Warfare, Fiscal Capacity, and Performance: An Empirical Investigation*

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Abstract

We exploit differences in historical war casualties to estimate the impact of fiscal capacity on economic performance. In the past, states fought different amounts of external conflicts, of various lengths and magnitudes. To raise the revenues to wage wars, states made fiscal innovations, which persisted and helped to shape current fiscal institutions. Using historical war casualties to instrument for current fiscal institutions, we estimate substantial impacts of fiscal capacity on GDP per worker.

Keywords: historical wars, fiscal capacity, worker productivity.
JEL codes: C20, H10, O10, N40.

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1 Introduction

A large body of work places institutions that secure individual property rights at the forefront of economic development.[1] This view suggests that parliamentary limits on executives reduce tax predation and encourage private investment. The focus on "strong" states, however, discounts the positive economic role that government may play. A more recent literature examines fiscal capacity, defined as the ability of states to raise tax revenues.[2] Non-state elites in less developed countries may resist fiscal control by central governments, leading states to underinvest in public goods that improve worker productivity.[3]

This "weak" state view receives support from the existing evidence. Political scientists find a close relationship between small capacity and lack of development in Africa, where traditional groups (bosses, chiefs, clan leaders, landlords, rich peasants) have consistently opposed tax reforms. In contrast, the successful development experiences of Asian Tiger nations took place under strong fiscal states.[4]

Nevertheless, we lack systematic estimates of the effect of fiscal capacity on economic performance. It is likely that wealthy economies choose or at least have the ability to choose strong fiscal systems. Economies that are different for a variety of reasons, moreover, may differ in terms of fiscal institutions and worker productivity.

To estimate the impact of fiscal capacity on performance, we need a source of exogenous variation in fiscal institutions. In this paper, we present a theory of fiscal differences among countries based on historical wars, and use this theory to derive a possible source of exogenous variation. We base our theory on the following three premises. First, states fought different amounts of external wars, of various lengths and magnitudes. Second, to raise the revenues to wage wars, states made fiscal innovations. Third, the impact of past innovations on fiscal systems persisted to the present.

[1] For theory, see Brennan and Buchanan (1980), North (1981), and Levi (1988). For empirics, see De Long and Shleifer (1993), Knack and Keefer (1995), and Acemoglu *et al.* (2001, 2002, 2005).

[2] See Acemoglu *et al.* (2004, 2010), Acemoglu (2005), and Besley and Persson (2009a,b, 2010).

[3] For instance, Lindert (2004, 2009) claims that mass formal education is a major determinant of long-run growth.

[4] See Migdal (1988), Wade (1990), Herbst (2000), and Bates (2001).

Given these premises, we use measures of historical conflicts as instruments for current fiscal systems. The following schema summarizes our theory:

Past wars ⇒ Past innovations ⇒ Current fiscal capacity ⇒ Current performance.

We compile a new database on total casualties for all major external conflicts from 1816 to 1913 in Western and Eastern Europe, North and Sub-Saharan Africa, the Middle East and Central Asia, the British Indian Empire, East and Southeast Asia and Oceania, the United States and Canada, the Caribbean, and South America from the statistical reference of Clodfelter (2002). This work is the most comprehensive source of historical data on armed conflicts that we know of. For robustness, we construct another set of instruments for the number of total battle-related deaths in major historical conflicts over this period from the Correlates of War database of Sarkees (2000). As a further check, we compile an alternative database from Clodfelter (2002) that covers all major external conflicts from 1700 to 1788.

There is a strong positive relationship between current GDP per worker and past war casualties for our sample of 96 countries: states which fought more conflicts in the past are nearly 130 percent more productive today than states which fought less. We argue that this relationship reflects the effect of historical fiscal innovations on current institutions. We test our claim by regressing current economic performance on current fiscal capacity, where we instrument for the latter by past military casualties. Our key measure of fiscal capacity is the share of total tax revenues from direct taxes (i.e., income, social security, payroll, and property taxes). There is a strong first-stage relationship between historical wars and current fiscal systems: countries that experienced greater war casualties in the past have fiscal capacities that are roughly 15 percentage points higher than countries that experienced fewer casualties.[5] Our two-stage least-squares estimates of the impact of fiscal institutions on performance are statistically significant and substantial. They imply, for instance, that raising Chad's fiscal capacity to the level of South Korea would double Chad's worker productivity.

The exclusion restriction that our instrumental variable regressions rely upon is that, conditional on the included controls, casualties sustained in historical conflicts have no effect on current economic performance, other than their impact on fiscal systems. We believe that this is likely to be the case, and that our exclusion restriction is

[5]Clearly, other factors also influence fiscal institutions. All that is required for our empirical strategy to be valid is that historical war casualties are *a source* of exogenous variation.

plausible. The cut-off year for our instruments, 1913, is before World War I (1914-8), the first "modern" conflict. This cut-off is also well before the post-1945 boom in social spending, which established far-reaching government bureaucracies. Military expenditures, in fact, dominated state budgets through the start of the twentieth century; there was little spending on social programs of any kind. The participation of women in the work force, moreover, was also a post-1913 phenomenon.[6]

If other factors correlated with the estimates of past war casualties affect current performance, then the validity of our exclusion restriction is called into question. To show that omitted factors do not drive our findings, we adopt two strategies. The first is to test whether fiscal institutions have comparable effects on performance once we control for a set of factors that may be correlated with past war casualties and economic outcomes. The results are robust to the inclusion of such variables, which include measures of geography, democracy, legal origin, religion, ethnolinguistic fractionalization, and government size.

We cannot control for all of the potential factors that may be correlated with past war casualties and income per worker. Our investigation may also capture the effect of historical conflicts on performance through channels beyond fiscal institutions. To address such problems, we use overidentification tests that include measures of historical democracy, fiscal institutions just prior to World War II (1939-45), and historical internal conflicts as additional instruments. The overidentification tests may then detect whether past war casualties directly impact economic outcomes. The findings, which show no evidence for a direct effect, reinforce the validity of our approach.

Our paper is related to the historical literature on state formation and long-run growth, including Kindleberger (1984), Brewer (1989), Tilly (1990), Hoffman and Rosenthal (1997a,b), Epstein (2000), O'Brien (2005), and Dincecco (2009). While standard theory assumes that governments are "born" with sufficient tax authority, economic historians study the evolution of fiscal capacity over time. Warfare, which encouraged fiscal innovations by states in order to raise greater revenues, plays a central role in such accounts. This literature, however, does not systematically test the links between past conflicts and current performance.

In that respect, the closest antecedents to our work are the recent set of papers by Besley and Persson (2009a,b, 2010), which study the relationships between conflict, state capacity, and growth over time. Though these authors perform preliminary

[6]For World War I, see Willmott (2003). For historical growth in government size, see Lindert (2004).

data tests, the literature still lacks a systematic analysis that examines the empirical relationships between wars, fiscal capacity, and productivity.

Finally, our paper is related to a number of works that examine the linkages between historical factors and development, including Diamond (1997), Engerman and Sokoloff (1997), La Porta *et al.* (1998), Hall and Jones (1999), Acemoglu *et al.* (2001, 2002, 2005), and Nunn (2008).[7] None of these studies, however, focus on fiscal capacity.

The rest of the paper proceeds as follows. The next section describes our hypothesis and provides historical evidence. Section 3 presents OLS regressions of GDP per worker on our fiscal capacity measures. Section 4 describes our main instruments for fiscal capacity, past war casualties. Section 5 presents the 2SLS results. Section 6 investigates the robustness of our findings, and Section 7 concludes.

2 Historical Background

We hypothesize that past wars promoted fiscal innovations which persisted and helped to shape current fiscal institutions. In this section, we substantiate our hypothesis. The next subsection describes the relationship between warfare and fiscal change, and the one that follows examines the causes of institutional persistence.

2.1 Warfare and Fiscal Change

The historical impact of external military conflicts on public finances was fundamental. Hoffman and Rosenthal (1997a) claim that the basic aim of early modern rulers was to wage war for royal glory and homeland defense. In the short run, the destruction caused by warfare may have had a negative effect on fiscal institutions. Over the long term, however, Kindleberger (1984), Tilly (1990), Hoffman and Rosenthal (1997b), Epstein (2000) and O'Brien (2005) argue that military competition promoted fiscal innovations that enabled states to raise larger tax amounts.

In Western Europe, the most widely studied region, fiscal change took place over centuries. Yet this process remained largely unfinished through the 1700s. Deep structural changes often occurred from 1789 onwards (Dincecco, 2009). Warfare was a key driver of institutional reform. To finance its campaigns against France, for instance, Britain introduced a modern income tax in 1799. Though it was repealed in 1802,

[7]Stylistically, our investigation hews closely to Acemoglu *et al.* (2001).

the tax was reintroduced the next year with the start of the Napoleonic Wars (1803-15). France also experimented with new taxes during this period, as did the Austrian Empire, the Netherlands, and Nordic states such as Denmark and Belgium (Aidt and Jensen, 2009). Overall, Dincecco (2009) finds strong relationships between the establishment of national tax systems around 1800 and increases in tax revenues.

A description of the implementation of the income tax during the nineteenth century further illustrates the links between warfare and public finances. Our account follows Clodfelter (2002) and Aidt and Jensen (2009). Denmark introduced temporary income taxation to finance its wars against Prussia in 1848-9 and 1864. During its successful war against Southern states (the Civil War, 1861-5), the U.S. government not only implemented a temporary income tax to fund military expenses, but also established the Internal Revenue Service for collection purposes. The Austrian Empire introduced a permanent income tax in 1849, at the time of the First War of Italian Independence (1848-9). Similarly, Italy implemented an income tax in 1864, just after it fought the Second War of Italian Independence (1859-61), and just before it fought the Austro-Prussian War (1866). Finally, Japan established the income tax in 1887, the same year that the Meiji government defeated the ex-samurai in the large-scale Satsuma Rebellion.

2.2 Institutional Persistence

There is a large literature that examines how economic and political institutions in history, ranging from the despotic empires in China, the Ottoman Empire, and Russia, to colonial structures in the New World, have shaped current institutional environments.[8] Once implemented, for instance, the income tax has generally become a fixed feature of the fiscal landscape.

There are several mechanisms that may lead to institutional persistence of this sort. We now describe two possibilities.[9] The first is that the establishment of strong fiscal institutions is costly. In Old Regime Europe, there was a close relationship between local tax authority and political autonomy. Hence, traditional economic groups (nobles, clergy, and residents of certain towns or regions) resisted state control. The implementation of national tax systems with uniform rates was often the result of "exogenous" shocks such as conquest by French Revolutionary or Napoleonic armies (Dincecco,

[8]See Wittfogel (1957), Engerman and Sokoloff (1997), La Porta *et al.* (1998), and Acemoglu *et al.* (2001).

[9]For further possibilities, see the discussions in Besley and Persson (2009a,b, 2010).

2009). When new executives inherit strong fiscal institutions, they may wish to exploit them for their own purposes, rather than cede authority to traditional elites. On the Italian Peninsula, for instance, Dincecco *et al.* (2010) show that restored rulers after 1815 retained the fiscal reforms first made by Napoleon, though they relinquished other ancient rights to local elites.

The second possibility is that, if states make irreversible investments that favor strong fiscal institutions, then they may be more willing to support them, leading to persistence. Hoffman and Rosenthal (1997b) claim that the transition to nascent parliaments took place after 1800 due to a major shift in the nature of warfare that increased the penalties for defeated rulers. For the first time, leaders who failed in battle also faced the risk of losing their thrones. In turn, rulers and elites struck power-sharing bargains, whereby rulers received greater funds to wage wars, and elites (who coordinated efforts through national representative bodies) were able to finance a larger portion of the public services that they valued. Once executives have access to greater military resources, they may prefer to employ them to the state's advantage.

3 Capacity and Performance: OLS Results

3.1 Descriptive Statistics

Table 1 displays the descriptive statistics for the main variables of interest. The Data Appendix provides further details about sources and construction methods. Our key measure of economic performance is output (GDP) per worker. There are large differences in performance across our set of 96 sample countries: output per worker in the most productive country is 47 times higher than that of the least productive one. As an alternative, we employ total factor productivity from Hall and Jones (1999). Since the formal labor force is difficult to assess, this variable is less precise than GDP per worker.

Our measures of fiscal capacity follow those used by Besley and Persson (2009b). The key variable, shown in row 2, is the share of direct taxes (i.e., income, social security, payroll, and property taxes) in total tax revenues from the Government Financial Statistics database of the IMF. We average the tax data over the 1990s, because data from the 2000s were not always available. Lindert (2004) argues that there are important similarities between the historical evolution of tax systems and current differences in tax regimes between rich and poor countries. The transition from tax systems char-

acterized by indirect taxes on trade and excises to those characterized by direct taxes, a shift that was completed in rich democracies by the early twentieth century, led to significant reductions in the costs of tax collection. Indeed, the ability of governments to tax the assets, earnings, and savings of wealthy citizens is a key feature of rich states with strong fiscal institutions today: the average share of direct taxes for G7 countries, 0.76, is nearly three times that of the seven least productive sample countries, 0.26.[10] Moreover, Lindert claims that, before making the transition to tax regimes characterized by direct taxes, many poor countries today must still make a prior shift, from tax systems dominated by arbitrary and narrow taxation to those characterized by stable and broad indirect taxes.

Rows 4 and 5 report two alternative measures of fiscal capacity. One minus the share of trade taxes in total tax revenues is a less precise measure of our key variable, while the ratio of total tax revenues to GDP is a catch-all measure of fiscal capacity.

3.2 OLS Regressions

Table 2 presents ordinary least-squares (OLS) regressions of log output per worker against fiscal capacity for various specifications. The linear regressions are for the equation:

$$\log(Y_i/L_i) = \alpha + \beta F_i + \boldsymbol{\gamma}'\mathbf{X_i} + \epsilon_i, \tag{1}$$

where Y_i/L_i is output per worker in country i, F_i is fiscal capacity, $\mathbf{X_i}$ is a set of controls, and ϵ_i is a random error term. Throughout our investigation, the coefficient of interest is β, the effect of fiscal capacity on output per worker.

Column 1 indicates that there is a significant positive correlation between direct tax shares, our key measure of fiscal capacity, and GDP per worker. Figure 1 depicts this relationship graphically. To provide a sense of the magnitude of the impact of fiscal capacity on performance, we compare Chad, which falls in roughly the 25th percentile of the direct tax share measure, 0.30, with South Korea, which falls in roughly the 50th percentile, 0.46. The column 1 estimate, 4.05, indicates that GDP per worker for South Korea should be nearly twice as large as that for Chad. In reality, this output gap is roughly 14-fold, which means that, if the impact estimated in Table 2 was causal, then

[10] We average direct tax shares over the 1990s. The G7 countries are Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. The seven least productive are Bhutan, Burundi, Chad, the Democratic Republic of the Congo, Madagascar, Myanmar, and Rwanda.

the effect of fiscal capacity on productivity would be substantial, but still notably less than the actual Chad-South Korean output difference.[11]

Climate is often thought to directly affect productivity. Distance from the equator also proxies for different patterns of Western colonialization.[12] To control for such factors, we include latitude as a regressor in column 2. The coefficient on fiscal capacity falls, but only slightly. Latitude is also significant, though less so, and has the positive sign suggested by past work. To capture geographic factors beyond climate, column 3 adds continental dummies for Africa, Asia, and Latin America. Since theory predicts that political inclusiveness influences government size (and hence fiscal capacity), column 4 includes a measure of democracy (Persson and Tabellini, 2000). The findings are similar in both cases. Column 5, which restricts our sample to non-OECD countries, indicates that that rich countries do not drive the results. Lastly, columns 6 and 7 repeat our baseline regressions using one minus the share of trade taxes in total taxes and the ratio of total taxes to GDP as alternative measures of fiscal capacity, and column 8 replaces our dependent variable, GDP per worker, with the TFP measure from Hall and Jones (1999). In each case, the correlation between fiscal capacity and economic performance remains positive and highly significant.

In total, the Table 2 findings display a strong correlation between our measures of fiscal capacity and worker productivity. There are two key reasons, however, why we should not interpret this relationship as causal. First, there is a problem of reverse casuality: wealthy economies may choose, or at least may afford, stronger fiscal systems. Second, there are arguably many omitted factors that affect both fiscal institutions and economic performance. We would expect these problems to positively bias the OLS estimates. On the other hand, if our capacity measures are noisy, and do not correspond well with the greater cluster of economic and political institutions that influence productivity in practice, then there may be a negative attenuation bias to the OLS estimates. To address such problems, we need a valid instrument for fiscal capacity. Our instrument must account in an important way for the observed variation in fiscal institutions, but have no direct impact on productivity. As described in Section 2, we believe that casualties sustained in pre-modern wars are plausible instruments.

[11] Naturally, a variety of factors beyond fiscal capacity also influence performance.

[12] See Diamond (1997), Engerman and Sokoloff (1997), Hall and Jones (1999), and Acemoglu *et al.* (2001).

4 Past War Casualties

Our data on past war casualties are from Clodfelter (2002), whose statistical compendium is the most comprehensive historical data source for armed conflicts that we know of. We computed the number of total casualties sustained by state armed forces in major external conflicts listed as wars, wars of independence, conquests, and campaigns from 1816 to 1913 for each sample country. 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. Data limitations mean that our figures may refer to soldiers killed or wounded in battle as well as deaths by disease rather than to casualties per se. In those cases, we employed total military deaths. When such tolls were not provided, deaths from major land and sea battles as well as major sieges were summed to compute totals. In some cases, we accounted for modern states by way of historical predecessors. The Data Appendix provides the details. To account for country size, we scaled the war casualty figures by square kilometers of territory. Since historical data on physical size were not available, we used current estimates. As an alternative, we also tested the raw casualty figures.

For robustness, we constructed another set of instruments for the number of total battle-related deaths sustained by state armed forces in major external conflicts from 1816 to 1913 from the Correlates of War (COW) database of Sarkees (2000). This data source is our second choice because its historical coverage skews heavily towards Western Europe. Once more, we scaled the COW figures by square kilometers of territory to account for country size, in addition to testing the raw death figures.

As a further check, we compiled an alternative database from Clodfelter (2002) that covers all major external conflicts from 1700 to 1788, the year prior to the French Revolution, which marked the end of the Ancien Régime. Since it concerns an earlier period, the use of this database improves the plausibility of our instrumental variables approach. Clodfelter's coverage of the eighteenth century, however, is less expansive. While he documents external conflicts for 10 geographical designations from 1816 to 1913, there are only six such designations for the 1700s.[13]

Table 3 displays the summary statistics for the historical war data. External conflicts led to an average of 0.10 total casualties per square kilometer of territory from 1816 to 1913 (standard deviation 0.26). Bulgaria experienced the most (scaled) casu-

[13] Among the missing are North and Sub-Saharan Africa.

alties over this period, at 1.51 per square kilometer. According to the COW database, which measures total battle-related deaths, the 1816-1913 average was lower, at 0.06 military deaths per square kilometer (standard devation 0.18). Here, Slovenia experienced the most (scaled) casualties, at 1.06 per square kilometer. Relatively more wars were fought during the eighteenth century. External conflicts led to an average of 0.20 total casualties per square kilometer of territory (standard deviation 0.54) from 1700 to 1788. The Netherlands experienced the most (scaled) casualties, at 3.36 per square kilometer, over this era.

5 Capacity and Performance: IV Results

Table 4 shows the results of the two-stage least-squares (2SLS) estimates of equation 1. We treat the fiscal capacity variable, F_i, as endogenous, and model the equation:

$$F_i = \lambda + \zeta W_i + \boldsymbol{\delta}' \mathbf{X_i} + \nu_i, \tag{2}$$

where W_i is past war casualties per square kilometer of territory. The exclusion restriction is that W_i does not appear in equation 1.

Panel A presents the 2SLS estimates for β, our coefficient of interest from equation 1, and Panel B displays the corresponding first stages. Column 1 shows the strong first-stage relationship between past war casualties and current fiscal institutions. The corresponding 2SLS estimate of the effect of fiscal capacity on GDP per worker is 4.96. This impact is significant at the 1 percent level. It is also larger than the OLS estimates from Table 2, which suggests that the negative attenuation bias may be more important than the positive biases from reverse casualty and omitted variables. It is difficult to disentangle the cluster of economic and political institutions that influence productivity in practice, and any one measure will only capture part of the total effect of the grouping of institutions that matter. It thus appears that the noisiness of our fiscal capacity variable generates a typical problem of measurement error. Moreover, though fiscal institutions in the past also influence current performance, our fiscal capacity measures for the 1990s will not be perfectly correlated with them.

To see whether the magnitude of our 2SLS estimate makes sense, we revisit our comparison of two countries with low and medium fiscal capacities, Chad and South Korea. The 2SLS estimate, 4.96, indicates that there should be a 123 percentage point gap in GDP per worker between the two countries. Since some of the difference may

be due to measurement error, we interpret this gap as an upper bound. Overall, the Table 4 estimates suggest a large, but not implausibly so, impact of fiscal capacity on productivity.

Column 2 shows that including latitude does not alter this relationship. As for Table 2, the coefficient on fiscal capacity falls, but only slightly. Latitude is no longer significant, which suggests that it is correlated with fiscal (as well as other economic and political) institutions. Column 3 adds the continental dummies (Africa, Asia, and Latin America), and column 4 controls for political inclusiveness. Column 5 restricts our sample to non-OECD countries. Columns 6 and 7 repeat our baseline specification for our alternative measures of fiscal capacity (one minus the share of trade taxes in total taxes, the ratio of total taxes to GDP), and column 8 does so for our alternative measure of performance (TFP). The results for each of these specifications resemble our baseline case.

Table 5 employs our alternative instruments for the impact of past wars. Column 1 replaces the scaled Clodfelter casualty data with the unscaled figures. The findings are similar. Columns 2 and 3 use the (scaled and unscaled) battle-related death figures from the COW database. Here the β coefficient rises, possibly due to the COW database's skewed coverage of historical conflicts towards Western Europe. Columns 4 and 5 exploit the (scaled and unscaled) Clodfelter casualty data from 1700 to 1788. The coefficient values for fiscal capacity again resemble our baseline case.

In total, the 2SLS results indicate a substantial impact of fiscal institutions on income per worker. The remainder of the paper examines the robustness of these findings.

6 Robustness

6.1 Additional Controls

Whether the 2SLS findings in Tables 4 and 5 are valid depends on the assumption that casualties sustained in pre-modern wars have no direct impact on current worker productivity. Though, for the reasons described in previous sections, we believe that this assumption is plausible, we now test it further by controlling for other possible variables that may be correlated with both past wars and economic outcomes, and checking whether the inclusion of such variables impacts our estimates. In total, we find that the results are very similar with the addition of the new controls.

La Porta *et al.* (1998) emphasize the importance of legal origins as a determinant of current institutional environments. Column 1 of Table 6 controls for English, German, Scandinavian, and Socialist legal origins, where the default group consists of countries with French legal origins (Table 1 displays the descriptive statistics for the additional controls). The significance of our 2SLS estimate of the impact of fiscal capacity on GDP per capita is unchanged.

Many theories, including Max Weber's "Protestant Ethic," claim that religion is an important economic determinant. Column 2 includes the population shares of Catholics and Protestants. In column 3, we control for ethnic and linguistic fractionalization, which we treat as exogenous. Column 4 adds the legal origin, religious, and fragmentation controls simultaneously. In each case, our main estimate remains highly significant. Columns 5 to 7 repeat the regression from column 4 for our alternative measures of fiscal capacity (one minus the share of trade taxes in total taxes, the ratio of total taxes to GDP) and performance (TFP). Once more, there is little effect on our key estimate.

Lastly, column 8 controls for government size, which we treat as endogenous. We follow Rodrik (1998) and use distance and population as additional IVs. To instrument for government size as well as for fiscal capacity, we estimate a first stage for government size. We then use the fitted values from this regression as an additional control for our 2SLS estimation. Our main estimate remains unaffected.

6.2 Overidentification Tests

We also employ overidentification tests to examine the validity of our approach, using measures of historical democracy from 1816 to 1913 from the Polity IV database of Jaggers and Marshall (2008), fiscal capacity just prior to World War II from Mitchell (2003a,b,c), and casualties sustained in major historical internal conflicts from 1816 to 1913 from Clodfelter (2002) as additional instruments. Table 3 displays the summary statistics for these variables. The Data Appendix provides further details about sources and construction methods. There is reason to think that past political inclusiveness influenced current fiscal capacity through its effect on government size (Besley and Persson, 2009b). While the pre-World War I period that we consider captures the shift from non-democracy to elite democracy, franchise extension to middle- and lower-class citizens generally took place from 1913 onwards (Lindert, 2004). We also compute a measure of fiscal capacity in 1938, just before the onset of World War II and

the post-1945 boom in social spending that established far-reaching government bureaucracies. We use one minus the share of total tax revenues from trade taxes, rather than direct tax shares, because this variable was available for the largest set of sample countries. Lastly, we construct a measure of past internal conflicts from 1816 to 1913. In contrast to past external conflicts, which we argue had a positive long-run effect on fiscal capacity, we hypothesize that historical internal conflicts had a destructive net impact on fiscal infrastructure, whose effect on fiscal systems persisted to the present.

The overidentification tests assume that one of our instruments is truly exogenous, and tests for the exogeneity of the others. This method is useful because it directly tests the exclusion restriction. The overidentification tests, however, may not reject instruments that are invalid but closely correlated to each other. We thus interpret our results cautiously.

There are three possible reasons why the overidentification tests may reject the validity of our instruments. The first is if the equation of interest does not have a constant coefficient (i.e., $\log(Y_i/L_i) = \alpha + \beta_i F_i + \epsilon_i$, where i is country). The second is if our additional instruments directly impact GDP per worker. The third is if our main instrument, past external conflicts, affects economic performance through a different channel such as culture.

Since the results of the overidentification tests support our strategy, we are able to count out the three possibilities listed above, subject to the problems of low power that such tests typically display. Hence, these findings lend greater credence that our main instrument, past external conflicts, is valid, and that our 2SLS approach is estimating the impact of fiscal institutions on worker productivity, rather than capturing the impact of omitted variables.

Table 7 presents the results of the overidentification tests. Panel A displays the 2SLS estimates of the impact of fiscal capacity on income per capita, and Panel B gives the corresponding first stages. The coefficient values for β are very similar to those described in Table 4. In column 1, for instance, we use historical democracy as our instrument for fiscal capacity. The estimated impact is 5.32, with standard error 1.54, as compared with our baseline estimate of 4.96. Column 2 adds our measure of fiscal institutions prior to World War II, and column 3 adds casualties from historical internal conflicts.

Panel A also reports an easy-to-interpret version of the overidentification tests which includes historical war casualties as an exogenous regressor. If past war casualties

had a direct impact on GDP per worker, then this variable should be positive and significant. In each case, however, it is small and statistically insignificant. In column 1, for instance, the coefficient on historical war casualties is -0.19, with standard error 0.25. These findings reinforce our claim that fiscal institutions are the likely channel through which past war casualties influence current economic performance.

7 Conclusion

A recent literature argues that fiscal capacity plays an important role in economic development. Problems of reverse causation and omitted variables, however, make it difficult to isolate exogenous sources of variation in fiscal institutions in order to estimate their impact on worker productivity. In this paper, we argued that differences in historical wars could be a source of exogenous variation in fiscal capacities.

We base our argument on the following premises. First, states fought different amounts of external wars, of various lengths and magnitudes. Second, to raise the revenues to wage wars, states made fiscal innovations. Third, the impact of past innovations on fiscal systems persisted to the present. Since past wars impact current fiscal institutions, we exploit these differences as a source of exogenous variation to isolate the impact of fiscal capacity on worker productivity.

Our empirical analysis indicates that there is a strong positive correlation between historical war casualties and current fiscal institutions. We estimate substantial effects of fiscal capacity on GDP per worker using this source of variation. We also show that our findings are robust to controls for geography, democracy, legal origin, religion, ethnolinguistic fractionalization, and government size.

Since casualties sustained in pre-modern wars are arguably exogenous, they make for useful instruments to estimate the impact of fiscal capacity on worker productivity. However, the results do not suggest that current fiscal institutions are predestined by past conflicts and cannot be changed. Our interpretation of the findings is that improvements in fiscal capacity may lead to large economic returns, such as the experiences of the Asian Tiger nations from the 1960s onwards.

Our results suggest that strengthening fiscal institutions would lead to substantial gains in worker productivity, but they do not indicate the precise mechanisms by which such improvements would occur. An investigation of the ways in which public goods (e.g., primary education) impact GDP per worker is a key area for future research.

Data Appendix

Log GDP per Worker: The natural logarithm of real gross domestic product per worker in constant dollars (chain index) expressed in international prices, base year 2000. We average this variable from 1990 to 2000. We dropped countries with populations of 500,000 or less from our sample. Source: Penn World Tables of Heston *et al.* (2006), Version 6.2.

TFP: Total factor productivity relative to that of the United States in 1988. Source: Hall and Jones (1999).

Share of Direct Taxes: The share of total tax revenues from direct taxes, where direct taxes are the sum of income taxes, social security taxes, payroll taxes, and property taxes divided by total tax revenues. We average this variable from 1990 to 2000. Source: Government Financial Statistics database of the IMF.

One Minus Share of Trade Taxes: One minus the share of total tax revenues from trade taxes. We average this variable from 1990 to 2000. Source: Government Financial Statistics database of the IMF.

Total Taxes to GDP: Total tax revenues divided by GDP in current prices. We average this variable from 1990 to 2000. Source: Government Financial Statistics database of the IMF.

Latitude: The distance from the equator, ranging from negative 90 degrees to positive 90 degrees. Source: CIA World Factbook (2009).

Continental and OECD Indicators: The dummy for Africa equals one for sample countries located in Africa. The dummy for Asia equals one for sample countries located in East and Southeast Asia (Japan is counted as an OECD country). The dummy for Latin America equals one for sample countries located in Latin America (i.e., Central and South America plus Mexico). The dummy for the OECD equals one for sample countries that were OECD members prior to 1993 (Turkey is not counted as an OECD country). Source: CIA World Factbook (2009).

Democracy: A country is democratic so long as the variable *polity2* has a strictly positive value. We average this variable from 1990 to 2000. Source: Polity IV Database of Jaggers and Marshall (2008).

Casualties from Historical External Wars: Our main variable for external conflicts is the number of total casualties in millions sustained by state armed forces in major external conflicts listed as wars, wars of independence, conquests, and campaigns from

1816 to 1913. 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. Data limitations mean that our figures may refer to soldiers killed or wounded in battle as well as deaths by disease rather than to casualties per se. In those cases, we employed total military deaths. When such tolls were not provided, deaths from major land and sea battles as well as major sieges were summed to compute totals. In some cases, we accounted for modern states by way of external conflicts fought by historical predecessors, based on the summary descriptions from Clodfelter (2002). For Europe, pre-unitary German (e.g., the Kingdom of Prussia) and Italian (e.g., the Kingdom of Sardinia-Piedmont) states were counted for Germany and Italy, respectively. We counted the Austrian (and later, the Austro-Hungarian) Empire for its member states.[14] For Africa, we counted the Dahomey Kingdom for Benin, the Belgian Congo for the Democratic Republic of the Congo, the Boer Colony and the Zulu Empire for South Africa, and the Ndebele Kingdom for Zimbabwe. For the Middle East and Central Asia, we counted Persia for Iran. For the British Indian Empire, we counted the Maratha Empire for India. Sepoys were Indian soldiers that served in the British armed forces. Hence, they were counted for the United Kingdom. In general, casualty figures for native soldiers in the armed forces of European colonists were counted for the European state for which they served. For East and Southeast Asia and Oceania, we counted Ceylon for Sri Lanka, Burma for Myanmar, Bali, Java, and Sumatra for Indonesia, and Siam for Thailand. For North America, we counted U.S. territories (e.g., Texas) that later became U.S. states for the United States. To account for country size, we scaled this variable by area in millions of square kilometers. Source: Clodfelter (2002).

The first alternative variable for external conflicts computes the number of total battle-related deaths in millions sustained by state armed forces in inter-state or extra-state wars from 1816 to 1913. Once more, pre-unitary German and Italian states were counted for Germany and Italy, and the Austrian Empire was counted for its member states. To account for country size, we scaled this variable by area in millions of square kilometers. Source: Correlates of War Database of Sarkees (2000), Version 3.0.

The second alternative resembles the main variable for external conflicts, except

[14]These were Austria, Belarus, Bosnia and Herzegovina, Croatia, the Czech Republic, Hungary, Italy, Poland, Romania, Serbia, the Slovak Republic, Slovenia, and Ukraine. Counting the casualty totals exclusively for Austria, or splitting them evenly with Hungary, the other modern state most closely associated with the Empire, did not alter the main results of the 2SLS regressions in any significant way.

that it covers the period from 1700 to 1788. Based on the summary description from Clodfelter (2002), we counted the Jesuit Reductions for Paraguay. To account for country size, we scaled this variable by area in square kilometers. Source: Clodfelter (2002).

Area: Physical size measured in millions of square kilometers. Source: CIA World Factbook (2009).

Legal Origins Indicators: The dummy for English legal origins equals one for sample countries with English legal origins. Similar classifications are used for countries with German, Scandinavian, or Socialist origins. Countries with French legal origins comprise the default group. Source: La Porta *et al.* (1998).

Religion: The percentage of the population professing the Catholic or Protestant religion in 1980. Source: La Porta *et al.* (1998).

Ethnic Fractionalization: One minus the Herfindahl index of ethnolinguistic group shares in 2001. This variable takes higher values for more fractionalized countries. Source: Alesina *et al.* (2002).

Distance: The geographic distance from 20 major world exporters. Source: Barro and Lee (1994).

Population: Total population in millions. Source: Penn World Tables of Heston *et al.* (2006), Version 6.2.

Historical Democracy: The average of the variable *polity2* from 1816 (or the year of independence if later) to 1913. A country was democratic so long as *polity2* had a strictly positive value. Source: Polity IV Database of Jaggers and Marshall (2008).

Fiscal Capacity in 1938: One minus the share of total tax revenues from trade taxes in 1938, just before the start of World War II. We used this measure rather than direct tax shares because it was available for the largest set of sample countries. We counted Czechoslovakia for the Czech Republic and the Slovak Republic, Korea for South Korea, and Yugoslavia for Croatia and Slovenia. When 1938 data were not available, we used data from the nearest year: 1937 for Austria, Czechoslovakia, Indonesia, Poland, and Yugoslavia, and 1935 for Spain. Lastly, the data for Indonesia and South Africa did not distinguish between trade and excise taxes. Source: Mitchell (2003a,b,c).

Casualties from Historical Internal Wars: The number of total casualties in millions sustained by all participants in major internal conflicts listed as civil wars, massacres, and revolutions from 1816 to 1913. We counted internal conflicts fought within pre-

unitary German and Italian states for Germany and Italy, respectively. Internal conflicts fought within the the Austrian Empire were counted for the modern state most coterminous in location with the relevant conflict. To account for country size, we scaled this variable by area in millions of square kilometers. Source: Clodfelter (2002).

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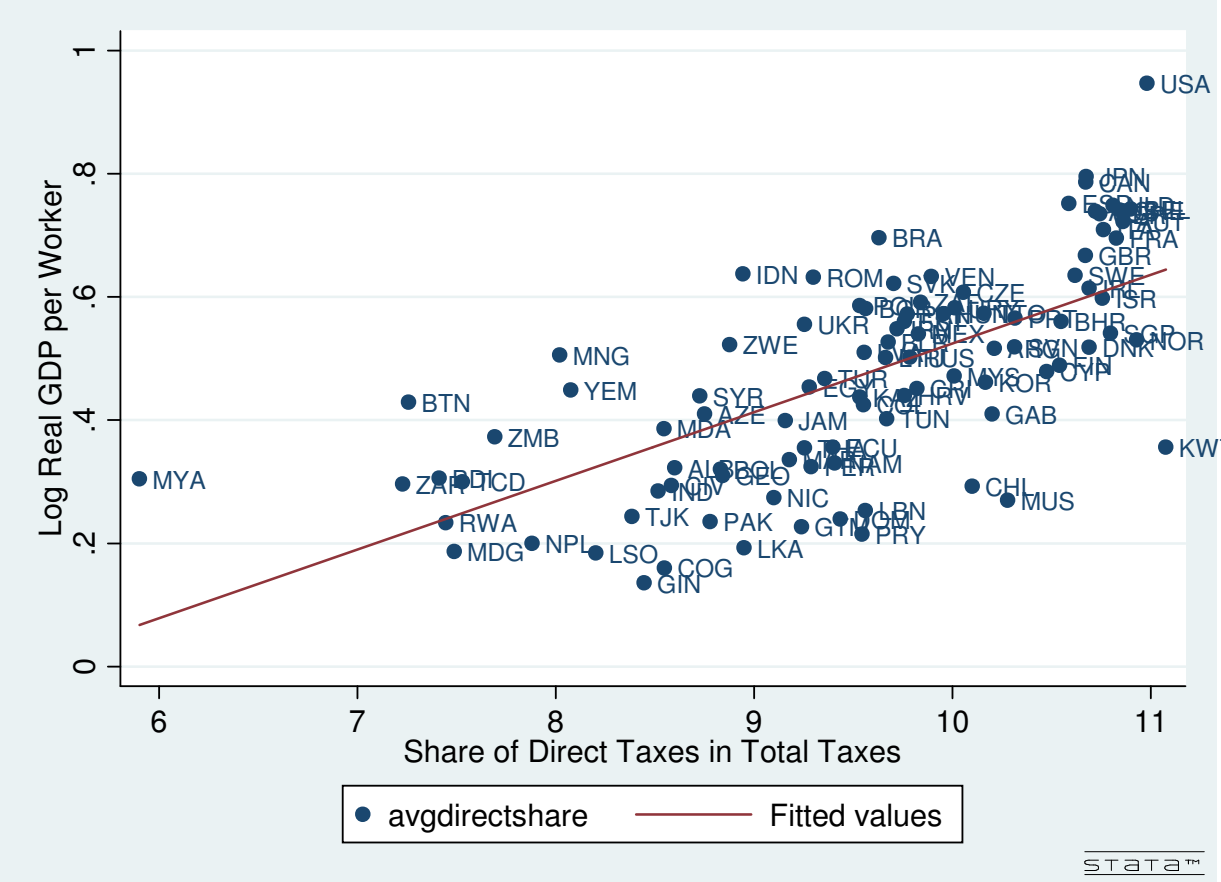
Figure 1: OLS Relationship between Fiscal Capacity and Performance



Sources: IMF Government Financial Statistics (tax data); Penn World Tables (GDP data).

Table 1: Descriptive Statistics

	Obs	Mean	Std Dev	Min	Max
GDP per Worker	96	20,667	16,733	366	64,619
Total Factor Productivity	72	0.59	0.30	0.08	1.21
Direct Tax Share	96	0.47	0.17	0.14	0.95
One Minus Share of Trade Taxes	95	0.85	0.16	0.32	1.00
Total Taxes to GDP	87	0.21	0.10	0.01	0.42
Latitude	96	0.35	0.20	0	0.71
Africa	96	0.18	0.38	0	1
Asia	96	0.05	0.22	0	1
Latin America	96	0.19	0.39	0	1
OECD	96	0.20	0.40	0	1
Democracy	95	0.72	0.41	0	1
English Legal Origins	96	0.24	0.43	0	1
French Legal Origins	96	0.44	0.50	0	1
German Legal Origins	96	0.05	0.22	0	1
Scandinavian Legal Origins	96	0.04	0.20	0	1
Socialist Legal Origins	96	0.23	0.43	0	1
Catholic	96	0.35	0.38	0	0.97
Protestant	96	0.13	0.23	0	0.98
Fractionalization	96	0.28	0.26	0	0.87
Distance	59	5.68	2.51	1.27	9.94
Population (1000s)	96	41,006	116,567	677	1,065,702

Sources: See Data Appendix.

Table 2: OLS Regressions

	(1)	(2)	(3)	(4)
	log Y/L	log Y/L	log Y/L	log Y/L
Share of Direct Taxes in Total Taxes	4.05***	3.64***	3.35***	3.33***
	(0.40)	(0.43)	(0.44)	(0.45)
One Minus Share of Trade Taxes				
Total Taxes to GDP				
Latitude		0.74*	1.79***	1.44**
		(0.42)	(0.67)	(0.55)
Democracy				0.39
				(0.29)
Continents	No	No	Yes	Yes
Adjusted R^2	0.45	0.46	0.50	0.52
Number of Observations	96	96	96	95

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

Notes: Robust standard errors in parentheses.

Table 2, Continued: OLS Regressions

	(5) log Y/L	(6) log Y/L	(7) log Y/L	(8) TFP
Share of Direct Taxes in Total Taxes	3.45***			1.00***
	(0.58)			(0.13)
One Minus Share of Trade Taxes		3.11***		
		(0.78)		
Total Taxes to GDP			5.32***	
			(1.31)	
Latitude				
Democracy				
Continents	Non-OECD	No	No	No
Adjusted R^2	0.25	0.21	0.23	0.37
Number of Observations	77	95	87	72

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

Notes: Robust standard errors in parentheses.

Table 3: Descriptive Statistics for Instrumental Variables

	Mean	Std Dev	Min	Max
Past War Casualties (Unscaled)	42,927	136,873	0	948,464
Past War Casualties (Scaled)	0.10	0.26	0	1.51
Past Battle Deaths (Unscaled, COW)	22,500	69,048	0	356,400
Past Battle Deaths (Scaled, COW)	0.06	0.18	0	1.06
Past War Casualties, 1700-88 (Unscaled)	40,458	142,372	0	1,166,942
Past War Casualties, 1700-88 (Scaled)	0.20	0.54	0	3.36
Past Democracy	0.31	0.38	0	1
Fiscal Capacity in 1938	0.77	0.15	0.37	0.99
Casualties from Past Internal Conflicts (Scaled)	0.05	0.25	0	1.91

Sources: See Data Appendix.

Notes: Unless stated otherwise, the instruments were constructed using data from 1816 to 1913. There are 96 observations for each variable except for past democracy, for which there are 46. The scaled figures are divided by square kilometers of territory.

Table 4: 2SLS Regressions

	(1)	(2)	(3)	(4)
Panel A: Two-Stage Least-Squares				
	log Y/L	log Y/L	log Y/L	log Y/L
Share of Direct Taxes in Total Taxes	4.96***	4.69***	4.90***	4.56***
	(0.79)	(1.26)	(1.32)	(1.52)
One Minus Share of Trade Taxes				
Total Taxes to GDP				
Latitude		0.31	1.22	1.10
		(0.66)	(0.78)	(0.71)
Democracy				0.31
				(0.31)
Continents	No	No	Yes	Yes
Panel B: First Stage				
	Direct Share	Direct Share	Direct Share	Direct Share
Past War Casualties (Scaled)	0.21***	0.14***	0.13***	0.11**
	(0.05)	(0.04)	(0.04)	(0.04)
Latitude		0.38***	0.34***	0.27**
		(0.07)	(0.11)	(0.13)
Democracy				0.05
				(0.04)
Adjusted R^2	0.09	0.26	0.30	0.31
Panel C: Ordinary Least Squares				
	log Y/L	log Y/L	log Y/L	log Y/L
Share of Direct Taxes in Total Taxes	4.05***	3.64***	3.35***	3.33***
	(0.40)	(0.43)	(0.44)	(0.45)
One Minus Share of Trade Taxes				
Total Taxes to GDP				
Number of Observations	96	96	96	95

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

Notes: Robust standard errors in parentheses.

Table 4, Continued: 2SLS Regressions

	(5)	(6)	(7)	(8)
	Panel A: Two-Stage Least-Squares			
	log Y/L	log Y/L	log Y/L	TFP
Share of Direct Taxes in Total Taxes	4.71*			1.75***
	(2.47)			(0.34)
One Minus Share of Trade Taxes		6.66***		
		(1.38)		
Total Taxes to GDP			7.22***	
			(1.48)	
Latitude				
Democracy				
Continents	Non-OECD	No	No	No
	Panel B: First Stage			
	Direct Share	One Minus Trade	Taxes to GDP	Direct Share
Past War Casualties (Scaled)	0.12***	0.15***	0.13***	0.24***
	(0.03)	(0.04)	(0.03)	(0.06)
Latitude				
Democracy				
Adjusted R^2	0.01	0.06	0.14	0.09
	Panel C: Ordinary Least Squares			
	log Y/L	log Y/L	log Y/L	TFP
Share of Direct Taxes in Total Taxes	3.45***			1.00***
	(0.58)			(0.13)
One Minus Share of Trade Taxes		3.11***		
		(0.78)		
Total Taxes to GDP			5.32***	
			(1.31)	
Number of Observations	77	95	87	72

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

Notes: Robust standard errors in parentheses.

Table 5: 2SLS Regressions with Alternative IVs

	(1)	(2)	(3)	(4)	(5)
	Panel A: Two-Stage Least-Squares				
	log Y/L	log Y/L	log Y/L	log Y/L	log Y/L
Share of Direct Taxes in Total Taxes	4.34***	6.92***	5.69***	5.70***	5.19***
	(0.95)	(1.77)	(1.60)	(0.83)	(0.54)
	Panel B: First Stage				
	Direct Share	Direct Share	Direct Share	Direct Share	Direct Share
Past War Casualties (Unscaled)	0.30***				
	(0.10)				
Past Battle Deaths (Scaled, COW)		0.20**			
		(0.09)			
Past Battle Deaths (Unscaled, COW)			0.47*		
			(0.24)		
Past War Casualties, 1700-88 (Scaled)				0.11***	
				(0.03)	
Past War Casualties, 1700-88 (Unscaled)					0.35***
					(0.11)
Adjusted R^2	0.04	0.04	0.02	0.10	0.07
	Panel C: Ordinary Least Squares				
	log Y/L	log Y/L	log Y/L	log Y/L	log Y/L
Share of Direct Taxes in Total Taxes	4.05***	4.05***	4.05***	4.05***	4.05***
	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)
Number of Observations	96	96	96	96	96

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

Notes: Robust standard errors in parentheses.

Table 6: Robustness Checks for 2SLS Regressions

	(1)	(2)	(3)	(4)
	Panel A: Two-Stage Least-Squares			
	log Y/L	log Y/L	log Y/L	log Y/L
Share of Direct Taxes in Total Taxes	5.07***	4.80***	4.92***	5.56***
	(0.63)	(0.65)	(1.01)	(0.76)
One Minus Share of Trade Taxes				
Total Taxes to GDP				
Catholic		0.39*		0.41*
		(0.20)		(0.21)
Protestant		0.45		−0.60
		(0.31)		(0.55)
Fractionalization			−0.11	0.23
			(0.46)	(0.45)
Government Size (Fitted)				
Legal Origins	Yes	No	No	Yes
	Panel B: First Stage			
	Direct Share	Direct Share	Direct Share	Direct Share
Past War Casualties (Scaled)	0.21***	0.20***	0.17***	0.18***
	(0.05)	(0.05)	(0.05)	(0.04)
Catholic		0.05		0.11**
		(0.05)		(0.05)
Protestant		0.16***		0.13
		(0.06)		(0.13)
Fractionalization			−0.19***	−0.15**
			(0.06)	(0.07)
Government Size (Fitted)				
Adjusted R^2	0.18	0.12	0.16	0.27
Number of Observations	96	96	86	86

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

Notes: Robust standard errors in parentheses.

Table 6, Continued: 2SLS Robustness Checks

	(5)	(6)	(7)	(8)
	Panel A: Two-Stage Least-Squares			
	log Y/L	log Y/L	TFP	log Y/L
Share of Direct Taxes in Total Taxes			1.65***	4.72***
			(0.32)	(0.92)
One Minus Share of Trade Taxes	7.29***			
	(1.24)			
Total Taxes to GDP		8.20***		
		(1.28)		
Catholic	0.07**	0.52**	−0.08	
	(0.31)	(0.22)	(0.09)	
Protestant	0.28	−0.56	−0.42**	
	(0.60)	(0.67)	(0.18)	
Fractionalization	0.16	0.01	−0.04	
	(0.58)	(0.43)	(0.16)	
Government Size (Fitted)				0.03
				(0.08)
Legal Origins	Yes	Yes	Yes	No
	Panel B: First Stage			
	One Minus Trade	Taxes to GDP	Direct Share	Direct Share
Past War Casualties (Scaled)	0.14***	0.11***	0.20***	0.18***
	(0.05)	(0.03)	(0.05)	(0.05)
Catholic	0.14***	0.06*	0.06	
	(0.05)	(0.03)	(0.05)	
Protestant	−0.02	0.12**	0.08	
	(0.11)	(0.05)	(0.16)	
Fractionalization	−0.11	−0.07*	−0.22**	
	(0.07)	(0.03)	(0.09)	
Government Size (Fitted)				−0.06**
				(0.03)
Adjusted R^2	0.27	0.31	0.27	0.44
Number of Observations	85	78	70	59

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

Notes: Robust standard errors in parentheses.

Table 7: Overidentification Tests

	(1)	(2)	(3)
Panel A: Second-Stage Least-Squares			
	log Y/L	log Y/L	log Y/L
Share of Direct Taxes in Total Taxes	5.32***	2.90***	2.91***
	(1.54)	(0.83)	(0.84)
Past War Casualties (Scaled)	−0.19	−0.00	−0.01
	(0.25)	(0.20)	(0.20)
Panel B: First Stage			
	Direct Share	Direct Share	Direct Share
Past Democracy	0.16***	0.10	0.10
	(0.07)	(0.07)	(0.07)
Fiscal Capacity in 1938		0.38**	0.39**
		(0.18)	(0.19)
Casualties from Past Internal Conflicts (Scaled)			−0.02
			(0.06)
Adjusted R^2	0.14	0.22	0.19
Number of Observations	46	32	32

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

Notes: Robust standard errors in parentheses. The variable for past war casualties is included as an exogenous regressor.