# The Determinants of European Returns, Spillovers and Contagion

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**Abstract**

Nowadays, returns are affected not only by country fundamentals but also by worldwide events such as financial crises. One characteristic these shocks have in common is their widespread nature as they can propagate from one country to the other. Using a panel of European countries covering the period 2003-2012, this research explores the factors that jointly determine returns and the transmission of external and internal shocks. This information should allow regulators to decide on adequate macro-preventive measures to protect countries from the harmful consequences of these shocks. Beyond trade and financial linkages which are the principal channels investigated by previous research, we find that bank-specific factors at the heart of the new Basel III regulation also play a role in the channeling of global shocks. While this finding is not new in itself, our main contribution is in showing that both returns and shock transmission are governed by different combinations of the same factors across various samples of the banking sector. This study will therefore constitute a forward-looking assessment of enhancements brought by the new regulation thus complementing the recent capital monitoring exercise by the European System of Financial Supervision.

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## 1. Introduction

Finance and economic researchers base their understanding of the interaction between countries on a scientific concept from the field of communications. In that respect, a financial shock acting as a signal is assumed to cross international borders using as its "media" the "linkages" between countries while being "amplified/reduced" by country-specific factors at the "sending/receiving" end. Under this scheme, since the receiving country has almost no control over the initial shock, it can only regulate the strength of the transmission and the tuning at the receiving end.

The importance of understanding the forces that govern this interaction can be seen in the following two examples. When the United States (US) was hit by the subprime crisis in 2007, the Euro-Area (EA) suffered the aftermath. Similarly, the EA sovereign crisis that followed in late 2009[1] delayed the US recovery. In fact, the turmoil in the EA brought back into question the

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[1] According to Tong and Zuccardi (2011), the euro crisis began on October 16, 2009, with the words of Greek prime minister "We have large hidden debts and spending".

purpose of a unified Europe[2] as it revealed the downside of having safer countries put at risk from their riskier neighbors.

As these examples illustrate, the study of how one economy is affected by another is more than a matter of exchange rate fluctuations; especially in the case of the EA where the issue does not present itself. Krugman (2008) first developed the concept of an "international finance multiplier" to help understand interconnections (linkages) between financial markets. Combined with financial vulnerabilities, this concept was later formalized in general equilibrium by Devereux and Yetman (2010). Many empirical works have lent themselves in one way or another to the same concept. Nonetheless, the empirical testing of similar frameworks began much earlier in order to evaluate the cross-border impact on returns as well as the transmission mechanism by which returns are affected. This was based on acquired knowledge from pre-established models such as the CAPM supplemented with a variety of explanatory variables which include bilateral and country-specific factors (Dungey et al. (2004), Bekaert et al. (2005) and Poirson and Schmittman (2012) to name a few). As per Calvo et al. (1993), the latter are also known as push and pull factors, respectively.

In this research we contribute to the existing literature by looking at the differential role played by these factors in jointly determining bank returns and shock transmission using a 2003-2012 dataset of eight EA countries and the UK. To our knowledge, this is the first paper to attempt such a combinatorial approach as Bekaert et al. (2009) conceded that different approaches could lead to different conclusions. This allows us to compare some of the contrasting results found in the literature under a unified framework. Our paper is closest to the work of Baele (2005) who focused on stock market volatility instead of bank returns and Fratzscher (2012) who have an international rather than Euro-oriented.

Whereas there is a restricted set of bilateral push factors to choose from that includes lending, investment and trade, there is an extensive list available for the set of country-specific pull factors which encompass various risk indicators. We select capitalization as our main country-risk variable and proxy for credit risk in order to reflect on the impact of the Basel II capital regulation on Europe. Implemented as part of the Capital Adequacy Directive (CAD (2006)), this regulation was enforced by all EU member countries including the UK (FSA (2006)) by 2007. Based on Shin (2012), the reason the EU signed the agreement faster than other advanced countries, notably the U.S., was because legislators recognized that European banks became experienced at gaming the initial Basel I Accord (CAD (2000)). Hence, one purpose for our work will be in assessing the Basel II regulation thereby determining the need for the new Basel III regulation.

Over the last two decades, capital has received mixed reviews in terms of how it can affect stock performance (see Cathcart et al. (2013b)). While not referring to equity returns in particular, Berger and Bouwman (2013) examined the effects of capital on a different measure of profitability, ROA, for US banks between 1984 and 2009. Their view is that capital has a positive effect depending on the type of crisis and the size of the banks. Note that their study does not account for "Too-Big-To-Fail" banks (TBTF), otherwise known as Systematically Important Financial Institutions (SIFIs). Indeed, Chan-Lau et al. (2012a) admitted that their results could be biased towards banks with strong capital bases which were normally the TBTF institutions. Another contribution of our work will be to factor those banks into the analysis.

Note that the effect of capital ratios can be dented by other factors which, until Basel III, were not part of the international regulation. One such factor is leverage, which is set by national

[2]The birth of the Euro in 1999 was based on a series of economic treaties that brought the member countries within closer dependency of each other (single currency, free movement of population, removal of trade barriers).

regulators, and was found to be strongly associated with balance-sheet risk (Adrian and Shin (2010))). Looking jointly at both ratios, Chan-Lau et al. (2012a) find that banks' equity returns are boosted by high equity-to-asset (leverage[3]) ratios. This finding agrees with Devereux and Yetman (2010) and is based on the inability of Basel's risk-based capital ratio to reflect risks adequately. Notably, a zero risk-weight was attributed to some EA countries' domestic government debt during the crisis despite the fact that their sovereign's creditworthiness had deteriorated.

With regards to international shock transmission, the study of cross-country effects of capital ratios goes back as early as Peek and Rosengren (1997) who examine the effects of these ratios for Japanese parent banks and how they influence the lending behavior of their branches in the US. The study showed how capital can act as a channel propagating a shock from parent to subsidiary. More importantly, the purpose behind the Basel regulation was to increase banks' resilience against such shocks, in other words, decrease the banks' sensitivity resulting from international exposure. A small exercise by the ECB (2011) showed that this is indeed the case. While this result is re-asserted in Poirson and Schmittman (2012), the authors are surprised to find occurrences of the opposite effect. This could either be due to their particular setup or their use of leverage instead of risk-based capital requirements as a proxy for the banks' capital level. We revisit this finding in our results.

Another contribution of our work is to test our results across a spectrum of samples going from the largest banks (SIFIs/TBTF) to the whole countries' banking sector. Also, in line with the suggestion by Berger and Bouwman (2013) of assessing any differential role of capital between crisis and normal times, we divide our sample into pre and post 2007 in the spirit of Ehrmann et al. (2004) in order to investigate the extent to which the fact that EU (and US) banks were well-capitalized prior to the crash (Chami and Cosimano (2010) and Persaud (2013)) fared well for them during the crisis. Note that Poirson and Schmittman (2012) devised a similar procedure but did not account for the possibility that their results could be biased by the synchronous introduction of the new Basel rules with the unfolding of the crisis.

Whereas similar variations in sample and time have lead previous authors to remain inconclusive regarding their results (Poirson and Weber (2011)), we filter out a set of persistent findings from our study. Namely, that although Basel capital requirements reflect negatively on EU country returns, they help prevent shock transmission. Note that while most of the literature focuses on individual banks, in our model, we use aggregate country measures in order to evaluate the broader macro implications of our findings, in agreement with the emphasis on macroprudential policy advocated by Basel III.

The paper is hence structured as follows. In section 2 we present an overview of the literature on shock transmission. In section 3, we introduce our methodology. This is followed by a discussion of our results and robustness tests in sections 4 and 5. We conclude with our contributions, policy recommendations and possible extensions.

## 2. Shock Transmission: Spillovers or Contagion?

During the EA crisis, country risk indicators, known as Credit Default Swaps (CDS), and bond returns for (peripheral) European countries displayed historically high spread co-movement

[3]Leverage is not to be confused with the traditional corporate finance definition of Debt/Equity. In fact both "capital" measures differ mainly in their denominator: the leverage ratio uses Unweighted assets (UWA) whereas the capital ratio uses risk-weighted-assets (RWA) in relation to capital (numerator).

compared to normal times (IMF (2011)). This suggests that, in times of economic turmoil, country indicators tend to behave similarly, meaning that the potential "spillover" between the countries is high which might lead to further failures (Cheung et al. (2010)).

Essentially, spillovers are transmissions that occur due to the interconnectedness between countries (Dungey et al. (2004)). The transmissions usually relate to returns but can equally apply to volatility (Baele (2005)), growth (Poirson and Weber (2011)) and even fiscal aspects (Ivanova and Weber (2011)). Methods to capture them vary from using a standard VAR model as in Diebold and Yilmaz (2009) or more complex SVAR models as in Ehrmann et al. (2004)[4]. While these models are able to integrate many components, they remain overly dependent on the sometimes unverifiable assumptions underlying the identification matrix. As a result, GARCH methods have also been used; yet, the problem of selecting the model parameters arises and is subject to the choice of sample and information criteria (Dungey and Martin (2007)). Other methods have also been proposed which use the Conditional Probability of Distress (CoPoD) as in Sergoviano (2006).

A more tractable method of studying spillovers involves a two-stage regression, the first stage being a return model that includes at least a global factor (common to all stocks) and country-specific[5] factors belonging to the region, sector and industry. Before running the model, the standard regression constraint on the coefficients being constant is relaxed. This can be done through repeatedly estimating the model at various time periods (rolling window) or through using more elaborate time-varying coefficient models. The coefficients then become the dependent variable of a second-stage model where the explanatory variables are arbitrarily chosen.

For instance, Brooks and DelNegro (2006) use a latent factor model for emerging markets between 1985 and 2002. Their second stage factors include international sales and income ratios. Nonetheless, the more common practice evolves around bilateral linkages, specifically trade and finance, as these are well-known for varying across time and markets (Blanchard et al. (2010)). The first factor relates to how countries channel their excess demand (supply) through imported (exported) goods and are thus potentially affected, ceteris paribus, by changes to these economic forces (Kose and Yi (2006)). As a result, banks are also impacted by lower trade as they deal with most of the guarantees such as letters of credit (Tong and Zuccardi (2011)). The second factor arises because of international capital flows such as lending (Foreign Claims-FC) and investment (Foreign Direct Investment-FDI). Similarly, if one country becomes reluctant to lend, its partner will experience tighter credit conditions resulting in a squeeze on banks and the economy.

With the creation of the Euro, these bilateral linkages were intensified thus creating "by far the biggest export market [and] largest single banking sector exposure" in the world according to Poirson and Weber (2011). Together, these factors are a close representation of the Forbes and Chinn (2004) model which we extend in this research bearing in mind the lack of consensus as to which linkage is more relevant. Clearly, this depends on other variables mainly: the prevailing circumstances, time period, sample and model specifications which greatly differ between authors thus leading them to different conclusions. For instance, Forbes and Chinn (2004) find that between 1986-1995, bilateral linkages are insignificant but from 1996-2000 they do play a role. Moreover, despite growth in international capital flows, trade linkages are the most important channel in determining spillovers from the world's largest economies to the rest of the globe. In contrast, while using the same methodology as their predecessors but looking at a period between 1997 and

[4]For a full list of applied VAR methods refer to Poirson and Weber (2011)

[5]The important difference with the country-specific factors mentioned earlier is that these are systematic whereas the previous ones were idiosyncratic.

2009, Balakrishnan et al. (2009) find the opposite result. The latter finding agrees with Blanchard et al. (2010) who investigate the post-subprime period.

While it is common in the literature to mix the spillover effect with contagion[6], the latter is recently attracting a lot of interest from the research community. Since we differentiate between both transmission methods in this paper, it is important to choose which definition of contagion we are referring to. In fact, a survey of almost a dozen definitions of contagion is listed in Forbes (2012)[7]. The most popular are "excess co-movement" (Kaminsky et al. (2003)) above what would be expected from economic fundamentals (Bekaert et al. (2005) and Fratzscher (2012)). Despite several approaches devoted to quantifying contagion, namely the Dynamic Conditional Correlation (DCC) used by Savva et al. (2009) and Yiu et al. (2010)[8], in this study, we measure it as being the residual transmission (Masson (1999)) after accounting for other sources of transmission (Dungey and Martin (2007)). More succinctly, it refers to the co-movement after accounting for spillover effects.

Theoretical explanations for contagion have evolved around Kaminsky et al. (2003)'s "unholy trinity". Their theory relies on abrupt reversals in capital inflows and surprise announcements alongside the existence of a "leveraged common lender". The latter effect arises when countries are supported by the same (creditor) country or international financial institution(s) (VanRijckeghem and Weder (2003)) which help contagion spread from country to country. Similarly, at the debtor's end, leverage is significantly related to contagion even if institutions themselves are not directly hit by a shock (Kiyotaki and Moore (2002)). Indeed, Forbes (2012) finds a clear association between leverage and contagion although the author's definition of leverage is somewhat different than ours[9]. Moreover, since Devereux and Yetman (2010) corroborate the fact that country interdependence and capital constraints play a role in contagion, this justifies our usage of capital and leverage ratios as explanatory variables in our model. Finally, Bae et al. (2003) find that exchange rate changes, interest rate levels, and return volatility are good predictors of contagion. Since the variables investigated by these authors are already factored into bilateral factors such as trade, investment and lending (albeit with a certain lag), this justifies our use of the latter variables in explaining contagion.

## 3. Methodology

### *3.1. Data*

Our dataset contains nine EU member countries[10]: Austria, Belgium, Germany, France, Greece, Italy, Portugal, Spain and the United Kingdom. In 2012, these countries accounted for around 75%

[6]Dungey and Martin (2007) see the difference between spillovers and contagion in the timing of the initial impact of the shock. "Spillovers are the transmission at time t or later, of shocks which occurred at time t - 1 [...]. Contagion, however, is the contemporaneous or later transmission of unexpected shocks".

[7]Some definitions of contagion such as that in Forbes and Rigobon (2002) which relies on unconditional correlation coefficients has lead the authors to reject the existence of contagion in many crises episodes (1987, 1994, 1997). We restrict ourselves to definitions that found some evidence of contagion.

[8]Refer to Dungey et al. (2004) for an exhaustive list of methods.

[9]Leverage is defined as "the ratio of private credit by deposit money banks and other financial institutions to bank deposits, including demand, time and saving deposits in nonbanks".

[10]Ireland had to be removed as its country index became obsolete at one point in time according to MSCI. Likewise, the Netherlands data series was discontinued in 2007 and Finland had no Banks Industry Group. Aside from these three countries, the rest cover all countries in the IMF (2011) report and EU-countries in Chan-Lau et al. (2012a).

of EU GDP. On the other hand, the world's two largest economic areas, the US and EU (aggregate), each stood at 19% of World GDP. We label them as partners.

As in Ammer and Mei (1996) and Chan-Lau et al. (2012b), we use each country's Morgan Stanley Capital International daily price bank index (BKMSCI) between 2003 and 2012 to compute the simple return level using logarithmic price difference. All prices are taken in local currency to abstract from currency movements as suggested in Savva et al. (2009). Note that in such a period where interest rates reached historical lows, whether we use excess or simple returns does not change the validity of our results.

We also keep with the MSCI series when choosing the world and regional stock index for the US and EU series, denoted respectively as MSCI_US and MSCI_EU. This makes the data more homogeneous unlike the use of specific country indices (such as S&P) as in Baele (2005) and Dungey and Martin (2007). Note that an alternative would have been to run a principal-component analysis on the World stock index. However, the reason we opt for these two indices instead of picking the latter is because we want to compute the bilateral linkages between each individual country and its partners. Choosing the World as a "partner" would not only make the task more difficult and prone to measurement error, but it also prevents us from directly identifying any causal factor related to a specific partner as was the case in Poirson and Schmittman (2012). For these reasons, we selected the US as an identifier of global shocks because of its size (Dungey and Martin (2007) and Devereux and Yetman (2010)) and the EU aggregate as an identifier of regional shocks. In this case, linkages between the countries and the US/EU are readily available for each country.

According to Poirson and Schmittman (2012), the fact that our global and regional indices are the most highly correlated with the World index would suggest that it would be difficult to isolate the individual effect of each partner. This problem was stressed by Forbes and Chinn (2004) and admittedly biased the results in Brooks and DelNegro (2006). Given that we restrict our study to country level we isolate the problem from spreading to other smaller categories, for instance sectoral and industry, as in the case of these authors. Nonetheless, to remedy the problem we orthogonalize the EU index on the US index in similar fashion to Fratzscher (2012). The residuals become the new EU index for our study[11]. As can be seen in Table I the correlation between the two indices is almost zero.

Furthermore, in order to measure the influence of bilateral push factors we obtain foreign direct investment (FDI) data from the OECD, (yearly aggregated) bank foreign claims (FC) from the BIS consolidated banking statistics and imports (IMP) from the IMF DOTS database. Consistently with Forbes and Chinn (2004) all flows are measured from partner to country to estimate the effect of a reduction of either factor on the recipient country[12]. All variables are weighted relative to the country's GDP to eliminate stationarity concerns. Finally, capital (leverage) ratios TCERWA (TCETA), defined as Total Common Equity divided by Total Risk-Weighted Assets (Tangible Assets) are obtained from Bankscope. Correlation between all variables is provided in Table II. Our positive correlation estimates between bilateral linkages are in line with those of Balakrishnan et al. (2009) and Fratzscher (2012). It is also important to point out that bilateral linkages and capital ratios are uncorrelated.

[11] We do not perform the reverse procedure because based on Ehrmann et al. (2004)'s result, between 1999 and 2004, the US accounted for 26% of the variance in three different EA assets while the EA only accounted for 8%. This makes the spillover effect much stronger from the US to the EU.

[12] Depending on the direction of trade, other authors choose exports instead; however, in our setting, exports from a given country are the imports of the partner which constitute the risk factor.

At this point, since we assume that the effect on the banking sector is captured by the country bank index, the choice of what sample of banks to include becomes crucial. As such, Bruno and Shin (2013) compute a global index based on the summation of a specified variable across the Top10 banks ranked according to asset size. However, this unweighted method along with averaging

**Table I:**
**Correlation matrix for MSCI bank indices (2003-2012)**

The data below shows the correlation between the Morgan Stanley Capital International (MSCI) daily price indices of various countries in our sample.

| | US | EU | AUS | BEL | DEU | FRA | GRE | ITA | POR | SPA | UK |
|---|---|---|---|---|---|---|---|---|---|---|---|
| US | 1.00 | | | | | | | | | | |
| EU | 0.07 | 1.00 | | | | | | | | | |
| AUS | 0.40 | 0.56 | 1.00 | | | | | | | | |
| BEL | 0.43 | 0.55 | 0.62 | 1.00 | | | | | | | |
| DEU | 0.47 | 0.54 | 0.60 | 0.63 | 1.00 | | | | | | |
| FRA | 0.47 | 0.67 | 0.65 | 0.71 | 0.69 | 1.00 | | | | | |
| GRE | 0.23 | 0.40 | 0.45 | 0.40 | 0.38 | 0.43 | 1.00 | | | | |
| ITA | 0.49 | 0.62 | 0.62 | 0.67 | 0.69 | 0.81 | 0.41 | 1.00 | | | |
| POR | 0.28 | 0.42 | 0.45 | 0.52 | 0.44 | 0.55 | 0.39 | 0.54 | 1.00 | | |
| SPA | 0.52 | 0.69 | 0.64 | 0.67 | 0.66 | 0.81 | 0.44 | 0.80 | 0.56 | 1.00 | |
| UK | 0.50 | 0.65 | 0.63 | 0.65 | 0.65 | 0.77 | 0.39 | 0.68 | 0.47 | 0.73 | 1.00 |

**Table II:**
**Correlation Matrix for Explanatory Variables (2003-2012)**

The data below show the correlation between the different explanatory variables in our model. Bilateral Variables are shown with respect to the US and EU partner countries. Capital and leverage ratios are computed for the FullSample (see Table III) but results do not differ dramatically for other bank samples.

| | FC_USA | FDI_USA | I_USA | FC_EUR | FDI_EUR | I_EUR | TCR | TCETA |
|---|---|---|---|---|---|---|---|---|
| FC_USA | 1.00 | | | | | | | |
| FDI_USA | 0.52 | 1.00 | | | | | | |
| I_USA | 0.48 | 0.40 | 1.00 | | | | | |
| FC_EUR | 0.46 | 0.41 | 0.36 | 1.00 | | | | |
| FDI_EUR | 0.19 | 0.26 | 0.43 | 0.37 | 1.00 | | | |
| I_EUR | 0.10 | 0.15 | 0.62 | 0.32 | 0.65 | 1.00 | | |
| TCERWA | 0.08 | 0.07 | 0.05 | -0.07 | 0.01 | 0.03 | 1.00 | |
| TCETA | 0.06 | 0.07 | -0.07 | -0.13 | -0.03 | -0.04 | 0.53 | 1.00 |

**Table III:**
**Bank Numbers based on Sample Size**

The data shows the number of banks that form each of our samples.

| | SIFI | IMF | Top200 | Top10 | Top30 | FullRank | FullSample |
|---|---|---|---|---|---|---|---|
| AUS | 0 | 3 | 2 | 10 | 30 | 261 | 402 |
| BEL | 0 | 2 | 2 | 10 | 30 | 48 | 174 |
| DEU | 1 | 7 | 13 | 10 | 30 | 1587 | 2796 |
| SPA | 2 | 5 | 9 | 10 | 30 | 128 | 316 |
| FRA | 4 | 5 | 16 | 10 | 30 | 249 | 779 |
| UK | 4 | 6 | 17 | 10 | 30 | 269 | 714 |
| GRE | 0 | 1 | 1 | 10 | 18 | 18 | 42 |
| ITA | 1 | 5 | 8 | 10 | 30 | 576 | 1055 |
| POR | 0 | 3 | 2 | 10 | 30 | 33 | 78 |
| Total | 12 | 37 | 70 | 90 | 258 | 3169 | 6356 |

across a given sample, is subject to a bank size bias. In order to circumvent this problem in the same manner used by the World Bank to calculate international debt statistics, we compute country aggregate measures for the abovementioned ratios based on the median values of a specific sample. Note that in order to remove any sample bias we do so for seven sub-categories of banks (Table III). In principal, each sub-category encompasses the previous and so on. The first, SIFIs, is based on a set of criteria in addition to size, defined in BCBS (2011)[13]. The second is a list of the most important banks per country as established by the IMF. For the next samples, instead of imposing heuristic thresholds as in Berger and Bouwman (2013), we rely on country rankings by Bankscope based on asset size. This creates a more reflective sample of each country's top banks, albeit making the initial sample sizes more heterogeneous. Hence, the third sample includes banks that figure amongst the world top 200. The fourth and fifth are top 10 and top 30 banks per country. The sixth sample includes all banks that were ranked by Bankscope for a given country. The seventh category includes all banks in the database.

Note that, based on the fact that more open economies are more exposed to larger trade shocks (VanRijckeghem and Weder (2003), Blanchard et al. (2010) and Tong and Zuccardi (2011)) other measures could have been used instead of imports such as trade openness (Exports plus Imports divided by GDP) and financial or capital account openness (Foreign Assets plus Liabilities divided by GDP). While these variables appear to be influential, Balakrishnan et al. (2009) show that this is not the case which supports their exclusion from our model. As an alternative, the Chinn-Ito measure for capital account restrictions could have been used as in Fratzscher (2012)[14]; however, for the countries we selected, there is no difference between countries owing to the obsoleteness of this measure due to the removal of trade barriers between EU countries. Other variables have similarly been excluded mainly for reasons of collinearity and inconsistency between various authors. For a full list of variable exclusions see Appendix[15].

### *3.2. Model*

#### *3.2.1. Returns*

The return model is setup using an adapted version of the CAPM[16]. In other words, country $i$'s market index BKMSCI now becomes the LHS variable which is explained by the contemporaneous global and regional indices MSCI_US and MSCI_EU, where $j \in$ [US, EU]. We also add the matrices of Bilateral Variables (BV = [FC, FDI, IMP]) and Capital Variables (CV = [TCERWA, TCETA]) which are lagged to eliminate endogeneity concerns.

$$BKMSCI_{it,j} = \alpha_j + \beta_{0,j} MSCI_{j,t} + \beta_{1,j} BV_{it-1} + \beta_{2,j} CV_{it-1} + \epsilon_{it,j} \tag{1}$$

All models are estimated using fixed-effects and Newey-White robust estimators. Note that, in this context, robust estimation is done based on the country dimension ($i$), which, in other words, leads to the same results as clustering by country. Indeed, Poirson and Schmittman (2012) detected

[13]The full list is given in FSB (2012).
[14]Note that these authors found no significance in this factor both during and after the crisis.
[15]Note that size is already factored into the definition of our samples as per Table III.
[16]There have also been models who use Fama-French like factors instead as in Bekaert et al. (2009)

the presence of country clusters for individual banks while Tong and Zuccardi (2011) found similar behavior for stocks clustered by SIC. However, as this study takes place at a more macro level (country banking industry), we can only cluster by country.

*3.2.2. Spillover*

The standard single-factor spillover model of Frankel and Rose (1998) has been extended in the literature, leading to multi-factor models as in Forbes and Chinn (2004). As mentioned earlier, the time-varying nature of this model is due to a relaxation of the constant constraint on MSCI_US and MSCI_EU coefficient in equation (1). We use a window period of 6 months (180 days) as in ECB (2011) to concentrate on short-term fluctuations as opposed to longer windows such as Aharony and Swary (1983) and Bunda et al. (2009). The first stage model becomes:

$$BKMSCI_{it,j} = \alpha_j + \beta_{0,j,t} MSCI_{j,t} + \epsilon_{it,j} \tag{2}$$

The "beta" coefficients now measure the time-varying sensitivity of the bank indices to shocks coming from the US or EU. Yearly aggregated betas then constitute the dependent variable for the next stage regression which incorporates BVs and CVs as the main set of explanatory variables.

$$\beta_{0,j,t} = \theta_j + \beta_{1,j,t} BV_{it-1} + \beta_{2,j,t} CV_{it-1} + \mu_{it,j} \tag{3}$$

In Figure 1, we plot the individual country betas based on equation (3) . These graphs are in the same spirit as that in Brooks and DelNegro (2004) which describes an aggregate developed market stock index during the period 1986-2001. Note that increases in beta are normally a reflection of greater economic and financial integration across countries or an increased sensitivity due to crises.

Bearing in mind the six month window used, in most of the graphs, one can see two peaks occurring respectively around the dates of the subprime and Euro crises which are preceded by a period of relative calm. This suggests that a more interesting approach would be to divide the sample period into a tranquil (2003-2007) versus a crisis period (2007-2011)[17]. This can also be interpreted as a pre/post-Basel setting which would account for any differential role played by the exogenous implementation of the capital regulation in the second period.

*3.2.3. Contagion*

Contagion is the portion of interdependence which is not accounted for by the spillover effect in accordance with Masson (1999).

$$\hat{\epsilon}_{it,j} = BKMSCI_{it} - \sum_{j=US,EU} \hat{\beta}_{0,j,t} MSCI_{it,j} \tag{4}$$

Residuals $\hat{\epsilon}_{it,j}$ are derived by re-arranging the terms in equation (2) using the estimated spillover effect obtained from equation (3) as shown in the formula below. Figure 2 displays the residuals stemming from (4) and thus reflects the contagion effect. As expected this effect is arbitrary for every country and hence we cannot capture any similarities at this stage as we did in the case of the spillover effect.

[17] Note the effect of the lag on the end date.

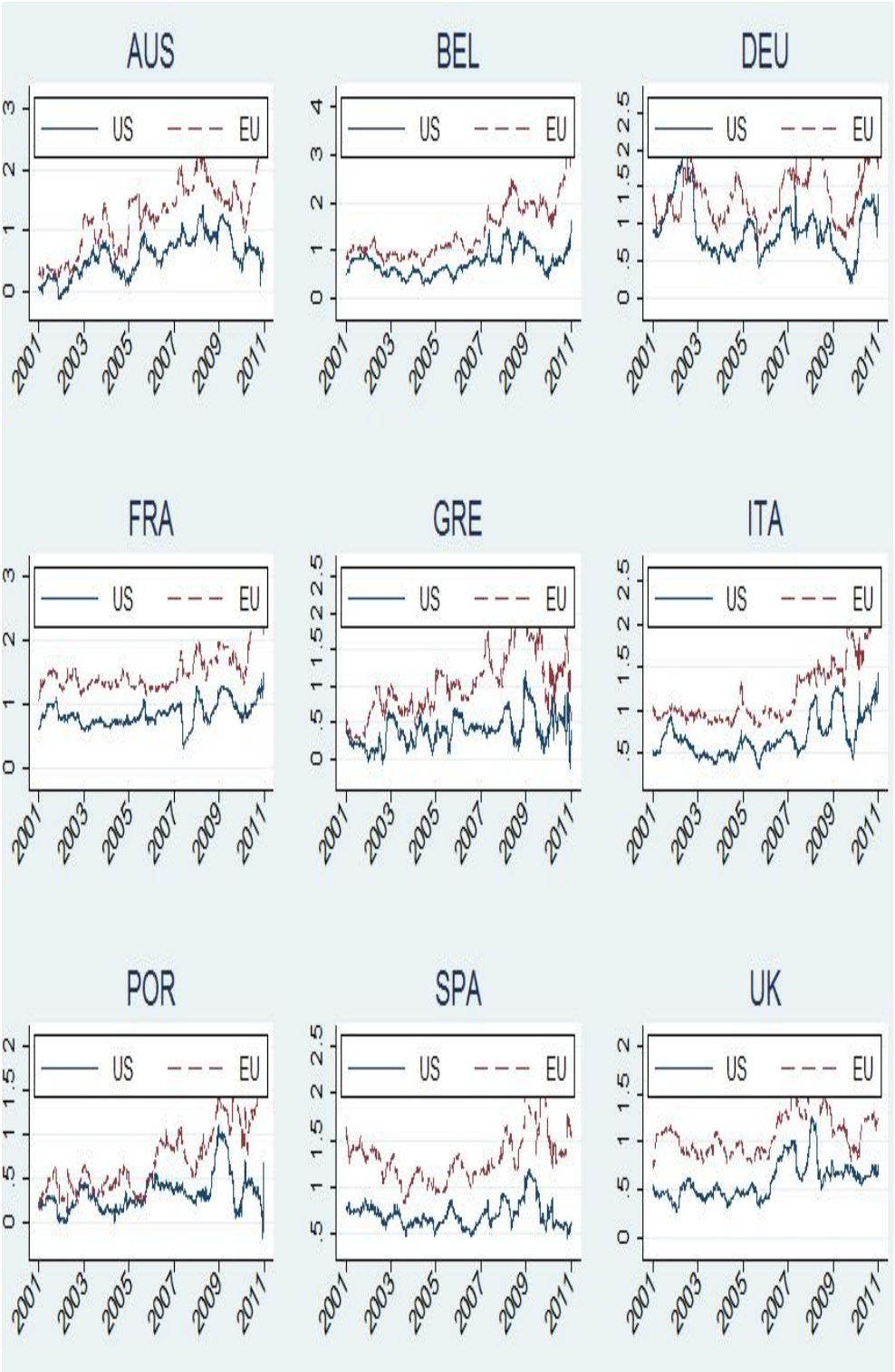


**Figure 1: Country Betas**


**Figure 2: Country Residuals (Horizontal line denotes the 0 intercept)**

## 4. Results

### *4.1. Background Analysis*

In this following, we evaluate the assumption made in section 3.2 that any EU country is likely to be predominantly affected by its partnerships with the US and countries within the EU; the latter being the strongest of both as reported by Bekaert et al. (2005). We compute the betas for the whole period by regressing each individual country's BKMSCI index on that of MSCI_US and MSCI_EU[18] The difference in beta between both partners is shown in Figure3. Clearly, country betas with respect to the EU are all higher than those of the US by around 0.6, with France having almost double that of Portugal. Next, we plot the individual country betas in Figure 4. We observe a linear beta trend between EU countries with regard to both the EU and US. We notice that the slopes of the linear fittings are almost the same with the $R^2$s being equal up to three significant figures. This is due to the orthogonalization we performed earlier on the MSCI indices.

Moreover, Figure 4 shows a clear separation between countries according to the magnitude of their respective betas. In fact, the ranking of countries seems to be the same with respect to the EU and US especially for countries with the lowest rankings. Aside from the UK whose beta could be affected by the fact that it is a non-EA member, the nations on the left-hand side are the peripheral countries which were subject to rescue programs during the euro crisis. Hence, these countries are referred to hereafter as "program" countries. In contrast, with the exception of Italy[19], the "non-program" countries at the right-hand side are the strongest powers within the EU. Also, the fact that France and Germany have the highest beta for the EU and US respectively reinforces the opinion of the IMF (2011) that spillovers within the EA will be mainly channeled by these two countries.

In addition, lending to EA countries played a prominent role during the euro crisis. In the spirit of Waysand et al. (2010) and Shin (2012), we present some figures describing the overall situation of these countries. In Figure 5, we plot the amount of lending of US banks to their EU counterparties based on BIS estimates. We observe that the negative impact on lending from the US to EU countries was short-lived during the subprime crisis but increased considerably afterwards compared to pre-crisis levels. Note however, that with the exception of the UK, the bulk of lending went to the core countries (N-PRGM) as they were perceived as safe borrowers. In turn, this left the task of lending to peripheral countries (PRGM) to the core countries, specifically France and Germany, in addition to the UK. This is showcased in Figure 6 which illustrates the amount of lending from core countries to the periphery. It is worthwhile pointing out that France did not participate in funding Portugal and Spain. Nonetheless, it still held the greatest debt proportion of the largest indebted country, Italy (130% of GDP according to IMF estimates), which raised spillover concerns from and to this country during the EA-crisis. This is in contrast to Germany who drastically cut down lending to the Iberic peninsula and was therefore less at risk from a negative spillover emanating from Europe's periphery. Finally, note that the UK, which took part in lending to the periphery, is also the heaviest borrower from the US (almost equal to the total of EA countries). This points to the particular role held by this country, and numerous attempts to renegotiate its position, within the EU.

[18] All results are highly significant (p-value $\approx 0$).

[19] Besides being a program country, Italy's position in the ranking is clearly a reflection of the size of its GDP: third (EA), fourth(EU).

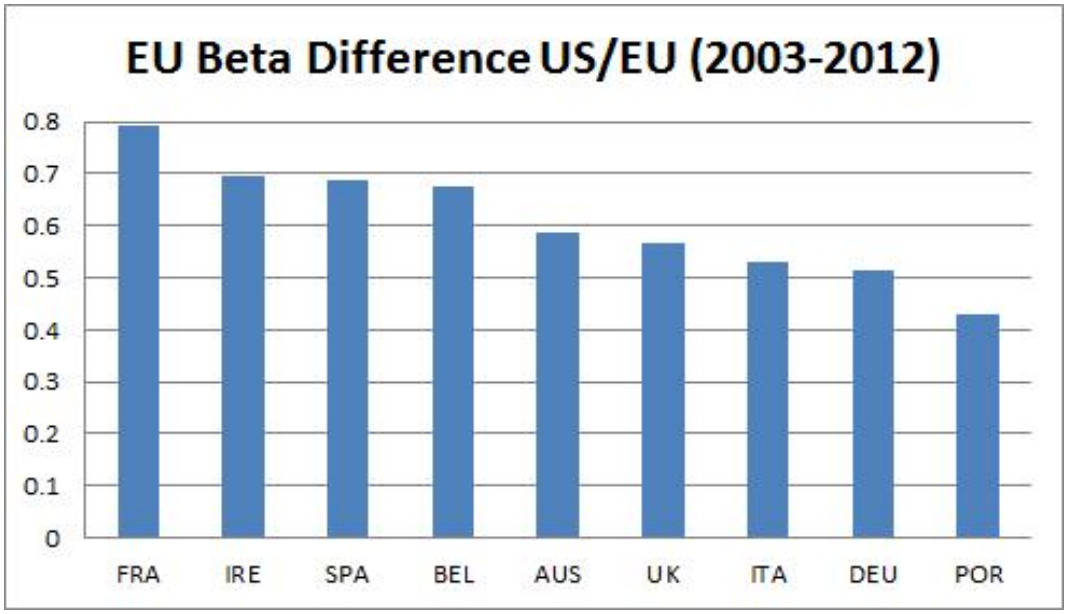


**Figure 3: Difference Between EU and US Betas (2003-2012)**

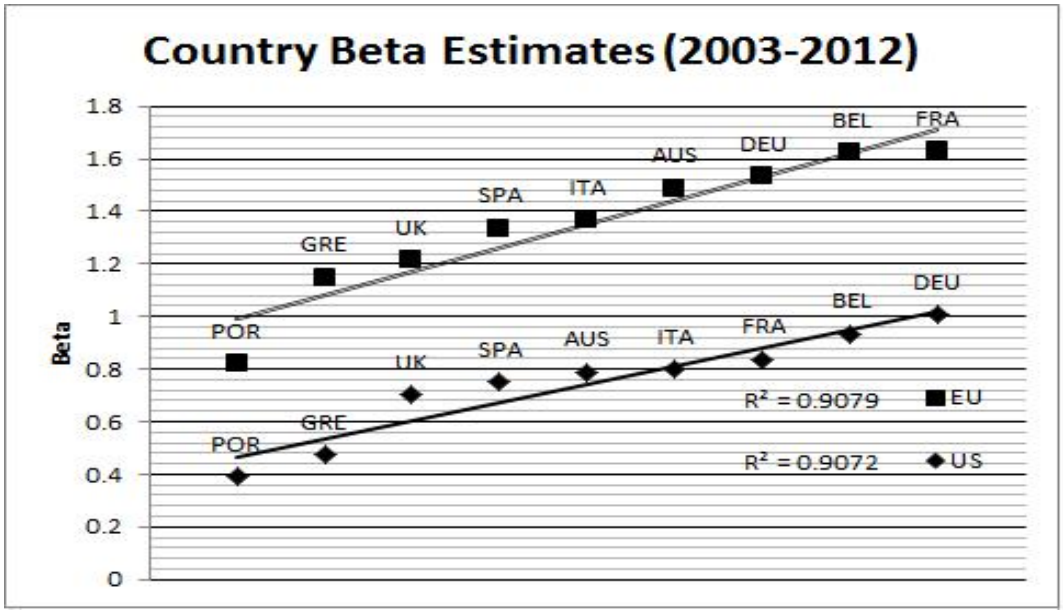


**Figure 4: Beta Coefficients against US and EU (2003-2012)**

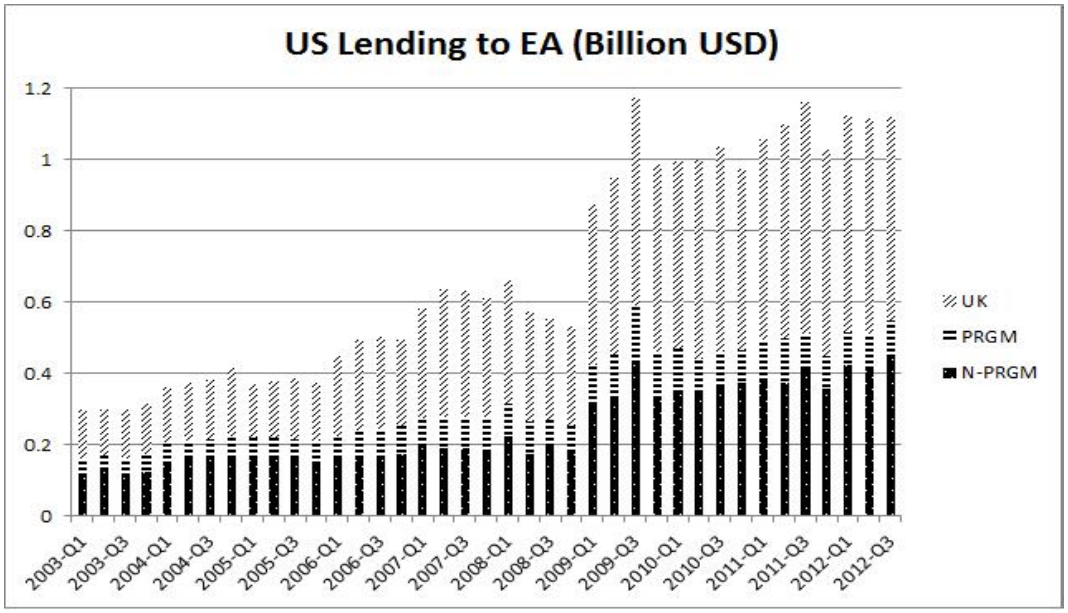


**Figure 5: Foreign Claims (in Trillions) of US banks on EU counterparties (Source: BIS consolidated banking statistics)**

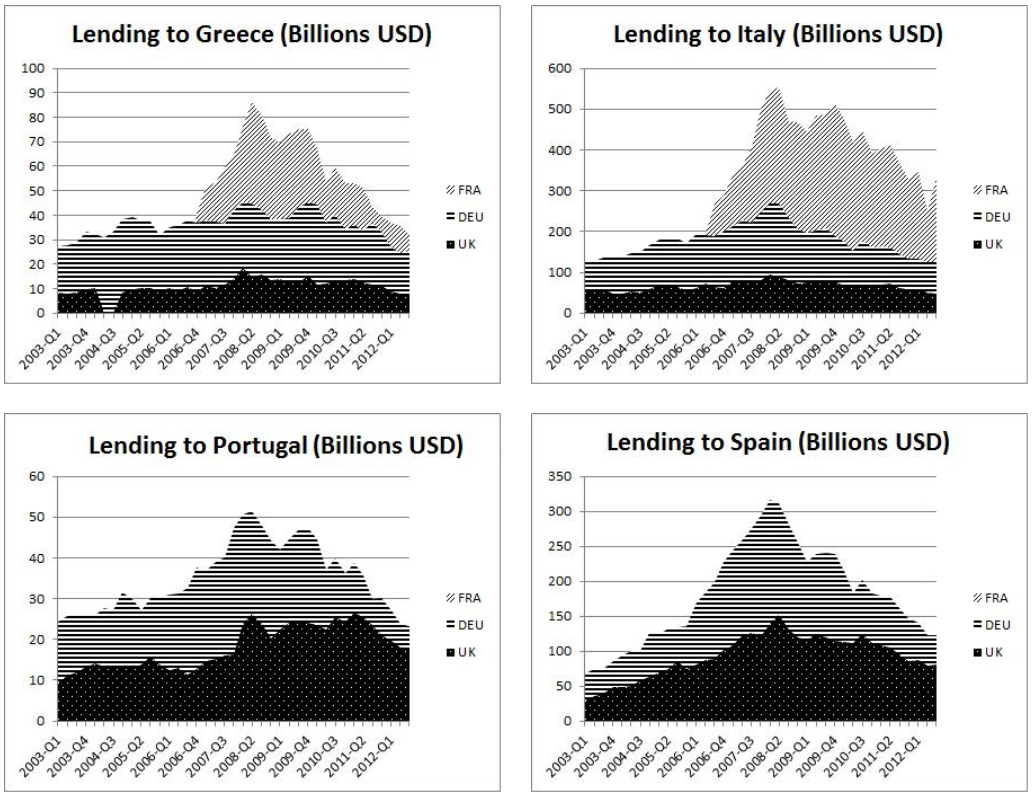


**Figure 6: Lending by Core to Peripheral EA Countries**

*4.2. Preliminary ECB regression*

Before running our model, we need to ascertain our assumption regarding our ability to capture certain features of the country's banking sector by creating a hypothetical representative bank for each country using the national median. To do so, we run the simple fixed-effect[20] regression in equation (5) taken from ECB (2011) and compare the results. Our setting is fairly similar except that their period runs from 1995-2011 with a sample consisting of 54 international banks headquartered in 18 different countries which includes non-European ones.

$$\beta_{it} = a_i + bCapratio_{it-1} + u_{it} \tag{5}$$

The result they find is that higher capital requirements reflected in a higher leverage ratio (TCETA) is significantly associated with lower bank market risk. We depict a similar result in Table IV, notwithstanding a possible size effect. Indeed, we observe that the sign on the leverage coefficient goes from slightly positively significant (SIFIs) to insignificant (IMF and Top200) before becoming negatively significant throughout in line with the result of the ECB. The cutoff point lies between the samples that encompass the number of banks used (54) in the ECB report as shown in Table III. Nonetheless, while our representative banks still reflect the overall composition of the banks in a given country our aggregation method inevitably results in a much smaller number of observations for any given sample. We therefore manage to reproduce the ECB result using only a tiny fraction of their observations (3% - 6%) with only one sixth reduction in $R^2$.

**Table IV:**
**Preliminary ECB Regression**

The data below show the results from the ECB Regression described in model 5. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| Sample | Beta | Coef | t-stat | Adj $R^2$ | Num Obs |
|---|---|---|---|---|---|
| SIFI | US | 0.089* | 2.19 | 0.06 | 40 |
| | EU | 0.139 | 1.25 | 0.04 | 40 |
| IMF | US | 0.021 | 0.36 | -0.01 | 75 |
| | EU | -0.007 | -0.05 | -0.01 | 75 |
| Top200 | US | 0.046 | 1.06 | 0.01 | 75 |
| | EU | 0.123 | 1.51 | 0.05 | 75 |
| Top10 | US | -0.023 | -1.76 | 0.02 | 77 |
| | EU | -0.052* | -2.00 | 0.03 | 77 |
| Top30 | US | -0.020** | -3.15 | 0.03 | 79 |
| | EU | -0.048** | -3.20 | 0.05 | 79 |
| FullRank | US | -0.019*** | -3.99 | 0.02 | 81 |
| | EU | -0.042*** | -3.75 | 0.03 | 81 |
| FullSample | US | -0.025** | -2.99 | 0.02 | 81 |
| | EU | -0.045** | -2.86 | 0.02 | 81 |

*4.3. Core Results*

In the following we present the results of our models for returns, spillovers and contagion.

First, building on the distinctions found in Figure 4, we split the full sample results into two partitions - non-program and program countries - for a more thorough analysis. This entails an

[20] As in the report itself, our results are qualitatively unchanged by running a random-effect model.

unavoidable decrease in the number of observations, which, in the case of the program sample was too small to avoid excessive multi-collinearity and hence had to be discarded. We infer the behavior of banks in this sample from the full and non-program samples whose sizes are in line with the existing literature (Poirson and Schmittman (2012)).

Second, for each of these samples, we highlight only the results which are found to be consistently significant across all banking samples using the order prescribed in Table III. We were forced to drop the SIFI sample due to an insufficient number of observations as Austria, Belgium, Greece and Portugal are not on the list (see Table III); nevertheless, these banks are included in the IMF sample.

Third, we run the analysis for the pre and post crisis sub-periods, with emphasis on the latter as it is usually more deserving of policy attention. Note that we choose to emphasize the crisis rather than the regulatory effect as there seems to be no consistently significant regulatory change between pre and post 2007 aside.

In this setup, we encountered another issue with multi-collinearity. This is highlighted in Table V where the Variance Inflation Factors (VIFs) for the TCERWA and TCETA are larger then 10 and the Conditioning Index (CI) is above 30[21]. We attribute this to the property of the capital ratio of tending towards the leverage ratio when the proportion of highly risk-weighted assets increases. As shown in Cathcart et al. (2013a), this allows for the correlation between the two ratios to change. Hence, the 53% correlation between the two ratios in Table II is reasonable in a period that combines variations from a tranquil (pre-2007) and crisis (post-2007) periods.

Nonetheless, as can be seen by comparing the Full Sample and pre/post-2007 partitions, this problem is not due to high correlations between variables in our sample (as shown in Table II); but to the smaller number of observations obtained by splitting the sample population across time sub-samples. To remediate the problem we use the ratio of risk-weighted assets to total assets (RWATA) instead of the capital and leverage ratios as shown in our Updated model in Table V. Indeed, this modification removes the multi-collinearity problem as shown by the low CIs [22]. Note that as mentioned in Cathcart et al. (2013a), the RWATA ratio is reflective of the credit risk undertaken by a bank and is actually equal to the ratio of the leverage and capital ratios. Hence if this interaction between both ratios gives a significant result, we relate our findings to the capital (leverage) ratio on the basis that it is inversely correlated with risk-weighted assets (total assets).

A nice feature of our model is that it allows us to determine the significant variables for each scenario of returns, spillovers and contagion in a consistent manner. In fact, our small number of variables provide an easier tool for policy-makers to handle than huge multi-variate models. However, the fact that we are unable to go beyond the stated number of regressors to keep clear of multi-collinearity creates another problem, namely omitted variable bias. We resolve it by using fixed effects estimations in order to capture missing bank-specific effects as in Cetorelli and Goldberg (2011) who suffer from similar small sample problems.

[21] The VIF relates to an $R^2$ greater than 90% in the auxiliary regressions while the CI is the threshold for multi-collinearity as established by Belsley et al. (1980).

[22] Effectively, this brings down our t-stats to the same magnitude as those in Poirson and Schmittman (2012). Also, to ensure that the problem does not arise again we display the CI in all upcoming regressions noting that all factors have a VIF less then 10.

**Table V:**
**Multicolinearity Tests**

The results in this table show the Variance Inflation Factors (VIFs) for our model variables and Conditioning Index (CI) of the overall regression. Results relate to the IMF Sample for the Return model on the US. VIF is defined as $\frac{1}{1-R^2}$ where $R^2$ is the explanatory power of the auxiliary regression defined as each variable regressed on the remainig ones. Typically a $VIF > 10$ or $CI > 30$ signals that multi-colinearity is present.

| Original | Full Sample | Post-2007 | Pre-2007 | Updated | Full Sample | Post-2007 | Pre-2007 |
|---|---|---|---|---|---|---|---|
| MSCI | 1.19 | 1.36 | 3.60 | MSCI | 1.12 | 1.30 | 3.21 |
| FC | 3.80 | 5.59 | 9.36 | FC | 3.17 | 3.45 | 8.24 |
| FDI | 2.11 | 3.08 | 1.75 | FDI | 2.09 | 2.44 | 1.82 |
| IMP | 5.65 | 10.07 | 9.07 | IMP | 4.05 | 4.01 | 8.62 |
| TCERWA | 21.31 | 38.70 | 22.69 | RWATA | 2.58 | 2.62 | 3.78 |
| TCETA | 10.47 | 13.16 | 13.02 | - | - | - | - |
| CI | 29.41 | 37.73 | 42.48 | CI | 15.84 | 18.37 | 17.87 |

*4.3.1. Returns*

The predominance of the MSCI indices is clearly showcased across our Full and NonProgram[23] country samples (Tables VI-VII). Whereas the EU-index is mostly significant as each country mirrored the overall regional context, the US-index is only relevant during the crisis period as EU countries suffered the effects of the subprime crisis. As such, the EU coefficients is understandably twice as high as the US coefficient during crisis periods. In fact, the MSCI component is so important at macro level that compared to the Spillover and Contagion models which do not directly account for this factor as a direct explanatory variable, the Return model exhibits the highest explanatory power. Indeed, running the model with either of the MSCI indices as a regressor can explain at least 30% of the changes in country returns. Clearly, this is a characteristic of our country-level CAPM model where idiosyncratic elements do not play as important a role as in the conventional bank-level model (in comparison to the 18% achieved by Chan-Lau et al. (2012a)). A similar finding was previously reported by Balakrishnan et al. (2009) who obtain an $R^2$ of 40% by regressing an emerging market index on an advanced market index.

Second, the persistent push factor affecting returns in both samples during the pre-crisis periods and with respect to both US and EU partners is IMP. This result can be better interpreted by inspecting the NonProgram sample which shows FDI as being positively significant, albeit only with respect to the EU. Noting that countries with FDI assets absorb losses from those with FDI liabilities (The Committee on International Economic Policy and Reform (2012)), this means that EU countries which attracted capital flows from their partners were considered as solid investment strategies which were likely to yield ex-post higher returns. In contrast, IMP is understood to have the reverse effect of FDI since any depreciation of the Euro domestic exchange rate results in a subsequent increase in exports (current account) to US and EU partners; this is simultaneously accompanied by a deterioration in investment (capital account). The opposite result holds in the case of an appreciation. This does not imply however that the two factors are perfectly inversely correlated. While the correlation between the two factors is highest in the context of the EU (0.65 as shown in Table II) and positive (as expected according to Balakrishnan et al. (2009), this is not

[23] F-stats could not be calculated for this particular because the number of regressors is greater than or equal to the number of clusters. This issue can be resolved by running the model using OLS without altering significantly our results.

## Table VI:
## Full Sample - Returns

The results below are from running equation (1) for the six samples of banks using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given between brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| MSCI | **2.277*** ** | 0.690 | **4.579*** ** | **1.423*** | **2.459*** ** | 0.769 | **4.633*** ** | **1.772*** ** | **2.609*** ** | 0.742 | **5.020*** ** | **1.763*** ** |
| | **(7.23)** | (1.25) | **(7.22)** | **(1.98)** | **(5.25)** | (1.40) | **(7.15)** | **(3.33)** | **(5.40)** | (1.28) | **(5.47)** | (3.19) |
| L.FC | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 |
| | (-1.41) | (0.31) | (1.41) | (-0.46) | (0.31) | (0.08) | (0.69) | (-1.04) | (0.18) | (0.26) | (0.53) | (-1.01) |
| L.FDI | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 |
| | (1.01) | (0.04) | (1.27) | (0.80) | (1.00) | (-0.25) | (1.18) | (1.16) | (0.25) | (-0.37) | (1.36) | (1.14) |
| L.IMP | -0.000 | **-0.001*** ** | -0.000 | **-0.000*** | 0.000 | **-0.001*** ** | -0.000 | **-0.000*** | 0.001 | **-0.001*** ** | -0.000 | -0.000 |
| | (-0.25) | **(-3.49)** | (-1.01) | **(-1.89)** | (0.00) | **(-5.35)** | (-0.92) | **(-2.01)** | (0.55) | **(-6.68)** | (-1.10) | (-1.73) |
| L.RWATA | 0.000 | -0.000 | -0.000 | -0.000 | **0.000*** | -0.000 | 0.000 | 0.000 | **0.000*** | -0.000 | 0.000* | -0.000 |
| | (1.28) | (-1.70) | (-1.07) | (-0.93) | **(2.17)** | (-0.44) | (0.48) | (0.01) | **(2.17)** | (-0.97) | (1.88) | (-0.38) |
| CONS | -0.004 | 0.008** | 0.007 | 0.007 | -0.016* | 0.005 | 0.003 | 0.003 | -0.019** | 0.006** | -0.003 | 0.004 |
| | (-1.02) | (3.05) | (0.90) | (1.81) | (-2.08) | (1.70) | (0.31) | (1.23) | (-2.34) | (2.62) | (-0.86) | (1.55) |
| $R^2$ | 0.32 | 0.54 | 0.43 | 0.52 | 0.35 | 0.46 | 0.43 | 0.48 | 0.37 | 0.49 | 0.45 | 0.49 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 33.39 | 38.47 | 45.75 | 4.37 | 26.09 | 61.55 | 67.24 | 3.60 | 58.84 | 77.75 | 26.31 | 3.42 |
| CI | 18.38 | 17.88 | 12.78 | 17.00 | 15.96 | 23.29 | 10.50 | 15.60 | 19.91 | 23.31 | 11.98 | 14.57 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| MSCI | **2.704*** ** | 0.887 | **5.079*** ** | **1.843*** ** | **2.329*** ** | 0.887 | **4.509*** ** | **1.761*** ** | **2.514*** ** | 0.887 | **4.507*** ** | **2.037*** ** |
| | **(4.83)** | (1.49) | **(5.39)** | **(3.56)** | **(8.91)** | (1.51) | **(8.25)** | **(3.44)** | **(8.33)** | (1.57) | **(8.75)** | **(4.69)** |
| L.FC | -0.000 | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | -0.000 |
| | (-0.45) | (-0.30) | (0.43) | (-1.34) | (-1.31) | (-0.30) | (1.17) | (-1.09) | (-0.93) | (-0.33) | (1.03) | (-1.37) |
| L.FDI | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | 0.001 | -0.000 | 0.001 | 0.000** |
| | (0.19) | (-0.22) | (1.04) | (1.12) | (0.31) | (-0.24) | (1.17) | (1.11) | (1.33) | (-0.22) | (1.10) | (2.44) |
| L.IMP | -0.001 | **-0.001*** ** | -0.000 | **-0.000** ** | -0.000 | **-0.001*** ** | -0.000 | **-0.000** ** | -0.000 | **-0.001*** ** | -0.000 | **-0.000*** ** |
| | (-0.26) | **(-5.66)** | (-1.04) | **(-2.47)** | (-0.26) | **(-5.88)** | (-0.98) | **(-2.39)** | (-0.13) | **(-6.43)** | (-0.94) | **(-3.73)** |
| L.RWATA | **0.000** ** | -0.000 | 0.000* | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | **0.000** ** | 0.000 | -0.000 | 0.000** |
| | **(2.57)** | (-0.02) | (1.89) | (1.36) | (1.38) | (-0.01) | (-0.45) | (0.43) | **(2.90)** | (0.19) | (-0.39) | (3.11) |
| CONS | -0.020*** | 0.004** | -0.004 | 0.002 | -0.008 | 0.004*** | 0.006 | 0.003 | -0.011 | 0.003*** | 0.007 | 0.000 |
| | (-3.74) | (3.09) | (-0.82) | (1.15) | (-1.04) | (4.33) | (0.62) | (1.03) | (-1.67) | (3.46) | (0.55) | (0.02) |
| $R^2$ | 0.39 | 0.45 | 0.44 | 0.51 | 0.33 | 0.45 | 0.43 | 0.48 | 0.34 | 0.45 | 0.43 | 0.57 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 77.76 | 60.69 | 76.70 | 5.24 | 56.26 | 80.16 | 43.27 | 3.92 | 81.63 | 104.69 | 40.12 | 7.15 |
| CI | 20.11 | 20.51 | 12.78 | 15.94 | 23.06 | 20.30 | 14.79 | 16.45 | 25.25 | 22.03 | 15.96 | 16.92 |

## Table VII:
## Non Program - Returns

The results below are from running equation (1) for the six bank samples using non-program countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given in brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| MSCI | **2.413*** ** | 0.813 | **4.387*** ** | **2.287** ** | **2.421*** ** | 0.755 | **4.415*** ** | **1.898*** ** | **2.381*** ** | 0.718 | **4.377*** ** | **1.886*** ** |
| | **(7.59)** | (1.07) | **(9.64)** | **(4.26)** | **(6.35)** | (0.98) | **(10.71)** | **(5.43)** | **(6.71)** | (0.94) | **(9.05)** | **(5.07)** |
| L.FC | -0.000 | -0.000 | 0.000 | **-0.000** ** | 0.000 | -0.000 | 0.000 | **-0.000*** ** | -0.000 | -0.000 | 0.000 | **-0.000*** ** |
| | (-0.53) | (-0.85) | (0.56) | **(-3.58)** | (0.01) | (-1.74) | (1.39) | **(-5.41)** | (-0.62) | (-1.31) | (0.48) | **(-4.68)** |
| L.FDI | 0.000 | 0.000 | **0.000** ** | **0.001*** | 0.000 | -0.000 | **0.000*** | **0.000** ** | 0.000 | -0.000 | **0.000*** | **0.000** ** |
| | (0.96) | (0.01) | **(3.74)** | **(2.46)** | (1.03) | (-0.11) | **(2.56)** | **(3.45)** | (1.11) | (-0.11) | **(2.23)** | **(3.12)** |
| L.IMP | 0.001 | **-0.001*** | -0.000 | **-0.000*** | 0.001 | **-0.001*** | -0.000** | **-0.000*** | 0.001 | **-0.001** ** | -0.000 | **-0.000** ** |
| | (2.10) | **(-2.44)** | (-2.01) | **(-2.36)** | (0.97) | **(-2.32)** | (-3.44) | **(-2.58)** | (0.68) | **(-3.40)** | (-1.83) | **(-3.04)** |
| L.RWATA | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 |
| | (0.27) | (-0.75) | (-1.01) | (1.05) | (0.47) | (1.57) | (-0.98) | (0.95) | (0.14) | (0.63) | (-0.44) | (0.76) |
| CONS | -0.004 | 0.008 | 0.003 | 0.000 | -0.009 | 0.003 | 0.002 | 0.004* | -0.004 | 0.004* | 0.001 | 0.005* |
| | (-0.65) | (1.50) | (1.23) | (0.10) | (-0.60) | (1.38) | (1.61) | (2.30) | (-0.42) | (2.30) | (1.29) | (2.40) |
| $R^2$ | 0.80 | 0.57 | 0.92 | 0.73 | 0.81 | 0.57 | 0.92 | 0.72 | 0.80 | 0.56 | 0.92 | 0.72 |
| Num Obs | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 |
| F-stat | . | . | . | . | . | . | . | . | . | . | . | . |
| CI | 16.23 | 19.46 | 11.15 | 21.40 | 14.06 | 25.65 | 8.22 | 20.70 | 17.79 | 23.14 | 10.47 | 17.96 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| MSCI | **2.443*** ** | 0.668 | **4.553*** ** | **2.065*** ** | **2.407*** ** | 0.722 | **4.353*** ** | **1.926** ** | **2.716** ** | 0.677 | **4.439*** ** | **1.959*** ** |
| | **(7.38)** | (0.90) | **(8.32)** | **(8.01)** | **(6.22)** | (0.97) | **(7.73)** | **(4.32)** | **(4.59)** | (0.89) | **(10.29)** | **(4.93)** |
| L.FC | -0.000 | -0.000 | -0.000 | **-0.000*** ** | -0.000 | -0.000 | 0.000 | **-0.000*** ** | 0.000 | -0.000 | 0.000 | **-0.000*** |
| | (-0.26) | (-1.14) | (-0.00) | **(-6.21)** | (-0.72) | (-1.08) | (0.36) | **(-4.85)** | (0.09) | (-1.10) | (0.17) | **(-2.63)** |
| L.FDI | 0.000 | -0.000 | 0.000 | **0.000** ** | 0.000 | -0.000 | 0.000 | **0.000** ** | 0.001 | -0.000 | 0.000 | **0.000*** |
| | (0.02) | (-0.21) | (1.05) | **(3.84)** | (1.30) | (-0.17) | (1.66) | **(3.03)** | (1.23) | (-0.17) | (1.63) | **(2.63)** |
| L.IMP | 0.001 | **-0.001** ** | -0.000 | **-0.000** ** | 0.001 | **-0.001** ** | -0.000 | **-0.000** ** | 0.002 | **-0.001** ** | -0.000 | **-0.000** ** |
| | (1.22) | **(-3.82)** | (-1.94) | **(-3.47)** | (1.25) | **(-3.91)** | (-1.74) | **(-2.88)** | (1.68) | **(-3.75)** | (-1.64) | **(-3.38)** |
| L.RWATA | 0.000 | 0.000 | 0.000 | 0.000** | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | -0.000 | 0.000 | 0.000 |
| | (1.08) | (0.27) | (0.56) | (3.62) | (0.33) | (-0.34) | (-0.16) | (-0.06) | (1.89) | (-0.01) | (0.56) | (0.92) |
| CONS | -0.012 | 0.005** | -0.001 | 0.004** | -0.005 | 0.005** | 0.001 | 0.005* | -0.018 | 0.005** | -0.001 | 0.003 |
| | (-1.11) | (3.00) | (-0.37) | (3.06) | (-0.57) | (4.15) | (0.48) | (2.56) | (-1.76) | (3.52) | (-0.39) | (1.25) |
| $R^2$ | 0.82 | 0.56 | 0.92 | 0.76 | 0.80 | 0.56 | 0.92 | 0.72 | 0.84 | 0.56 | 0.92 | 0.74 |
| Num Obs | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 |
| F-stat | . | . | . | . | . | . | . | . | . | . | . | . |
| CI | 16.00 | 21.44 | 12.49 | 21.98 | 22.04 | 21.19 | 18.60 | 22.08 | 25.24 | 25.47 | 17.52 | 26.13 |

sufficient to cause any multi-collinearity concerns judging by the conditioning index (CI) of these regressions. Our explanation is supported by the work of Forbes and Chinn (2004) who do not find any such problem by incorporating both factors together. We believe the reasons for this imperfect correlation are the lags between both factors and their different multipliers.

Thirdly, RWATA provides a significant pull mechanism for returns. Its positive sign suggests that banks with lower risk-weighted assets (higher capital ratios) were effectively obtaining lower returns especially during the crisis[24]. Hence, on a macro level, this result contradicts that in Berger and Bouwman (2013). At first, the latter could be justified on the grounds of moral hazard with regard to large banks which were excluded from these authors' sample. However, we notice that this behavior also extends to the entire banking sector (FullSample) which includes the smaller banks as well. A more general explanation could be the fact that setting aside money for higher capital cushions constrains the bank from using it in more profitable investments. To compensate for this, banks are forced to invest in riskier projects where the downside is triggered during crisis times. Another explanation is that the amount of capital set aside did not reflect the risk inherent in sovereign debt whose yields widened during the crisis thus lowering returns. Notice that the mentioned effect is not reflected in the NonProgram sample suggesting that this effect was most highly experienced by Program countries.

*4.3.2. Spillover*

At the full sample level (Table VIII), aside from the FC effect during pre-crisis for the US, no factor appears to have played a role in explaining spillovers in the EU. Taking into consideration the lag in this variable, this means that any increase in lending to these countries would result in an ex-post increase in their sensitivity to crises in the US. Indeed, according to Figure 5 overall lending to the EU's "safe" countries (mainly Germany and France) increased towards the end of the subprime crisis which explains why the effect is replicated identically in the sample of non-program countries (Table IX). We can also speculate that this effect was also present for the Program countries, since accounting as well for the six month (window) delay, the increase in sensitivity in all countries occurred mostly around the same time, as can be seen in Figure 1. In essence, this confirms the statement by the IMF (2011) which described these countries as "exhibiting the greatest potential for spillover effects in times of stress".

Moreover, we observe a persistent IMP component with regard to the EU crisis period affecting non-program countries. This implies that if the US increased its imports from these countries, this would make them more reliant on the overall economic status of the US, as documented in Kalemli-Ozcan et al. (2012) thus increasing the safe countries' sensitivity to shocks affecting the entire region. We would normally expect the same significance for the EU partner. However, despite the strongest IMP effect being observed in this case of the largest sample (IMF), the effect does not trickle down to the rest of the banking sector. In other words, it was only the largest banks which were sensitive to trade shocks arising in the EU which would seem counter-intuitive. Nevertheless, the signs are identical across all samples.

Finally, for the NonProgram countries we find that higher RWATA lead to a higher potential for spillover effects. This result is in agreement with those found previously in ECB (2011) and Poirson and Schmittman (2012) for TCETA. In other words, countries with a higher capitalized banking sector are better able to cope with these risky assets and are hence more likely to avoid spillovers. In fact, this effect is only noticeable before the introduction of Basel II. While the

[24] A statement made also by the Economist (2013).

## Table VIII:
## Full Sample - Spillover

The results below are from running equations (2) and (3) for the six bank samples using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given in brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.008 | **0.067*** ** | 0.007 | 0.011 | -0.004 | **0.058** ** | 0.008 | 0.010 | -0.005 | **0.056** ** | 0.008 | 0.010 |
| | (-0.67) | **(3.58)** | (1.00) | (1.22) | (-0.26) | **(2.42)** | (1.22) | (1.06) | (-0.44) | **(3.11)** | (1.26) | (1.15) |
| L.FDI | -0.011 | 0.002 | -0.020 | 0.052 | 0.004 | 0.006 | -0.021 | 0.052* | 0.006 | 0.013 | -0.018 | 0.050 |
| | (-0.34) | (0.06) | (-1.09) | (1.77) | (0.15) | (0.21) | (-1.04) | (2.02) | (0.17) | (0.62) | (-0.90) | (1.83) |
| L.IMP | 0.085 | -0.003 | -0.011 | -0.008 | 0.081 | 0.031 | -0.010 | -0.007 | 0.077 | 0.016 | -0.006 | -0.009 |
| | (1.10) | (-0.01) | (-0.61) | (-0.53) | (0.95) | (0.20) | (-0.62) | (-0.50) | (0.88) | (0.12) | (-0.35) | (-0.62) |
| L.RWATA | -0.006 | 0.002 | -0.011 | -0.006 | -0.000 | 0.007 | -0.011 | 0.008 | -0.001 | 0.011** | -0.019 | 0.005 |
| | (-0.91) | (0.20) | (-0.75) | (-1.53) | (-0.00) | (0.86) | (-0.90) | (1.43) | (-0.24) | (2.44) | (-1.58) | (0.77) |
| CONS | 0.918* | 0.309 | 2.041** | 0.978** | 0.593 | -0.011 | 1.974** | 0.353 | 0.661 | -0.182 | 2.309*** | 0.501 |
| | (1.92) | (0.62) | (2.35) | (3.22) | (0.83) | (-0.02) | (2.75) | (1.28) | (1.50) | (-0.65) | (5.00) | (1.81) |
| $R^2$ | 0.10 | 0.09 | 0.08 | 0.29 | 0.07 | 0.11 | 0.07 | 0.30 | 0.07 | 0.16 | 0.13 | 0.29 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 0.89 | 13.17 | 0.82 | 1.77 | 0.56 | 12.87 | 0.89 | 1.61 | 0.56 | 17.15 | 1.63 | 1.45 |
| CI | 18.07 | 16.69 | 12.68 | 15.10 | 15.55 | 20.92 | 10.30 | 14.21 | 19.49 | 21.22 | 11.80 | 13.36 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.005 | **0.063** ** | 0.009* | 0.011 | -0.004 | **0.067*** ** | 0.007 | 0.010 | -0.006 | **0.065*** ** | 0.007 | 0.010 |
| | (-0.47) | **(3.31)** | (2.03) | (1.43) | (-0.48) | **(3.63)** | (1.25) | (1.17) | (-0.59) | **(3.74)** | (1.48) | (1.16) |
| L.FDI | 0.008 | -0.020 | -0.003 | 0.059* | -0.005 | 0.001 | -0.009 | 0.055* | 0.002 | 0.018 | -0.004 | 0.053 |
| | (0.20) | (-0.64) | (-0.14) | (1.91) | (-0.15) | (0.05) | (-0.47) | (1.86) | (0.07) | (0.75) | (-0.22) | (1.84) |
| L.IMP | 0.084 | -0.019 | -0.003 | -0.007 | 0.077 | -0.015 | -0.003 | -0.007 | 0.082 | -0.017 | -0.017 | -0.007 |
| | (1.21) | (-0.10) | (-0.17) | (-0.48) | (0.92) | (-0.08) | (-0.17) | (-0.45) | (1.16) | (-0.08) | (-0.97) | (-0.36) |
| L.RWATA | -0.003 | 0.008 | -0.035** | -0.006 | 0.005 | 0.006 | -0.027 | -0.002 | -0.006 | 0.009 | -0.028** | -0.001 |
| | (-0.26) | (1.20) | (-2.55) | (-1.52) | (0.59) | (0.55) | (-1.27) | (-0.30) | (-0.81) | (0.87) | (-2.49) | (-0.09) |
| CONS | 0.721 | 0.051 | 2.996*** | 0.980*** | 0.341 | 0.088 | 2.721** | 0.806*** | 0.907* | -0.046 | 3.048*** | 0.751* |
| | (1.13) | (0.17) | (4.03) | (4.46) | (0.56) | (0.39) | (2.70) | (3.38) | (1.87) | (-0.14) | (3.54) | (2.25) |
| $R^2$ | 0.07 | 0.13 | 0.20 | 0.30 | 0.08 | 0.12 | 0.13 | 0.28 | 0.09 | 0.13 | 0.17 | 0.28 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 0.70 | 26.02 | 4.24 | 1.80 | 1.67 | 22.09 | 1.74 | 1.24 | 0.88 | 8.40 | 4.79 | 1.23 |
| CI | 19.77 | 19.10 | 12.65 | 14.39 | 22.68 | 18.72 | 14.63 | 15.22 | 24.73 | 20.32 | 15.72 | 15.49 |

## Table IX:
## Non Program - Spillover

The results below are from running equations (2) and (3) for the six bank samples using non-program countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given in brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | 0.008 | **0.059**** | 0.001 | 0.008 | 0.033 | **0.039*** | -0.001 | 0.009 | 0.017 | **0.052*** | 0.007 | 0.011 |
| | (0.51) | **(3.30)** | (0.23) | (0.76) | (1.85) | **(2.19)** | (-0.18) | (0.68) | (1.08) | **(2.32)** | (0.98) | (0.90) |
| L.FDI | 0.008 | -0.024 | -0.051** | 0.066 | 0.015 | 0.009 | -0.036* | 0.043 | -0.039 | 0.016 | -0.025 | 0.045 |
| | (0.18) | (-0.81) | (-2.96) | (1.12) | (0.85) | (0.32) | (-2.26) | (1.13) | (-0.98) | (0.78) | (-0.72) | (0.93) |
| L.IMP | **0.198**** | -0.131 | 0.030*** | -0.011 | **0.243***** | 0.056 | 0.017 | -0.001 | **0.272***** | 0.005 | 0.019 | -0.011 |
| | **(3.54)** | (-0.45) | (5.68) | (-0.44) | **(6.09)** | (0.36) | (0.97) | (-0.04) | **(4.88)** | (0.03) | (1.10) | (-0.48) |
| L.RWATA | 0.008 | **0.051**** | 0.025 | 0.009 | 0.025 | **0.023*** | 0.016 | 0.022* | 0.016 | **0.018**** | -0.027 | 0.013 |
| | (0.95) | **(3.49)** | (1.50) | (0.34) | (1.53) | **(2.70)** | (1.45) | (2.23) | (1.16) | **(4.10)** | (-1.43) | (2.07) |
| CONS | -0.174 | -1.062* | 0.110 | 0.576 | -1.210 | -0.537 | 0.809 | -0.076 | -0.769 | -0.234 | 2.074* | 0.352 |
| | (-0.29) | (-2.42) | (0.18) | (0.44) | (-1.46) | (-0.76) | (1.88) | (-0.13) | (-1.09) | (-0.54) | (2.69) | (0.95) |
| $R^2$ | 0.22 | 0.12 | 0.15 | 0.24 | 0.31 | 0.17 | 0.07 | 0.36 | 0.25 | 0.18 | 0.16 | 0.29 |
| Num Obs | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 |
| F-stat | 99.68 | 102.11 | 116.69 | 10.67 | 19.43 | 32.05 | 1.74 | 96.03 | 61.29 | 82.73 | 2.46 | 35.25 |
| CI | 15.81 | 18.67 | 11.13 | 18.79 | 13.65 | 23.91 | 8.09 | 19.18 | 17.41 | 21.30 | 10.37 | 16.62 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | 0.014 | **0.059**** | 0.006 | 0.010 | 0.006 | **0.068**** | 0.004 | 0.009 | 0.004 | **0.067**** | 0.005 | 0.011 |
| | (1.49) | **(3.32)** | (0.76) | (0.77) | (0.88) | **(3.56)** | (0.45) | (0.77) | (0.33) | **(4.60)** | (0.68) | **(0.93)** |
| L.FDI | -0.073 | -0.055 | -0.019 | 0.067 | -0.057 | -0.007 | -0.024 | 0.062 | -0.008 | 0.031 | -0.011 | 0.054 |
| | (-1.78) | (-1.69) | (-0.70) | (1.07) | (-2.02) | (-0.29) | (-0.92) | (1.09) | (-0.32) | (1.05) | (-0.38) | (1.22) |
| L.IMP | **0.238***** | -0.073 | 0.021 | -0.009 | **0.230**** | -0.061 | 0.014 | -0.010 | **0.192**** | -0.079 | 0.001 | -0.014 |
| | **(4.92)** | (-0.37) | (1.48) | (-0.35) | **(4.05)** | (-0.27) | (0.89) | (-0.35) | **(4.35)** | (-0.33) | (0.04) | (-0.39) |
| L.RWATA | 0.031* | **0.016*** | -0.028 | -0.004 | 0.022* | 0.009 | -0.009 | 0.000 | 0.003 | **0.020*** | -0.023 | 0.006 |
| | (2.14) | **(2.30)** | (-0.67) | (-0.44) | (2.27) | (0.63) | (-0.28) | (0.02) | (0.27) | **(2.37)** | (-0.86) | (0.31) |
| CONS | -1.275 | 0.058 | 2.168 | 0.972** | -0.877 | 0.211 | 1.663 | 0.863** | 0.074 | -0.175 | 2.505 | 0.646 |
| | (-2.01) | (0.13) | (1.42) | (3.30) | (-1.72) | (1.38) | (1.26) | (3.93) | (0.20) | (-0.36) | (1.44) | (1.38) |
| $R^2$ | 0.33 | 0.18 | 0.10 | 0.24 | 0.33 | 0.15 | 0.05 | 0.24 | 0.20 | 0.22 | 0.09 | 0.24 |
| Num Obs | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 |
| F-stat | 88.84 | 11.23 | 1.31 | 9.26 | 12.06 | 59.66 | 0.66 | 1.85 | 79.92 | 40.12 | 16.07 | 0.67 |
| CI | 15.56 | 20.27 | 12.48 | 19.26 | 21.65 | 19.85 | 18.40 | 20.48 | 24.75 | 24.23 | 17.50 | 23.87 |

effect itself is weaker in the post-crisis despite no regulatory changes affecting the capital ratio thresholds, we speculate that the reason could be because of an offsetting effect introduced by the lowering of the leverage factor (TCETA), during this period. Indeed, Poirson and Schmittman (2012) were surprised that leverage can in some cases be insignificant, or even have a positive effect on spillovers. The authors assumed this peculiarity was due to a reversal between bank size and vulnerability. In contrast, we show here that such a result can occur irrespective of size (comparing IMF to FullSample in Tables VIII and IX). In any case, this supports the introduction by Basel III of the leverage ratio as a backstop measure in order to maintain the beneficial aspect of risk-based capital ratios.

Note that the explanatory power of our model coincides to a large extent with the 22-28% range of $R^2$ in Poirson and Schmittman (2012) which, as the authors highlight, were almost double that of Brooks and DelNegro (2006). Nonetheless, the advantage of our model is in achieving the same power with a much smaller set of factors.

*4.3.3. Contagion*

Despite the possibility of model misspecification in the case of contagion as highlighted in Bekaert et al. (2005), looking at the full sample (Table X), it would appear at first that the only factor increasing the potential for contagion from the US is FDI. With the notable absence of any capital related effects, this means that a shock emanating from the US could affect EU countries indirectly via alternative channels such as other countries or factors.

While the FDI effect is to a certain extent reproduced in our NonProgram sample, we note the negative effect of FC during the pre-crisis period. This means that lending from the US could be interpreted as a signal that a given country was solid economically-speaking which would counteract the effects of contagion that could a priori emanate from these alternative channels.

In sum, while our findings point out that countries might have the incentive to reduce their capital ratios in order to achieve higher returns, nonetheless having a substantial amount of capital can shield them from the effects of spillover. Hence, it is important to maintain these capital ratios at sensible levels as they can act as a counterweight to the sometimes aggravating effects of bilateral linkages. As a matter of fact, this finding applies to all bank samples irrespective of size.

## 5. Robustness

In order to strengthen the validity of our results we run a series of robustness tests covering all three models presented above. All tests are on the Full Sample in order to avoid any unintended multi-collinearity.

First, we would like to assert if the results we are obtaining are linked to EA countries only or are driven somewhat by the UK. Therefore, we remove the UK from our EU sample and check if the Returns results in Table VI change. In Table I, we see that this is not the case except for a weakening of the trade relationship with the EU. This was expected given that the UK is one of the largest trading partners with the EU.

Second, in Table II, we introduce the credit-to-gdp gap (CRGDP), a cyclical macro-economic variable which the Basel committee on Basel III views as the determinant of the new counter-cyclical capital cushions. We choose this variable for both its macroeconomic (control) and regulatory (new capital buffers) content. As described in BCBS (2010), we construct this variable by taking

## Table X:
## Full Sample - Contagion

The results below are from running equation (4) for the six samples of banks using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given between brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 |
| | (-0.31) | (-0.83) | (0.81) | (0.34) | (0.02) | (-0.49) | (0.45) | (0.57) | (-0.13) | (-0.60) | (0.60) | (0.48) |
| L.FDI | **0.000**** | 0.000 | 0.000 | 0.000 | **0.000***** | 0.000 | 0.000 | 0.000 | **0.000***** | 0.000 | 0.000 | 0.000 |
| | **(2.61)** | (1.08) | (0.26) | (0.66) | **(3.76)** | (1.22) | (0.14) | (0.74) | **(4.26)** | (1.14) | (0.02) | (0.80) |
| L.IMP | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | -0.000 | -0.000 |
| | (-1.07) | (0.51) | (-0.11) | (-0.85) | (-1.02) | (0.54) | (0.08) | (-1.05) | (-0.99) | (0.69) | (-0.01) | (-0.78) |
| L.RWATA | -0.000 | 0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (-0.01) | (0.26) | (-0.58) | (0.28) | (0.35) | (-0.78) | (0.05) | (-1.18) | (0.38) | (-0.83) | (0.70) | (-1.03) |
| CONS | 0.001 | -0.001 | 0.001 | -0.000 | -0.000 | 0.001 | -0.001 | 0.001 | -0.000 | 0.000 | -0.002 | 0.001 |
| | (0.34) | (-0.45) | (0.36) | (-0.24) | (-0.10) | (0.63) | (-0.28) | (1.24) | (-0.03) | (0.45) | (-0.89) | (0.95) |
| $R^2$ | 0.12 | 0.05 | 0.03 | 0.04 | 0.13 | 0.07 | 0.02 | 0.08 | 0.13 | 0.07 | 0.04 | 0.07 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 59.71 | 11.40 | 1.63 | 0.90 | 28.24 | 1.43 | 1.59 | 0.91 | 14.27 | 1.73 | 1.55 | 0.86 |
| CI | 18.07 | 16.69 | 12.68 | 15.10 | 15.55 | 20.92 | 10.30 | 14.21 | 19.49 | 21.22 | 11.80 | 13.36 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 |
| | (-0.41) | (-0.64) | (1.12) | (0.63) | (-0.35) | (-0.74) | (0.65) | (0.54) | (-0.13) | (-0.67) | (0.60) | (0.43) |
| L.FDI | **0.000***** | 0.000 | 0.000 | 0.000 | **0.000***** | 0.000 | -0.000 | 0.000 | **0.000***** | 0.000 | -0.000 | 0.000 |
| | **(8.28)** | (1.35) | (0.20) | (0.78) | **(5.66)** | (1.71) | (-0.11) | (1.04) | **(5.23)** | (1.20) | (-0.24) | (0.67) |
| L.IMP | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 |
| | (-0.92) | (0.84) | (0.09) | (-0.94) | (-1.05) | (1.08) | (-0.07) | (-0.64) | (-1.05) | (0.76) | (0.47) | (-0.47) |
| L.RWATA | -0.000 | -0.000 | -0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000** | 0.000 | -0.000 | 0.000 | -0.000 |
| | (-0.62) | (-0.66) | (-0.19) | (-0.64) | (0.17) | (-1.66) | (0.43) | (-2.46) | (0.88) | (-0.61) | (0.75) | (-0.74) |
| CONS | 0.002 | 0.000 | -0.000 | 0.001 | 0.000 | 0.001 | -0.002 | 0.001** | -0.001 | 0.000 | -0.003 | 0.001 |
| | (1.08) | (0.44) | (-0.02) | (0.75) | (0.11) | (1.57) | (-0.60) | (3.27) | (-0.59) | (0.45) | (-0.91) | (0.90) |
| $R^2$ | 0.13 | 0.08 | 0.02 | 0.06 | 0.12 | 0.16 | 0.03 | 0.16 | 0.16 | 0.06 | 0.05 | 0.05 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 35.60 | 1.46 | 1.55 | 0.95 | 32.23 | 1.28 | 2.23 | 3.98 | 13.70 | 2.42 | 1.92 | 1.27 |
| CI | 19.77 | 19.10 | 12.65 | 14.39 | 22.68 | 18.72 | 14.63 | 15.22 | 24.73 | 20.32 | 15.72 | 15.49 |

## Table XI:
## Non Program - Contagion

The results below are from running equation (4) for the six bank samples using non-program countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given in brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | 0.000 | **-0.000*** ** | 0.000 | -0.000 | 0.000 | **-0.000** ** | 0.000 | -0.000 | 0.000 | **-0.000*** | 0.000 | -0.000 |
| | (0.51) | **(-4.68)** | (1.54) | (-0.96) | (0.96) | (-2.53) | (0.67) | (-0.83) | (1.53) | **(-2.21)** | (0.95) | (-1.26) |
| L.FDI | **0.001*** | 0.000 | 0.000 | 0.000 | **0.001** ** | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 |
| | **(2.21)** | (0.35) | (0.08) | (1.06) | **(3.34)** | (1.08) | (-0.13) | (1.36) | (1.01) | (0.96) | (-0.12) | (1.38) |
| L.IMP | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 |
| | (-0.44) | (-1.10) | (-0.46) | (-1.28) | (-0.08) | (-1.18) | (-0.24) | (-1.52) | (0.81) | (-1.11) | (-0.54) | (-0.93) |
| L.RWATA | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000* | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.39) | (1.15) | (-0.16) | (0.96) | (1.02) | (-1.40) | (0.13) | (-2.30) | (1.67) | (-1.22) | (1.27) | (-1.95) |
| CONS | -0.001 | -0.003 | 0.000 | -0.002 | -0.006 | 0.001 | -0.001 | 0.002 | -0.007 | 0.001 | -0.003 | 0.002 |
| | (-0.25) | (-1.02) | (0.03) | (-0.83) | (-0.92) | (1.80) | (-0.25) | (2.07) | (-1.60) | (1.95) | (-1.29) | (1.87) |
| $R^2$ | 0.23 | 0.25 | 0.07 | 0.16 | 0.33 | 0.20 | 0.07 | 0.18 | 0.36 | 0.19 | 0.25 | 0.18 |
| Num Obs | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 |
| F-stat | 51.67 | 23.95 | 2.28 | 106.05 | 83.09 | 46.75 | 2.71 | 1.83 | 4.09 | 10.84 | 6.78 | 2.05 |
| CI | 15.81 | 18.67 | 11.13 | 18.79 | 13.65 | 23.91 | 8.09 | 19.18 | 17.41 | 21.30 | 10.37 | 16.62 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | 0.000 | **-0.000*** | 0.000 | -0.000 | 0.000 | **-0.000** ** | 0.000 | -0.000 | 0.000 | **-0.000** ** | 0.000 | -0.000 |
| | (1.11) | **(-2.56)** | (0.10) | (-0.68) | (0.67) | **(-2.98)** | (0.98) | (-1.02) | (1.85) | **(-3.03)** | (0.44) | (-1.04) |
| L.FDI | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | **0.000*** | 0.000 | -0.000 | 0.000 |
| | (1.68) | (1.83) | (-0.78) | (1.57) | (1.86) | (1.68) | (-0.85) | (1.66) | **(2.41)** | (1.24) | (-1.32) | (1.09) |
| L.IMP | -0.000 | 0.000 | -0.000 | -0.000* | -0.000 | 0.000 | -0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (-0.30) | (0.03) | (-0.96) | (-2.20) | (-0.44) | (0.66) | (-0.68) | (-0.95) | (1.21) | (-0.31) | (1.33) | (-0.25) |
| L.RWATA | 0.000 | -0.000 | 0.000* | -0.000 | 0.000 | -0.000 | 0.000 | -0.000** | 0.000** | 0.000 | 0.000* | -0.000 |
| | (1.49) | (-1.22) | (2.25) | (-0.62) | (0.82) | (-1.61) | (1.25) | (-2.94) | (4.25) | (0.04) | (2.61) | (-0.55) |
| CONS | -0.005 | 0.001* | -0.006** | 0.001* | -0.003 | 0.001** | -0.005 | 0.001*** | -0.011*** | 0.000 | -0.010** | 0.001 |
| | (-1.52) | (2.65) | (-2.98) | (2.33) | (-0.74) | (2.78) | (-1.68) | (5.27) | (-5.08) | (0.75) | (-2.87) | (0.94) |
| $R^2$ | 0.30 | 0.16 | 0.35 | 0.07 | 0.28 | 0.27 | 0.31 | 0.22 | 0.58 | 0.15 | 0.41 | 0.08 |
| Num Obs | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 | 20 | 22 |
| F-stat | 94.23 | 13.43 | 4.20 | 14.17 | 98.84 | 22.93 | 4.58 | 53.50 | 91.49 | 80.09 | 81.16 | 75.60 |
| CI | 15.56 | 20.27 | 12.48 | 19.26 | 21.65 | 19.85 | 18.40 | 20.48 | 24.75 | 24.23 | 17.50 | 23.87 |

the CRGDP deviation from the long-term trend using a Hodrick-Prescott filter[25]. The variable introduces no additional explanatory power with regards to contagion[26] while maintaining the significance of the FDI factor as in Table X. In other words, contagion is as likely to occur in any state of the economy after accounting for other lending sources such as FC.

Third, wholesale funding emerged in Poirson and Schmittman (2012) as a leading pull factor in spillovers. However, the authors acknowledge that the opposite result was found in Tressel (2011)'s work. We use the same indicator, loans-to-deposits, to gauge the effect of wholesale funding. We find that this ratio only starts to appear significant as the number of banks increases to encompass the whole of the banking sector. This brings together both findings regarding the impact of wholesale funding and confirms the necessity of our contribution in avoiding any sample effects. Moreover, this opens an interesting research question to explain why smaller banks are more sensitive to spillovers via wholesale funding. This could be due to the fact that smaller banks are less capable of replacing sources of wholesale funding by other resources in the same way that larger banks are able to.

Finally, despite having excluded liquidity from our study on the basis of multi-collinearity concerns, we include it only for illustrative purposes[27]. We find that liquidity is the only factor which is able to minimize the impacts of spillovers (Table IV) and contagion (Table IV) simultaneously, noticeably in larger sample banks that do not suffer as much from multi-collinearity. This means that liquidity seems to be the best protection against transmission shocks especially when solvency constraints play no meaningful role. The latter agrees with the importance attributed by Fratzscher (2012) to country-specific fundamentals (albeit not not to bank-specific factors such as leverage and liquidity per se); thus reinforcing the introduction of liquidity standards in Basel III. Therefore, applying a similar model to a larger sample would be a good venue to corroborate our results.

## 6. Conclusion

Boosting a country's economy through higher returns while safeguarding it from externalities have always been main targets of policy-makers. With the creation of the EU, this objective became even more central as the targets shifted to a regional scale with the added concern of protecting the EU, not only from the rest of the world, but from itself. Indeed, the recent Euro crisis brought to light the internal vulnerabilities of Europe which threatened to break up the union just over a decade after its creation.

Whereas the economic target was achieved after 1999 through relaxing constraints on bilateral linkages between countries (mainly trade and investment), Europe's leaders witnessed during the crisis that more was needed with regards to the safety target. The latter has been handed over to the EU's regulatory bodies whose role is being questioned for not achieving enough oversight. As a result, the EU Commission has favored extending the supervisory powers of the Central Bank (ECB) while promoting a full banking union. In turn, this creates a sizable problem for any regulator: that of choosing uniform safety targets for the EU's banking sector in order to ensure its financial stability. In that regard, the problem facing regulators is the diversity of

[25] Using a smoothness parameter of 400,000 as suggested by the BCBS.

[26] Except in the last regression for each sample where multi-collinearity occurs. We discard the results from these regressions.

[27] Liquidity is defined as total liquid assets to total deposits and short term funding.

country-specific vulnerabilities that so far have been outside the jurisdiction of EU authorities. One European regulation which escaped such criticism due to its homogeneous enforcement across member countries was the Basel II/CRD regulation. As one lever of the safety mechanism, the regulation still got its share of scrutiny for not doing enough to safeguard the sanctity of the banking sector. This has propelled efforts towards increased capital measures and a backstop leverage requirement under Basel III.

Note that even if regulators mainly focus on the whole macroeconomic banking sector, some banks, particularly, the SIFIs have attracted a lot of criticism in both the US and EU crises. While we do not uncover any aspect particularly related to this sample of banks, one of our contributions has been in establishing the key factors for each mentioned scenario using a diversity of samples ranging from the largest banks (including the SIFIs) to the whole of the banking sector. Despite data limitations similar to those encountered in the literature, this makes our results more robust than those of authors who focus only on one particular sample. Moreover, whereas Poirson and Schmittman (2012) have attempted a similar exercise which included European countries, the merit of our approach is in the use of country-to-country linkages rather than overall country exposures. More generally, such authors have focused on explaining individual bank behavior whereas our method addresses the overall banking sector. This should prove more useful for regulators as it points the axis towards macroprudential policy which has become one of the central pillars of the Basel III regulation.

Furthermore our main purpose in this research was to shed light on where the vulnerabilities of the EU lie with respect to the safety targets mentioned earlier in order to help policy-makers in addressing them. Indeed, by building a model that encompasses both the linkages between countries and country-specific components we detect which factors are more prevalent in increasing returns and containing spillovers and contagion. Due to data limitations, we do so only for our full sample of countries and a partition of non-program countries. Nonetheless, we subject these results to a battery of robustness tests to ascertain their validity.

For instance, we find that FDI played an important role in keeping returns afloat particularly for non-program countries. However, we find that high capital ratios (low risk-weighted assets) curtail returns for all countries. This has become a subject of concern for the banking industry as it shows a tradeoff between profitability and safety; the reason being that banks exceeding the target thresholds can afford to take more risk since they can cover their losses. Hence, while our results show that the enforcement of Basel II was unable to reverse that trend, the guidelines in Basel III with respect to increasing the threshold requirements will make it more difficult for banks to partake in similar wrongdoing (moral hazard).

Nonetheless, in conjunction with the lending and import factors' effect on spillovers, capital ratios emerge as the primary safety mechanism for non-program countries. This accentuates the importance attributed to higher capital buffers in the banking industry despite the cautioning against a possible credit crunch arising from the newly-established capital increments under Basel III. Similarly, the introduction of a leverage threshold also seems to be well-founded in order to preserve the safety benefits of capital ratios.

Still, our results indicate that capital ratios cannot prevent contagion from occuring. This raises the question as to which other factors might be missing from our model. While we make an attempt at addressing that question through the use of the credit-to-gdp ratio as advocated by the BCBS for its counter-cyclical capital buffers, this matter requires further analysis. In fact, since we find that solvency is not a solution, we believe liquidity would be a good starting point.

The EU crisis spurred the debate with regard to the direction that macroprudential policy should take in either enforcing capital controls to maintain the linkage channel between countries or improve country's resilience to shocks via idiosyncratic measures. One characteristic of the EU crisis is that trade and financial linkages were shown to be intrinsically two sides of the same coin (twin deficits). However, they are not the only important factors. Attention should be given as well to the regulatory side. Whereas capital and leverage ratios might have detrimental effects for profitability, they deserve a lot of credit in arguably more important situations such as safeguarding countries from the spread of crises. Our conclusion from this work is therefore to support the recommendation of Cheung et al. (2010) for the need of policy-makers to balance between the various tradeoffs that can affect the dynamics of global interdependence. In other words, whereas FDI can be benefitial especially for Non-Program country returns, it can also increase the risk of contagion; hence the need for a proper balance when considering the enforcement of capital controls.

## Appendix A.

## Table I:
## Full Sample - Returns - noUK

The results below are from running equation (1) for the six samples of banks using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given between brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| MSCI | **2.303*** ** | 0.363 | **4.595*** ** | 1.389 | **2.539*** ** | 0.579 | **4.632*** ** | **1.767** ** | **2.838*** ** | 0.509 | **5.182*** ** | **1.766** ** |
| | **(6.66)** | (0.64) | **(7.85)** | (1.84) | **(5.52)** | (1.13) | **(8.75)** | **(3.01)** | **(4.44)** | (0.87) | **(5.77)** | **(2.84)** |
| L.FC | -0.000 | 0.001 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 |
| | (-0.32) | (1.59) | (0.98) | (-0.51) | (-0.06) | (0.75) | (0.77) | (-0.88) | (0.24) | (0.93) | (0.31) | (-0.85) |
| L.FDI | 0.000 | -0.001 | 0.001 | 0.000 | 0.001 | -0.000 | 0.001 | 0.000 | -0.000 | -0.001 | 0.000 | 0.000 |
| | (0.55) | (-1.13) | (1.30) | (0.56) | (0.57) | (-0.76) | (1.13) | (0.96) | (-0.17) | (-1.00) | (1.33) | (0.90) |
| L.IMP | -0.000 | **-0.002*** ** | -0.000 | -0.000 | 0.000 | **-0.002*** ** | -0.000 | -0.000 | 0.001 | **-0.002*** ** | -0.000 | -0.000 |
| | (-0.20) | **(-5.90)** | (-1.04) | (-1.22) | (0.06) | **(-6.45)** | (-0.97) | (-1.56) | (0.94) | **(-5.15)** | (-1.03) | (-1.25) |
| L.RWATA | 0.000 | -0.000 | -0.000 | -0.000 | **0.000*** ** | -0.000 | 0.000 | 0.000 | **0.000*** | -0.000 | 0.000 | -0.000 |
| | (1.11) | (1.21) | (-0.84) | (-1.01) | **(3.68)** | (-0.46) | (0.06) | (0.12) | **(2.01)** | (-1.15) | (1.79) | (-0.31) |
| CONS | -0.004 | 0.010*** | 0.008 | 0.007* | -0.017** | 0.005 | 0.005 | 0.003 | -0.024* | 0.007** | -0.002 | 0.004 |
| | (-1.29) | (4.44) | (0.84) | (1.93) | (-2.86) | (1.60) | (0.37) | (1.03) | (-1.92) | (2.78) | (-0.39) | (1.43) |
| $R^2$ | 0.31 | 0.62 | 0.45 | 0.53 | 0.34 | 0.49 | 0.45 | 0.48 | 0.38 | 0.54 | 0.46 | 0.49 |
| Num Obs | 32 | 34 | 32 | 34 | 32 | 34 | 32 | 34 | 32 | 34 | 32 | 34 |
| F-stat | 67.62 | 70.93 | 34.48 | 3.89 | 45.87 | 108.99 | 37.42 | 3.22 | 39.78 | 102.37 | 27.21 | 2.88 |
| CI | 23.19 | 25.75 | 21.86 | 23.46 | 19.06 | 26.53 | 16.41 | 22.05 | 25.05 | 24.63 | 16.67 | 20.89 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| MSCI | **2.738*** ** | 0.717 | **5.076*** ** | **1.836** ** | **2.359*** ** | 0.756 | **4.406*** ** | **1.759** ** | **2.530*** ** | 0.681 | **4.437*** ** | **2.122*** ** |
| | **(4.42)** | (1.04) | **(5.21)** | **(3.23)** | **(7.84)** | (1.09) | **(8.34)** | **(3.03)** | **(6.89)** | (1.11) | **(8.35)** | **(3.89)** |
| L.FC | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 |
| | (-0.03) | (0.70) | (0.28) | (-0.83) | (-0.35) | (0.66) | (0.97) | (-0.80) | (-0.15) | (0.72) | (0.80) | (-0.74) |
| L.FDI | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.001 | 0.000 | 0.001 | -0.001 | 0.001 | 0.000* |
| | (0.08) | (-0.77) | (1.16) | (1.15) | (0.08) | (-0.72) | (1.27) | (0.97) | (0.76) | (-0.77) | (1.22) | (2.06) |
| L.IMP | -0.000 | **-0.002*** ** | -0.000 | -0.000 | -0.000 | **-0.002*** ** | -0.000 | -0.000 | -0.000 | **-0.002*** ** | -0.001 | **-0.000** ** |
| | (-0.20) | **(-4.87)** | (-1.05) | (-1.86) | (-0.20) | **(-5.01)** | (-1.04) | (-1.67) | (-0.08) | **(-5.62)** | (-1.02) | **(-3.22)** |
| L.RWATA | **0.000*** | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | **0.000** ** | -0.000 | -0.000 | 0.000** |
| | **(2.31)** | (-0.60) | (1.51) | (0.75) | (1.26) | (-0.47) | (-0.83) | (0.28) | **(2.54)** | (-0.57) | (-0.54) | (2.87) |
| CONS | -0.022** | 0.005*** | -0.001 | 0.002 | -0.009 | 0.004*** | 0.010 | 0.003 | -0.012 | 0.004*** | 0.011 | 0.000 |
| | (-2.43) | (3.95) | (-0.23) | (0.83) | (-1.06) | (4.50) | (0.81) | (1.03) | (-1.78) | (5.91) | (0.69) | (0.05) |
| $R^2$ | 0.39 | 0.49 | 0.45 | 0.50 | 0.32 | 0.48 | 0.45 | 0.49 | 0.33 | 0.48 | 0.45 | 0.58 |
| Num Obs | 32 | 34 | 32 | 34 | 32 | 34 | 32 | 34 | 32 | 34 | 32 | 34 |
| F-stat | 56.23 | 90.86 | 49.75 | 4.33 | 87.61 | 104.42 | 29.73 | 3.25 | 58.06 | 84.05 | 23.57 | 6.12 |
| CI | 22.34 | 24.93 | 17.81 | 19.23 | 24.87 | 25.79 | 17.72 | 18.13 | 28.41 | 28.44 | 19.58 | 19.98 |

## Table II:
## Full Sample - Contagion - CRGDP

The results below are from running equation (4) for the six samples of banks using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given between brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000* | 0.000 | 0.000 | 0.000 | 0.000* |
| | (0.05) | (0.28) | (0.78) | (1.80) | (0.20) | (0.39) | (0.44) | (2.09) | (0.11) | (0.33) | (0.54) | (2.03) |
| L.FDI | **0.000**** | 0.000 | 0.000 | 0.000** | **0.000**** | 0.000 | 0.000 | 0.000** | **0.000***** | 0.000 | 0.000 | 0.000** |
| | **(2.82)** | (1.47) | (0.26) | (2.41) | **(3.02)** | (1.56) | (0.14) | (2.39) | **(3.38)** | (1.42) | (0.02) | (2.55) |
| L.IMP | -0.000 | 0.000 | -0.000 | -0.000** | -0.000 | 0.000 | 0.000 | -0.000** | -0.000 | 0.000 | -0.000 | -0.000** |
| | (-1.02) | (0.47) | (-0.16) | (-2.78) | (-0.97) | (0.60) | (0.05) | (-3.13) | (-0.94) | (0.69) | (-0.04) | (-3.08) |
| L.RWATA | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.09) | (0.35) | (-0.58) | (0.61) | (0.35) | (-0.49) | (0.07) | (-0.36) | (0.34) | (-0.39) | (0.70) | (-0.47) |
| L.CRGDP | 0.000 | -0.000 | -0.000 | -0.000** | 0.000 | -0.000 | -0.000 | -0.000** | 0.000 | -0.000 | -0.000 | -0.000** |
| | (0.55) | (-1.43) | (-0.43) | (-2.90) | (0.93) | (-1.39) | (-0.23) | (-2.91) | (1.00) | (-1.31) | (-0.34) | (-3.17) |
| CONS | 0.000 | -0.001 | 0.001 | -0.001 | -0.000 | 0.000 | -0.001 | -0.000 | -0.000 | -0.000 | -0.002 | -0.000 |
| | (0.10) | (-0.85) | (0.38) | (-0.89) | (-0.15) | (0.03) | (-0.31) | (-0.10) | (-0.08) | (-0.29) | (-0.90) | (-0.06) |
| $R^2$ | 0.13 | 0.13 | 0.03 | 0.27 | 0.13 | 0.13 | 0.02 | 0.26 | 0.13 | 0.12 | 0.04 | 0.26 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 73.58 | 33.45 | 1.73 | 9.99 | 26.89 | 7.63 | 1.32 | 10.96 | 9.47 | 21.60 | 1.31 | 14.68 |
| CI | 19.44 | 17.29 | 16.31 | 36.34 | 17.00 | 21.71 | 11.93 | 35.53 | 21.63 | 22.11 | 13.39 | 34.30 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.000 | 0.000 | 0.000 | 0.000* | 0.000 | 0.000 | 0.000 | 0.000* | 0.000 | 0.000 | 0.000 | 0.000* |
| | (-0.09) | (0.28) | (1.06) | (2.13) | (0.03) | (0.03) | (0.47) | (2.06) | (0.30) | (0.30) | (0.42) | (2.08) |
| L.FDI | **0.000***** | 0.000 | 0.000 | 0.000** | **0.000***** | 0.000 | -0.000 | 0.000** | **0.000***** | 0.000 | -0.000 | 0.000** |
| | **(5.05)** | (1.56) | (0.21) | (2.69) | **(4.91)** | (1.81) | (-0.11) | (2.32) | **(3.45)** | (1.57) | (-0.23) | (2.53) |
| L.IMP | -0.000 | 0.000 | 0.000 | -0.000** | -0.000 | 0.000 | -0.000 | -0.000* | -0.000 | 0.000 | 0.000 | -0.000** |
| | (-0.90) | (0.62) | (0.06) | (-3.33) | (-1.02) | (0.94) | (-0.06) | (-2.26) | (-1.00) | (0.68) | (0.42) | (-2.72) |
| L.RWATA | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (-0.45) | (-0.11) | (-0.24) | (1.36) | (0.20) | (-1.29) | (0.39) | (-1.14) | (0.88) | (-0.35) | (0.72) | (-0.12) |
| L.CRGDP | 0.000 | -0.000 | -0.000 | -0.000*** | 0.000 | -0.000 | 0.000 | -0.000** | 0.000 | -0.000 | 0.000 | -0.000** |
| | (0.58) | (-1.13) | (-0.34) | (-3.78) | (0.78) | (-1.11) | (0.07) | (-2.62) | (1.06) | (-1.42) | (0.10) | (-3.12) |
| CONS | 0.001 | -0.000 | 0.000 | -0.001 | -0.000 | 0.000 | -0.002 | 0.000 | -0.002 | -0.000 | -0.003 | -0.000 |
| | (0.66) | (-0.39) | (0.06) | (-1.80) | (-0.02) | (0.73) | (-0.54) | (0.63) | (-0.65) | (-0.39) | (-0.85) | (-0.44) |
| $R^2$ | 0.13 | 0.12 | 0.02 | 0.28 | 0.13 | 0.18 | 0.03 | 0.29 | 0.17 | 0.12 | 0.05 | 0.26 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 34.54 | 41.46 | 1.14 | 11.58 | 35.89 | 15.02 | 1.88 | 26.40 | 8.40 | 61.97 | 1.48 | 10.09 |
| CI | 21.27 | 19.60 | 15.12 | 35.34 | 25.16 | 19.28 | 16.00 | 35.80 | 28.41 | 21.14 | 17.19 | 36.00 |

## Table III:
## Full Sample - Spillover - LTD

The results below are from running equations (2) and (3) for the six bank samples using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given in brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.007 | **0.067*** ** | 0.008 | 0.011 | 0.001 | **0.056*** | 0.008 | 0.010 | -0.003 | **0.046** ** | 0.008 | 0.009 |
| | (-0.56) | **(3.59)** | (1.85) | (1.18) | (0.03) | **(2.05)** | (1.10) | (1.03) | (-0.29) | **(2.47)** | (1.42) | (0.99) |
| L.FDI | 0.011 | 0.001 | -0.042 | 0.050 | 0.008 | 0.002 | -0.026 | 0.052* | 0.011 | 0.021 | -0.022 | 0.047 |
| | (0.22) | (0.03) | (-1.79) | (1.72) | (0.34) | (0.11) | (-1.50) | (2.00) | (0.36) | (1.32) | (-1.22) | (1.82) |
| L.IMP | 0.074 | -0.004 | 0.001 | -0.009 | 0.107 | 0.043 | -0.008 | -0.007 | 0.086 | -0.044 | -0.005 | -0.011 |
| | (0.92) | (-0.02) | (0.06) | (-0.56) | (1.31) | (0.25) | (-0.49) | (-0.49) | (1.14) | (-0.25) | (-0.32) | (-0.87) |
| L.RWATA | -0.006 | 0.002 | -0.013 | -0.006 | -0.002 | 0.002 | -0.013 | 0.007 | -0.006 | 0.006* | -0.024* | 0.003 |
| | (-1.11) | (0.24) | (-1.33) | (-1.24) | (-0.17) | (0.16) | (-0.92) | (1.25) | (-1.05) | (1.94) | (-2.00) | (0.61) |
| L.LTD | 0.002 | -0.000 | 0.006 | -0.001 | 0.005 | 0.006 | 0.004 | 0.000 | **0.005*** | 0.008 | 0.006 | 0.003 |
| | (1.24) | (-0.21) | (1.48) | (-0.49) | (1.83) | (1.00) | (0.81) | (0.03) | **(2.15)** | (1.48) | (1.10) | (1.46) |
| CONS | 0.660 | 0.338 | 1.009 | 1.025** | -0.111 | -0.549 | 1.429* | 0.348 | 0.147 | -0.781 | 1.755** | 0.219 |
| | (1.58) | (0.63) | (0.91) | (3.15) | (-0.14) | (-0.64) | (1.89) | (1.26) | (0.31) | (-1.50) | (2.77) | (0.57) |
| $R^2$ | 0.13 | 0.09 | 0.17 | 0.29 | 0.16 | 0.18 | 0.09 | 0.30 | 0.16 | 0.28 | 0.17 | 0.31 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 0.83 | 10.68 | 2.49 | 1.30 | 1.50 | 6.41 | 1.13 | 1.38 | 2.88 | 4.67 | 2.88 | 2.39 |
| CI | 20.89 | 18.64 | 18.10 | 17.33 | 21.30 | 23.31 | 19.79 | 17.45 | 23.99 | 25.54 | 21.75 | 19.76 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | 0.005 | **0.070** ** | 0.007 | 0.010 | -0.003 | **0.065*** ** | 0.006 | 0.010 | -0.005 | **0.060*** ** | 0.007 | 0.009 |
| | (0.42) | **(3.18)** | (1.22) | (1.66) | (-0.38) | **(3.76)** | (1.19) | (1.14) | (-0.59) | **(3.72)** | (1.55) | (1.08) |
| L.FDI | 0.025 | -0.027 | -0.003 | 0.063* | -0.009 | -0.002 | -0.009 | 0.054 | -0.012 | 0.010 | 0.002 | 0.052 |
| | (0.76) | (-1.00) | (-0.15) | (2.04) | (-0.31) | (-0.12) | (-0.48) | (1.77) | (-0.43) | (0.40) | (0.11) | (1.56) |
| L.IMP | 0.096 | -0.057 | -0.003 | -0.010 | 0.093 | -0.029 | -0.002 | -0.007 | 0.103 | -0.047 | -0.020 | -0.007 |
| | (1.81) | (-0.31) | (-0.19) | (-0.75) | (1.26) | (-0.15) | (-0.12) | (-0.45) | (1.68) | (-0.22) | (-1.03) | (-0.36) |
| L.RWATA | -0.004 | 0.011 | -0.034** | -0.004 | 0.008 | 0.007 | -0.020 | -0.002 | -0.009 | 0.009 | -0.034*** | -0.001 |
| | (-0.45) | (1.55) | (-2.84) | (-0.97) | (1.17) | (0.60) | (-1.02) | (-0.26) | (-1.84) | (1.00) | (-3.65) | (-0.05) |
| L.LTD | **0.005*** | 0.002 | 0.006 | 0.001 | **0.007** ** | 0.001 | 0.012 | 0.000 | **0.008*** ** | 0.003 | 0.015 | 0.001 |
| | **(2.23)** | (1.29) | (1.53) | (1.21) | **(2.51)** | (0.86) | (1.36) | (0.07) | **(2.53)** | (1.81) | (1.59) | (0.17) |
| CONS | 0.063 | -0.336 | 2.211** | 0.745*** | -0.601 | -0.058 | 1.116 | 0.795** | 0.205 | -0.305 | 1.874* | 0.697 |
| | (0.10) | (-0.85) | (2.57) | (4.17) | (-0.84) | (-0.16) | (0.68) | (2.60) | (0.33) | (-0.94) | (1.92) | (1.44) |
| $R^2$ | 0.14 | 0.24 | 0.24 | 0.34 | 0.14 | 0.14 | 0.19 | 0.28 | 0.17 | 0.18 | 0.29 | 0.28 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 6.37 | 5.92 | 36.10 | 1.79 | 49.97 | 33.15 | 7.35 | 1.57 | 4.60 | 10.59 | 15.66 | 1.72 |
| CI | 20.48 | 21.84 | 27.68 | 19.18 | 27.75 | 21.96 | 17.18 | 17.46 | 28.58 | 23.50 | 18.16 | 19.11 |

## Table IV:
## Full Sample - Spillover - LIQR

The results below are from running equation (4) for the six samples of banks using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given between brackets below the coefficients. * $p < 0.05, **p < 0.01, ***p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.008 | **0.069**** | 0.010 | 0.011 | -0.001 | **0.041**** | 0.011* | 0.017* | -0.002 | **0.043**** | 0.010* | 0.017* |
| | (-0.78) | **(3.35)** | (1.70) | (1.13) | (-0.07) | **(2.66)** | (2.16) | (1.94) | (-0.25) | **(3.06)** | (2.04) | (1.98) |
| L.FDI | 0.009 | -0.009 | -0.012 | 0.052 | 0.052 | -0.025 | -0.013 | 0.073** | 0.008 | -0.009 | -0.009 | 0.074** |
| | (0.23) | (-0.22) | (-0.74) | (1.72) | (1.41) | (-0.62) | (-0.69) | (2.98) | (0.25) | (-0.28) | (-0.44) | (2.48) |
| L.IMP | 0.096 | -0.036 | -0.015 | -0.008 | 0.083 | 0.026 | -0.011 | -0.020* | 0.098 | 0.002 | -0.018 | -0.020* |
| | (1.39) | (-0.17) | (-0.92) | (-0.52) | (1.08) | (0.18) | (-0.79) | (-2.27) | (1.14) | (0.01) | (-0.87) | (-1.97) |
| L.RWATA | -0.006 | 0.004 | -0.014 | -0.006 | 0.003 | 0.007 | -0.012 | 0.008 | 0.005 | 0.010* | -0.011 | 0.007 |
| | (-0.85) | (0.47) | (-1.07) | (-1.52) | (0.37) | (0.97) | (-1.10) | (1.35) | (0.92) | (2.27) | (-0.78) | (1.16) |
| L.LIQR | -0.008 | 0.011 | **-0.020***** | 0.000 | **-0.015**** | 0.007 | **-0.026***** | **-0.013*** | **-0.015*** | 0.005 | **-0.025*** | **-0.013*** |
| | (-1.40) | (1.02) | **(-4.71)** | (0.02) | **(-2.37)** | (0.98) | **(-3.70)** | **(-1.99)** | **(-2.01)** | (0.76) | **(-2.10)** | **(-2.30)** |
| CONS | 1.017* | 0.002 | 2.457** | 0.972** | 0.674 | -0.119 | 2.383*** | 0.582* | 0.591 | -0.138 | 2.496*** | 0.568* |
| | (2.29) | (0.00) | (3.21) | (3.25) | (1.05) | (-0.28) | (3.80) | (2.07) | (1.39) | (-0.43) | (5.50) | (2.12) |
| $R^2$ | 0.15 | 0.13 | 0.19 | 0.29 | 0.20 | 0.14 | 0.23 | 0.38 | 0.16 | 0.17 | 0.21 | 0.38 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 1.78 | 8.66 | 7.47 | 1.67 | 2.41 | 7.85 | 7.13 | 3.65 | 4.81 | 12.83 | 5.92 | 2.47 |
| CI | 33.99 | 30.07 | 22.13 | 44.54 | 26.23 | 40.64 | 24.69 | 24.52 | 25.25 | 36.37 | 24.34 | 27.33 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.002 | **0.082***** | 0.009* | 0.012** | 0.000 | **0.066***** | 0.007 | 0.011 | -0.002 | **0.064***** | 0.006 | 0.011 |
| | (-0.18) | (3.68) | (2.10) | **(2.34)** | (0.04) | (3.70) | (1.19) | (1.10) | (-0.14) | **(3.63)** | (0.93) | (1.19) |
| L.FDI | 0.005 | -0.018 | -0.004 | 0.058 | -0.015 | 0.002 | -0.011 | 0.055 | 0.012 | 0.015 | -0.011 | 0.054 |
| | (0.13) | (-0.65) | (-0.20) | (1.65) | (-0.45) | (0.09) | (-0.51) | (1.84) | (0.29) | (0.64) | (-0.56) | (1.83) |
| L.IMP | 0.089 | -0.074 | -0.004 | -0.009 | 0.103 | -0.032 | -0.002 | -0.008 | 0.096 | -0.023 | -0.005 | -0.009 |
| | (1.20) | (-0.43) | (-0.22) | (-0.76) | (1.17) | (-0.16) | (-0.15) | (-0.46) | (1.26) | (-0.12) | (-0.21) | (-0.42) |
| L.RWATA | 0.002 | 0.008 | -0.032* | -0.006 | 0.009 | 0.007 | -0.025 | -0.002 | -0.005 | 0.009 | -0.024** | -0.000 |
| | (0.17) | (1.43) | (-2.14) | (-1.12) | (1.22) | (0.59) | (-1.02) | (-0.32) | (-0.79) | (0.85) | (-2.56) | (-0.04) |
| L.LIQR | -0.012 | **-0.010**** | -0.007 | -0.008 | **-0.018*** | -0.003 | -0.005 | 0.001 | -0.013 | -0.003 | **-0.024*** | 0.005 |
| | (-0.92) | **(-2.48)** | (-0.50) | (-1.36) | **(-2.04)** | (-1.42) | (-0.24) | (0.76) | (-1.69) | (-1.64) | **(-2.03)** | (1.60) |
| CONS | 0.652 | 0.308 | 2.968*** | 1.110** | 0.343 | 0.177 | 2.721** | 0.773** | 0.993* | 0.043 | 3.095*** | 0.630 |
| | (0.97) | (0.94) | (4.03) | (3.12) | (0.64) | (0.85) | (2.68) | (2.87) | (2.21) | (0.12) | (3.71) | (1.65) |
| $R^2$ | 0.10 | 0.21 | 0.21 | 0.36 | 0.13 | 0.14 | 0.13 | 0.28 | 0.12 | 0.13 | 0.21 | 0.29 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 1.54 | 20.26 | 3.33 | 1.85 | 48.34 | 87.76 | 1.84 | 1.66 | 2.14 | 7.40 | 9.10 | 1.23 |
| CI | 26.91 | 30.47 | 20.81 | 22.71 | 28.55 | 21.66 | 33.94 | 18.24 | 29.13 | 24.24 | 30.10 | 19.31 |

## Table V:
## Full Sample - Contagion - LIQR

The results below are from running equation (4) for the six samples of banks using all EU countries in our dataset. L. denotes lagged values. Highlighted cells are factors mostly consistent across bank samples. t-stats are given between brackets below the coefficients. * $p < 0.05, ** p < 0.01, *** p < 0.001$.

| SAMPLE | IMF | | | | Top200 | | | | Top10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 |
| | (-0.30) | (-0.88) | (0.73) | (0.42) | (0.10) | (0.15) | (0.46) | (1.69) | (-0.12) | (-0.27) | (0.65) | (1.00) |
| L.FDI | **0.000**** | 0.000 | 0.000 | 0.000 | **0.000**** | 0.000 | 0.000 | 0.000 | **0.000***** | 0.000 | 0.000 | 0.000 |
| | **(3.00)** | (1.07) | (0.24) | (0.64) | **(3.15)** | (1.66) | (0.12) | (1.84) | **(4.01)** | (1.26) | (0.05) | (1.44) |
| L.IMP | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000** | -0.000 | 0.000 | -0.000 | -0.000 |
| | (-0.89) | (0.73) | (-0.10) | (-0.79) | (-0.90) | (0.64) | (0.09) | (-2.55) | (-0.84) | (0.88) | (-0.08) | (-1.41) |
| L.RWATA | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.01) | (0.16) | (-0.53) | (0.18) | (0.50) | (-0.70) | (0.06) | (-1.32) | (0.45) | (-0.56) | (0.75) | (-0.84) |
| L.LIQR | -0.000 | -0.000 | 0.000 | -0.000 | -0.000 | -0.000 | 0.000 | **-0.000**** | -0.000 | -0.000 | -0.000 | **-0.000**** |
| | (-0.37) | (-0.83) | (0.04) | (-0.68) | (-1.02) | (-1.27) | (0.06) | **(-2.80)** | (-0.11) | (-0.81) | (-0.14) | **(-2.47)** |
| CONS | 0.001 | -0.000 | 0.000 | 0.000 | -0.000 | 0.001 | -0.001 | 0.001** | -0.000 | 0.000 | -0.002 | 0.001 |
| | (0.38) | (-0.07) | (0.27) | (0.07) | (-0.04) | (1.02) | (-0.29) | (2.34) | (-0.04) | (0.34) | (-0.82) | (1.04) |
| $R^2$ | 0.13 | 0.08 | 0.03 | 0.05 | 0.15 | 0.14 | 0.02 | 0.21 | 0.13 | 0.08 | 0.04 | 0.11 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 57.71 | 4.23 | 2.43 | 0.60 | 30.10 | 1.25 | 2.05 | 7.76 | 11.18 | 1.15 | 1.47 | 4.23 |
| CI | 33.99 | 30.07 | 32.13 | 44.54 | 26.23 | 40.64 | 24.69 | 24.52 | 25.25 | 36.37 | 24.34 | 27.33 |
| SAMPLE | Top30 | | | | FullRank | | | | FullSample | | | |
| PARTNER | US | | EU | | US | | EU | | US | | EU | |
| PERIOD | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 | Post-2007 | Pre-2007 |
| L.FC | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 |
| | (-0.18) | (-0.06) | (0.97) | (1.70) | (0.11) | (-0.88) | (0.20) | (0.06) | (0.06) | (-0.70) | (0.26) | (0.25) |
| L.FDI | **0.000***** | 0.000 | 0.000 | 0.000 | **0.000***** | 0.000 | -0.000 | 0.000 | **0.000***** | 0.000 | -0.000 | 0.000 |
| | **(6.40)** | (1.79) | (0.06) | (1.06) | **(3.58)** | (1.82) | (-0.62) | (1.10) | **(5.27)** | (1.13) | (-0.36) | (0.63) |
| L.IMP | -0.000 | 0.000 | -0.000 | -0.000** | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | 0.000 | 0.000 | -0.000 |
| | (-0.78) | (0.24) | (-0.13) | (-2.61) | (-0.58) | (0.97) | (0.07) | (-0.46) | (-0.89) | (0.68) | (0.62) | (-0.31) |
| L.RWATA | -0.000 | -0.000 | 0.000 | -0.000 | 0.000 | -0.000* | 0.000 | -0.000** | 0.000 | -0.000 | 0.000 | -0.000 |
| | (-0.04) | (-1.17) | (0.24) | (-1.22) | (0.55) | (-1.90) | (0.91) | (-2.77) | (0.89) | (-0.66) | (0.83) | (-0.80) |
| L.LIQR | -0.000 | **-0.000**** | -0.000 | **-0.000***** | -0.000 | **-0.000***** | -0.000 | **-0.000**** | -0.000 | **-0.000**** | -0.000 | **-0.000**** |
| | (-0.56) | **(-3.06)** | (-0.78) | **(-6.37)** | (-1.51) | **(-6.12)** | (-1.57) | **(-2.87)** | (-1.39) | **(-3.26)** | (-0.40) | **(-2.82)** |
| CONS | 0.001 | 0.001* | -0.000 | 0.001*** | 0.000 | 0.001** | -0.002 | 0.001*** | -0.001 | 0.001 | -0.002 | 0.001 |
| | (0.80) | (1.92) | (-0.11) | (3.49) | (0.11) | (2.54) | (-0.67) | (4.88) | (-0.47) | (0.87) | (-0.83) | (1.21) |
| $R^2$ | 0.14 | 0.19 | 0.04 | 0.20 | 0.18 | 0.25 | 0.13 | 0.23 | 0.17 | 0.08 | 0.05 | 0.07 |
| Num Obs | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 | 36 | 38 |
| F-stat | 23.20 | 34.19 | 1.80 | 48.10 | 25.12 | 12.70 | 3.43 | 13.60 | 14.21 | 4.57 | 2.36 | 4.20 |
| CI | 26.91 | 27.47 | 20.81 | 22.71 | 28.55 | 21.66 | 33.94 | 18.24 | 29.13 | 24.24 | 30.10 | 19.31 |

## Appendix B.

**Table I: List of Excluded variables**

| Variable | Source | Reason |
|---|---|---|
| VIX | Chan-Lau et al. (2012a) | Marginal contribution |
| Euribor-OIS | Chan-Lau et al. (2012a) | Insignificant (High Collinearity) |
| BtM | Brooks and DelNegro (2006) | No substantial addition |
| Size | Berger and Bouwman (2013) | Capital has a positive effect irrespective of size |
| IP/LIBOR | Balakrishnan et al. (2009) | Not significant |
| Commodity Price Growth | Balakrishnan et al. (2009) & Forbes (2012) | Opposite results |
| Interest Rates/TED | Forbes (2012) | Significant depending on the chosen sample |
| Current account/fiscal deficits | Balakrishnan et al. (2009) | Already reflected in bilateral linkages |

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