1 plus P2 plus P3, 1692–1801; and P4, 1802–1913.

Acts of Union conjoined England and Wales in 1536, Scotland in 1707, and Ireland in 1800 (see Chapter 2). For 1650–91, revenue data for the English Crown are used. Due to a lack of data, neither Wales nor Scotland was included, though the English Crown collected revenues from those domains. To convert revenue data into per capita terms, they were divided by the English population only.[2] Revenue data are for Great Britain (England, Scotland, and Wales) for 1692–1801 and for the United Kingdom (Great Britain and Ireland) for 1802–1913. Accordingly, revenue data were divided by the populations for England, Scotland, and Wales for 1692–1801, and for England, Scotland, Wales, and Ireland for 1802–1913.

The British official price of gold in pounds per fine troy ounce, 1650–1717, and the London market price of gold in pounds per fine troy ounce, 1718–1913, are from Officer (2010). With the exception of French revolutionary and Napoleonic times (1789–1815), these two series are

[2] This choice biases the data against the hypothesis that the establishment of limited government in 1688 led to greater revenues. Since the pre-1692 denominator (i.e., population) was made smaller than it actually was, pre-1692 revenues per capita become higher than they actually were. Any revenue increases after parliamentary reform will thus be smaller than otherwise. Also see Chapter 3.

nearly identical. British revenues in gold troy ounces were converted into revenues in gold grams by multiplying by 31.10.

E1 is issues and assignments for the English exchequer, 1660–87, from Chandaman (1975). To calculate total expenditures, issues (listed at half-year intervals, A and B) and assignments (also listed at half-year intervals, A and B) were summed. E2 is total net expenditure including debt charges for Great Britain, 1692–1801, from BHS. E3 is central government expenditure for Great Britain, 1750–1801, and for the United Kingdom, 1802–1913, from IHS. The composite series for central government expenditures is E1, 1650–87; E2, 1692–1749; and E3, 1750–1913. The same conversion process into gold grams was used for expenditures as for revenues.

*France*. Since no single debt instrument analogous to the British consol existed in France before the nineteenth century, it is difficult to identify "the" interest rate paid on government loans. Bonds could be perpetual or finite, redeemable or not, and repudiated when revenues ran thin. The eighteenth-century yield data were collected by Velde and Weir (1992), who chose the October loan as the asset that best captured yields on long-term French government bonds for 1750–93. Prior to 1770, the October loan was a private debt of the Compagnie des Indes. From 1770 onward, it was a perpetual debt of the French government. For 1793–6, the Paris Stock Exchange was closed off and on. Data for 1794–1800 are not available, though a perpetual 5 percent consolidated bond was issued in 1798. This bond continued to trade until 1825, when the French government refunded it and issued a perpetual 3 percent bond, which became the primary government bond until 1949.[3] French data for the nineteenth and twentieth centuries are from Jean-Laurent Rosenthal for 1801–72 and from the GFD for 1873–1913. For 1750–1879, monthly data are used to compute yearly averages; for 1880–1913, weekly data. Yields are for bonds traded on the Paris Stock Exchange.

R1 is ordinary revenues of the French monarchy, 1650–95, from Bonney (2010b). R2 is total royal revenue in France from various sources converted into livres tournois, 1660–1775, from Bonney (2010c). R3 is French ordinary revenue, 1727–1814, from Bonney (2010d). R4 is French revenue, 1650–1870, from François Velde. R5 is ordinary central government revenue, 1815–1913, from IHS. R6 is extraordinary central government revenue, 1815–1890, from the Institut national de la statistique et des études économique (1966). The composite series

[3] A new 3% bond paying quarterly interest replaced the previous one in 1862.

of central government revenues is R1, 1650–6, 1662; R2, 1661–1703, 1705–15, 1727–50, 1757–8, 1761, 1763, 1773–4; R3, 1751–4, 1764–5, 1768, 1780–1, 1788–96, 1806–13; R4, 1716–26, 1759–60, 1766–7, 1769, 1772, 1775–9, 1782–7, 1791–1805, 1814; R5 plus R6, 1815–90; and R5, 1891–1913. Years 1657–60, 1755–6, 1762, and 1770–1 are interpolated.[4]

P1 is the population of France from Dupaquier (1988, vol. 2). P2 is the population of France from Mathias and O'Brien (1976). P3 is the population of France from Blayo and Henry (1975). P4 is the population of France at censuses from IHS. The composite population series is P1, 1650, 1670, 1680, 1690, 1710; P2, 1715, 1725, 1730, 1735; P3, 1740, 1745, 1750, 1755, 1760, 1765, 1770, 1775–6, 1780–1, 1785–6, 1790–1, 1795–6, 1800–1, 1805–6, 1810–11, 1815–16, 1820–1, 1825–6, 1830–1, 1835–6, 1840–1, 1845–6, 1850–1, 1855–6, 1860–1; P4, 1866, 1872, 1876, 1881, 1886, 1891, 1896, 1901, 1906, 1911, and 1921. All intermediate years are interpolated.

The Paris market price of gold in francs per gram, 1650–1913, is from Jean-Laurent Rosenthal.

E1 is royal expenditure in France, 1600–95, from Bonney (2010e). E2 is royal expenditure in France, 1670–1715, from Bonney (2010f). E3 is French ordinary expenditure, 1727–1814, from Bonney (2010d). E4 is expenditure of the French monarchy at various dates, 1773–85, from Bonney (2010g). E5 is total French expenditure, 1801–44, from Bonney (2010h). E6 is ordinary and extraordinary central government expenditure, 1815–1913, from IHS. The composite series of central government expenditures is E1, 1650–6, 1662–83; E2, 1684–1715; E3, 1727–52, 1764–5, 1767–8, 1780–1, 1788–96; E4, 1785; E5, 1801–14; and E6, 1815–1913. The same conversion process into gold grams was used for expenditures as for revenues.[5]

[4] Massive inflation took place after the start of the French Revolution in 1789, generating per capita revenue calculations for 1794–6 that were incredibly large. The revenue data for those years were thus interpolated using the 1793 and 1797 figures. This choice biases the data against the hypothesis that fiscal centralization (which occurred in 1790) improved public finances, since after interpolation the revenue estimates for the 1790s become much lower. Any revenue increases after tax reform will thus be smaller than otherwise. Also see Chapters 2 and 5.

[5] Massive inflation occurred in France during the 1790s, generating incredible expenditure calculations: per capita estimates were 1792, 49.24 gold grams; 1793, 95.94 gold grams; 1794, 170.87 gold grams; 1795, 204.09 gold grams; and 1796, 0.07 gold grams. By comparison, they were 7.62 gold grams in 1791 and 6.16 gold grams in 1801 (the next available observation). The expenditure data for 1792–96 were thus excluded. Also see the preceding footnote.

*The Netherlands*. Public bonds in the Dutch Republic (1572–1795) were issued by several authorities, including the Union, provinces, and cities. Joost Jonker, Oscar Gelderblom, and Heleen Kole collected the Dutch data used in this study for 1780–1810.[6] Prior to 1780, there were not enough data to form a complete series. For 1780–95, the source is the Dutch newspaper *Maandelijksche Hollandsche Mercurius*, which reported yields on government bonds from securities auctions in Amsterdam. Jonker et al. chose the Holland and Westfriesland perpetual 2.5 percent bond, which (like the October loan in eighteenth-century France) best captured long-term yield levels. For 1796–1813, the source is the Dutch newspaper *Prijscourant der Effecten*. Perpetual 2.5 percent national bonds are used. Data are not available for 1812. The entire national debt, with interest rates ranging from 1.25 to 7 percent, was converted into a single debt in 1814 at a rate of 2.5 percent. The data source for 1814–1913 is the GFD. For 1780–96, monthly data are used to compute yearly averages; for 1797–1812, biweekly data; for 1814–81, monthly data; for 1882, biweekly data; and for 1883–1913, weekly data. Post-1813 bonds were also traded in Amsterdam.

R1 is total tax revenues in the Dutch Republic, 1720–95, from Fritschy et al. (2007).[7] Provincial tax streams for Drenthe, Friesland, Groningen, Holland, Overijssel, and Utrecht were calculated using this source. Sums included income from direct and indirect taxes but excluded income from land sales and loans. The totals for Overijssel were used to calculate those for Brabant and Gelderland. Official quotas for Overijssel and Gelderland were 3.60 percent and 5.61 percent, respectively (see t'Hart, 1997). The totals for Gelderland were thus calculated as 1.56 times (i.e., 5.61 divided by 3.60) those for Overijssel. These totals were also used for Brabant. Data for Zeeland and its admiralty are from Veenstra (2006, 2010).[8] His data include customs (*convooien en licenten*) and tonnage (*lastgeld*) and ship (*veilgeld*) taxes. Customs tax data for the four other admiralties (Amsterdam, Friesland, Noorderkwartier, Rotterdam) are from Hovy (1966). The admiralty data also include annual payments of 364,000 guilders made by the Dutch East India Company. Total tax revenues for the Republic as a whole were calculated as sums of these diverse categories. R2 is income of the Batavian Republic and its successors, 1803–10 and 1814, and R3 is income during the reign of William I,

[6] Thanks to Joost Jonker for help with the Dutch yield data.
[7] Thanks to Wantje Fritschy for help with this fascinating database.
[8] Thanks to Wietse Veenstra for help with the Admiralty data.

1814, 1821, 1826, 1831, 1836, and 1840, from van Zanden and van Riel (2004). Since the totals for 1815–30 include Belgium, the average yearly net Belgian transfer according to van Zanden and van Riel (2004, p. 99) was subtracted. For example, the net transfer from Belgium for 1814–20 was 11,800,000 guilders, or 1,966,666 guilders per annum. The latter amount was thus deducted from total income for the Netherlands for each year over this six-year period. The same correction was performed for the periods 1821–5 and 1826–30.[9] The results closely matched the (interpolated) data from Fritschy and van der Voort (1997). R4 is central government revenue, 1845–1913, from IHS. The composite series of central government revenues is R1, 1720–95; R2, 1803–10; R3, 1814–40; and R4, 1845–1913. Years 1841–4 are interpolated.

P1 is the population of the Netherlands from De Vries (1984). The population data used in the time series for per capita revenues for Holland in Figure 5.5 are from Jan Luiten van Zanden. P2 is the population of the Netherlands from IHS. The composite population series is P1, 1700, 1750, 1800; and P2, 1816, 1829, 1839, 1849, 1859, 1869, 1879, 1889, 1899, 1909, and 1920. All intermediate years are interpolated. The data exclude the Southern Netherlands (see earlier discussion).

The Dutch market price of gold in guilders per gram, 1719–1913, is from W. L. Korthals Altes. The years 1749 and 1759, which were missing, are interpolated.

E1 is total expenditures in the Dutch Republic, 1720–94. The totals for Drenthe, Friesland, Groningen, Holland, Overijssel, and Utrecht were calculated from Fritschy et al. (2007). Sums include expenditures on behalf of the Generality and provincial spending. Total expenditures for Gelderland were calculated using the official quotas for Overijssel (3.60 percent) and Gelderland (5.61 percent). As for revenues, the totals for Gelderland were calculated as 1.56 times (i.e., 5.61 divided by 3.60) those for Overijssel. Data for Zeeland are from Veenstra (2010). Roughly 80 percent of defense expenditures for the Republic in 1790 were from the seven provinces and Drenthe. Fritschy et al. (2007) claim that the remaining 20 percent were from other parts: 11 percent from the Admiralties, 7 percent from Brabant, and 2 percent from additional central revenue sources. The series of expenditures by Holland on behalf of the Generality was used to calculate the remaining portion of Generality expenditures. During the 1700s, Holland paid a yearly amount of roughly 60 percent of total Generality expenditures including those of the seven provinces

[9] Thanks to Jan Luiten van Zanden for help with this correction.

and Drenthe, or roughly 48 percent of Generality expenditures overall. The remaining portion of yearly Generality expenditures was thus computed as 42 percent (i.e., 20 divided by 48) of Holland's expenditures on behalf of the Generality.[10] Total expenditures for the Republic as a whole were calculated as sums of these diverse categories.[11] E2 is expenditures in the Batavian Republic and its successors, 1803–10, from van Zanden and van Riel (2004). E3 is estimates of expenditures in the Netherlands, 1814–1913, from Jan Luiten van Zanden. His data exclude southern provinces like Belgium. See Fritschy and van der Voort (1997) for a comparison. The composite series of central government expenditures is E1, 1720–95; E2, 1803–10; and E3, 1814–1913. The same conversion process into gold grams was used for expenditures as for revenues.

*Prussia*. Prussian data on 10-year government bonds for 1815–41 are from the GFD. However, this source used Bavarian bonds for 1842–69. Prussian data on 10-year government bonds for those years were thus taken from Homer and Sylla (2005). 4s bonds are used, except for 1844–52, when 3.5s bonds are used. The Prussian data on 10-year government bonds for 1870–1913 are from the GFD. Prussian 4 percent consols are used for 1870–97, and German 3 percent Imperial loans for 1898–1913. For 1815–41, monthly data are used to compute yearly averages; for 1842–69, infrequent data; for 1870–80, monthly data; and for 1881–1913, weekly data. Yields are for bonds traded in Berlin.

R1 is net revenues of the Prussian state, 1688–1806, from Korner (2010). Revenue data are from the military treasury only for 1688–1713. R2 is total ordinary revenues, 1807–1913, from Mauersberg (1988). The composite series of central government revenues is R1, 1688–1806; and R2, 1821, 1829, 1841, 1847, 1850, 1855, 1860, 1867, 1868, 1870, 1874, 1875, 1880, 1885, 1890, 1900, 1905, and 1910. All intermediate years are interpolated.[12]

P1 is the population of Prussia from Peter Brecke. These data incorporate Prussian territorial changes over the seventeenth to the nineteenth centuries as well as possible. P2 is the population of Prussia from Mauersberg (1988). The composite population series is P1, 1688–1865; and P2, 1870, 1874, 1875, 1880, 1885, 1890, 1895, 1900, 1905, 1910, and 1914. All intermediate years are interpolated.

[10] The percentage of expenditures for the Admiralties was lower during the Fourth Anglo-Dutch War (1780–4), which was fought at sea.

[11] Thanks to Wantje Fritschy for help with the expenditure calculations for the Dutch Republic.

[12] Thanks to Mark Spoerer for help with the Prussian budgetary data.

One thaler equaled 60 kreuzer through 1692. The thaler became the speciesthaler in 1693 following the Conference of Leipzig, with 1 speciesthaler equal to 120 kreuzer. The speciesthaler was redefined as equal to 1.33 thalers in 1753 following the Convention of Vienna. Revenues in thalers were converted into revenues in kreuzer by multiplying by 60 for 1688–92 and by 120 for 1693–1871, and by dividing by 1.33 for 1753–1913. Revenues in kreuzer were then converted into revenues in silver grams by multiplying by the yearly exchange rate from Pribram (1938, pp. 76–82). Revenues in silver grams were then converted into revenues in gold grams by dividing by the silver for gold price ratio, also from Pribram (1938, pp. 76–82). Since Pribram's data were not available for 1795–1809, the silver for gold price ratio from Officer (2010) was used for those years. These two series are nearly identical from the seventeenth century to the 1870s. The mark–U.S. dollar exchange rate series from the GFD began in 1872. Revenues in thalers were converted into revenues in marks by multiplying by 3 for 1872–1913. Revenues in marks were then converted to revenues in U.S. dollars. Exchange rates were computed as yearly averages of closing prices taken from the last day of trading each month. Revenues in dollars were then converted into gold troy ounces by dividing by the New York market price of gold from Officer (2010). Revenues in gold troy ounces were then converted into revenues in gold grams by multiplying by 31.10.[13]

E1 is total expenditure of the Prussian state, 1688–1806, from Korner (2010). E2 is expenditures, 1821–66, from Tilly (1966, 1967). E3 is total ordinary expenditures, 1807–1913, from Mauersberg (1988). The composite series of central government expenditures is E1, 1688–1806; E2, 1838, 1849, 1853, 1856, 1866; and E3, 1821, 1829, 1841, 1847, 1850, 1855, 1860, 1867, 1868, 1870, 1874, 1875, 1880, 1885, 1890, 1900, 1905, 1910. The same conversion process into gold grams was used for expenditures as for revenues.

*Spain*. Like Old Regime France, Spain issued many disparate debt instruments prior to the nineteenth century (see Tortella and Comín, 2001). The Spanish yield series, however, did not begin until 1821. Data are for 10-year government bonds from the GFD. For 1823–36, 5s bonds are used. For 1836–81, 3s bonds are used. In 1881, the 3s bonds were converted into a 1 percent bond. The 1 percent bond was converted into a 1.25 percent bond in 1882, and then into a 4 percent bond. The 4 percent bond is used for 1882–1913. Monthly data are used for 1821–1913 to

[13] The conversion from thalers into gold grams was updated from Dincecco (2009a).

compute yearly averages. London yields are used for the entire series, except for 1913, when the Madrid yield is used.

R1 is ordinary and extraordinary revenues to the Spanish Crown, 1703 and 1713, from Lynch (1989, p. 61). R2 is ordinary and extraordinary revenues to the Spanish Crown, 1753–88, from Gelabert (2010). R3 is Ingresos Totales del Estado, 1801–42, and R4 is Derechos Reconocidos y Liquidados Totales, 1845–1913, from Carreras and Tafunell (2006). The composite series of central government revenues is R1, 1703, 1713; R2, 1753–88; R3, 1801–7, 1813–20, 1822, 1824–39, 1841–2; and R4, 1845, 1849–1913. All other years are interpolated.[14]

P1 is the population of Spain from De Vries (1984). P2 is the population of Spain from Nogal and Prados de la Escosura (2006). P3 is the population of Spain from Lynch (1989). P4 is the population of Spain from IHS. The composite population series is P1, 1700, 1850; P2, 1750, 1787; P3, 1717, 1797; and P4, 1768, 1857, 1860, 1877, 1887, 1897, 1900, 1910, and 1920. All intermediate years are interpolated.

Since buying and selling bullion outside the Spanish mint was forbidden, the Spanish market price of gold or silver is not available from the sixteenth to the nineteenth century.[15] Spanish revenues were in reales for 1703–1842 and pesetas for 1843–1913, with 1 peso equal to 20 reales or 5 pesetas. Revenues in reales were converted into revenues in pesos by dividing by 20 through 1842 and by 5 from 1843 onward. Revenues in pesos were then converted into revenues in pounds using the peso–pound exchange rate series from the GFD. Exchange rates were computed as yearly averages of closing prices taken from the last day of trading each month. Revenues in pounds were then converted into revenues in gold grams by dividing by the London market price of gold in pounds per fine troy ounce from Officer (2010). Revenues in gold troy ounces were then converted into revenues in gold grams by multiplying by 31.10.

E1 is Gastos Totales del Estado, 1801–42, and E2 is Obligaciones Totales del Estado Reconocidos y Liquidadas, 1845–1913, from Carreras and Tafunell (2006). The composite series of central government expenditures is E1, 1801–3, 1805–7, 1813–7, 1819–22, 1827–8, 1830–1, 1833–9, 1841–2; and E2, 1845, 1849–1913. The same conversion process into gold grams was used for expenditures as for revenues.

[14] Thanks to Carlos Álvarez Nogal for help with the Spanish revenue data.
[15] Thanks to Maria Del Pilar Nogués Marco for this information.

### *A.2.2. Group 2*

*Belgium*. Belgian data on 10-year government bonds are from the GFD. For 1832–44, the 5 percent bond is used; for 1845–58, the 4.5 percent bond; and for 1859–1913, the 3 percent bond. For 1832–84, monthly data are used to compute yearly averages; for 1885–98, biweekly data; and for 1889–1913, monthly data. Yields are for bonds traded in Brussels.

R1 is central government revenue, 1831–1912, from IHS. Data are not available for 1913. The composite series of central government revenues is R1, 1831–1912.

P1 is the population of Belgium from IHS. The composite population series is P1, 1816, 1831, 1846, 1856, 1866, 1880, 1890, 1910, and 1920. All intermediate years are interpolated.

Belgium adopted the French monetary system during French revolutionary and Napoleonic times (1789–1815) with one Belgian franc equal to one French franc. The Paris market price of gold in francs per gram from Jean-Laurent Rosenthal was thus used.

E1 is central government expenditure, 1831–1912, from IHS. Data are not available for 1913. The composite series of central government expenditures is E1, 1831–1912. The same conversion process into gold grams was used for expenditures as for revenues.

*Denmark*. Danish data on 10-year government bonds are from the GFD. For 1821–5 and 1852–8, the 5s bond is used; for 1825–52, the 3s bond; and for 1864–94 the consolidated 4s bond. The consolidated 4s bond was converted into 3.5 percent consols in 1895, which are used through 1913. Data are not available for 1859–63. Monthly data are used to compute yearly averages for 1821–1913. Yields are for bonds traded in London.

R1 is central government revenue, 1853–1913, from IHS. These data include the Duchies of Schleswig, Holstein, and Lauenburg for 1853–64. The composite series of central government revenues is R1, 1853–1913.

P1 is the population of Denmark from IHS. These data include the Duchies of Schleswig, Holstein, and Lauenburg for 1853–64. The composite population series is P1, 1769, 1787, 1801, 1834, 1840, 1845, 1850, 1855, 1860, 1870, 1880, 1890, 1901, 1906, 1911, and 1916. All intermediate years are interpolated.

Revenues in kroner were converted into revenues in U.S. dollars by multiplying by the exchange rate from the GFD. This series began in 1864. Exchange rates were computed as yearly averages of closing prices taken from the last day of trading each month. Revenues in dollars were

then converted into gold troy ounces by dividing by the New York market price of gold from Officer (2010). Revenues in gold troy ounces were then converted into revenues in gold grams by multiplying by 31.10.[16]

E1 is central government expenditure, 1854–1913, from IHS. Figures include the Duchies of Schleswig, Holstein, and Lauenburg for 1854–65. The composite series of central government expenditures is E1, 1854–1913. The same conversion process into gold grams was used for expenditures as for revenues.

*Italy*. Italian data on long-term government bonds are from the GFD. The average maturity was six years. For 1862–99, the consolidated 5 percent bond is used; for 1900–13, the 3.5 percent consol bond. Monthly data are used to compute yearly averages for 1862–1913. Yields are for bonds traded in London.

R1 is central government revenue, 1862–83 and 1886–1913, from IHS. The composite series of central government revenues is R1, 1862–1913. Years 1884–5 are interpolated.

P1 is the population of Italy from IHS. The composite population series is P1, 1861, 1871, 1881, 1901, 1911, and 1921. All intermediate years are interpolated.

The lira was adopted as the monetary unit of the Kingdom of Italy in 1862 with 1 lira equal to 1 French franc. The Paris market price of gold in francs per gram from Jean-Laurent Rosenthal was thus used.

E1 is central government expenditure, 1862–83 and 1886–1913, from IHS. Data are not available for 1884–5. The composite series of central government expenditures is E1, 1862–83 and 1886–1913. The same conversion process into gold grams was used for expenditures as for revenues.

*Portugal*. Portuguese data on 10-year government bonds are from the GFD. For 1823–95 and 1903–13, the 3 percent bond is used; for 1896–1902, the 1 percent bond. Data are not available for 1903. Monthly data are used to compute yearly averages for 1823–1913. Yields are for bonds traded in London.

R1 is government revenue, 1762–1913, from Cardoso and Lains (2010b). The composite series of government revenues is R1, 1762–76, 1797–1804, 1812, 1817, 1821, 1827–8, 1834–45, 1847, and 1852–1913.[17] All intermediate years are interpolated.

[16] The conversion from kroner into gold grams was updated from Dincecco (2009a).

[17] Due to new evidence published by Cardoso and Lains (2010a), the time series for Portuguese revenues and expenditures was updated from Dincecco (2009a).

P1 is the population of Portugal from IHS. The composite population series is P1, 1768, 1801, 1821, 1835, 1838, 1841, 1854, 1858, 1861, 1864, 1878, 1890, 1900, 1911, and 1920. All intermediate years are interpolated. The Azores and Maderia are included from 1841 onward.

Revenues in contos were converted into revenues in milreis by multiplying by 1,000. Revenues in milreis were then converted into revenues in pounds by dividing by the exchange rate from the GFD. Yearly averages of monthly exchange rates were used. Revenues in pounds were then converted into revenues in gold troy ounces by dividing by the London market price of gold from Officer (2010). Revenues in gold troy ounces were then converted into revenues in gold grams by multiplying by 31.10.

E1 is government expenditure, 1762–1913, from Cardoso and Lains (2010b). The composite series of government expenditures is E1, 1762–76, 1800–2, 1812, 1817, 1821, 1827–8, 1834–45, 1847, and 1852–1913. The same conversion process into gold grams was used for expenditures as for revenues.

*Sweden*. Swedish data on 10-year government bonds are from the GFD. For 1868–78, the 5s bond is used; for 1878–94, the 4s bond; and for 1894–1913, the 3s bond. Monthly data are used to compute yearly averages for 1868–1913. Yields are for bonds traded in London.

R1 is ordinary and extraordinary state revenue, 1722–1911, from Fregert and Gustafsson (2008). R2 is central government revenue, 1912–3, from IHS. The composite series of central government revenues is R1, 1722–1911, and R2, 1912–3.[18]

P1 is the population of Sweden from IHS. The composite population series is P1, 1750, 1760, 1770, 1775, 1780, 1785, 1790, 1795, 1800, 1805, 1810, 1815, 1820, 1825, 1830, 1835, 1840, 1845, 1850, 1855, 1860, 1870, 1880, 1890, 1900, 1910, and 1915. All intermediate years are interpolated.

Revenues in kronor were converted into revenues in guilders by multiplying by the exchange rate from the GFD. This series began in 1740. Exchange rates were computed as yearly averages of closing prices taken from the last day of trading each month. Revenues in guilders were then converted into gold grams by dividing by the Dutch market price of gold in guilders per gram from W. L. Korthals Altes. The years 1749 and 1759, which were missing, are interpolated.[19]

[18] Due to the discovery of the evidence published by Fregert and Gustafsson (2008), the time series for Swedish revenues and expenditures were updated from Dincecco (2009a).

[19] The conversion from kronor into gold grams was updated from Dincecco (2009a).

E1 is ordinary and extraordinary state expenditure, 1722–1911, from Fregert and Gustafsson (2008). E2 is central government expenditure, 1912–3, from IHS. The composite series of central government expenditures is E1, 1722–1911, and E2, 1912–3. The same conversion process into gold grams was used for expenditures as for revenues.

### A.3. Descriptions of Control Variables

For further details, see Chapter 7.

*War Deaths*. Average military deaths per conflict year sustained by participant countries (in hundreds of thousands). All external conflicts fought in Western and Eastern Europe that involved at least one sample country according to Clodfelter (2002) were included. Clodfelter's dates for the durations of wars were used. However, formal peace treaties were not signed until years after ceasefires in some cases. The term "casualty" refers to all persons lost to active military service, including those killed in action or by disease, disabled by physical or mental injuries, captured, deserted, or missing. Due to data limitations, Clodfelter's data sometimes refer to soldiers killed or wounded in battle and deaths by disease, and not to casualties per se. Total military deaths were used in such cases. If those data were not available, then deaths from major land and sea battles and major sieges were summed. Death totals were then divided by conflict lengths to determine average military deaths per year. Non-overlapping average deaths per conflict were summed for each year that a sample country was involved in two or more wars. Sources: Clodfelter (2002) and Dincecco (2009a, app. 3).

*Enemy Coalition Size*. Sums of (available) total populations for coalition countries in the year that conflicts began (in tens of millions). Non-overlapping opposition coalition totals were summed for each year that a sample country was involved in two or more conflicts. Sources: Clodfelter (2002), Dincecco (2009a, app. 3), and Appendix 2.

*Mercenary Dummy*. Equal to 1 for each year that a country fought as part of an alliance with England, the Dutch Republic, or France. Sources: Clodfelter (2002) and Dincecco (2010a).

*Default Dummy*. Equal to 1 for each year that a national government partially or fully defaulted on its public debt. Sources: Reinhart et al. (2003, table 2), supplemented by Ferguson and Shularick (2006) for Belgium, Denmark, and Sweden; by Jones (1994, p. 94) for England; by Sargent and Velde (1995, p. 480) for France; by Federico (2010) for Italy; and by Fritschy and van der Voort (1997, p. 65) for the Netherlands.

*Internal Conflict Dummy*. Equal to 1 for each year of civil war, coup, and revolution. Insurrections, massacres, riots, and uprisings were typically excluded. Sources: Clodfelter (2002) and the *Encyclopedia Britannica* (2010).

*Urbanization Rate*. Annual shares of urban populations in total populations. Data are for 1650, 1700, 1750, 1850, 1890, and 1980, and are for cities with minimum populations of 10,000 through 1850, 20,000 in 1890, and 100,000 inhabitants in 1980. All intermediate years are interpolated. The data for Austria include Bohemia. Due to data limitations, figures for Germany were used for Prussia, and figures for Scandinavia were used for Denmark and Sweden. Sources: De Vries (1984, app. 3 and table 4.8) and Appendix A.2.

*Country Dummy*. Equal to 1 for each sample country.

*Old Regime Dummy*. Equal to 1 for each year before the fall of the Old Regime in 1789.

*Gold Standard Dummy*. Equal to 1 for each year that a country adhered to the gold standard, starting the year in which a currency became de facto and de jure convertible into gold. Sources: Meissner (2005, table 1), supplemented by Officer (2001) for England.

*Average Credit Risk*. Average annual yield spread using available data for all sample countries over the "safe" British consol.

*Change in Gold Stock*. Yearly change in the cumulative world stock of gold in millions of troy ounces. Source: Velde and Weber (2000).

*Railway Nationalization Dummy*. Equal to 1 for each year that a major nationalization of railways took place. Source: Bogart (2009, table 1).

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