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Sovereign Default Risk in the Euro-Periphery and the Euro-Candidate Countries

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Abstract:

This study examines the key drivers of sovereign default risk in five euro area periphery countries and three euro-candidates that are currently pursuing independent monetary policies. We argue that the recent proliferation of sovereign risk premiums stems from both domestic and international sources. We focus on contagion effects of external financial crisis on sovereign risk premiums in these countries, arguing that the countries with weak fundamentals and fragile financial institutions are particularly vulnerable to such effects. The domestic fiscal vulnerabilities include: economic recession, less efficient government spending and a rising public debt. External ‘push’ factors entail increasing liquidity- and counter-party risks in international banking, as well as risk-hedging appetites of international investors embedded in local currency depreciation against the US Dollar. We develop a model capturing the internal and external determinants of sovereign risk premiums and test for the examined country groups. The results lead us to caution against premature fiscal consolidation in the aftermath of the global economic crisis, since such policy might actually worsen sovereign default risk. The model works well for the euro-periphery countries; it is less robust for the euro-candidates that upon a future euro adoption will have to pursue real economy growth oriented policies in order to mitigate a potential increase in sovereign default risk.

Keywords: sovereign default risk, euro area, euro-candidate countries, public debt, liquidity risk, counter-party risk.

JEL classification: E43, E63, G12

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I. Introduction

The recent proliferation of sovereign risk in the euro area and among some of the EU members remaining outside the European common currency was not foreseen in the optimum currency area (OCA) literature. The classic OCA theorems (R. Mundell's labor mobility, R. McKinnon's trade diversification and P. Kenen's production diversity) spell out economic convergence conditions that purportedly result in a compression of government bond yields, i.e. diminishing sovereign risk premia among the OCA members. The appropriateness of the three leading OCA theories for sustainability of common currency areas has been widely discussed, albeit and at times seriously questioned (Goodhart, 1998)¹. In the aftermath of the recent global financial crisis, the reality has evolved in the opposite direction. The recent explosion of the euro-periphery sovereign risk as well as a discernible divergence of sovereign bond yields among some of the euro-candidate countries (see Figure 1 a-b) demonstrates that consolidation of the EU and euro area economies remains far from being satisfactory.

These topical developments raise a number of questions that we aim to address in this paper. The main investigative problem of our study is to examine whether adopting the euro as opposed to maintaining a monetary autonomy is effective for lowering sovereign default risk for a European Union Member State. We devise a model encompassing key determinants of *sovereign (default) risk premium* (SRP) and test it for five selected euro-area members and three euro-candidate countries. The selected euro members are those that have recently experienced explosion of SRP: Spain, Portugal, Ireland, Italy, and Greece. The examined euro-candidates are the largest EU New Member States that are pursuing independent monetary policies based on the inflation targeting framework: Poland, Hungary and the Czech Republic. Our exercise intends to highlight systemic differences between both country groups. Our working assumption is that SRPs in the euro-periphery countries are driven by both external and internal factors, with the leading role among the latter being played by the level of public debt in relation to GDP. External factors are presumed to be key drivers of SRPs in the candidate countries, as the public debt in this group has not reached an acceleration threshold suggested by Reinhart, et al., (2012) at 90 percent of GDP.

We assume a standard definition of SRP as a difference between domestic and a low-risk euro area long-term government bond yields. We contribute to the existing literature examining drivers of SRP in two ways. First, our model distinguishes between sets of domestic (local) and external factors determining SRP. It also includes the exchange rate vis-à-vis the US Dollar (USD), which can be interpreted as an interaction variable reflecting relative changes between the domestic and the euro area economic conditions. Second, we distinguish between euro-periphery and the euro-candidate countries as the influence of local vis-à-vis external determinants on SRP is seemingly different.

Several hypothetical assumptions underlie our analysis. First, we argue that an accelerated real GDP growth has a mitigating impact on SRP. Second, higher government spending as a share of nominal GDP may actually reduce, rather than raise SRP. Third, a

¹ An assertion by Goodhart (1998) is worth noting. He argues that the leading OCA theories have been derived from a 'Metallists' view that the value of a currency depends on the intrinsic value of the backing of that currency. The standard OCA models fail to recognize the importance of a 'Cartalists' approach whereas the value of a currency must be backed by the fiscal power of the issuing authority. The latter has become particularly relevant during the ongoing sovereign risk crisis in the euro area that streamlines policy solution for the euro survival to the importance of establishing a common fiscal authority and a cohesive fiscal policy.

rising public debt has a strong, direct impact on SRP regardless of monetary conditions, i.e. the actual euro adoption of the candidacy status. The euro adoption does not provide a shield against this causal interaction. Fourth, SRPs in both country groups are likely to be strongly influenced by deteriorating global credit risks and counter-party risks among international banks that we proxy by inclusion of the TED spread in our analytical model. Fifth, we assume that local currency depreciation will raise SRP, particularly in heavily indebted countries with lax fiscal discipline. Yet we argue that SRPs in the examined countries are affected by the expected exchange rate trend, and not by the observed variations in the exchange rate.

Our paper is organized as follows. Section II is an overview of pertinent literature. Section III analyzes SRP in an open-economy framework. The distinction between domestic and international drivers of SRP is explicated further in Section IV. The recent time path of SRP for the euro members and, separately, for the euro candidates is shown and discussed in Section V. The testable form of our model of SRP determination is shown in Section VI, and its empirical tests are examined in Section VII. The main conclusions and policy recommendations are summarized in Section VIII.

I. Literature Survey on Causal Interactions between Macroeconomic Stability and Sovereign Risk

The effects of macroeconomic policy adjustment have been traditionally assessed in the economic literature and by policy-makers in terms of their impact on individual macroeconomic policy targets, namely, real GDP growth or inflation. Among the domestic determinants of SRP identified in our study, we draw attention to the effects of changes in government spending and public debt in relation to GDP on SRP. Moreover, we view SRP as a hybrid, proxy indicator of combined macroeconomic and financial stability.² Such approach seems to gain merit, particularly in the aftermath of the recent global financial crisis, which has proven that policy prescriptions aimed solely at macroeconomic stability had a fundamental flaw as they have largely ignored the impact of financial stability on macroeconomic stability, assuming unconditional market efficiency and absence of financial bubbles (see for instance, Orlowski, 2008b; Skidelsky, 2009; Gjerstad/Smith, 2009).

While the literature investigates various domestic and external factors affecting sovereign default risk, the interplay between them under various monetary regimes has been marginalized. We aim to focus our study on this vacant issue. When a monetary regime has changes from sovereign currencies to a monetary union, the relative importance of fiscal vis-à-vis financial risk factors also changes. In a sovereign currency framework, fiscal policies may follow the concept of ‘functional finance’ pioneered by Lerner (1943), where deficits and public debt ratios are purposely changed by a government in response to specific needs to stabilize the real economy. However, in a monetary union, a single national government no longer plays a role of a common fiscal authority. It becomes a provincial fiscal agent and it can borrow only when financial markets are ready to provide liquidity. Therefore, integration with the union-wide financial markets becomes deeper and it imposes constraints on national fiscal policies. The functional finance concept helps us draw the distinction between the euro-periphery and the euro-candidates. While the euro-candidates can enact fiscal policies consistent with the functional finance concept, the euro-members can no longer do so.

² We apply a standard definition of SRP as a spread between yields on domestic versus benchmark low-risk long-term government bonds, such as U.S. Treasuries or German Bunds.

In dynamic terms, a long-term objective of minimizing SRP is important for growth and overall stability. A lower country risk environment is crucial for attracting international investment in tangible and financial assets that in turn brings about job creation and income growth. By expanding taxable income, it has a long-run ‘loop’ effect on fiscal soundness and sustainability.

There is no uniform agreement on the medium- and long-term effects of fiscal impulses on sovereign default risk. For this reason, the causal connection between fiscal impulses and SRP remains loose. One theoretical background is the Keynesian multiplier; a fiscal expansion in terms of public final consumption or public investment contributes to output and employment stabilization in recessionary times. However, the impact on the sovereign risk premium remains ambiguous. If financial markets expected a positive output response, sovereign default risk should stay unchanged. If financial markets are uncertain about the predictability of the output response, the sovereign risk might increase in the short-period and fall (or not) in the longer perspective. Also, the so-called non-Keynesian effects of a fiscal stimulus are assumed to lead to crowding out of private investment, hence ending up in higher inflation, unchanged output, but in an increase in SRP.

The effects of fiscal policy adjustment have been traditionally assessed in the economic literature and by policy-makers in terms of their impact on specific macroeconomic policy targets, namely, real GDP growth or inflation. In our analysis, we draw attention to repercussions of a government spending and public debt on SRP, which defines conditions of financial stability as a pre-requisite for sustainable real-economy growth and price stability in the long-run. Such approach seems to gain merit, particularly in the aftermath of the recent global financial crisis, which has proven that policy prescriptions aimed solely at macroeconomic stability suffer from a fundamental flaw as they have largely ignored the goal of financial stability³.

The recent debate examining fiscal policy effects pertains to the efficiency of government stimulus programs, such as the American Recovery and Reinvestment Act or Germany’s ‘Konjunkturpakete I und II’. The central investigative issue is whether the recent stimulus programs will have positive or neutral/negative effects on output growth. The answer to this conundrum depends on the relative proportion of the spending multipliers to the ‘crowding-out’ effects. A multiplier effect takes place when a fiscal stimulus is transmitted with some impact lag into higher consumer and investment spending that is funded with the initial income earned from the economic activity paid for by the government. The opposite ‘crowding-out effect’ is present when higher government spending has no impact on output growth, as it is offset by a decline in private spending. The initial income injected by the government is saved by private agents rather than spent in the economy. The subsequent income decline is attributable to higher interest rates and expectations of future tax increases in response to the initial increase in government spending. These positive or negative effects of fiscal stimulus on output have been recently investigated in the empirical literature. A number of recent studies have indicated a sharp decline in spending and tax multipliers stemming from the recent financial crisis, providing some merit to crowding out

³ We do not aim to test the Barro-Ricardian equivalence, which rejects the idea that a fiscal stimulus has an impact on financial markets and interest rates, and is tested mainly by investigating the behavior of consumers. We are led to believe that the Barro-Ricardo equivalence and the resulting policy prescriptions are inadequate for understanding the effects of a fiscal stimulus on financial and real economy stability. Such reasoning neglects the impact of a financial sector, which is crucial in our approach.

effects (IMF, 2008; Égert, 2010; Wieland, 2010). Other studies seem to support prevalence of positive effects of fiscal spending on output in spite of the decline in the value of fiscal multipliers during the recent crisis (Cwik/Wieland, 2009; Corsetti, et al., 2009). Current econometric models for the U.S. estimate that a tax cut has a multiplier effect of about 1.0, while the multiplier effect for government spending is 1.6 after about 18 months (Romer, 2009). Both multipliers have fallen from their long-term normal levels that exceed two by a large margin.

The recent literature on the link between fiscal policy and asset prices, as well as sovereign default risk focuses mainly on causal effects of changes in the value of financial assets on government budget positions. The predominant finding is not surprising - higher equity and housing prices tend improve fiscal balances, as they raise revenues from property taxes.⁴ We emphasize the opposite transmission, i.e. from changes in fiscal position on SRPs.

The prevalent views in the literature about the transmission of fiscal impulses on sovereign risk can be encapsulated as follows:

1. Fiscal deficits amplify sovereign risk premiums, particularly at times of financial distress (von Hagen, et al., 2011). This evidence is extracted from the empirical methods capturing short- to medium-term effects.
2. There is mixed evidence that government debt levels at the time of borrowing have positive impact on risk premiums. Von Hagen et al., (2011) question such evidence for EU countries based on the early pre-crisis data. However, in the aftermath of the 2008-2010 global financial crisis, the public debt proliferation has been a critical contributing factor to the 2010-2011 sovereign risk explosion in the euro-periphery. In the case of the U.S., such causal relationship has been diluted since 2004 due to massive international purchases of U.S. securities (Chinn/Frankel, 2007). Nevertheless, Chung et al. (2012) find that a one percentage-point increase in the debt-to-GDP ratio raises the real yield on equilibrium 10-year U.S. Treasury bond by about six basis points.
3. The detachment of long-term equilibrium yields from government bonds in Europe has been widely attributed to a successful convergence of bond yields during the period preceding the euro inception and extending until the recent global financial crisis (Codogno et al., 2003; Côté/Graham, 2004; Kim, et al., 2006), as shown in our Fig. 1a. There is also evidence of bond yield compression of the 2004 EU accession countries after 2003, but not in the preceding period (Orlowski/Lommatzsch, 2005; Orlowski, 2008a). There is a visible divergence of sovereign bond yields in the aftermath of the recent financial crisis (Gabrisch/Orlowski, 2010), as shown also in Fig. 1b below.
4. Institutional quality of fiscal authorities plays a critical role in this transmission process (Hallerberg/Wolff, 2006). Lower risk premiums strongly depend on established fiscal policy rules and the thoroughness of the policy monitoring as argued by Gjersem (2003), Chinn/Frankel (2007) and IMF (2008). However, this transmission has been recently distorted by the financial crisis, the flaws in credit rating systems, liquidity preferences of international investors, and various debt issuance techniques by governments.

⁴ See Égert (2010) among others, for compelling evidence.

We examine validity of the above assertions in our model and its empirical testing, particularly the association between SRP and changes in government spending as well as public debt in relation to GDP. The transmission of fiscal impulse into lower SRP seems entirely possible under both the mainstream balanced budget and ‘tax smoothing’. The balanced budget policy relies on the low level of public spending and of taxes that is suitable for ‘normal’ business cycle conditions. In a straightforward way, a continuous fiscal discipline results in a low public debt that translates into a lower risk premium. The problem arises when the economy is in a prolonged recession with high unemployment. The orthodox approach to tax smoothing allows for fiscal expansion and debt accumulation during ‘normal’ recessions (as oppose to depressions). The public debt is expected to be repaid when the economy returns to a stable growth path. Keynes added to this scenario a policy prescription for more permanent downturns arguing that larger than normal fiscal stimuli were needed at the time of more persistent recessions. His followers in the 1960s expanded the traditional approach by adding cyclically-adjusted revenue and expenditure components to the counter-cyclical policy. Their policy framework compares actual revenues and expenditures with the estimated ones for the economy reaching its full potential. Hence, a deep negative output gap necessitates more-than-normal expansionary fiscal policy. Thus in sum, the Keynesian policy course calls for expansions during recession, while the counter-cyclical post-Keynesian view maintains a fiscal stimuli until the negative output gap is eradicated. In the long-run, a fiscal expansion in either form is likely to restore confidence of consumers and investors whose increased spending can overcome an economic downturn. A counter-cyclical fiscal policy should reverse taxes and expenditures into a restrictive gear when the negative output gap comes down to an end. In all, a counter-cyclical fiscal policy is likely to engender a low risk environment for consumers and investors in the long-run. However, the risk-abating goal will not be reached when fiscal expansion becomes chronic and pro-cyclical, motivated by short-term non-economic factors, including political, populist pressures (Buti/van den Noord, 2004; Kaminsky, et al., 2004; Hallerberg/Wolff, 2006; Golinelli/Momigliano, 2009). Execution of this goal can be also distorted by the discrepancy between the policy design and implementation stages. Among others, Golinelli/Momigliano (2009) find that in spite of declaration of fiscal discipline, the euro area governments have a tendency to loosen fiscal stance during the policy implementation stage. Bernoth, et al. (2008) go further by arguing that fiscal policy in the euro area countries is planned mainly as counter-cyclical, but its realization has become predominantly pro-cyclical.

II. A Model of Sovereign Risk Premium in Open-Economy Setting

We augment the existing literature by investigating a nexus between domestic and external drivers of SRP and by adding a task of mitigating sovereign risk premium to the counter-cyclical fiscal policy framework. Our basic assumption is that the external factors have a dominant impact on SRPs in the economies with autonomous monetary regimes, while local factors prevail in the financially integrated economies within a currency union. We further assume that during a period of deep recession when there is a real threat of systemic risk (defined as a high probability of a permanent damage to real economic growth and financial stability), a government enacts a fiscal stimulus of a magnitude sufficient for abating such risk at a predetermined future period. At the same time, the government should indicate willingness to revert to a normal, disciplined policy or to a budget surplus when certain stability conditions are met. Such conditions should include elimination of both the systemic risk and the negative output gap. It is imperative that the government stimulus programs entail mainly the ‘exhaustive’ government spending that directly engenders income

growth and subsequently promotes real consumption and business fixed investment⁵. In addition, fiscal consolidation cannot be enacted prematurely; as such action could worsen credit risk as well as systemic risk. When the economic growth is restored and probability of systemic risk is minimized to a certain threshold level, the transmission of fiscal stimulus into a decline in SRP may be viewed as completed. We further recognize that contagion effects of externally-induced financial crisis are significant in small economies with capital asset liberalization. These adverse, destabilizing reactions will be stronger in countries with derailed fiscal discipline and weak overall macroeconomic fundamentals.

We begin from the identification of domestic vis-à-vis external factors that influence a SRP. In general terms the determinants of SRP can be specified as

$$SRP = f(LRF, ERF, ER) \quad (1)$$

The sovereign risk premium (SRP) is a function of local risk factors (LRF), exogenous risk factors (ERF) and the exchange rate (ER). LRF are affected by a range of complex indicators that are seemingly inter-connected. They include macroeconomic fundamentals, domestic credit conditions and domestic liquidity constraints. Thus in essence, LRF encompasses systemic risk (including default risk), credit risk and liquidity risk in the economy. It strongly depends on actual changes in fiscal, monetary and regulatory policies that purport whether the overall policy will be sustainable and credible. The macroeconomic risk largely depends on the size of fiscal deficit and the public debt, both assessed in relation to the current nominal GDP. Our view of fiscal policy stance is a bit broader than the standard treatment of fiscal determinants of government bond yields and sovereign risk premiums that focuses mainly on public debt-to-GDP ratio as a proxy of these fundamentals (Eichengreen/Mody, 2000; Codogno, et al., 2003; Marattin/Salotti, 2010). We emphasize mainly changes in the budget deficit position, in addition to an increase in public debt. The role of fiscal impulses as a source of sovereign risk is downplayed in the standard literature that assumes, in our opinion somewhat arbitrarily, that increases in government deficits are uniformly translated into higher public debt. As evidenced by Codogno et al., (2003), Marattin/Salotti (2010) and Égert (2010), this transmission is not linear, namely, fiscal expansion in high-debt economies has a stronger multiplicative impact on sovereign bond spreads (thus higher SRP) than in low-debt countries.

Considering disposition of policy preferences, we can rewrite the above function as

$$SRP_{t+\tau} = \gamma_0 + \gamma_1 \sum_{i=1}^k LRF_t + (1 - \gamma_1) \sum_{i=1}^l ERF_t + \kappa ER_t \quad (2)$$

In this specification $\sum_{i=1}^k LRF_t$ represents k-number of pertinent domestic risk factors and $\sum_{i=1}^l ERF_t$ is a set of exogenous factors. Parameter γ_0 reflects a long-term risk premium that depends on dynamic transformation of structural and institutional factors affecting sovereign risk, γ_1 is a weight parameter showing importance of local relative to exogenous risk

⁵ For a comprehensive review of key features of effective government spending programs that contribute to sustained economic growth, particularly in the aftermath of the recent global financial crisis, see IMF (2010).

determinants, κ is an interaction parameter of local and exogenous determinants of exchange rate movements, and τ is the impact lag of changes in domestic relative to foreign risk factors on SRP. It can be noted that for smaller open economies with flexible exchange rates γ_1 will be relatively low and κ significant. For the countries with fixed exchange rate regimes κ is equal zero. For large economies with a low degree of openness to trade and capital flows γ_1 will be high, closer to the unity, and κ relatively low.

The LFR group includes a long list of factors that affect SRP, they are probably too complex for examination in a single study. We focus on changes in the real economy growth, ratio of government spending to GDP and the public debt in relation to GDP. We admit that proliferation of public debt does not always stem from a fiscal stimulus. Among other contributing factors, it depends on exchange rate changes, particularly when a large share of government debt is denominated in foreign currency. In our model, the ER component can be viewed as an interaction variable between local and exogenous risk factors, as an interplay between these factors always affects local currency movement against a benchmark low-risk currency. If local risks outweigh foreign or global market risk, domestic currency will depreciate in line with the ‘flight-to-quality’ in international capital markets.

Changes in ERF also affect yield spreads on local versus selected low risk benchmark government bonds⁶, thus alter the $SRP_t = i_t^d - i_t^f$, where i_t^d and i_t^f represent yields on domestic and foreign (benchmark) government bonds respectively. Elevated international market risk stemming from concerns about global financial and political stability, as well as the expected course of the global output always induce investors to seek the safety of low risk benchmark bonds, contributing to lower yields on these bonds and to higher SRP for smaller, open economies. For large autonomous economies with a good fiscal track-record $i_{t+\tau}^f$ is close to zero, since the projected yield on domestic bonds is the benchmark country yield. The inclusion of ERP in our model is backed by a strong support in the empirical literature. Among others, Bernoth and Erdogan (2010) argue that SRP within the euro area can be explained by a common international factor that reflects risk aversion by global investors. At times of elevated financial market risk, international investors tend to buy low-risk assets and sell high-risk sovereign bonds, contributing to rising yields on risky sovereigns and higher SRP for more risky economies. This “flight-to-safety” process at times of financial distress is also highlighted in a recent financial market model developed by Brunnermeier and Pedersen (2009).

We now proceed to a more detailed specification of domestic and external factors affecting interest rate differentials vis-à-vis a risk-free rate, i.e. sovereign risk premia.

III. Domestic and International Factors Affecting Sovereign Risk

The literature that examines determinants and key drivers of sovereign default risk identifies a wide range of its domestic and external sources. Chief among the ‘local’ economy factors the ability of a country to maintain fiscal discipline, or in other words, sustainability of the

⁶ The term ‘benchmark bonds’ is used here for government bonds with a long maturity of 10 years (as in the notation of Thompson Reuter’s Data Stream).

public debt, captured mainly by the trend in the public debt-to-GDP ratio. This factor has been found significant in affecting country risk by Codogno et al. (2003), Haugh, et al., (2009), Marratin and Salotti (2010), Bernoth and Erdogan (2010), among others. The recent increase in the likelihood of default on debt repayments by the euro-periphery countries has contributed to the widening spreads on benchmark bond yields in the euro area and has played a pivotal role in proliferation of the euro-periphery sovereign risk crisis of 2010-2011.

Moreover, there is an increasing consensus in the literature that the current data on the government budget deficit position are less predictive for long-term interest rates than the expected deficit-to-GDP ratios. For instance, in a path-breaking study Canzoneri, et al., (2002) find that a 1 percent deterioration in projected fiscal deficit 5 to 10 years ahead widens the term spread of 10Y over 3M U.S. Treasuries by 41-60 basis points. A similar reaction of long term interest rates to a projected rather than an actual fiscal deficit has been found more recently for the EU countries, especially for the euro area economies by Haugh et al., (2009) as well as Bernoth and Erdogan (2010), and for the OECD member countries by Ardagna, et al., (2007). In addition to the expected degree of fiscal discipline, the institutional quality of fiscal authorities has a significant impact on sovereign default risk (Hallerberg and Wolff, 2006). Fiscal policy clarity and transparency coupled with a high level of tax discipline help mitigate the risk of default on government bond interest repayments.

There is increasing empirical evidence that not only the public, but also the private sector debt and default risk strongly affect sovereign default risk. Altman and Rijken (2011) bring a valuable new dimension to research on the determination of sovereign default risk by showing that it strongly depends on aggregate default risk of a nation's private sector. They assess a corporate health index for the private sectors of the U.S. and nine European countries on the basis of the new Risk Metrics' Z-Metrics system, concluding that the index provides an effective warning indicator and an appropriate hierarchy of relative sovereign risk for the examined countries. Their assessment of corporate health index as a driver of SRP is certainly more appropriate for the economies dominated by a large number of publicly listed corporations, and perhaps less relevant for countries whose national income is generated predominantly by small businesses. The private banking sector plays an important role for SRP as well, as tested in a study by Dötz and Fischer (2010). We choose to omit these factors as they may interact with other independent variables included in our model.

In addition to indebtedness of the public and the private sectors, the institutional strength and the depth of financial markets are also critical for ameliorating sovereign default risk. Domestic financial market liquidity, as measured by bid/ask spreads is important in the determination of sovereign bond spreads within the European Monetary Union (Gómez-Puig, 2006; Abad et al., 2010). The market size, depth and breadth also help reduce sovereign risk (Bernoth, et al., 2004). The impact of liquidity constraints on SRP depends on the prevalent level of interest rates. Manganelli and Wolswijk (2009) find that liquidity variations explain nearly half of the interest rate spread when the rates are high. They also prove a positive link between interest rate levels and SRP in the euro area in 'normal' market periods (specifically for the sample period March 1999 – April 2008).

A key domestic institutional factor affecting SRP is stability of domestic financial markets and strength of local financial institutions. The development of private financial markets and the ability of financial institutions to attract foreign capital have an important impact on the severity of defaults, thus also on sovereign default risk (Gennaioli, et al., 2010). It is because sound financial institutions by attracting both domestic and foreign capital and

leverage provide an internal discipline for the government to repay its debt (Altman and Rijken, 2011). Moreover, changes in SRP show high sensitivity to the size and the structure of national banking sectors, as argued by Gerlach et al. (2010).

Recent studies examining sovereign risk suggest influence of the size of the economy. Gültekin-Karakaş et al., (2011) provide evidence that credit rating agencies give higher ratings to developed industrial countries than to emerging market economies regardless of macroeconomic fundamentals. Particularly puzzling is a higher credit rating of Western European countries in contrast to East European transition economies that ignores fiscal and current account balance positions. However, this finding should be interpreted with a caution, as the Western European bond markets are larger and provide investors with a lower liquidity risk and transaction costs, thus yields on bonds traded in Eastern markets contain a liquidity risk premium.

As we imply by the design of our model, not only domestic but externally-generated or foreign factors affect an individual country's SRP. Among them, variations in foreign short-term interest rates appear to be most influential. A rise in foreign relative to domestic interest rates is likely to induce capital outflows, thus exacerbate country risk in a small open economy. Moreover, spreads between local interbank lending rates and a risk free international benchmark rate indicate, such as the TED spread or the Libor-OIS spread, indicate tensions in global credit markets, thus reflect credit risk and counter-party risk conditions in international banking. As argued by Orłowski (2008b) variations in the TED spread during the recent global financial crisis have helped explain the crisis' main stages and deranged intensity.

External factors affecting capital flows are transmitted mainly via contagion effects of global financial crises. These external factors are also referred to in the literature as 'common' or 'push' factors affecting capital inflows. They play a dominant role in determining capital flows to emerging market economies over the 'pull', i.e. country-specific factors. A balance of dynamics between the 'push' and the 'pull' factors affects the actual net capital flows and is strongly correlated with the individual country risk. Specifically, low risk economies with stable currencies and resilient financial markets are likely to experience large capital inflows driven by the 'push' forces, particularly at times of global financial distress. As a result of large capital inflows, their bond yields will fall (bond prices increase) and the SRP will decline further. A compelling evidence on the prevalence of the 'push' over the 'pull' factors, particularly for the emerging markets and during the 2009-2010 period is presented by Fratzscher (2011). A similar preponderance of the 'push' over the 'pull' factors holds true for the pre-crisis period. As evidenced by Codogno et al. (2003), sovereign bond spreads in emerging markets are strongly affected by both the yield on US government bonds and/or the slope of the US yield curve. In the euro area, widening yield spreads between the euro-periphery domestic and the low-risk euro-core sovereign bonds have been recently somewhat mitigated by new capital transfer mechanisms to the smaller, more indebted euro area members.

Liquidity constraints in international financial markets are also likely to affect domestic bond yields, particularly in the absence of controls on capital inflows. Particularly in times of uncertainty in global markets, international investors become risk-averse and allocate capital in countries with low-default risk (Codogno et al., 2003, Sgherri and Zoli, 2009). Such situation was certainly prevalent at the peak of the recent global financial crisis in October/November 2008 (Orłowski, 2008b). A particularly important role in proliferation of

the recent global financial crisis has been played by tensions in global credit markets and inter-bank lending as measured by the TED spread, i.e. the difference between the short-term (3M) USD Libor and the (3M) US T-bill yield. In essence, the TED spread reflects the degree of global credit risk and the counter-party risk in the international banking system. We are led to believe that SRPs of several European countries whose economic development is financed by credits from large international banks (Ireland, Spain, Portugal in particular) are likely to deteriorate with increasing global credit and counter-party risks. Their economic growth prospects may suffer as a result of a global credit squeeze. Moreover, significant proliferation of credit risk in international banking engenders a global systemic risk (Orlowski, 2012).

On a more general note, there is a consensus in the literature that a buildup of SRP usually follows a long-term, dynamic trend. As argued among others by Ang and Piazzesi (2003), it is not typically influenced by short-term financial market sentiments.

IV. Unsustainable Convergence of Bond Yield Spreads

Before devising a testable model of SRP determination, we wish to highlight the dramatic shifts in convergence (and divergence) patterns of spreads between yields on local and the German long-term sovereign bonds. We show the time patterns of these spreads for the five (peripheral) euro-area members, i.e. Spain, Portugal, Ireland, Italy and Greece in Figure 1a. Separately, Figure 1b shows the pattern of local vis-à-vis German bond spreads for the three largest euro candidate countries that are pursuing independent monetary policies (guided by inflation targeting) with flexible exchange rates against the euro: Poland, Hungary and the Czech Republic.

..... insert Figures 1a and 1b around here

As shown in Figure 1a, the sovereign bond yield compression for the euro-area members was nearly perfect (albeit illusory) during the period between the euro inception in 1999 and the peak of the recent global financial crisis in October/November 2008. Yet, that yield convergence was clearly detached from the pronounced differences in fiscal discipline and other institutional and structural discrepancies between the euro core and the euro periphery. It was based on perceptions of the euro eminent success and possible bailouts of the states with lingering fiscal imbalances. At the peak of the crisis, the collapse of Lehman Brothers triggered a surge in the TED spread (to 464 bps on October 10, 2008) reflecting a global credit freeze and the outbreak of extreme liquidity and counter-party risks in international banking, which ultimately intensified expectations of a global systemic risk. These extreme or 'tail' risks associated with escalating volatility of interbank lending rates, exchange rates, stock market indexes, both public and private bond yields and other financial market indicators were most absorbed by countries with derailed public finances, highly leveraged banking systems, and outright manipulation of Libor by the leading global banks (Orlowski, 2012). That unbalanced absorption of various types of financial risks ultimately led to significant divergence of sovereign bond yield spreads, which was the most pronounced in the cases of Greek, Irish, Italian and Portuguese government bonds. To this date, bailout plans aimed at rescuing the most affected euro-periphery countries and the proposed strategies for restoring effective bond yield convergence for the euro area have been rather ineffective.

Somewhat less dramatic swings in sovereign bond yields have been experienced by the euro candidates. As shown in Figure 1b, convergence of their local to the German bond yields proceeded effectively, particularly during the period between their EU accession in May 2004 and the outbreak of the financial crisis in August 2007, albeit at a slow and varied pace. The Czech government bond yields became effectively aligned with the German Bund yields; the spread between them was even negative in 2002/03 and in the first half of 2007. Yield spreads for Hungary have been consistently the largest among the examined euro candidates, as a result of this country's higher government budget deficit and public debt to GDP ratios. In addition, spikes in Hungarian and Czech yields in 2009 stemmed from elevated political risks that triggered expectations of deteriorating fiscal imbalances. However, since the third quarter of 2010, the bond yield spreads for all three countries have been declining, in contrast to the rising spreads among the euro-periphery members. This may suggest that a better policy scenario for the euro candidates is, at least for the time-being, the detachment from the euro area that allows for a disciplined pursuit of autonomous fiscal and monetary policies. These policies are essential for avoiding a surge of exchange rate risk, namely, a local currency depreciation that could translate into a higher SRP.

Nevertheless, we refrain from endorsing a deep, indiscriminate fiscal consolidation for both the euro area members and the euro candidate countries. Severe cuts in government spending could reduce national income by a stronger proportion, thus they may lead to a severe economic recession and a subsequent deterioration, i.e. an increase in SRP.

V. A Model of SRP Determination

The key factors affecting SRP discussed above allow us to expand the model of SRP determination. In Eq. (2), we made a distinction between domestic and external drivers of SRP. Among complex domestic, local drivers of SRP, we focus on the role of real GDP growth rate y_t , the ratio of government spending-to-nominal GDP $\left(\frac{G}{Y}\right)_t$, and the total public debt-to-nominal GDP $\left(\frac{D}{Y}\right)_t$. Therefore, the local, domestic risk factors LRF_{it} for a single country i are reflected by

$$LRF_{it} = \alpha_0 + \alpha_1 y_{it+\tau} + \alpha_2 \left(\frac{G}{Y}\right)_{it+\tau} + \alpha_3 \left(\frac{D}{Y}\right)_{it+\tau} + \mu_{it} \quad (3)$$

The displacement parameters τ reflect various optimal impact leads or lagged effects of the independent variables on LRF.

In a similar vein, we dissect the ERF_t into its key components, which should include at minimum an elevated credit risk and counter-party risk among leading global financial institutions that are roughly proxied by the *TED* spread, i.e. the spread between 3M USD Libor and 3M US Treasury bill yield. As proven by the recent global financial crisis, increased tensions in global credit markets pass through into higher sovereign default risk in

the economies with weaker fundamentals with a certain time lag (Orlowski, 2012). We also insert into the model a dummy variable FCD reflecting the financial crisis and the post-crisis periods, as opposed to the pre-crisis time of (illusory) stability. Considering these factors, the ERF is specified as

$$ERF_t = \beta_0 + \beta_1 TED_{t+\tau} + \beta_2 FCD + \mu_t \quad (4)$$

The ‘interactive’ variable capturing relative developments in local versus foreign fundamentals is the spot exchange rate e_t . In our tested model, the exchange rate reflects changes in the USD values of local currencies, that is, the Euro for the periphery countries and the Czech Koruna, Polish Zloty and the Hungarian Forint for the candidate countries. The exchange rate against the USD is chosen due to the continuous function of the USD as the leading international reserve currency.

The combined impact on of LRF, ERF and e of a group of N countries on SRP is shown by

$$\sum_{i=1}^N SRP_{it} = \gamma_0 + \alpha_1 \sum_{i=1}^N y_{i,t+\tau} + \alpha_2 \sum_{i=1}^N \left(\frac{G}{Y} \right)_{i,t+\tau} + \alpha_3 \sum_{i=1}^N \left(\frac{D}{Y} \right)_{i,t+\tau} + \beta_1 TED_{t+\tau} + \beta_2 FCD + \beta_3 \sum_{i=1}^N e_{i,t+\tau} + \xi_t \quad (5)$$

In this specification, changes in SRP are driven by the τ -lagged changes in the local factors that include the real GDP growth, government spending-to-GDP, and public debt-to-GDP ratios. They are also associated with external factors such as the TED spread and the financial crisis dummy, as well as the local currency value of the US Dollar.

As noted above, short-term money market and credit market effects on SRP in a given country are captured by the TED spread and by the exchange rate. These risks have played a crucial role in the propagation of the 2007-2008 global financial crisis (Orlowski, 2008b) and subsequently during the euro area sovereign default risk crisis in 2009-2011 (Orlowski, 2012). Both variables might not reflect all responses of capital markets in case of global shocks. We insert a dummy for the outbreak financial crisis since the third quarter 2007 (FCD). In essence, this dummy captures portfolio adjustments of international investors and their spillover effects on local equity markets.

The empirical tests of Eq.(5) are shown and discussed in the next section. Descriptive statistics for the tested variables, as well as their unit root tests are provided in Appendix A. Evidently, all variables are non-stationary at their levels and become stationary at their first differences.

VI. Empirical Tests for Euro-Periphery and Euro-Candidates

The process prescribed by Eq.(5) is tested for the two sets of countries: the euro-periphery and the euro-candidate states – the selection of which we have explained above. We aim to demonstrate whether there are significant differences in the impact of local versus external

factors on SRPs between these two distinctive groups. In essence, we intend to show whether adoption of the euro as opposed to a monetary independence helps mitigate country risk associated with fiscal imbalances and whether it shields a local financial system from contagion effects of an externally-generated crisis.

Due to a limited number of quarterly data, we employ pooled least square estimations for both groups, and subsequently check robustness of these tests by running regressions on stacked (panel) data for both groups. In all cases, we enter the variables in first differences since all the tested data series are non-stationary at their levels. The tests are optimized by applying appropriate lag (or lead) operators for all variables, and their optimized combination is obtained by minimizing the Akaike and Schwartz Information Criteria. The results of the pooled least square estimations are shown in Tables 1a and 1b, for the euro-periphery and the euro-candidates respectively.

..... insert Tables 1 a and 1b around here

The results shown in Table 1a suggest that all independent variables in Eq.(5) are highly significant for the five euro-periphery countries. SRPs are inversely related to future (forwarded by two quarters) changes in real GDP growth rates. In other words, SRPs are likely to decline if capital market investors expect acceleration of economic growth in these countries, and reversely, they will increase as expectations of economic recession or a slowdown become apparent. The government spending as a share of GDP is even more significantly related to SRP. An increase in this ratio results in a lower SRP with a one-quarter lag. This finding leads us to caution against a deep fiscal consolidation, i.e. sharp cuts in government spending, which may potentially aggravate rather than mitigate sovereign default risk through their detrimental short-term impact on economic growth and unfavorable outlook for investment. As it can be intuitively expected, a rise in the public debt-to-GDP ratio tends to exacerbate SRP in the euro-periphery countries. This magnifying effect of rising public debt on sovereign default risk has been widely investigated and agreed upon in the literature (recently, for example by Reinhart/Sbrancia, 2011).

The external factors have a significant impact on SRPs in the euro-periphery countries as well. A rising TED spread that reflects tensions in credit markets and increasing counterparty risk among global banks tends to raise SRPs, at least with a one-quarter lag, as investors recently have a tendency to pull out capital from more risky markets and allocate it in low risk assets. The tests of our empirical model also confirm the recent proliferation of SRPs in the euro-periphery countries through a positive, highly significant effect of the financial crisis period dummy variable FCD. Changes in the USD-per-EUR exchange rate show a strong inverse association with SRPs in these countries. Apparently, depreciation of the euro accompanies a rise in sovereign default risk in the euro-periphery. Therefore, policy actions aimed at stabilizing the euro, such as credible and sufficient bailout plans facilitated through the European Stability Mechanism, or further steps toward fiscal policy coordination and consolidated sovereign support for ECB liquidity injections are indispensable for mitigating sovereign default risk in the crisis-prone euro area members. The cross-fixed country effects show a strong increase in SRP for Greece, relative to the rest of the peer group.⁷

The estimation of our model (Eq.5) for the euro-candidate countries (Table 1b) shows a different balance of key SRP drivers. This distinction stems from the main institutional

⁷ It could be argued that this significant increase displays parts of institutional weaknesses in the Greek government sector which are not covered as such by our data base.

differences between the euro-candidates and the euro-periphery countries that include: lower public debt-to-GDP ratios in the candidates' group, as well as their flexible exchange rates, and historically more volatile government bond markets that were only introduced in the late 1990s in Hungary and early 2000s in Poland and the Czech Republic⁸. Business cycle conditions, i.e. changes in real GDP growth rates have a stronger impact on SRP in the candidate countries than in the periphery. As shown in Table 1b, an acceleration of economic growth tends to reduce SRPs, with a two-quarter impact lead, with a factor by about 5 larger than in the periphery. Equally important is the public debt level. Its increase in relation to GDP is associated with higher SRPs. The TED spread tends to exacerbate SRPs in the candidates' group with a one-quarter impact lag. The influence of the changes on the USD values of local currencies of the candidates is similar to those for the periphery states; specifically, local currency depreciation tends to drive up SRP in both groups. This leads us to argue that a euro adoption does not mitigate the exchange rate risk against the USD - the key international capital asset currency. There are two major differences in the main drivers of SRP among both country groups. First, the government spending-to-GDP ratio does not play a significant role in the euro-candidates. Second, the financial crisis and the euro-crisis periods captured by the FCD variable have no discernible impact on proliferation of SRP in the three candidate countries. Apparently, they remain vulnerable to global credit market conditions, but not directly affected by major shifts of capital flows related to the recent crises. Arguably, their monetary autonomy along with a prudent macroeconomic policy implementation helps them cushion possible contagion effects of such crisis episodes. The cross fixed effects shown in Table 1b suggest a successful containment of SRP in Poland, relative to the Czech Republic and, particularly, to Hungary. Nonetheless, the model estimation for the candidate countries is less robust than that for the euro-periphery, as implied by lower adjusted R-squared and F-statistics, and a higher sum of squared residuals.

We further test for robustness of the results obtained from the pooled data estimation by performing least square regressions on stacked (panel) data. The results of the panel estimations are shown in Tables 2a and 2b.

..... insert Tables 2 a and 2b around here

The obtained results for the euro-periphery countries shown in Table 2a are consistent and more robust than those shown in Table 1a, as implied by much higher adjusted R-squared (0.61 versus 0.45 respectively). The stacked data estimation shows a significant, inverse relationship between the expected acceleration of real GDP growth and SRPs. Equally meaningful impact on SRP increases is played by reduced government spending and by a coincident increase in public debt. The external factors also play a strong role in SRP proliferation. A higher TED spread evidently drives up SRPs in these countries, so does the FCD dummy. Distinct to the results in Table 1a is the impact of an appreciation of the Euro against the US dollar. While the pooled model with fixed effects yields a decrease of the SRP, the regression with stacked data shows an increase in risk premiums in response to the Euro appreciation (which also implies a SRP decrease associated with the Euro depreciation). Since the regression estimation for the candidate countries (Table 2b) show a negative sign as before, we conclude that the nominal exchange rate is not a robust regressor in the case of the peripheral countries. This estimation also shows some country differences (Italy vis-à-vis the others).

⁸ See Iorgova/Ong (2008) and Gabrisch/Orlowski (2010) for a more detailed description and discussion on the evolution and stability of government bond markets in Central and Eastern Europe.

We obtain results for the euro-candidates (Table 2b), somewhat different to the pooled regression. The first improvement of the panel data estimation is that both fiscal variables are now insignificant, underlining the weak relevance of fiscal positions in investors' decision making with respect to countries with sovereign currency. In addition, the difference between the coefficients of the acceleration or deceleration of real economic growth is now more pronounced (0.897 vs. 0.055) than in the pooled model specification. The external factors are consistently significant, although their impact is less pronounced in the determination of SRP for the candidates relative to the periphery. Specifically, the FCD variable drives up SRPs of the euro-candidates, what it remained ambiguous in the pooled data regression (Table 1.b). A further noteworthy result is that the TED spread has lost some of its former significance in favor of the financial crisis dummy.

In sum, our empirical estimations suggest that the main difference among the drivers or SRPs in the euro-periphery and the euro-candidate countries are the fiscal policy indicators. Changes in the ratio of government spending-to-GDP and public debt-to-GDP play a stronger role in the euro-periphery group, but are seemingly detached from SRP in the candidate countries. The common SRP determinants in both groups of countries include the expected economic growth and the external factors. The impact of the exchange rate on SRP is less robust in the euro-periphery. Thus arguably, flexible exchange rate and monetary independence of the candidates seemingly contribute to detachment of the exchange rate risk from the sovereign default risk.

Overall, both pooled and panel data estimations suggest that the best policies to abate sovereign default risk is to generate economic growth, but not necessarily to resort to deep cuts in government spending. Moreover, the countries with weak fundamentals are particularly and undeniably more susceptible to assimilation of external liquidity and systemic risks.

VII. A Synopsis

We have devised a model examining the major drivers of sovereign default risk in the euro area periphery and the euro-candidate countries. In our model, SRP proxied by the spread between the yields on local versus German 10Y government bonds depends on two sets of domestic (country-specific) and external economy explanatory variables. The domestic variables include quarterly changes in: real GDP growth, the government spending-to-GDP ratio, and the public debt-to-GDP. The external variables include the TED spread (measured as a difference between three-month USD Libor rates and US T-bill yields) and the dummy variable extracting the recent global financial crisis and the euro area sovereign risk crisis from the sample period. In addition, we include the exchange rates specified as USD values of local currencies as a connecting factor between local and external variables.

We conduct empirical tests of our model using pooled data and stacked pooled data least squares methods for two groups of countries: five euro-periphery members and three euro-candidates. This distinction is introduced to show differences in drivers of SRP and to demonstrate whether the euro adoption by itself has a mitigating impact on sovereign default risk. The model yields robust results for the euro-periphery and somewhat less conclusive for the euro-candidates. SRPs in the euro-periphery are driven strongly by both local and external factors. The most decisive drivers of SRPs are the expected real GDP growth, government spending and public debt ratios, the external factors and the EUR in USD exchange rate. Both

the local and the external factors included in our model are strongly related proliferation of SRPs in the euro-periphery. Our focal result is that an increase in government spending is likely to reduce SRPs, with at least a one-quarter lag. This result questions validity of sharp fiscal consolidation and containment of government spending for the purpose of lowering sovereign default risk, at least in a short-run horizon.

SRPs in the euro-candidate group are predominantly associated with expected changes in economic growth. Local fiscal variables are by far less significant in this group. Contagion effects of elevated risks in global credit markets play some, although less significant role in proliferation of SRPs in these countries. We therefore argue that continuation of policies stimulating real economy growth is a correct venue for abating sovereign default risk. It is also essential for these countries to preserve a sound banking system by avoiding excessive bank leverage and protecting solvency of financial institutions, as means to avoid proliferation of sovereign default risk.

The model prescribed by Eq. 5 and its empirical tests further allow us to argue that no single country seems to be immune to contagion effects of external financial crises, regardless whether it has or has not adopted the euro. Moreover, the impact of the financial crisis dummy variable is stronger in the case of the euro-periphery which financial systems are integration with the entire euro area. Thus evidently, the financial integration makes these countries more susceptible to external financial shocks. We may further argue that contagion effects of external crises ought to be mitigated with well-known measures, including higher capital adequacy requirements proposed by the Basel III directives, and low costs of bank borrowings consistent with the near-zero targets for short-term interest rates pursued by the U.S. Federal Reserve and several other central banks. Yet, this venue of investigative research remains outside the boundaries of this study.

It shall be further noted that policy-makers in the EU will be well-advised to recognize that declarations of new macroprudential policies and the official policy decrees are not a panacea for curbing sovereign default risk problems. Neither is a recommendation for a fast-track euro adoption by the euro-candidates. Sound macroeconomic fundamentals and macroprudential regulations, along with pro-growth policies are essential for preventing possible proliferation of sovereign default risk in the future.

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Figure 1: Spreads of local over German government 10Y bond yields.

Figure 1a: The euro-area countries, quarterly averages for the sample period 1990 Q1 – 2012 Q1.

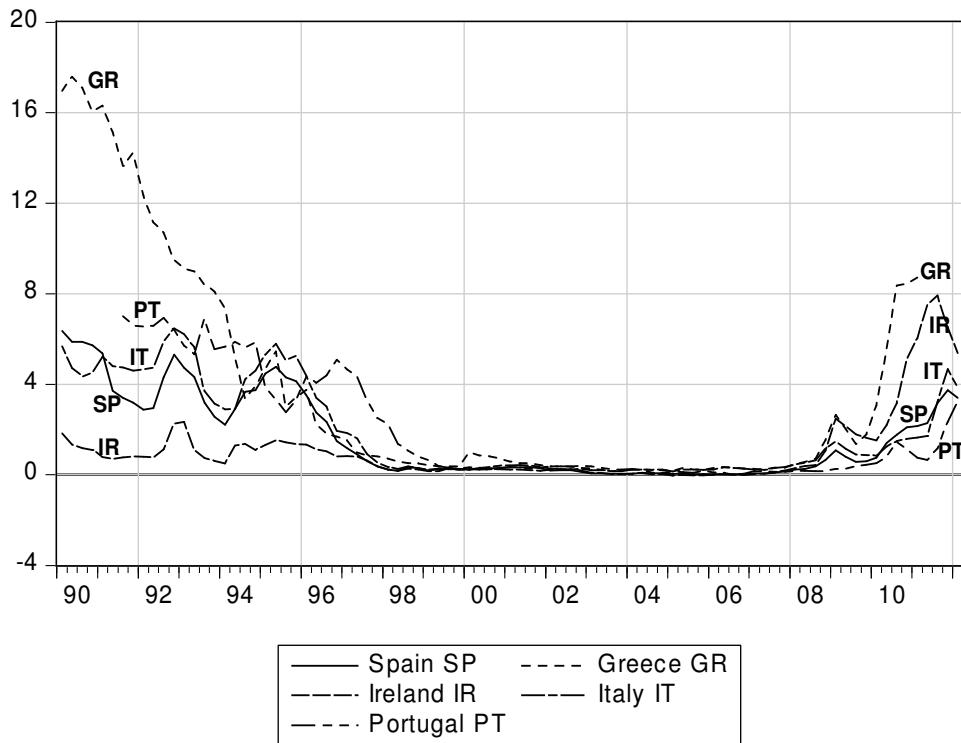
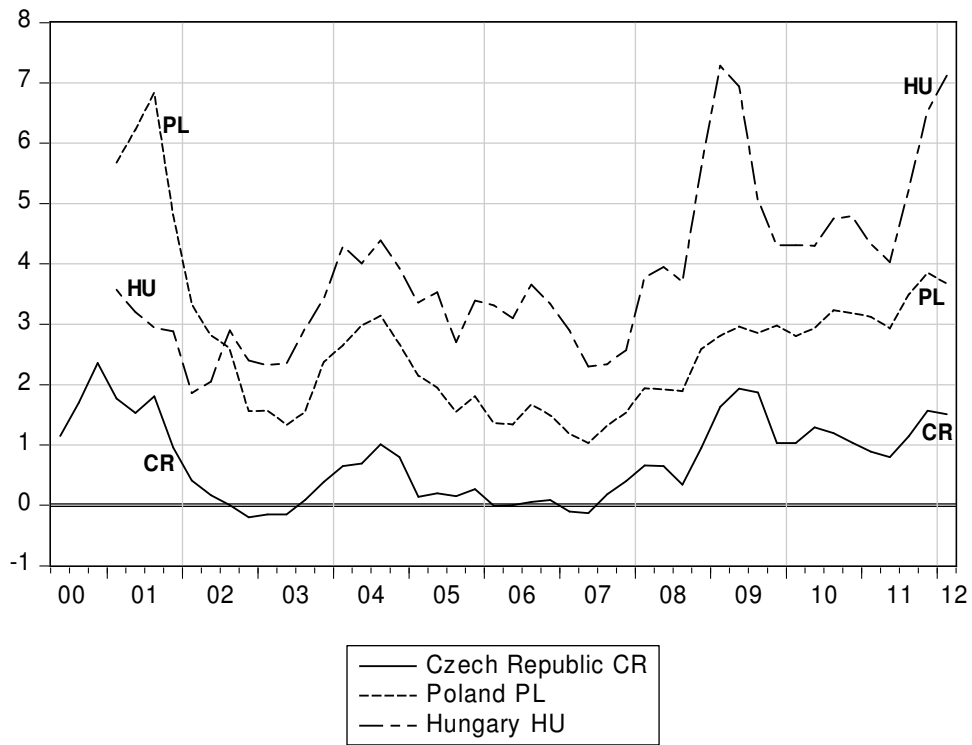


Figure 1b: The euro-candidate countries, quarterly averages for the sample period 2000 Q1 – 2012 Q1:



Data source: Eurostat.

Table 1a: Estimation of Eq.(5) for the Euro-Periphery Countries - Pooled Least Squares with Country Fixed Effects.

Dependent variable: change in the spread between local and German 10Y government bond yields.

Sample period: 2000 Q1 – 2012 Q1.

Indep. Variables →	Constant term	Δy	$\Delta(G/Y)$	$\Delta(D/Y)$	$\Delta(TED)$	FCD	$\Delta \ln(e)$
Coefficient	0.047***	-0.025***	-14.516***	1.863***	0.168***	0.104***	-1.442***
t-statistics	(3.58)	(-2.87)	(-4.55)	(2.92)	(5.06)	(3.91)	(-5.80)
Lead(Lag)	NA	+2	-1	0	-1	0	-1
<i>Cross fixed effects:</i>				<i>Descriptive statistics:</i>			
Spain: -0.016 Ireland: -0.006 Italy: -0.033 Portugal: -0.044 Greece: +0.098				Total pool (balanced) observations: 200 Cross sections: 5 Adjusted R ² : 0.446 F-statistics: 17.00 Sum of squared residuals: 10.57			

Notes: changes in exchange rates $\Delta \ln(e)$ are specified in terms of USD values of EUR for euro-area members and USD values of local currencies for the euro-candidates; Δy = change in the real GDP growth rate over the same period of previous year; $\Delta(G/Y)$ = change in government spending-to-nominal GDP; $\Delta(D/Y)$ = change in public debt-to-nominal GDP; TED spread is the difference between the 3M USD Libor and 3M US T-bill yield; FCD financial crisis dummy assumes 1 for the period 2007Q3-2012Q1 and 0 otherwise; *** denotes significance at 1%, ** at 5% and * at 10%.

Data source: Eurostat, OECD Main Economic Indicators, IMF IFS, Datastream.

Table 1b: Estimation of Eq.(5) for the Euro-Candidate Countries - Pooled Least Squares with Country Fixed Effects.

Dependent variable: change in the spread between local and German 10Y government bond yields.

Sample period: 2001 Q1 – 2012 Q1.

Indep. Variables →	Constant term	Δy	$\Delta(G/Y)$	$\Delta(D/Y)$	$\Delta(TED)$	FCD	$\Delta \ln(e)$
Coefficient	-0.067	-0.118***	3.819	4.571**	0.424***	0.149	-2.019***
t-statistics	(-1.17)	(-3.26)	(0.43)	(2.07)	(3.06)	(1.66)	(-2.93)
Lead(Lag)	NA	+2	-1	0	-1	0	-1
<i>Cross fixed effects:</i>			<i>Descriptive statistics:</i>				
Czech R: 0.012			Total pool (balanced) observations: 123				
Hungary: 0.036			Cross sections: 3				
Poland: -0.048			Adjusted R ² : 0.249				
			F-statistics: 6.05				
			Sum of squared residuals: 25.68				

Notes: see Table 1a

Data source: as in Table 1a.

Table 2a: Estimation of Eq.(5) for the Euro-Periphery Countries - Pooled Least Squares on Stacked, Panel Data.

Dependent variable: change in the spread between local and German 10Y government bond yields.

Sample period: 2000 Q1 – 2012 Q1.

Indep. Variables →	Δy	$\Delta(G/Y)*100$	$\Delta(D/Y)$	$\Delta(TED)$	FCD	$\Delta \ln(e)$
Coefficient	-0.055***	-0.305***	5.777***	0.365***	0.299***	2.43***
t-statistics	(-2.98)	(-4.97)	(12.41)	(3.25)	(3.93)	(3.37)
Lead(Lag)	+1	-1	0	-1	0	0
<i>Country fixed effects:</i>			<i>Descriptive statistics:</i>			
Italy: -0.138*			Total pool (balanced) observations: 233			
Greece: -0.009			Adjusted R ² : 0.612			
Ireland: -0.133			Sum of squared residuals: 62.932			
Spain: -0.049						
Portugal: -0.034						

Notes: see Table 1a.

Data source: as in Table 1a.

Table 2b: Estimation of Eq.(5) for the Euro-Candidate Countries - Pooled Least Squares on Stacked, Panel Data.

Dependent variable: change in the spread between local and German 10Y government bond yields.

Sample period: 2001 Q1 – 2012 Q1.

Indep. Variables →	Δy	$\Delta(G/Y)*100$	$\Delta(D/Y)$	$\Delta(TED)$	FCD	$\Delta \ln(\bar{e})$
Coefficient	-0.897***	-0.135	0.697	0.255*	0.215**	-0.545***
t-statistics	(-2.66)	(-1.49)	(0.36)	(1.84)	(2.37)	(-2.71)
Lead(Lag)	+1	0	0	0	0	0
<i>Country fixed effects:</i>			<i>Descriptive statistics:</i>			
Czech R: -0.070 Hungary: -0.000 Poland: -0.108			Total pool (balanced) observations: 136 Adjusted R ² : 0.23 Sum of squared residuals: 33.77			

Notes: see Table 2a.

Data source: as in Table 1a.

Annex A: Supporting statistics.

Table 1A: Descriptive statistics of sovereign risk spreads

a) Sample: entire period (1990Q1 – 2012Q1)

	Spain	Greece	Ireland	Italy	Portugal
Mean	1.623258	4.182432	1.075056	1.918989	1.932530
Median	0.570000	1.525000	0.490000	0.840000	0.390000
Maximum	6.350000	17.58000	7.920000	6.470000	7.000000
Minimum	0.010000	0.150000	-0.040000	0.140000	0.000000
Std. Dev.	1.853768	5.242209	1.620141	2.038242	2.332111
Skewness	0.930787	1.260178	2.681700	0.802854	0.990981
Kurtosis	2.542126	3.322222	10.12252	2.046622	2.397981
Jarque-Bera	13.62851	19.90608	294.7989	12.93181	14.83832
Probability	0.001098	0.000048	0.000000	0.001556	0.000600
Sum	144.4700	309.5000	95.68000	170.7900	160.4000
Sum Sq. Dev.	302.4082	2006.095	230.9874	365.5898	445.9770
Observations	89	74	89	89	83

b) Sample: estimation period

	Czech Republic	Hungary	Poland	Spain	Greece	Ireland	Italy	Portugal
Mean	0.745	3.821	2.659	0.594	2.503	1.185	0.723	0.424
Median	0.675	3.570	2.650	0.220	0.445	0.240	0.315	0.260
Maximum	2.3600	7.280	6.830	3.730	22.91	7.920	4.680	3.210
Minimum	-0.200	1.860	1.030	0.010	0.150	-0.040	0.140	0.000
Std. Dev.	0.680	1.324	1.284	0.925	4.841	2.113	0.943	0.570
Skewness	0.422	1.019	1.424	2.096	2.649	2.025	2.686	3.326
Kurtosis	2.135	3.675	5.206	6.434	9.591	5.887	10.24	14.88
Jarque-Bera	2.922	8.641	24.33	61.17406	148.950	51.539	169.188	386.103
Probability	0.2320	0.0133	0.000	0.000	0.000	0.000	0.000	0.000
Sum	35.770	171.9300	119.660	29.700	125.160	59.250	36.140	21.180
Sum Sq. Dev.	21.724	77.100	72.510	41.942	1148.139	218.791	43.580	15.911
Observations	48	45	45	50	50	50	50	50

Table 2A: Unit root test results. Null hypothesis: series has a unit root (yes/no)

Yes: p-values ≥ 0.1 ;

Period: estimation period

Variables	Countries	Greece	Ireland	Italy	Portugal	Spain	Czech Rep.	Hungary	Poland
	Period	2000Q1-2011Q1	2000Q1-2012Q1				2000Q2-2012Q4	2001Q1-2012Q1	
	Test								
SRP	ADF/PP	yes	yes	yes	yes	yes	yes	yes	yes
YGOV	ADF	yes	yes	yes	yes	yes	yes	yes	borderline
	PP	yes	yes	yes	yes	yes	yes	yes	borderline
DBR	ADF/PP	yes	yes	yes	yes	yes	yes	yes	yes
EX	ADF/PP	yes					yes	yes	yes
EX_FD	ADF/PP	yes					yes	yes	yes
EX_VAR	ADF	yes					yes	borderline	yes
	PP	yes					yes	borderline	yes
USTED	ADF/PP	borderline					yes	yes	yes
	(2000Q2-2012Q1)	yes					---	---	---

Borderline: p-values of one or both test results > 0.05