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Abstract

In countries with highly-developed financial systems bank portfolios have high exposure, directly or indirectly, to the real estate sector. Changes in the value of real estate can have a potentially significant impact on the default risk of banks and on their profitability as a result of high exposure to the real estate sector. This is especially critical during real estate crises, when bank losses tend to increase dramatically and for all banks, placing the entire financial system at the risk of collapse, as it was the case of the recent international subprime crisis. This article studies the sensitivity of bank stock returns to real estate market conditions in 15 European countries. The results indicate that there is a positive relation between bank stock returns and real estate returns after controlling for general market conditions and interest rates. In particular, stock returns are more sensitive to real estate market conditions, in the case of smaller banks, banks with greater asset exposure to the real estate sector and banks from countries with less conservative mortgage credit systems.

JEL classification: G21; G12

Keywords: Real Estate; Banks; Asset Pricing; Mortgage Lending.

1. Introduction

In countries with highly-developed financial systems bank portfolios have high exposure, directly or indirectly, to the real estate sector. He *et al.* (1996), Lausberg (2004) and Lu e So (2005), indicate the existence of a high concentration of activity and assets in the real estate sector by banks in the US, in Germany and in some Asian countries.

This way, in spite of all bank loans being vulnerable to general market conditions, the default risk on loans is influenced by an additional factor: bank real estate loans are affected by movements in the real estate market which are only indirectly related to the general economic conditions. Given that the financing of the real estate industry constitutes a significant part of banks loan portfolios, it is likely that real estate market conditions affect their stock prices. If the market value of banks is systematically influenced by the real estate market, the valuation models of bank stocks should include factors which reflect the conditions in the real estate market.

The inclusion of real estate market conditions as a risk factor has not been thoroughly considered in the literature. Studies looking the behavior of bank stock returns focus on market risk and interest rate changes (see for example, Viale *et al.* 2009). The Asian financial crisis and, more recently, the subprime crisis highlighted the importance of the real estate risk. Herring and Wachter (1999) and Lu and So (2005) state that, prior to these crises, there was a tendency for over-investment in the real estate sector due to the high returns associated with this type of investment, potentially driving the occurrence of speculative bubbles in real estate prices in the vast majority of these markets. Furthermore, the increase in real estate prices tends also to bring about an increase in the value of collaterals, resulting in a perceived lower risk by the lender. For these reasons, the increase in real estate prices tends to produce increasing bank credit granting, which in turn, leads to new further rises in real estate prices.

A drop in real estate prices brings about a reduction in bank equity, as a consequence of the reduction in the value of the real estate asset portfolios held by banks, and by the corresponding reduction of collaterals. Also, the drop in real estate prices tends to result in greater awareness by banks of the perceived risks of real estate loans. For these reasons, it is very likely that a significant decrease in bank credit granting will occur when real estate market conditions deteriorate. Added to this, supervisors and regulators react to the scenario of reduced bank equity with additional requirements of solvability and more stringent rules for the risk evaluation and provisioning for bad loans of real estate assets. These measures result in a further reduction in the bank credit magnifying the downfall movement in real estate prices. This seems to be the mechanism of transmission between real estate market conditions and bank stock risk and returns.

In this article, we study the sensitivity of bank stock returns with regards to real estate returns in 15 European countries (EU-15). In particular, we look at the relationship between the banking industry market returns and the returns of real estate companies, for each of the EU-15 countries, in order to assess the reasonableness of the hypothesis of a priced risk factor in real estate returns of European bank stocks. Later, we analyze whether real estate risk exposures of the EU-15 listed bank, in particular, are determined by size and relative asset exposure to the real estate market. Finally, we analyze whether institutional characteristics (such as mortgage credit systems, rental markets and fiscal systems) influence the sensitivity of bank returns to real estate conditions. In our analysis we use a three-factor risk model and an extended Fama-French model (1992, 1993).

The results of our research indicate that the stocks of the EU-15 banks are sensitive to the changes in real estate returns: we find a positive relation between bank stock returns and real estate returns, even after controlling for general market conditions and interest rates changes. Stocks of small banks and banks with greater balance-sheet exposure to the

real estate market, as well a bank stocks from countries with less conservative mortgage credit system, showed to be more sensitive to changes in real estate returns.

The remainder of the article is organized as follows. In section 2 we present a review of the previous literature and main previous findings. Section 3 presents the methodology and describes the sample. Section 4 presents and discusses the empirical results. The conclusions appear in section 5.

2. Real Estate Market Risk

Studies looking at the importance of real estate market conditions on bank stock returns are fairly recent and almost exclusively look at the US market. The vast majority of studies that look into common risk factors in bank stock returns uses a two-factor risk model, whereas bank stock returns are influenced by general market conditions and by movements in interest rates (see, for example, Flannery and James, 1984 and Viale *et al.* 2009). These authors find a significant negative relation between the change in interest rates and bank stock returns, conditional on the balance-sheet exposure to interest rate risk.

Allen *et al.* (1995) argue that the value of banks react significantly to real estate market conditions when: (1) banks have a significant exposure to the real estate sector; and (2) the exposure is significantly influenced by changes in the conditions of the real estate sector. The first condition can be easily verified through analysis of the annual reports of banks. The second condition, concerning the systematic influence of the real estate conditions on bank valuations, as a function of bank asset exposure, is analyzed below.

2.1. Real Estate Market and Bank Values

Although mortgage loans are exposed to interest rate risk, they are also exposed to default risk. As previously stated, the default risk is at least in part a function of changes in the value of the underlying property. When real estate prices fall, there is an increased probability of default due to the resulting decrease in value of loans with collateral. Thus, given that the value of the collateral has an impact on the value of loans and mortgages, the potential loss to a bank as a result of a default is inversely related to the value of the collateral.

While real estate and overall stock market indices are positively correlated[1], the two markets do not always behave in tandem. Thus the impact of changes in real estate market conditions in bank stock returns is thus not completely captured by the overall stock market index returns.

Based on the arguments above, bank stocks returns are positively related to changes in real estate market returns. Moreover, the importance of the relationship between the stock market value of a particular bank and real estate market conditions should be a function of the bank's exposure to real estate assets.

In addition, there is a relationship between the bank size and the risk exposure to real estate market conditions, due to the relevant issue of moral hazard or of "too big to fail." Mei and Lee (1994) and Mei and Saunders (1995) report, that in the US, small bank stocks show a greater sensitivity to real estate sector market conditions. In part, this could be due to the fact that investors attribute a lower probability of default to large banks, due to systemic risk. This is the case when a bank is sufficiently large that its failure may spread to the overall banking system. Large banks may thus be perceived as safer because, they

[1] Mei and Lee (1994) and Mei and Saunders (1995), for the US, and Lu and So (2005), for seven Asian countries, find that real estate market returns are highly correlated with overall stock market returns.

will never fail in isolation and, as such, will always be bailed out by governments (see O'Hara and Shaw, 1990). On the other hand, this may be due to the fact that small banks have less sophisticated risk-analysis tools[2] and less ability to diversify risk. Thus, *ceteris paribus*, for different levels of real estate holdings, larger banks should show a lower sensitivity to the conditions in the real estate market.

2.2. Previous Empirical Findings

Table 1 shows a summary of the main studies looking at the relationship between the market capitalization of banks and the real estate market. The majority of these studies were done for the US market and all of them use multi-factor models. The variables used and the time periods considered vary substantially. This gives greater robustness to the evidence found, which underlines the importance of a real estate risk factor in bank stock returns.

INSERT TABLE 1

The studies included in Table 1 are for the US market and the Asian markets during periods of real estate market crises, and where these had a significant effect on the profitability of the banking industry and consequently on the assessment of the values of banks by investors.

In addition, Lu and So (2005) present a set of additional studies which show the existence of a significant relationship between the real estate market conditions and the

[2] Herring and Wachter (1999) mention that one of the reasons that could lead banks to underestimate default risk originating from real estate loans is the unavailability or low quality of real estate prices time series.

market capitalization of banks. Peek and Rosengren (1994) state that large bank equity losses are the result of exposure to high-risk mortgage loans. Peek and Rosengren (1996) further show that banks with reduced equity ratios tend to reduce real estate credit grants in a substantial manner after regulatory measures are introduced. Ghosh *et al.* (1997) show also that the stock prices of financial institutions react negatively to announcement of adverse news concerning the real estate industry.

Hancock and Wilcox (1993, 1994 and 1997) carried out a set of studies on the interaction between loan grants and real estate market activity. They show that the flow of bank loans in the US in 1990 declined primarily due to problems related to the real estate industry and suggest that the reduction of bank equity had a significant effect on the residential and commercial real estate market. Blasko and Sinkey (2006) investigate real-estate lending, asset structure and risk-taking of all insured commercial banks on the period 1989-1996, in the US. They focus primarily on banks specializing in real-estate lending (REBs), defined as commercial banks holding more than 40% of their total assets in loans secured by real estate. All other commercial banks in the economy provide a benchmark used to compare and contrast the behavior of REBs. The results show that REBs are more profitable and riskier than non-REBs. Davis and Zhu (2009) analyzed a sample of 904 banks worldwide over the period 1989-2002. Their results suggest that commercial property prices have a marked impact on the behavior and performance of individual banks. Moreover, there is evidence that the magnitude of this impact is related to the size of the bank, the direction of commercial property price movements, and regional factors.

3. Methodology and Sample

3.1. Methodology

The literature reviewed above shows the existence of a close relationship between the valuation of banks and banking activity and the real estate industry, in the U.S. and in Asia. However, no direct analysis was conducted in order to test the sensitivity of bank returns with respect to the real estate conditions in European countries.

To carry out the analysis of the relation between bank stock returns and the real estate market conditions, we use two models: a three-factor risk model (market risk, interest rate risk and real estate market risk) and an extended Fama-French model with a real estate market risk factor.

The three-factor model used for each of the EU-15 markets is the following:

$$R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + e_{jt} \qquad (1)$$

where $R_{jt,}$ is the banking industry stock market return in country j in period t; R_{mjt} is the general stock market return in country j in period t; I_{jt} are the interest rate changes in country j in period t and R_{Rjt} is the real estate industry stock market return in country j for period t. β_{mj}, β_{Ij} and β_{Rj} are the coefficients to estimate. These coefficients measure bank stock returns sensitivities relative to the general stock market returns, interest rate movements and the real estate market returns. β_{0j} is the independent term and e_{jt} is the error term. This three-factor model is the natural extension of the two-factor asset pricing model used in earlier studies (for example, Flannery and James, 1984 and Viale *et al.*, 2009) to analyze the effects of interest rates and market returns on bank stock returns.

To test the hypothesis of the importance of a real estate market risk factor on bank returns, we also use an extended Fama – French return generating model:

$$R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + \beta_{vj}HML_{jt} + \beta_{sj}SMB_{jt} + e_{jt} \qquad (2)$$

where HML_{jt} and SMB_{jt} are added to equation (1) and measure, respectively, the excess historical returns of value stocks vis a vis growth stocks, and the excess returns of stocks with small capitalization stocks vis a vis large capitalization stocks. The obtained *HML* (high minus low book to market) and *SMB* (small minus big) returns for the EU-15 countries were constructed using MSCI[3] indices, in the following manner:

SMB = ("Small Cap Value" + "Small Cap Growth")/2 – ("Large Cap Value" + "Large Cap Growth")/2;

HML = ("Large Cap Value" + "Small Cap Value")/2 – ("Large Cap Growth" + "Small Cap Growth")/2.

The estimation procedure is the Generalized Method of Moments (GMM)[4], so that the *t* statistics for the estimated regressions are corrected for heterokedasticity and autocorrelation.

Given the internationalization of business activities and the integration of the banking industry at a regional and international level, we also compute sensitivities of bank stock returns using real estate regional stock market indices.

Finally, in order to test a change in the sensitivities of bank stock returns to market risk, interest rates and the movements in real estate market, due to the emergence of the subprime crisis, a variable dummy D_t is incorporated into equation (1), with a value of 1, for the period from 18 June 2007 (daily data) or June 2007 (monthly data) to the end of 2008[5], as follows:

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[3] Source: Thomson Reuters DATASTREAM.

[4] Mei and Lee (1994) and Mei and Saunders (1995) also use GMM to estimate the sensitivities of U.S. bank stocks.

[5] June, 18 2007 corresponds to the bankruptcy announcement of Bear Stearns. This date is widely accepted as the "official" start of the subprime crisis. See, for example, Crouhy *et al.* (2008).

$$R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + \beta_{1j}D_t + \beta_{2j}D_t{*}Rm_{jt} + \beta_{3j}D_t{*}I_{jt} +$$

$$+ \beta_{4j}D_t{*}R_{Rjt} + e_{jt} \qquad (3)$$

The magnitude of sensitivities of bank stock returns to common risk factors appears to be dependent on the specific characteristics of banks. For example, Jahankhani and Lynge (1980) argue that bank stock betas are related to dividend payout ratios, the variability of deposits and to the ratio between loans and deposits. Flannery and James (1984) show that the sensitivity to interest rates appears to be related to the mismatch of asset durations against liabilities.

Given that the empirical evidence points to the existence of the sensitivity of bank returns to the movements in the real estate market, we study the relationship between the specific characteristics of banks and the real estate market risk coefficients obtained in the three-factor and the extended Fama-French models. To this end, we test the hypothesis that the sensitivities to real estate market risk are related to bank size and bank asset exposure to the real estate market.

To evaluate this, we looked at: (1) real estate market sensitivities for different quintiles of bank size and bank asset exposure; and (2) we use cross-sectional regressions of real estate market sensitivities of bank stock returns. The simple and multiple cross-sectional regression specifications are as follows:

$$\widehat{\beta_{R1}} = \alpha_0 + \alpha_1 VR_i + \varepsilon_i \qquad (4)$$

$$\widehat{\beta_{R1}} = \alpha_0 + \alpha_1 VRD_i + \alpha_2 VRE_i + \varepsilon_i \qquad (5)$$

where, $\widehat{\beta_{R1}}$ are the estimated betas obtained from estimating (1) and (2) above for bank *i* and VR_i is a proxy variable for size (VRD_i) or the asset exposure to the real estate market

(VRE_j). a_1 and a_2 are the coefficients to estimate. a_0 is the independent term and ε_i is the error term.

Martins *et al.* (2011) develop an analysis of clusters which reveals significant differences in terms of institutional characteristics across the EU-15 countries[6]. Five clusters emerge. The cluster formed by Spain, Ireland and the United Kingdom, with a less conservative mortgage credit system, a sparse rental market and a generous fiscal system. On the other extreme, a second cluster characterized by conservative mortgage credit system, a large rental market and a less generous fiscal system is formed by Germany and Austria. To control for statistically significant differences in behavior between banks in countries belonging to different clusters, we estimated the equation (5) for the five clusters of European countries obtained by Martins *et al.* (2011).

3.2. Sample

3.2.1. Three-Factor Model and the Fama-French Extended Model

We use daily and monthly industry index returns for the different time periods. Three time frames are used in the estimates of the two models: (1) Total Period – this time frame differs from country to country, by virtue of the depth of the time series. The estimates are conducted for a period from an indicated start date for each of the EU-15 countries to 2008:12; (2) for a sub-period between 2002 and 2006 (five-year time frame); and (3) for a sub-period between 1997 and 2006 (ten-year time frame).

[6] Maclennan *et al.* (1998), Tsatsaronis and Zhu (2004), Green and Wachter (2005) and Calza *et al.*, (2007), among others, showed that housing finance differs markedly across the world along several dimensions. Differences exist in funding, the range of mortgage products and markets, government support, home ownership rates, and legislation.

The proxies used to estimate the three-factor model and the Fama-French extended model are the variables proposed in previous studies (afore mentioned, in Table 1) depending on its availability for the European markets.

With respect to the dependent variable, banking industry stock return indices are used for each country[7].

With respect to the real estate market risk proxy, we use real estate companies' indices[8]. This option follows Lu and So (2005). The absence of REITs indices for the majority of European countries contributed much to our choice of proxy. Only Germany, Belgium, France, Holland and the United Kingdom have available long series of REITs returns. Notwithstanding the lack of consensus that REITs returns constitute the perfect measure of real estate market fundamentals[9], these indices have been used in the studies carried out for the US market (see Table 1). In this regard, Allen *et al.* (1995) mention that the use of REITs indices are justified because they are based on market transactions in opposition to real estate market return measures based on valuations made by surveyors. According to the authors, the latter do not constitute a perfect measure of real estate market activity due to the price smoothing problems (see also in this respect, Geltner, 1991 and Geltner and Ling, 2006). Given that the industry stock market index for real estate companies, like the REITs indices, are based on market transactions, it is expected to constitute an unbiased measure of real estate market fundamentals[10].

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[7] Source: Thomson Reuters DATASTREAM – "*Total Return Index – Banks*."

[8] Source: Thomson Reuters DATASTREAM – "*Total Return Index – Real Estate*." For Ireland and Luxembourg the real estate market *proxy* refers, respectively, to the UK and BENELUX.

[9] For a throughout discussion, see Allen *et al.* (1995).

[10] Lu e So (2005) refer two potential problems of using real estate companies market returns as a proxy for the real estate market conditions: not only there is little consensus across countries regarding the definition of

To assess the robustness of the obtained results, the analysis is repeated using REITs returns as proxy for the real estate market returns for the countries for which there are long series of REITs returns[11].

We use unexpected yield changes on 10-year government bonds, as the proxy for the interest rate risk factor[12], given the conclusions obtained by He *et al.* (1996). To compute unexpected changes in government bond yields we follow Flannery and James (1984). The yield changes are calculated using the following procedure:

$$\Delta\% \, yield_t = (yield_t - yield_{t-1}) / yield_{t-1} \qquad (6)$$

To estimate the unexpected government bond interest rates, the following *AR(p)* model is used[13].

$$\Delta\% \, yield_t = \varphi_0 + \sum_{k=1,\ldots,p} \varphi_k \, \Delta\% \, yield_{t-k} + w_t \qquad (7)$$

The error term of equation (7), w_t, represents the unexpected change of bond interest rate yields.

The stock market indices for each EU-15 country are used as benchmark for overall market returns[14].

3.2.2. Banks Characteristics and Real Estate Market Sensitivities

a Real Estate company but also it could be the case that these companies are not representative of the underlying real estate market.

[11] Source: Thomson Reuters DATASTREAM – "*Total Return Index – REITs*."

[12] Source: Thomson Reuters DATASTREAM – "*Bond Yield Governement 10 Years*."

[13] The number of lags is given by a likelihood ratio test.

[14] Source: Thomson Reuters DATASTREAM – "*Total Return Index – Market*".

We use a sample of 202 EU-15 listed banks over the period between 2002 and 2008[15]. The choice of the period is due to two factors: (1) some of the data with respect to the specific characteristics of banks (namely assets and loans) were not available prior to 2002; and (2) the number of listed banks prior to 2002 was very low.

We use three proxies for size: two accounting variables, total assets and total loans, and one market variable, market capitalization. These three proxies were obtained from BANKSCOPE (specifically, *"Total Assets"; "Total Loans – Net"*; and *"Current Market Capitalization"*).

To measure bank asset exposure to the real estate market, we use the following proxies: Real Estate Holdings/Equity; Real Estate Holdings/Assets; Real Estate Loans/Equity and Real Estate Loans/Assets, based on Allen *et al.* (1995). Bank's real estate holdings are obtained in the annual reports of each bank, due to the explicit absence of this information in BANKSCOPE for most European banks. The procedure adopted for the data collection of relative bank asset exposure to the real estate market was the following: (1) we obtained the list of EU-15 listed banks in BANKSCOPE; (2) the annual reports 2002-2008 of the banks were consulted at their internet site. European listed banks disclose financial information through segments (IAS 14 – "Segment Reporting" and later IFRS 8 – "Operational Segment")[16]. Based on the procedure followed by Allen *et al.* (1995), the value

[15] Our sample includes more banks than those used in DATASTREAM banking industry indices. We include all listed banks with available information in the period between 2002 and 2008. Data source for accounting data is BANKSCOPE.

[16] Operational Segment includes the breakdown by business segments ("*Primary Segment Reporting: By Business Segment*") and geographical segments ("*Secondary Segment Reporting: By Geographical Segment").*

of total asset exposure to real estate for each bank is the sum of mortgage loans[17] *("Real Estate Loans"*) and direct investments in real estate assets[18]. The variables Equity and Assets correspond to the book value of Equity and Total Net Assets, respectively[19].

4. Results

4.1. Descriptive statistics

Table 2 presents the summary of the descriptive statistics for the returns of the banking and real estate companies' indices for each the 15 European countries analyzed.

INSERT TABLE 2

Panel A of Table 2 presents the average, the median and the variance of industry index stock returns for banks and real estate companies.

Panel B of Table 2 shows that the banking industry market returns are positively and significantly correlated to the real estate companies returns. This evidence is consistent with the argument that banks are exposed to real estate market risk. There is also a strong and significant correlation between overall market returns and either banking or real estate

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[17] This is the sum of *Credit Granted to Construction* and *Real Estate* and *Residential Mortgage Loans*. Source: BANKSCOPE and individual financial reports ("*Loans and Advance to Customers*" - *Construction*", "*Property Companies*" and "*Personal: Residential Mortgage Loans*").

[18] This is the sum of *Real Estate Assets for Trade* and *Investment* and *Properties* owned by banks. Source: BANKSCOPE and individual financial reports ("*Financial Assets Designated at Fair Value*" including "*Mortgage Backed Securities*"; "*Investment Property*" and "*Tangible Fixed Assets - Property and Equipment*").

[19] Source: BANKSCOPE: *"Total Assets"* and *"Total Equity"*.

industry returns. Panel C of Table 2 presents the values of market capitalization and the number of companies which constitute DATASTREAM's banking industry and real estate indices. The United Kingdom, Belgium and Spain show a higher average market capitalization, which is not surprising when you consider that some of the main European and international banks are included in these indices.

The cross-sectional analysis below is conducted for a larger number of banks than those included in Thompson DATASTREAM banking industry index (92 banks in DATASTREAM versus 202 listed banks). Panel A of Table 3 shows the breakdown of the sample of 202 banks by countries. Denmark, France and Italy are the countries with the largest number of listed banks analyzed. The listed banks of these three countries represent over 50% of the total sample.

INSERT TABLE 3

With respect to the average size of listed banks per country, United Kingdom and Belgium have higher bank assets, loans and market capitalization[20]. ECB (2008) refers a coefficient concentration of 84% for the five main Belgium banks, most of which are listed. On the contrary, banks in Denmark, Finland and Luxemburg, are smaller. With respect to the average asset bank exposure of European banks to the real estate market, the highest exposures refer to Ireland, Spain, UK and Sweden.

Panel B of Table 3 shows the correlation matrix between measures associated with size and the relative exposure to the real estate sector. Size and relative asset exposure to

[20] Average assets, loans and market capitalization for the period 2002-2008. Data source is BANKSCOPE.

the real estate sector are highly correlated, suggesting that large banks are more exposed to the real estate market.

Finally, in Panel C of Table 3, a comparative analysis is done between the 202 listed banks and the universe of banks in the EU-15 countries analyzed, in terms of number, average size and relative exposure to the real estate market. Whilst there is no substantial difference between listed banks and the universe of banks with respect to relative exposure to the real estate market, the average listed bank is, as expected, substantially larger.

4.2. Sensitivities of Bank Returns to the Real Estate Market

Tables 4 and 5 show the estimates of the three-factor model as defined by equation (1). The estimated regressions for the different time periods aim to test the robustness of the results over different periods of time. We exclude 2007 and 2008. These are the years of the outbreak and the large impact of the subprime crisis.

INSERT TABLES 4 and 5

In these regressions, the dependent variables are banking industry returns. Tables 4 and 5 show that: 1) banking returns are positively and significantly related to the returns of real estate companies in most EU-15 countries; 2) the three-factor model seems to capture in a reasonable manner the relationship between bank returns and the risk factors considered, since that the average contribution of omitted variables of the model seems small and economically insignificant; 3) the more significant effects come from the market itself, as indicated by the significantly high coefficients associated to this factor; 4) the effects of interest rates do not appear to be significant in determining banking stock returns

for the majority of EU-15 countries. Lu and So (2005) found similar results in their study of the Asian market. According to these authors, equation (1) may suffer from multicolinearity problems. As such the effects of interest rates may be subsumed by the returns of real estate companies[21].

These conclusions are supported by the extended Fama-French model results shown in table 6. Again, with the exception of Austria, Belgium and Spain, the significance, signs and magnitude of the real estate returns coefficient indicate that EU-15 listed banks are exposed to the movements in the real estate market.

INSERT TABLE 6

To evaluate whether the addition of a real estate market risk factor to the two-factor model and the Fama and French model increases the explanatory power of models, we compare the new *R*-squares (and *F*-values) with those from the previous models[22]. We

[21] Given that interest rate changes and real estate assets are positively highly correlated, we run the regression including either interest rate changes or real estate companies' returns. The two variables are significant and estimates are similar. To overcome multicolinearity we also run regressions using orthogonalized real estate returns. Results are similar and are available upon request.

[22] He *et al.* (1996) also use the *F*-test to evaluate whether the additional real estate return index is relevant in explaining the variation of bank stock returns, in the USA. For this purpose the two-factor model and the Fama and French model are estimated without the incorporation of real estate factor to obtain the resulting *R*-squares. Subsequently the following *F*-statistics are calculated:

$$\left[\frac{R_Q^2 - R_K^2}{1 - R_Q^2}\right]\left[\frac{n-Q}{Q-K}\right] \sim F(Q-K; n-Q),$$

where: R^2 is the coefficient of determination; n is the number of observations; K and Q are the number of explanatory variables plus a constant term, and Q > K.

use an *F*-test for the Total Period, for both models and by country. Results are available upon request. The results provide strong support that real estate returns have a significant impact on bank stock returns, which can be differentiated from the market and the interest rate effects.

To test the robustness of the results above, the analysis is repeated using the REITs returns as proxy for the real estate market returns. These results appear in Table 7 and do not reveal any significant changes to the sensitivity of bank stock returns to the real estate market.

INSERT TABLE 7

Table 8 shows the influence of the subprime crisis on possible changes in the sensitivities of banking returns to overall market risk, market interest rates unexpected changes and the movements in the real estate market. The results show an increasing influence of the real estate market movements (given by β_4), in particular, on the returns of Irish, Spanish and British banking industry after the subprime crisis. This suggests that banks in these countries have become more sensitive to the movements in the real estate industry after the subprime crisis. This evidence is consistent with the findings obtained by Ghosh *et al.* (1997). The authors report that because the market has incomplete information about the true value of real estate assets, significantly negative reactions follow to adverse real estate news. They also show that price reaction of an individual bank is significantly associated with the level of its real estate exposure. For the other remaining European countries in sample, it is not clear that there is an increase in the sensitivity of banking returns to real estate market conditions after the subprime crisis.

INSERT TABLE 8

Given the internationalization process of business activities by banks and the integration of the banking industry at a regional level, we also assess the impact of domestic, regional and international real estate activities on banking industry returns. Table 9 shows the listed banks in EU-15 that have a significant exposure to non-domestic, regional or international, real estate markets. 23 banks in 11 countries included in our sample had at least 40% of their real estate assets portfolio in non-domestic assets.

INSERT TABLE 9

To account for the fact that, in many cases, the risks associated with banks' portfolio of real estate assets are non-domestic, we run regressions of equations (1) and (2) for 11 countries of the EU-15, now considering a regional index as the proxy associated to the real estate market. The new estimates for the two models are presented in Tables 10, 11 and 12.

INSERT TABLES 10, 11 and 12

The coefficients associated to real estate risk are positive and statistically significant for all the 11 European countries and for all the time frames considered. The results suggest that the use of regional indices may be a more accurate proxy for measuring banks'

exposure to real estate market conditions in countries with an internationalized banking sector. In those countries where listed banks have a very significant weight in the banking industry, the high exposure to international real estate assets precludes the use of domestic real estate companies returns to ascertain the sensitivity of real estate market returns. The high international banking activity in Spain and Belgium may help understand the negative signs and statistically significant real estate market risk coefficients found in Tables 4, 5, 6 and 8. Given the importance of non-domestic real estate markets in the asset portfolio of the main banks in these countries, the relationship between bank returns and domestic real estate stock market returns might not properly reflect the their true exposure to real estate market risk.

4.3. Sensitivities of Banks to Real Estate Asset Exposure and Size

Table 13 tests the relationship between bank size - as measured by the value of total assets, loans and market capitalization – and market returns. Beforehand, we estimated the sensitivities to real estate market returns for each of the 202 listed banks in our sample using the three-factor model (equation 1) and the Fama-French extended model (equation 2). The dependent variables are now the daily or monthly stock returns of individual banks for the period 2002 to 2008[23]. Next, five bank portfolios were formed based on the average value of total assets, loans and market capitalization, used as proxies for bank size.

The conclusions for the sample of the EU-15 countries listed banks are identical to those of Mei and Lee (1994) and Mei and Saunders (1995) for the US. Small banks show greater sensitivity to real estate market risk.

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[23] Source: Thomson Reuters DATASTREAM -"*Total Return Index*".

INSERT TABLE 13

The results in Table 13 show that the sensitivity to real estate market risk is higher for the portfolios of small banks. The *t*- test statistic for the differences between large and small quintile average real estate market sensitivities confirms the existence of statistically significant differences between large and small banks sensitivity to real estate market risk. Further, the simple and multiple cross-section regressions (Tables 15 and 16) show that the larger the bank, the lower tends to be its sensitivity to real estate market risk. The results are robust to different proxies of size (with the exception of the regression for loans and monthly returns based on the extended Fama-French model).

The results may reflect the "too big to fail" effect: investors attribute a lower probability of default to large banks due to the systemic risk for the banking system, and trusting that large banks will always be bailed out by governments. Another explanation for this result is that small banks possess less sophisticated risk-analysis tools which lead to an excessive concentration of risk in a given segment or market.

Table 14 shows the relation between the sensitivity to real estate market risk and the asset exposure to the real estate sector. Banks that hold more real estate assets are more sensitive to changes in real estate market conditions. The *t*-test statistic for the differences between high and low quintiles average real estate market sensitivities confirms the existence of statistically significant differences between the sensitivity to real estate market risk by portfolios of banks with higher and lower asset exposure to real estate. The results are robust to different proxies of asset exposure with the exception of the Real Estate/Equity and Real Estate/Assets proxies in the Fama-French extended model with daily returns. These conclusions are identical to those of Allen *et al.* (1995) for the US.

INSERT TABLE 14

The simple cross-sectional regressions (Table 15) confirm that the measure of relative bank asset exposure to the real estate market is positively and significantly related to the sensitivity of banks to real estate market risk (with exception of the three regressions for daily returns based on the extended Fama-French model). In general though, the regressors show very little explanatory power with *Adj-*R^2 below 5%.

INSERT TABLE 15

Table 16 shows the multiple cross-sectional regression estimates between the bank returns sensitivities to real estate market risk and size and asset exposure to real estate. The *Adj-*R^2 improve but the fit is still very poor. The generality of the results shows the existence of joint statistical significance of the coefficients associated with the specific characteristics of banks in explaining the bank return sensitivities to the real estate market risk obtained through the three-factor model. These results are weaker when we use sensitivities to the real estate market risk obtained through the extended Fama-French model.

INSERT TABLE 16

Table 17 presents the cross-sectional regressions estimates for each of the five clusters of countries mentioned above. We observe that size and real estate asset exposure show a stronger relation with real estate market risk loadings obtained through the three-

factor model in the cluster of Spain, UK and Ireland comparatively to the cluster of Germany and Austria. The opposite is true in the cluster formed by Germany and Austria. The Wald test[24] computed to examine whether there are significant differences in regression estimates in each of those subsamples confirms the existence of statistically significant differences between cluster of Spain, UK and Ireland and cluster of Germany and Austria.

INSERT TABLE 17

Because the dependent variables are estimates of real estate market risk loadings, cross-sectional estimates may suffer from the EIV – Error In Variables – problem. To test the robustness of these results we compute weighted least squares estimators (see Kim 1995 and 1997, for further details). Results are similar to those presented in tables 15 to 17 and are available upon request.

In summary, the results presented suggest that small European listed banks, and banks with greater asset exposure to the real estate market, from countries with less conservative mortgage credit systems, have a greater sensitivity to real estate market risk.

[24] This Wald test (factor breakpoint test) splits an estimated equation's sample into a number of subsamples classified by one or more variables and examines whether there are significant differences in equations estimated in each of the subsamples. A significant difference indicates a structural change in the relationship. To carry out the test, we partition the data by splitting the estimation sample into subsamples of each unique value of the classification variable (clusters formed). The Wald statistic is computed from a standard Wald test of the restriction that the coefficients on the equation parameters are the same in all subsamples.

5. Conclusion

Given the weight of real estate assets on the balance sheets of banks, the objective of this study is to assess if bank stock returns are systematically affected by the real estate market returns. The results show the existence of a positive and statistically significant relationship between bank stock returns and real estate market returns proxies suggesting that real estate risk is a priced factor. This relationship between bank stock returns and the proxies for real estate is more significant when regional market indices are used as benchmark for real estate market conditions, which is justified by the fact that many major European banks are global banks. The results further show an increasing influence of real estate market movements in the bank stock returns, after the subprime crisis, in Ireland, Spain and the United Kingdom.

This study also examines whether bank sensitivities to the real estate market are function of the bank size, its degree of asset exposure to the real estate market and the institutional characteristics of the country where it operates. The results indicate that smaller banks, banks with greater relative asset balance sheet exposure to the real estate sector, and banks from countries with less conservative mortgage credit systems, tend to be more sensitive to real estate market conditions.

These results have two important implications. First, regulators, managers and investors should monitor the exposition of banks to the real estate market, just as they monitor the exposure of banks to interest rates. Second, with respect to event study tests for the banking sector, the results suggest that the underlying return generating models should incorporate an additional risk factor: real estate market risk. Similarly, real estate market risk should be included alongside market risk and interest rates to estimate the cost of capital when assessing the NPV of bank investments or in asset pricing models to evaluate bank performance.

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Table 1: Empirical Studies on the Relationship between Banking Stock Market Returns and the Real Estate Market

		Sample and Variables	Main Results
		I. US Market	
Mei and Lee (1994)	i.	**Indices**: Banking Industry Returns; Dividend Yield; T-bill rates; Income Yield on the Wilshire Real Estate Index; Spread between AAA Bonds and T-bills (default risk factor).	There is a real estate risk premium for all stocks in addition to the stock market and the interest rate risk premiums.
	ii.	**Others**: Stock Market Returns; Government Bonds Yield Changes; REITs; Small Caps Returns; Russell-NCREIF Returns.	
	iii.	**Period**: 1978-1989.	
	iv.	**Quarterly Returns**	
Mei and Saunders (1995)	i.	**Indices**: Returns of different portfolios of 180 US-banks; Dividend Yield; T-bill rates; Cap Rate constructed as a ratio of net stabilized earnings to the equity market-value of a well diversified property portfolio (*ACLI cap-rate*); Spread between AAA Bonds and T-bills (default risk factor); January dummy.	A premium for real estate risk is increasingly apparent in bank stocks, presumably reflecting these banks' growing exposures to this market; it could be as high as the premium for interest rate risk.
	ii.	**Others**: Stock Market Returns; Government Bonds Yields; REITs	
	iii.	**Period**: 1971-1989.	
	iv.	**Monthly Returns**	

Table 1: Empirical Studies on the Relationship between Banking Stock Market Returns and the Real Estate Market (cont.)

		Sample and Variables	Main Results
Allen, Madura and Wiant (1995)	i.	**Indices**: Stock Returns of various portfolios of 125 US-banks; S&P 500 Returns; T-Bond rates and Unexpected T-Bond Yield Changes, NAREIT Equity REIT index returns.	There is a positive relationship between monthly bank returns and real estate index returns; the sensitivity of bank values to the real estate market has increased over time; the bank-specific sensitivity is positively related to the bank´s balance sheet exposure to the real estate market.
	ii.	**Others**: Balance sheet data.	
	iii.	**Period**: 1979-1992.	
	iv.	**Monthly Returns**	
He, Myer and Webb (1996)	i.	**Indices**: Stock Returns of various portfolios of 166 US-bank holding companies; four different stock market proxies; three proxies of Interest Rates; six Real Estate returns proxies.	Bank stock returns are very sensitive to changes in real estate returns; banks with a larger portion of their total loans invested in real estate are more sensitive to real estate returns.
	ii.	**Others**: Balance sheet data.	
	iii.	**Period**: 1986-1991.	
	iv.	**Weekly and Monthly Returns**	
		II. **Asian Markets**	
Lu and So (2005)	i.	**Indices**: Stock Returns of various portfolios of US banks; Stock Market returns; Expected and Unexpected three-month Inter-bank Interest Rates; Stock Returns of portfolio of Real Estate companies.	Listed banks are exposed to real estate risk both before and after the crisis but the exposure increases in the post-crisis period.
	ii.	**Others**: Interest Rate Spreads, defined as the difference between the three-month Inter-Bank Rates and the Deposit Rates.	
	iii.	**Period**: 1995-1999.	
	iv.	**Daily Returns**	

Table 2: Descriptive Statistics – Banking and Real Estate Stock Market Industry Indices

This table shows the descriptive statistics of the banking industry and real estate indices returns, based on daily observations for each of the EU-15 countries. The analysis period starts in the period indicated in the table and ends in 2008. For Ireland and Luxembourg, real estate returns are proxied by the real estate returns index of the UK and of Benelux, respectively, due to the lack of data for real estate companies in the domestic market. Panel A shows the median and average returns of the banking industry and real estate index returns. Panel B shows the correlations between the banking industry (*Banking*), real estate companies (*Real Estate*) and the overall stock market index returns (*Market)*. Panel C reports the values of market capitalization (€ Million) and number of companies that comprise the banking industry return and real estate companies return indices.

Panel A. Averages, Medians and Variances of DATASTREAM Index Returns

Country	Start	Banking			Real Estate		
		Average ($\times 10^{-3}$)	Median ($\times 10^{-3}$)	Variance ($\times 10^{-3}$)	Average ($\times 10^{-3}$)	Median ($\times 10^{-3}$)	Variance ($\times 10^{-3}$)
Germany	1993/10/01	0.008	0.110	0.276	0.494	0.015	0.306
Austria	1991/10/11	0.252	0.023	0.227	-0.012	-0.004	0.115
Belgium	1989/06/06	0.078	0.149	0.268	0.215	0.122	0.085
Denmark	1991/10/08	0.405	0.342	0.199	0.247	0.000	0.125
Spain	1991/04/05	0.430	0.304	0.231	0.277	0.118	0.163
Finland	1998/06/02	0.425	0.035	0.363	0.222	0.186	0.354
France	1987/07/09	0.333	0.073	0.317	0.323	0.256	0.071
Greece	1990/01/02	0.469	0.042	0.398	0.823	0.063	0.714
Netherlands	1986/05/16	0.344	0.374	0.438	0.198	0.321	0.073
Ireland	1986/05/28	0.457	0.142	0.390	0.319	0.242	0.122
Italy	1987/04/01	0.285	0.264	0.198	0.264	0.093	0.212
Luxembourg	1998/12/31	0.079	0.050	0.130	0.263	0.495	0.075
Portugal	1993/07/19	0.213	0.148	0.125	0.913	0.086	1.101
United Kingdom	1986/05/16	0.528	0.234	0.277	0.319	0.242	0.122
Sweden	1988/11/29	0.540	0.078	0.474	0.447	0.127	0.243

Table 2: Descriptive Statistics – Banking and Real Estate Stock Market Industry Indices (cont.)

Panel B. Correlation of Index Returns

Country	Banking vs. Real Estate		Banking vs. Market		Real Estate vs. Market	
	Daily	Monthly	Daily	Monthly	Daily	Monthly
Germany	0.319[a]	0.445[a]	0.679[a]	0.787[a]	0.282[a]	0.376[a]
Austria	0.265[a]	0.423[a]	0.765[a]	0.762[a]	0.397[a]	0.525[a]
Belgium	0.197[a]	0.509[a]	0.831[a]	0.887[a]	0.335[a]	0.641[a]
Denmark	0.173[a]	0.299[a]	0.727[a]	0.669[a]	0.208[a]	0.312[a]
Spain	0.430[a]	0.534[a]	0.924[a]	0.915[a]	0.535[a]	0.684[a]
Finland	0.205[a]	0.317[a]	0.313[a]	0.350[a]	0.211[a]	0.148[c]
France	0.365[a]	0.422[a]	0.746[a]	0.760[a]	0.433[a]	0.471[a]
Greece	0.234[a]	0.141[b]	0.925[a]	0.962[a]	0.287[a]	0.153[b]
Netherlands	0.232[a]	0.479[a]	0.669[a]	0.788[a]	0.417[a]	0.514[a]
Ireland	0.280[a]	0.370[a]	0.727[a]	0.716[a]	0.017	0.344[a]
Italy	0.389[a]	0.589[a]	0.849[a]	0.869[a]	0.437[a]	0.578[a]
Luxembourg	0.166[a]	0.368[a]	0.293[a]	0.409[a]	0.202[a]	0.323[a]
Portugal	0.425[a]	0.557[a]	0.779[a]	0.827[a]	0.514[a]	0.595[a]
United Kingdom	0.492[a]	0.572[a]	0.783[a]	0.777[a]	0.607[a]	0.625[a]
Sweden	0.373[a]	0.509[a]	0.659[a]	0.658[a]	0.496[a]	0.627[a]

[a], [b] and [c] denote statistical significance at 1%, 5% and 10% levels for bilateral tests.

Panel C. Number of Constituents and Market Capitalization

Country	Real Estate Industry Index (DATASTREAM)		Banking Industry Index (DATASTREAM)	
	Number of Constituents	Average Market Capitalization (€ Million)	Number of Constituents	Average Market Capitalization (€ Million)
Germany	13	683	6	9,446
Austria	7	1,243	6	3,095
Belgium	19	182	4	12,812
Denmark	1	432	8	1,930
Spain	12	434	9	11,033
Finland	2	927	1	1,677
France	27	1,850	10	12,486
Greece	2	569	10	2,152
Netherlands	10	1,046	1	1,277
Ireland	0		2	7,548
Italy	5	976	19	8,267
Luxembourg	0		2	1,084
Portugal	1	53	4	2,805
United Kingdom	29	1,022	5	36,976
Sweden	7	927	5	7,112
TOTAL	135	971	92	8,658

Table 3: Bank Characteristics: Descriptive Statistics

This table shows the descriptive statistics for the banks of the EU-15 countries between 2002 and 2008. Panel A shows the number of listed banks, the average size (*Total Assets*, *Total Loans* and *Market Capitalization*) and the average relative asset exposure to the real estate market (*Real Estate/Equity*, *Real Estate/Assets*, *Real Estate Loans/Equity* and *Real Estate Loans/Assets*). *Real Estate* refers to real estate holdings obtained by adding *Real Estate Loans* and *Direct Real Estate Investments*. Equity and Assets are the book value of equity and total assets. Data were obtained from BANKSCOPE and individual bank reports. Median and standard deviation are presented in brackets. # refers to the number of banks per country. Panel B shows the correlations between average size and average relative asset exposure of banks to the real estate market. Panel C compares the sample of the 202 listed banks with the universe of the EU-15 banks in terms of number of banks, average size (*Total Assets* and *Total Loans*) and average asset exposure of banks to the real estate market (*Real Estate Loans/Assets*). Data were obtained from the database BANKSCOPE and ECB (2008).

Panel A. Number of Listed Banks, Average Size and Real Estate Market Exposure

Country	#	Size			Exposure to the Real Estate Market			
		Total Assets	Total Loans	Market Capitalization	Real Estate /Assets	Real Estate Loans/Assets	Real Estate /Equity	Real Estate Loans/Equity
Germany	24	115,977	34,656	2,772	0.193	0.177	2.574	2.400
		(7,656)	(1,961)	(521)	(0.138)	(0.098)	(2.948)	(2.501)
		[302,831]	[65,810]	[6,988]	[0.169]	[0.176]	[6.615]	[6.661]
Austria	8	39,405	22,090	2,242	0.222	0.213	3.267	3.126
		(10,351)	(6,487)	(639)	(0.253)	(0.245)	(3.632)	(3.464)
		[59,573]	[32,265]	[3,194]	[0.093]	[0.097]	[2.162]	[2.177]
Belgium	4	373,630	152,253	12,811	0.168	0.064	2.010	1.904
		(438,299)	(184,514)	(15,135)	(0.072)	(0.067)	(2.290)	(2.143)
		[276,614]	[109,370]	[8,047]	[0.059]	[0.056]	[1.470]	[1.146]
Denmark	38	12,074	7,109	465	0.194	0.175	1.960	1.764
		(626)	(428)	(67)	(0.182)	(0.164)	(1.624)	(1.496)
		[61,299]	[35,611]	[1,901]	[0.092]	[0.084]	[1.312]	[1.220]
Spain	10	164,603	102,827	10,029	0.406	0.395	6.758	6.579
		(54,921)	(41,064)	(2,934)	(0.421)	(0.407)	(6.216)	(6.025)
		[273,534]	[159,372]	[17,304]	[0.075]	[0.076]	[2.413]	[2.411]
Finland	3	20,561	6,480	2,291	0.231	0.223	4.230	4.129
		(24,265)	(8,545)	(1,677)	(0.109)	(0.108)	(1.780)	(1.763)
		[16,677]	[3,949]	[2,531]	[0.302]	[0.299]	[5.786]	[5.693]
France	34	136,615	37,124	4,850	0.274	0.222	2.155	1.938
		(7,203)	(5,758)	(1,022)	(0.205)	(0.184)	(1.894)	(1.694)
		[366,617]	[89,309]	[11,120]	[0.206]	[0.159]	[1.383]	[1.391]
Greece	13	23,189	14,866	1,720	0.188	0.170	3.145	2.916
		(12,574)	(6,675)	(839)	(0.200)	(0.179)	(2.437)	(2.306)
		[24,325]	[15,590]	[1,889]	[0.092]	[0.097]	[2.621]	[2.493]
Netherlands	7	187,821	75,096	5,935	0.175	0.171	3.771	3.667
		(1,069)	(2,877)	(1,277)	(0.148)	(0.145)	(1.241)	(1.239)
		[439,206]	[167,680]	[12,919]	[0.171]	[0.175]	[5.325]	[5.302]
Ireland	3	126,597	81,857	5,783	0.421	0.404	10.627	9.941
		(150,913)	(103,026)	(5,723)	(0.407)	(0.404)	(11.423)	(11.347)
		[50,682]	[43,269]	[3,560]	[0.042]	[0.021]	[4.051]	[3.522]
Italy	30	72,488	37,341	5,271	0.154	0.142	1.960	1.800
		(8,685)	(4,549)	(703)	(0.187)	(0.172)	(2.388)	(2.213)
		[193,699]	[98,791]	[12,187]	[0.123]	[0.120]	[1.669]	[1.601]
Luxembourg	3	21,265	12,831	1,487	0.080	0.067	1.239	1.143
		(419)	(117)	(1,084)	(0.067)	(0.059)	(0.582)	(0.511)
		[36,300]	[22,036]	[1,675]	[0.066]	[0.072]	[1.638]	[1.559]
Portugal	5	37,671	25,933	2,275	0.224	0.211	3.934	3.720
		(35,010)	(24,220)	(1,649)	(0.247)	(0.235)	(4.117)	(3.912)
		[33,384]	[23,657]	[2,112]	[0.065]	[0.071]	[1.556]	[1.621]
United Kingdom	14	405,218	166,106	17,163	0.278	0.162	4.889	3.740
		(10,583)	(4,914)	(1,165)	(0.114)	(0.075)	(1.690)	(1.520)
		[288,356]	[178,837]	[30,072]	[0.238]	[0.243]	[6.830]	[6.819]
Sweden	6	153,709	85,527	6,099	0.197	0.194	4.718	4.644
		(168,314)	(87,748)	(6,952)	(0.220)	(0.214)	(6.025)	(5.855)
		[138,659]	[81,548]	[5,627]	[0.137]	[0.136]	[3.566]	[3.546]
EU-15	202	111,004	34,656	5,043	0.220	0.201	2.981	2.698

Table 3: Bank Characteristics: Descriptive Statistics (cont.)

Panel B. Correlation between Size and Real Estate Market Exposure

Variable	Total Assets	Total Loans	Market Capitalization	Real Estate /Equity	Real Estate /Assets	Real Estate Loans /Equity	Real Estate Loans /Assets
Total Assets	1.000						
Total Loans	0.930	1.000					
Market Capitalization	0.921	0.958	1.000				
Real Estate /Equity	-0.092	-0.020	-0.046	1.000			
Real Estate /Assets	0.085	0.143	0.068	0.664	1.000		
Real Estate Loans /Equity	-0.066	0.012	-0.015	0.916	0.726	1.000	
Real Estate Loans /Assets	0.085	0.143	0.071	0.636	0.992	0.736	1.000

Panel C. Listed Banks vs. All Banks in the EU-15 Countries

Country	Listed Banks				All Banks			
	#	Total Assets	Loans	Real Estate Loans / Assets	#	Total Assets	Loans	Real Estate Loans / Assets
Germany	24	115,977	34,656	0.177	2,108	3,273	1,447	0.139
Austria	8	39,405	22,090	0.213	808	897	403	0.074
Belgium	4	373,630	152,253	0.064	105	9,901	3,339	0.090
Denmark	38	12,074	7,190	0.175	196	3,813	2,007	0.179
Spain	10	164,603	102,827	0.395	350	6,185	3,777	0.342
Finland	3	20,561	6,480	0.223	363	648	328	0.207
France	34	136,615	37,124	0.222	865	14,287	4,803	0.098
Greece	13	23,189	14,866	0.170	62	4,620	2,442	0.153
Netherlands	7	187,821	75,096	0.171	406	4,394	2,305	0.199
Ireland	3	126,597	81,857	0.404	79	11,978	4,253	0.296
Italy	30	72,488	37,341	0.142	802	3,252	1,683	0.074
Luxembourg	3	21,265	12,831	0.067	160	4,885	921	0.044
Portugal	5	37,671	25,933	0.211	187	2,021	1,152	0.216
United Kingdom	14	405,218	166,106	0.162	406	20,622	11,202	0.124
Sweden	6	153,709	85,527	0.194	208	1,671	877	0.162
TOTAL	202	111,003	46,001	0,191	7,105	5,584	2,475	0,138

Table 4: Three-Factor Model Estimates - Monthly Stock Returns

This table reports the estimation results of the model defined in equation (1): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{1j}I_{jt} + \beta_{Rj}R_{Rjt} + e_{jt}$, for the EU-15 countries analyzed. R_{jt} are banking industry index returns for country j in period t; R_{mjt} are the general stock market returns for country j in period t; I_{jt} are unexpected yield changes on 10 year government bonds for country j in period t and R_{Rjt} are the real estate industry index returns for country j in period t. The model is estimated for three different periods based on monthly stock returns: Total Period: from the date indicated in the column "Start" to the end of 2008; 5 years: 2002 to 2006; and 10 years: 1997 to 2006. For Ireland and Luxembourg the real estate index refers to the UK and the Benelux real estate industry index, due to the lack of data. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Country	Start-2008 (Total Period)						2002-2006 (5 years)					1997-2006 (10 years)				
	Start	β_0	β_m	β_I	β_R	Adj. R^2	β_0	β_m	β_I	β_R	Adj. R^2	β_0	β_m	β_I	β_R	Adj. R^2
Germany	1993-10	-0.008[b]	0.986[a]	0.009	0.156[a]	65.7%	-0.006	0.943[a]	0.008	0.136	68.9%	-0.003	0,938[a]	0,132	0,133[b]	63,3%
		(0.014)	(0.000)	(0.912)	(0.000)		(0.195)	(0.000)	(0.950)	(0.430)		(0.547)	(0,000)	(0,194)	(0,022)	
Austria	1991-11	0.001	0.975[a]	0.150[b]	0.037	58.7%	0.005	1.088[a]	0.057	-0.190[a]	54.2%	0.005	1,076[a]	0,111	-0,185[a]	54,1%
		(0.707)	(0.000)	(0.036)	(0.711)		(0.325)	(0.000)	(0.550)	(0.001)		(0.272)	(0,000)	(0,165)	(0,001)	
Belgium	1989-07	-0.004[c]	1.432[a]	0.081	-0.167[b]	79.6%	-0.006[b]	1.393[a]	0.016	-0.088	90.3%	-0.005[b]	1,335[a]	0,049	0,066	83,6%
		(0.071)	(0.000)	(0.181)	(0.031)		(0.038)	(0.000)	(0.771)	(0.497)		(0.034)	(0,000)	(0,346)	(0,545)	
Denmark	1991-11	0.003	0.785[a]	-0.077	0.127[b]	44.6%	-0.007	0.861[a]	0.023	0.120[c]	64.1%	0.002	0,748[a]	-0,074	0,143[c]	43,5%
		(0.433)	(0.000)	(0.390)	(0.039)		(0.152)	(0.001)	(0.784)	(0.063)		(0.654)	(0,000)	(0,449)	(0,057)	
Spain	1991-05	-0.003[c]	1.350[a]	0.125[a]	-0.156[a]	85.9%	-0.004	1.279[a]	0.234[a]	-0.125[b]	87.3%	0.000	1,396[a]	0,143[a]	-0,186[a]	87,8%
		(0.087)	(0.000)	(0.005)	(0.000)		(0.272)	(0.000)	(0.000)	(0.011)		(0.859)	(0,000)	(0,008)	(0,000)	
France	1987-08	-0.002	1.023[a]	-0.006	0.160[c]	58.5%	-0.006	1.054[a]	0.002	0.200[c]	72.0%	0.000	1,229[a]	-0,055	0,080	63,2%
		(0.581)	(0.000)	(0.927)	(0.069)		(0.163)	(0.000)	(0.981)	(0.059)		(0.915)	(0,000)	(0,502)	(0,477)	
Finland	1998-06	0.005	0.222[a]	-0.144	0.274[a]	18.8%	0.005	0.300[b]	-0.151	0.363[a]	23.7%	0.003	0,209[a]	-0,190	0,319[a]	17,9%
		(0.367)	(0.000)	(0.258)	(0.001)		(0.525)	(0.011)	(0.383)	(0.001)		(0.568)	(0,006)	(0,135)	(0,001)	
Greece	1990-01	-0.004[b]	1.171[a]	-0.126[b]	0.061[c]	93.0%	0.000	1.329[a]	-0.002	0.188[c]	90.5%	-0.001	1,206[a]	-0,128[b]	-0,006	90,0%
		(0.044)	(0.000)	(0.019)	(0.086)		(0.929)	(0.000)	(0.927)	(0.095)		(0.673)	(0,000)	(0,023)	(0,557)	
Netherlands	1986-06	-0.005	1.348[a]	0.028	0.184[b]	65.7%	-0.009	1.768[a]	-0.224	0.272[c]	79.3%	-0.008	1,512[a]	-0,011	0,253[b]	74,5%
		(0.141)	(0.000)	(0.698)	(0.050)		(0.167)	(0.000)	(0.210)	(0.087)		(0.196)	(0,000)	(0,926)	(0,047)	
Ireland	1986-06	-0.005	0.933[a]	-0.161[c]	0.196[a]	53.3%	-0.022[a]	1.024[a]	0.152	0.469[a]	61.7%	-0.008	1,090[a]	-0,018	0,329[a]	52,9%
		(0.223)	(0.000)	(0.066)	(0.003)		(0.002)	(0.000)	(0.338)	(0.000)		(0.185)	(0,000)	(0,893)	(0,002)	
Italy	1987-04	0.001	0.880[a]	0.028	0.119[a]	76.7%	0.006	1.260[a]	0.123	0.197[b]	80.3%	0.002	0,991[a]	0,027	0,076[c]	82,4%
		(0.513)	(0.000)	(0.551)	(0.001)		(0.101)	(0.000)	(0.115)	(0.019)		(0.531)	(0,000)	(0,660)	(0,063)	
Luxembourg	1999-01	-0.002	0.261[a]	-0.036	0.360[b]	21.1%	-0.005	0.498[a]	-0.051	0.357[b]	30.3%					
		(0.633)	(0.002)	(0.716)	(0.025)		(0.315)	(0.000)	(0.632)	(0.017)						
Portugal	1993-08	-0.002	0.885[a]	0.128[b]	0.157[b]	70.5%	-0.008[b]	1.053[a]	0.195[b]	0.054	75.0%	-0.002	0,879[a]	0,144[b]	0,179[c]	70,0%
		(0.332)	(0.000)	(0.033)	(0.050)		(0.046)	(0.000)	(0.016)	(0.608)		(0.468)	(0,000)	(0,045)	(0,059)	
United Kingdom	1986-06	0.002	1.040[a]	-0.007	0.177[a]	65.2%	-0.010[b]	0.880[a]	0.125	0.303[a]	65.0%	-0.001	1,150[a]	0,008	0,237[a]	62,3%
		(0.479)	(0.000)	(0.923)	(0.004)		(0.022)	(0.000)	(0.237)	(0.000)		(0.695)	(0,000)	(0,928)	(0,001)	
Sweden	1988-12	0.002	0.778[a]	-0.184	0.259[b]	47.1%	0.000	0.833[a]	0.114	0.070	68.5%	0.002	0,655[a]	0,023	0,156[c]	49,6%
		(0.662)	(0.000)	(0.167)	(0.018)		(0.943)	(0.000)	(0.221)	(0.426)		(0.704)	(0,000)	(0,809)	(0,056)	

Table 5: Three-Factor Model Estimates - Daily Stock Returns

This table reports the estimation results of the model defined in equation (1): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + e_{jt}$, for the EU-15 countries analysed. R_{jt} are banking industry index returns for country j in period t; R_{mjt} are the general stock market returns for country j in period t; I_{jt} are unexpected yield changes on 10 year government bonds for country j in period t and R_{Rjt} are the real estate industry index returns for country j in period t. The model is estimated for three different periods based on daily stock returns: Total Period: from the date indicated in the column "Start" to the end of 2008; 5 years: 2002 to 2006; and 10 years: 1997 to 2006. For Ireland and Luxembourg the real estate index refers to the UK and the Benelux real estate industry index, due to the lack of data. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Country	Start-2008 (Total Period)						2002-2006 (5 years)					1997-2006 (10 years)				
	Start	β_0	β_m	β_I	β_R	Adj. R^2	β_0	β_m	β_I	β_R	Adj. R^2	β_0	β_m	β_I	β_R	Adj. R^2
Germany	1993/10/01	0.000	0.835[a]	0.109[a]	0.128[a]	48.3%	0.000	0.946[a]	0.120[a]	0.141[a]	65.9%	0.000	0.875[a]	0.106[a]	0.083[a]	53,7%
		(0.390)	(0.000)	(0.000)	(0.000)		(0.201)	(0.000)	(0.000)	(0.000)		(0.853)	(0.000)	(0.000)	(0.000)	
Austria	1991/10/01	0.000	1.207[a]	0.076[a]	-0.067[a]	58.9%	0.000	1.397[a]	0.011	-0.203[a]	61.2%	0.000	1.352[a]	0.010	-0.116[a]	68,5%
		(0.881)	(0.000)	(0.000)	(0.000)		(0.812)	(0.000)	(0.647)	(0.000)		(0.905)	(0.000)	(0.700)	(0.001)	
Belgium	1989/06/06	0.000	1.424[a]	0.000	-0.163[a]	69.7%	0.005[b]	1.497[a]	0.028[b]	-0.155[a]	92.9%	0.010[a]	1.438[a]	0.053[a]	-0.106[a]	82,8%
		(0.196)	(0.000)	(0.989)	(0.000)		(0.037)	(0.000)	(0.028)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	
Denmark	1991/10/08	0.000	0.886[a]	-0.035[b]	0.030[b]	52.9%	0.000	0.729[a]	-0.001	0.052[a]	52.9%	0.000	0.785[a]	-0.039[b]	0.029[c]	45,6%
		(0.614)	(0.000)	(0.029)	(0.048)		(0.814)	(0.000)	(0.952)	(0.000)		(0.261)	(0.000)	(0.031)	(0.100)	
Spain	1991/04/05	0.000	1.297[a]	0.047[a]	-0.104[a]	85.9%	0.000	1.423[a]	0.052[a]	-0.121[a]	91.2%	0.000	1.389[a]	0.069[a]	-0.132[a]	89,0%
		(0.119)	(0.000)	(0.000)	(0.000)		(0.254)	(0.000)	(0.000)	(0.000)		(0.760)	(0.000)	(0.000)	(0.000)	
France	1987/07/09	0.000	1.059[a]	0.017	0.108[a]	55.9%	0.000	1.123[a]	0.044[b]	0.141[a]	70.9%	0.000	1.076[a]	0.044[b]	0.152[a]	60,6%
		(0.506)	(0.000)	(0.422)	(0.000)		(0.210)	(0.000)	(0.024)	(0.000)		(0.775)	(0.000)	(0.020)	(0.000)	
Finland	1998/06/02	0.000	0.240[a]	0.047	0.145[a]	11.8%	0.000	0.368[a]	-0.005	0.144[b]	15.9%	0.000	0.240[a]	0.047	0.145[a]	11,8%
		(0.389)	(0.000)	(0.157)	(0.000)		(0.270)	(0.000)	(0.898)	(0.045)		(0.389)	(0.000)	(0.193)	(0.002)	
Greece	1990/01/02	0.000	1.093[a]	-0.002	0.145[a]	85.8%	0.000	1.214[a]	-0.007	0.135[a]	84.7%	0.000	1.074[a]	0.004	0.077[a]	84,2%
		(0.155)	(0.000)	(0.788)	(0.000)		(0.586)	(0.000)	(0.500)	(0.002)		(0.881)	(0.000)	(0.642)	(0.010)	
Netherlands	1986/05/06	0.000	1.254[a]	0.000	-0.140[a]	44.9%	0.000	1.415[a]	0.033	-0.084[a]	82.8%	0.000	1.268[a]	0.000	-0.037	71,8%
		(0.727)	(0.000)	(0.477)	(0.000)		(0.451)	(0.000)	(0.413)	(0.003)		(0.713)	(0.000)	(0.273)	(0.204)	
Ireland	1986/05/28	0.000	1.087[a]	0.041[b]	0.128[a]	52.9%	0.000	0.863[a]	0.172[a]	0.146[a]	52.8%	0.000	0.946[a]	0.110[a]	0.184[a]	50,4%
		(0.192)	(0.000)	(0.045)	(0.008)		(0.965)	(0.000)	(0.000)	(0.007)		(0.295)	(0.000)	(0.000)	(0.004)	
Italy	1987/04/01	0.000	0.936[a]	0.006	0.021[b]	72.1%	0.000	1.091[a]	0.020	0.065[a]	79.2%	0.000	0.977[a]	0.041[a]	0.003	75,1%
		(0.480)	(0.000)	(0.680)	(0.020)		(0.173)	(0.000)	(0.191)	(0.004)		(0.131)	(0.000)	(0.007)	(0.808)	
Luxembourg	1998/12/31	0.000	0.275[a]	-0.018	0.146[a]	9.7%	0.000	0.247[a]	-0.049	0.101	4.9%					
		(0.989)	(0.000)	(0.324)	(0.001)		(0.802)	(0.000)	(0.199)	(0.105)						
Portugal	1993/07/19	0.000	0.870[a]	0.000	0.054[b]	60.7%	0.000	0.894[a]	0.000	0.058[b]	59.8%	0.000	0.837[a]	0.000	0.083[a]	60,3%
		(0.449)	(0.000)	(0.220)	(0.033)		(0.757)	(0.000)	(0.523)	(0.027)		(0.711)	(0.000)	(0.550)	(0.001)	
United Kingdom	1986/05/16	0.000	1.256[a]	0.001[a]	0.008	61.3%	0.000	1.129[a]	0.125[a]	0.002	75.5%	0.000	1.273[a]	0.078[a]	0.026	65,0%
		(0.843)	(0.000)	(0.000)	(0.661)		(0.526)	(0.000)	(0.000)	(0.906)		(0.394)	(0.000)	(0.006)	(0.236)	
Sweden	1988/11/29	0.000	0.946[a]	0.011	0.087[a]	43.6%	0.000	1.044[a]	0.024	-0.030	69.7%	0.000	0.757[a]	-0.003	0.115[a]	49,8%
		(0.800)	(0.000)	(0.654)	(0.000)		(0.352)	(0.000)	(0.310)	(0.326)		(0.424)	(0.000)	(0.914)	(0.000)	

Table 6: Fama and French Extend Model Estimates - Daily and Monthly Stock Returns

This table reports the estimation results of Fama and French extended model defined in equation (2): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + \beta_{vj}HML_{jt} + \beta_{sj}SMB_{jt} + e_{jt}$, for the EU-15 countries analyzed. R_{jt} are banking industry index returns for country j in period t; R_{mjt} are the general stock market returns for country j in period t; I_{jt} are unexpected yield changes on 10 year government bonds for country j in period t and R_{Rjt} are the real estate industry index returns for country j in period t. HML_{jt} e SMB_{jt} measure, respectively, the excess returns of value stocks vis a vis growth stocks, and the excess returns of small vis a vis large capitalization stocks. The model is estimated for Total Period based on monthly and daily stock returns. Total Period: from the date indicated in the column "Start" to the end of 2008. For Ireland and Luxembourg the real estate index refers to the UK and the Benelux real estate industry index, due to the lack of data. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Country	Monthly Returns								Daily Returns							
	Start	β_0	β_m	β_I	β_R	β_v	β_s	Adj. R^2	Start	β_0	β_m	β_I	β_R	β_v	β_s	Adj. R^2
Germany	1994-06	-0.009[b]	1.036[a]	0.062	0.167[a]	0.403[a]	-0.036	68.4%	1994/06/01	0.000	0.739[a]	0.146[a]	0.141[a]	0.326[a]	-0.327[a]	52,4%
		(0.012)	(0.000)	(0.450)	(0.000)	(0.000)	(0.705)			(0.348)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
Austria	1994-06	-0.001	0.986[a]	0.104	0.022	0.343[a]	-0.118[b]	69.0%	1994/06/01	0.000	1.197[a]	0.068[a]	-0.068	0.158[a]	-0.158[a]	67,0%
		(0.753)	(0.000)	(0.144)	(0.812)	(0.002)	(0.035)			(0.769)	(0.000)	(0.002)	(0.184)	(0.000)	(0.000)	
Belgium	1994-06	-0.006[a]	1.366[a]	0.069	0.029	0.393[a]	-0.135[b]	89.4%	1994/06/01	0.010[a]	1.295[a]	0.054[a]	-0.025	0.471[a]	-0.238[a]	85,0%
		(0.003)	(0.000)	(0.293)	(0.766)	(0.000)	(0.034)			(0.004)	(0.000)	(0.003)	(0.301)	(0.000)	(0.000)	
Denmark	1994-06	0.002	0.877[a]	-0.034	0.064[b]	0.638[a]	0.070	60.3%	1994/06/01	0.000	0.794[a]	-0.017	0.049[a]	0.274[a]	-0.239[a]	60,5%
		(0.530)	(0.000)	(0.540)	(0.041)	(0.000)	(0.491)			(0.845)	(0.000)	(0.285)	(0.000)	(0.000)	(0.000)	
Spain	1994-06	-0.001	1.253[a]	0.133[b]	-0.101[c]	-0.042	-0.183[a]	87.7%	1994/06/01	0.000	1.238[a]	0.054[a]	-0.083[a]	0.129[a]	-0.125[a]	88,4%
		(0.749)	(0.000)	(0.012)	(0.058)	(0.641)	(0.009)			(0.429)	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)	
France	1994-06	-0.005	1.276[a]	-0.027	0.128[c]	0.777[a]	-0.090	66.5%	1994/06/01	0.000	1.287[a]	-0.045[a]	0.084[a]	0.295[a]	0.185[a]	62,4%
		(0.241)	(0.000)	(0.696)	(0.079)	(0.000)	(0.487)			(0.557)	(0.000)	(0.008)	(0.000)	(0.000)	(0.000)	
Finland	1998-07	0.003	0.665[a]	-0.299[b]	0.106[c]	0.563[a]	0.164[c]	34.3%	1998/06/03	0.000	0.242[a]	0.044	0.147[a]	0.054[a]	-0.153[a]	12,0%
		(0.574)	(0.000)	(0.013)	(0.082)	(0.000)	(0.068)			(0.421)	(0.000)	(0.181)	(0.000)	(0.003)	(0.006)	
Greece	1997-12	-0.001	1.222[a]	-0.158[a]	0.085[b]	-0.074	-0.033	90.1%	1997/12/01	0.000	1.116[a]	-0.002	0.076[a]	-0.071	-0.035	85,9%
		(0.776)	(0.000)	(0.001)	(0.021)	(0.340)	(0.384)			(0.524)	(0.000)	(0.832)	(0.003)	(0.128)	(0.178)	
Netherlands	1994-06	-0.008[b]	1.527[a]	0.031	0.036	0.652[a]	-0.001	76.0%	1994/06/01	0.000	1.382[a]	0.000	-0.253	0.354[a]	0.100	46,3%
		(0.039)	(0.000)	(0.720)	(0.763)	(0.000)	(0.996)			(0.610)	(0.000)	(0.220)	(0.128)	(0.000)	(0.441)	
Ireland	1994-06	-0.003	1.039[a]	-0.115	0.226[b]	0.128	-0.322[a]	57.4%	1994/06/01	0.000	1.191[a]	0.104[a]	0.127[c]	0.000	0.000	55,9%
		(0.549)	(0.000)	(0.319)	(0.014)	(0.138)	(0.000)			(0.488)	(0.000)	(0.009)	(0.078)	(0.118)	(0.145)	
Italy	1994-06	0.000	1.056[a]	0.010	0.134[b]	0.279[a]	-0.042	82.2%	1994/06/01	0.000	1.041[a]	0.001	0.104[c]	0.319[a]	0.014	78,1%
		(0.979)	(0.000)	(0.863)	(0.040)	(0.005)	(0.549)			(0.942)	(0.000)	(0.968)	(0.083)	(0.000)	(0.446)	
Luxembourg	1999-02	-0.003	0.315[a]	-0.004	0.274[b]	0.316	0.186	22.7%	1999/01/31	0.000	0.276[a]	-0.018	0.143[a]	0.027	-0.028	9,7%
		(0.437)	(0.001)	(0.962)	(0.032)	(0.129)	(0.186)			(0.975)	(0.001)	(0.239)	(0.000)	(0.238)	(0.118)	
Portugal	1996-06	-0.004	0.911[a]	0.135[c]	0.103[c]	-0.057	0.230[a]	73.6%	1996/06/01	0.000	0.865[a]	0.000	0.064[b]	0.063[a]	-0.083[a]	61,2%
		(0.154)	(0.000)	(0.093)	(0.055)	(0.371)	(0.002)			(0.417)	(0.000)	(0.193)	(0.026)	(0.004)	(0.005)	
United Kingdom	1994-06	0.000	1.157[a]	0.042	0.229[a]	0.191	-0.258[a]	63.3%	1994/06/01	0.000	1.300[a]	0.055[b]	0.013	0.841[a]	-0.145[a]	71,2%
		(0.943)	(0.000)	(0.589)	(0.003)	(0.112)	(0.007)			(0.566)	(0.000)	(0.027)	(0.527)	(0.000)	(0.000)	
Sweden	1994-06	0.000	1.131[a]	-0.213[a]	0.135[c]	0.736[a]	-0.086	62.6%	1994/06/01	0.000	1.149[a]	-0.021	0.036[b]	0.824[a]	-0.105[a]	70,4%
		(0.967)	(0.000)	(0.007)	(0.071)	(0.000)	(0.321)			(0.537)	(0.000)	(0.304)	(0.042)	(0.000)	(0.000)	

Table 7: Three-Factor Model and Fama and French Extended Model Estimates: REITs

This table reports the estimation results of the model defined in equation (1): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + \epsilon_{jt}$, and Fama and French extended model defined in equation (2): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + \beta_{vj}HML_{vjt} + \beta_{sj}SMB_{jt} + \epsilon_{jt}$, for the subset of EU-15 countries analyzed where REITS data is available. R_{jt} are banking industry index returns for country j in period t; R_{mjt} are the general stock market returns for country j in period t; I_{jt} are unexpected yield changes on 10 year government bonds for country j in period t and R_{Rjt} are the real estate industry index returns for country j in period t proxied by REITs returns. HML_{vjt} e SMB_{jt} measure, respectively, the excess returns of value stocks vis a vis growth stocks, and the excess returns of small vis a vis large capitalization stocks. The model is estimated for Total Period based on monthly and daily stock returns. Total Period: from the date indicated in the column "Start" to the end of 2008. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Panel A: Three-Factor Model

Country	Monthly Returns						Daily Returns					
	Start	β_0	β_m	β_I	β_R	Adj. R^2	Start	β_0	β_m	β_I	β_R	Adj. R^2
Germany	1993-11	-0.008[a]	1.056[c]	0.023[c]	0.029[b]	63.3%	1993/01/10	0.000	0.875[a]	0.115[a]	0.032[a]	46.9%
		(0.004)	(0.080)	(0.078)	(0.021)			(0.102)	(0.000)	(0.000)	(0.007)	
Belgium	1995-01	-0.009[a]	1.489[c]	0.078[c]	0.051[c]	86.7%	1995/01/01	0.016[a]	1.518[a]	0.083[a]	-0.119[b]	78.9%
		(0.003)	(0.080)	(0.061)	(0.084)			(0.000)	(0.000)	(0.000)	(0.040)	
France	1988-08	-0.002[a]	1.088[c]	0.005[c]	0.075[c]	56.7%	1988/07/11	0.000[a]	1.156[b]	0.000[b]	0.012[a]	59.0%
		(0.003)	(0.082)	(0.063)	(0.059)			(0.000)	(0.024)	(0.020)	(0.010)	
Netherlands	1986-07	-0.005[a]	1.334	0.030[c]	0.238	66.0%	1986/06/16	0.000	1.248[a]	0.000	-0.134[a]	44.9%
		(0.004)	(0.118)	(0.099)	(0.156)			(0.751)	(0.000)	(0.458)	(0.000)	
United Kingdom	1986-07	0.002[a]	1.045[c]	-0.005[c]	0.170[c]	65.1%	1986/06/16	0.000	1.231[a]	0.001[a]	0.037[c]	61.4%
		(0,003)	(0,084)	(0,070)	(0,062)			(0,852)	(0,000)	(0,000)	(0,061)	

Panel B: Fama and French Extended Model

Country	Monthly Returns								Daily Returns							
	Start	β_0	β_m	β_I	β_R	β_v	β_s	Adj. R^2	Start	β_0	β_m	β_I	β_R	β_v	β_s	Adj. R^2
Germany	1993-11	-0.008[b]	1.107[a]	0.072	0.028	0.358[a]	-0.044	65.4%	1993/01/10	0.000	0.783[a]	0.153[a]	0.040[a]	0.321[a]	-0.320[a]	50.9%
		(0.030)	(0.000)	(0.397)	(0.148)	(0.001)	(0.666)			(0.548)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	
Belgium	1995-01	-0.007[a]	1.400[a]	0.068	-0.023	0.388[a]	-0.127[b]	89.7%	1995/01/01	0.009[b]	1.305[a]	0.048[a]	-0.038	0.471[a]	-0.237[a]	85.5%
		(0.004)	(0.000)	(0.318)	(0.822)	(0.000)	(0.038)			(0.012)	(0.000)	(0.010)	(0.482)	(0.000)	(0.000)	
France	1988-08	-0.005	1.220[a]	-0.018	0.084	0.737[a]	-0.144	66.8%	1988/07/11	0.000	1.398[a]	-0.007	0.017	0.401[a]	-0.140[a]	62.9%
		(0.165)	(0.000)	(0.790)	(0.184)	(0.000)	(0.173)			(0.317)	(0.000)	(0.667)	(0.126)	(0.000)	(0.000)	
Netherlands	1986-07	-0.009[b]	1.487[a]	0.033	0.133	0.613[a]	-0.032	76.2%	1986/06/16	0.000	1.370[a]	0.000	-0.245	0.353[a]	0.097	46.3%
		(0.029)	(0.000)	(0.705)	(0.235)	(0.000)	(0.789)			(0.648)	(0.000)	(0.235)	(0.154)	(0.000)	(0.464)	
UK	1986-07	0.000	1.185[a]	0.041	0.180[b]	0.216[c]	-0.208[b]	62.6%	1986/06/16	0.000	1.296[a]	0.055[b]	0.005	0.839[a]	-0.147[a]	71.2%
		(0.894)	(0.000)	(0.602)	(0.016)	(0.078)	(0.023)			(0.576)	(0.000)	(0.026)	(0.803)	(0.000)	(0.000)	

Table 8: Three-Factor Model Estimates - Subprime Crisis Effect Analysis

This table reports the estimation results of the model defined in equation (3): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{1j}I_{jt} + \beta_{Rj}R_{Rjt} + \beta_{1j}\,D_t + \beta_{2j}D_t{*}Rm_{jt} + \beta_{3j}\,D_t{*}I_{jt} + \beta_{4j}D_t{*}R_{Rjt}+\epsilon_{jt}$, for the EU-15 countries analyzed. R_{jt} are banking industry index returns for country j in period t; R_{mjt} are the general stock market returns for country j in period t; I_{jt} are unexpected yield changes on 10 year government bonds for country j in period t and R_{Rjt} are the real estate industry index returns for country j in period t. D_t is a dummy variable that takes the value of 1 for the date of June 18, 2007 (daily data) or June 2007 (monthly data) to the end of 2008, and 0 for the remaining period. The model is estimated for Total Period based on monthly and daily stock returns. Total Period: from the date indicated in the column "Start" to the end of 2008. For Ireland and Luxembourg the real estate index refers to the UK and the Benelux real estate industry index, due to the lack of data. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Country	Daily Returns										Monthly Returns									
	Start	β_0	β_m	β_I	β_R	β_1	β_2	β_3	β_4	Adj. R^2	Start	β_0	β_m	β_I	β_R	β_1	β_2	β_3	β_4	Adj. R^2
Germany	1994/06/01	0.000	0.854[a]	0.060[a]	0.079[a]	-0.001	-0.302	0.126	0.101[a]	51.7%	1994-06	-0.005	0.923[a]	0.046	0.133[b]	-0.018	0.366[c]	-0.464[b]	0.121	67.4%
		(0.390)	(0.000)	(0.001)	(0.000)	(0.594)	(0.214)	(0.376)	(0.001)			(0.146)	(0.000)	(0.593)	(0.016)	(0.219)	(0.070)	(0.018)	(0.523)	
Austria	1994/06/01	0.000	1.040[a]	0.095[a]	-0.152[a]	0.000	0.484[a]	-0.206[a]	0.026	61.1%	1994-06	0.004	0.893[a]	0.154[b]	-0.129[c]	-0.010	0.830[a]	-0.268	-0.286	60.0%
		(0.357)	(0.000)	(0.000)	(0.000)	(0.679)	(0.000)	(0.000)	(0.415)			(0.284)	(0.000)	(0.040)	(0.069)	(0.452)	(0.002)	(0.225)	(0.185)	
Belgium	1994/06/01	0.000	1.264[a]	0.000	-0.130[a]	0.003	0.609[a]	0.019	-0.309	72.0%	1994-06	0.000	1.228[a]	0.028	-0.136[b]	-0.011	0.352[b]	0.314	0.654[c]	83.5%
		(0.790)	(0.000)	(0.613)	(0.000)	(0.880)	(0.000)	(0.849)	(0.141)			(0.748)	(0.000)	(0.589)	(0.049)	(0.306)	(0.044)	(0.118)	(0.081)	
Denmark	1994/06/01	0.000	0.831[a]	-0.049[a]	0.012	-0.002[a]	0.188[a]	0.053	0.023[c]	53.6%	1994-06	0.008[b]	0.688[a]	-0.117[c]	0.042	-0.040[b]	0.499[b]	0.021	-0.133	47.9%
		(0.355)	(0.000)	(0.001)	(0.449)	(0.008)	(0.001)	(0.374)	(0.094)			(0.030)	(0.000)	(0.098)	(0.534)	(0.015)	(0.025)	(0.936)	(0.451)	
Spain	1994/06/01	0.000	1.313[a]	0.057[a]	-0.114[a]	0.000	-0.047	-0.049	0.142[b]	86.0%	1994-06	-0.004[b]	1.377[a]	0.112[a]	-0.163[a]	-0.003	-0.210[c]	0.214	0.170[c]	86.0%
		(0.664)	(0.000)	(0.000)	(0.000)	(0.475)	(0.239)	(0.221)	(0.020)			(0.036)	(0.000)	(0.010)	(0.000)	(0.621)	(0.081)	(0.248)	(0.059)	
France	1994/06/01	0.000	1.038[a]	-0.030[c]	0.040	-0.001	0.045	0.182[c]	0.180	56.4%	1994-06	0.000	1.018[a]	-0.019	0.105	-0.017	-0.122	-0.031	0.298	58.5%
		(0.846)	(0.000)	(0.063)	(0.116)	(0.359)	(0.753)	(0.055)	(0.127)			(0.954)	(0.000)	(0.780)	(0.269)	(0.290)	(0.698)	(0.880)	(0.367)	
Finland	1998/06/03	0.000	0.179[a]	0.056	0.083[a]	0.000	0.548[a]	-0.142	0.016	15.9%	1998-07	0.004	0.214[a]	-0.179	0.308[a]	-0.002	0.425	0.226	0.398[c]	18.3%
		(0.217)	(0.000)	(0.111)	(0.000)	(0.787)	(0.000)	(0.173)	(0.850)			(0.503)	(0.005)	(0.160)	(0.001)	(0.909)	(0.155)	(0.450)	(0.083)	
Greece	1997/12/01	0.000	1.072[a]	-0.002	0.151[a]	0.000	0.314[a]	-0.165	-0.254	86.1%	1997-12	-0.004[c]	1.176[a]	-0.126[b]	0.052	0.000	-0.197	0.185	0.225	93.0%
		(0.109)	(0.000)	(0.799)	(0.000)	(0.655)	(0.000)	(0.882)	(0.325)			(0.055)	(0.000)	(0.020)	(0.468)	(0.127)	(0.167)	(0.846)	(0.418)	
Netherlands	1994/06/01	0.000	1.203[a]	0.000	-0.031	-0.002[b]	0.455[a]	0.289[a]	-0.533	45.9%	1994-06	0.001	1.141[a]	-0.007	0.022	-0.007	1.099[a]	-0.147	0.351	73.9%
		(0.764)	(0.000)	(0.488)	(0.331)	(0.026)	(0.000)	(0.000)	(0.173)			(0.598)	(0.000)	(0.917)	(0.772)	(0.706)	(0.000)	(0.748)	(0.475)	
Ireland	1994/06/01	0.000	0.912[a]	-0.041[b]	0.014	-0.002	0.624[a]	0.142	0.860[c]	56.6%	1994-06	0.003	0.867[a]	-0.315[a]	-0.001	-0.003	0.385[b]	1.238[a]	1.046[a]	64.6%
		(0.486)	(0.000)	(0.040)	(0.824)	(0.335)	(0.000)	(0.520)	(0.085)			(0.395)	(0.000)	(0.000)	(0.986)	(0.905)	(0.036)	(0.004)	(0.000)	
Italy	1994/06/01	0.000	0.902[a]	-0.005	0.006	0.000	0.274[a]	-0.064	0.008	72.8%	1994-06	0.002	0.877[a]	0.032	0.109[a]	-0.004	0.089	-0.074	0.015	76.5%
		(0.214)	(0.000)	(0.715)	(0.544)	(0.753)	(0.000)	(0.251)	(0.801)			(0.364)	(0.000)	(0.521)	(0.006)	(0.628)	(0.635)	(0.696)	(0.903)	
Luxembourg	1999/01/31	0.000	0.233[a]	-0.017	-0.023	-0.002[b]	0.175[c]	-0.014	0.296[a]	12.3%	1999-02	0.009[a]	0.235[a]	-0.099	-0.048	-0.051[a]	0.506[c]	0.392[b]	-0.459	38.3%
		(0.278)	(0.000)	(0.298)	(0.560)	(0.016)	(0.052)	(0.833)	(0.000)			(0.008)	(0.004)	(0.208)	(0.215)	(0.004)	(0.064)	(0.017)	(0.758)	
Portugal	1996/06/01	0.000	0.870[a]	0.000	0.006	0.147	-0.032	0.055	0.113	60.9%	1996-06	0.001	0.863[a]	0.013	0.061	-0.034[a]	0.303[c]	0.702[a]	-0.327[c]	74.9%
		(0.492)	(0.000)	(0.177)	(0.804)	(0.356)	(0.671)	(0.352)	(0.134)			(0.588)	(0.000)	(0.807)	(0.555)	(0.002)	(0.055)	(0.000)	(0.086)	
United Kingdom	1994/06/01	0.000	1.235[a]	0.001[a]	0.001	-0.002[c]	0.025	0.189[c]	0.180[c]	61.6%	1994-06	0.004	1.112[a]	-0.038	0.064	-0.021	-0.241	-0.081	0.371[b]	61.6%
		(0.177)	(0.000)	(0.000)	(0.961)	(0.059)	(0.789)	(0.061)	(0.071)			(0.113)	(0.000)	(0.590)	(0.312)	(0.128)	(0.351)	(0.657)	(0.012)	
Sweden	1994/06/01	0.000	0.891[a]	0.010	0.088[a]	0.000	0.484[a]	-0.019	0.203[a]	44.4%	1994-06	0.003	0.753[a]	-0.245[c]	0.253[b]	0.001	0.280	0.468[c]	0.160	46.9%
		(0.569)	(0.000)	(0.728)	(0.001)	(0.712)	(0.000)	(0.701)	(0.001)			(0.543)	(0.000)	(0.096)	(0.029)	(0.942)	(0.222)	(0.070)	(0.439)	

Table 9: EU-15 Listed Banks with Real Estate Market Exposure at a Regional Level

This table shows the listed banks in the EU-15 countries analyzed with significant asset exposure to the real estate market at the regional or international level (assets associated with the real estate sector have a weight of at least 40% in international market). Data regarding geography exposure is from the reports and accounts of listed banks in the EU-15 (IAS 14 and IFRS 8). The table shows average figures for the period 2002-2008.

Country	# Listed Banks	'Global' Banks				
		# Banks	Name	Main Regional Market	Non-domestic Asset Weight (%)	Ranking[1]
Germany	24	2	Deutsche Bank	Europe	47.0	1
			Commerzbank	Europe	40.0	2
Austria	8	3	Bank Austria	Europe	66.0	1
			Erste Group Bank	Europe	51.0	2
			Raiffeisen International Bank	Europe	100	6
Belgium	5	3	Dexia	Europe	83.9	1
			Fortis	Europe	58.2	2
			KBC Group	Europe	59.6	3
Spain	10	2	Santander	Europe	62.4	1
			BBVA	Europe	40.9	2
France	34	2	BNP Paribas	Europe	67.0	1
			Société Générale	Europe	51.0	3
Netherlands	7	1	ING Groep	Europe	48.2	1
Ireland	3	2	Allied Irish Banks	United Kingdom	40.1	2
			Bank of Ireland	United Kingdom	60.9	4
Italy	30	1	Unicredit	Europe	61.7	1
Luxembourg	3	1	Espírito Santo Financial Group	BENELUX and Europe	50.9	1
United Kingdom	14	4	Barclays	Europe	39.3	2
			HSBC	Europe	61.8	3
			Lloyds	Europe	39.7	4
			Standard Chartered	Asia	98.0	5
Sweden	6	2	Nordea Bank	Scandinavia	76.6	1
			SEB	Scandinavia	47.0	2

[1] Ranking at the domestic level in terms of Total Assets for 2008; Source: BANKSCOPE.

Table 10: Three-Factor Model Estimates - Monthly Stock Returns and Regional Indices

This table reports the estimation results of the model defined in equation (1): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + e_{jt}$, for the subset of the EU-15 countries analyzed whose banking sector has significant degree of internationalization. The region is chosen on the basis of information provided in financial reports. R_{jt} are banking industry index returns for country j in period t; R_{mjt} are the general stock market returns for country j in period t; I_{jt} are unexpected yield changes on 10 year government bonds for country j in period t and R_{Rjt} are the real estate industry index returns for region l in period t. The model is estimated for three different periods based on monthly stock returns: Total Period: from the date indicated in the column "Start" to the end of 2008; 5 years: 2002 to 2006; and 10 years: 1997 to 2006. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Country (Region)[1]	Start-2008 (Total Period)						2002-2006 (5 years)						1997-2006 (10 years)					
	Start	β_0	β_m	β_I	β_R	Adj. R^2	β_0	β_m	β_I	β_R	Adj. R^2		β_0	β_m	β_I	β_R	Adj. R^2	
Germany (Europe)	1993-10	-0.008[b]	1.035[a]	0.051	0.192[b]	63.7%	-0.015	1.084[a]	-0.025	0.255[b]	76.0%		0.002	1.029[a]	0.134	0.151[a]	61.0%	
		(0.021)	(0.000)	(0.547)	(0.037)		(0.268)	(0.000)	(0.823)	(0.020)			(0.731)	(0.000)	(0.210)	(0.003)		
Austria (Europe)	1991-11	0.001	0.946[a]	0.155[b]	0.088[b]	58.8%	0.002	1.132[a]	0.072	0.088[c]	51.6%		0.004	1.131[a]	0.118	0.129[b]	53.6%	
		(0.809)	(0.000)	(0.029)	(0.042)		(0.668)	(0.000)	(0.398)	(0.064)			(0.366)	(0.000)	(0.157)	(0.042)		
Belgium (Europe)	1989-07	-0.005[b]	1.260[a]	0.119[b]	0.210[a]	80.0%	-0.006[b]	1.402[a]	0.019	0.077[c]	90.3%		-0.005[b]	1.344[a]	0.043	0.136[c]	83.5%	
		(0.017)	(0.000)	(0.040)	(0.002)		(0.040)	(0.000)	(0.760)	(0.082)			(0.053)	(0.000)	(0.492)	(0.069)		
Spain (Europe)	1991-05	-0.003	1.264[a]	0.158[a]	0.122[a]	84.7%	-0.004	1.435[a]	0.204[a]	0.294[b]	88.3%		0.000	1.384[a]	0.160[a]	0.250[b]	86.8%	
		(0.150)	(0.000)	(0.001)	(0.061)		(0.210)	(0.000)	(0.004)	(0.030)			(0.961)	(0.000)	(0.008)	(0.015)		
France (Europe)	1987-08	-0.002	0.956[a]	-0.011	0.313[a]	58.5%	-0.005	1.022[a]	0.002	0.253[b]	72.3%		-0.001	1.132[a]	-0.049	0.274[b]	64.1%	
		(0.549)	(0.000)	(0.865)	(0.002)		(0.214)	(0.000)	(0.975)	(0.035)			(0.850)	(0.000)	(0.544)	(0.044)		
Netherlands (Europe)	1986-06	-0.006	1.267[a]	0.020	0.367[b]	66.7%	-0.010	1.642[a]	-0.186	0.485[b]	80.2%		-0.009[c]	1.414[a]	-0.022	0.473[a]	75.5%	
		(0.154)	(0.000)	(0.833)	(0.029)		(0.113)	(0.000)	(0.277)	(0.011)			(0.051)	(0.000)	(0.844)	(0.002)		
Ireland (United Kingdom)	1986-06	-0.005	0.933[a]	-0.161[c]	0.196[a]	53.3%	-0.022[a]	1.024[a]	0.152	0.469[a]	61.7%		-0.008	1.090[a]	-0.018	0.329[a]	52.9%	
		(0.223)	(0.000)	(0.066)	(0.003)		(0.002)	(0.000)	(0.338)	(0.000)			(0.185)	(0.000)	(0.893)	(0.002)		
Italy (Europe)	1987-04	0.001	0.919[a]	0.035	0.144[b]	76.0%	0.008[c]	1.215[a]	0.075	0.278[b]	79.8%		0.001	1.013[a]	0.019	0.117[c]	82.3%	
		(0.651)	(0.000)	(0.479)	(0.026)		(0.053)	(0.000)	(0.336)	(0.041)			(0.656)	(0.000)	(0.755)	(0.076)		
Luxembourg (Benelux)	1999-01	-0.002	0.261[a]	-0.036	0.360[b]	21.1%	-0.005	0.498[a]	-0.051	0.357[b]	30.3%							
		(0.633)	(0.002)	(0.716)	(0.025)		(0.315)	(0.000)	(0.632)	(0.017)								
United Kingdom (Europe)	1986-06	0.001	1.053[a]	-0.065	0.295[a]	65.6%	-0.010[b]	0.866[a]	0.089	0.350[a]	61.4%		-0.002	1.138[a]	-0.012	0.250[b]	60.6%	
		(0.654)	(0.000)	(0.360)	(0.000)		(0.022)	(0.000)	(0.420)	(0.006)			(0.563)	(0.000)	(0.891)	(0.035)		
Sweden (Scandinavia)	1988-12	0.002	0.687[a]	-0.153	0.410[a]	50.1%	0.000	0.755[a]	0.116	0.187[b]	69.8%		0.001	0.568[a]	0.035	0.305[a]	52.1%	
		(0.625)	(0.000)	(0.134)	(0.000)		(0.994)	(0.000)	(0.201)	(0.045)			(0.728)	(0.000)	(0.702)	(0.001)		

[1]In parentheses the geographic region chosen to proxy the real estate market risk factor.

Table 11: Three-Factor Model Estimates - Daily Stock Returns and Regional Indices

This table reports the estimation results of the model defined in equation (1): $R_{jt} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + e_{jt}$, for the subset of the EU-15 countries analyzed whose banking sector has significant degree of internationalization. The region is chosen on the basis of information provided in financial reports. R_{jt} are banking industry index returns for country j in period t; R_{mjt} are the general stock market returns for country j in period t; I_{jt} are unexpected yield changes on 10 year government bonds for country j in period t and R_{Rjt} are the real estate industry index returns for region l in period t. The model is estimated for three different periods based on daily stock returns: Total Period: from the date indicated in the column "Start" to the end of 2008;5 years: 2002 to 2006; and 10 years: 1997 to 2006. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Country (Region)[1]	Start-2008 (Total Period)						2002-2006 (5 years)					1997-2006 (10 years)				
	Start	β_0	β_m	β_I	β_R	Adj. R^2	β_0	β_m	β_I	β_R	Adj. R^2	β_0	β_m	β_I	β_R	Adj. R^2
Germany (Europe)	1993/10/01	0.000	0.737[a]	0.074[a]	0.612[a]	51.7%	0.000	0.736[a]	0.133[a]	0.636[a]	55.0%	0.000	0.742[a]	0.106[a]	0.614[a]	52.2%
		(0.296)	(0.000)	(0.005)	(0.000)		(0.169)	(0.000)	(0.003)	(0.000)		(0.887)	(0.000)	(0.001)	(0.000)	
Austria (Europe)	1991/10/11	0.000	1.122[a]	0.068[a]	0.141[a]	59.0%	0.000	1.375[a]	0.022	0.183[c]	57.2%	0.000	1.200[a]	0.037[b]	0.097[a]	54.5%
		(0.998)	(0.000)	(0.004)	(0.001)		(0.922)	(0.000)	(0.424)	(0.066)		(0.452)	(0.000)	(0.037)	(0.006)	
Belgium (Europe)	1989/06/06	0.000	1.355[a]	0.000	0.056[b]	69.1%	0.006[b]	1.500[a]	0.031[b]	0.090[a]	92.8%	0.010[a]	1.433[a]	0.052[a]	0.062[b]	82.7%
		(0.159)	(0.000)	(0.305)	(0.047)		(0.019)	(0.000)	(0.014)	(0.000)		(0.000)	(0.000)	(0.000)	(0.021)	
Spain (Europe)	1991/04/05	0.000	1.233[a]	0.060[a]	0.162[c]	85.4%	0.000	1.375[a]	0.054[a]	0.188[a]	90.6%	0.000	1.317[a]	0.074[a]	0.201[a]	88.3%
		(0.122)	(0.000)	(0.000)	(0.060)		(0.204)	(0.000)	(0.000)	(0.009)		(0.243)	(0.000)	(0.000)	(0.009)	
France (Europe)	1987/07/09	0.000	1.076[a]	0.018	0.137[a]	55.8%	0.000	1.118[a]	-0.019	0.116[a]	82.5%	0.000	1.039[a]	-0.009	0.100[a]	59.8%
		(0.574)	(0.000)	(0.224)	(0.001)		(0.543)	(0.000)	(0.173)	(0.000)		(0.343)	(0.000)	(0.637)	(0.000)	
Netherlands (Europe)	1986/05/16	0.000	1.217[a]	0.000	0.121[a]	44.7%	0.006	1.434[a]	0.031	0.205[a]	82.9%	0.000	1.288[a]	0.000	0.130[a]	71.9%
		(0.702)	(0.000)	(0.484)	(0.009)		(0.411)	(0.000)	(0.437)	(0.000)		(0.490)	(0.000)	(0.293)	(0.001)	
Ireland (United Kingdom)	1986/05/28	0.000	1.087[a]	0.041[b]	0.128[a]	52.9%	0.000	0.863[a]	0.172[a]	0.146[a]	52.8%	0.000	0.946[a]	0.110[a]	0.184[a]	50.4%
		(0.192)	(0.000)	(0.045)	(0.008)		(0.965)	(0.000)	(0.000)	(0.007)		(0.295)	(0.000)	(0.000)	(0.004)	
Italy (Europe)	1987/04/01	0.000	0.880[a]	-0.002	0.259[a]	73.3%	0.000	1.062[a]	0.022	0.088[a]	78.8%	0.000	0.958[a]	0.041[a]	0.083[a]	75.2%
		(0.846)	(0.000)	(0.883)	(0.000)		(0.311)	(0.000)	(0.206)	(0.010)		(0.254)	(0.000)	(0.010)	(0.002)	
Luxembourg (Benelux)	1998/12/31	0.000	0.275[a]	-0.018	0.146[a]	9.7%	0.000	0.247[a]	-0.049	0.101	4.9%					
		(0.989)	(0.000)	(0.324)	(0.001)		(0.802)	(0.000)	(0.199)	(0.105)						
United Kingdom (Europe)	1986/05/16	0.000	1.183[a]	0.001	0.234[a]	62.0%	0.000	1.136[a]	0.153[a]	0.151[a]	70.5%	0.000	1.244[a]	0.103[a]	0.075[b]	66.0%
		(0.970)	(0.000)	(0.366)	(0.000)		(0.958)	(0.000)	(0.000)	(0.001)		(0.542)	(0.000)	(0.000)	(0.020)	
Sweden (Scandinavia)	1988/11/29	0.000	0.885[a]	0.019	0.209[a]	44.7%	0.000	1.006[a]	0.030	0.072[b]	69.8%	0.000	0.713[a]	0.004	0.233[a]	51.0%
		(0.814)	(0.000)	(0.355)	(0.000)		(0.531)	(0.000)	(0.199)	(0.019)		(0.561)	(0.000)	(0.868)	(0.000)	

[1]In parentheses the geographic region chosen to proxy the real estate market risk factor.

Table 12: Fama and French Extended Model Regional Indices Estimates - Daily and Monthly Stock Returns

The table reports the estimation results of Fama and French extended model defined in equation (2): $R_{ij} = \beta_{0j} + \beta_{mj}R_{mjt} + \beta_{Ij}I_{jt} + \beta_{Rj}R_{Rjt} + \beta_{vj}HML_{jt} + \beta_{sj}SMB_{jt} + e_{jt}$, for the subset of the EU-15 countries analyzed whose banking sector has significant degree of internationalization. The region is chosen on the basis of information provided in financial reports. R_{ij} are banking industry index returns for country *j* in period *t*; R_{mjt} are the general stock market returns for country *j* in period *t*; I_{jt} are unexpected yield changes on 10 year government bonds for country *j* in period *t* and R_{Rjt} are the real estate industry index returns for region *l* in period *t*. HML_{jt} e SMB_{jt} measure, respectively, the excess returns of value stocks vis a vis growth stocks, and the excess returns small vis a vis large capitalization stocks. β_{mj}, β_{Ij} , β_{Rj}, β_{vj} and β_{sj} are the coefficients to estimate. The model is estimated for from the date indicated in the column "Start" to the end of 2008. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Country (Region)[1]	Monthly Returns								Daily Returns							
	Start	β_0	β_m	β_I	β_R	β_v	β_s	Adj. R^2	Start	β_0	β_m	β_I	β_R	β_v	β_s	Adj. R^2
Germany (Europe)	1994-06	-0.008[b]	1.092[a]	0.090	0.152[a]	0.343[a]	-0.052	65.5%	1994/06/01	0.000	0.629[a]	0.109[a]	0.660[a]	0.344[a]	-0.433[a]	56.3%
		(0.025)	(0.000)	(0.295)	(0.000)	(0.002)	(0.611)			(0.123)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
Austria (Europe)	1994-06	-0.001	0.973[a]	0.106	0.046	0.340[a]	-0.120[b]	69.0%	1994/06/01	0.000	1.125[a]	0.063[a]	0.088[b]	0.166[a]	-0.168[a]	66.9%
		(0.711)	(0.000)	(0.136)	(0.685)	(0.002)	(0.034)			(0.751)	(0.000)	(0.003)	(0.026)	(0.000)	(0.000)	
Belgium (Europe)	1994-06	-0.007[a]	1.330[a]	0.074	0.102[b]	0.389[a]	-0.143[b]	89.5%	1994/06/01	0.010[a]	1.263[a]	0.052[a]	0.051[b]	0.478[a]	-0.254[a]	85.0%
		(0.001)	(0.000)	(0.150)	(0.049)	(0.000)	(0.017)			(0.005)	(0.000)	(0.004)	(0.022)	(0.000)	(0.000)	
Spain (Europe)	1994-06	-0.001	1.122[a]	0.152[a]	0.155[b]	-0.063	-0.250[a]	87.5%	1994/06/01	0.000	1.183[a]	0.063[a]	0.058[b]	0.152[a]	-0.124[a]	87.5%
		(0.737)	(0.000)	(0.001)	(0.039)	(0.344)	(0.000)			(0.347)	(0.000)	(0.000)	(0.018)	(0.004)	(0.000)	
France (Europe)	1994-06	-0.004	1.174[a]	-0.016	0.149[c]	0.702[a]	-0.170	66.7%	1994/06/01	0.000	1.376[a]	-0.010	0.134[a]	0.394[a]	0.231[a]	62.9%
		(0.208)	(0.000)	(0.822)	(0.075)	(0.000)	(0.181)			(0.273)	(0.000)	(0.527)	(0.009)	(0.000)	(0.000)	
Netherlands (Europe)	1994-06	-0.009[b]	1.381[a]	0.027	0.339[b]	0.595[a]	-0.100	76.9%	1994/06/01	0.000	1.450[a]	0.000	0.465[b]	0.352[a]	0.132	46.7%
		(0.022)	(0.000)	(0.755)	(0.015)	(0.000)	(0.405)			(0.634)	(0.000)	(0.210)	(0.026)	(0.000)	(0.465)	
Ireland (United Kingdom)	1994-06	-0.003	1.039[a]	-0.115	0.226[b]	0.128	-0.322[a]	57.4%	1994/06/01	0.000	1.191[a]	0.104[a]	0.127[c]	0.000	0.000	55.9%
		(0.549)	(0.000)	(0.319)	(0.014)	(0.138)	(0.000)			(0.488)	(0.000)	(0.009)	(0.078)	(0.118)	(0.145)	
Italy (Europe)	1994-06	0.000	1.037[a]	0.015	0.134[c]	0.280[a]	-0.057	82.5%	1994/06/01	0.000	0.997[a]	-0.002	0.112[a]	0.307[a]	-0.017	78.3%
		(0.845)	(0.000)	(0.793)	(0.068)	(0.004)	(0.398)			(0.939)	(0.000)	(0.893)	(0.000)	(0.000)	(0.364)	
Luxembourg (Benelux)	1999-02	-0.003	0.315[a]	-0.004	0.274[b]	0.316	0.186	22.7%	1999/01/31	0.000	0.276[a]	-0.018	0.143[a]	0.027	-0.028	9.7%
		(0.437)	(0.001)	(0.962)	(0.032)	(0.129)	(0.186)			(0.975)	(0.001)	(0.239)	(0.000)	(0.238)	(0.118)	
United Kingdom (Europe)	1994-06	-0.001	1.123[a]	0.024	0.302[a]	0.296[a]	-0.237[b]	63.1%	1994/06/01	0.000	1.256[a]	0.054[b]	0.186[b]	0.834[a]	-0.171[b]	71.3%
		(0.815)	(0.000)	(0.756)	(0.005)	(0.007)	(0.011)			(0.538)	(0.000)	(0.028)	(0.027)	(0.000)	(0.034)	
Sweden (Scandinavia)	1994-06	0.000	0.994[a]	-0.190[b]	0.128[c]	0.673[a]	-0.153[c]	61.9%	1994/06/01	0.000	1.016[a]	-0.016	0.135[a]	0.771[a]	-0.181[a]	70.9%
		(0.895)	(0.000)	(0.017)	(0.075)	(0.000)	(0.093)			(0.457)	(0.000)	(0.293)	(0.000)	(0.000)	(0.000)	

[1]In parentheses is indicated the geographic region used as a risk factor of the real estate industry in the estimation of equation (2).

Table 13: Real Estate Market Sensitivities and Bank Size

This table shows bank's real estate market sensitivities for different size quintiles, estimated over the period 2002-2008. Proxies for size are *Total Assets*, *Total Loans* and *Market Capitalization* (Panel A, B and C, respectively) from BANKSCOPE ("Total Assets", "Total Loans - Net" and "Current Market Capitalization", respectively). The average estimates of real estate market sensitivities were obtained based on the three-factor model (equation 1) and Fama and French extended model (equation 2), using daily and monthly stock returns of the 202 listed banks in the EU-15 countries analyzed. Each quintile comprises 40 banks except for the lowest quintile which is composed of 42 banks. Banks with the lowest average value of total assets, market capitalization or total loans are included in the "Small" quintile. *t*-tests are for average differences between Small and Large quintiles. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Panel A. Total Assets

Quintile	Total Assets	Real Estate Market Sensitivity			
		Three-factor Model		Fama and French Extended Model	
		Daily Returns	Monthly Returns	Daily Returns	Monthly Returns
Large	519,358.3	0.0737	0.1062	0.0344	0,0778
Q2	32,088.8	0.1322	0.1608	0.0560	0,0763
Q3	7,529.9	0.1150	0.1541	0.0768	0,0544
Q4	1,369.1	0.1304	0.1805	0.0690	0,0790
Small	213.8	0.1737	0.2737	0.1450	0,2046
t-Test		1,746[b]	3.241[a]	1.943[b]	2.044[b]
(*p-value*)		(0,040)	(0.001)	(0.026)	(0.020)

Panel B. Total Loans

Quintile	Loans	Real Estate Market Sensitivity			
		Three-Factor Model		Fama and French Extended Model	
		Daily Returns	Monthly Returns	Daily Returns	Monthly Returns
Large	208,050.4	0.0767	0.1054	0.0362	0,0754
Q2	19,224.2	0.1283	0.1682	0.0565	0,0806
Q3	4,313.0	0.1028	0.1536	0.0589	0,0455
Q4	586.3	0.1040	0.1540	0.0649	0,0897
Small	53.1	0.2108	0.2787	0.1580	0,1900
t-Test		2,334[a]	3.390[a]	2.095[b]	1.786[b]
(*p-value*)		(0,010)	(0.000)	(0.018)	(0.037)

Panel C. Market Capitalization

Quintile	Market Cap	Real Estate Factor Sensitivity			
		Three-factor Model		Fama and French Extended Model	
		Daily Returns	Monthly Returns	Daily Returns	Monthly Returns
Large	20,919.2	0.087	0.095	0.149	0,148
Q2	2,139.8	0.102	0.114	0.156	0,152
Q3	685.8	0.070	0.095	0.185	0,242
Q4	157.8	0.119	0.147	0.189	0,274
Small	33.8	0.156	0.175	0.208	0,263
t-Test		1,700[b]	1.591[c]	1.698[b]	2.603[a]
(*p-value*)		(0,045)	(0.056)	(0.045)	(0.005)

Table 14: Real Estate Market Sensitivities and Bank Asset Exposure to the Real Estate Market

This table shows bank's real estate market sensitivities for different size quintiles, estimated over the period 2002-2008. Proxies for Bank Asset Exposure to the Real Estate are *Real Estate/Equity*, *Real Estate/ Assets*, *Real Estate Loans/Equity* and *Real Estate Loans/Assets* (Panel A, B, C and D, respectively). *Real Estate* refers to real estate holdings obtained by adding Real Estate Loans and Direct Real Estate Investments. Equity and Assets are respectively, the book values of equity and of total assets. The average estimates of real estate market sensitivities were obtained based on the three-factor model (equation 1) and Fama and French extended model (equation 2), using daily and monthly stock returns of the 202 listed banks in the EU-15 countries analyzed. Each quintile comprises 40 banks except for the lowest quintile which is composed of 42 banks. Banks with lowest Real Estate/Equity, Real Estate/Assets, Real Estate Loans/Equity or Real Estate Loans/Assets ratios are aggregated in the "Low" quintile. *t*-tests are for average differences between High and Low quintiles. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Panel A. Real Estate/Equity

Quintile	Real Estate/Equity	Real Estate Factor Sensitivity			
		Three-factor Model		Fama and French Extended Model	
		Daily Returns	Monthly Returns	Daily Returns	Monthly Returns
High	9.1041	0.1714	0.2432	0.0753	0,1330
Q2	3.7419	0.1213	0.2043	0.0675	0,1283
Q3	2.2929	0.1010	0.1597	0.0561	0,0953
Q4	1.1700	0.0869	0.1306	0.0405	0,1047
Low	0.1639	0.0819	0.1275	0.0522	0,0287
t-Test		2,071[b]	2.002[b]	0.741	1.464[c]
(*p-value*)		(0,019)	(0.023)	(0.229)	(0.072)

Panel B. Real Estate/Assets

Quintile	Real Estate/Assets	Real Estate Factor Sensitivity			
		Three-factor Model		Fama and French Extended Model	
		Daily Returns	Monthly Returns	Daily Returns	Monthly Returns
High	0.4566	0.1525	0.2893	0.0621	0,1853
Q2	0.2707	0.0887	0.1707	0.0460	0,0917
Q3	0.1901	0.0886	0.1878	0.0388	0,0935
Q4	0.1195	0.0889	0.1743	0.0547	0,0820
Low	0.0272	0.0866	0.1271	0.0454	0,0113
t-Test		1,323[c]	2.472[a]	0.348	2.111[b]
(*p-value*)		(0,093)	(0.007)	(0.364)	(0.017)

Table 14. Real Estate Market Sensitivities and Bank Asset Exposure to the Real Estate Market (cont.)

Panel C: Real Estate Loans/Equity

Quintile	Real Estate Loans /Equity	Real Estate Factor Sensitivity			
		Three-factor Model		Fama and French Extended Model	
		Daily Returns	Monthly Returns	Daily Returns	Monthly Returns
High	8.917	0.1410	0.1720	0.1960	0,2370
Q2	3.529	0.0800	0.0750	0.1990	0,1780
Q3	2.028	0.0880	0.1000	0.1490	0,1850
Q4	1.021	0.0860	0.0980	0.1520	0,1650
Low	0.091	0.0700	0.0840	0.0770	0,1260
t-Test		1.574[c]	1.743[b]	2.384[a]	1.653[b]
(*p-value*)		(0.058)	(0.041)	(0.009)	(0.049)

Panel D. Real Estate Loans/Assets

Quintile	Real Estate Loans /Assets	Real Estate Factor Sensitivity			
		Three-factor Model		Fama and French Extended Model	
		Daily Returns	Monthly Returns	Daily Returns	Monthly Returns
High	0.4220	0.1220	0.1480	0.1930	0,2840
Q2	0.2530	0.0920	0.0850	0.1490	0,2100
Q3	0.1730	0.0850	0.1120	0.1320	0,2120
Q4	0.0990	0.0760	0.0670	0.1310	0,2200
Low	0.0170	0.0720	0.0780	0.0840	0,1160
t-Test		1.285[c]	1.403[c]	1.944[b]	2.221[b]
(*p-value*)		(0.099)	(0.080)	(0.026)	(0.013)

Table 15: Simple Cross-Sectional Regressions

The table reports the results of simple cross-sectional regressions defined in equation (4) based on daily and monthly returns for the period 2002-2008, given by: $\widehat{\beta_{Ri}} = a_0 + a_1 VR_i + \varepsilon_i$. $\widehat{\beta_{Ri}}$ is the estimated beta value associated to real estate market risk for bank *i* and VR_i is a variable associated to size or asset exposure to the real estate, for bank *i*. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets. In panels A and B, respectively, the real estate market sensitivities were obtained based on the three-factor model (equation 1) and the Fama and French extended model (equation 2), for the 202 listed banks in the EU-15 countries analyzed.

Panel A. Three-Factor Model

Variable	Daily Returns				Monthly Returns			
	α_0	α_1	R^2 Adj.	*F-Statistic*	α_0	α_1	R^2 Adj.	*F-Statistic*
Log (Assets)	0.233[a]	-0.013[c]	3.00%	44.59[a]	0.360[a]	-0.021[a]	8.00%	84.08[a]
	(0.001)	(0.072)			(0.000)	(0.001)		
Log (Loans)	0.162[a]	-0.006[b]	2.10%	47.45[a]	0.231[a]	-0.008[b]	3.40%	82.00[a]
	(0.000)	(0.024)			(0.000)	(0.021)		
Log (Market Capitalization)	0.172[a]	-0.010[b]	2.40%	59.65[a]	0.208[a]	-0.013[b]	2.51%	51.42[a]
	(0.000)	(0.028)			(0.000)	(0.025)		
Real Estate/Equity	0.070[a]	0.013[b]	8.80%	58.69[a]	0.109[a]	0.019[a]	9.90%	78.32[a]
	(0.000)	(0.021)			(0.000)	(0.000)		
Real Estate/Assets	0.072[a]	0.135[c]	0.90%	32.21[a]	0.114[a]	0.358[a]	6.20%	73.41[a]
	(0.001)	(0.094)			(0.000)	(0.002)		
Real Estate Loans/Equity	0.068[a]	0.008[a]	3.48%	43.51[a]	0.069[a]	0.012[a]	5.43%	42.87[a]
	(0.000)	(0.008)			(0.000)	(0.009)		
Real Estate Loans/Assets	0.063[a]	0.134[c]	1.78%	14.09[a]	0.064[a]	0.173[c]	1.79%	30.07[a]
	(0.000)	(0.059)			(0.003)	(0.058)		

Panel B. Fama and French Extended Model

Variable	Daily Returns				Monthly Returns			
	α_0	α_1	R^2 Adj.	*F-Statistic*	α_0	α_1	R^2 Adj.	*F-Statistic*
Log (Assets)	0.203[a]	-0.015[b]	4.10%	19.12[a]	0.239[a]	-0.016[b]	3.20%	20.18[a]
	(0.007)	(0.050)			(0.003)	(0.039)		
Log (Loans)	0.117[a]	-0.006[b]	1.90%	18.71[a]	0.118[a]	-0.003	1.00%	18.62[a]
	(0.000)	(0.030)			(0.000)	(0.413)		
Log (Market Capitalization)	0.245[a]	-0.011[b]	1.25%	21.07[a]	0.378[a]	-0.025[a]	4.86%	25.10[a]
	(0.000)	(0.042)			(0.000)	(0.002)		
Real Estate/Equity	0.046[a]	0.004	1.10%	26.40[a]	0.060[b]	0.012[b]	2.40%	17.36[a]
	(0.000)	(0.333)			(0.014)	(0.016)		
Real Estate/Assets	0.046[b]	0.017	0.10%	10.50[a]	0.021	0.354[a]	4.40%	38.19[a]
	(0.012)	(0.798)			(0.588)	(0.006)		
Real Estate Loans/Equity	0.129[a]	0.007[c]	1.62%	19.67[a]	0.131[a]	0.015[a]	4.46%	23.81[a]
	(0.000)	(0.071)			(0.000)	(0.003)		
Real Estate Loans/Assets	0.129[a]	0.156	1.10%	21.00[a]	0.138[a]	0.264[b]	1.98%	26.38[a]
	(0.000)	(0.139)			(0.000)	(0.046)		

Table 16: Multiple Cross-Sectional Regressions

The table reports the results of the multiple cross-sectional regressions defined in equation (5) based on monthly returns for the period 2002-2008, given by: $\widehat{\beta_{Rt}} = a_0 + a_1 VRD_i + a_2 VRE_i + \varepsilon_i$. $\widehat{\beta_{Rt}}$ is the estimated beta value associated to real estate market risk for bank *i* and VRD_i e VRE_i are the variables associated to the size and asset exposure to real estate, for bank *i*, respectively. a_0 is the independent term and ε_i is the error term. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets. In panels A and B the real estate market sensitivities were obtained based on the model of three factors (equation 1) and Fama and French extended model (equation 2), respectively, for the 202 listed banks in the EU-15 countries analyzed.

Panel A. Three-Factor Model (Monthly Returns)

	1	2	3	4	5	6	7	8
Intercept	0.293[a]	0.352[a]	0.310[a]	0.352[a]	0.262[a]	0.296[a]	0.280[a]	0.299[a]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Assets)	-0.014[b]	-0.022[a]	-0.014[b]	-0.021[a]				
	(0.028)	(0.002)	(0.030)	(0.003)				
Log (Market Capitalization)					-0.014[c]	-0.020[b]	-0.014[c]	-0.019[b]
					(0.074)	(0.019)	(0.079)	(0.022)
Real Estate/Equity		0.017[a]				0.014[a]		
		(0.001)				(0.006)		
Real Estate/Assets	0.228[b]				0.214[c]			
	(0.044)				(0.059)			
Real Estate Loans/Equity				0.015[a]				0.013[b]
				(0.003)				(0.012)
Real Estate Loans/Assets			0.167				0.145	
			(0.177)				(0.238)	
Adj. R^2	3.81%	6.97%	2.72%	6.18%	3.01%	4.94%	1.93%	4.37%
F-Statistic	25.34[a]	24.92[a]	25.48[a]	25.03[a]	25.45[a]	25.20[a]	25.59[a]	25.27[a]

Panel B. Fama and French Extended Model (Monthly Returns)

Model	1	2	3	4	5	6	7	8
Intercept	0.080	0.142[b]	0.103	0.141[b]	0.054	0.101[c]	0.078	0.103[c]
	(0.225)	(0.028)	(0.116)	(0.031)	(0.380)	(0.087)	(0.204)	(0.081)
Log (Assets)	-0.004[b]	-0.009	-0.004	-0.007				
	(0.028)	(0.266)	(0.563)	(0.330)				
Log (Market Capitalization)					-0.001	-0.004	-0.001	-0.004
					(0.892)	(0.647)	(0.883)	(0.702)
Real Estate/Equity		0.012[b]				0.011[b]		
		(0.027)				(0.049)		
Real Estate/Assets	0.303[b]				0.295[b]			
	(0.014)				(0.017)			
Real Estate Loans/Equity				0.011[c]				0.009[c]
				(0.058)				(0.094)
Real Estate Loans/Assets			0.222[c]				0.208[c]	
			(0.099)				(0.092)	
Adj. R^2	3.03%	2.47%	1.39%	1.83%	2.88%	1.96%	1.24%	1.43%
F-Statistic	27.52[a]	27.60[a]	27.75[a]	27.70[a]	29.55[a]	27.68[a]	25.78[a]	27.78[a]

Table 17: Institutional Characteristics: Multiple Cross-Sectional Regressions

The table reports the results for each cluster of the multiple cross-sectional regressions defined in equation (5) based on monthly returns for the period 2002-2008, given by: $\widehat{\beta_{Rt}} = a_0 + a_1 VRD_i + a_2 VRE_i + \varepsilon_i$. $\widehat{\beta_{Rt}}$ is the estimated beta value associated to real estate market risk for bank *i* and VRD_i e VRE_i are the variables associated to the size and asset exposure to real estate, for bank *i*, respectively. a_0 is the independent term and ε_i is the error term. The clusters were defined according Martins *et. al.* (2011). The clusters formed are: cluster 1: Germany and Austria; cluster 2: Italy and Greece; cluster 3: Belgium, France, Luxembourg, Netherlands and Portugal; cluster 4: Denmark, Finland and Sweden and cluster 5: Spain, United Kingdom and Ireland. In panels A and B the real estate market sensitivities were obtained based on the model of three factors (equation 1) and Fama and French extended model (equation 2), respectively, for the 202 listed banks in the EU-15 countries analyzed. The Wald test for the existence of structural changes in the relationship has the null hypothesis of no significant differences in equations estimated in each of the subsamples. [a], [b] and [c] denote statistical significance at 1%, 5% and 10%, respectively. The *p-value*s are presented in brackets.

Panel A: Three-Factor Model (Monthly Returns)

Specification 1	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.293[a]	0.421[b]	0.414[b]	0.227[c]	0.255[a]	-0.078
	(0.000)	(0.045)	(0.013)	(0.082)	(0.005)	(0.579)
Log (Assets)	-0.014[b]	-0.004[c]	-0.016[c]	-0.005	-0.020[c]	-0.021[b]
	(0.028)	(0.093)	(0.075)	(0.661)	(0.066)	(0.036)
Real Estate/Assets	0.228[b]	0.093[c]	0.201[c]	0.162[c]	0.322[c]	0.417[b]
	(0.044)	(0.100)	(0.091)	(0.081)	(0.076)	(0.033)
Adj. R²	3.81%	6.99%	9.76%	2.49%	4.12%	18.51%
Wald-Statistic		9.339[b]	5.953	1.233	1.841	7.290[c]
		(0.025)	(0.114)	(0.745)	(0.606)	(0.063)

Specification 2	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.352[a]	0.549[a]	0.464[a]	0.322[a]	0.235[a]	-0.042
	(0.000)	(0.004)	(0.003)	(0.003)	(0.006)	(0.747)
Log (Assets)	-0.022[a]	-0.006[b]	-0.026[c]	-0.004[c]	-0.022[c]	-0.027[c]
	(0.002)	(0.012)	(0.067)	(0.070)	(0.087)	(0.077)
Real Estate/Equity	0.017[a]	0.004[a]	0.016	0.018[c]	0.020	0.028[b]
	(0.001)	(0.004)	(0.183)	(0.082)	(0.761)	(0.013)
Adj. R²	6.97%	21.32%	7.99%	5.26%	3.12%	22.04%
Wald-Statistic		16.088[a]	3.879	0.809	2.043	8.662[b]
		(0.001)	(0.275)	(0.847)	(0.564)	(0.034)

Specification 3	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.310[a]	0.467[b]	0.422[a]	0.322[a]	0.305[b]	-0.061
	(0.000)	(0.021)	(0.007)	(0.003)	(0.016)	(0.640)
Log (Assets)	-0.014[b]	-0.004[c]	-0.018	-0.004[c]	-0.019[b]	-0.031[b]
	(0.030)	(0.100)	(0.351)	(0.070)	(0.041)	(0.047)
Real Estate	0.167	0.119	0.184	0.018	0.184	0.423[b]
Loans/Assets	(0.177)	(0.186)	(0.881)	(0.821)	(0.673)	(0.021)
Adj. R²	2.72%	3.32%	10.20%	5.26%	6.12%	19.37%
Wald-Statistic		6.928[c]	4.921	1.237	1.899	6.539[c]
		(0.074)	(0.178)	(0.744)	(0.594)	(0.088)

Specification 4	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.352[a]	0.561[a]	0.460[a]	0.321[a]	0.229[a]	-0.040
	(0.000)	(0.003)	(0.003)	(0.003)	(0.007)	(0.755)
Log (Assets)	-0.021[a]	-0.008[b]	-0.026[c]	-0.003	-0.013	-0.028[b]
	(0.003)	(0.014)	(0.072)	(0.760)	(0.323)	(0.037)
Real Estate	0.015[a]	0.009[a]	0.018[b]	0.016[c]	0.023[c]	0.027[b]
Loans/Equity	(0.003)	(0.007)	(0.032)	(0.069)	(0.058)	(0.011)
Adj. R²	6.18%	19.29%	8.33%	4.00%	6.12%	22.85%
Wald-Statistic		15.505[a]	3.752	0.867	2.104	10.180[b]
		(0.001)	(0.290)	(0.833)	(0.551)	(0.017)

Table 17: Institutional Characteristics: Multiple Cross-Sectional Regressions (cont.)

Panel A. Three-Factor Model

Specification 5	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.262[a]	0.402[b]	0.380[a]	0.092	0.251[a]	-0.057
	(0.000)	(0.041)	(0.004)	(0.477)	(0.001)	(0.663)
Log (Market	-0.014[c]	-0.005[c]	-0.014	-0.011	-0.015	-0.018[c]
Capitalization)	(0.074)	(0.094)	(0.486)	(0.487)	(0.626)	(0.088)
Real Estate/Assets	0.214[c]	0.084[c]	0.181[c]	0.193[c]	-0.165	0.444[b]
	(0.059)	(0.055)	(0.077)	(0.073)	(0.753)	(0.015)
Adj. R²	3.01%	6.01%	9.95%	5.98%	1.80%	17.64%
Wald-Statistic		9.415[b]	3.992	2.908	1.643	6.377[c]
		(0.024)	(0.262)	(0.406)	(0.650)	(0.095)

Specification 6	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.296[a]	0.484[a]	0.412[a]	0.236[b]	0.236[a]	-0.030
	(0.000)	(0.008)	(0.002)	(0.030)	(0.001)	(0.808)
Log (Market	-0.020[b]	-0.008[b]	-0.026[c]	-0.008	-0.013	-0.032[c]
Capitalization)	(0.019)	(0.027)	(0.085)	(0.612)	(0.815)	(0.077)
Real Estate/Equity	0.014[a]	0.011[b]	0.022[c]	0.022[c]	0.004	0.018[a]
	(0.006)	(0.011)	(0.088)	(0.087)	(0.725)	(0.007)
Adj. R²	4.94%	17.51%	7.11%	1.68%	1.37%	21.74%
Wald-Statistic		15.583[a]	4.364	4.058	1.551	10.217[b]
		(0.001)	(0.225)	(0.255)	(0.671)	(0.017)

Specification 7	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.280[a]	0.488[b]	0.378[a]	0.185	0.259[a]	-0.041
	(0.000)	(0.024)	(0.004)	(0.145)	(0.001)	(0.751)
Log (Market	-0.014[c]	-0.005[c]	-0.016	-0.003	-0.005	-0.021[b]
Capitalization)	(0.079)	(0.055)	(0.442)	(0.821)	(0.661)	(0.046)
Real Estate	0.145	0.061[c]	0.134[c]	0.133	0.133	0.449[b]
Loans/Assets	(0.238)	(0.095)	(0.085)	(0.151)	(0.536)	(0.013)
Adj. R²	1.93%	8.93%	9.61%	0.68%	1.42%	18.64%
Wald-Statistic		7.197[c]	5.210	2.286	1.665	7.285[c]
		(0.066)	(0.157)	(0.515)	(0.644)	(0.063)

Specification 8	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.299[a]	0.286[a]	0.409[a]	0.226[b]	0.233[a]	0.496[a]
	(0.000)	(0.002)	(0.002)	(0.030)	(0.001)	(0.007)
Log (Market	-0.019[b]	-0.012[b]	-0.025[c]	0.010	-0.002	-0.068[b]
Capitalization)	(0.022)	(0.041)	(0.091)	(0.492)	(0.899)	(0.030)
Real Estate	0.013[b]	0.008[a]	0.025[c]	0.025[b]	0.006	0.034[b]
Loans/Equity	(0.012)	(0.006)	(0.075)	(0.033)	(0.593)	(0.015)
Adj. R²	4.37%	22.55%	7.50%	4.70%	1.21%	15.72%
Wald-Statistic		11.603[a]	4.219	4.181	1.668	14.880[a]
		(0.009)	(0.239)	(0.243)	(0.644)	(0.002)

Table 17: Institutional Characteristics: Multiple Cross-Sectional Regressions (cont.)

Panel B. Fama and French Extended Model (Monthly Returns)

Specification 1	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.080	0.180	0.417	-0,047	0.177[a]	-0.540[a]
	(0.225)	(0.287)	(0.101)	(0.729)	(0.039)	(0.000)
Log (Assets)	-0.004[b]	-0.021	-0.038	0.011	-0.013	-0.046[a]
	(0.028)	(0.283)	(0.252)	(0.396)	(0.206)	(0.002)
Real Estate/Assets	0.303[b]	0.076[c]	0.073[c]	0.282[b]	0.246[c]	0.415[b]
	(0.014)	(0.090)	(0.094)	(0.030)	(0.082)	(0.027)
Adj. R²	3.03%	2.52%	4.58%	4.96%	3.48%	44.50%
Wald-Statistic		3.979	5.290	1.771	1.145	11.131[b]
		(0.264)	(0.152)	(0.621)	(0.766)	(0.011)

Specification 2	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.142[b]	0.274[c]	0.395	0.118	0.185[b]	-0.503[a]
	(0.028)	(0.096)	(0.106)	(0.303)	(0.026)	(0.001)
Log (Assets)	-0.009	-0.003[b]	-0.033	0.006	-0.012[c]	-0.046[a]
	(0.266)	(0.014)	(0.260)	(0.665)	(0.081)	(0.002)
Real Estate/Equity	0.012[b]	0.003[b]	-0,005	0.013[c]	0.012[c]	0.016[b]
	(0.027)	(0.039)	(0.874)	(0.066)	(0.093)	(0.024)
Adj. R²	2.47%	7.47%	1.61%	1.55%	3.37%	44.93%
Wald-Statistic		4.600	3.444	4.687	1.026	12.223[a]
		(0.204)	(0.328)	(0.196)	(0.795)	(0.007)

Specification 3	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.103	0.218	0.417	0.059	0.196[b]	-0.522[a]
	(0.116)	(0.200)	(0.102)	(0.659)	(0.021)	(0.001)
Log (Assets)	-0.004	-0.002	-0.037	0.004	-0.012	-0.045[a]
	(0.563)	(0.329)	(0.246)	(0.740)	(0.236)	(0.002)
Real Estate	0.222[c]	0.170	0.070	0.210	0.085	0.403[b]
Loans/Assets	(0.099)	(0.221)	(0.905)	(0.335)	(0.692)	(0.031)
Adj. R²	1.39%	1.11%	1,03%	1.78%	1.12%	44.01%
Wald-Statistic		2.955	4.323	1.347	1.339	11.666[a]
		(0.399)	(0.229)	(0.718)	(0.720)	(0.009)

Specification 4	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.141[b]	0.280[c]	0.392	0.117	0.173[b]	-0.502[a]
	(0.031)	(0.093)	(0.110)	(0.305)	(0.038)	(0.001)
Log (Assets)	-0.007	-0.003[c]	-0.032	0.007	-0.009	-0.046[a]
	(0.033)	(0.081)	(0.270)	(0.568)	(0.457)	(0.002)
Real Estate	0.011[c]	0.005[c]	0.007[c]	0.010[c]	0.010[c]	0.016[b]
Loans/Equity	(0.058)	(0.055)	(0.083)	(0.083)	(0.069)	(0.023)
Adj. R²	1.83%	5.72%	1.01%	3.62%	3.71%	45.03%
Wald-Statistic		4.666	3.394	5.760	1.208	12.267[a]
		(0.198)	(0.335)	(0.124)	(0.751)	(0.007)

Specification 5	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.054	0.184	0.211	-0.163	0.154[b]	-0.523[a]
	(0.380)	(0.266)	(0.318)	(0.232)	(0.038)	(0.001)
Log (Market	-0.001	-0.030	-0.012	-0.029	-0.014	-0.057[a]
Capitalization)	(0.892)	(0.253)	(0.739)	(0.112)	(0.237)	(0.002)
Real Estate/Assets	0.295[b]	0.073[c]	0.274[c]	0.233[b]	0.243[c]	0.499[a]
	(0.017)	(0.051)	(0.062)	(0.013)	(0.083)	(0.008)
Adj. R²	2.88%	3,01%	1.78%	9.02%	3.05%	43.94%
Wald-Statistic		5.007	3.811	3.218	1.191	10.031[b]
		(0.171)	(0.283)	(0.359)	(0.755)	(0.018)

Table 17: Institutional Characteristics: Multiple Cross-Sectional Regressions (cont.)

Panel B. Fama and French Extended Model (Monthly Returns)

Specification 6	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.101[c]	0.256	0.224	0.042	0.160[b]	-0.490[a]
	(0.087)	(0.104)	(0.281)	(0.720)	(0.016)	(0.001)
Log (Market	-0.004	-0.003[c]	-0.014	0.019	-0.013	-0.057[a]
Capitalization)	(0.647)	(0.078)	(0.648)	(0.260)	(0.365)	(0.001)
Real Estate/Equity	0.011[b]	0.004[b]	0.017	0.015	-0.001	0.020[a]
	(0.049)	(0.047)	(0.526)	(0.292)	(0.909)	(0.005)
Adj. R^2	1.96%	7.08%	2.14%	2.56%	1.53%	45.51%
Wald-Statistic		5.818	2.574	5.363	1.167	10.963[b]
		(0.121)	(0.462)	(0.147)	(0.761)	(0.012)

Specification 7	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.078	0.224	0.210	-0.042	0.174[b]	-0.502[a]
	(0.204)	(0.176)	(0.320)	(0.757)	(0.017)	(0.001)
Log (Market	-0.001	-0.029	-0.012	0.019	-0.013	-0.055[a]
Capitalization)	(0.883)	(0.287)	(0.719)	(0.259)	(0.268)	(0.002)
Real Estate	0.208[c]	0.054[c]	0.132[c]	0.146[c]	0.189[c]	0.486[a]
Loans/Assets	(0.092)	(0.077)	(0.063)	(0.075)	(0.068)	(0.009)
Adj. R^2	1.24%	1.53%	1.74%	1.93%	3.17%	43.41%
Wald-Statistic		3.987	2.832	2.168	1.339	10.586[b]
		(0.263)	(0.418)	(0.538)	(0.720)	(0.014)

Specification 8	All Countries	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Intercept	0.103[c]	0.264[c]	0.222	0.035	0.155[b]	-0.488[a]
	(0.081)	(0.097)	(0.287)	(0.762)	(0.019)	(0.001)
Log (Market	-0.004	-0.004[c]	-0.014	0.022	-0.009	-0.057[a]
Capitalization)	(0.702)	(0.089)	(0.661)	(0.189)	(0.498)	(0.001)
Real Estate	0.009[c]	0.002[c]	0.020[b]	0.022[c]	0.006	0.029[a]
Loans/Equity	(0.094)	(0.066)	(0.050)	(0.055)	(0.608)	(0.005)
Adj. R^2	1.43%	11.58%	2.27%	2.41%	1.01%	45.52%
Wald-Statistic		7.097[c]	2.485	6.538[c]	1.332	11.174[b]
		(0.086)	(0.478)	(0.088)	(0.722)	(0.011)