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Political institutions and debt crises

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Abstract This paper shows that political institutions matter in explaining defaults on external and domestic debt obligations. We explore a large number of political and macroeconomic variables using a non-parametric technique to predict safety from default. The advantage of this technique is that it is able to identify patterns in the data that are not captured in standard probit analysis. We find that political factors matter, and do so in different ways for democratic and non-democratic regimes, and for domestic and external debt. In democracies, a parliamentary system or sufficient checks and balances almost guarantee the absence of default on external debt when economic fundamentals or liquidity are sufficiently strong. In dictatorships, high stability and tenure play a similar role for default on domestic debt.

Keywords Sovereign debt crises · Political institutions · Early warning systems

JEL Classification D27 · F30 · F34

1 Introduction

Defaults on sovereign debt have been observed at very different debt levels. Some countries, such as Belgium, have tolerated more than 100% of GDP of debt, whereas countries such as Argentina have repeatedly defaulted at much lower levels. Of course, there are important economic conditions that make debt more tolerable in one country than in others. But it is also highly likely that political conditions matter in government decisions to default and that it is, frequently, the combination of economic and political conditions that explains differences in behavior. In fact, the literature on sovereign debt has long emphasized that

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"willingness to pay" in addition to "ability to pay" plays an important role in debt crises (Bulow and Rogoff 1989). It takes only a small step to conclude that this "willingness" will in turn be influenced by politics, i.e., by the distribution of interests and the institutions and power structures that mediate them. Also, one of most striking regularities in debt crises is that countries with histories of default have a higher propensity to resort to defaults again (Reinhart et al. 2003). Again, such "serial defaults" are observed at very different debt levels, which might also suggest that the cause is underlying political institutions. In spite of this, the empirical literature on sovereign defaults has, with few exceptions, ignored the role of politics.

This paper uses a flexible estimation technique to unearth political conditions that help countries steer clear of sovereign default. The technique allows one to test hypotheses such as that a political system with many veto players is less prone to default but only at certain levels of liquidity and/or real growth. It provides estimates of "safe zones"—thresholds for debt above which default does not occur conditional on specific political institutions. The strength of the technique we deploy is to identify such interactions and thresholds across a great number of variables. The purpose of the paper, therefore, is to take a new and sweeping look at the possible ways in which politics could interact with economic factors in providing safety from default.

We take our cue on relevant variables from the theoretical literature that focuses explicitly on the internal politics of fiscal adjustment or default. For instance, Alesina and Drazen (1991) suggest that a more *polarized government* may lead to a game of attrition and delay stabilization. Thus, a system characterized by polarization amongst veto players should have a higher propensity to default. Alternatively, a high *level of political constraints* and many veto players will restrain the executive. For instance, Kohlscheen (2005) argues that the probability of default is less under a *parliamentary system* than a presidential system, since the former imposes more constraints on the executive. When looking to the broader political economy literature, one can identify a large number of additional political variables that should bear on economic outcomes.[1] Prominent among these are *elections*, *political instability* (including large disruptions such as wars), the *length of tenure* of the chief executive and corruption. Alesina et al. (1997), for instance, discuss different theories of electoral cycles and find evidence of policy changes in the immediate aftermath of elections. For authoritarian systems, the role of tenure is important since governments with a short horizon will tend to make opportunistic decisions knowing that negative consequences will be pushed into the future (e.g., Olson 1993; Clague et al. 1996; Tullock 1987).

To date, the empirical literature on sovereign defaults is sparse. Kohlscheen (2005) studies democracies only and shows that the probability of default on external debt is lower in parliamentary democracies, when there are a large number of veto players, in coalition governments, and when the tenure of the government is long. Similarly, Saiegh (2005) finds a lower probability of default on external debt in coalition governments. Manasse et al. (2003),

[1] Amador (2003) and Alichi (2005) consider whether democracies offer greater commitment to debt repayment than non-democracies. Chang (2003) models political revolts to bring about default. Saiegh (2005) considers the role of coalition governments versus two-party contests. Outside the default literature, Roubini and Sachs (1989), Persson et al. (2000), and Keefer (2002b) have examined fiscal consequences of the political structure. Other related literature includes papers on partisan politics (Persson and Svensson 1989; Tabellini and Alesina 1990; Cusack 1997; Allers et al. 2001). Bussiere and Mulder (2000) in a study of currency crises rather than debt crises find that currency crises tend not to occur before elections and are instead bunched after elections.

henceforth MRS, find that in years with presidential elections, the probability of a debt crisis increases. Manasse and Roubini (2005) find that countries with presidential elections in less than five years have a high probability of default when international capital markets are tight.

In comparison with the existing empirical literature this paper studies the role of political institutions more comprehensively. We analyze both democratic and non-democratic regimes, whereas the literature either focuses on democratic regimes or does not differentiate across regimes; we investigate the role of a large number of political characteristics; we study both domestic and foreign debt crises (the literature has ignored domestic debt crises) and we explore the role of political variables in conjunction with each other as well as with macro-economic variables.

An innovation in this paper is the approach used to predict safety from default. The literature thus far uses mostly probit analysis to analyze the probability of default, notable exceptions being MRS and Manasse and Roubini (2005), who use CART (Classification and Regression Tree Analysis). We use the non-parametric technique developed by Osband and Van Rijckeghem (2000) to study currency crises, which is similar to but has certain advantages over CART. Essentially, we search for powerful conditions that can classify observations into two groups. In one "safe" group, defaults are historically never observed. The other group includes observations with and without default. Powerful conditions—which we call strong filters—are those that classify large numbers of observations within the first group. To give an example, defaults were never observed in parliamentary democracies with debt-service to exports ratios less than 19%, and close to 200 observations out of 745 tranquil observations satisfy the criteria, making this a powerful filter. Compared to probit, this technique (1) efficiently explores non-linearities, which is important if different ingredients are necessary in combination to steer clear of default (e.g., a low debt-service in conjunction with a favorable political situation), and (2) helps uncover the overall role of politics in debt default, including its effect through debt levels and real growth. In regression analysis, by contrast, some political characteristics might be eliminated from regressions that control for debt, fiscal deficit and growth, even if it is those political characteristics that account for low debt or favorable debt dynamics.

The remainder of the paper is organized as follows. Section 2 introduces the data used in the empirical analysis, Sect. 3 discusses the empirical strategy, and Sect. 4 presents the results. Section 5 concludes.

2 Data

For our main sample, we consider the low and middle-income countries for which we have annual data from 1974 to 2000. The sample includes 73 countries (see Table A.1). For transition countries, we include observations only from 1992 onwards. We focus on the middle and low-income countries to avoid raising doubts as to whether our results are driven by industrial countries, which have not experienced default in recent years. We use the 1974–2000 data to study defaults during 1975–2001 and reserve the last two years of data for out of sample testing (we use 2001 data to predict safety in 2002 and 2002 data to predict safety in 2003). As we aimed at both avoiding endogeneity bias and at developing a system eventually usable as an early warning system, we used lagged variables whenever practicable. In practice, this means we looked at the characteristics of "pre-debt crisis" observations (pre-crisis observations for short), or observations the year before default. As is common in the literature, we also exclude all default-observations that follow an initial entry into default.

For instance, if a sovereign was in default during 1995–2000, we exclude observations for 1996–2000 from the data. Both political and economic variables are systematically affected by default, so including these observations would bias the results.

Our sample contains 1915 democratic observations and 1652 non-democratic observations. A country is classified as democratic if the average of the Gastil Indices on political rights and on civil rights is below 5. Years in default other than the year of entry into default are not included in our sample. The default rates according to regime and type of debt—external versus domestic—are given in Table 1.

We investigate the determinants of defaults on (1) external debt, as defined by Standard and Poor's (S&P) (2003), and (2) domestic debt, as defined by S&P or a large increase in domestic credit to the government (more than 25% of *current* period total domestic credit). We used S&P (2003) for these variables, supplemented with data on domestic credit to the government from International Financial Statistics (IMF). S&P defines a default as (1) an instance where debt service is not paid as scheduled within the grace period; or (2) an exchange offer with terms less favorable than the original. The data cover local and foreign currency bonds and bank loans, and thus *exclude debt to official creditors*. Default or restructuring of debts to official creditors are likely to be motivated by different factors than those to commercial creditors, may in fact be initiated by creditors, and can be expected to have fewer negative repercussions, so the fact that the S&P data exclude arrears/restructuring on debt to official creditors is a desirable feature for our purposes. Another advantage of the S&P data is that they refer exclusively to defaults on *sovereign* debt. Data on arrears/restructuring of external debt provided in the Global Development Finance (World Bank), used in many other studies, instead include arrears by commercial entities, not just the sovereign.

Our *economic variables* on the fiscal side include total external debt, public external debt, and the overall budget balance (all scaled by GDP), debt-service/exports, government revenue/gnp, and inflation, based on IMF and World Bank published sources. There is some evidence that the sizes of external debt and debt-service/exports affect the probability of default (Detragiache and Spilimbergo 2001; MRS 2003; Kraay and Nehru 2006), but at the same time it has been noted that default may occur at very low debt levels and not occur at very high debt levels (Reinhart et al. 2003; IMF 2003). Studies have tried but failed to find evidence that the budget balance affects the probability of default (Hemming et al. 2003; MRS 2003). Several studies have found a role for inflation (e.g., MRS 2003). Studies have also found a role for openness (the ratio of exports plus imports over GDP) (Detragiache and Spilimbergo 2001; MRS 2003; Sy and Pescatori 2004). This variable can be conceived of as a measure of ease of debt-servicing, but also as a political variable indicating the sizes of interest groups which would oppose default, if default would imperil trade relations or trade credits.

We also include a number of variables to proxy for adverse shocks: real GDP growth and currency (see Reinhart 2002) and banking crises. For banking crises, we use the data of Glick and Hutchison (2002), updated with the more recent systemic and non-systemic banking crises identified by Caprio and Klingebiel (2003). For currency crises, we use a binary variable that is defined as one when the real exchange rate (end-of-period) depreciates by at least 25% in a year.

As measures of liquidity we use reserves/short-term debt and reserves over M2, variables which numerous earlier studies confirm as being important to the likelihood of default on external debt. To proxy for international liquidity conditions we include the US treasury bill rate and the London Inter-Bank Offer Rate (LIBOR).

We use a large number of *political variables.* Our main data source is Database of Political Institutions (DPI) (Beck et al. 2001; Keefer 2002a) but we also supplemented with data from other sources (see Tables A.2 and A.3).

One group of variables ("*constraints"*) measures the extent to which government is constrained by the presence of *veto players* and thus aims to measure the feasibility of policy change. A veto player is a president, prime minister, or government party with veto power over policy. This group includes the variables "system," "checks and balances," and "political constraints" (PolconIII and PolconV). The variable "system" classifies systems into presidential and parliamentary systems. When there are both a prime minister and a president, the system is classified as presidential if the president has veto power over legislation or can appoint and dismiss the prime minister and/or other ministers, dissolve parliament and call for new elections. We also checked an alternative definition of presidential/parliamentary systems according to Persson and Tabellini (2000) that is based on the existence of a vote of confidence by the legislature. Under both definitions, parliamentary systems as a rule provide a greater constraint on the chief executive. Checks and balances ("checks") is a variable that records the number of veto players in the executive branch of government, adjusted for the alignment of government parties with the opposition. Political constraints (PolconIII and PolconV) are similar variables intended to capture the difficulty of effecting change in policies. PolconIII measures the alignment of preferences across executive and legislative branches of government (the executive and each house of parliament is considered a "veto point", which is not to be confused with the concept of veto player). PolconV is derived the same way as PolconIII but includes two additional "veto points" (the judiciary and subfederal entities) across which alignment is calculated (see Henisz 2000, 2002). In addition to these constraints on the government we also consider constraints on fiscal policy execution emanating from a federal structure of government. When revenues and/or expenditures are devolved to the local level, it is more difficult to carry out fiscal adjustment. We use the variable "State," which measures whether the provincial executive and/or legislature are directly locally elected.

As an indicator of *polarization* we used "polarization", which is defined as the absolute value of the greatest difference in orientation (left, center, right) between the chief executive's party, the three largest government parties and the largest opposition party.

As indicators of *elections* we track (1) recent elections and (2) planned elections. We would like to establish whether countries are safe when there has not been a recent election and when no election is on the horizon. For recent elections we use an indicator variable denoting whether a parliamentary or presidential election was held the current or the previous year (noparel, noprel) and variables indicating years since parliamentary and presidential elections were held (ysparel, ysprel). For planned elections we used the remaining years in the current term of the chief executive (yrcurnt2).

For *length of tenure* of the executive and parliament variables we use: longest length of tenure of a veto player (tenlong); shortest length of tenure of a veto player (tenshort); the length of tenure of the chief executive (yrsoffc); and the remaining term of the chief executive (yrcurnt). We group these variables along with other variables measuring political stability, namely the share of veto players who drop from government and opposition (stabs) and "war" (including internal strife) from Nils et al. (2002).

A final political variable is "corruption". The political indicators are not highly correlated among themselves. Only very few indicators have correlations of 0.4 or above. Tenure variables tend to be highly correlated with one other. So are checks and balances, political constraints, and "system."

3 Empirical methodology

Given our desire to identify complementary factors that help countries avoid defaults, we use the non-parametric technique of Osband and Van Rijckeghem (2000) to search for conditions under which debt crises are never observed. This method is similar to the popular CART methodology, which aims to classify observations into two groups (e.g., defaulters versus non-defaulters). Like CART, its flexibility is its main strength, allowing one to uncover patterns in the data that probit analysis cannot do easily. The method handles non-linearities readily, which is important since we a priori expect important complementarities (voters may or may not favor default depending on the level of economic variables, such as debt service and growth). We also expect thresholds above which there is no marginal effect from improving fundamentals (e.g., a decrease in debt/GDP ratio is not expected to have much impact on the probability of default if debt/GDP already is low). Such patterns are not easily uncovered by probit analysis when a large number of independent variables are involved. Furthermore, in probit analysis, the general to specific modeling strategy would normally eliminate variables that are insignificant on account of being correlated with other independent variables. Thus, some political characteristics might be eliminated from regressions that control for debt, fiscal deficit and growth, even if it is those political characteristics that account for low debt or favorable debt dynamics. In classification analysis, these political factors will show up strongly. Our analysis also allows us to use more data, since observations are not dropped when observations are missing on just one characteristic, as in probit. The only requirement is for (pre-) default-years not to have missing data. Our analysis is also robust to outliers in a way that probit is not, since extreme values have no effect on whether a condition such as $x > a$ holds. Finally, the analysis handles categorical independent variables (a variable with a range consisting of several categories such as a corruption index) without the need to introduce a large number of dummy variables, which would otherwise be necessary to allow for a different impact of a move in e.g., a corruption index from a value of 1 to 2 to a value of 5 to 6. It is also not affected by heterogeneity in the relationship between default and independent variables across countries.

Classification methods such as CART allow for unequal misclassification costs, e.g., they allow one to put a heavy weight on avoiding certain types of classification errors. In our case, given our interest in identifying conditions under which default is highly unlikely, we in effect put a very large weight on avoiding classifying default observations as safe. We conduct a search over a large number of combinations of conditions (42×42), such as "external debt/GDP less than x and fiscal balance larger than sample average" to identify those conditions for which no debt crises are ever observed.

We restrict the second leg of each "and" condition to be a comparison with the sample mean in order to restrict the number of searches. Note that this also means we consider combinations such as "inflation $< x$ and inflation $<$ sample average", so that we are by the same token considering filters that contain effectively only one condition. When the effect in theory could go either way, as in the case of the number of veto players or tenure, negative values of the variables are also considered.

In practice, we search for the highest value of a variable x where a pre-crisis is observed (i.e., the year before a default), conditional on the second leg of the condition. We call the highest value of such a variable a threshold for safety. For example, we search for the largest real GDP growth rate ever observed one year ahead of default, conditional on external debt being less than sample average. This largest GDP growth rate is 9%, so we set the threshold for safety at 9% of GDP. For any value of x higher than the threshold of x, defaults were, by construction, never observed historically the next year. We label the conditions we find through this procedure filters.

It can be seen intuitively that the filter in our example is not very "useful" since there are only few countries and years among tranquil observations that fulfill the condition of real GDP growth over 9%. In fact there are only 63 tranquil observations that fulfill this condition; that is the filter provides a "pass" of safety only for 63 of the tranquil observations. Therefore the next step is to determine a minimum of observations that a filter can extract from the data in order to be a useful filter. A useful filter should also have a small error out of sample, that is, it should have a small chance of mislabeling an observation as safe.

It is easy to show formally that the confidence we can have in any one filter depends on the number of extractions (S) of tranquil observations by that filter. With a sufficiently large number of sufficiently uncorrelated and un-trended observations, as proven in Osband and Van Rijckeghem (2000), environments identified as safe bear about a $1/S\%$ risk of a sovereign debt default. Thus, in order to limit the risk of misclassification to about 1%, we would want to consider filters with at least 100 extractions or passes. In that case, for each 100 passes, one pass on average will be faulty and associated with a debt crisis. The ability to calculate the classification error analytically is an advantage of our method, compared to CART.

The proof (from Osband and Van Rijckeghem) relies on non-parametric statistics. Denote the probability of mislabeling an observation as safe from default as Pr(*pre-crisis*|*pass*). Note that this probability can be re-written as a function of Pr(*pass*|*precrisis*) using Bayes' rule

$$\Pr(precrisis/pass) = \frac{\Pr(pass/precrisis) \cdot \Pr(precrisis)}{\Pr(pass)}. \tag{1}$$

In turn, the probability Pr(*pass*/*pre-crisis*) that a filter will give a "pass" to a pre-crisis observation equals the probability that fundamentals of that pre-crisis observation exceed the threshold set in all C previous crises. Based on non-parametric statistics in the case of untrended fundamentals, this is equivalent to the probability of being the best performer in a sample of $C + 1$ observations. Filters will thus give a "pass" to a pre-crisis observation with a probability $1/(C + 1)$. Thus, $\Pr(pass|pre\text{-}crisis) = 1/(C + 1)$. Continuing our above example, 9% growth is the maximum growth observed in pre-crisis, of which there were 39 in our data. The next crisis will be the 40th crisis, and there will be a $1/40$ probability that growth will exceed 9% in the year before that crisis.

Next note that $\Pr(pre\text{-}crisis) = C/(C + T)$ and $\Pr(pass) = S/(C + T)$, assuming that the sample is representative of the whole. Substituting in the expression above, we obtain

$$\Pr(pre\text{-}crisis|pass) = [C/(C + 1)]/S \sim 1/S. \tag{2}$$

For large C, this is just slightly less than $1/S$, the inverse of the number of passes.

To avoid confusion, it has to be clarified that the safety check's out-of-sample classification error of the type Pr(*pre-crisis*|*pass*) is in fact not gauged by $1/S$, but by $1/S$ in comparison to the probability of crisis. This is because a system that simply labeled all observations as safe would have an error equal to the probability of crisis. An error smaller than this probability of crisis is therefore an improvement.

We use the cutoff of 150 extractions in our work in order to be confident that our error will be less than 1%. The in-sample probability of entry into default is 3.6–5.6% (depending on the sample, since we distinguish according to the degree of democracy and the nature of debt—see Table 1); thus a system that simply labeled all observations as safe would have an error of about 3.6–5.6%. A filter with an error of less than 1% is therefore an improvement. Note for comparison that a filter based on irrelevant variables would extract only 19 observations in the case of democracies and external debt (Osband and Van Rijckeghem 2000), compared to the 150 we require.

It should be highlighted that with larger datasets, the system will normally have a lower error rate, since S, the number of extractions, will normally be larger. Let S, C, and T double as the number of observations double. Then in equation (1) Pr(*pass*) and Pr(*pre-crisis*) remain unchanged, but Pr(*pass*|*precrisis*) declines and as a result so does Pr(*precrisis*|*pass*). Intuitively, with more data and more crises, there will be a smaller chance that the next pre-crisis observation will exceed the threshold value of fundamentals in the previous pre-crisis observations. Again continuing our previous example, if we had double the sample and therefore double the number of crises, or 78 crises, there would only be a $1/79$ chance of growth in the next pre-crisis exceeding fundamentals in all earlier pre-crises.

4 Results

We start by looking at the pattern of defaults across debt categories and regime types. Then we discuss the findings on strong filters for every type of regime and debt.

4.1 Probabilities of default

Table 1 shows the probability of default for democratic and non-democratic countries and for foreign and domestic debt. Under our definition of domestic debt default, the incidence of defaults on external debt is higher than for domestic defaults in both democracies and non-democracies, consistent with the view that foreign debtors tend to be penalized more than domestic debt holders because of governments' concerns for its voter base. An interesting feature to note is that the default rate on domestic debt is lower in non-democratic regimes (3.6 versus 4.4 for democracies). This goes against the concept of a "democratic advantage," i.e., the idea that accountability to voters confers a commitment advantage on domestic debt to democracies (North and Weingast 1989; Schultz and Weingast 2003). Defaults on foreign and domestic debt and in democracies and non-democracies could have different causal factors. We therefore chose not to pool regime types but conduct the empirical analysis that follows by regime and debt types separately.

The number of observations (country/years) is similar in all four cases. Therefore we are comparing groups of roughly similar size.

Table 1 Probability of default by regime and debt type

	Number of defaults	Total observations	Probability of default (in percent)
Democracies			
Foreign debt	39	784	5.0
Domestic debt	41	925	4.4
Non democratic countries			
Foreign debt	35	622	5.6
Domestic debt	28	779	3.6

Total observations exclude default years subsequent to the year of entry into default

4.2 Strong filters

We now present the strong filters that predict safety from debt crises in the next year. The next four tables present the list of all strong filters by regime and debt type, sorted by purely macroeconomic conditions and by political conditions.

One finding applies across regime and debt types: as far as political and institutional conditions are concerned, they matter only in conjunction with economic conditions (that is, in none of our filters are both legs political conditions). The only exception is that political factors do enter in combination with openness, which can be considered a political variable (as it affects interest groups) or an economic variable (as it is a measure of the ability to service external debt).

Table 2 shows the strong filters for safety from debt crises on *foreign debt* in *democracies*. The entries in the table are read as follows: The first filter says that no defaults on foreign debt have been observed in democracies with a parliamentary system and a sufficiently high level of reserves, specifically with a threshold of M2 over reserves that is smaller than 9.1. This filter alone yields 242 extractions, that is, it identifies 30% of all tranquil observations.

Overall, the results on *political factors* support the hypothesis that political constraints (parliamentary democracies and systems with a large number of veto players) in conjunction with favorable economic conditions help ensure safety from default. It is important to underscore the early warning nature of these results: the results state only that countries satisfying

Table 2 Democracies and foreign debt: strong filters for safety from default in the next year

	Extractions
Political conditions	
Broad money/reserves < 9.1 and parliamentary system	242
Short term debt/reserves < 0.8 and parliamentary system	193
Political constraints (PCV) > 0.5 and openness > average	188
Short term debt/reserves < 0.4 and veto players leaving government < average	187
US T-bill rate < 5 and political constraints (PCIII) > average	186
Debt service/exports (%) < 19 and parliamentary system	182
Inflation < 11 and parliamentary system	181
Total debt/exports < 1.1 and parliamentary system	159
Macroeconomic conditions	
Short term debt/reserves < 1 and real growth rate > average	308
Real growth rate > 3.5 and debt service/exports < average	290
Real growth rate > 4.3 and total debt/exports < average	274
Total debt/exports < 1.3 and real growth rate > average	229
Debt service/exports (%) < 14 and real growth rate > average	213
US T-bill rate < 5 and total external debt/gdp < average	189
US T-bill rate < 5 and overall fiscal balance/gdp > average	187
Broad money/reserves < 3.7 and official external debt/total > average	181
Short term debt/reserves < 0.55 and overall fiscal balance/gdp > average	157
Short term debt/reserves < 0.47 and official external debt/total > average	155

Strong filters are filters yielding 150 or more extractions

certain conditions are unlikely to experience a crisis within one year (they are unlikely to get into trouble quickly), not that they are unlikely to experience a crisis ever. In fact, many of our strong filters show that political constraints are not helpful when countries are already experiencing a loss in confidence, as captured by, e.g., short-term debt to reserves.

The strongest evidence relates to the form of the political system, and indicates that parliamentary systems confer a debt servicing advantage. Five strong filters involve the presence of a parliamentary system. The combination of a parliamentary system with a high level of liquidity (M2/reserves < 9 or short term debt/reserves < 0.8), a low level of inflation (below 11%) or a low level of debt service or debt to exports all indicate safety from default in the following year. This finding is consistent with the evidence in Kohlscheen (2005), who finds that parliamentary systems have lower propensities to default than presidential ones when controlling for economic fundamentals, and with our own probit analysis (results are available upon request). However, the filter methodology points to the importance of the interaction between economic and political conditions. An executive faced with a strong parliament will be more likely to service debt, but this only is true as long as debt service is not too high and/or liquidity conditions are not binding. Conversely, a presidential system is not safe from default a year later, even when economic conditions are good. This could reflect the fact that conditions can change/deteriorate quickly in a presidential system, because it is by nature less constrained.

Before continuing on to the other variables, it is worthwhile asking why a parliamentary system may be helpful in steering a country clear of default. A cursory examination shows that parliamentary systems perform better on almost all fundamentals affecting debt dynamics (growth, debt/GDP), liquidity and debt servicing capacity (STD/R, openness), as well as less standard variables (currency crisis, war, corruption, democracy) (Table A.4). The fact that there are so many variables that perform better under parliamentary regimes suggests that there is a major underlying driver such as uncertainty over property rights. Greater uncertainty may arise in two ways under presidential regimes: (1) unchecked power and less secure property rights when the presidential party is in control of parliament (2) overly conflictual relations when the presidential party is not in control of parliament or the cabinet.

Two strong filters involve the *number of veto players*. Countries with many veto players and which are simultaneously open appear to steer clear of default. This finding fits the view that countries pay their debts because of concerns over international trade, as argued in the default literature. This is discussed empirically by Rose (2005), who finds that Paris Club renegotiations are associated with a decline in trade of 8% a year. Following this interpretation, openness has an influence on the chance of default through its effect on the distribution of interests: the larger fraction of the population whose livelihood depends on trade in conjunction with a sufficient number of veto players, which ensures representation of various interest groups, the lower the chance of default. A second condition links high political constraints with low interest rates on US treasury bills (US T-bill rate $< 5\%$). This suggests that defaults are not to be expected when international liquidity conditions are good, when there are sufficient political constraints, which can be interpreted as a willingness to service debt. We also found the expected impact for high government revenues and fiscal centralization in conjunction with the number of veto players ("PolconV"), but the number of extractions was approximately only 120, below our cutoff of 150 for a strong filter.

In general the results point to the benefits of a system with strong checks and balances and a large number of veto players. We did not find a strong filter involving the absence of polarization. Thus, the results appear to run counter to the predictions of "delayed-stabilization", whereby one would expect a larger number of veto players to make agreement on how to

share the burden of stabilization more difficult. What we have found regarding the importance of a sufficient number of veto players is however somewhat more subtle, because of the required complementary conditions (high international liquidity, an open economy). We do not suggest, for example, that a country like Argentina with a large number of veto players at the time of its default, was relatively safe (since it did not meet any of the complementary conditions).

Political stability, measured by a low percentage of veto players dropping out of government or opposition, works in conjunction with a sufficient level of reserves relative to short-term debt.

None of the strong filters for foreign debt involves *elections*, though there is one filter involving elections with 145 extractions, just below our chosen threshold. That filter indicates that when short-term debt/reserves is less than 0.4, countries whose last parliamentary election was at least one year ago never experienced default. These results are consistent with the idea that large changes are implemented in the immediate aftermath of elections, as proposed in some models of political business cycles (see Alesina et al. 1997).

In terms of the macroeconomic variables we find a long list of conditions that include both internal and external conditions.

Some of the strongest results are obtained for liquidity measures. We find that no countries that had short-term debt equal to reserves, thus following the so-called Guidotti-Greenspan rule, and also had growth higher than 3.4% ever defaulted. Growth is a very important variable, as it enters in six strong filters. This can be interpreted against the role that growth plays in debt sustainability analysis, but could also be interpreted in a political sense. Pettis (2001), for example, has argued that low growth leads to dwindling support for market openness and reform. No defaults on external debt have been observed historically in democratic regimes delivering growth rates exceeding 3.5% to 4% that also had moderate-average levels of debt or debt service (in relation to their exports). Levels of reserves less than short-term debt are sufficient for safety if fiscal conditions are not binding (levels of about half short-term debt if the fiscal balance is larger than the sample average of −4.4% of GDP). Such a fiscal balance is also sufficient for safety if international interest rates are sufficiently low. This suggests that the fiscal balance only becomes binding at moderate short-term debt to reserve ratios or under reasonably tight international liquidity conditions. This might be the reason why the existing literature, which did not allow for complementarities, has not found a role for fiscal variables.

External conditions matter in that when US treasury rates are low, countries tend to be safe from default. This result neatly fits with the pro-cyclical nature of lending to emerging markets, which has been the focus of the literature of late. In years that mature market interest rates are low, a push for yields occurs, with market appetite for debt instruments of countries that would be defaulters in other years. The level of debt, and as already noted, political constraints and the fiscal balance, are the complementary conditions.

Table 3 shows the results for *domestic debt in democratic* regimes. The most striking fact in this table is that inflation less than 7.2%, without any complementary condition, is sufficient for safety from debt crisis in democracies. Adding political constraints to this inflation constraint does not help increase safety. Thus, political considerations (at least those considered in this paper) cannot help ensure safety from default on domestic obligations in democratic regimes. It may seem paradoxical that political considerations (notably political regime and constraints) are not effective in ensuring safety from default on domestic debt, but are effective for external debt. This may be because a default on domestic debt, which most often results from monetary financing of a deficit, does not necessarily involve the vote of confidence by the legislature.

Table 3 Democracies and domestic debt: strong filters for safety from default in the next year

	Extractions
Political conditions	
...	
Macroeconomic Conditions	
Inflation < 7.24	292
Inflation < 7.68 and real growth rate > average	261

Strong filters are filters yielding 150 or more extractions

Table 4 Non-democracies and external debt: strong filters for safety from default in the next year

	Extractions
Political conditions	
...	
Macroeconomic conditions	
Short term debt/reserves < 1.8 and US T-bill rate < average	250
Short term debt/reserves < 1.8 and LIBOR < average	205
Real growth rate > 5.8 and broad money/reserves < average	198
Real growth rate > 4.544 and US T-bill rate < average	171
Broad money/reserves < 4.317 and US T-bill rate < average	158
Short term debt/reserves < 0.3	156
Short term debt/reserves < 0.335 and broad money/reserves < average	151

Strong filters are filters yielding 150 or more extractions

Table 4 presents the results for *non-democratic regimes and external debt*. The finding here is as in Table 3. We could not identify a single strong filter for safety that would involve a political factor. Thus, political constraints do not ensure safety from default on external debt in non-democratic regimes.

The relevant considerations for these regimes are economic constraints and external factors. Four strong filters involve the level of international interest rates. As above, this indicates that push factors on international capital markets play a role in explaining the incidence of default. Another strong condition is the level of short-term debt relative to reserves, which in fact enters even by itself. No defaults have been observed when reserves were about three times higher than short-term debt. In combination with low international interest rates reserves need only be about half short-term debt to provide safety from default.

Table 5 shows the results for *domestic debt in non-democratic regimes*. Recall from above that this is the constellation where we find the lowest probability of default. Not surprisingly, in non-democratic regimes veto players do not appear in strong filters. Interestingly, electoral considerations do play a role, indicating that the level of regime support is important even in non-democratic settings. A low level of polarization, in combination with low inflation, is another condition for no default. Polarization—the difference in orientation between the party of the chief executive and other parties on the left-center-right axis—is the variable

Table 5 Non-democracies and domestic debt: strong filters for safety from default in the next year

	Extractions
Political conditions	
Inflation < 8.2 and polarization in government < average	281
Inflation < 8.2 and no recent elections*	243
Inflation < 8.2 and peace	242
Total debt/exports < 2.6 and longest tenure of a veto player > average	197
Total debt/exports < 2.6 and years in office of chief executive > average	192
Macroeconomic conditions	
Inflation < 7.6 and total debt/exports < average	201
Total external debt/gdp < 64.9 and official external debt/total external debt > average	199
Inflation < 5.3	190
Inflation < 7.6 and total external debt/gdp < average	168

Strong filters are filters yielding 150 or more extractions

*Recent elections refer to elections the prior or same year as the default data

that most closely fits the concept of polarization of interests in Alesina and Drazen's war of attrition, lending some support to this theory in non-democratic settings. A long tenure of the chief executive in combination with not too high a level of external debt or the absence of a war also ensures safety from default. All three conditions can be interpreted as pointing to the importance of government stability. They also show the important role of complementarities: when economic conditions are not favorable (as when inflation or external debt is relatively high) political conditions do not ensure safety from default. This is as expected. Facing a high debt, for example, even a dictator with long expected tenure may find it beneficial to default.

With so many conditions apparently guaranteeing safety from default with only a 1% error, the question arises whether it is sufficient to meet just one of the conditions for safety. The 1% error refers however to the error when one condition is met by itself, without knowledge of the results on the other tests. If a country passes one test but fails many others, the probability of crisis will be much higher than 1%, while if it meets many other tests the probability of crisis will be lower.

5 Tests of our approach

We conclude by providing two tests of the power of our approach. First, we check the range that debt variables can adopt in the group of observations labeled as safe. For this exercise we take the example of the filter "broad money/reserves < 9.1 and parliamentary system" in democratic regimes. The results are shown in Table 6.

We find that external debt ranged up to 98% of GDP and four times exports in safe country-years (those with broad money/reserves < 9.1 and parliamentary system), a very wide range. Thus the range of debt that can nevertheless be identified as safe under certain economic and political conditions is considerable. This testifies to the power of the filter approach in identifying conditions for debt sustainability that would not be identified with simple rules.

Table 6 Range of debt variables in episodes labeled safe based on "broad money/reserves < 9.1 and parliamentary system". Comparison between pre-crisis and tranquil observations

	Total external debt/GDP			Total external debt/exports		
	Pre-crisis	Tranquil	If broad money/reserves <9.1 and parliamentary system	Pre-crisis	Tranquil	If broad money/reserves <9.1 and parliamentary system
Mean	62.04	46.43	41.20	2.30	1.63	1.00
Maximum	187.33	230.15	98.0	6.51	16.86	3.98
Minimum	18.60	0.49	4.0	0.54	0.06	0.07
Std. dev.	36.80	32.77	20.7	1.10	1.54	0.66
Observations	38.00	669.00	221.00	38.00	654.00	219.00

Table 7 Prediction for countries that experienced default in 2002 or 2003 (out-of-sample test using one-year lagged data)

	Gabon 2002	Moldova 2002	Nigeria 2002	Paraguay 2003	Uruguay 2003
Parliamentary system and M2Y/R < 9.1	Not safe	Not safe	Not safe	Not safe	Not safe
STD/R < 1 and real growth > 3.4%	Not safe	Not safe	Not safe	Not safe	Not safe
US treasury rate < 5 and debt/gdp < 57.4%	Not safe	Not safe	Not safe	Safe	Not safe

Second, we test the out-of sample performance of three relatively uncorrelated filters for external debt in democracies: (1) a parliamentary system with broad money/reserves of less than 9; (2) short-term debt/reserves of less than one and real growth above 3.4%; and (3) US treasury bill rate less than 5% and debt/GDP less than 57%. These filters individually each have over 200 extractions and are uncorrelated in the sense that they each extract a large number of observations that the others do not (see Osband and Van Rijckeghem 2000 for further details on the methodology). We check whether any of the default countries during 2002–03 satisfied these filters (since 2003 no new sovereigns entered default). Defaults on external debt in democracies during that period occurred in Gabon (2002), Moldova (2002), Nigeria (2002), Paraguay (2003), and Uruguay (2003).[2] We find that the three filters performed well, with an error rate of about 1% (one error for about 100 passes), compared to a frequency of crisis of 5%. Thus, we conclude that these filters may serve as an early warning system for debt default (Table 7).

[2]S&P classifies Indonesia as a default because of a restructuring of syndicated bank credits at terms less favorable than the original in April 2002. These terms were required by the Paris Club of official creditors in April 2001. For this reason, it is inaccurate to characterize Indonesia as entering default in 2002 for purpose of our study. It is also not characterized as a default in other studies. See Sturzenegger and Zettelmeyer (2006) who provide an in-depth discussion of the last wave of debt defaults. Including Indonesia our error rate would be two percent rather than one percent.

6 Conclusions

The main findings are as follows. First, we find that the factors that safeguard countries from default vary substantially across democracies and non-democracies and across debt types. Second, we find strong evidence that political institutions help countries steer clear of default, but only in conjunction with (1) strong international liquidity or (2) favorable economic fundamentals, such as high foreign exchange reserves, a low debt-service to exports ratio and high growth, or (3) sufficient openness. There is thus no simple political panacea that ensures safety from default.

We find inter alia that in democracies political constraints (a parliamentary regime, a large number of checks and balances) are helpful in avoiding default but only when the economic situation is supportive.

Further exploration showed that the advantage of parliamentary regimes in democracies stems from better performance on a wide range of factors affecting debt-dynamics (low debt-ratios, high growth and openness, low corruption, few currency crises), as well as a lower probability of default holding constant these factors. The purpose of this paper was to uncover empirical patterns, rather than to present possible explanations for these results. However, we speculate that the underlying factor in the better performance of parliamentary regimes may be greater control of uncertainty and better commitment technology. Presidential regimes may produce more uncertainty through (1) unchecked power and less secure property rights when the presidential party is in control of parliament and/or (2) overly conflictual relations when the presidential party is not in control of parliament or the cabinet. Certainly, these issues would merit further research.

Another empirical regularity we uncover is an absence of default on domestic debt in non-democratic regimes characterized by less polarization, long tenure, and stability (absence of recent elections and war) in conjunction with macroeconomic stability (low inflation).

We also confirm the role of certain economic variables (liquidity, growth, inflation, and openness) found in the literature. And we find—in contrast to the existing literature—a role for the fiscal balance, once we allow for certain complementary conditions. We find evidence that small fiscal deficits ensure "safety" provided international interest rates are low. The literature thus far has not been able to uncover a role for the fiscal deficit, and our results here attest to the power of an approach such as ours that incorporates complementary conditions.

A further finding is that the non-parametric approach is powerful in the sense that we are able to accurately predict safety from defaults even at very high levels of debt and that our classification system performs well as an early warning for the latest set of sovereign defaults.

Our approach can also contribute to the debate in international institutions about appropriate "debt thresholds," or maximum recommended debt levels. In the past, debt sustainability analysis was mostly based on economic considerations, and was frequently distilled into simple rules of thumb. For instance, in the context of the initiative to alleviate the debt burden of highly indebted poor countries (Highly Indebted Poor Country Initiative, HIPIC), the threshold for indebtedness was set at debt/exports larger than 150% (or in certain cases 250% of fiscal revenues). Our analysis lends support to suggestions of, e.g., Kraay and Nehru (2006) that "smart thresholds" for debt should be related to the quality of policies and institutions.

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Appendix

Table A.1 Countries included in the sample

Afghanistan	Lithuania
Algeria	Madagascar
Argentina	Malawi
Bangladesh	Malaysia
Bolivia	Mali
Botswana	Mauritius
Brazil	Mexico
Burkina Faso	Moldova
Burundi	Morocco
Cameroon	Niger
Chile	Nigeria
Colombia	Oman
Costa Rica	P. N. Guinea
Cote d'Ivoire	Pakistan
Cyprus	Panama
Czech Rep.	Paraguay
Dom. Rep.	Peru
Ecuador	Philippines
Egypt	Poland
El Salvador	PRC
Estonia	Romania
Ethiopia	Russia
Gabon	S. Africa
Guatemala	Senegal
Haiti	Sierra Leone
Honduras	Slovakia
Hungary	Sri Lanka
India	Sudan
Indonesia	Thailand
Jamaica	Trinidad-Tobago
Jordan	Tunisia
Kazakhstan	Turkey
Kenya	Ukraine
Korea	Uruguay
Latvia	Venezuela
Lebanon	Zambia
Lesotho	Zimbabwe

Table A.2 Summary statistics for democracies

Variable	Definition	Source	Mean	Median	Max.	Min.	Std. dev.
BCRIS	Systemic and borderline banking crises	Glick and Hutchison + Caprio and Klingebiel	0.25	0.00	1.00	0.00	0.43
CAGNP	Current account/GNP	MRS	−3.54	−3.46	33.88	−39.49	5.94
CCRIS	Currency crisis	Own calculations	0.09	0.00	1.00	0.00	0.28
CHECKS	Checks and balances	DPI	3.23	3.00	18.00	1.00	1.83
CORRUPT	Control of corruption	ICRG merged with TI	2.61	3.00	6.00	0.00	1.08
DEBTLOCAL	Default on local currency debt	S&P, own calculations	0.13	0.00	1.00	0.00	0.34
DEBTSP	Default on foreign currency debt	S&P	0.26	0.00	1.00	0.00	0.44
DEMOCRACY	Average of 2 indeces	Gastil	2.93	3.00	4.50	1.00	1.03
DNONOIL	Non-oil producers	MRS	0.92	1.00	1.00	0.00	0.26
DSX	Debt service/ exports (%)	GDF	21.27	18.67	181.60	0.02	15.19
GX	Export growth (%)	GDF	9.40	8.13	204.05	−34.53	16.91
INF	Inflation (%)	IFS	75.89	11.41	11749.63	−68.00	518.04
LIBOR	Libor (%)	MRS	9.44	7.63	17.06	5.38	3.50
M2YR	M2/reserves	IFS	9.90	4.15	348.01	0.00	24.50
OBY	Overall fiscal balance/GDP (%)	MRS	−4.43	−3.71	19.42	−48.78	5.67
ODTD	Official debt/total debt (%)	GDF	46.26	44.05	99.93	0.00	26.82
OPEN	(imports + exports)/ GDP (%)	MRS	78.33	67.31	436.35	11.94	45.53
PAREL	Parliamentary elections	MRS	0.25	0.00	1.00	0.00	0.43
PCIII	Political constraints (polcon III)	Wharton U.	0.31	0.37	0.65	0.00	0.19
PCV	Political constraints (polcon V)	Wharton U.	0.43	0.43	0.86	0.00	0.28
PEACE	No war	Nils et al.	0.77	1.00	1.00	0.00	0.42
PEDY	Public external debt (%)	MRS	40.72	32.08	177.82	1.39	31.52

Table A.2 (*Continued*)

Variable	Definition	Source	Mean	Median	Max.	Min.	Std. dev.
POLARIZ	Polarization of government	DPI	0.43	0.00	2.00	0.00	0.77
PREL	Presidential elections	MRS	0.12	0.00	1.00	0.00	0.32
REVY	Government revenue/GNP	MRS	22.9	21.3	76.1	7.1	10.2
RGRWT	Real gdp growth	MRS	3.33	4.09	67.7	−57.0	6.38
STABS	Percent of veto players who leave government	DPI	0.16	0.00	1.00	0.00	0.32
STATE	Ranges from 0–2 depending on whether Provincial executive and/or legislature are locally elected	DPI	0.8	1	2	0	0.8
STDR	Short-term debt/reserves	GDF	3.79	0.84	1176.6	0.008	39.16
STTD	Short-term debt/total debt (%)	GDF	15.29	12.24	83.36	0.09	11.81
SYSTEM2	Parliamentary system	DPI	0.31	0.00	1.00	0.00	0.46
TDEG	Total external debt/GDP (%)	GDF	57.54	47.84	249.28	0.49	39.59
TDEX	Total external debt/exports (%)	GDF	2.06	1.64	16.86	0.06	1.77
TENLONG	Longest tenure of a veto player	DPI	6.84	4.00	46.00	1.00	6.93
TENSHORT	Shortest tenure of a veto player	DPI	3.32	2.00	39.00	1.00	3.38
UST	3-months US Treasury bill rate	MRS	6.35	5.51	14.08	3.02	2.42
YRCURNT2	Remaining terms of chief executive	DPI	3.13	3	7	1	1.43
YRSOFFC	Years in office of chief executive	DPI	5.28	3.00	46.00	1.00	6.54
YSPAE	Years since parliamentary elections	MRS	1.93	2.00	15.00	0.00	2.09
YSPRE	Years since presidential elections	MRS	2.16	2.00	15.00	0.00	2.29

Table A.3 Summary statistics for non-democratic regimes

Variable	Definition	Source	Mean	Median	Max.	Min.	Std. dev.
BCRIS	Banking crisis	Glick and Hutchison	0.2	0	1	0	0.4
CAGNP	Current account/GNP	MRS	−3.8	−3.6	19.5	−33.5	6.1
CCRIS	Currency crisis	Own calculation	0.09	0	1	0	0.3
CHECKS	Checks and balances	DPI	1.4	1	8	1	0.9
CORRUPT	Control of corruption	ICRG merged with TI	2.	2	5	−0.2	1.1
DEBTLOCAL	Default on local currency debt	S&P, own calculation	0.052	0	1	0	0.22
DEBTSP	Default on external debt	S&P	0.26	0	1	0	0.44
DEMOCRACY	Average of 2 indeces	Gastil	5.5	5.5	7	4.5	0.7
DNONOIL	Non-oil producers	MRS	0.9	1	1	0	0.3
DSX	Debt service/exports	GDF	20.9	18.6	77.8	0.2	13.5
GX	Export growth	GDF	8.0	7.0	187.1	−60.1	20.2
INF	Inflation	IFS	28.7	10.3	1879.9	−14.9	121.1
LIBOR	Libor	MRS	10.4	10.6	17.1	5.4	3.5
OBY	Overall fiscal (%) balance/GDP	MRS	−5.9	−4.9	12.8	−57.7	7.0
ODTD	Official debt/total debt (%)	GDF	54.0	54.8	100	4.5	25.1
OPEN	(imports + exports) /GDP	MRS	70.2	58.8	410.0	10.3	46.1
PAREL	Parliamentary elections	MRS	0.10	0	1	0	0.30
PCIII	Political constraints (polcon III)	DPI	0.05	0	0.58	0	0.13
PCV	Political constraints (polcon V)	DPI	0.08	0	0.78	0	0.20
PEACE	No war	Nils et al. (2002)	0.75	1	1	0	0.43
PEDY	Public external debt (%)	MRS	47.1	37.2	266.1	0.9	34.2

Table A.3 (*Continued*)

Variable	Definition	Source	Mean	Median	Max.	Min.	Std. dev.
POLARIZ	Polarization of government	MRS	0.036	0	2	0	0.25
PREL	Presidential elections	MRS	0.052	0	1	0	0.22
REVY	Government revenue/GNP	MRS	21.5	19.3	48.4	7.1	8.6
RGRWT	Real gdp growth	MRS	3.44	4.07	44.5	−42.2	6.70
STABS	percent of veto players who leave government	DPI	0.10	0	1	0	0.27
STATE	Ranges from 0–2 depending on whether Provincial executive and/or legislature are locally elected	DPI	0.4	0	2	0	0.6
STDR	Short-term debt/reserves	GDF	21.0	1.0	2268.1	0.0004	128.9
STTD	Short-term debt/total debt	GDF	14.2	12.1	83.4	0.013	11.6
SYSTEM2	Parliamentary system	DPI	0.083	0	1	0	0.28
TDEG	Total external debt/GDP (%)	GDF	66.2	52.4	415.9	0.13	49.0
TDEX	Total external debt/exports (%)	GDF	3.1	2.1	36.5	0.006	3.9
TENLONG	Longest tenure of a veto player	DPI	11.1	9	45	1	8.9
TENSHORT	Shortest tenure of a veto player	DPI	7.9	5	37	1	7.5
UST	3-month US Treasury bill rate	MRS	6.9	5.8	14.1	3.0	2.7
YRCURNT2	Remaining terms of chief executive	DPI	3.1	3	7	1	1.5
YRSOFFC	Years in office of chief executive	DPI	10.6	8	45	1	9.0
YSPAE	Years since parliamentary elections	MRS	4.0	3	22	0	4.1
YSPRE	Years since presidential elections	MRS	2.9	2	13	0	2.8

Table A.4 Averages by regime (democracies only)

Variable	Mean presidential regime	Mean parliamentary regime	P-value difference = 0*
Entry into external default (probability)	0.07	0.02	0
External debt/GDP	52.5	40.4	0
Public external debt/GDP	37.4	26.6	0
Debt service/exports	20.9	16.1	0
Short-term debt/reserves	1.7	0.9	0
Real GDP growth	3.1	4.3	0
Control of Corruption (ICRG index)	2.5	3.0	0
Current Acount/GDP	−3.7	−2.7	0.05
Currency Crisis (probability)	0.08	0.04	0.02
Checks and balances (DPI index)	2.6	4.3	0
Openness (imports + exports)/GDP)	72.0	95.3	0
Absence of Democracy (Gastil index)	3.2	2.7	0
War (dummy variable)	0.11	0.04	0
Institutional Investor Rating (score)	36.9	42.4	0
GDP per capita (95USD, PPP)	4694	4171	0.02
Fiscal balance/GDP	−4.6	−4.1	0.36
Official debt/total debt	47.2	45.3	0.34

*Difference in means-test allows for different variances in the two groups

Variable definitions are given in Table A.3

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