Determinant of Sovereign Default– Does Political Factors Matter?

Sherry Xinrui Yu

Boston University

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Abstract

In this paper, I study the impact of political risk on sovereign default. An extended model of Alesina and Tabellini (1990) shows that political instability increases the likelihood of default. To test the theoretical implication, a panel logit model is adopted to estimate the effect of political factors, along with other macroeconomic variables on the probability of default. Data from 68 countries in the period of 1970 to 2010 is used to conduct the study, including both developed and developing countries. Some key findings suggest that a country is more likely to default when i) it has a relatively younger political regime in place; ii) it faces a higher chance of political turnover; and iii) it has a less democratic political system. Economic and liquidity factors are also vital as a country with stronger growth and less external debt is less likely to experience sovereign debt crisis. Robustness tests using alternative measures of political risk and EMBI sovereign bond spreads also support the baseline findings.

1 Introduction

Sovereign debt crisis has captured the center of attention in the recent global economic recession as several European states fell on the edge of default. Debt restructuring and default have occurred frequently between 1980 and 2000[1]. Specifically, several Latin American countries suffered with debt issues in the late 1980s followed by similar phenomenon in numerous Asian countries during the 1997 East Asian Crisis. Stepping into the 21st century, sovereign debt problems have been rather uncommon and limited in impact until the outbreak of the 2008 Global Recession. At the end of 2009, fears of sovereign debt crisis developed among global investors as the debt level rose around the world accompanied by the downgrading of government bonds in Greece and Spain. International borrowing is subject to a special risk factor referred to as the *sovereign risk*, which captures the possibility of debt default and restructuring posing significant losses to investors. Global credit market operates distinctively as government borrowings are usually lack of physical collateral. Creditors have limited ability to penalize a country in default and minimal means to recoup lost value. The government plays a critical role in the event of default since it is the ultimate decision maker in this situation. This paper studies both theoretically and empirically the determinants of sovereign default with special focus on political factors. The objective is to explore the effect of political risk on the probability of sovereign default.

A debtor country could default either due to lack of economic resources to repay, or simply unwilling to fulfill the responsibility when capable. Eaton and Gersovitz (1981) is the first to distinguish between 'ability to pay' and 'willingness to pay'. The former is determined

[1]See Reinhart and Rogoff (2009) for a survey

by macroeconomic conditions and the latter by political factors. A default decision could be highly influenced by political conditions[2]. Outright example includes default occurred during war time or significant transition of power. A government with sufficient liquidity may be unwilling to render debt incurred by its predecessor. Indirect effects of political orientation are evident from two examples. First, Hungary suffered a consecutive negative GDP growth from 1990 to 1994 after the collapse of the former Soviet Union, and struggled with a prolonged hyperinflation era. The country was on the verge of default several times but managed to find an alternative because the government was in fear of losing support from the Western world in light of default (Verma 2002). On the contrary, Russia voluntarily defaulted on foreign-denominated debt in 1998. The country engaged in an unrealistic fixed-exchange rate regime that was draining out the foreign reserves. The government was capable of making repayments in domestic currency but chose to default on foreign-denominated bonds, which later concluded with a floating currency at the expense of global investors. Argentina fell in similar circumstance later in 2001. Some restructuring and dispute over the Argentinian default even remain unresolved today[3]. Political consideration has significant impact on the decision of default but is not well studied in the literature. The most common empirical challenge researchers encouter is the ability to accurately measure political risk.

Recent development in constructing large panel data to measure political uncertainty has assisted the study of its impact on sovereign default. This paper utilizes data from the Polity IV project and Freedom House to infer about a country's political stability by examining

[2]Hatchondo and Martinez (2010) discuss the politics of sovereign default in detail. They argue that political turnover causes sovereign default risk to increase dramatically, where a more stable political system reduces the likelihood of default.

[3]An Argentinian vessel was seized in October, 2012 by debtors from previous default.See http://www.reuters.com/article/2012/10/24/ghana-argentina-ship-idUSL5E8LOHSL20121024

"concomitant qualities of democratic and autocratic authority" (Polity IV Project, 2012). Along with other macroeconomic factors, the objective of this paper is to investigate how political characteristics affect the probability of sovereign default. Prior empirical research on sovereign debt crisis mostly focus on bond spreads. A surge in bond spread is interpreted as an increase in the probability of default. Political implications may not always be well-represented in bond spreads, but have direct impact on default decisions. In this paper, I use a panel logit model to study the direct link between sovereign default and political characteristics while taking consideration of relevant macroeconomic conditions. Some key findings suggest that a country is more likely to default when i) it has a relatively younger political regime in place; ii) it faces a higher chance of political turnover; and iii) it has a less democratic political system. Economic and liquidity factors are also vital in the sense that a country with stronger growth and less external debt is less likely to experience sovereign default.

This paper also provides a theoretical framework that extends the model by Alesina and Tabellini (1990) to study the effect of political uncertainty on sovereign default decisions. The theoretical connections between political risk and default analyzed in the paper are supported by empricial findings. First, within the model, there is a positive relationship between the probability of potential change in the political party in power and sovereign default. Moreover, consumption falls in light of default. This is consistent with findings from Mendoza and Yue (2011).

The rest of the paper is organized as follows. Section 2 provides an overview of the literature on the determinants of sovereign default. Section 3 discusses the theoretical framework that links sovereign default and political stability. Data, descriptive statistics and empirical

specifications are presented in Section 4. Section 5 summarizes the empirical results obtained from the logit model. Robustness and sensitivity analyses are reported in Section 6. Section 7 concludes.

2 Literature Review

This paper builds on the foundation laid by prior work. The first related strand of literature is the theoretical model of sovereign default. Eaton and Gersovitz (1981) emphasizes on the reason why international lending takes place, and discusses the incentive to repay external debt. Distinction between solvency and political influences is carefully explained. In a follow up paper, Eaton, Gersovitz and Stiglitz (1986) states that 'willingness to pay' contributes more to a default than simple insolvency or illiquidity. In the presence of moral hazard and adverse selection, incomplete information available to lenders also presents difficulties in assessing the borrower's true ability to pay. One of the pioneer theoretical models taking political risk into consideration is Alesina and Tabellini (1990), which considers the effect of political uncertainty on debt levels and fiscal policy. Ozler and Tabellini (1991) finds the existence of multiple equilibria involving default, when two types of government rotate in power. Following this initial setup, Cuadra and Sapriza (2008) shows that a government may choose to default in light of uncertainty in election results, caused by the ruling party optimally taking excessive debt under precautionary motive. Hotchondo et. al (2009) discusses how the presence of heterogeneous borrowers affects the probability of default when one type of borrower is more patient than the other one. The authors argue that debt level goes up when the patient incumbent fears to be replaced by the impatient whose optimal

allocations are less favorable. Arellano and Kocherlakota (2008) models an economy where sovereign default is the result of coordination of domestic entrepreneurs facing difficulties in liquidating large-scale assets.

Numerous research papers try to empirically assess the determinants of credit spreads in emerging markets. Edwards (1984) finds that external debt, debt service, current account balance and international reserves are key factors. Min (1998) studies a broader set of macroeconomic variables and find that in addition to Edwards' findings, inflation rate, exchange rate and terms of trade also have significant impact on credit spreads. Nonetheless, Westphalen (2001) tests the variables identified in the structural models (funding costs, interest rate, market illiquidity, etc) and finds that these factors only account for one fifth of the variations in sovereign bond spreads. Similarly, Eichengreen and Mody (1998) finds that changes in macroeconomic variables only explain a fraction of spread variation between 1991 and 1996. In a more recent study, Rowland and Torres (2004) finds that credit ratings are also influenced by macroeconomic variables. Among these empirical papers, political risk factors have received limited attention. Ferrucci (2003) comments on the importance of political factor in explaining the residuals of bond spreads but presents no empirical assessment. Recent development in this matter is presented in Baldacci, Gupta and Mati (2011), which uses a panel of 46 emerging markets from 1997 to 2008 to study the specific impact of political risk and fiscal stability on EMBI spreads[4]. The authors find that lower political risk and less effort on fiscal consolidation are associated with tighter spreads.

Quantitative studies on determinants of sovereign default in the past usually focus on

[4]EMBI spread is defined as the difference between sovereign bond yield of emerging markets and the US treasury bill rate with comparable maturities.

specific events. Cline (1995) and Aggarwal (1996) discuss the 1980s' South American crisis, while Roubini and Setser (2004) and Sturzenegger and Zettelmeyer (2006) focus on more recent cases of crisis. Although many researchers try to find the determinants of sovereign risk and default, few have focused on political and institutional factors. The findings also appear highly inconsistent. Verma (2002) uses a panel of 30 developing countries from 1975 to 1995 to study the determinants of sovereign default and finds that more democratic countries tend to default more. He comments on the inefficient use of borrowed money in countries with higher level of democracy that leads to more defaults. When designing an early warning system for debt crisis, Manasse, Roubini and Schimmelpfennig (2003) finds that before and during a debt crisis, the probability of default is higher for countries with lower ranking in the index of freedom status. By studying 73 countries from 1974 to 2000, Van Rijckeghem and Weder (2009) find that countries with parliamentary system are safe from default when their economic fundamentals are sound. In a related work, Manasse and Roubini (2009) finds that political instability aggravates illiquidity problem for defaulting countries. Bordo and Oosterlinck (2005) studies a panel of 29 countries from 1880 to 1913 and finds that half of the default incidents occurred during the sample period were around political turnovers. Inconsistent findings motivate further research on the possible link between default and political characteristics.

Among the few work that takes consideration of political risk factors, none of which emphasizes on its direct impact on the probability of sovereign default. Moreover, these studies tend to utilize a narrow period and focus only on developing countries. As mentioned in the introduction, developed countries are also vulnerable to default risk and may be subject to political instability. In addition, the measures of political risk presented in these papers

are rather limited with many focus only on the level of democracy and political freedom. The main novelty of this paper is to use a broader set of data with a variety of direct political risk and government stability measures to assess the impact on sovereign default.

3 Theoretical Framework

This section outlines a simple theoretical framework that illustrates the role of macroeconomic conditions and political stability on sovereign default, adapted from Alesina and Tabellini (1990), Ozler and Tabellini (1991) and Cuadra and Sapriza (2008). A survey by Carmignani (2003) reviews the literature on political models involving policy design and macroeconomic outcomes. According to these papers, sovereign borrower faces uncertainty in next period's election result and is motivated to implement policies to restrain resources available to the potential successor. The strategic use of debt may be helpful in explaining deficit and debt build-up in industrialized countries, as well as default decisions. Political economy theories suggest that elections, government stability and characteristics of the policy maker help to explain debt, deficit and fiscal policy[5].

Political uncertainty and instability arise when parties who are heterogeneous in political views compete for power. The timing of election and fragmentation of the government affect the choice of optimal level of debt. In this section, I present a simple two-period model to illustrate the impact of political risk on default decisions.

[5]See surveys by Alesina and Perotti (1994), Drazen (2000) and Gartner (2000).

Consider a two-period model where the generic voter i maximizes:

$$U_i = E\left\{\sum_{t=1}^{2} \alpha_i u(x_t) + (1-\alpha_i)u(y_t)\right\} \tag{1}$$

where E is the expectation operator, x and y are two types of public goods consumed each period, t denotes time, and $\alpha_i \in [0,1]$ is the weight placed on good x. The utility function is increasing and concave with $u'(\cdot) > 0$ and $u''(\cdot) < 0$. Without loss of generality, we assume $u(0) = 0$.

There are two political parties, X and Y who compete in the election held at the end of period 1. Each generic party maximizes the same utility function with α_j, $j = X, Y$, where $0 \leq \alpha_Y < \alpha_X \leq 1$. In words, this implies party X cares more about good x while party Y emphasizes on y. Given the structure of this model, the parameter α_i fully characterizes individual preference and voting behavior, which implies that the median voter theorem applies[6]. To create instability, let us assume that the position of the median voter changes with probability $\pi \in [0,1]$. The existence of π creates election uncertainty, where the incumbent party in period 1 is not guaranteed to stay in power next period. Moreover, the difference in α between the two parties create political fragmentation. Both factors are important in determining the probability of default.

In order to finance public expenditure, the government is entitled to one unit of output in period 1, and e units in period 2 where $e \in [1, \bar{e}]$ and is uniformly distributed with a continuous positive density function $dF(e) = 1/(\bar{e} - 1)$. The amount of endowment in period 2 is designed to be more than that of period 1 in order to induce borrowing for

[6]See Drazen (2000, Chapter 14) for the proof and explanation.

consumption-smoothing. In the beginning of the second period, the value of e is revealed and the incumbent party maximizes its utility taking e as given. The incumbent in the first period can issue debt, which is to be repaid by the incumbent in period 2. Facing a higher endowment in the subsequent period, the party in office in period 1 optimally chooses to incur debt to smooth the supply of public goods. Default occurs when e is less than the amount of debt plus associated interests. In a world without political risk, the government simply borrows to the level where the expected utility of each period is equalized.

The incumbent in period 1 issues bond to foreign risk-neutral creditors facing a real interest rate of zero. Let b be the amount of bond issued in period 1 at price $q(b)$, the government borrows $q(b)b$ and is expected to repay b in period 2. The probability of default is defined by

$$\Pr(e \leq b) = F(b) = (b-1)/(\bar{e}-1) \tag{2}$$

which increases monotonically with the level of debt. There is zero recovery for lenders when the incumbent defaults. Loans are provided as long as the expected return equals to the gross world interest rate, or

$$1 = \frac{b(1-F(b))}{q(b)b} \tag{3}$$

this defines the price of the bond $q(b) = 1 - F(b) = (\bar{e}-b)/(\bar{e}-1)$. As more bonds are issued, the price of bond decreases monotonically to compensate for the default risk that lenders take.

The incumbent in period 1 chooses (x_1, y_1, b) to maximize the total expected utility given the probability of staying in office next period, subject to government budget constraints.

Similarly, the incumbent in period 2 observes (b, e) and chooses (x_2, y_2) to maximize the objective function. If $e \leq b$, the government defaults and $x_2 = y_2 = 0$.

Proposition 1 *In the extreme case where $\alpha_X = 1$ and $\alpha_Y = 0$, the level of optimal debt chosen in period 1 increases with π, which is the probability that the incumbent will be replaced in the subsequent period. This implies that the probability of default also increases with π.*

Proof. When $\alpha_X = 1$ and $\alpha_Y = 0$, this setup implies that party X only cares about good x and party Y obtains utility solely from good y. Suppose party X is in power in period 2, then it solves

$$\max_{x_2, y_2} u(x_2) \tag{4}$$

$$s.t.\ x_2 = \begin{pmatrix} e - b - y_2, if\ e \geq b \\ 0, otherwise \end{pmatrix}$$

The solution to (4) is trivial. $x_2 = e - b$ if $e \geq b$ and $y_2 = 0$. Party X only cares about good x, thus it will allocate all available resources net of debt repayment to good x. There is no public supply of good y in period 2. The opposite applies when party Y is in office. In the case of full divergence, only the type of good that the government cares about will be supplied in the second period. ■

Now, suppose party X is the office in period 1. It solves

$$\max_{x_1, y_1, b} u(x_1) + (1 - \pi)E[u(x_2)] \tag{5}$$

$$s.t. x_1 = 1 + q(b)b - y_1$$

$$x_2 = \begin{pmatrix} e - b, if\ e \geq b \\ 0, otherwise \end{pmatrix}$$

With probability π, the incumbent loses the election and obtains zero utility since $x_2 = 0$ when party Y is in office. Equilibrium conditions $y_1 = 0$ and $x_1 = 1 + q(b)b$ hold under the case of full divergence. Taking account of the distribution of e and substitute in the budget constraints from both periods, we can rewrite the problem as

$$\max_b u(1 + q(b)b) + \frac{1-\pi}{\bar{e}-1}\int_b^{\bar{e}} u(e-b)de \tag{6}$$

Without loss of generality, assume the discount factor for both parties are 1. The first order condition is

$$0 = u'(1 + q(b)b)[q'(b)b + q(b)] - \frac{1-\pi}{\bar{e}-1}\int_b^{\bar{e}} u'(e-b)de \tag{7}$$

Equation (7) characterizes the optimal choice of debt subject to π. If $\pi = 1$, party X is certain that it will be replaced in period 2, then the economy has maximum instability. It is clear that the utility of party X in period 2 will be zero given that no supply of good x will be offered. The first order condition is then reduced to

$$0 = u'(1 + q(b)b)[q'(b)b + q(b)] \tag{8}$$

An interior solution b^* is guaranteed given the concavity of $u(\cdot)$ and the fact that $q'(b)b + q(b) = 1 - F(b) - dF(b)b = (\bar{e} - 2b)/(\bar{e} - 1)$ in decreasing in b. In this case, party X is only maximizing its utility in the first period where maximum debt would be issued to ensure marginal utility equals to zero. When π moves away from 1, $-\frac{(1-\pi)}{\bar{e}-1}\int_b^{\bar{e}} u'(e-b)de$ appears making the first order condition to become negative at b^*.The right hand side of equation

(7) decreases with b[7], which implies that in order to maintain equality, a lower level of b is desired.

When $\pi = 0$, the value of the right hand side of equation (7) is minimized, implying a minimal level of optimal debt. Political instability provides a distorted incentive for the benevolent social planner. When $\pi > 0$, instability leads to over-issue of government bonds relative to first-best choice under $\pi = 0$. Moreover, a higher level of debt implies a higher probability of default, evidently from the fact that $\Pr(e \leq b) = F(b)$. Note that the symmetric considerations hold if party Y is in office in period 1.

In words, when the probability of being replaced in period 2 decreases, higher political stability implies that the incumbent in period 1 will issue less debt to increase the available resource in the second period. In constrast, when the incumbent is certain to be replaced in period 2, the fact that there would be zero utility provides incentive to issue maximum level of debt to maximize period 1 utility. Moreover, a higher π implies less public goods offered in the second period, reducing household consumption.

The general case with $\alpha_j \in (0, 1)$ is mathematically more involved, but the intuition stands unchanged. Political instability induces the incumbent to issue excessive debt to increase consumption while in office and reduce the total resource available for the new party in power next period.

Proposition 2 *When $\alpha_j \in (0, 1)$, there are two opposing effects on the optimal level of debt from an increase in π. The "composite effect" motivates the incumbent to issue more debt to reduce total resources in period 2, similar to the extreme case before. However, as Party X*

[7] Take derivative of the first order condition with respect of b and evaluated at b* obtains $2u''(1 + q(b)b)[q'(b)b + q(b)] + 2u'(1 + q(b)b)q'(b) + \frac{(1-\pi)}{\bar{e}-1}\int_b^{\bar{e}} u''(e-b)de < 0$

and Y now care about both goods, the "level effect" implies less debt is desirable to allow more of preferred goods to be offered in period 2. A sufficient condition for the "composition effect" to dominate found by Tabellini and Alesina (1990) is when $-u''(c)/[u(c)]^2$ is decreasing in c, where c is the public goods offered.

Proof. Suppose party j is in office in period 2. It chooses (x_2, y_2) to solve the problem

$$\max_{x_2,y_2} \alpha_j u(x_2) + (1-\alpha_j)u(y_2) \tag{9}$$

$$s.t.\ x_2 = \begin{pmatrix} e-b-y_2, if\ e \geq b \\ 0, otherwise \end{pmatrix}$$

Similar to the full divergence case, when $e < b$, the government defaults and $x_2 = y_2 = 0$. Substitute in the budget constraint, we get the first order condition

$$\alpha_j u'(x_2) - (1-\alpha_j)u'(e-b-x_2) = 0 \tag{10}$$

Equation (10) explicitly defines the optimal choice of x_2 and y_2, which are functions of pre-determined variables, (α_j, b, e). We can express the policy functions as $x_2 = A(\alpha_j, b, e)$, and $y_2 = B(\alpha_j, b, e)$. It is trivial to see that $\partial A/\partial b < 0$, $\partial B/\partial b < 0$, $\partial A/\partial \alpha_j > 0$, and $\partial B/\partial \alpha_j < 0$. The intuition is that a higher debt level incurred in period 1 reduces the resources to supply either type of public goods in the subsequent period, and a greater weight on good x (higher α_j) leads to more supply of this good and less of good y. ■

The incumbent in period 1 takes account of political instability and chooses the optimal amount of debt. Again, let party X be in office and π be the probability that party Y will

win the election next period. Party X chooses (x_1, y_1, b) and solves the problem

$$\begin{aligned}\max_{x_1,y_1,b} EU_1^X &= \alpha_X u(x_1) + (1-\alpha_X)u(y_1) \\ &+\frac{1-\pi}{\bar{e}-1}\int_b^{\bar{e}}[\alpha_X u(A(\alpha_X,b,e)) + (1-\alpha_X)u(B(\alpha_X,b,e))]de \\ &+\frac{\pi}{\bar{e}-1}\int_b^{\bar{e}}[\alpha_X u(A(\alpha_Y,b,e)) + (1-\alpha_X)u(B(\alpha_Y,b,e))]de\end{aligned} \tag{11}$$

$$s.t.\ y_1 = 1 + q(b)b - x_1$$

Substitute in the budget constraint, we can obtain the first order conditions as:

$$x_1 : 0 = \alpha_X u'(x_1) - (1-\alpha_X)u'(1+q(b)b-x_1) \tag{12}$$

$$\begin{aligned}b : 0 &= (1-\alpha_X)u'(1+q(b)b-x_1)(q(b)+q'(b)b) \\ &+\frac{1-\pi}{\bar{e}-1}\int_b^{\bar{e}}[\alpha_X u'(A(\alpha_X,b,e))\frac{\partial A(\alpha_X,b,e)}{\partial b} + (1-\alpha_X)u'(B(\alpha_X,b,e))\frac{\partial B(\alpha_X,b,e)}{\partial b}]de \\ &+\frac{\pi}{\bar{e}-1}\int_b^{\bar{e}}[\alpha_X u'(A(\alpha_Y,b,e))\frac{\partial A(\alpha_Y,b,e)}{\partial b} + (1-\alpha_X)u'(B(\alpha_Y,b,e))\frac{\partial B(\alpha_Y,b,e)}{\partial b}]de\end{aligned} \tag{13}$$

Utilizing equation (12), we can rewrite (13) as

$$\begin{aligned}0 &= \alpha_X u'(x_1)(q(b)+q'(b)b) \\ &+\frac{1-\pi}{\bar{e}-1}\int_b^{\bar{e}}[\alpha_X u'(A(\alpha_X,b,e))\frac{\partial A(\alpha_X,b,e)}{\partial b} + (1-\alpha_X)u'(B(\alpha_X,b,e))\frac{\partial B(\alpha_X,b,e)}{\partial b}]de \\ &+\frac{\pi}{\bar{e}-1}\int_b^{\bar{e}}[\alpha_X u'(A(\alpha_Y,b,e))\frac{\partial A(\alpha_Y,b,e)}{\partial b} + (1-\alpha_X)u'(B(\alpha_Y,b,e))\frac{\partial B(\alpha_Y,b,e)}{\partial b}]de\end{aligned} \tag{14}$$

When $\pi = 0$, algebraically, we can reduce equation (13) to be

$$0 = \alpha_X u'(x_1)(q(b) + q'(b)b) \tag{15}$$
$$+ \frac{1}{\bar{e} - 1} \int_b^{\bar{e}} [\alpha_X u'(A(\alpha_X, b, e)) \frac{\partial A(\alpha_X, b, e)}{\partial b} + (1 - \alpha_X) u'(B(\alpha_X, b, e)) \frac{\partial B(\alpha_X, b, e)}{\partial b}] de$$

It is easy to see that since $\partial A/\partial b < 0$ and $\partial B/\partial b < 0$, the second term on the right hand side is negative and the first term has to be sufficiently large and positive to ensure an interior solution. Similar to the full divergence case, a solution exists and the incumbent optimally chooses a relatively small b^*. When $\pi > 0$, the direction of change in b with response to an increase in π is ambiguous. First, as indicated in the full divergence case, when the incumbent faces a positive probability of being replaced in the subsequent period, there is an incentive to issue more debt to reduce the total amount of resources available for period 2. The is referred by Carmignani (2003) as the "composition effect". Even party X now cares about both types of public good offered in the second period, the fact that $\alpha_Y < \alpha_X$ implies that it still prefers good x to good y. This fundamental preference difference induces the incumbent to issue more debt when facing a possibility of being replaced later. This is the sole effect evident in the full divergence case.

On the other hand, the second effect is exactly opposite in the sense that party Y will provide more of good x when there are more resources available in economy in period 2. Party X has the incentive to reduce borrowing or even save to provide more supply of good x in the future when party Y is in office. This effect is referred to as the "level effect", which takes consideration that when the desired amount of good x is offered in period 2, party X is satisfied even when party Y spends more on good y. A sufficient condition

for the "composition effect" to dominate found by Tabellini and Alesina (1990) is when $-u''(c)/[u(c)]^2$ is decreasing in c, where c is the public good offered in this case.

When there is full stability in the economy, the problem is reduced to a two-period consumption-savings model as the incumbent chooses the optimal amount of borrowing to ensure expected utility of the two periods are identical. Minimal debt will be issued since increasing the amount of debt in period 1 reduces the available resources in period 2. However, the effect on debt of positive values of π is more complex. When the "composition effect" dominates, the incumbent in period 1 issues more debt when facing a higher chance of political turnover. Alternative and more complicated formulation provides similar intuition. Hotchondo et. al (2009) find that default may be triggered when there is change in office from patient to impatient type of government when facing high political instability and poor economic fundamentals. The general conclusion is that higher political instability is associated with higher level of optimal government debt, hence greater probability of default. The rest of the paper is dedicated to test the theory empirically taking consideration of political risk factors and macroeconomic fundamentals. The key question to study is whether political instability increases the likelihood of sovereign default.

4 Data and Empirical Specification

A panel logit model is adopted in this paper to find key determinants of sovereign default. This study is based on data from 68 countries over a 40-year period from 1970 to 2010. Among these countries, 25 are developed nations and 43 are emerging markets. Overall, 95 incidents of external and domestic defaults were identified during this period. This implies

that the probability of sovereign default is about 2.74%, which appears to be consistent with existing literature[8]. This time interval is chosen to cover major defaulting events in the 1980s and 1990s, as well as the recent financial recession to shed lights on the ongoing Eurozone debt crisis.

The dependent variable is probability of default. In recent empirical studies, serious debt renegotiation and rescheduling agreements also count towards default. In this paper, default data is taken from Reinhart and Rogoff (2009), which includes episodes of both domestic and external default for 70 countries from 1800 to 2010. External default is defined according to IMF's definition, which includes "failure to meet principal or interest payment and rescheduled debt that is in terms less favorable than the original obligation" on foreign debt. Domestic debt crisis includes similar definitions applied to government bonds issued in domestic markets and also considers "freezing of bank deposits and/or forcible conversions of these deposits from dollars to local currency"[9].

For example, Argentina has experienced a domestic default in the end of 2001 when the government declared state emergency to prevent bank runs and limited conversion of pesos to USD. The government later defaulted on parts of its external debt in the beginning of 2002, causing massive capital flight and currency devaluation. It is evident that in many cases, domestic and external default occurred in close proximity of each other. In the timespan covered in this paper, only three distinctive domestic defaults were found: El Salvador in 1981, Myanmar in 1984 and Sri Lanka in 1996 (See Table 1 for a full list). To avoid double-

[8] Benjamin and Wright (2009) estimates the default rate across countries to be 4.4% for the period 1989-2006. Yue (2010) reports the average default rate of Argentina since 1824 is 2.7%. 3% is the conventional rate preferred by most papers.

[9] These definitions are taken from IMF, 2003, External Debt Statistics: Guide for Compilers and Users, Appendix III, Glossary, IMF, Washington DC

counting, we aggregate over both domestic and external defaulting events and construct a new binary variable, Default, where

$$Default_{t,i} = \left\{ \begin{matrix} 1 \text{ if a country } i \text{ is in domestic and/or external default in year } t \\ 0, \text{ otherwise} \end{matrix} \right\}$$

The logit model assumes that the probability of default is related to a set of political and macroeconomic variables, X_i, in the following form:

$$prob. = P(Default_{t,i} = 1 \mid X_i) = \frac{e^{X_i'\beta}}{1 + e^{X_i'\beta}} = \Lambda(X_i'\beta) \tag{16}$$

where X_i is a vector of independent variables, x_k for all periods up to $t-1$. The estimated coefficients, β_k, is the percentage effect of a change in x_k on the odds ratio defined as

$$Odds\ Ratio = \frac{P(Default_{t,i} = 1 \mid X_i)}{P(Default_{t,i} = 0 \mid X_i)} \tag{17}$$

In a panel logit model, these estimates only provide the direction of impact from a change in x_k, rather than magnitudes of change in the probability of default. In contrast, the marginal effect measures the elasticity of an exogenous variable with respect to the probability. Specifically, it is defined as

$$\text{Marginal Effect} = \frac{dP(Default_{t,i} = 1|X_i)}{dX_i} = \beta_i \Lambda(X_i'\beta) \tag{18}$$

Both the estimated coefficients, β_k, and marginal effects are reported in this paper. The explanatory variables are:

External Debt Conditions: these variables account for the liquidity and solvency of the borrowing nation, which have been found significant in Manasse, Roubini and Schimmelpfennig (2003) and include: i) external debt as a percentage of GDP, which is an indicator of 'ability to pay'; ii) (log) interest in arrears for public and publicly guaranteed debt, which measures the amount of interest payments not paid during any given year. A country is highly likely to experience a debt crisis when the interest owed is high.

Macroeconomic Conditions: these variables measure the economic performance of a borrowing nation and include: i) trade openness, which is the sum of imports and exports as percentage of GDP and is expected to have negative effect on default; ii) GDP growth, which is a key indicator for economic condition. A faster economic growth implies greater ability to generate cash flow and attract investments.

Government/Election Conditions: these variables measure political stability and election competitiveness, which include i) duration of current political regime. For example, Turkey held a general election in 1983 after the military took over the government in 1980. It has been running the same political regime for the 27^{th} year in 2010. A more tenured political system implies less regime changes and higher long-run stability; ii) years in office, which is the number of years the current incumbent party is in office. The longer the ruling party stays in power, the higher the likelihood of an election or change in government executive in the near future, which then implies greater short-run instability; and iii) executive electoral competitiveness, which is measured on a scale of 1 to 7, with 1 implying no election (in the case that rival chief executive in power) and 7 referring to executives being elected competitively by the general population. A communist country like China gets a score of 3 as the chief is elected by the Party Congress. The expected effect is two-fold: higher electoral

competitiveness impies greater political liberty and democracy, but induces higher instability as elections are more frequent. Data is taken from Beck et al. (2001) and updated by the author using the Database of Political Institutions (DPI) complied by the World Bank.

Investment Conditions: these variables capture the general condition of investments, which include i) the 6-month US T-bill rate, which is expected to have positive impact on default probability as a higher borrowing rate implies greater difficulties for debtor countries to service their obligations; and ii) the net foreign direct investment as a percentage of GDP. Higher inflow of foreign capital serves as a positive sign for investment, which should have a negative effect on sovereign default probability.

Political risk: political factors are captured by the Polity score developed under the Polity IV Project, which is a data series commonly used in political science research. The new dataset contains an aggregate score that measures a country's level of democracy based on evaluations on the competitiveness, openness and level of participation in elections[10]. This score is centered around 0 and has positive values for high level of democracy, implying lower political risk, and negative score for autocratic countries. For robustness test, two alternative measures constructed from data published by the Freedom House, a US-based non-for-profit organization, are used: i) freedom of the world, which is the average of the political rights and civil liberty scores published in the annual *Freedom in the World* survey since 1970. It is reformatted to take values 1 to 7 with 7 implying highest level of freedom; ii) freedom of the press, which is the average of freedom in public print and broadcast. The data is taken from the annual *Press Freedom* survey since 1980 and takes on the value of 1 to 3 with 3 being free and 1 as not free.

[10]See the description of the project at http://www.systemicpeace.org/polity/polity4.htm

All data is taken from the *International Financial Statistics* and the *World Development Indicators* published by the World Bank unless otherwise noted. Table 1 summarizes the events of default for 68 countries from 1970 to 2010 and Table 2 presents the descriptive statistics of variables included in the regression. The baseline model is estimated using random effects panel logit regression with maximum likelihood estimators. All explanotary variables are lagged one period to predict for the probability of default in the subsequent period. Robustness test includes fixed effects estimation, two alternative measures of political risk and panel OLS regression on EMBI (Emerging Market Bond Index) bond spreads calculated by JP Morgan[11].

5 Estimation Results

Panel regression results are presented in this section. Table 3 presents results of the baseline model using random effects estimation. The first column reports the impact of Polity score on the probability of default, the second column analyzes the additional effect from external debt conditions (external debt to GDP and interest in arrears). The third column takes consideration of macroeconomic conditions (trade and GDP growth). The fourth and fifth column report the augmented model where the significance of political factor is assessed while controlling for government stability and investment conditions.

The results show that the political factors remain significant under all specifications with the expected signs. The probability of default is higher for countries with lower Polity scores. Moreover, duration of the political system is another key variable that measures stability.

[11]I thank Ying Chen and Xin Yan for collecting these data from Bloomberg Terminal.

The results show that a country with longer political regime in place has less chance to default. The external debt to GDP ratio and interest in arrears have positive impact on sovereign default as they are the first and foremost indicators of a nation's liquidity condition. GDP growth and trade volume exert negative pressure on the probability of default as these are measures of overall economic health of the borrowing country. In terms of global investment conditions, the US short-term policy rate serves as a proxy for the international credit market, and higher rate implies a higher probability of default. This finding shows that when the borrowing condition is tightened, countries face extensive barriers to raise new debt or renew their existing obligations, which may ultimately lead to a default. Net foreign direct investment is also significant and has negative impact on default risk. A slump in net inflow of foreign capital stalls domestic economic growth, causing greater difficulties to generate sufficient cash flow to service debt obligation. This is especially evident in developing countries experiencing sudden stops and flight to quality.

It is clear to see that years in office exert a positive pressure on default. Consistent with the hypothesis made previously, when the current ruling party stays in power for an extensive period, the chance of running an election in the immediate future increases. According to the model in Section 3 and findings by Hotchondo et.al (2009), this is a clear sign of short-term political instability and has a positive influence on the probability of default.

The impact of electoral competitiveness shows mixing results. It appears to be have a significant and positive influence on default in column (5) but is not significant in (4). Positive signs associates higher probability of default with competitive elections, but the inconsistent significance level provides us with no further inference. In summary, most results are consistent with the hypotheses and there is a strong, positive relationship between

political risk and the probability of default, consistent with the theoretical model presented in Section 3.

Nonetheless, the estimated coefficients of the logit model offer only the direction of impact but no inference on the magnitude. To study quantitatively the effect of these explanatory variables on the probability of default, marginal effects must be carefully examined. Table 4 reports the marginal effects corresponding to the regressions in Table 3.

Theoretically,

$$\text{Marginal Effect} = \frac{\partial}{\partial X} P(Default_i = 1 \mid X_i) \tag{19}$$

which measures the elasticity with respect to the independent explanatory variable. For the full model specification shown in column (5) of Table 4, a 1% improvement in GDP growth decreases the probability of default by 1.71%. A country with 1% higher debt to GDP ratio is 0.8% more likely to default next year. Similarly, an one-year increase in duration of political regime decreases the probability of default by 1.45%. Since the Polity score is centered around 0 and ranges from -9 to 10, a more autocratic country such as Zimbabwe (score of -4) is nearly 7% more likely to default in any particular year than a highly democratic country like the US (score of 10), *ceteris paribus*. In terms of government stability, one additional year in office for the ruling party increases the chance of default by 1.2%. More significant impact comes from investment conditions where a 1% increase in net foreign direct invesment to GDP ratio implies a drop of 2.96% in the likelihood of default. A 25-basis point increase in the 6-month US T-bill rate implies an increase of nearly 1% in the probability of default.

Overall, the baseline model provides empirical evidence that supports the theoretical framework presented in Section 3. The next section presents several sensitivity analyses.

6 Robustness Tests

This paper focuses on finding the impact of political risk on the probability of sovereign default and our results are robust to various alternative specifications. Table 5 presents alternative results of the full model (as in Column (5), Table 3). First, in addition to the random effects estimation in the baseline model, fixed effects model is also used to ensure consistency of the model in presence of country-specific effects. To check if these country-specific effects are orthogonal to other covariates in the model, a Hausman specification test is conducted to verify if the random effects model is biased. The test fails to reject the null hypothesis that both models are correctly specified and shows that the fixed effects model is no more efficient than its counterpart. The results presented in Column *Fixed Effects* show that all variables remain significant with consistent signs.

Political risk can be assessed in multiple dimensions. Common factors include the level of democracy, freedom in the society, and freedom of speech (Howell, 2002). The Polity score measures the degree of democracy in the political system and elections, but is limited in the assessment of civil liberties. The regime duration variable measures the long-run stability of a political system, but does not evaluate the level of efficiency. To explore a broader valuation of political risk, we have included two alternative measures for robustness check. The *Freedom in the World* survey conducted annually provides scores on the level of political rights and civil liberties in participating nations, and the *Press Freedom* survey assesses the degree of print, broadcast and internet freedom of countries across the world. The estimation results using these two measures are presented in Table 5, Columns *Freedom in the World* and *Freedom of the Press*. The alternative political risk measures and other variables remain

significant with the expected signs. Overall, political factors have significant impact on the probability of default. A country is more likely to experience a default when it is less free and democratic, and with greater political instability.

The last robustness test utilizes selected sovereign bond spreads (annual averages) obtained from EMBI for 25 countries[12]. When the borrowing condition worsens, bond spreads in EMBI increases as the debtor nation has to offer a higher rate to obtain new funding. Similar to the probability of default, we should observe a negative relationship between the spreads and political risk. A high level of bond spread is a clear indicator of sovereign debt issues and one of the earliest signs of default. Balacci et. al (2011) finds that political and fiscal risk factors are key determinants of quarterly EMBI spreads using a different set of measures for political uncertainty. Taking the spreads expressed in percentage and running a panel OLS regression on the same set of explanatory variables used in the previous analyses, it is evident to see that Polity IV score remains significant with a negative sign. However, interest in arrears, political system duration, years in office and foreign direct investments become insignificant. One explanation for this is that the bond spreads taken are annual averages, which may not reflect the spontaneous effect of certain news coming into the market. Given that we are using lagged variables to project for future default risk, the effects from these variables may have already been incorporated into the spreads at an early time of the year. The remaining variables are significant with the correct signs.

A 1% increase in the US T-bill rate would cause the bond spreads to go up by 64 basis points. With other variables held constant, an one-unit improvement on the Polity score

[12]The countries included are: Argentina, Brazil, Chile, China, Columbia, Cote D'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Ghana, Hungary, Indonesia, Malaysia, Mexico, Nigeria, Panama, Peru, Phillipines, Poland, Russia, South Africa, Turkey, Uruguay, Venezuela

lowers the spreads by 7 basis points. Moreover, an one-percent increase in GDP growth implies a drop of 61 basis points in annual bond spreads. These findings suggest that the Polity socre along with liquidity and macroeconomic conditions are significant determinants of sovereign bond spreads, which implies that these variables are tightly connected to default. It is interesting to see that electoral competitiveness remain weakly significant for all alternative specifications with a positive sign, implying that a more competitive executive election system increases the probability of default, which may be caused by having more complex and frequent elections.

Two additional sensitivity analyses are performed using data from only developing countries and considering external and domestic defaults separately. There are no evident changes in the results considering only developing countries, which implies that since most incidents of sovereign default occurred in emerging markets, the additional data from developed countries adds no significant value to the explanatory power. Nevertheless, this does not conclude that developed countries are free of default risk. The baseline results presented in Section 5 suggests that we should focus on the political and economic conditions when assessing the probability of default, rather than the country's name. Moreover, no signiciant change is found when regressing against external default only. However, many variables fail to remain significant when regressing against domestic default only. During the period of 1970 to 2010, there were only 26 incidents of default on domestic bonds compared to 69 external defaults. In most cases, domestic debt crises occur in near vicinity of external default when countries suffer from political and economic challenges. Given that only three incidents of domestic defaults occured independently, finding the determinants of these events remains outside the scope of this paper.

7 Conclusion

This paper utilizes a new set of panel data constructed under the Polity IV project to study the specific effect of political risk on domestic and external default. The findings suggest that political stability is a significant factor in determining the probability of sovereign default. Liquidity measures, macroeconomic variables and the world economic condition are also strong indicators of potential debt issues and should be carefully assessed. Most papers in this literature focus only on economic factors and overlook the importance of political characteristics, or only study the effect on sovereign bond spreads. This paper fills the gap and examines the direct effect of political and institutional factors on the probability of default. To conclude, a country with higher level of democracy and freedom, along with consistent political regime is less likely to experience sovereign default. On the other hand, near-future elections and higher debt to GDP ratio imply greater chance of default.

8 Appendix

Table 1 – Episodes of Sovereign Default from 1970 to 2010

Country*	Year of External Default	Year of Domestic Default
Algeria	1991-96	
Angola	1985-2003	1976, 1992-2002
Argentina	1982-93, 1989, 2001-05	1982, 1989-90, 2001-05, 2007-09
Bolivia	1980-84, 1986-93, 1989-97	1982-85
Brazil	1983-90	1986-87, 1990
Central African Rep.	1981, 1983-2009	
Chile	1972, 1974-75, 1983-90	
Costa Rica	1981, 1983-90, 1984-85	
Cote D'Ivoire	1983-98, 2000-09	
Dominican Republic	1982-94, 2005	1975-2001
Ecuador	1982-95, 1999-2000, 2008	1999
Egypt	1984	
El Salvador		1981-96
Ghana	1970, 1974, 1987	1979, 1982
Greece	2010	

Table 1 – Episodes of Sovereign Default from 1970 to 2010 (con'd)

Country*	Year of External Default	Year of Domestic Default
Guatemala	1986, 1989	
Honduras	1981-2010	
India	1972-76, 1989-90	
Indonesia	1998-2000, 2002	1997-2000
Kenya	1994-98, 2000-01	
Mexico	1982-90	1982
Morocco	1983, 1986-90	
Myanmar	2002-10	1984
Nicaragua	1979-2010	1985-90
Nigeria	1982-92, 2001, 2004-05	
Panama	1983-96	1988-89
Paraguay	1986-92, 2003-04	
Peru	1976, 1978, 1980, 1984-97	1985-87
Phillipines	1981-92	
Poland	1981-94	
Romania	1981-83, 1996	

Table 1 – Episodes of Sovereign Default from 1970 to 2010 (con'd)

Country*	Year of External Default	Year of Domestic Default
Russia	1960-86, 1991-2000	1988-89
South Africa	1985-87, 1989, 1993	
Sri Lanka	1979, 1981-83	1996
Thailand	1997-98	
Tunisia	1979-82	
Turkey	1978-79, 1982, 2000-2001	2001
Uruguay	1983-85, 1987, 1990-91, 2003	
Venezuela	1983-88, 1990, 1995-97, 2004-05	1995-97, 1998
Zambia	1983-94	
Zimbabwe	1965-74, 2000-09	2006

*Countries without default: Austrilia, Austria, Belgium, Canada, China, Columbia, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Mauritius, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, UK and USA.

Table 2 Summary of Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
External/domestic default	2720	0.0274	0.1633	0	1
Polity score	2716	3.8132	6.9850	-9	10
External debt/GDP	1628	65.2536	79.6774	0.1	1210.0600
Log of interest in arrears	972	16.5617	3.4387	7.6009	23.5243
Trade	1318	65.0103	48.2069	0.1814	445.9112
GDP growth	2632	3.6338	4.2222	-26.4788	27.4240
Duration of political system	2716	31.1804	35.9450	0	201
Years in office	2358	5.8774	6.3700	1	38
Electoral competitiveness	2361	6.1792	1.7086	1	7
US 6-month T-bill rate	2788	5.5112	3.0788	0.1000	13.8000
Foreign direct investment/GDP	2511	2.1466	4.0663	-32.6430	92.3794

Table 3 Logit Estimation Results – Baseline Model

	(1)	(2)	(3)	(4)	(5)
Variable	Default	Default	Default	Default	Default
Polity	-0.0146***	-0.0241***	-0.0184**	-0.0193**	-0.0200**
	(0.0042)	(0.0083)	(0.0081)	(0.0096)	(0.0102)
Debt/GDP		0.0176***	0.0186***	0.0188***	0.0303***
		(0.0034)	(0.0036)	(0.0038)	(0.0050)
Interest in Arrears		0.3847***	0.4087***	0.3853***	0.3919***
		(0.0444)	(0.0474)	(0.0491)	(0.0540)
Openness			-0.0269***	-0.0300***	-0.0203**
			(0.0066)	(0.0072)	(0.0079)
GDP Growth			-0.0666***	-0.0558**	-0.0695***
			(0.0215)	(0.0222)	(0.0249)
Duration				-0.0522***	-0.0589***
				(0.0139)	(0.0154)
Year in Office				0.0636***	0.0487**
				(0.0195)	(0.0206)

Electoral Comp.				0.1020	0.2138**
				(0.0737)	(0.0849)
US Policy Rate					0.1428***
					(0.0451)
FDI					-0.1202***
					(0.0425)
Constant	-2.9590***	-8.1194***	-6.8363***	-6.6008***	-8.9952***
	(0.3745)	(0.7851)	(0.8356)	(0.9832)	(1.3106)
Observations	2715	962	958	894	853
Pseudo R^2	0.2667	0.3361	0.3468	0.3395	0.3912

standard errors in parentheses

*p < 0.1, **p < 0.05, ***p < 0.01

Table 4 Marginal Effects – Baseline Model

	(1)	(2)	(3)	(4)	(5)
Variable*	Default	Default	Default	Default	Default
Polity	-0.0007***	-0.0057***	-0.0043**	-0.0047**	-0.0049**
	(0.0003)	(0.0020)	(0.0020)	(0.0024)	(0.0025)
Debt/GDP		0.0042***	0.0044***	0.0045***	0.0075***
		(0.0009)	(0.0010)	(0.0010)	(0.0013)
Interest in Arrears		0.0913***	0.0958***	0.0929***	0.0965***
		(0.0121)	(0.0137)	(0.0135)	(0.0140)
Openness			-0.0063***	-0.0072***	-0.0050**
			(0.0016)	(0.0018)	(0.0020)
GDP Growth			-0.0156***	-0.0134**	-0.0171***
			(0.0052)	(0.0054)	(0.0062)
Duration				0.0126***	-0.0145***
				(0.0035)	(0.0038)
Years in Office				0.0153***	0.0120**
				(0.0048)	(0.0051)

Electoral Comp.				0.0246	0.0527**
				(0.0179)	(0.0212)
US Policy Rate					0.0352***
					(0.0112)
FDI					-0.0296***
					(0.0106)
Observations	2715	962	958	894	853

standard errors in parentheses

*p < 0.1, **p < 0.05, ***p < 0.01

Table 5 Alternative Estimations – Full Model

	Baseline	Fixed Effects	Freedom in the World	Freedom of the Press	EMBIG
Variable	Default	Default	Default	Default	Default
Polity Factors	-0.0200**	-0.0188**	-0.4541**	-0.2631**	-0.0717***
	(0.0102)	(0.0094)	(0.2342)	(0.1161)	(0.0283)
Debt/GDP	0.0303***	0.0314***	0.0293***	0.0305***	0.1751***
	(0.0050)	(0.0054)	(0.0049)	(0.0050)	(0.0278)
Interest in Arrears	0.3919***	0.3762***	0.3737***	0.3981***	0.1332
	(0.0540)	(0.0574)	(0.0550)	(0.0544)	(0.1897)
Openness	-0.0203**	-0.0299***	-0.0213***	-0.0212***	-0.0497*
	(0.0079)	(0.0093)	(0.0080)	(0.0079)	(0.0287)
GDP Growth	-0.0695***	-0.0591**	-0.0677***	-0.0676***	-0.6096***
	(0.0249)	(0.0253)	(0.0252)	(0.0250)	(0.1517)
Duration	-0.0589***	-0.0706***	-0.0569***	-0.0564***	-0.0592
	(0.0154)	(0.0182)	(0.0160)	(0.0153)	(0.0588)
Year in Office	0.0487**	0.0547**	0.0529**	0.0567***	0.0481
	(0.0206)	(0.0220)	(0.0209)	(0.0212)	(0.1506)

Electoral Comp.	0.2138**	0.2012**	0.1721**	0.1572*	1.4459**
	(0.0849)	(0.0904)	(0.0879)	(0.0923)	(0.6235)
US Policy Rate	0.1428***	0.1213***	0.1124**	0.1400***	0.6368**
	(0.0451)	(0.0468)	(0.0471)	(0.0450)	(0.3341)
FDI	-0.1202***	-0.1186***	-0.1219***	-0.1187***	-0.2096
	(0.0425)	(0.0424)	(0.0423)	(0.0420)	(0.3437)
Constant	-8.9952***		-7.3040***	-7.9313***	-3.1825***
	(1.3106)		(1.4933)	(1.4655)	(0.5851)
Observations	853	736	819	853	155
Pseudo R^2	0.3912	0.3687	0.3927	0.4014	0.3563

standard errors in parentheses

*p < 0.1, **p < 0.05, ***p < 0.01

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