The euro bias of bank assets in the eurozone

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Abstract: The integration of euro-area financial markets since the advent of the euro in 1999 has been the center of attention in policy debates and academic research. This paper complements this much-explored line of research by examining a subject that has attracted much less attention: namely, the effect of the euro on bank assets. We analyze the bank assets of monetary financial institutions in Germany vis-à-vis nonresidents. Our main empirical finding is that the financial institutions of the eurozone countries have tended to invest in assets of other eurozone countries substantially more since the introduction of the euro. Especially, the euro effect was stronger in the weaker eurozone economies than in the stronger eurozone economies. Furthermore, the impact of the euro has been even greater in securities than in loans.

Keywords: euro; Germany; bank loans; securities; seemingly unrelated regression; random effects; Tobit

JEL Classification: C30; F30; G21

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1. Motivation

The introduction of the euro in 1999 has changed the eurozone and world economies considerably, creating both positive and negative effects. An example of the former may be that the euro has encouraged the integration of eurozone goods and financial markets. In contrast, it is also true that rapid and excessive economic integration has caused economic and financial instability in the region. Before the eurozone crisis, the euro's positive effect was stressed. Now, the eurozone crisis has made clear that its negative effects must be considered.

Financial-market integration following the euro's introduction is presumed to be related to current eurozone fiscal and financial instability. After euro adoption, cross-border financial flows in the euro area strongly accelerated in the years preceding the financial crisis (Forster et al. 2011). This financial-market integration facilitated cross-border lending and borrowing beyond some banks' and borrowers' capacity, thus aggravating both the current and fiscal accounts of the crisis countries (Jaumotte and Sodsriwiboon, 2010; Schmitz and von Hagen, 2011; Collignon, 2013).

Many researchers have studied the euro's effect on bilateral trade, foreign direct investment (FDI), and financial markets. However, studies on the euro's impact on cross-border bank asset portfolios are rare. Therefore, we analyze the euro's impact on German Bank's asset portfolios vis-à-vis nonresidents. To analyze bank asset portfolios, we used data from the balance-of-payment statistics from Bundesbank.

Our paper is organized as follows. The literature survey is in section 2, and the empirical analysis is explained in section 3. Section 4 includes empirical results, and section 5 concludes the paper.

2. Literature Survey

There is considerable literature documenting the euro's impact on trade volume, foreign direct investment and the integration of European financial markets. The EMU has increased bilateral trade among eurozone countries (Rose, 2000; Glick and Rose, 2002; Micco et al., 2003, Baldwin, 2006; Baldwin et al., 2008). Most of the research on the euro's effect on FDI concludes that the EMU has increased FDI (de Sousa and Lochard, 2011; Petroulas, 2007; Brouwer et al., 2008; Coeurdacier et al., 2009; Choi and Park, 2012). The introduction of the euro in 1999 mitigated currency risk up until the eurozone crisis erupted and provided a further push for financial integration. Both legal and regulatory convergence and the mitigation of currency risk can explain the marked increase in cross-border financial activity.

Many studies show the decreased interest-rate differentials and increased volume of cross-border European bond and money market activity following the euro introduction. Given the existence of a single monetary policy across the eurozone, the money market is the most integrated of the financial markets. The unsecured money market segment became highly integrated immediately after the euro's introduction (Santillan et al., 2000; Hartmann et al., 2001). Baele et al.

(2004) find that not only the overnight market, but also the longer unsecured segment in the money market was integrated rapidly after the euro adoption.

The EMU launch also created a more integrated bond market. Baele et al. (2004) find that bond portfolios have become internationally diversified especially in the smaller euro-area countries. Using a gravity equation with bilateral portfolio investment data, Lane (2006) finds that common membership in the eurozone roughly doubles bilateral bond holdings. Coeurdacier and Martin (2009) also find evidence that the euro's advent lowered transaction costs inside the eurozone and increased the elasticity of substitution between bonds inside the eurozone compared to bonds denominated in other currencies. Using firm-level data, Hale and Spiegel (2008) show that the advent of the euro results in statistically and economically significant increases in the share of euro–denominated issues.

The euro has also increased equity investment among member states (de Santis and Gérard, 2006; Lane and Wälti, 2006; Lane and Milesi-Ferretti, 2007; Giofré, 2008; Coeurdacier and Martin, 2009). Lane and Milesi-Ferretti (2007) document that the euro has increased international equity investment among member states. Giofré (2008) finds overweighting of EMU equities in the portfolios of EMU investing countries. Cappiello et al. (2006) find an increased comovement of returns in eurozone bond and equity markets.

In contrast to the increased integration of the money, bond, and equity markets with the advent of the euro, where the products are highly standardized, integration of the banking markets lags behind and the results appear to be rather mixed. Adam et al. (2002) find a convergence in interest rates for mortgage loans,

but only weak evidence for convergence in the corporate-loan market. Cabral et al. (2002) also find that financial integration in retail banking proceeded slowly with the inception of the single currency. Baele et al. (2004) find substantial convergence in mortgage loan rates subsequent to the launch of the euro, although the consumer credit market appears to have remained highly segmented.

Although the retail banking market remains quite fragmented, the banking sector has been a central driver of financial integration, through cross-border interbank loans and deposits (Allen et al., 2011). Blank and Buch (2007) estimate the effect of the euro on intra-EU banking sector linkages using a gravity model from the Bank for International Settlements data set of banks' bilateral foreign assets and liabilities. They find a positive and significant euro effect on the distribution of bank assets, with a weaker estimate obtained for liabilities. Coeurdacier and Martin (2009) also find a positive euro effect on bilateral bank lending among the member countries using the data from the Coordinated Portfolio Investment Survey (CPIS) and the Bank for International Settlements. Interestingly, Spiegel (2009a, b) decomposes the relative increase in bilateral bank claims among union members into three possible channels—a *borrower effect*, a *creditor effect*, and a *pairwise effect*—and finds some evidence of borrower effect from Portuguese and Greek banks.[1]

In our paper we focus on banking-market integration with respect to euro adoption. We analyze the effect of the euro on cross-border German bank asset portfolios vis-à-vis nonresidents. To analyze bank asset portfolios, we use data from Bundesbank's balance-of-payment statistics from 2002 to 2010 to separately analyze the effect of the euro on cross-border securities and lending.[2]

3. Empirical analysis

We test whether German banks invest more in countries that have joined the common currency. A modified gravity equation is used in the sense that only Germany's partner-country GDPs and distance are included in the equation. The gravity equation has been used extensively to estimate such factors as trade and FDI between two countries. The gravity equation was first used in estimating trade by Tinbergen (1962). In our model, securities investment and bank loans vis-à-vis nonresidents are estimated by the gravity model. This implies that the volume of securities or bank loans is proportional to the two countries' economic sizes (GDP) and inversely proportional to the distance between them. Three equations are used in the empirical analysis:[3]

$$\log(Securities_{it}) = \beta_0 + \beta_1 \log(GDP_{it}) + \beta_2 \log(DISTANCE_i) + \beta_3 BORDER_i + \beta_4 CORE_{it} + \beta_5 PIIGS_i + \beta_6 PER_{it} + \beta_7 CRISIS_t + \beta_8 \log\left(\frac{M_2}{GDP_{it}}\right) + u_{it} \quad (1)$$

$$\log(Long_{it}) = \beta_0 + \beta_1 \log(GDP_{it}) + \beta_2 \log(DISTANCE_i) + \beta_3 BORDER_i + \beta_4 CORE_{it} + \beta_5 PIIGS_i + \beta_6 PER_{it} + \beta_7 CRISIS_t + \beta_8 \log\left(\frac{M_2}{GDP_{it}}\right) + u_{it} \quad (2)$$

$$\log(Short_{it}) = \beta_0 + \beta_1 \log(GDP_{it}) + \beta_2 \log(DISTANCE_i) + \beta_3 BORDER_i + \beta_4 CORE_{it} + \beta_5 PIIGS_i + \beta_6 PER_{it} + \beta_7 CRISIS_t + \beta_8 \log\left(\frac{M_2}{GDP_{it}}\right) + u_{it}, \quad (3)$$

where $u_{it} = \eta_i + \varepsilon_{it}$, η_i is an individual (country) effect and ε_{it} is independently and identically distributed among countries and years. $Securities_{it}$ stands for German banks' nonlending assets from partner country *i* in year *t*. $Long_{it}$ stands for German banks' long-term lending of banks in Germany to partner country *i* in year *t*, and $Short_{it}$ stands for German banks' short-term lending to partner country *i* in year *t*. GDP_{it} is the nominal GDP of partner country *i* in year *t*. $DISTANCE_i$ is the distance between Frankfurt, Germany, and the capital city of partner country *i*. $BORDER_i$, a dummy variable, is 1 if Germany and partner country *i* share a border, and is 0 otherwise. Similarly partner countries are classified into four geographic groups: core eurozone countries ($CORE_{it}$)[4]; Portugal, Italy, Ireland, Greece, and Spain ($PIIGS_i$); non-euro EU countries (PER_{it}) and non-EU countries (the baseline case). $CRISIS_t$, a dummy variable, is 1 if year *t* is 2009 or 2010, years of the euro crisis during that period, and is 0 otherwise. M_2/GDP_{it} denotes the degree of financial deepening which is calculated by M_2 divided by *GDP*.

We expected the coefficient of GDP_{it} to be positive as bigger countries will receive more assets from German banks. We expected the coefficient of $DISTANCE_i$ to be negative because closer countries will draw more assets, and we expected countries sharing a common border to receive more investment as well. We expected the coefficients of $CORE_{it}$ and $PIIGS_i$ to be positive as we expected eurozone partner countries to receive more capital from German banks for several reasons: First, a borrower eurozone country has improved its creditworthiness by joining the eurozone, so it receives more financial flows than before (refer to Spiegel 2009a). We, however, do not know which coefficient, of $CORE_{it}$ or of

$PIIGS_i$, is greater. We expected PER_{it}, the non-euro EU country dummy variable, to have a positive coefficient. We expected the eurozone crisis dummy variable, $CRISIS_t$, to have a negative coefficient as the euro crisis may have negatively influenced cross-border financial flows. We also expected the coefficient of financial deepening, M_2/GDP_{it}, to be positive because the financially developed partner countries should receive more assets from German banks.

Banks have assets from abroad as well as domestically. We can hypothesize that if two countries adopt a common currency—i.e., the euro—then banks' cross-border investment will increase. In this paper, we analyze empirically whether the adoption of the euro has increased banks' cross-border investment. We analyze empirically which impact on financial flows is greater, that of CORE or PIIGS. We also classify bank assets into securities and loans to see whether the impact of the euro on securities is different from that on loans.

4. Data and Empirical Results

Data for 87 countries from 2002 to 2010 are used in our empirical analysis. Data for assets of banks (MFIs, monetary financial institutions) in Germany vis-à-vis nonresidents were provided by the Bundesbank. These data include total assets and long-term and short-term loans and advances to foreign partner countries. "Securities" include money market instruments, bonds and notes, and shares and participating interests.[5] Securities are calculated by subtracting long-term and short-term "loans and advances" from total assets. Asset data are originally denominated in euro and converted to US dollars because other relevant data such

as GDP are denominated in US dollars. Relevant exchange-rate data are from International Financial Statistics from the International Monetary Fund. GDP data and M_2/GDP (Money and quasimoney, M_2, as a percentage of *GDP*) are from the World Development Indicators of the World Bank. The list of countries with a common border with Germany is from the CIA World Factbook website. The date of entry into the EU and EMU is from the official website of the European Union. Sources for various data are listed in the appendix. Statistics and correlation coefficients of the variables used in the analysis are in Tables 1 and 2, respectively.

⇒ Insert Tables 1 and 2.

In Table 3, pooled ordinary least squares (OLS) and random effects models are used to test whether and how the euro influences the cross-border asset portfolios of German banks. The estimation results by a pooled OLS are listed in columns (1), (2), and (3), where the Huber–White sandwich estimator is used to estimate the standard errors.[6] The error structure is robust to heteroscedasticity and lack of normality. Columns (4), (5), and (6) list the random effects results for securities and long- and short-term loans, respectively.

According to equation (1) for securities, the estimated coefficient of GDP_{it} is 0.934 and significant at the 1% level as expected. This means that when the GDP increases by 1%, securities investment from Germany to the partner country increases by 0.934%. The estimated coefficients of *DISTANCE* and *BORDER* are −0.256 and 0.460 and insignificant, respectively. The estimated coefficient of *CORE* is 3.424 and significant at the 1% level. Core eurozone countries induce

more securities investment from German banks than non-EU countries. The estimated coefficient of *PIIGS* is 4.276 and significant at the 1% level. These PIIGS countries induce more securities investment from German banks than non-EU countries. The estimated coefficient of *PER* is 3.278 and significant at the 1% level. A non-euro EU partner country (PER) induces more securities investment from German banks than non-EU countries. The estimated coefficient of *CRISIS* is −0.967 and significant at the 1% level. This means that during 2009 and 2010, nonlending assets owned by banks in Germany from partner country decreased significantly. The estimated coefficient of financial depth, M_2/GDP, is 1.308 and significant at the 1% level. A financially deep country attracts more securities investment from German banks.

In the long-term-loan equation (2), the estimated coefficient of GDP_{it} is 0.596 and significant at the 1% level as expected. The estimated coefficients of *DISTANCE* and *BORDER* are –0.340 and 0.627, and significant at the 1% level as expected, respectively. The estimated coefficients of *CORE*, *PIIGS*, and *PER* are 1.112, 1.755, and 0.981 and significant at the 1% level, respectively. Countries from CORE, PIIGS, and PER induce more long-term loans than non-EU country. The coefficient of *CRISIS* is −0.276 and significant at the 5% level. The coefficient of M_2/GDP is 0.537 and significant at the 1% level.

In equation (3) for short-term loans, the estimated coefficients of *GDP*, *DISTANCE* and *BORDER* are 0.671, −0.351, and 0.917 and significant at the 1% level. The estimated coefficients of *CORE*, *PIIGS*, and *PER* are 1.341, 2.078, and 0.979 and significant at the 1% level, respectively. Countries from *CORE*, *PIIGS*, and *PER* induce more short-term loans than non-EU country.

In columns (4), (5), and (6) in Table 3, random effects model is used for the estimation of the securities and long- and short-term-loan equations. A Huber–White sandwich estimator is used. The estimation results are very similar to those of (1), (2), and (3) as expected, except for the estimated coefficients of *BORDER* in the long-term and short-term equations and *CORE* in the securities equation (4). Each of those coefficients lost statistical significance in the random effects model.

⇒ Insert Table 3.

In Table 3, errors in the separate equations are assumed to be uncorrelated. However, it is likely that errors from securities and long- and short-term-loan equations are correlated. In Table 4, the seemingly unrelated regression (SUR) model is used in columns (1), (2), and (3) (Zellner 1962, 1963; Zellner and Huang 1962). The random effects SUR model is employed in the estimation of columns (4), (5), and (6) to consider the correlation between equations. The estimation results in Table 4 are similar to those of Table 3. Throughout Table 4, the estimated coefficients of *CORE*, *PIIGS*, and *PER* are all positive and significant at the 1% level except those of *CORE* and *PER* for short-term loans, column (6).

After estimating the random effects SUR, columns (4)–(6) in Table 4, we tested hypotheses using the Wald test. The test results are listed in Figure 1. The coefficients of *CORE* and *PIIGS* in the securities equation are greater than those in the long-term and short-term-loan equations (⊙–☾ in Figure 1). The coefficients of *PIIGS* in securities, long-term, and short-term loans are greater than those of *CORE* (▲–▼ in Figure 1). The coefficients of *CORE* only in

securities and long-term loans are greater than those of *PER* (◇ and ◈ in Figure 1).

From the above hypothesis test, we found that the effects of *CORE*, *PIIGS*, and *PER* are greater on securities than they are on long-term and short-term loans. Securities are more influenced by the adoption of the euro and EU membership than are long-term and short-term loans. We also found that the effect of *PIIGS* on financial flows is greater than that of *CORE*, and the effect of *CORE* on financial flows, except in short-term loans, is greater than that of *PER*. After euro adoption, financial flows from Germany to Greece, Italy, Ireland, Portugal, and Spain (PIIGS) were greater than to other eurozone countries (*CORE*). This may explain the overborrowing of *PIIGS* countries before the eurozone crisis erupted. The fact that the effects of *CORE* and *PIIGS* on financial flows are greater than those of *PER* implies that the euro has an additional effect beyond the EU effect on financial flows.

⇒ Insert Table 4 & Figure 1.

In Table 5, Tobit and random effects Tobit are estimated. If the dependent variable includes zeros, some data will be missing in the estimation while taking the logarithm of those zeros. To avoid losing the zeros, the logarithm is taken after adding 1 to the dependent variable. A Tobit estimator with left-censoring at zero is estimated. The Tobit results are presented in columns (1)–(3) and random effects Tobit results are in columns (4)–(6). Throughout Table 5, the estimated coefficients of *CORE*, *PIIGS*, and *PER* are all positive and significant at the 5%

level except the coefficient of *PER* in column (6). There are 760 observations in the Tobit data. With zero data in 111, 1, 7 cases for securities, long-term loans, and short-term loans, respectively, they represent less than 1% of the data in the second two estimations.

⇒ Insert Table 5.

5. Conclusion

There have been many studies of the euro's impact on the economic integration of member countries. We used the data of German banks' asset portfolios vis-à-vis foreign countries to estimate securities and long- and short-term loans equations by OLS, random effects, SUR, random effects SUR, Tobit, and random effects Tobit. Euro membership (CORE, PIIGS) and EU membership (CORE, PIIGS, and PER) increases the financial flows compared to non-EU countries. We found that securities are more influenced by the euro's adoption and EU membership than long- and short-term loans. Furthermore, Greece, Italy, Ireland, Portugal, and Spain are more influenced than CORE eurozone countries and CORE countries tend to be more influenced in all types of financial flows than PER countries. Our results suggest that the euro has resulted in deeper integration of the banking industry, especially between Germany and Greece, Italy, Ireland, Portugal, and Spain, which had lower credit than core eurozone countries and become creditworthy by joining the euro. This may have contributed to their overborrowing before the eurozone crisis. The policy implication is that when member countries with low credit join a common

currency, they should be very careful about overborrowing from key countries in the zone. Regional banking supervision could be prepared beforehand and strengthened when banking industry becomes integrated by the adoption of a common currency.

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Appendix Data sources

- Border country dummy: *BORDER* = 1 for Austria 784 km, Belgium 167 km, Czech Republic 646 km, Denmark 68 km, France 451 km, Luxembourg 138 km, Netherlands 577 km, Poland 456 km, Switzerland 334 km. *BORDER* = 0 otherwise, CIA World Factbook: https://www.cia.gov/library/publications/the-world-factbook
- Distance: distance from Frankfurt to capital cities of partner country in kilometers: http://www.distancefromto.net/
- Exchange rate: International Financial Statistics, International Monetary Fund: http://www.imfstatistics.org/imf/about.asp
- GDP and financial deepening (M_2/GDP): World Development Indicator, World Bank: http://data.worldbank.org/data-catalog
- Membership in the EU http://ec.europa.eu/economy_finance/international/enlargement/index_en.htm
- Membership in the EMU: http://ec.europa.eu/economy_finance/euro/ index_ en.htm

Table 1 Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Euro	760	0.148684	0.356011	0	1
CORE	760	0.089474	0.285614	0	1
PIIGS	760	0.059211	0.236174	0	1
PER	760	0.117105	0.321757	0	1
BORDER	760	0.106579	0.30878	0	1
Securities	760	6.595671	16.96129	–0.00575	117.8981
Long-term loans	760	5.742649	13.27446	0	129.0623
Short-term loans	760	8.937638	35.33092	0	392.1689
Dollar/euro	760	1.262811	0.147926	0.9456	1.4708
GDP	760	655.9395	1672.817	1	14587
Per capita GDP	760	19027.88	16173.2	309	89172
DISTANCE	760	5029.603	4244.813	186	18581
M_2/*GDP*	760	84.31316	77.43702	8.400001	628.5

Table 2 Pairwise Correlation Coefficient Matrix[a,b,c]

	Log(*securities*)	Log(*long*)	Log(*short*)	*CORE*	*PIIGS*	*PER*	Log(*GDP*)	Log(*DISTANCE*)	*BORDER*
Log(*long*)	*0.7351*	*1*							
	0								
	649	*759*							
Log(*short*)	*0.7408*	*0.8481*	*1*						
	0	*0*							
	647	*752*	*753*						
CORE	*0.3235*	*0.3301*	*0.3793*	1					
	0	*0*	*0*						
	649	*759*	*753*	760					
PIIGS	*0.3207*	*0.3061*	*0.323*	−0.0786	1				
	0	*0*	*0*	0.0302					
	649	*759*	*753*	760	760				
PER	*0.1967*	*0.1784*	*0.1445*	−0.1142	−0.0914	1			
	0	*0*	*0.0001*	0.0016	0.0117				
	649	*759*	*753*	760	760	760			
Log(*GDP*)	*0.3883*	*0.5253*	*0.5139*	0.0081	0.1526	−0.0395	1		
	0	*0*	*0*	0.8225	0	0.2762			
	649	*759*	*753*	760	760	760	760		
Log(*DISTANCE*)	*−0.3993*	*−0.4609*	*−0.4674*	−0.4949	−0.1792	−0.3829	−0.0028	1	
	0	*0*	*0*	0	0	0	0.9391		
	649	*759*	*753*	760	760	760	760	760	
BORDER	*0.346*	*0.4118*	*0.4475*	0.564	−0.0866	0.1792	0.1223	−0.6237	*1*
	0	*0*	*0*	0	0.0169	0	0.0007	0	
	649	*759*	*753*	760	760	760	760	760	*760*
Log(M_2/*GDP*)	*0.446*	*0.4527*	*0.5601*	0.4018	0.2389	−0.0067	0.1993	−0.3219	*0.332*
	0	*0*	*0*	0	0	0.8538	0	0	*0*
	649	*759*	*753*	760	760	760	760	760	*760*

Note: a. Numbers in the first row in each division are the correlation coefficient; b. Numbers in the second row represent the significance level for each entry; c. Numbers in the third row are the numbers of observations for each entry.

Table 3 German Bank Assets: Benchmark Pooled OLS Regressions[a, b]

	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled OLS			Random Effects		
Variable	Log(*Securities*)	Log(*Long*)	Log(*Short*)	Log(*Securities*)	Log(*Long*)	Log(*Short*)
Log(*GDP*)	0.934***	0.596***	0.671***	1.631***	0.526***	1.120***
	(0.087)	(0.050)	(0.051)	(0.260)	(0.123)	(0.144)
Log(*DISTANCE*)	−0.256	−0.340***	−0.351***	−1.249**	−0.357**	−0.648***
	(0.172)	(0.069)	(0.082)	(0.580)	(0.162)	(0.199)
BORDER	0.460	0.627***	0.917***	0.613	0.389	0.122
	(0.342)	(0.187)	(0.243)	(1.539)	(0.505)	(0.648)
CORE	3.424***	1.112***	1.341***	1.829	0.973***	1.217***
	(0.438)	(0.196)	(0.196)	(1.128)	(0.138)	(0.314)
PIIGS	4.276***	1.755***	2.078***	3.694***	1.386***	1.273**
	(0.386)	(0.162)	(0.214)	(1.024)	(0.366)	(0.540)
PER	3.278***	0.981***	0.979***	0.565***	0.610***	0.564***
	(0.346)	(0.156)	(0.196)	(0.159)	(0.113)	(0.162)
CRISIS	−0.967***	−0.276**	−0.315**	−0.381***	−0.359***	−0.360***
	(0.329)	(0.140)	(0.133)	(0.122)	(0.094)	(0.094)
Log(M_2/*GDP*)	1.308***	0.537***	1.081***	0.970***	1.042***	1.021***
	(0.218)	(0.105)	(0.103)	(0.354)	(0.228)	(0.255)
Constant	−10.675***	−2.699***	−6.141***	−5.702	−4.199***	−5.656***
	(1.565)	(0.748)	(0.764)	(4.882)	(1.565)	(1.745)
Obs.	649	759	753	649	759	753
R^2	0.508	0.576	0.644	0.444	0.553	0.607
No. of countries				87	87	87

Note: a. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; b. Huber–White sandwich estimator is used.

Table 4 German Bank Assets: Seemingly Unrelated Regression[a,b]

	(1)	(2)	(3)	(4)	(5)	(6)
	SUR			Random Effects SUR		
Variables	Log(*Securities*)	Log(*Long*)	Log(*Short*)	Log(*Securities*)	Log(*Long*)	Log(*Short*)
Log(*GDP*)	0.934***	0.519***	0.609***	1.307***	0.353***	0.528***
	(0.074)	(0.030)	(0.037)	(0.014)	(0.019)	(0.031)
Log(*DISTANCE*)	−0.256	−0.406***	−0.379***	−1.065***	0.321***	−1.058***
	(0.160)	(0.066)	(0.079)	(0.016)	(0.021)	(0.036)
BORDER	0.459	0.522**	0.834***	1.372***	4.349***	0.189
	(0.498)	(0.205)	(0.247)	(0.091)	(0.119)	(0.201)
CORE	3.424***	0.698***	0.999***	3.187***	2.552***	0.016
	(0.531)	(0.219)	(0.263)	(0.079)	(0.105)	(0.192)
PIIGS	4.276***	1.417***	1.794***	5.019***	3.953***	1.374***
	(0.522)	(0.215)	(0.259)	(0.080)	(0.105)	(0.194)
PER	3.278***	0.574***	0.725***	2.230***	0.701***	0.061
	(0.401)	(0.165)	(0.199)	(0.053)	(0.070)	(0.128)
CRISIS	−0.970***	−0.221*	−0.389***	−1.222***	−0.225***	1.239***
	(0.275)	(0.113)	(0.136)	(0.028)	(0.039)	(0.076)
Log(M_2/*GDP*)	1.308***	0.566***	1.216***	−0.091***	−1.177***	1.272***
	(0.201)	(0.083)	(0.100)	(0.030)	(0.039)	(0.067)
Constant	−10.674***	−1.562**	−5.905***			
	(1.517)	(0.624)	(0.752)			
Obs.	647	647	647	647	647	647
R^2	0.506	0.585	0.642			
No. of countries				87	87	87

Note: a. *** p < 0.01, ** p < 0.05, * p < 0; b. Seemingly unrelated regression models (Zellner 1962, 1963; Zellner and Huang 1962) are used.

Table 5 German Bank Assets: TOBIT[a]

	(1)	(2)	(3)	(4)	(5)	(6)
	TOBIT[b]			Random Effects TOBIT		
Variables	Log(*Securities*+1)	Log(*Long*+1)	Log(*Short*+1)	Log(*Securities*+1)	Log(*Long*+1)	Log(*Short*+1)
Log(*GDP*)	0.312***	0.306***	0.303***	0.335***	0.315***	0.466***
	(0.030)	(0.029)	(0.030)	(0.039)	(0.036)	(0.043)
Log(*DISTANCE*)	−0.103***	−0.189***	−0.214***	−0.239***	−0.205**	−0.322***
	(0.033)	(0.033)	(0.041)	(0.086)	(0.090)	(0.106)
BORDER	0.531***	0.674***	0.734***	0.612**	0.460	0.623
	(0.125)	(0.136)	(0.192)	(0.310)	(0.323)	(0.382)
CORE	1.499***	0.555***	0.607***	0.819***	0.491***	0.277***
	(0.122)	(0.110)	(0.129)	(0.103)	(0.086)	(0.092)
PIIGS	2.568***	1.238***	1.219***	2.220***	0.949***	0.911**
	(0.119)	(0.096)	(0.169)	(0.325)	(0.339)	(0.401)
PER	0.954***	0.416***	0.298**	0.225***	0.216***	0.019
	(0.094)	(0.101)	(0.136)	(0.063)	(0.053)	(0.056)
CRISIS	−0.091	0.008	−0.160**	−0.055*	−0.049**	−0.166***
	(0.064)	(0.066)	(0.074)	(0.029)	(0.024)	(0.026)
Log(M_2/*GDP*)	0.499***	0.310***	0.592***	0.505***	0.616***	0.528***
	(0.048)	(0.049)	(0.058)	(0.069)	(0.060)	(0.063)
Constant	−2.488***	−0.390	−1.555***	−1.339*	−1.506*	−1.153
	(0.354)	(0.344)	(0.357)	(0.768)	(0.785)	(0.919)
Obs.	760	760	760	760	760	760
No. of countries				87	87	87

Note: a. *** p < 0.01, ** p < 0.05, * p < 0; b. A Huber–White sandwich estimator is used.

Figure 1 Hypothesis Test from Random Effects SUR

⊙ Ho: $\beta_4(CORE)|_{\log(securities)} = \beta_4(CORE)|_{\log(long)}$

$\chi^2(1) = 56.97$, Prob > χ^2 = 0.0000

⬣ Ho: $\beta_4(CORE)|_{\log(securities)} = \beta_4(CORE)|_{\log(Short)}$

$\chi^2(1) = 305.65$, Prob> χ^2 = 0.0000

⬣ Ho: $\beta_5(PIIGS)|_{\log(securities)} = \beta_5(PIIGS)|_{\log(long)}$

$\chi^2(1) = 163.81$, Prob > χ^2 = 0.0000

☾ Ho: $\beta_5(PIIGS)|_{\log(securities)} = \beta_5(PIIGS)|_{\log(short)}$

$\chi^2(1) = 411.28$, Prob > χ^2 = 0.0000

▲ Ho: $\beta_5(CORE)|_{\log(securities)} = \beta_5(PIIGS)|_{\log(securities)}$

$\chi^2(1) = 330.91$, Prob > χ^2 = 0.0000

▶ Ho: $\beta_4(CORE)|_{\log(long)} = \beta_5(PIIGS)|_{\log(long)}$

$\chi^2(1) = 110.77$, Prob > χ^2 = 0.0000

▼ Ho: $\beta_4(CORE)|_{\log(short)} = \beta_5(PIIGS)|_{\log(short)}$

$\chi^2(1) = 30.55$, Prob > χ^2 = 0.0000

◇ Ho: $\beta_5(CORE)|_{\log(securities)} = \beta_6(PER)|_{\log(securities)}$

$\chi^2(1) = 163.38$, Prob > χ^2 = 0.0000

◈ Ho: $\beta_4(CORE)|_{\log(long)} = \beta_6(PER)|_{\log(long)}$

$\chi^2(1) = 347.38$, Prob > χ^2 = 0.0000

◆ Ho: $\beta_4(CORE)|_{\log(short)} = \beta_6(PER)|_{\log(short)}$

$\chi^2(1) = 0.06$, Prob > χ^2 = 0.8075

Notes

[1] Borrowers in euro zone become more creditworthy to foreign lenders (borrower effect) and creditors in euro zone may increase the attractiveness of a nation's commercial banks as intermediaries, perhaps through increased scale economies or through an improved regulatory environment after the advent of monetary union (creditor effect) (refer to Spiegel 2009a).

[2] The detailed data was obtained from Statistics Department at the Bundesbank.

[3] Similar gravity equations for the estimation of cross-border portfolios and FDI are used in Portes and Rey (2005) and Wei and Choi (2004).

[4] Core country here is defined to be eurozone countries except Greece, Italy, Ireland, Portugal, and Spain ($PIIGS_i$).

[5] Refer to the classification of asset data in (Bundesbank, 2013, p. 24).

[6] Huber (1967) and White (1982).