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Transmission of sovereign risk in the Euro crisis[☆]

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ABSTRACT

We assess the role of financial linkages for the transmission of sovereign risk in the Euro crisis. Building on the narrative approach by Romer and Romer (1989, 2010) and augmented by Mertens and Ravn (2013), we use financial news to identify structural shocks in a vector autoregressive model of daily sovereign CDS premia for eleven European countries. To estimate how these shocks transmit across borders, we use data on cross-country bank exposures to sovereign debt. Our results indicate that cross-border financial exposures constitute important transmission channels: a reduction of exposure to overall Greek debt by one standard deviation is associated with a reduction in the response of the sovereign CDS to a shock to Greek sovereign risk by about three quarters in the average country. Decomposing these effects, we find that exposures to sovereign debt constitute significant transmission channels, while we find no robust support for transmission through bank-to-bank lending.

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1. Introduction

In late 2009, with the global economy inching out of the Great Recession, the sovereign debt crisis hit Europe with a remarkable pace and vigor. Fears of sovereign insolvency initially developed in one peripheral country, Greece, but quickly spread to other European countries, prompting policymakers to take bold actions aimed at stopping contagion.

Sovereign risk may propagate across borders through multiple channels. In the context of the Euro crisis, however, the public debate has repeatedly stressed the role of financial linkages across countries, and, in

particular, of cross-border bank exposures as drivers of contagion.¹ Following a common line of argument, a looming Greek sovereign default would transmit more heavily to the banking systems of other European countries, the more these latter are exposed to Greek sovereign debt. A troubled foreign banking system, in turn, constitutes a liability to its sovereign through implicit guarantees and thus increases the respective sovereign risk. By similar mechanisms, cross-border interbank lending can matter: as the Greek banking system becomes stressed in a Greek sovereign debt crisis, foreign counterparties of Greek banks are adversely affected, which again strains the financial health of the respective foreign countries. While those and related channels have been frequently debated, the importance of cross-border financial linkages for the transmission of sovereign risk is contended (see [van Wincoop \(2013\)](#), among others) and their exact role in the Euro crisis ultimately remains an empirical issue.

In this paper, we provide empirical evidence which documents a significant relation between the transmission of sovereign risk in the

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¹ Christine Lagarde, Managing Director of the International Monetary Fund, states that "[f]inancial exposures across the continent are transmitting weakness and spreading fear from market to market, country to country, periphery to core." See also Financial Times: "Greek contagion fears spread to other EU banks", June 15, 2011. For a careful discussion of the role of financial institutions for the international propagation of risk see [Bolton and Jeanne \(2011\)](#) and [Guerrieri et al. \(2012\)](#).

Euro crisis and the cross-border exposures of financial institutions. Methodologically, we consider a vector autoregressive (VAR) model for sovereign Credit Default Swaps (CDS) premia, which serve as a measure of sovereign risk. We rely on the narrative approach of Romer and Romer (1989, 2010) to identify exogenous shocks in one country, focusing on daily news stemming from Greece (“Greek shocks”).² The actual estimations then adopt the procedure of Mertens and Ravn (2013, 2014) and instrument VAR residuals with the narrative variable.³

Proceeding in two steps, we first estimate the time-invariant transmission rate of Greek shocks for eleven European countries. Our results indicate that a 1% shock to Greek sovereign CDS premia is associated with a 0.275% increase in the CDS premia of the average European country, which suggests economically significant *transmission rate*. These spillover effects also appear to be long-lived, leading to persistent increases in CDS premia in all countries.

In a second step, we use data from the Bank for International Settlements (BIS) to relate the cross-country spillovers of sovereign risk to foreign banks’ holdings of Greek debt. Specifically, we test whether within-country changes in the response to Greek shocks are related to changes in financial exposure to Greece, while controlling for unobserved country-pair effects and other factors like bilateral trade linkages. Our estimates thus rely on the within-country variation of financial exposures only so that we can separate the role of financial linkages from other transmission channels, which are not systematically related to the changes in exposure (e.g., contagion through common lenders or expectation shifts).⁴

We find that the transmission rate is significantly related to financial linkages. In particular, the estimates of our baseline specification suggest that a reduction in financial exposure to overall Greek debt by one standard deviation (corresponding to a drop from 0.74% to 0.28% of GDP for the average country) is associated with a decline in the transmission rate of Greek shocks by 0.20, i.e., by about three quarter for the average country.⁵ These results suggest that financial linkages contributed substantially to transmission of sovereign risk during the Euro crisis.

Interested in the different types of financial linkages, we also distinguish between exposure to public debt and bank-to-bank lending. Our findings suggest that bilateral exposures to sovereign debt constitute economically and statistically significant transmission channels. Specifically, a reduction of sovereign debt exposures by one standard deviation is associated with a decline of the response to Greek shocks by roughly 0.12 – which is about 43% of the estimated rate of transmission. On the contrary, we find no robust support for transmission through bank-to-bank lending.

² The narrative approach exhibits some commonalities with a classic event-study methodology, which has been previously applied to study the international transmission of financial crises (e.g., (Forbes, 2004)). This methodology, however, considers a market model to explain the behavior of financial assets during normal times and then compute within a specific event-window a measure of abnormal returns, defined as the deviation of asset returns from the model predictions. In our study, we are forced to use a VAR model to account for the strong autocorrelation of CDS premia during the Euro crisis. Additionally, event studies are typically based on a single event-window of extended length rather than on a collection of daily events. Our definition of an event is thus more conservative since a clear identification of the exact origin of the event is much easier to motivate for short-lived single-day events.

³ The use of instrumental variables to estimate structural impulse response functions has been applied by other papers in the literature (e.g., (Hamilton, 2003)). In particular, the identification approach used in our paper is very close to the one discussed in Stock and Watson (2012) and Olea et al. (2012).

⁴ We acknowledge that the decomposition of the channels of contagion is difficult on theoretical grounds. We argue however that our empirical methodology, which focuses on few carefully identified country-specific shocks and on within-country variation of financial linkages, helps reducing identification problems, which are common to the existing literature.

⁵ This result does not contradict the fact that the perceived risk of Germany, whose exposure to Greek debt in 2009Q4 was with 1.3% of GDP among the highest in our sample, was relatively low throughout the crisis period. Compare also Fig. 1 below.

The narrative approach has the major advantage that identification is achieved without imposing a specific pattern on cross-country spillovers. This virtue is particularly important when analyzing cross-country transmission because in this context standard identification assumptions, e.g., short-run, long-run or sign restrictions, are difficult to defend (see Rigobon (2003)). Some concerns need to be addressed, however. Importantly, our estimates of Greek spillovers might reflect the response to events occurring outside Greece if the narratively identified shocks captured exogenous variation stemming from other countries. We have several reasons to think that this is not the case. First, with daily data the problem of simultaneity is sensibly reduced. Second, we take special care in reviewing financial news to exclude from our analysis those Greek events that overlapped with relevant financial news in other countries.⁶ Third, by controlling for global financial factors in the estimation, common shocks that affect sovereign risk through general market conditions are accounted for.

A second concern is that our narrative record of Greek events may identify the latent Greek shocks only up to a measurement error. This may lead to an attenuation bias in our estimates of cross-country spillovers, and may eventually affect our assessment of the role played by financial linkages. To obviate this problem, we adopt a methodology proposed by Mertens and Ravn (2013, 2014). Specifically, we use the narratively identified Greek events as an instrument for the actual structural shocks. Identification is then achieved by assuming that the narrative shocks correlate with Greek shocks but are orthogonal to shocks in other countries. As shown by Mertens and Ravn (2013), this approach is robust to the presence of a wide range of measurement errors in the narrative measures. To further address whether measurement errors affect our results, we consider different definitions of Greek events, which render results that are in line with our baseline specification. In addition, we perform placebo tests to address remaining concerns that our findings may as well result from a random identification of Greek events. Specifically, we randomize the days identified as Greek events and show that the resulting estimations only lead to statistically significant and economically meaningful estimates with low likelihood.

For a sound interpretation of our results, some concerns regarding omitted variables need to be addressed. In particular, due to pure contagion (unrelated to fundamentals, in the sense of Calvo and Reinhart (1996)) the sovereign CDSs of more vulnerable countries might react stronger to Greek shocks than more stable countries. To address related concerns, we control for the level of sovereign CDS prior to the Greek shock and find that the estimated coefficients barely change.

Another concern arises if financial markets interpret some of the Greek news as shocks to global financial stability, which are not captured by our exogenous variables. In this case, the estimates might suffer an omitted variable bias if shocks transmit through aggregate exposure to foreign debt, for which exposure to Greek debt is a proxy. We address this concern by controlling, in addition, for aggregate exposure to foreign debt. The corresponding estimates show that the previous results on the effect of exposure to Greece remain intact, while no significant relation between the responses to Greek shocks and the exposure to general foreign risk of countries is detected. We thus conclude that our estimates are not affected by omitted variables of this sort.

Omitted variables might also be a concern in connection with the valuation principles applied by BIS-reporting banks. In general, the positions reported to the BIS should be marked-to-market, but in practice banks possibly manage the recognition of losses actively. Thus, a bias could arise if banks in some countries are reluctant to recognize losses on their Greek bonds and, at the time, are more vulnerable to contagion. We discuss the data on financial linkages in the Section 2 and try to counter these concerns regarding strategic recognition. In addition, we re-estimate the model excluding the three crisis countries Italy, Portugal

⁶ A detailed description of the data and the selection procedure follows in Section 2.

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