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Stoian, Andreea and Obreja Brasoveanu, Laura and  
Dumitrescu, Bogdan and Brasoveanu, Iulian

Department of Finance and CEFIMO, Bucharest University of  
Economic Studies

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# Empirical study on the determinants of fiscal vulnerability: evidence for the European Union \*

**Andreea Stoian**

Department of Finance and CEFIMO  
Bucharest University of Economic Studies

**Laura Obreja Braşoveanu**

Department of Finance and CEFIMO  
Bucharest University of Economic Studies

**Bogdan Dumitrescu**

Department of Money and Banking and CARFIB  
Bucharest University of Economic Studies

**Iulian Braşoveanu**

Department of Finance and CEFIMO  
Bucharest University of Economic Studies

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## Abstract

The aim of this paper is to study the factors that drive fiscal vulnerability in the European Union countries. For this purpose, we employ a logit model with random effects for a balanced panel comprising of 20 countries and on annual data extracted for 2000-2012. We use as a dependent a dummy variable which takes value of 1 if fiscal policy is assessed as being vulnerable, and 0, otherwise. As explanatories, we use two distinct categories which capture the intrinsic and the exogenous sources of fiscal vulnerability. The results show that higher overall taxation and non-distortionary taxes decrease the likelihood of fiscal policy to be vulnerable, whilst the size of total and of productive government expenditures contribute to an increase in the fiscal vulnerability. Tight fiscal policy has an important contribution to decrease in the fiscal vulnerability. The responsiveness of fiscal policy through discretionary actions also is more likely to reduce fiscal vulnerability that through the automatic response of stabilizers. Improved economic condition mitigate the risk of one country to become more fiscal vulnerable, whilst large financial sector increase the probability. Tighter control of corruption will lead to a decrease in fiscal vulnerability, while stronger rule of law contributes to growth in fiscal vulnerability.

**Keywords:** fiscal policy, vulnerability, automatic stabilizers, discretionary, logit, panel, European Union

**JEL Classification:** E62, H12, C23

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## 1.Introduction

Since the European sovereign debt crisis in 2009 there has been an increased interest in the study of fiscal vulnerability. International Monetary Fund (IMF) and the European Commission (EC) provided various methodologies of early detecting fiscal vulnerabilities (i.e. Baldacci, McHucgh and Petrova, 2011; Baldacci, Petrova, Belhocine, Dobrescu and Mazraani, 2011; Schaechter et al, 2012; Berti, Salto and Lequien, 2012). Moreover, some of the financial institutions developed their own measures for assessing the degree of fiscal vulnerability, thus providing useful insights for their investors (i.e. BlackRock Investment Institute, 2011; Hayes, 2011).

Most of the suggested methodologies relies upon several relevant indicators believed that they can signal fiscal distress. But, one question which can arise is that if these indicators actually represent sources of fiscal vulnerability or if they just capture the weaknesses in the fiscal policy. If we think, for instance, to the budgetary deficit which is one of the basic variables most frequently used for detecting fiscal vulnerabilities, we can ask whether this is a source or just an effect of some intrinsic weaknesses in the fiscal policy, such as poor tax compliance or increased tax evasion which negatively affect government revenues, hence causing large deficits.

There are only few papers providing extended discussions on the sources of fiscal vulnerability (Hemming and Petrie, 2000; Cottarelli, 2011; Greene, 2012) which can be grouped as: (i) *weak initial fiscal position* referring to large budgetary deficits and high indebtedness rates which increase the exposure to the solvency risks; (ii) *uncertainty* taking in consideration the variations of fiscal outcomes to changes or shocks in key macroeconomic variables; (iii) *long term risks* implying the exposure to important structural changes in demographics (i.e. the impact of ageing population and pensions and health spending) or economy (i.e. the exhaustion on medium term of resources for mineral and oil exporting countries) which might affect fiscal sustainability in the long run; (iv) *structural weaknesses* indicating the vulnerabilities in the composition of the government revenues and expenditures (i.e. the composition of revenues dominated by few taxes having narrow bases, high proportion of non-discretionary spending or large items of expenditures which are resilient to adjustments), inconsistent tax legislation and poor quality of government (i.e. inappropriate roles and responsibilities of the government, weak budgeting process, corruption); (v) *non-fiscal sources* suggesting the vulnerabilities induced by the *financial sector* and by the *economic openness*: credit or asset price bubbles, too-short maturities, heavy borrowing in foreign currency, or non-performing loans and large acquisitions of risky financial assets could lead to bank failures and the need for greater government expenditures to prevent the systemic risk or to recapitalize the banking system could generate fiscal vulnerability; economic openness plays an important role in fostering fiscal vulnerability because it renders a country to external economic conditions exposing itself to a larger degree of shock over which it has no direct or relatively little control.

In our understanding, fiscal vulnerability can be driven by: (i) *inherent* factors which refer to the *intrinsic* weaknesses of fiscal policy such as: poor composition of the government revenues and expenditures (sizeable transfer payments, small size of discretionary expenditures), reduced tax compliance and large tax evasion or poor synchronization between government revenues and expenditures, the

maturity structure, interest, and currency composition of the public debt, the type of fiscal policy (lax or restrictive) and its correlation with the business cycle (pro-cyclical vs. anti-cyclical), the low responsiveness of fiscal policy due to small share or to non-operational automatic stabilizers, poor budgeting process, the quality of fiscal institutions, government assets and liabilities management etc., and (ii) *exogenous factors* which are not specific to fiscal policy but affect the size, the dynamics and the composition of basic fiscal variables on short, medium and long term, such as poor economic conditions, financial sector spillovers, demographic, political or environmental changes.

Thus, the aim of this paper is to provide a comprehensive investigation on the factors which drive the fiscal vulnerability. For this purpose, the remainder of the paper is organized as follows: Section 2 describes the methodology employed and the dataset. Section 3 presents and discusses the results and Section 4 draws the main concluding remarks of this study.

## 2. Empirical methodology and the dataset

In order to study the determinants of fiscal vulnerability, we employ a logit regression for a balanced panel using as dependent a dummy which takes value of 1 if fiscal policy is vulnerable and 0, otherwise. Equation (1) describes the model:

$$\Pr(y_{it} \neq 0 | x_{it}) = \Pr(x_{it}\beta + v_i) \quad (1)$$

For  $i=1, \dots, n$  countries and  $t=1, \dots, T$  years.  $y_{it}$  is the dependent variable for each country,  $i$ , at time  $t$ ;  $x_{it}$  is the set of explanatory variables for each country  $i$  at time  $t$ ;  $v_i$  are i.i.d  $N(0, \sigma_v^2)$ .

For the dependent variable ( $y_{it}$ ) we use the results provided by Stoian, Obreja Braşoveanu, Dumitrescu and Braşoveanu (2015) for the European Union countries. They developed a new methodology (*V-L-D*) for detecting fiscal vulnerabilities which relies upon two indicators: one *level* indicator capturing the weaknesses signaled by the size of the cyclically adjusted balance and by distance-to-stability, and one *dynamics* indicator showing the vulnerabilities signaled by the changes in the cyclically adjusted balance and in the public debt, both to-GDP ratios, for two consecutive years. Authors' view on *fiscal vulnerability* is that it represents '*any kind of intrinsic weakness in the existing fiscal policy or exogenous shocks that lead to a significant deterioration in the level and/or dynamics of the budgetary deficit and/or public debt over the short term that will limit the government's ability to achieve its goals*'. They considered budgetary deficit and public debt as relevant indicators signaling fiscal vulnerability caused by inherent or exogenous factors. This is consistent with our beliefs on the sources which drive fiscal vulnerability, thus arguing the use of this framework for the purpose of our investigation. The *V-L-D* detects 5 categories of vulnerabilities from none to extreme vulnerability. Additional findings showed that financial markets react significantly to strong and extreme vulnerability. Thus, we build our dependent variable (*vulnerability*) as a dummy which takes value of 1 if *V-L-D* indicates strong and extreme vulnerability and 0, otherwise (see Table 1 in the Appendix).

For the explanatory variables we use two distinct sets. One describing the intrinsic sources of fiscal vulnerability, ( $I_{it}$ ) and the other indicating the exogenous ones, ( $E_{it}$ ). Thus, equation (1) can be re-written as:

$$\Pr(y_{it} \neq 0 | I_{it}, E_{it}) = P(I_{it}\beta_1 + E_{it}\beta_2 + \vartheta_i) \quad (2)$$

The variables describing the intrinsic sources of fiscal vulnerability are grouped into five categories: (i) one category consists in variables measuring the fiscal position through the size of government revenues and expenditures. We use the current tax burden (*burden*) as proxy for the government revenues and government expenditures as GDP ratio (*expenditures*). (ii) one category comprising of variables indicating the composition of government revenues and expenditures. Following Barro (1990), we group the current tax burden into *distortionary* and *non-distortionary* taxes and the government expenditures into *productive* and *unproductive* spending. The reason of splitting the revenues and expenditures is given by Barro's findings that taxes and spending behave differently and have distinct impact on economic growth. This classification is widely used in studies examining the impact on fiscal policy on economic growth. For the purpose of our investigation, we use the categories provided by Kneller, Bleaney and Gemmell (1999). They group taxation on income and profit, social security contributions taxation on payroll and manpower and taxation on property as distortionary taxes and taxation on domestic goods and services as non-distortionary one. Also, they consider general public services, educational, defence, health, housing, transport and communication expenditures as productive, and social security and welfare, recreation, and economic services expenditures as unproductive ones. Thus, we consider as *distortionary* taxation the direct taxes and social security contributions, and as *non-distortionary* taxation, the indirect taxes. We use the collective consumption expenditures for the *productive* spending and total social transfers as *unproductive* one. (iii) one category describing the type of fiscal policy by using we use the fiscal impulse. Schinasi and Lutz (1991) defined fiscal impulse as 'measuring the change in government budget balance resulting from changes in government expenditure and tax policy'. Alesina and Perotti (1995) suggested the use of fiscal impulse in order to assess fiscal stance as being tight or expansionary. We calculate the fiscal impulse as annual changes in the cyclically adjusted primary balance. We decided to use the cyclically adjusted primary balance for two reasons: on one hand, we can capture the true nature of fiscal policy by eliminating the influences coming from the business cycle, and, on the other hand, we can avoid the effects of past deficits on current fiscal policy. We give lower scores for fiscal impulse indicating tight or strong fiscal adjustments reasoning that during consolidation fiscal vulnerability should be reduced (Daniel, Davis, Fouad and Van Rijckeghem, 2006). (iv) one category capturing the responsiveness of fiscal policy during the cyclically swings. Fiscal policy plays an important role to stabilize the economy. The reaction can be automatic through the automatic stabilizers which ensures a prompt, self-correcting fiscal response or can be delayed through employment of discretionary actions (Baunsgaard and Symansky, 2009). Automatic stabilizers can be defined as variations in taxes (i.e. business and personal) and government transfers (i.e. unemployment benefits) that occur automatically in response to changes in output and employment (IMF, 2015). Hence, they can smooth the business cycle and allow fiscal policy to act countercyclical. The size of the automatic stabilizers can be commonly approximated by the ratio of general government expenditures to GDP (Debrun and Kapoor, 2010).

But, considering the development of our investigation and the fact that we have already used government expenditures to GDP ratio as a proxy for fiscal position, we decided to employ a different method to assess the size of the automatic stabilizers. IMF (2015) reported fiscal stabilization coefficient for the advanced and emerging economies worldwide which resulted from country specific OLS regressions of the overall budget balance on the output gap. Taking into account that we use annual data for our estimations, we calculate the annual changes in the overall balance to annual changes in the output gap (*stabilizers*) (see Table 1 in the Appendix). One way of assessing the discretionary fiscal policy (*impulse*) is to calculate the changes in the cyclically adjusted balance (Blanchard, 1990). For this, we calculate the annual changes in the cyclically adjusted primary balance which we consider a better indicator for discretionary fiscal policy considering that it excludes the interest payments on public debt which are assessed as nondiscretionary type. (v) one category describing the fiscal institutions. Fiscal institution is a broad concept and consists of several various aspects, such as: fiscal norms, rules and institutions or budget process (Hallerberg and Yläoutinen, 2010). For the purpose of our study, we focus only on the fiscal rules (*rule*) ‘which entail substantive constraints on public spending, taxation, deficit and debt, usually in the form of explicit quantitative targets’ (Raudla, 2014). Fiscal rules can contribute to a decrease in fiscal vulnerability because they aim at imposing durable fiscal discipline and overcome the problem of deficit bias (Daniel, Davis, Fouad and Van Rijckeghem, 2006). We use in our analysis, the Fiscal Rule Index developed by the European Commission (2015).

For the exogenous factors which might affect fiscal vulnerability, we use real GDP growth rate (*growth*) describing overall economic conditions within one country; domestic credit to private sector as GDP ratio (*financial*) measuring the size of the financial sector; the economic openness (*external*) as volume of trades (exports and imports) to GDP ratio assessing the external sector, and the quality of government institutions captured by various indicators, such as government effectiveness (*effectiveness*), regulatory quality (*regulatory*), rule of law (*law*) and control of corruption (*corruption*) as in Kaufmann, Kraay and Mastruzzi (2010).

We run equation (2) for a balanced panel comprising of 20 European Union countries and on annual data extracted for 2000-2012. The countries considered for investigation are: Belgium, the Czech Republic, Denmark, Germany, Ireland, Spain, France, Italy, Cyprus, Latvia, Hungary, Malta, the Netherlands, Austria, Portugal, Slovenia, Slovakia, Finland, Sweden and the United Kingdom. We provide details about each variable employed in our investigation as well as the data source in Table 1 in the Appendix. We also report the descriptive statistics in Table 2 and 3 in the Appendix.

### **3. Results and discussions**

Using equation (2), we estimated several models. We ran the logit separately using first as a proxy for the fiscal position the government revenues (*burden*) and its components (*non-distortionary* and *distortionary*) and then the government expenditures (*expenditures*) and its components (*productive* and *unproductive*). Then, we added the variables describing the type of fiscal policy (*type*), the responsiveness (*stabilizers* and *impulse*) and the fiscal institutions (*rule*). We decided to study them separately, in order

to avoid any inter-influences. The variables which capture the exogenous sources of fiscal vulnerability are kept in each model and they act as control variables. The results are reported in Table 4.1 and 4.2 in the Appendix.

The results show that higher tax burden and non-distortionary taxes significantly decrease the probability that fiscal policy to be vulnerable, whilst the total and the productive government expenditures increase the likelihood of fiscal vulnerability. We found no evidence for the distortionary taxes and for the unproductive government expenditures to contribute to fiscal vulnerability.

With regard to the type of fiscal policy, we introduce it as a factor variables, hence allowing us to study the impact of each type. For categorical variables, we assess the impact of each category by comparison with the base category which in our case is the category indicating very tight or strong fiscal adjustments. We observe that the type of fiscal policy has a significant contribution to fiscal vulnerability. The results suggest that tight fiscal policy has the largest impact in decreasing fiscal vulnerability compared with neutral, loose or expansionary fiscal policy.

The responsiveness of fiscal policy through discretionary actions is more likely to reduce fiscal vulnerability that through the automatic response of stabilizers. This finding is consistent with what IMF (2015) suggested that ‘fiscal response of the advanced economies to the global financial crisis showed the importance of discretionary actions in mitigating the effects of a severe slump’.

Strengthening the fiscal rules would not play such an important role for decreasing the probability of fiscal policy to be vulnerable. We observed that only in the cases of distortionary taxes and unproductive spending fiscal rules become more relevant.

Improving economic conditions has a significant contribution to the reduction of fiscal vulnerability. By comparison, large financial sector stimulates the increase in the probability to be more vulnerable. We found no relevant influence on fiscal vulnerability coming from the external sector.

Concerning the governance indicators, the results show that the rule of law and the control of corruption have a significant influence on fiscal vulnerability. Increasing control of corruption will lead to a decrease in the probability that fiscal policy to be vulnerable. On contrary, having stronger rule of law will determine an increase in the likelihood of one country to be more vulnerable.

#### **4. Concluding remarks**

Fiscal vulnerability has been a much debated topic in the last years since the financial crisis in 2007-08. Trying to cope with the effects of economic recession afterwards and to avoid public debt to have unstable trajectories leading to sovereign debt crisis like in the case of Greece and Cyprus, made European governments to take severe fiscal consolidation actions and to be more aware of factors that might drive fiscal vulnerability. Since then, there has been a large focus on developing methodologies easily to be implemented in order to early signal vulnerabilities in fiscal policy. More of the developments with this regard have come from the International Monetary Fund and the European Commission on their permanent monitoring mission.

Fiscal vulnerability assessment frameworks have relied on a set of indicators which were assumed to have a high power in detecting fiscal vulnerabilities. But, the existed literature hasn’t provided yet and result concerning the factors which may drive fiscal vulnerability. There are only few papers describing and discussing the potential sources of fiscal vulnerability. Thus, the aim of this paper was to develop

an empirical study of the determinants of fiscal vulnerability. For this purpose, we employed a logit model for a balanced panel comprising of 20 European Union countries and on annual dataset extracted from 2000-2012. We used as dependent a dummy variable taking value of 1 if fiscal policy was assessed as being vulnerable, and 0, otherwise. For the explanatory, we employed two distinct sets of variables, one capturing the intrinsic sources of fiscal vulnerability, and one describing the exogenous ones. For the former, we introduced variables describing the fiscal position, the composition of government revenues and expenditures, the type and the responsiveness of fiscal policy, and the fiscal institutions. For the latter, we focused on the economic condition, on the influence of the financial and external sectors and on governance.

The results showed that higher taxation and non-distortionary taxes reduce the likelihood of fiscal policy to be vulnerable. The size of total and of productive government expenditures have a significant contribution to the increase in the probability of fiscal vulnerability. Tight fiscal policy decreases the vulnerability by comparison with neutral, loose or expansionary fiscal policy. The discretionary actions are more likely to reduce the probability of fiscal vulnerability than the response through the automatic stabilizers. Also, improved economic conditions have a significant contribution in lowering fiscal vulnerability, whilst large financial sector has a positive effect on rising vulnerability. Stronger control of corruption will lead to a decrease in fiscal vulnerability, while tighter rule of law contributes to growth in fiscal vulnerability.

## References

- Alesina, A.; Protti, R. (1995), 'Fiscal Expansions and Fiscal Adjustment in OECD Countries', NBER Working Paper No. w5214
- Baldacci, E.; McHugh, J; Petrova, I. (2011), 'Measuring Fiscal Vulnerability and Fiscal Stress: A Proposed Set of Indicators', IMF Working Paper WP/11/94.
- Baldacci, E.; Petrova, I.; Belhocine, N.; Dobrescu, G.; Maazrani, S. (2011), 'Assessing Fiscal Stress', IMF Working Paper WP/11/100.
- Barro, R. (1990), 'Government Spending in a Simple Model of Endogenous Growth', *Journal of Political Economy*, Vol.98, No.5, S103-S125.
- Baunsgaard, T.; Symansky, S. (2009), 'Automatic Fiscal Stabilizers', IMF Staff Position Note SPN/09/23, September 28, 2009.
- Berti, K.; Salto, M.; Lequien, M. (2012), 'An early-detection index of fiscal stress for EU countries', European Commission, Economic Papers 475/December 2012.
- BlackRock Investment Institute (2011), 'Introducing the BlackRock Sovereign Risk Index. A More Comprehensive View of Credit Quality', BlackRock Investment Institute, June 2011.
- Blanchard, O. (1990), 'Suggestions for a new set of fiscal indicators', OECD Working Papers No.79/April 1990



Cottarelli, C. (2011), 'The Risk Octagon: A Comprehensive Framework for Assessing Sovereign Risks', paper presented at seminar held at the Sapienza University (Rome, January 25, 2011) and Politeia (London, January 26, 2011).

Daniel, J.; Davis, J.; Fouad, M.; Van Rijckenghem, C. (2006), 'Fiscal Adjustment for Stability and Growth', IMF Pamphlet Series No.55.

Debrun, X.; Kappor, R. (2010), 'Fiscal Policy and Macroeconomic Stability: Automatic Stabilizers Work Always and Everywhere', IMF Working Paper WP/10/111.

European Commission, Directorate General for Economic and Financial Affairs (2015), [http://ec.europa.eu/economy\\_finance/db\\_indicators/fiscal\\_governance/fiscal\\_rules/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm)

Greene, J.E. (2012), 'Public Finance: An International Perspective', World Scientific Publishing Company.

Hallerberg, M.; Yläoutinen, S. (2010), 'Political Power, Fiscal Institutions and Budgetary Outcomes in Central and Eastern Europe', Journal of Public Policy, 30, 1, 00.45-62.

Hayes, S. (2011), 'Fiscal vulnerability: a stocktake', The IFS Green Budget, February 2011.

Hemming, R.; Petrie, M. (2000), 'A Framework for Assessing Fiscal Vulnerability', IMF Working Paper WP/00/52.

International Monetary Fund, 2015, 'Now Is the Time: Fiscal Policies for Sustainable Growth', Fiscal Monitor, April 2015.

Kaufmann, D.; Kraay, A.; Mastruzzi, M. (2010), 'The Worldwide Governance Indicators. Methodology and Analytical Issues', World Bank Policy Research Working Paper No. 5430.

Kneller, R.; Bleaney, M.; Gemmell, N. (1999), 'Fiscal policy and growth: evidence from OECD countries', Journal of Public Economics, 74 (1999), 171-190.

Raudla, R. (2014), 'Budgetary Institutions', in Encyclopedia of Law and Economics, eds. Jürgen Backhaus, Springer, New York, 2014.

Schaechter, A. et al (2012), 'A Toolkit to Assessing the Fiscal Vulnerabilities and Risks in the Advanced Economies', IMF Working Paper WP/12/11.

Schinasi, G.; Lutz, M. (1991), 'Fiscal Impulse', IMF Working Paper WP/91/91.

Stoian, A.; Obreja Brasoveanu, L.; Dumitrescu, B.; Brasoveanu, I. (2015), 'A new framework for detecting the short term fiscal vulnerability for the European Union countries', Munich Personal RePec Archive

## Appendix

**Table 1 Description of the dataset**

Variable	Description	Data source
<i>vulnerability</i>	0, if fiscal policy is non, low or moderate ( <i>V-L-D</i> is 0, 1 or 2) 1, if fiscal policy is strong or extremely vulnerable ( <i>V-L-D</i> is 3 or 4)	Stoian, Obreja Brasoveanu, Dumitrescu and Brasoveanu (2015)
<i>burden</i>	The current tax burden of total economy is the sum of indirect taxes, direct taxes and social security contributions as GDP ratio	Ameco
<i>expenditures</i>	Total general government expenditures as GDP ratio	Ameco
<i>distortional</i>	Direct taxes and actual social security contributions as GDP ratio	Ameco
<i>nondistortional</i>	Indirect taxes as GDP ratio	Ameco
<i>productive</i>	Collective consumption expenditures as GDP ratio	Ameco
<i>unproductive</i>	Social transfers in kind and social benefits other than social transfers in kind as GDP ratio	Ameco
<i>type</i>	0, indicating very tight or strong adjustments if fiscal impulse $\leq -1.5\%$ 1, indicating tight fiscal policy if fiscal impulse $\in (-1.5\%, -0.5\%)$ 2, indicating neutral fiscal policy if fiscal impulse $\in [-0.5\%, 0.5\%)$ 3, indicating loose fiscal policy if fiscal impulse $\in [0.5\%, 1.5\%)$ 4, indicating expansionary fiscal policy if fiscal impulse $\geq 1.5\%$	Ameco
<i>stabilizers</i>	Changes in overall budget balance to changes in output gap. Overall budget balance is net lending/borrowing of general government Output gap is the gap between actual and trend gross domestic product at 2010 reference levels	Ameco
<i>impulse</i>	Annual changes in the cyclically adjusted primary balance as GDP ratio	Ameco
<i>rule</i>	Fiscal Rule Index	European Commission, Directorate General for the Economic and Financial Affairs
<i>growth</i>	Real GDP growth rate calculated as the percentage change of real GDP	Ameco
<i>financial</i>	Domestic credit to private sector as GDP ratio	World Bank
<i>external</i>	Volumes of imports and exports as GDP ratio	Ameco
<i>effectiveness</i>	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Worldwide Governance Indicators
<i>regulatory</i>	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	Worldwide Governance Indicators
<i>law</i>	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract	Worldwide Governance Indicators

	enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	
<i>corruption</i>	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Worldwide Governance Indicators

**Table 2 Descriptive statistics**

Variable	Mean	St.dev	Median	Min	Max
<i>burden</i>	37.47	5.67	36.83	27.78	49.58
<i>expenditures</i>	45.95	6.01	46.57	31.06	66.06
<i>nondistortionary</i>	13.63	2.75	13.23	8.55	22.99
<i>distortionary</i>	22.92	4.54	22.68	14.46	32.20
<i>productive</i>	8.40	1.30	8.23	5.44	11.78
<i>unproductive</i>	26.16	4.84	26.57	14.54	36.64
<i>impulse</i>	-0.10	2.43	-0.16	-17.79	18.74
<i>stabilizers</i>	40.17	630.07	0.46	-31.76	10160.01
<i>rule</i>	0.32	0.93	0.21	-1.01	3.05
<i>growth</i>	2.00	3.29	2.22	-17.70	10.99
<i>financial</i>	113.10	56.44	105.22	19.24	305.09
<i>external</i>	105.56	52.48	97.69	26.96	323.01
<i>effectiveness</i>	1.38	0.52	1.46	0.21	2.36
<i>regulatory</i>	1.33	0.35	1.28	0.54	2.08
<i>law</i>	1.30	0.49	1.34	0.14	2.00
<i>corruption</i>	1.29	0.75	1.31	-0.29	2.59

**Table 3 Statistics for the factor variables**

Variable	Freq.	Percent	Cum.
<i>vulnerability</i>	0	213	81.92
	1	47	18.08
<i>type</i>	0	48	18.46
	1	48	36.92
	2	88	70.77
	3	38	85.38
	4	38	100.00

Table 4.1 Logit panel with random effects

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>burden</i>	-0.179*** (0.0604)	-0.182*** (0.0622)	-0.172*** (0.0582)	-0.185*** (0.0642)								
<i>1.type</i>		-1.475** (0.665)				-1.480** (0.659)				-1.617** (0.703)		
<i>2.type</i>		-2.288*** (0.620)				-2.291*** (0.627)				-2.490*** (0.656)		
<i>3.type</i>		-3.058*** (0.879)				-3.150*** (0.908)				-3.234*** (0.941)		
<i>4.type</i>		-2.196*** (0.703)				-2.296*** (0.715)				-2.413*** (0.771)		
<i>growth</i>	-0.334*** (0.0713)	-0.345*** (0.0747)	-0.341*** (0.0694)	-0.339*** (0.0724)	-0.306*** (0.0695)	-0.315*** (0.0737)	-0.317*** (0.0672)	-0.318*** (0.0721)	-0.307*** (0.0775)	-0.312*** (0.0759)	-0.310*** (0.0716)	-0.319*** (0.0794)
<i>financial</i>	0.00910** (0.00456)	0.00937* (0.00483)	0.00905** (0.00438)	0.00793 (0.00543)	0.0135** (0.00553)	0.0144** (0.00566)	0.0123** (0.00477)	0.0131** (0.00605)	0.0205*** (0.00774)	0.0177*** (0.00588)	0.0170*** (0.00576)	0.0192** (0.00862)
<i>external</i>	-0.00847** (0.00417)	-0.0118** (0.00459)	-0.00749* (0.00424)	-0.0108 (0.00666)	-0.00718 (0.00479)	-0.0109** (0.00556)	-0.00582 (0.00439)	-0.0110 (0.00681)	-0.00797 (0.00754)	-0.00949 (0.00590)	-0.00547 (0.00626)	-0.0148 (0.00952)
<i>effectiveness</i>	1.339 (1.256)	1.846 (1.345)	1.433 (1.221)	0.932 (1.537)	0.736 (1.422)	0.979 (1.522)	1.042 (1.337)	-0.0111 (1.454)	0.252 (1.594)	0.871 (1.528)	0.829 (1.427)	-0.0827 (1.559)
<i>regulatory</i>	-1.470 (1.199)	-1.206 (1.207)	-0.847 (1.176)	-0.904 (1.244)	-0.872 (1.263)	-0.567 (1.254)	-0.0611 (1.175)	-0.217 (1.330)	-2.013 (1.627)	-1.287 (1.369)	-0.920 (1.374)	-0.815 (1.594)
<i>law</i>	3.375** (1.411)	4.147*** (1.504)	2.507* (1.353)	3.049* (1.797)	3.698** (1.695)	4.653*** (1.794)	2.561* (1.480)	3.581** (1.808)	5.410** (2.549)	5.005** (2.054)	3.231 (1.982)	4.717* (2.440)
<i>corruption</i>	-2.874** (1.156)	-4.041*** (1.311)	-2.459** (1.117)	-2.376** (1.144)	-3.444*** (1.232)	-4.601*** (1.377)	-2.956*** (1.125)	-2.841** (1.264)	-4.019** (1.595)	-4.662*** (1.481)	-3.196** (1.314)	-3.402** (1.577)
<i>impulse</i>	-0.297*** (0.110)				-0.315*** (0.110)				-0.319*** (0.117)			
<i>stabilizers</i>			0.0320 (0.0199)				0.0352* (0.0207)				0.0335 (0.0232)	
<i>rule</i>				-0.214 (0.356)				-0.416 (0.392)				-0.745* (0.440)
<i>distortionary</i>					-0.0870 (0.0708)	-0.0797 (0.0766)	-0.0918 (0.0631)	-0.0780 (0.0797)				
<i>nondistortionary</i>									-0.595** (0.280)	-0.468** (0.188)	-0.425** (0.204)	-0.645** (0.282)
<i>Constant</i>	4.447* (2.661)	5.975** (2.770)	3.730 (2.622)	4.755* (2.880)	-0.587 (2.134)	0.720 (2.272)	-1.076 (1.955)	-0.633 (2.369)	5.066 (3.730)	5.309* (2.895)	2.616 (2.980)	5.798 (3.651)

Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4.2 Logit panel with random effects

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>expenditures</i>	0.274*** (0.106)	0.222** (0.0982)	0.255*** (0.0986)	0.302*** (0.102)								
<i>1.type</i>		-1.428** (0.725)				-1.437** (0.715)				-1.650** (0.684)		
<i>2.type</i>		-2.166*** (0.688)				-2.219*** (0.676)				-2.418*** (0.656)		
<i>3.type</i>		-3.399*** (1.008)				-3.278*** (0.996)				-3.412*** (0.956)		
<i>4.type</i>		-2.453*** (0.793)				-2.208*** (0.747)				-2.614*** (0.776)		
<i>growth</i>	-0.179** (0.0800)	-0.213*** (0.0813)	-0.186** (0.0788)	-0.188** (0.0820)	-0.254*** (0.0742)	-0.276*** (0.0772)	-0.258*** (0.0775)	-0.266*** (0.0795)	-0.241*** (0.0768)	-0.255*** (0.0788)	-0.266*** (0.0751)	-0.250*** (0.0805)
<i>financial</i>	0.0261*** (0.00773)	0.0246*** (0.00729)	0.0241*** (0.00692)	0.0247*** (0.00795)	0.0176** (0.00685)	0.0178*** (0.00660)	0.0187*** (0.00718)	0.0181** (0.00748)	0.0210*** (0.00646)	0.0210*** (0.00638)	0.0184*** (0.00547)	0.0204*** (0.00711)
<i>external</i>	-0.00363 (0.00763)	-0.00747 (0.00736)	-0.00330 (0.00717)	-0.0113 (0.00860)	-0.0115 (0.00729)	-0.0149* (0.00763)	-0.0124 (0.00830)	-0.0182** (0.00876)	-0.00403 (0.00587)	-0.00791 (0.00621)	-0.00315 (0.00523)	-0.0117 (0.00797)
<i>effectiveness</i>	-0.401 (1.820)	-0.195 (1.796)	0.164 (1.689)	-0.909 (1.744)	-0.621 (1.655)	-0.661 (1.747)	-0.570 (1.689)	-1.400 (1.653)	0.0136 (1.568)	0.217 (1.622)	0.418 (1.390)	-0.893 (1.596)
<i>regulatory</i>	0.693 (1.829)	0.986 (1.764)	1.703 (1.730)	2.102 (1.870)	-1.188 (1.561)	-0.709 (1.529)	-0.588 (1.622)	-0.533 (1.626)	-0.554 (1.463)	-0.0429 (1.444)	0.238 (1.333)	0.637 (1.606)
<i>law</i>	4.698** (2.307)	5.010** (2.187)	3.146 (2.096)	3.946* (2.353)	6.029** (2.627)	6.862*** (2.555)	6.202** (2.822)	6.723** (2.690)	4.379** (1.939)	5.013*** (1.927)	2.988* (1.653)	3.992* (2.085)
<i>corruption</i>	-5.240*** (1.809)	-5.781*** (1.751)	-4.747*** (1.674)	-4.467** (1.785)	-3.153** (1.568)	-4.136** (1.631)	-3.020* (1.643)	-2.595 (1.637)	-4.403*** (1.501)	-5.366*** (1.566)	-3.625*** (1.310)	-3.616** (1.521)
<i>impulse</i>	-0.310*** (0.111)				-0.269** (0.112)				-0.355*** (0.118)			
<i>stabilizers</i>			0.0313 (0.0226)				0.0370 (0.0235)				0.0336 (0.0213)	
<i>rule</i>				-0.981** (0.468)				-0.700* (0.419)				-0.918* (0.487)
<i>productive</i>					1.016** (0.483)	0.926** (0.469)	1.295** (0.535)	1.274*** (0.480)				
<i>unproductive</i>									0.133 (0.0991)	0.127 (0.0974)	0.0814 (0.0827)	0.180 (0.112)
<i>Constant</i>	-17.20*** (5.776)	-12.78** (5.346)	-16.81*** (5.513)	-18.39*** (5.709)	-12.60** (5.383)	-10.20** (5.129)	-16.36*** (6.167)	-15.38*** (5.537)	-6.620** (3.183)	-4.716 (3.042)	-5.720** (2.778)	-7.543** (3.489)

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1