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Regulation and government debt

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Abstract

Government debt is large in most developed countries, and while budget deficits may reflect short-term attempts to kickstart the economy in times of crisis by means of fiscal stimulus, the longer-term consequences risk being detrimental to investment and growth. Those negative consequences make it important to identify factors that are associated with public debt. While previous studies have related government debt to economic and political variables, they have not incorporated the degree to which the economy is regulated. Using a measure of regulatory freedom (absence of detailed regulation of labor, business and credit) from the Economic Freedom of the World index, we conduct an empirical analysis covering up to 67 countries during the 1975–2010 period. The main finding is that regulatory freedom, especially with respect to credit availability, reduces debt accumulation. The effect is more pronounced when the political system is fractionalized and characterized by strong veto players, indicating policy stability and credibility, and when governments have rightwing ideologies.

Keywords

Debt, Economic freedom, Regulation, Markets, Stimulus. Keynesianism

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1. Introduction

Government debt has been at the forefront of economic policy debates in recent years, not least because some countries have experienced large increases in indebtedness during and after the

financial crisis. It is not hard to see why such a focus has arisen. As outlined by Elmendorf and Mankiw (1999), the debt-to-GDP ratio is important because it affects resource allocation in an economy and ultimately economic growth.[1] While, according to many economists, more short-term debt is able to boost aggregate economic performance during downturns, long-term debts of substantial size will tend to dampen growth, e.g., by lowering national saving and by creating deadweight losses from taxation needed to service the debt.[2] What seems clear is that the association between high debt and growth is negative, although the precise magnitude of the relationship still is being discussed.[3] That debt is related to growth motivates this study, which introduces a new predictor of debt development.

We propose that the extent to which an economy is regulated matters, on the basis of four theoretical links. The first one is that people who hold pro-market attitudes tend to be opposed to public regulation of the private sector and hold skeptical views about substantial government debt. The second and third are that regulation affects the functioning of the economy in ways that influence debt, and that regulation may serve as a signal to lenders regarding contemporaneous or future problems in the economy or the government, such that they set interest rates (that influence debt levels) accordingly. Finally, a regulated economy may be comparatively inflexible and unable to

[1] Debt also is relevant when considering other long-term goals, e.g., inflation, employment, intergenerational equity and fiscal sustainability (Auerbach 2008).

[2] Indeed, Reinhardt and Rogoff (2010) find that the debt-growth relationship is quite weak at "normal" debt ratios but that very high debt ratios (above 90% of GDP) tend to reduce growth sharply: from 3% to 1.7% over the two-century period they study, but even more, from 3% to –0.1% in the post-war sample. The estimates were criticized by Herndon et al. (2014), who find smaller negative effects of high debt and no particular threshold at 90%; but Reinhart et al. (2012) provide some further support for the previous findings. See also Eberhardt and Presbitero (2015) for further evidence of a negative relationship, but with no common threshold across countries; cf. Égert (2015).

[3] High debt levels also make it more difficult for stimulus to be effective: see Nickel and Tudyka (2014).

adjust very well to changing macroeconomic circumstances, which could leave the government with incurring debt to counteract downturns as its only politically viable option.

Against this background, which leads us to expect a relationship between regulation and debt, we investigate empirically whether regulation is indeed related to debt and, if so, how strongly and in what direction. As our measure of regulation, we use a component of the Economic Freedom of the World index – regulatory freedom – which measures how little an economy is regulated in the areas of labor, credit and business. We assemble panel data from up to 67 countries with Western-style political institutions for which we have information on government debt as well as a set of policy indicators. We observe the countries in up to seven five-year periods in which we are able to follow the development of their debt levels and policy changes. Our main result is that regulatory freedom is negatively related to the debt ratio: an increase in the former of one unit (on a 10-unit scale) is on average associated with a six percentage-point reduction in the debt-to-GDP ratio. Moving from the regulatory freedom of Greece to that of Denmark would, all other things being equal, entail a reduction in the debt ratio of ten percentage points within a five-year period. That negative relationship primarily is driven by regulatory credit market freedom.

Moreover, we interact regulatory freedom with other variables in order to see whether the relationship depends on various circumstances – and, e.g., find that regulatory freedom is more negatively related to debt the further right is government ideology and the stronger are veto players. Moreover, above a certain threshold, the negative association between regulatory freedom and debt becomes stronger. Finally, the greater the extent of legislative fractionalization, the more regulatory freedom is able to restrain public debt growth.

This study contributes to a literature that investigates the determinants of government debt by proposing a new factor of importance, namely credit market regulation. Previous studies have looked at a range of economic, political and institutional variables as explanatory factors of which we now mention some of the more important ones dealing with the character of government and

governance. Roubini and Sachs (1989) identify short governing tenures and the need to form government coalitions as important sources of debt. Grilli et al. (1991) similarly find that governments who expect to stay in power only for a short time do not care very much about the long run and, thus, tend to accumulate more debt. Persson and Tabellini (2003) confirm that majoritarian electoral systems, with fewer and larger parties, are associated with smaller budget deficits. Cheibub (2006) finds support for presidential systems having better fiscal outcomes than parliamentary systems, especially if the president plays an important role in the budgetary process and if he or she can veto legislation. Volkerink and de Haan (2001) and Elgie and McMenamin (2008) show that more fragmented governments run higher budget deficits, while governments with large legislative majorities have smaller deficits.

Furthermore, Koehler and König (2015) find that government debt in the Eurozone would have been much larger without the Growth and Stability Pact, hence indicating an effect of the institutional setting on budget balances. Leachman et al. (2007) document that both strict budget institutions and federalism contribute to lower deficits. Gunzinger and Sturm (2016) test the degree to which political constraints affected the size of stimulus packages in connection with the so-called Great Recession. The idea is that the ease with which political decisions in general can be taken affects the ability to pursue (debt-increasing) policies – and that conjecture is supported by the empirical findings.[4] However, to our knowledge, tests of the hypothesis that regulation plays a role in debt accumulation have not been undertaken before, and we thereby think we fill an important gap in the literature.

[4] Political business cycles could provide a further explanatory mechanism for debt accumulation, if voters reward expansionary fiscal policy and punish more restrictive policy. However, Alesina and Passalacqua (2015, p. 18) write that such cycles "cannot be the main explanation for large and long-lasting accumulation of public debt".

The rest of the paper is structured as follows. In Section 2, we provide a brief theoretical framework to structure our analysis. We then turn to the empirics, presenting the data and empirical method in Section 3 and the results in Section 4. Concluding remarks close the paper, in Section 5.

2. Some theoretical considerations

We specify four mechanisms that link regulation to government debt and call them 1) reflection effects, 2) direct economic effects, 3) reputation effects and 4) political economy effects.[5] If they emerge, they do so in a political setting, the characteristics of which we present first.

[5] In Section 4.4, we provide an explorative empirical analysis to see if some of these four possibilities can be shown to function as actual channels between regulation and debt.

2.1. The political process

The political process, and the factors therein that affect government debt, are illustrated in Figure 1.[6]

Figure 1 about here

Politicians adhere to political platforms containing a number of positions: they present them during campaigns and some candidates are elected with the stated purpose of implementing them. In devising their policy positions, they are, on the one hand, "internally motivated": they have certain basic values and they hold certain beliefs about how the world works, i.e., certain ideas. The former identify the political ends and the latter clarify (what the politicians perceive to be) the means of achieving those ends. The ideas can concern all kinds of issues, but we focus on the basic belief in the relative abilities of governments and markets to function in ways that satisfy some conception of the public interest. However, policy positions are determined not only by the internal ideologies of the politicians themselves – since the aim is to get elected, candidates must pay attention to what voters and interest groups want as well. Those external constituencies may, of course, desire many different things. If we assume that politicians are vote-maximizers (since no matter what they want to accomplish, they need to be in power to do so), their policy positions are the result of tradeoffs on the margin: between the politicians' own preferred policy positions, between the policy positions of voters, between the policy positions of necessary coalition partners and between the policy positions

[6] This exposition concerns democracies. For non-democratic settings, voters and the legislature are not relevant as such – authoritarian regimes often have legislatures that only have nominal power; and if there are voters, they do not *de facto* have alternatives to vote for.

of interest groups (to the extent that the various positions go in different directions). Depending on the weights put on those four factors, and beliefs about how the support of voters and interest groups varies with the policy positions taken by the politicians, a policy platform emerges.[7] For example, if a politician embraces the basic utilitarian value that the happiness of the people is what matters and if he is very government-friendly, then he might be inclined to propose to regulate corporations by supporting consumer-protection legislation. If he thinks that a large segment of the electorate (especially important marginal voters) will support such a position, he is reinforced in advocating it. However, important corporate interest groups probably oppose that position and would give resources to other politicians, which is a cost to consider. Such overall reasoning can be extended to political parties, whose politicians are united behind a platform of policy positions after a collective-choice process with the individual positions as inputs.

The next step is the political process. It is one thing, as an elected politician or a party, to espouse a set of policy positions; it is another to see those positions become enacted by the legislature. Policy positions are necessary, but not sufficient for political decisions. The latter are determined by governments and legislatures, whose characteristics in turn are determined by the rules of the political game (the political institutions) and whose compositions are determined in elections. Many political decisions affect economic outcomes of various kinds, such as spending and taxes, and some of those outcomes in turn influence debt.

[7] We here follow the general approach of Peltzman (1976). However, the public choice literature has documented a number of mechanisms by which politicians' stated ideological preferences could either be distorted or reversed entirely: Hillman (2009) and Holcombe (2016) provide compendia of such mechanisms.

2.2. Reflection effects

The first proposed link assumes that ideas (in this case regarding how well markets and governments function) affect public policy and debt – illustrated by "1" in Figure 1. Keynes (1936, pp. 383–384) stated famously that

> The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else.

Undoubtedly, one of the most important economists in that regard is Keynes himself, whose ideas about the causes of and solutions to economic downturns have been powerful in affecting the mindsets of both policymakers and economists (Hall 1989). In connection with the great recession of 2007–2009, Keynesian-type policy prescriptions were adopted in many countries, often advocated by economists,[8] and resulted in larger government debts.

However, scholars who are skeptical of the Keynesian prescriptions have always been with us. Such skepticism arguably rests on a different assessment of the relative capacities of markets and governments to function well. While the Keynesians tend to see markets as prone to malfunction and in need of government intervention, at least temporarily, the skeptics are much more optimistic about the long-term benefits of markets and more pessimistic, owing to knowledge and incentive

[8] The Initiative on Global Markets (IGM) Economic Experts Panel leaned towards the Keynesian position in 2014 (IGM 2014). When asked whether the benefits of US stimulus efforts will end up exceeding their costs, 20% strongly agreed, 36% agreed, 23% were uncertain and 5% disagreed. Even stronger agreement with Keynesian ideas was found in a large survey of economists some decades earlier (Frey et al. 1984).

problems, about what government can do to improve matters (Pennington, 2011). Such skepticism speaks in favor of a negative relationship between pro-market/government-skeptical ideas and debt.

Even though our main hypothesis is one of a negative relationship between market-friendliness and public debt, it cannot be ruled out, on theoretical grounds, that the relationship is positive. One reason could be that some market-friendly people advocate an approach to debt called "starving the beast", the purpose of which is to use tax cuts as a method to reduce government expenditures (see, e.g., Mulligan 2008). The presumption is that debt will not be tolerated and that the size of government will therefore have to be cut. However, empirical analysis seems to undermine that proposed mechanism (see Romer and Romer 2009); hence, our main hypothesis is still that market-friendliness, as proxied by the relative absence of substantial regulation, is negatively related to debt.

2.3. Direct economic effects

The reflection effects described in Section 2.2 explain the regulation–debt relationship by regarding regulation as an indicator of certain ideas that affect policy positions both on regulation and debt. Here, we propose another mechanism that can explain the relationship: direct economic effects. Regulation is taken as the starting point: for some reason – a combination of politicians' values and ideas, the influence of interest groups and voters and the political decision-making process – it is there, and it does not matter for what reason. In and of itself, regulation can affect debt. These effects are illustrated by the number 2 in Figure 1, going from regulation to economic outcomes to debt.

Such effects mean that regulation influences how the economy works in a manner that in turn has repercussions on the debt-to-GDP ratio. If the business sector is regulated heavily, intervention

may impede competition, dynamism and flexibility, with fewer innovations and, as a result, slower and maybe negative economic growth.[9] If growth slows down, the debt ratio may be affected both through its numerator (smaller tax bases, lower tax revenues, or higher government spending, e.g., to subsidize rigid sectors and fund unemployment benefits) and its denominator (which is GDP, the growth of which is retarded and may even become negative). One particular market that tends to suffer from heavy regulation is the labor market, with adverse employment outcomes (Skedinger 2011). Greater unemployment reduces the tax base and tax revenues, and it increases government expenditure in the form of financial support to the unemployed, thus increasing debt. However, although such negative effects of regulation are plausible, some types of regulation can have the opposite effect, e.g., certain regulations affecting the financial sector. That sector can, as was evident in large parts of the world in 2007–2009, bring about crises with very serious fiscal consequences. Thus, financial markets need to function within a well-crafted set of rules (Zingales 2015) that, among other things, make debt build-up improbable and credibly prevent bailout guarantees. Still, what those optimal rules are is difficult to say (Cochrane 2014).

2.4. Reputation effects

[9] A number of studies link stricter regulation to less adaptability and dynamism. For example, Alesina et al. (2005) show that regulatory reform of product markets in OECD countries is associated with an increase in investment. Djankov et al. (2006), Jalilian et al. (2007) and Justesen (2008) find that countries with fewer regulatory restrictions grow faster. Haltiwanger et al. (2014) find strong and robust evidence that stringent hiring and firing regulations tend to reduce the pace of job reallocation. Bjørnskov (2016) shows that countries with more regulated markets tend to experience substantially longer and deeper economic crises.

Reputation effects refer to how regulation is perceived by lenders. The idea is that regulation is considered to be a signal that influences interest rates (cf. Afonso et al. 2011; Biglaiser and Staats 2012). The effect could go in both directions. On the one hand, regulation may be interpreted as evidence of problems – either in the economy or in government's handling of things – that market actors observe. They might react rationally by increasing interest rates, which increases debt over time by making it more costly to roll it over and by raising the costs of servicing it. On the other hand, regulation may be seen as an indicator of political strength and a determination to solve problems in the economy, which may lead lenders to reduce interest rates, to the extent they believe that the regulation will help. This mechanism is illustrated by the number 3 in Figure 1.

2.5. Political economy effects

The fourth type of effects hinges on political considerations. If an economy is heavily regulated, adjustments by economic actors in the face of macroeconomic downturns may not be forthcoming, thus worsening or prolonging a crisis.[10] If politicians are committed to keeping regulations in place, they may nevertheless feel obliged to "do something", and fiscal stimulus is then a policy instrument they can apply. While that response usually is a short-term phenomenon, we suggest that if the political logic (in accordance with Buchanan and Wagner 1977) is such that budget surpluses tend not to be run when the economy is doing well, fiscal stimulus will entail long-term debt increases as well. As shown by "4" in Figure 1, political decisions that increase debt are taken *given* strong regulation.

[10] In a very general way, Alchian (1950) describes how adaptability is a central feature of economic development. Feldman (2009) documents how labor-market regulations tend to affect unemployment, which, in certain situations, gives rise to an inclination to increase public spending.

In summary, several mechanisms may create links between regulatory activity and debt development. Most, but not all, of those mechanisms likewise could entail a positive association, and may depend on regulatory content and political circumstance.

3. Data and empirical method

3.1. The data

Our main data are total general government debt as a share of GDP, which we get from the IMF (2016) and the World Bank (2016). Government debt includes *all* liabilities that require some form of payment of interest and/or principal by the debtor (a government) to the creditor at some or more dates in the future. It thus is not restricted to certain forms of liabilities and include debt both to domestic as well as international creditors. We start by illustrating the structure of these data by plotting the average debt rates in 2010–2014 for all countries in our sample; the data are depicted in Figure 2. The figure illustrates the vast diversity that stretches from a debt level of 8% of GDP in Estonia and 11% in Chile, to 162% in Greece and 231% in Japan. To illustrate developments over time in our central variables, we provide Figure OA1 in the Online Appendix, which shows the average debt rates and the average values of regulatory freedom since 1980.

Figure 2 about here

The remaining data are drawn from a number of different sources. Our main explanatory variable of interest is economic freedom, as measured by the Economic Freedom of the World dataset (Gwartney et al. 2016). We focus primarily on the index of regulatory freedom, which measures the burden of regulations in credit, product and labor markets on a scale from 0 to 10; the overall index is composed of those three sub-indices. The observations are available on a five-year basis from 1970 for an expanding number of countries. In an extension, we enter the four other elements of the overall economic freedom index, which also measures government size, legal quality, monetary freedom and the freedom to trade internationally.

We use the following control variables, based on previous studies as well as our own theoretical considerations in the text above. We first include a lagged dependent variable, such that all effects reported below can be interpreted as influences on the *development* of debt and not associations with a hypothetical equilibrium level.[11] Second, we include the five-year average growth rate of real purchasing-power parity (PPP) GDP as well as a count measure of the number of years within a five-year period that growth was negative, i.e., when a given country was in recession. The recession measure captures the *additional* effects of economic problems and political pressure during recessions and crises. We also control for the (log to the) size of the population, as larger countries may be better able to service a larger debt burden (as indicated by better credit ratings; see Fuchs and Gehring 2017).

In addition, we control for a number of political features that potentially are relevant. We include dummies for political instability, captured by failed coups during a given period, electoral democracy, presidential political institutions (democratic as well as autocratic) and proportional

[11] Including a lagged dependent variable is equivalent to estimating *changes* in debt levels during five-year periods. Empirically, either using the change as a left-hand side variable or the level is the same as long as both specifications include a lagged dependent variable. The only real difference is the estimated coefficient on the lagged dependent variable.

voting systems (cf. Persson and Tabellini 2003). We also include a measure of the strength of political veto players, which may both serve to prevent some decisions from being made and lock in specific policy decisions (Justesen 2008). Finally, we include two measures of the political environment: the ideological position of the incumbent government and the political party fractionalization of the legislature or parliament, measured as the Herfindahl-Hirschmann index. We note that substantial fractionalization is likely to have effects similar to those of strong veto institutions.

In line with the literature presented in the Introduction, our expectations for the political variables are as follows. Presidential systems may be better at avoiding logrolling problems that cause larger and potentially underfunded expenditures (cf. Tullock 1981). Conversely, however, presidents may also have their own agendas and discretionary spending priorities, which could cause larger expenditures and debt burdens. Proportional representation also may contribute to such problems by creating more parliamentary instability or more fractionalized legislatures in which larger coalitions are necessary before reaching policy decisions. Our theoretical expectation would thus be that countries with proportional voting and fractionalized legislatures carry larger debt burdens, while the consequences of presidential institutions are ambiguous. Similarly, the association with governmental ideology is ambiguous as leftwing governments are prone to spend more, but may also be better able to implement necessary funding mechanisms (Cukierman and Tommasi 1998).

Summary statistics are presented in Table 1, while we provide variable definitions and data sources in Appendix Table A1. In Table A2 in the Appendix, the countries included in the sample are listed.

Table 1 about here

3.2. The empirical method

Our data consist of an unbalanced panel of 67 countries observed in five-year periods between 1975 and 2010. In the following, we estimate all models using OLS with panel-corrected standard errors (Beck and Katz 1995). We do so since it is reasonable to expect cross-sectional contemporaneous error correlation because of similar shocks across developed countries and similar developments in the international financial system. The Beck and Katz estimator allows for such correlations while also offering standard errors that are robust to heteroscedasticity in a panel setting. The estimates that follow can therefore best be interpreted as medium- to long-run effects on debt development following policy and institutional changes.[12]

4. Results

4.1. Baseline findings

We present our baseline findings in Table 2, by expanding the empirical model gradually. While the point estimates of regulatory freedom, i.e., the absence of regulation, are relatively small in the first

[12] The results that follow are robust to applying either a standard random effects estimator or adding country fixed effects. We do both, but prefer an OLS estimator with panel-corrected standard errors, as the use of fixed effects more clearly identifies short- to medium-run relations. We note that our choice in the present context produces the most conservative estimates.

three specifications, as well as weakly or not at all significant, the simple estimates are likely to be subject to substantial omitted variables bias. In particular, much of the previous literature has focused on the sizeable effects of institutional differences, which we add to the model in column 4. In addition, regulatory activity is likely to differ across types of political institutions, which further exacerbates the bias.[13]

The full model points at a sizeable negative and statistically significant association of regulation with the debt-to-GDP ratio.[14] Taking this finding as the basis, if regulatory freedom increases by one unit on the ten-point scale, for example, going from the level of Austria to that of Canada, the debt ratio declines by six percentage points within a five-year period. This evidence suggests that a relatively strong market orientation, in the form of a freer, less regulated economy, is related to smaller public debts as a share of GDP.[15]

Table 2 about here

[13] Estimating the association between our control variables and regulation, and using the latter as the dependent variable, illustrates the potential problems. Regulation is strongly associated with both veto player strength, proportional voting, presidential democracy and government ideology. Not including those characteristics in the specification must give rise to omitted variable bias in our main estimate.

[14] Inspired by Gørgens et al. (2005), we also have tried non-linear modelling, but it did not produce evidence of curvilinear effects. Including a squared regulation term yields a worse fit and no statistical significance. Furthermore, categorizing the regulatory freedom variable in four equal categories suggests that the effects are approximately linear.

[15] We also tried including four additional indicators of economic freedom, indicators that together with regulatory freedom constitute the Economic Freedom of the World Index (Gwartney et al. 2016). As can be seen in Table A3 in the Appendix, the four are not related to the debt ratio in a statistically significant way.

When looking at the control variables in column 4, we see that the current debt ratio is positively related to the previous one. By including the lagged dependent variable we can effectively be said to study the development of the debt ratio over our five-year periods. Growth is negative for the debt ratio, plausibly because it affects both the nominator (negatively, by indicating more economic activity and larger tax revenues) and the denominator (positively). Recessions have a positive effect on debt ratios, and so do larger populations. Turning to political variables, having experienced a coup that failed does not seem to affect debt ratios in a statistically significant way. Democracy, presidential systems and proportional electoral systems all are associated with smaller debt ratios than their alternatives, while veto players (i.e., the blocking features of the political institutions) are related to higher debt. On the one hand, one could have expected the opposite sign, as strong veto players indicate that it is more difficult to agree on various spending measures; but, on the other hand, it could be that veto players reach agreement by granting each other favors; it may be that veto players effectively block certain, but not all types of political decisions (maybe it is easier to pass tax cuts than spending increases). Government ideology does not appear to matter; nor does the estimate for legislative fractionalization attain statistical significance.[16]

4.2. Conditional findings

In order to get a more granular picture of the relation between market-friendliness, as captured by regulatory freedom, and public debt, we now interact our freedom variable with five other variables: recession, ideology, veto players, fractionalization and a debt ratio above 90%. The idea is that those

[16] We also tested whether an ideological *change* in government within each five-year is related to debt. We find that a dummy variable indicating such change is statistically insignificant and that its inclusion does not affect any of our main findings.

factors might affect the way in regulation affects debt – and perhaps differently in democracies, which is why we, in presenting the interaction results in Table 3, separate results for democracies and for all other countries in the sample. Throughout the table, we report only the central estimate although we apply the full specification as in Table 2, column 4.

The addition of interaction terms also alleviates another problem. We have so far interpreted our findings as causal, i.e., as evidence of an effect of changes in regulatory policy on the development of government debt. However, it also remains plausible that increasing government debt could give rise to regulatory reforms. For example, governments may react to increasing debt levels, or increasing costs of servicing a growing debt level, by attempting to regulate labor markets more tightly to avoid rising public employee wage bills, or financial markets to regulate directly interest payments on government debt. If such mechanisms are important, our estimates are subject to endogeneity bias. Yet, as shown by Nizalova and Murtazashvili (2016), even in the presence of endogeneity bias, interactions can be interpreted causally as long as *one* of the interacting variables is approximately exogenous. In addition to allowing for different reactions under different economic and political conditions, the results in Table 3 therefore have the benefit of being partially causally interpretable. We believe this approach to be a more viable solution to the potential endogeneity problem than standard solutions.[17]

Table 3 about here

[17] The standard solution is an IV approach, but the most obvious candidates as identified in previous studies – ideological differences and legal origins – also are candidates for direct influences. We have been unable to find any other theoretically valid variables that solve the identification problem and therefore cannot undertake any IV estimates.

We find that the relation between regulatory freedom and public debt does not depend on whether a *recession* is underway or not. Turning to *government ideology*, a more complete picture of how it affects the regulatory freedom-debt relationship can be found in Figure 3, where the estimated coefficients for regulatory freedom, in its relation to debt, have been plotted against all values of ideology.[18] As can be seen, regulatory freedom is more negatively related to debt the more rightwing the government is – if the government is sufficiently far to the left that no center or rightwing party participates in government, regulatory freedom is not affected in its relationship with debt by the ideology of the government.[19] In a rightwing setting, the market-friendly/government-skeptical attitudes seem more effective in hindering debt accumulation.

Continuing with *veto players*, the point estimates reveal that when veto players are anything but very weak, the effect of regulatory freedom is again negative, and more so the stronger the veto players. That relation holds both in democracies and in the full sample. Looking at Figure 4, we see the latter effect illustrated (with confidence intervals): above a certain threshold, the more veto players there are and, thus, the less likely it is that regulatory reforms will be reversed, the stronger is the negative association between regulatory freedom and debt. This result indicates that veto players appear to make the consequences of regulation more powerful, by providing a formal institutional constraint on decision-making, making it harder to change policy directions.

Next, let us look at *legislative fractionalization*, which to some extent proxies for debt-increasing logrolling agreements as hypothesized above, but also has effects similar to those of strong veto institutions. To the extent that a significant relationship exists, the more split the legislative party landscape is, the higher the debt ratio will be, in line with earlier studies. As can be seen in Figure 5, where the full relationship between the regulatory freedom-debt estimates and

[18] Figures 3–5 have been produced using the delta method (Brambor et al., 2006). They cover the full sample.

[19] We suggest that this finding can be explained by the fact that left- and rightwing governments can impose different types of regulation (Potrafke 2010; Bjørnskov and Potrafke 2012, 2013).

legislative fractionalization is shown (with relatively narrow confidence intervals), fractionalization (above low levels) strengthens the negative impact of market-friendly attitudes or policies, as proxied by regulatory freedom, on debt. One way to interpret this last finding is that substantial fractionalization has political functions similar to institutionalized veto players in the sense that it makes any policy decision, including reform reversals, less likely. However, another realistic interpretation may be that logrolling allows governments to reach supermajority agreements on regulatory changes, such that more parties publicly commit to any policy decision.

Lastly, we interact a dummy indicating whether the *debt ratio is very high (above 90%)*. Our findings indicate that that variable factor, which reflects a particularly dire fiscal situation, is not related to the subsequent debt ratio; nor does it affect how regulatory freedom is related to the debt ratio.

Although not direct evidence, we note that if the reverse causal direction were dominant, we would expect regulatory reactions to rising debt to be stronger when debt ratios surpass some threshold, and when the economy is in a recession. We find no heterogeneity in the initial debt level and the reverse pattern when we interact with a recession dummy. As we also find rather strongly significant interactions, we take the results to imply that, at least across some range of ideology, veto player strength and legislative fractionalization, our causal interpretation fits the actual data.

Figure 3 about here

Figure 4 about here

Figure 5 about here

4.3. Sensitivity analysis

In addition to the evidence presented above, we performed a number of sensitivity analyses, two of which are reported in Table A4 in the Appendix. First, we enter country fixed effects and report the findings in columns 1–3 (which should be compared to columns 4, 6 and 8 in Table 3). The main idea behind fixed effects is to control effectively for the potential influences of nearly time-invariant factors such as, e.g., culture, long-term debt history and constitutional influences. Such estimates therefore arguably are more robust to omitted variables bias and problems with accounting for "reflection" effects (see section 2.2) econometrically. Comparing the fixed effect estimates in Table A4 with the corresponding ones in Table 3, we nonetheless find that the coefficient estimates are all in general larger in magnitude, but the overall pattern is very much the same (in columns 6 and 8 of Table 3 and columns 2 and 3 in Table A4).[20] Yet, we remain agnostic on which results are closer to a "true" effect, as the fixed effects estimates are more likely to capture pure short- to medium-run effects than those in previous tables.

Second, we exclude countries with less than 10 years of democratic experience to avoid specific cases of transition – not least the post-communist transition in Central and Eastern Europe – that can influence the results. Those results are reported in columns 4–5 of Table A4 (which should be compared to columns 6 and 8 in Table 3). Reassuringly, we obtain quantitatively similar findings for regulatory freedom as well as the interactions. Excluding particular countries with very specific histories or idiosyncratic political developments, such as Argentina, Chile or Singapore, or single time periods (not shown), likewise does not influence our results, nor does extending the period of having been a democracy to 20 years.

Third, we have excluded observations with the 10% highest and 10% lowest debt levels, in order to ensure that our results are not driven by observations with uncharacteristically high or low

[20] However, the interaction with ideology loses significance in the fixed effects estimates.

debt burdens. If so, the results could in principle be robust, but the findings would not generalize to most countries or situations. We nevertheless find only very small and insignificant changes in our estimates of regulatory impact. Similarly, we have excluded observations with the 10% highest and 10% lowest regulation scores, in order to ascertain that the findings also apply to variation within a "normal" regulatory scope. We again find quantitatively very small and insignificant changes in our main estimates, which all remain significant at conventional levels. These results are available on request.

Fourth, we have thus far entered the lagged dependent variable among the explanatory variables in order to specify a dynamic model. However, a bias potentially is introduced stemming from correlation between the lagged variable and the regression error terms. In order to investigate that possible econometric problem, we have run a regression in which we remove the lagged variable from the regression of Table 2, column 4, with results being reported in Table 4, column 1. As can be seen, we find that the main results are relatively unchanged, which should alleviate concerns for serious bias.

We conclude that our main results hold up to the most intuitively important robustness tests.

4.4. Exploring transmission mechanisms

While we have established a clear and robust connection between regulatory freedom and public debt development, the most likely transmission mechanism remains an open question. In Table 4, column 2, we therefore repeat the main estimates from Table 2, column 4, with a reduced sample

for which all three sub-indices are available, and then explore the potential effects on the debt-to-GDP ration of freedom from credit, labor and business regulation within the same sample.[21]

Table 4 about here

First, we present a comparison between the original and restricted samples in columns 2 and 3, which reveals a slightly, but not significantly, larger point estimate of regulation in the latter, such that results can be compared (note that the restricted sample is about 25% smaller than the original). Second, separating the three sub-indices in columns 4–6 reveals that the main result is driven almost entirely by freedom from credit regulation: neither regulatory freedom for labor nor for business attain significance, and the sign of the association even changes for the former. The main effects in Tables 2 and 3 thus seem to be driven by regulatory activity specific to credit markets and the financial sector.

In further, very tentative tests (available in an Online Appendix), we explore three of the four channels through which regulatory freedom could affect public debt, as outlined in our theoretical section. We have been able to do this only with crosssectional data for quite limited samples; and we should stress that the specific indicators used are not necessarily clear-cut for testing the transmission channels (and for two of the channels, we have been unable to identify indicators to conduct any test). Still, to test reflection effects as a channel whereby regulatory freedom and debt development are both the result of attitudes towards markets and governments, we explore the

[21] This is a way of recognizing that the regulatory environment is a complex one, and that any aggregation is bound to hide a great deal of heterogeneity, e.g., in terms of what the effects on some outcome variable may be. The point estimates we produce are to be seen as "net effects" of all the components of a particular index, where both sizes and signs can vary between those variables.

crosssectional association between debt development and measures of confidence in major companies, people's preferences for government responsibility versus reliance on markets and whether people think that market competition is a force for good or bad.[22] Then, to test direct economic effects, we use the Grant Thornton (2018) global dynamism index to see whether the flexibility of an economy with fewer regulatory restrictions relates to debt development. Lastly, to test reputation effects, we use the association between debt development and credit ratings from Standard and Poor's. Throughout, we look at the association of these indicators with overall regulatory freedom, freedom from credit regulation, and with debt development.

We first find that countries' credit ratings are positively and significantly associated with overall regulatory freedom, and the specific measure of freedom from credit regulation also is associated with confidence in major companies. These results indicate that reflection effects and reputation effects may explain the link between financial regulation and debt development. However, we also find that their inclusion does not change the cross-sectional correlation between regulation and debt, which we would have expected if those were channels at work. We do not observe any indications of such changes and therefore do not find direct evidence of either reflection, reputation or direct economic effects, although we cannot rule them out with our limited analysis. Nor can we, of course, rule out political economy effects, since we could not provide any test of that potential channel.

Hence, while we can state with some certainty that the development of sovereign debt is strongly and significantly related to the specific regulation of credit markets, no survey with sufficient coverage across countries and over time provides information that would allow us to conclusively

[22] As in Aghion et al. (2010) and Pitlik and Kouba (2015), these measures all derive from the most recent waves of the World Values Survey and the European Values Study. When a country is included in both surveys, we take the average.

test the mechanisms at work. Clearly, more research should be undertaken regarding mechanisms as panel data become available.

5. Concluding remarks

Government debt is of classic concern to policymakers and economists alike, not least because of the perceived benefits and costs associated with it. Whether the benefits dominate the costs, or vice versa, is a matter of contention, but it is quite clear that many people favor running short-term deficits in order to combat recessions – often supposing both that such stimulus works and that the political incentives are such as to run subsequent budget surpluses in better times. Others are less prone to accept Keynesian stabilization policy, on the basis of a skepticism regarding the ability and incentives of government to use its fiscal tools in ways that produce better outcomes than if markets are left alone.

In this study, we focus on a particular type of policy, regulation of markets, and its effects on government debt, a relation that to our knowledge has not been analyzed before. Arguably, the degree to which an economy is regulated stems from ideas regarding how comparatively well markets and government work, just as it is in the case of debt. One possible link between regulation and debt therefore is that of pro-market/government-skeptical ideas that cause both little regulation and high debt. But at least three other links are possible: direct economic effects (such as regulation affecting growth and unemployment in a way that in turn influences the debt), reputation effects (when lenders regard regulation as a signal of either economic problems or as solutions to economic problems and set interest rates accordingly) and political economy effects (a regulated economy may induce politicians to stimulate it since it does not adapt easily on its own).

Our main finding is that regulatory freedom – especially in credit markets – is negatively related to the debt-to-GDP ratio. That is to say, stricter regulation of credit tends to go hand in hand with greater public indebtedness. The effect of changes in regulatory policy may be sizeable. Increasing regulatory freedom by a standard deviation – approximately 1.5 points on the ten-point scale, or going from the level of Germany (6.6 in 2010) to that of Canada (8.3 in 2010) – is associated with a nine percentage points smaller debt ratio within a five-year period. In other words, such a regulatory change on average induces a 1.8 percentage point reduction in the debt level every year within a five-year period.

In a more detailed analysis, where we interact regulatory freedom with various features of the political environment, we find that *ideology* tends to matter: regulatory freedom is more negatively related to debt the more rightwing the government is (in democracies), the stronger are *veto players*, i.e., the more difficult it is to agree on decisions, the stronger is the negative association between regulatory freedom and debt. In addition, the more *fractionalized* the legislature is, the more freedom from regulatory intervention is able to restrain debt.

When interpreting the finding of a negative relation between regulatory freedom and government debt, one possibility is that policymakers who adhere to a market-friendly/government-skeptical ideology tend not only not to regulate the economy, but also to refrain from increasing public indebtedness. They reject interventions on the micro level (regulation) and on the macro level (debt-increasing stimulus or many of the large expenditure programs). But the result also is consistent with regulatory freedom entailing a well-functioning economy that is associated with lower debt, with regulatory freedom signaling a well-functioning economy that merits low interest rates from lenders and with regulatory freedom enabling political decision-makers to use methods other than debt (e.g., tax cuts) to stimulate the economy in downturns. However, an exploratory empirical analysis did not generate clear support for any particular mechanism, which points to the need for more granular work on this matter as more panel data become available in the future.

Appendix

Table A1 about here

Table A2 about here

Table A3 about here

Table A4 about here

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Tables and figures

Table 1. Descriptive statistics

Variable	Mean	Standard deviation	Observations
Government debt	51.238	32.998	329
Growth	1.807	2.586	443
Recession	1.174	1.195	476
Log population	15.783	1.581	533
Failed coup	.011	.059	519
Democracy	.797	.375	544
Presidential	.411	.493	544
Proportional	.751	.433	498
Veto players	.366	.164	515
Government ideology	.170	.437	495
Legislative fractionalization	.161	.123	495
Debt over 90 %	.131	.337	216
Size of government	5.706	1.586	482
Legal quality	6.236	1.853	461
Sound money	7.425	2.344	493
Freedom to trade	7.054	1.957	475
Regulatory freedom	6.321	1.313	463

Table 2. Debt-ratio predictors

	1	2	3	4
Lagged dependent	.655***	.613***	.604***	.573***
	(.081)	(.076)	(.076)	(.074)
Growth		-2.399***	-2.988***	-2.805***
		(.776)	(.828)	(.799)
Recession		4.889***	4.787***	4.475***
		(1.401)	(1.399)	(1.321)
Log population		.564	.529	1.220*
		(.686)	(.688)	(.742)
Failed coup				-24.010
				(31.384)
Democracy				-13.844*
				(8.136)
Presidential				-8.959***
				(2.867)
Proportional				-9.399***
				(3.305)
Veto players				23.852**
				(9.959)
Government			-4.223	-1.311
ideology			(3.456)	(3.299)
Legislative			-8.551	3.529
fractionalization			(11.062)	(11.156)
Regulatory freedom	-2.974**	-2.109*	-1.453	-5.091***
	(1.268)	(1.208)	(1.322)	(1.509)
Regional FE	Yes	Yes	Yes	Yes
Observations	258	256	255	255

Countries	68	67	67	67
R squared	.605	.669	.675	.703
Wald Chi sq.	256.51	351.06	363.89	500.82

Note: *** (**) [*] denote significance at p<.01 (p<.05) [p<.10]. All regressions include a constant term. Regions include Asia, Latin America and the Caribbean, and the formerly communist countries in Central and Eastern Europe.

Table 3. Conditional findings

	1	2	3	4	5	6	7	8	9	10
	All	Democracies	All	Democracies	All	Democracies	All	Democracies	All	Democracies
Lagged	.569***	.566***	.572***	.569***	.575***	.571***	.565***	.559***	.428***	.417***
dependent	(.073)	(.074)	(.074)	(.075)	(.074)	(.074)	(.073)	(.074)	(.063)	(.062)
Recession	-9.294	-8.664	4.533***	4.435***	4.468***	4.366***	4.726***	4.677***	3.448***	3.517***
	(8.700)	(9.062)	(1.318)	(1.325)	(1.313)	(1.315)	(1.293)	(1.293)	(1.130)	(1.133)
Veto players	24.221**	23.473**	22.694**	22.249**	130.112*	193.653**	21.399**	16.007	10.442	7.774
	(9.943)	(10.315)	(9.929)	(10.187)	(74.606)	(81.922)	(9.808)	(9.888)	(8.057)	(8.273)
Government	-1.375	-.139	16.475	23.204	-2.121	-.672	-.028	1.294	.326	1.785
ideology	(3.243)	(3.429)	(15.353)	(15.321)	(3.319)	(3.406)	(3.235)	(3.394)	(2.723)	(2.858)
Legislative	2.616	.056	4.809	2.021	2.479	-2.389	257.477***	296.565***	2.126	-.387
fractionalization	(11.029)	(11.369)	(11.229)	(11.468)	(11.174)	(11.407)	(72.037)	(76.495)	(9.392)	(9.516)
Debt over 90 %									28.084	10.473
									(18.820)	(19.139)
Regulatory	-7.494***	-7.264***	-4.376***	-4.049***	.869	4.771	2.423	3.828	-3.782***	-4.033***
freedom	(1.983)	(2.037)	(1.564)	(1.543)	(4.405)	(4.889)	(2.639)	(2.778)	(1.328)	(1.331)

Reg. *	2.045	1.940								
Recession	(1.282)	(1.341)								
Reg. * ideology			-2.643	-3.397						
			(2.251)	(2.229)						
Reg. * veto					-14.887	-24.194**				
players					(10.458)	(11.602)				
Reg. *							-37.182***	-43.369***		
fractionalization							(10.385)	(11.009)		
Reg. * debt									1.294	4.216
over 90 %									(2.709)	(2.770)
Regional FE	Yes	Yes	. Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	255	247	255	247	255	247	255	247	255	247
Countries	67	64	67	64	67	64	67	64	67	64
R squared	.706	.700	.704	.699	.705	.703	.716	.714	.793	.795
Wald Chi sq.	505.81	437.26	501.30	429.09	522.94	459.64	548.69	493.77	934.08	873.12

Note: *** (**) [*] denote significance at p<.01 (p<.05) [p<.10]. All regressions include a constant term and the full specification from Table 2, column 4. Regions include Asia, Latin America and the Caribbean, and the formerly communist countries in Central and Eastern Europe.

Table 4. Debt-ratio predictors with specific regulatory indicators

	1	2	3	4	5	6
Lagged		.573***	.648***	.643***	.653***	.642***
dependent		(.074)	(.090)	(.086)	(.092)	(.094)
Growth	-2.778***	-2.805***	-3.147***	-3.605***	-3.282***	-3.294***
	(1.077)	(.799)	(.745)	(.676)	(.785)	(.757)
Recession	4.842**	4.475***	5.691***	3.046**	6.343***	6.290***
	(2.026)	(1.321)	(1.389)	(1.351)	(1.439)	(1.421)
Log population	2.539**	1.220*	1.319	1.439*	1.886*	1.695*
	(.999)	(.742)	(.939)	(.872)	(.972)	(.945)
Failed coup	-55.825	-24.010	-51.231	-6.264	-34.242	-45.802
	(36.895)	(31.384)	(39.042)	(34.917)	(28.893)	(33.976)
Democracy	-31.398***	-13.844*	-10.293	-12.188	-6.043	-8.115
	(10.586)	(8.136)	(9.654)	(9.739)	(9.417)	(10.157)
Presidential	-16.529***	-8.959***	-8.811***	-10.946***	-7.700**	-8.493**
	(4.015)	(2.867)	(3.143)	(3.055)	(3.275)	(3.447)
Proportional	-4.536	-9.399***	-10.206***	-8.039***	-2.705	-4.667
	(4.792)	(3.305)	(3.330)	(2.801)	(3.799)	(3.063)
Veto players	37.883***	23.852**	28.953***	30.561***	25.104**	26.541**
	(14.281)	(9.959)	(11.123)	(10.639)	(11.062)	(11.455)
Government	1.432	-1.311	3.711	2.865	-.092	1.459
ideology	(4.271)	(3.299)	(3.499)	(3.178)	(3.571)	(3.645)
Legislative	-4.099	3.529	-6.335	-1.342	-9.778	-9.846
fractionalization	(16.259)	(11.156)	(11.364)	(10.779)	(11.879)	(11.930)
Regulatory	-4.629**	-5.091***	-5.823***			
freedom	(1.962)	(1.509)	(1.664)			
Credit				-6.845***		
regulation				(1.152)		

Labor					.616	
regulation					(1.192)	
Business						-1.513
regulation						(1.464)
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	305	255	196	196	196	196
Countries	67	67	67	67	67	67
R squared	.285	.703	.785	.809	.772	.773
Wald Chi sq.	129.95	500.82	597.04	728.48	569.80	556.36

Note: *** (**) [*] denote significance at p<.01 (p<.05) [p<.10]. All regressions include a constant term. Regions include Asia, Latin America and the Caribbean, and the formerly communist countries in Central and Eastern Europe.

Table A1. Definitions of variables

Variable	Definition and measurement
Government debt	Full government debt, at central government and lower levels, as a share of GDP; from IMF (2016) and World Bank (2016)
Growth	Five-year average percentage growth rate of real PPP GDP per capita, based on Heston et al. (2012)
Recession	Number of years within a five-year period that yearly growth is negative
Log population	The logarithm to the size of population at the beginning of a five-year period
Failed coup	The share of years within a five-year period in which a failed coup occurred
Democracy	Dummy for the existence of competitive electoral democracy from Bjørnskov and Rode (2018)
Presidential	Dummy for the presidential political system from Bjørnskov and Rode (2018)
Proportional	Dummy for proportional voting system from last update of Beck et al. (2001)
Veto players	Index of veto player strength from Henisz (2001)
Government ideology	Five-step index between -1 (communist) and 1 (classical liberal) of party ideology; in coalition governments, weights are parties' seats in parliament; from Bjørnskov (2015)
Legislative fractionalization	Herfindahl-Hirschmann index of (lower house) legislature; based on data in Bjørnskov (2015)
Debt over x %	Dummy for whether end-of-period government debt is above x % of GDP
Size of government	Index of the size of government, measured on scale from 0 (maximum government) to 10 (minimum government), from Gwartney et al. (2016)
Legal quality	Index of quality and independence of legal system, from Gwartney et al. (2016)
Sound money	Index of sound money – low and stable inflation and the freedom to hold bank accounts in foreign currency, from Gwartney et al. (2016)
Freedom to trade	Index of the freedom to trade and invest internationally, from Gwartney et al. (2016)

Regulatory freedom	Index of regulatory burden in credit, labor and product markets, from Gwartney et al. (2016)

Table A2. The countries included in the study

Country	Country	Country
Albania	Germany	Norway
Argentina	Greece	Panama
Australia	Guatemala	Paraguay
Austria	Guyana	Peru
Belgium	Honduras	Poland
Belize	Hungary	Portugal
Bolivia	Iceland	Romania
Brazil	Ireland	Serbia
Bulgaria	Israel	Singapore
Canada	Italy	Slovakia
Chile	Jamaica	Slovenia
Colombia	Japan	Spain
Costa Rica	Korea	Suriname
Croatia	Latvia	Sweden
Cyprus	Lithuania	Switzerland
Czech Republic	Luxembourg	Trinidad and Tobago
Denmark	Macedonia	Turkey
Dominican Republic	Malta	United Kingdom
Ecuador	Mexico	United States
El Salvador	Montenegro	Uruguay
Estonia	The Netherlands	Venezuela

Finland	New Zealand
France	Nicaragua

Table A3. Debt-ratio predictors, including all five areas of the Economic Freedom Index

	1	2	3	4	5
Lagged dependent	.579***	.566***	.581***	.576***	.573***
	(.075)	(.076)	(.071)	(.075)	(.074)
Growth	-2.822***	-3.086***	-3.098***	-2.946***	-2.805***
	(.836)	(.820)	(.818)	(.811)	(.799)
Recession	5.189***	4.919***	5.733***	4.869***	4.475***
	(1.350)	(1.369)	(1.407)	(1.349)	(1.321)
Log population	1.341*	1.364*	1.109	1.678**	1.220
	(.776)	(.796)	(.793)	(.780)	(.742)
Failed coup	-15.383	-24.368	-15.399	-17.639	-24.010
	(28.239)	(31.545)	(29.649)	(28.461)	(31.384)
Democracy	-9.337	-11.478	-8.676	-12.268	-13.844*
	(8.021)	(8.337)	(7.922)	(8.327)	(8.136)
Presidential	-6.849**	-9.179***	-7.164**	-9.223***	-8.959***
	(3.305)	(3.068)	(2.971)	(3.129)	(2.867)
Proportional	-4.269	-3.950	-3.047	-3.248	-9.399***
	(2.907)	(2.747)	(2.729)	(2.692)	(3.305)
Veto players	19.135*	22.405**	15.608	21.389**	23.852**
	(9.912)	(10.206)	(9.708)	(10.121)	(9.959)
Government	-4.062	-3.892	-6.723**	-3.734	-1.311
ideology	(3.272)	(3.291)	(3.301)	(3.298)	(3.299)
Legislative	.228	.893	-.126	1.183	3.529
fractionalization	(11.603)	(11.659)	(11.872)	(11.545)	(11.156)
Size of	-1.049				
government	(1.071)				
Legal quality		-1.737			
		(1.414)			

Sound money			2.197*		
			(1.138)		
Freedom to trade				-1.477	
				(1.191)	
Regulatory					-5.091***
freedom					(1.509)
Regional FE	Yes	Yes	. Yes	Yes	Yes
Observations	255	255	255	255	255
Countries	67	67	67	67	67
R squared	.692	.692	.696	.692	.703
Wald Chi sq.	475.74	481.11	484.10	471.05	500.82

Note: *** (**) [*] denote significance at p<.01 (p<.05) [p<.10]. All regressions include a constant term. Regions include Asia, Latin America and the Caribbean, and the formerly communist countries in Central and Eastern Europe.

Table A4. Additional tests

	1	2	3	4	5
	Fixed effects	Fixed effects	Fixed effects	OLS	OLS
	Democracies	Democracies	Democracies	Stable democracy	Stable democracy
Lagged dependent	.271***	.275***	.267***	.655***	.648***
	(.047)	(.046)	(.045)	(.068)	(.068)
Veto players	15.441	178.547**	9.678	231.366***	11.279
	(15.847)	(70.437)	(15.221)	(78.151)	(9.416)
Legislative	2.837	-1.300	357.137***	-8.968	253.203***
fractionalization	(3.891)	(22.569)	(89.143)	(12.112)	(79.291)
Regulatory	-11.386***	-1.457	.181	6.815	2.344
freedom	(2.249)	(4.733)	(3.568)	(4.742)	(2.652)
Reg. * veto players		-23.712**		-29.882***	
		(9.985)		(11.001)	
Reg. *			-53.236***		-37.459***
fractionalization			(13.102)		(11.299)
Regional FE	Yes	Yes	Yes	Yes	Yes
Observations	247	247	247	235	235
Countries	64	64	64	63	63
R squared	.608	.621	.645	.765	.758
Wald Chi / F	15.13	15.00	16.54	533.89	580.34

Note: *** (**) [*] denote significance at p<.01 (p<.05) [p<.10]. All regressions include a constant term and the full specification in Table 2, column 4. Regions include Asia, Latin America and the Caribbean, and the formerly communist countries in Central and Eastern Europe. Stable democracy denotes countries that have been democratic for at least ten years at the time of observation. Columns 1–3 should be compared to columns 4, 6 and 8 in Table 3, while columns 4–5 should be compared to columns 6 and 8 in Table 3.

Figure 1. Theoretical framework

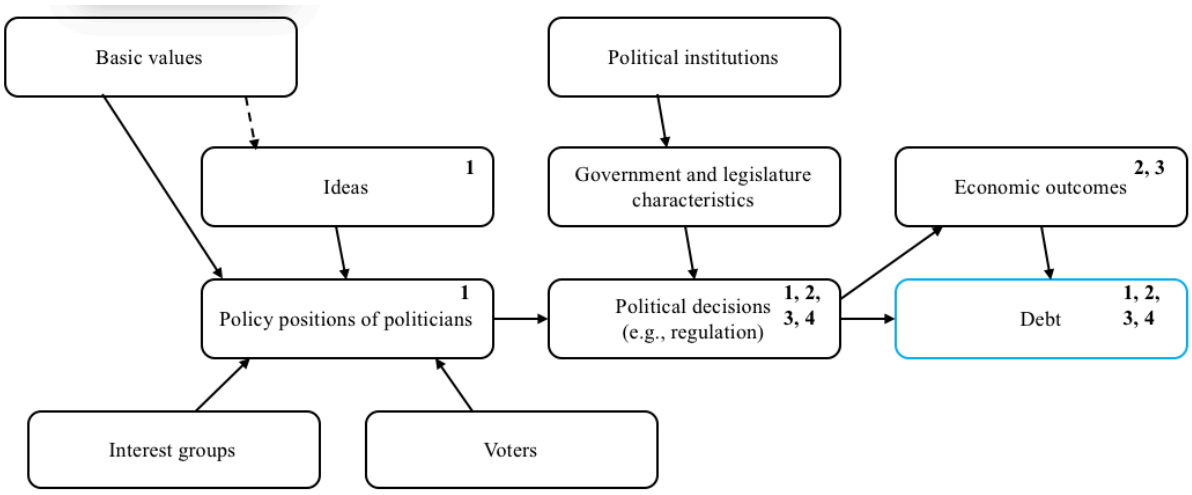


Figure 2. Debt rates, all countries in sample

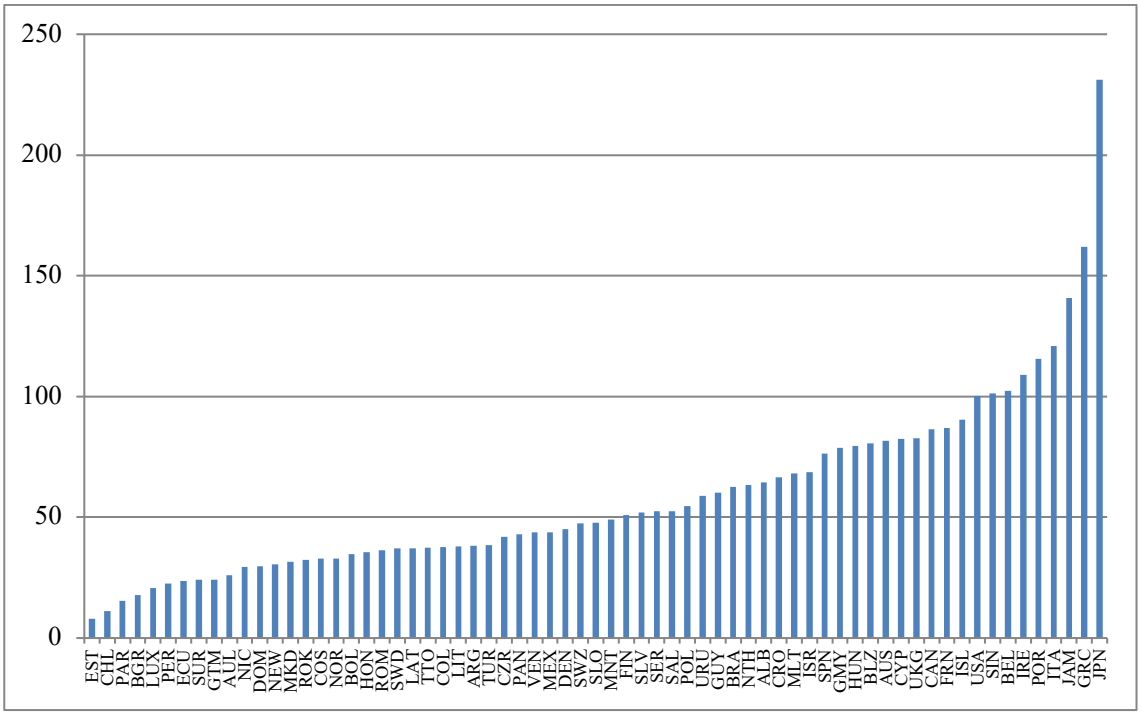


Figure 3. Effects of regulatory freedom, conditional on government ideology

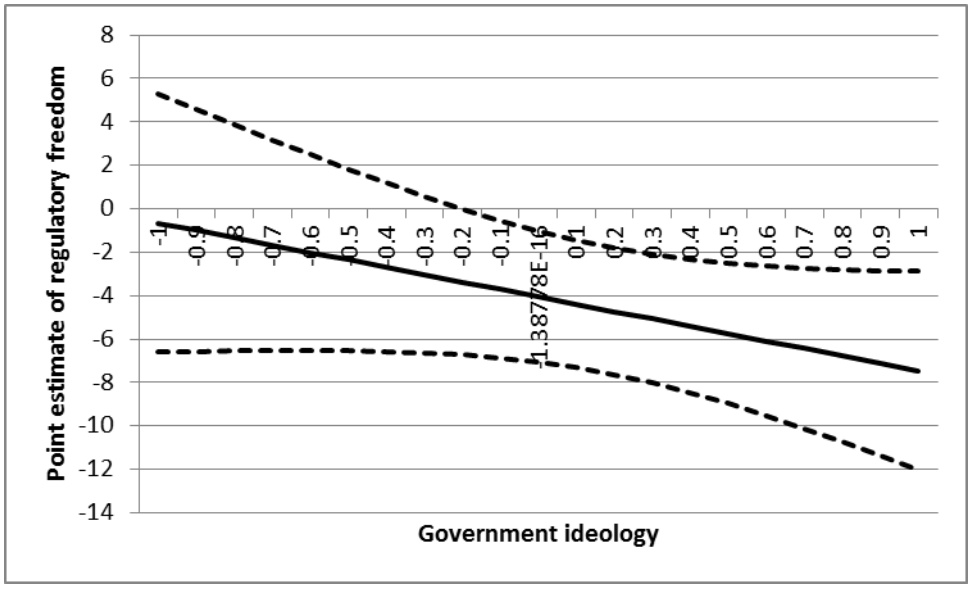
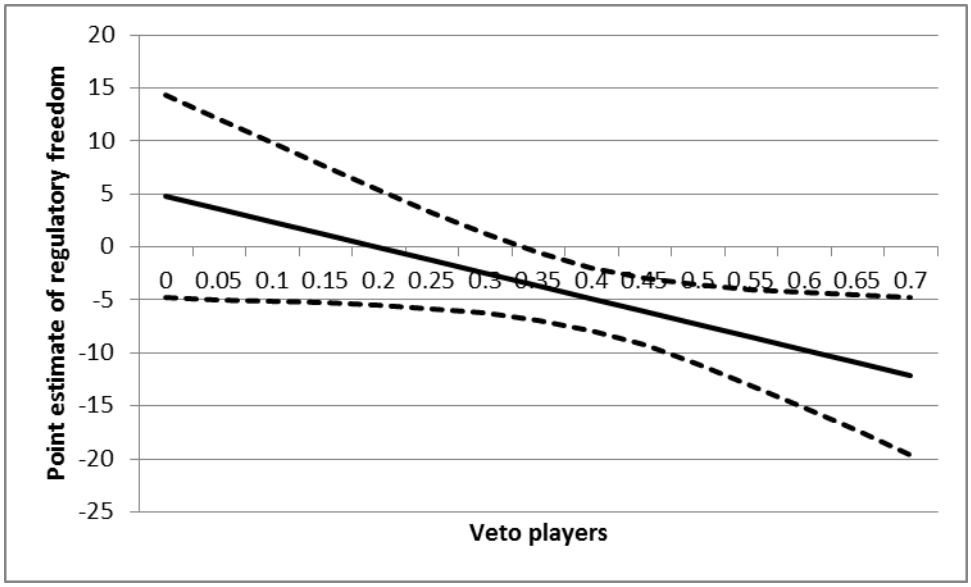
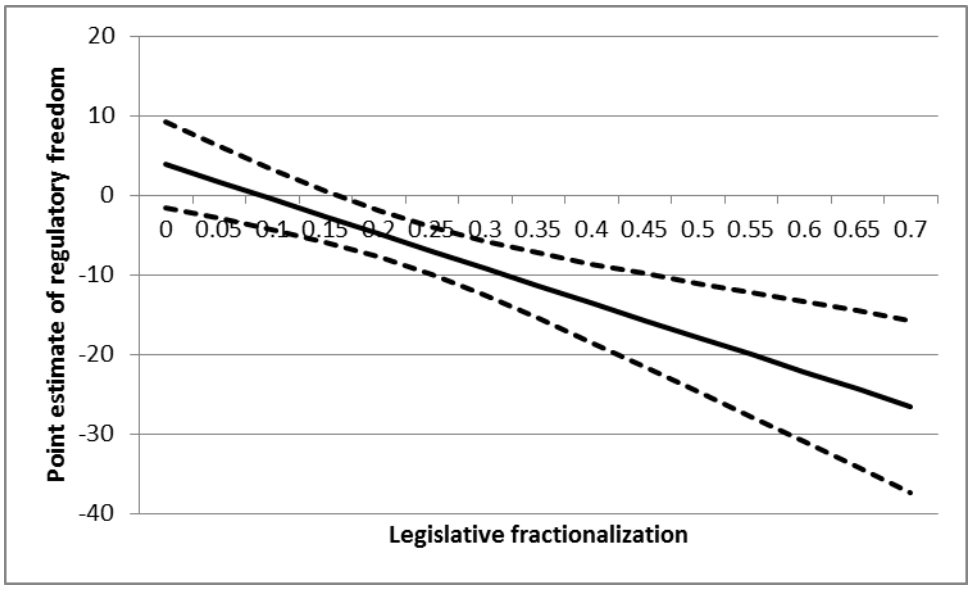


Figure 4. Effects of regulatory freedom, conditional on veto players



Note: The figure is based on results obtained with the democratic sample.

Figure 5. Effects of regulatory freedom, conditional on legislative fractionalization



Note: The figure is based on results obtained with the democratic sample.

Online appendix

In this Online Appendix, we provide Figure OA1, showing the average development of the dependent variable (government debt/GDP and of regulatory freedom, in both cases from 1980 onwards. Both curves are shown for the full but changing sample (in black) and for the sample of 18 countries for which data exist for 1980 (in grey). We refer to this figure in the article, on p. XX.

We also document the cross-sectional test referred to in Section 4.4. In Tables OA1 and OA2, we make use of cross-sectional data from 2010, moving away from the panel approach in the paper due to the very limited availability of data.

To test reflection effects as a channel, we use three indicators from the World Values Survey (2014) and the European Values Study (2011): 1) average confidence in major companies; 2) a rating of whether "government should take more responsibility to ensure that everyone is provided for" versus "people should take more responsibility to provide for themselves"; and 3) a rating of whether "competitions is good" versus "competition is harmful". The former is explored in Pitlik and Kouba (2015), while Aghion et al. (2010) associate the two latter with regulatory activity.

To test reputation effects as a channel, we make use of the fact that Standard and Poor's (2018) rates 66 of the 67 countries in our sample. We use the credit rating in 2010–2011, which we turn into numerical values with a perfect AAA rating counted as 1 and adding one for each subsequent rating step. In case the ratings changed over the period, we use the lowest rating as almost all cases with rating changes during this particular period where downwards.

Lastly, the third channel for which we could identify a potential indicator is direct economic effects. The indicator is the Grant Thornton (2018) measure of Global Dynamism, which we include

since regulatory freedom may affect debt development through a more dynamic and entrepreneurial business environment.

As noted in the paper, we first of all associate regulation with confidence in major companies as a proxy for the business or market friendliness of society. We here find a small but significant positive association with freedom from credit regulation, but only weak evidence of an association with debt development and again no change in the regulatory freedom estimate.

Turning to the measures from Aghion et al. (2010), we find even less evidence of any association with regulation. The direct associations in Table OA1, columns 4 and 7, are small and insignificant, and neither the measure of preferred government responsibility nor the assessment of competition is associated with debt. Exploring the simple cross-sectional associations, as in Aghion et al. (2010), thus does not provide evidence of reflection effects, but with the limited analysis at hand, neither can we rule out that they play an actual role.

As for reputation effects, if regulatory freedom was important for debt development and debt dynamics in most countries, one would believe that credit rating agencies ought to take it into account when rating sovereign bonds. In columns 1–3 of Table OA2, we observe that presidential institutions matter and that ratings are sensitive to recessions, as known from previous studies (e.g., Afonso, 2003). Most importantly for our purpose, we also observe a significant negative association between the rating score and regulatory freedom. For each point of regulatory freedom, we find that credit ratings on average improve two steps. Yet, when including the lagged debt level, credit ratings entirely lose significance. It thus seems more likely that credit ratings and the assessment of dynamism are affected by debt development instead of the opposite causality.

Finally, to test direct economic effects, we add the measure of global dynamism in columns 4–6 in Table OA2. We again find that regulatory freedom is associated with dynamism, although only weakly so for freedom from credit regulation. Yet, as in other applications, we find no clear evidence

of an association with debt development once a lagged dependent is added to the specification. As in other cases here, the significant association in column 8 appears to most likely be a cause of debt being reflected in the dynamism index, i.e. taking into account when the dynamism index was coded, instead of an actual effect of dynamism.

In total, while we cannot claim that these cross-sectional associations are more than indications, none of the factors tested here seem to be valid candidates for transmission mechanisms, but we cannot rule out that they do play a role either. For this, more detailed analysis using future panel data is needed.

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Table OA1. Cross-sectional test of channels

	Confidence in comp.	Debt	Debt	Government responsibility	Debt	Debt	Competition	Debt	Debt
	1	2	3	4	5	6	7	8	9
Lagged dependent			.818***			.852***			.859***
			(.078)			(.079)			(.078)
Growth	-.026	-9.265**	-5.623**	.049	-9.206**	-4.899**	-.038	-8.219**	-4.709**
	(.023)	(4.174)	(2.106)	(.063)	(4.552)	(1.998)	(.063)	(4.141)	(1.981)
Recession	-.004	8.102	12.276***	-.083	6.449	12.198***	-.038	6.041	12.021***
	(.051)	(7.043)	(3.690)	(.142)	(6.867)	(3.905)	(.131)	(6.982)	(3.975)
Log population	-.018	3.131	.047	.022	4.168	.163	.045	3.846	.177
	(.015)	(2.288)	(2.164)	(.054)	(2.710)	(2.169)	(.080)	(3.299)	(2.151)
Democracy	.115	-66.148***	-30.105**	-.472	-57.042**	-24.811***	-1.012***	-49.561*	-25.474**
	(.179)	(19.69)	(11.324)	(.386)	(27.709)	(9.069)	(.379)	(26.798)	(9.691)
Presidential	.122	-11.564	-2.095	-.395	-14.242	-3.192	.201	-20.914	-4.332
	(.090)	(12.359)	(6.099)	(.204)	(13.456)	(8.078)	(.186)	(12.894)	(7.463)
Proportional	-.121**	-15.995	-15.057*	-.223	9.512	-5.308	.282	3.665	-6.188

	(.058)	(11.192)	(8.244)	(.298)	(12.067)	(9.024)	(.409)	(13.121)	(9.151)
Veto players	-.294	68.241	54.560**	-1.424*	72.157	48.759***	1.292	41.079	43.909**
	(.373)	(55.693)	(22.652)	(.816)	(51.299)	(18.236)	(.797)	(51.093)	(19.417)
Government	.122	44.069***	18.809**	-.315	37.046**	12.588	.357	29.296*	11.336
ideology	(.138)	(15.245)	(8.663)	(327)	(17.842)	(9.681)	(.329)	(15.943)	(8.865)
Legislative	-.267	-94.367	-62.589*	.981	-65.658	-45.944	-1.101	-41.639	-42.481
fractionalization	(.454)	(59.589)	(34.816)	(.897)	(48.100)	(32.575)	(1.069)	(44.772)	(30.803)
Regulatory freedom	.051	-17.774***	-9.467***	.124	-20.561***	-8.570***	-.058	-18.522***	-8.095**
	(.061)	(6.342)	(3.472)	(.146)	(6.471)	(4.041)	(.124)	(6.469)	(3.866)
Confidence in major		-62.348**	-22.928*						
companies		(28.383)	(12.749)						
Government					10.613	2.936			
responsibility					(8.297)	(4.721)			
Competition								12.353	.444
								(8.242)	(5.958)
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48	48	48	49	49	49	49	49	49
R squared	.308	.651	.906	.429	.599	.889	.292	.604	.888

F statistic	-	-	-	579.44	4.64	31.79	2.63	3.25	30.24
Specific result									
Credit regulation	.051**	-11.417***	-8.750***	.033	-13.740***	-8.842***	-.033	-13.070***	-8.688***
	(.025)	(3.505)	(1.644)	(.056)	(3.059)	(1.577)	(.072)	(2.979)	(1.587)

Note: *** (**) [*] denote significance at p<.01 (p<.05) [p<.10]. All regressions include a constant term. Regions include Asia, Latin America and the Caribbean, and the formerly communist countries in Central and Eastern Europe.

Table OA2. Cross-sectional test of channels

	Credit rating	Debt	Debt	Global dynamism	Debt	Debt
	1	2	3	4	5	6
Lagged dependent			.778***			.882***
			(.092)			(.083)
Growth	-.036	-5.540**	-2.286	-1.212*	-13.167**	-6.919**
	(.323)	(2.631)	(1.555)	(.647)	(4.798)	(2.573)
Recession	1.413**	4.195	8.778***	-3.112***	-1.255	8.116
	(.604)	(4.644)	(3.098)	(1.162)	(8.955)	(5.031)
Log population	-.716***	6.984***	2.509	-1.094	6.073	-.133
	(.282)	(2.536)	(1.598)	(.861)	(4.184)	(2.264)
Democracy	.866	-45.739*	-21.911**	-11.426	-78.345	-15.547
	(1.913)	(24.239)	(8.723)	(6.319)	(59.397)	(16.419)
Presidential	2.962***	-31.487**	-7.572	1.555	-23.351	-1.948
	(1.092)	(13.474)	(7.638)	(2.362)	(16.598)	(8.536)
Proportional	.455	-13.174	-7.467	-3.105	-2.413	-11.514
	(1.057)	(10.862)	(6.048)	(2.681)	(16.952)	(8.549)
Veto players	-4.759	83.406**	42.764***	14.819*	79.617	31.596
	(3.789)	(37.494)	(15.744)	(8.732)	(60.878)	(21.273)
Government	.665	15.618*	11.478*	.371	55.286**	21.939*
ideology	(1.216)	(8.382)	(5.979)	(3.459)	(22.972)	(12.329)
Legislative	-2.558	-4.903	-14.846	11.443	-64.394	-69.356*
fractionalization	(3.141)	(23.396)	(21.500)	(10.938)	(62.999)	(37.523)
Regulatory freedom	-2.058**	-5.431	-6.507**	2.813**	-10.522	-6.188

	(.842)	(4.9130)	(3.201)	(1.224)	(8.139)	(4.435)
Competition						
Credit rating		3.691***	.514			
		(1.028)	(.754)			
Global dynamism					-2.405**	-.306
					(.999)	(.652)
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	66	66	66	40	40	40
Countries						
R squared	.718	.623	.865	.766	.656	.918
F statistic	21.45	6.51	23.40	-	-	-
Specific result						
Credit regulation	-.936**	-8.465***	-8.936***	1.420*	-13.173***	-8.194***
	(.373)	(2.549)	(1.710)	(.818)	(3.663)	(2.492)

Note: *** (**) [*] denote significance at p<.01 (p<.05) [p<.10]. All regressions include a constant term. Regions include Asia, Latin America and the Caribbean, and the formerly communist countries in Central and Eastern Europe.

Figure OA1. Average development of the government debt ratio and regulatory freedom