‘Too Systemically Important to Fail’ in Banking – Evidence from Bank Mergers and Acquisitions

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Abstract

In this paper, we examine the systemic risk implications of banking institutions that are considered ‘Too-systemically-important-to-fail’ (TSITF). We exploit a sample of bank mergers and acquisitions (M&As) in nine EU economies between 1997 and 2007 to capture safety net subsidy effects and evaluate their ramifications for systemic risk. We find that safety net benefits derived from M&A activity have a significantly positive association with rescue probability, suggesting moral hazard in banking systems. We, however, find no evidence that gaining safety net subsidies leads to TSITF bank’s increased interdependency over peer banks.

Key words: systemic importance, systemic risk, mergers and acquisitions, banking

JEL Classifications: G14, G18, G21, G34

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1. Introduction

Bailouts of large financial institutions, in particular banks, have always caught the attention of the public due to their high social and economic costs (Stern and Feldman, 2004; Giannetti and Simonov, 2010). The term 'too-big-to-fail' (TBTF) was first used in a US congressional hearing in 1984 to justify the decision to bail out Continental Illinois National Bank (incurring a $1.1 billion expense to the Federal Deposit Insurance Corporation - FDIC) and also to 10 other large US banks that would have been rescued in the event of failure (Carrington, 1984).

The recent financial crisis between 2008 and 2009 provides a timely case study for TBTF effects in EU banking sectors. Large scale banking rescues occurred in all major EU economies and those rescued banks appear as natural candidates for a TBTF study as their failures would have posed systemic risk to the real economy (Petrovic and Tutsch, 2009). In addition, European banking markets have experienced far-reaching structural changes over recent years as part of the process of European integration which could have exacerbated TBTF effects. These changes are reflected in greater product and geographical diversification (Barros et al., 2005; Laeven and Levine, 2007) facilitated by mergers and acquisitions (M&As) between banks and other financial institutions that have become commonplace (ECB, 2000; Goddard et al., 2007).

However, as banks can grow substantially via merger and acquisition (M&A) (Hawkesby et al., 2007), deals undertaken by these large EU banks may not only increase their market value but can also offer evidence for the existence of safety net subsidies associated with TBTF (e.g. Carbó et al., 2011; Penas and Unal, 2004). There are also concerns that these EU banks' mergers can affect financial stability (Hagendorff et al., 2012b). First, systemic risk may increase as institutions become more interdependent due to similar business lines, investment portfolios, and common exposures after consolidation. Due to such

interdependency, when a large bank fails, its problems may be contagious and rapidly infect counterparties; in turn, this may pose a threat to the stability of the economy. Second, when banks engage in M&As they can become more complex (i.e., bancassurance or conglomerates) and this may lead to greater opacity posing challenges for regulators (Carbó et al., 2011). Larger and more complex banks may find it easier to exploit regulatory loopholes without being monitored appropriately. Finally, cross-border M&As within the EU may also complicate issues further as uncertainties regarding the jurisdiction of national safety net arrangements and coordination problems between regulators may arise (Hagendorff et al., 2012a). Evidently, all of the three pan-European banks that failed in the crisis (Dexia, Fortis and ING) received some form of financial assistance from different EU member state governments[1].

While the term TBTF may appear a misnomer - in some cases bailed-out banks have not been particularly large (Kaufman, 2003), from a regulatory perspective a bank's systemic importance, in other words, the complexity of the business model, connectivity to others as well as size, is the main consideration in a bail-out rather than size per se (Bank of England, 2009; IMF/BIS/FSB, 2009). To avoid confusion in terminology we will use the term TSITF in the remainder of this study, broadly encompassing TBTF and 'too-systemically-important-to-fail' institutions. We present an overview of the literature in *Table I*, grouped according to the type of TSITF measure employed (asset size, market capitalization, market shares, rating and so on). The more recent reflect on the insights gained from the 2008-9 crisis and consequently consider a wider range of attributes such as business complexity, wholesale banking activities, substitutability of services, in addition to size when assessing systemic importance.

[*Insert Table I here*]

This paper contributes to the literature in two important ways. First, we develop an innovative approach to extract a measure of safety net subsidies from an auxiliary regression model, which examines the determinants of bank merger premiums. Previous M&A studies either fail to disentangle other incentives to consolidate (efficiency gains, enhanced market power, reduced agency costs) from potential safety net subsidies (Pennacchi, 2000), or only test the safety net subsidy effects associated with one specific factor such as size and ignore other factors that may explain such subsidies including phenomena such as: political clout, managerial opportunism, relaxed market monitoring and organizational flexibility (Kane, 2010).[2] Our approach, however, is capable of stripping out safety net subsidy gains broadly defined in M&As. Second, although the literature has documented a gradual increase in systemic risk in the EU over the past decade or so (Hawkesby et al., 2003, 2007; Brasili and Vulpes, 2005; Gropp and Moermann, 2004), Kane (2010) suggests that typical measures of systemic risk, namely indicators of interdependency between TSITF banks, have not enabled regulators to diagnose the root cause of financial distress correctly. In other words, regulators have been unable to effectively detect the build-up of systemic risk within the financial system. We extend the literature by providing an initial step towards analyzing the relationship between the change in bivariate correlations of TSITF banks' share price returns and their gains in safety net subsidies via M&As.

This study first uses a frontier modeling technique to capture safety net subsidy gains while testing for the motives of paying merger premiums in M&As. In the first test, we find substantial variation in the willingness of acquirer banks to pay for safety net subsidies. Our test also shows that EU acquiring banks pay merger premiums to a target if it will bring more market power; is located in a strong supervisory environment and operates in a concentrated market. In the second step of our analysis, we assess whether a bank that posed systemic risk during 2008 and 2009 paid merger premiums in the past to gain safety net subsidies, which are estimated from our first test. We find consistent and significant evidence that gaining

safety net subsidies in the pre-crisis era via M&As increases the probability of being rescued in the crisis. We, however, find no evidence that safety net subsidy gains via M&A lead to increased interdependency between TSITF and other banks, which is measured by TSITF bank's share return correlations with its peers' in each country. Our results remain consistent when banks' interdependency is measured using accounting information instead of market prices. Overall, these findings help us understand how banks exploit national safety nets and increase instability in the financial system. Echoing recent legislation developments in the US and EU that aims to end TSITF bailouts [3],our results also point to the direction that there should be greater regulatory scrutiny of bank M&A activity as banks continue to grow in systemic importance.

The paper is organized as follows: Section 2 states our research questions and develops our hypotheses. Section 3 describes the dataset and methodology. We present our results and robustness tests in Section 4. We offer concluding remarks in Section 5.

2. Research Hypotheses

Acquirers often pay more than a target's 'fair value' in the consolidation process. To explain this phenomenon, previous studies mainly focus on the financial characteristics of the target, acquirer as well as the combined entity (Beatty et al., 1987; Palia, 1993; Hakes et al., 1997; Diaz and Azofra, 2009). Other motives such as market power gains and improved safety net access, on the other hand, have been examined less (Hagendorff et al., 2012a; Brewer and Jagtiani, 2007). Our first hypothesis homes in on the fact that a bank can gain better access to the safety net, or in other words, increase its systemic importance post-merger. By taking over various targets, a bank can become substantially larger, have a more complex business model and therefore become more interconnected with a larger number of counterparties in the financial system. To achieve this, a bank may pay a higher premium in a

merger deal for safety net subsidies (as well as other benefits) it may obtain after the transaction. We formulate our first hypothesis as follows:

H1. Safety Net Subsidies Hypothesis: *Merger premiums are paid for gaining safety net subsidies via banking M&As.*

Next, we examine whether banks deliberately pay merger premiums to exploit safety net benefits, we first define rescued banks in the 2008-9 crises as TSITF. The identification of TSITF in our study is simple yet appropriate. During the recent crisis, numerous banks were assisted by regulators in different ways to avoid failure. Regulators justified their rescues by stating that these banks were systemically important to the stability of the financial systems and economies (Bank of England, 2009; IMF/BIS/FSB, 2009). Moreover, in general the risk of failure is a consequence of a set of decisions made by banks. If we examine the pattern of behavior of those TSITF banks over ten years pre-crisis, in other words whether they exploit safety nets before the crisis, we may be able to discern whether there are moral hazard effects.

Among the few formal models of TSITF in the literature, Vassalou and Xing (2004) use Merton's (1974) option pricing model to compute default measures for individual firms and assess the effect of default risk on equity returns. Their model shows that safety net support allows creditors to put some or all of their losses to safety net managers, which reduces the net default risk that markets for equity and debt must price. Ennis and Malek (2005) show that TSITF policy creates not only a risk distortion (moral hazard), but also a size distortion, and one distortion tends to enhance the other and vice versa. Thus, theoretically banks would try to become larger to exploit safety net benefits meanwhile becoming more risk-taking.

We assume in our study that the amount of safety net subsidies obtained via M&As reflect the level of risk and systemic importance distortion banks seek from such transactions. More

specifically, TSITF banks pay higher merger premiums so as to obtain safety net subsidies, providing them with benefits unavailable to smaller counterparts, so that they cannot be adequately disciplined by the market (Mishkin, 2006). This results in a gradual increase in moral hazard that can eventually lead to their failure. This process can eventually trigger panics, bank runs, a full-scale financial crisis and costly bank rescues (Stern and Feldman, 2004). We hypothesize this as follows:

H2. Safety Net Exploitation Hypothesis: *There is a positive relationship between being a TSITF bank and exploiting safety net via M&As.*

Finally, Goodhart and Huang (1999) develop a model of the lender of last resort. They show that if contagion is the main concern, the central bank will have an incentive to rescue banks. Therefore, rescued banks pose systemic risk. In our study, TSITF banks' exploitation of the safety net may result in an increase of systemic risk over time, which we measure as the interdependency between TSITF banks (i.e. stock return correlations among TSITF banks). Therefore, we summarize our final hypothesis as follows:

H3. TSITF Interdependency Implication Hypothesis: TSITF banks exploit safety nets and in turn increase their interdependency with other TSITF banks

3. Data and Methodology

3.1 Data sources

Between October 2008 and June 2009 a total of 12 EU countries provided ailing banks with various rescue packages (Stolz and Wedow, 2010; Petrovic and Tutsch, 2009). These countries include Austria, Belgium, France, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden and the UK. All countries claimed that the failure of these banks would disrupt the provision of financial services to the real economy and have dire economic and social consequences.[4]

Therefore, allowing for widespread bank insolvency was not a credible policy option (Petrovic and Tutsch, 2009). Consequently, these rescued banks are the natural candidates for TSITF. In this study, we have 9 EU countries (Austria, Belgium, France, Germany, Greece, Netherlands, Portugal, Sweden and the UK), that experienced 71 bank rescues during the crisis. *Table II* presents a list of rescued banks and outlines the rescue measures taken.[5]

[Insert Table II here]

We hand-collect information on banks' M&As in nine EU countries between January 1997 and December 2007 from Thomson One Banker. In total, we identify 162 M&A transactions by 54 acquiring banks where acquirers take full control of targets (over 50% share control after a transaction). Acquirers are banks or mutual credit institutions and targets are financial service providers (defined by Thomson One Banker as banks, insurance companies, asset-management firms, credit institutions and brokerages). We obtain banks' accounting information from BankScope.

3.2 Extracting safety net subsidies in M&As

Previous studies (e.g. Hagendorff et al., 2012a; Brewer and Jagtiani, 2007; Benston et al., 1995) assume that a bank has its motives to justify the amount of premium it pays to its target in each M&A. Therefore, for a sample of banks the *i*th bank would pay:

$$PREM_i = \alpha + \beta X_i + v_i \qquad [1]$$

Equation [1] applies ordinary least squares (OLS) regression and relates merger premium a bank pays to various acquiring and acquired bank-specific as well as deal-specific characteristics. The aforementioned studies typically do not take into account the possibility that banks may pay a merger premium to extend their access to the safety net. An exception is

Brewer and Jagtiani (2007), who measure the safety net subsidy effects associated with size increase. Studies that model banking safety net management, however, argue that gaining safety net subsidies is associated with potential increase in managerial opportunism/aggression, lobbying activity and more flexible organizational structure, which may in turn lead to the change in risk-taking behavior - and not necessarily from bank's size *per se* (Kane, 2010; Acharya et al., 2010; Eberlein and Madan, 2010). Therefore, an OLS regression approach such as *Equation [1]* that attempts to capture safety net subsidies with the use of a simple bank size control variable for systemic importance post-merger seems somewhat limited.

As such, in this study, we use a stochastic cost frontier modeling technique borrowed from the efficiency literature (e.g. Berger and Mester, 1997) to capture safety net subsidy gains broadly defined in M&As. Recently, such techniques have also been applied in other contexts in the banking literature. Baele et al. (2010), for instance, estimate a stochastic frontier to examine banks' 'risk inefficiency' relative to best performing peers. A stochastic cost frontier model estimates the minimum possible cost (i.e. a frontier) given a set of outputs and assumes that each firm potentially produces at more than the minimum cost might be due to a degree of inefficiency. As a result, it provides estimators for the parameters of a linear model with a disturbance that is assumed to be a mixture of two components: a deviation from the cost frontier (a measure of cost inefficiency) and a stochastic error term, which have a strictly nonnegative and symmetric distribution, respectively.

Every model makes deliberate and hard–to-defend simplifications. In interpreting our parsimonious experiments, we cannot rule out the possibility that omitted variables, measurement errors may distort the outcomes in unknown ways. Nevertheless, this model is applicable and more appropriate than an OLS regression model because stochastic cost frontier analysis in our study assumes that each acquiring bank potentially pays an extra

amount of merger premiums to a target after controlling for an extensive array of variables based on previous studies that explain the primary determinants of merger premiums paid in banking, excluding any safety net subsidy motives.[6] In this case, the disturbance term of the model is also decomposed into a non-negative deviation from the frontier, which is safety net gains via each M&A; and an error term, which makes the frontier stochastic and incorporates measurement error and randomness of an acquiring bank's valuation of a target firm. The model we use is as follows:

$$PREM_i = \alpha + \beta_1 MPOW_i + \beta_2 RROA_i + \beta_3 RCIR_i + \beta_4 AGECY_i + \beta_5 TLEV_i + \beta_6 TFOC_i + \beta_7 TGROW_i + \beta_8 TSUP_i + \beta_9 TCON_i + \beta_{10} RSIZE_i + u_i + v_i$$

$$u_i \sim iid|N(0, \sigma_{u_i}^2)| \qquad [2]$$

$$v_i \sim iid\ N(0, \sigma_v^2)$$

Equation [2] relates merger premiums to various independent variables explained in detail below. v_i is a random error term and safety net subsidy gains u_i capture safety net gains. The term u_i is assumed to follow a half normal distribution to capture non-negativity (truncated at zero). This stochastic cost frontier model reduces to an OLS regression model if the variance of the safety net subsidy gains σ_u^2 is *z*ero. As we will show later, this hypothesis is soundly rejected. The dependent variable of *Equation [2]* - PREM is bank merger premiums measured as follows:

$$PREM = \frac{deal\ value}{V \times s} - 1 \qquad [3]$$

where deal value is the purchase price paid by the acquirer. *V* is the market capitalization of the target 20 days before the deal if the target was a listed company.[7] In many cases, however, the target was not publicly listed or the market value is not available. Although the literature that studies bank merger premiums tends to use book values (e.g. Hagendorff et al., 2012a; Palia, 1993; Diaz and Azofra, 2009; Adkisson and Fraser, 1990; Cheng et al., 1989), it is arguably a less accurate measure because a bank's future cash flow is not incorporated. We

therefore use average market/book ratios of a target's peers (based on pre-merger asset size and the return on assets ratio) to adjust target's book value of equity in the fiscal year before the deal announcement. The term *s* is the percentage of shares acquired in the deal.

Following Pennacchi's (2000) caution about the interpretations of results from M&A event studies, we introduce three major motivations for bank M&As (excluding safety net subsidies). These incentives relate to: enhanced market power, efficiency gains and managerial agency problems. MPOW is a target's Lerner Index divided by the acquirer's Lerner Index before the merger. The Lerner Index reflects a bank's ability to price over its marginal costs to generate its interest and non-interest income (Carbó et al., 2009). MPOW measures potential market power gains from an M&A transaction. A positive coefficient may suggest that the acquirer pays a premium to the target for its relatively high market power. In terms of the efficiency gains, we use two profit-based and cost-based efficiency ratios to capture such potential: RROA is the ratio of the target's return on assets (ROA) to the acquirer's ROA; and RCIR is the ratio of the target's cost-to-income ratio (CIR) and the acquirer's CIR.[8] Previous studies have reported that acquirers may prefer a target with efficiency potential measured with reference to either profit or cost benchmarks (Pilloff, 1996). Agency conflicts/costs may also explain why management overpays the target in an M&A (Palia, 1993). AGECY measures the level of the agency conflicts/costs, which is the total percentage of an acquiring bank's shares held by institutions owning 5% or more. A large body of literature that focuses on the effect of concentrated outside ownership (or blockholdings) on firm value and agency costs suggests that, under certain conditions, institutional ownership could increase the level of agency costs (e.g., Demsetz 1983; Lease, McConnell, and Mikkelson 1983; Shleifer and Vishny, 1986 etc.). A significant and positive coefficient on this variable suggests that M&As are driven by agency problems in acquiring firms.

The following three independent variables in *Equation [2]* describe targets' characteristics: TLEV measures the levels of target's Tier 1 capital, which is the equity-to-asset ratio in the fiscal year before the M&A announcement. Most studies report a significantly negative relationship between the levels of target capital and merger premiums paid as higher levels of capital may dilute the merger premiums paid per share (e.g. Hagendorff et al., 2012a; Beatty et al., 1987; Hakes et al., 1997; Diaz and Azofra, 2009; Brewer et al., 2007). TFOC indicates target firm's business focus. In this study, acquiring firms are either banks or mutual credit institutions and targets include all types of financial service providers. We use the ratio of the net interest income of the target firm to its total operating income in the year prior to the transaction to measure the extent to which the target firm is focused on traditional core banking business. We assume that acquiring banks may pay a premium if the target generates more income from fee-based business lines, which, in turn, may provide greater opportunities for diversification. Studies, however, find no strong evidence to support this hypothesis (e.g. Diaz and Azofra, 2009; Brewer and Jagtiani, 2007). TGROW measures target's pre-merger growth. It has been suggested that acquiring banks may prefer fast-growing targets (Cheng et al., 1989; Rhoades, 1987; Beitel et al., 2004). TGROW is the target's average assets growth rate over three years prior to the merger. [9] We use TSUP to measure the target country's supervisory strength. Evidence shows that acquirers exploit regulatory arbitrage if a target's home country has weak regulations (Hagendorff et al., 2012a; Carbó et al., 2010). Following Buch and DeLong (2008) and Hagendorff et al. (2012a) we compile a Supervisory Strength Index for the acquirer and target's countries based on the Barth et al. (2001) database on regulation and supervision. Supervisory Strength Index varies between 0 and 12 with higher scores indicating a banking system with a stronger supervisory environment and enforcement.[10]

A concentrated banking market may be appealing for an acquirer as a high level of profitability may be maintained compared to a more competitive market. Some studies have found that acquiring banks pay higher premiums to targets in more concentrated markets

(Beatty et al., 1987; Palia, 1993). Others, however, find no significant relationship (Hagendorff et al., 2012a; Hakes et al., 1997; Diaz and Azofra, 2009).[11] We measure target's market concentration using the CR3 ratio (TCON), which is the market share (in terms of assets) of the largest three banks in a country.

The size of the target in relation to the acquirer is also included in our model. RSIZE is defined as the ratio of the sum of the target and acquirer's asset size divided by the acquirer's assets in the year preceding the merger. The findings from the literature are mixed. Some studies find a significantly negative relationship suggesting that acquirers may prefer smaller targets so post-integration costs will be lower (Benston et al., 1995; Palia, 1993; Hakes et al., 1997; Cheng et al, 1989; Brewer et al., 2007). In contrast, a positive and significant relationship can be found in other studies, which may suggest that potential economies of scale are sought by the acquirers (Brewer and Jagtiani, 2007; Brewer et al., 2007).

Table III presents summary statistics of all variables in *Equation [2]*. It shows that targets in EU banking M&As have an average equity-to-asset ratio of 10%. They also have considerable fee-based business. They seem to grow quickly prior to the M&A transactions and tend to have greater market power (measured by the Lerner Index) compared to acquirers. Acquirers appear to be more profitable (higher ROA's) but are more inefficient (larger CIR ratios).

[Insert Table III here]

3.3 A new test for safety net exploitation of TSITF banks

In the second step of our analysis, we use a binary response model to assess whether a bank that posed systemic risk during 2008 and 2009 paid merger premiums in the past to gain

safety net subsidies. As both logit and probit model produce the same results in our study, we estimate the following model using a probit set-up:

$$PR(TSITF_i) = \alpha + \beta_1 SUBD_i + \beta_2 ASUP_i + \beta_3 ADEP_i + \varepsilon_i \qquad [4]$$

where TSITF is a dummy variable, which takes the value 1 if a bank posed systemic risk between 2008 and 2009. In this study, we focus on the potential cost that would have been caused if those support measures had not been implemented from a public policy's point of view rather than shareholders'. Therefore, these are the banks that were actually rescued or supported during the crisis. Non-rescued banks as a control group take the value 0. There are in total 4318 banking firms in 2007 (which is also the number of firm-year observations) that were not involved in any rescues in 9 EU countries in our sample.

Although the measure the government may (or may not) take to support a bank is unknown before the bailout, various banking rescue/support measures may result in different economic and social costs. For example, government capital injections may impose greater costs on taxpayers than other types of intervention such as loan guarantees etc. We therefore also estimate *Equation [4]* as a multinomial probit regression by assuming TSITF has three outcomes 1, 2 and 3: non-rescued banks, banks receiving state guarantees and banks that were recapitalized between 2008 and 2009.[12] The explanatory variables of *Equation [4]* are defined as follows:

SUBD is the sum of the safety net subsidies estimated from *Equation [2]* (i.e. u_i) for an acquiring bank between 1997 and 2007. We assume that there is a higher probability that an acquiring bank that posed systemic risk (was rescued) in the recent financial crisis had gained safety net subsidies via previous M&A activity. We also include two country level control

variables ASUP and ADEP. These refer to the Supervisory Strength Index (previously defined in section 4.2) and the Deposit Insurance Strength Index in 2007, respectively. The Deposit Insurance Strength Index (ADEP) is measured according to Hagendorff et al. (2012a) and takes a value between 0 and 3 with higher values indicating a stricter (more expensive) deposit insurance arrangement.[13] Bail-out policy is expected to vary in different countries. We control for these regulatory settings as it may be the case that in weaker regulatory environments there are more banks that may pose stability threats. *Table IV* presents summary statistics of all variables in *Equation [4]*.

[Insert Table IV here]

3.4 A new test for interdependency among TSITF banks

Having examined the systemic risk implications of TSITF in the second step of our analysis, we re-examine this issue in a different way. We first follow the traditional approach measuring TSITF bank and peers' bivariate share return correlations in each country between 1997 and 2007 (Hawkesby et al., 2007; De Nicolo and Kwast, 2002). Next, we estimate each TSITF bank's average correlation with its peers in each year - this measures the interdependency the TSITF bank had with other peer banks. We then take the year-on-year difference of the correlations to measure change in interdependency (systemic risk change) of a TSITF bank (variable $\Delta INDEP$). As the number of banks that are publically listed is limited, we are not able to carry out a comprehensive test. Here we only examine the correlation coefficient of $SUBD_t$ and $\Delta INDEP_{t+1}$ and assume that gaining safety net subsidies could lead to a significant increase in interdependency (bearing in mind the reservations about the incompleteness of our systemic risk measure as noted by Kane (2010)).

4. Empirical Results

4.1 Extracting safety net subsidies in M&As - results

Table V shows the summary statistics of safety net gains derived from the decomposition of the error from the stochastic cost frontier model for each bank with a higher value indicating a larger portion of merger premium paid for safety net benefits. In total, we identify 54 banks and in 9 countries that have paid merger premiums to gain safety net benefits, among whom Société Générale and HSBC Holdings appear to have paid the most. Moreover, banks that pay premiums larger than average for safety net subsidies also tend to focus more on cross-border M&As (e.g. Erste Group Bank; BNP Paribas; and Standard Chartered).

[Insert Table V here]

For completeness, we also show in *Table VI* the results that examine the commonly used determinants of merger premiums. As the distribution of merger premiums may be influenced by some large deals, we apply 5^{th} and 95^{th} percentile winsorization to remove the outliers. We find that market power gains seem to explain the amount of merger premiums paid. The coefficient on MPOW is strongly positive and significant. The coefficient on TSUP is positive and significant. This result contradicts the findings from previous studies and suggests that EU acquirers are willing to pay a higher premium for a target located in a strong supervisory environment. Finally, TCON is also positive, which is consistent with the findings from Beatty et al. (1987) and Palia (1993) who find that acquirers pay higher premiums for targets based in more concentrated markets. The overall estimation of this stochastic cost frontier model is efficient in testing for the determinants of M&A premiums, as indicated by the variance of safety net subsidy gains being significantly different from zero.

[Insert Table VI here]

4.2 A new test for safety net exploitation of TSITF banks - results

4.2.1 The robustness test of safety net gains

Before formally testing the systemic consequences of exploiting safety net via M&As, it is necessary to test whether the cost function frontier model estimates safety net gains in a robust manner as *Equation [2]* may suffer from omitted variable issues.

We therefore test the correlations between a bank's total safety net subsidies gained via mergers prior to the crisis SUBD and various indicators that measure the systemic importance (i.e. size, complexity and interconnectedness according to IMF/BIS/FSB, 2009) of a banking institution in 2007 in 9 EU banking systems. We expect a positive relationship between SUBD and bank's systemic importance. First of all, we use two separate size measures as at December 2007: the first is an absolute measure ABSIZE that is the natural logarithm of a bank's assets; the second measure is a market share indicator MAKSH – bank assets size divided by total assets of the banking sector. The relevance of size will also depend on a bank's complexity and interconnectedness (IMF/BIS/FSB, 2009). A complex bank may simultaneously have banking, insurance and securities subsidiaries; operate internationally; and/or have exposures to a broad array of financial products and markets (Bank of England, 2009; IMF/BIS/FSB, 2009). We use a variable COMP to measure a bank's complexity in December 2007, which is the natural logarithm of the number of an acquiring bank's total subsidiaries. Interconnectedness, on the other hand, measures contractual relations with other institutions. We use two complementary measures: the first ABCONN is the natural logarithm of an acquiring bank's total interbank deposits in December 2007. The second, RECONN is the ratio of acquiring bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007. *Table VII* shows that SUBD is mildly correlated with five systemic importance indicators. Considering the size of our sample, our results from the frontier model appear to be robust.

[Insert Table VII here]

4.2.2 Probit Regression Results

Table VIII shows the results from the estimation of *Equation [4]* using a binomial probit regression model, which analyzes the probability that a TSITF bank (defined as banks that were rescued in 2008 and 2009) paid merger premiums to gain safety net subsidy benefits.

We report marginal effects of the estimation. A significant finding shows that gaining safety net subsidies in the pre-crisis era via M&As increases the probabilities of being rescued in the crisis. This therefore confirms our ***Safety Net Exploitation Hypothesis***. We also find that the regulatory regime (measured using the Supervisory Strength Index and Deposit Insurance Strength Index) has a positive and significant influence on the presence of TSITF banks. Overall, all specifications exhibit a relatively high classification accuracy. For example, the area under the receiver operating characteristic (ROC) curve is on average above 91%.[14]

[Insert Table VIII here]

Table IX shows the results from the estimation of *Equation [4]* using a multinomial probit regression model instead, which analyzes the probability of several outcomes of being a TSITF bank. In each estimation, TSITF=1 (non-rescued bank) is the base outcome. We find evidence that gaining safety net subsidies tends to increase the probabilities of being recapitalized (including nationalization or a forced merger) as well as getting state guarantees. Moreover, there is evidence that a strict supervisory regime and a generous deposit insurance scheme are more likely to offer failing banks state guarantees rather than capital injections.

[Insert Table IX here]

To test the robustness of our estimation, we first use an ordinary least-squares (OLS) regression model instead of cost function frontier model to estimate *Equation [2]*. In this case, residuals from the OLS estimation are treated as safety net subsidy gains (with no random errors separated). We then repeat our second step analysis using the residuals from the OLS estimation as the variable SUBD in *Equation [4]*. *Table X* ***Panel A*** shows weaker evidence that gaining safety net subsidies significantly increases the possibilities of being a rescued bank in the crisis. Weaker results may be explained by the inclusion of random errors in the variable SUBD in this estimation, which in turn suggests the necessity of applying a stochastic frontier modeling technique in our study.

Secondly, the dummy variable of *Equation [4]* TSITF may not include some systemically important banks that did not seek any assistance during the crisis. We, therefore, replace the dependent variable with an alternative TSITF indicator: a bank's total asset weighted by its home country's GDP in 2007 and run *Equation [4]* using OLS regression. *Table X* ***Panel B*** shows that our results remain consistent and significant.

Next, we divide our sample into two sub-samples and re-estimate *Equation [4]* using a binomial probit regression model. The underlying reason why we choose this approach is that our results may be influenced by countries that experience more bank M&A transactions. *Sub-sample I* includes Austria, Belgium, Greece, Netherlands, Portugal and Sweden, where each country, on average, has a smaller number of bank M&As (50 transactions in total between 1997 and 2007); *Sub-sample II* includes France, Germany and the UK, that have 112 transactions between 1997 and 2007. *Table X* ***Panel C*** *shows that* in obtaining safety net subsidies banks significantly increase the possibility of being rescued and the results appear significant for both samples. This suggests that our results are not driven by the sample size.

To control for the potential effects of omitted variables that may also lead to the rescue of a bank during the crisis, we use a two-stage approach to test the endogeneity of the independent variable SUBD in *Equation [4]* according to Rivers and Vuong (1988). In the first stage, we estimate an OLS regression SUBD on two instrumental variables: MAVAL (bank's total M&A deal value) and MANUM (bank's past M&A deal number) in natural logarithm between 1997 and 2007, which explain the amount of safety net subsidies gained via M&As but are uncorrelated with bank rescue. The residuals of the regression are saved and added to *Equation [4]* as an additional independent variable in the second stage estimation. The null hypothesis of this endogeneity test is that SUBD is exogenous if the coefficient of the residuals RESID in the second probit estimation is insignificantly different from zero. *Table X* ***Panel D*** presents our first and second stage results. ***Panel D*** first reports the coefficients for the instrumental variables of the OLS regression, which are both significantly different from zero. ***Panel D*** then reports the marginal effects of the estimation of *Equation [4]*. While the coefficient (not reported in the table) as well as marginal effects of RESID are insignificantly different from zero, our main results remain consistent and significant.

In our M&As sample, we have both cross-border and domestic M&A deals. Due to the fact that cross-border M&As can be complicated and involve more than one banking supervisor, the safety net implications may also vary as a result. Consequently, it is necessary to test whether these two types of transactions adversely affect financial stability to a different extent. Instead of using the independent variable SUBD of *Equation [4]*, we use two separate variables CROSUBD and DOMSUB, which are the sum of the safety net benefits for each bank from the cross-border and domestic deals respectively. *Table X* ***Panel E*** reports that in all the estimations this relationship is significantly positive for both cross-border and domestic transactions. Therefore, the results remain consistent and there is no evidence that

systemically important banks are more likely to gain safety net subsidies in different types of M&A transactions.

Since we test in ***Panel D*** that a bank's total M&A deal value and number (between 1997 and 2007) explain safety net subsidies, we also need to further examine whether our findings only suggest size distortion other than other aspects such as complexity and interdependence. We replace the independent variable SUBD of *Equation [4]* with AVSUBD, which is the average value of a bank's subsidy benefits between 1997 and 2007. *Table X* ***Panel F*** shows that our results remain consistent and significant.

Our M&As in the sample include consolidations between banks as well as non-deposit taking financial institutions. It is possible that safety net implications are different if the target is a non-deposit taking firm. We rerun *Equation [4]* using two separate variables instead of SUBD: BANKSUBD and NBANKSUB, which are the sum of the safety net benefits for each bank from the bank-bank deals and bank-non bank deals respectively. *Table X* ***Panel G*** reports that the relationship is significantly positive for both bank-bank and bank-non bank mergers. Therefore, the results remain consistent.

[Insert Table X here]

There is a growing policy consensus in the US and EU that compensation practices and bonus payments in particular have promoted excessive risk-taking at financial firms and, thus, played an important role in causing the recent financial crisis (Financial Stability Board, 2009; the Committee of European Banking Supervisors, 2010). Therefore, we use European banks' CEO remuneration data compiled by Vallascas and Hagendorff (2013) to see whether there is a positive relationship between CEO cash bonus payments and merger premiums as CEOs may be driven by their personal incentives to secure M&A deals by over-paying for

targets. We add one remuneration variable LGBONUS to *Equation [2]*, which is the logarithmic transformation of 1 plus the total cash bonus received by the CEO. We also add AGE that is the log transformation of CEO age - to control for personal traits. Due to the fact that the level of CEO pay disclosure varies widely across Europe, our sample size is reduced to only 54 M&As. We re-estimate *Equation [2]* with these two additional variables using the stochastic cost frontier model. *Table XI* shows that the coefficients of LGBONUS and AGE are insignificantly different from zero. Also the explanatory power of the model is weaker probably due to the smaller sample size. Nevertheless, when we re-run *Equation [4]* the results are unchanged after using SUBD derived from the first stage estimation.[15]

[Insert Table XI here]

There is a literature that follows Merton (1974) to derive a measure of the bank safety net from the cost of deposit insurance modeled derived from the price of a put option on a bank's assets (e.g. Ronn and Verma, 1986; Carbó et al., 2008). The per-period flow of safety net benefits that bank stockholders enjoy can be defined as a 'fair' insurance premium (IPP) expressed per dollar of a bank's deposits (Carbó et al., 2008). To validate our measure of safety net subsidies, we first measure changes in IPP (i.e. ΔIPP) surrounding the consolidation, which is the difference between an acquiring bank's IPP in the year of the merger and one year prior to the deal. We then test the correlations between ΔIPP and safety net gains via each M&A estimated by *Equation [2]*. In total, we have 59 observations. The correlation coefficient between these two variables is 0.22 and significant at 10% level, suggesting a moderate and positive relationship, which supports the claims to some extent that banks gain safety net subsidies via M&As.[15]

4.3 *A new test for interdependency among TSITF banks- results*

Table XII shows the results from our test that examines whether gaining safety net subsidies leads to TSITF bank's increased interdependency over peer banks. As not all TSITF

banks were listed, we reduce our observations from 162 to 86. On average, $\Delta INDEP$ has a 0.049 mean value.[16] The correlation coefficient between these two variables is 0.08, indicating no clear relationship. We also increase the gap from one year to two or three years to re-estimate $\Delta INDEP$ assuming gaining safety net subsidies may affect this systemic risk measure over the medium term. Again, we cannot find any significant link.[15] These results reject our ***TSITF Interdependency Implication Hypothesis*** and show that TSITF banks that gain safety net subsidies via M&A do not appear to have any impact on interdependency with peer banks.

[Insert Table XII here]

However, this test for TSITF banks' interdependency suffers from the drawback that only listed TSITF banks are examined. We therefore use all TSITF banks' balance sheet information to calculate aggregate Z-scores for each country and year as a systemic risk indicator between 1997 and 2007.[17] This measure is a proxy for the joint probability of failure for TSITF banks in each country and is consistent with the definition of systemic risk potential based on the strength of total interdependency among systemically important institutions (De Nicolo et al., 2004). We then measure the change in total interdependency by estimating the year-on-year percentage change of aggregate Z-scores and examine the correlation coefficient of $SUBD_t$ (estimated from *Equation [2]* using frontier modeling) and $\Delta INDEP_{t+1}$.[18] The correlation coefficient between these two variables is 0.112, which again shows no significant relationship.

5. Conclusions

There has been growing interest on how to monitor and discipline 'too-systemically-important-to-fail' (TSITF) banks so as to prevent future costly bail-outs. This paper contributes to the literature by addressing three highly policy-relevant and related research questions:

1) Do banks pay higher M&A premiums for safety net benefits?

2) Does exploitation of safety net benefits explain bank rescues in the 2008-9 crises?

3) Does interdependency between TSITF banks have implications for systemic risk?

We first examine the determinants of bank merger premiums by using a frontier modeling technique to strip-out a safety net subsidy measure. In total, we identify 162 deals where premiums are paid for safety net subsidy benefits. Second, we incorporate our safety net subsidy measures in a probit model that tests for the probability of being a systemically important bank (defined as banks rescued during the recent crisis). We find that safety net subsidy benefits derived from M&A activity have a significant and positive association with rescue probability. Direct evidence is found that merger premiums are paid to obtain safety net subsidies that have adverse systemic risk implications. Finally, we evaluate traditional measures of systemic risk by examining the relationship between safety net subsidy effects and interdependency between TSITF banks post-merger. We do not find any significant relationship suggesting that stock price return correlations for systematically important banks are not linked to safety net subsidies. This result further questions the efficacy of using stock-return correlations as an appropriate indicator of banking sector systemic risk.

A number of robustness tests show that the frontier technique is an appropriate approach for estimating safety net subsidies and our results remain consistent when banks' interdependency is measured by accounting measures instead of market information.

Our study contributes to the ongoing financial reform policy debate relating to minimizing the likelihood of taxpayer bailouts of TSITF banks in the future.[19] First, we

suggest that banks' M&A activity needs to be carefully reviewed not only for its competition implications but more importantly for its financial stability implications.[20] Moreover, if banks gain safety net subsidy benefits via M&A activity, such benefits need to be taxed to discourage banks to grow excessively. Third, our study suggests that commonly used measures are unable to measure the systemic risk that TSITF banks pose. More research is needed to measure banking systemic risk appropriately so it is monitored effectively and regulators can determine appropriate capital requirements for institutions that pose such risks.

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FOOTNOTES

[1] Dexia was rescued for the second time in September 2011 by a support program coordinated between French, Belgium and Luxembourg authorities.

[2] For example, Brewer and Jagtiani (2007) relate banking merger premiums to acquiring banks' size change dummy variables. They argue that the amount of premiums paid for reaching certain size thresholds reflects the perceived benefits of safety net subsidies. Some, however, propose that acquiring banks will obtain safety net subsidies when they pay more for targets that have greater covariance with their own profitability (as well as higher profit variance) (Hagendorff et al., 2012a; Benston et al., 1995). These studies, however, find no evidence to support this hypothesis.

[3] Provisions in the U.S. Dodd–Frank Wall Street Reform and Consumer Protection Act 2010 (otherwise known as Dodd-Frank) seek to end taxpayer bailouts of banks and other financial institutions. Similar provisions are also included in the UK's Financial Services Bill (2011) that was enacted in 2012.

[4] It has become a usual approach for banking regulators to provide support measures when handling banking crises. See for example (Giannetti and Simonov, 2010; Hoshi and Kashyap, 2008; Berger et al., 2010) for detailed accounts of the regulators' responses in various countries since the 1990s.

[5] We exclude Ireland, Luxembourg and Spain from our sample due to incomplete information. Ireland had 6 banks that were rescued (Allied Irish Bank, Anglo Irish Bank,

Bank of Ireland, Postbank, EBS Building Society, Irish Nationwide Building Society), but these were excluded from our analysis because of limited M&A information. Spain and Luxembourg only provided state guarantees to Caja Castilla-La Mancha and capital injections into Fortis Banque Luxembourg respectively. Therefore, banks from these two countries are also excluded.

[6] Controlling for a broad range of independent variables is important from an econometric point of view as we can mitigate omitted variable issues (to a certain extent).

[7] Market capitalization may respond to information leakage (if any) before M&As. Therefore, merger premiums measured may not be accurate in this case. We also use companies' market capitalization 30, 40 or 50 days before the M&A announcement alternatively to calculate the merger premiums, the results, nevertheless, from the stochastic frontier model remain consistent.

[8] CIR measures a bank or financial firm's cost efficiency in terms of how much operational cost (excluding interest expenses and loan-loss provisions) is incurred to generate its income before loan-loss provisions.

[9] We also use core deposit growth rate to proxy target's growth potential as suggested by Cheng et al. (1989) and find similar results.

[10] Target's home country's supervisory strength index (TSUP) is an equally-weighted sum of 12 components, which include: banks disclose risk management procedures; risk-weights are in line with Basel guidelines; the capital-asset ratio varies with credit risk; the capital-asset ratio varies with market risk; there is a formal definition of 'non-performing loan'; there are automatic mechanisms to sanction directors and managers; the supervisory agency can order directors/management to make provisions to cover losses; the supervisory agency can suspend the distribution of dividends, bonuses, or management fees; the latter has been enforced in the past five years; the supervisory agency can declare a bank insolvent; the

agency can suspend ownership rights of a problem bank; the supervisory agency can take measures aimed at bank restructuring and reorganization.

[11] Note that there is a related literature that focuses on the measurement of bank competition (e.g. Schaeck et al., 2009). However, a further investigation of this matter is beyond the scope of this study and we assume that greater concentration correlates positively with less competition. We believe this is justified in our context as we only focus on a small set of predominantly large and complex institutions with fundamentally different business models from those observed in small savings and cooperative banks that operate locally.

[12] If a bank received state guarantees as well as capital, we classify it as 'bank that was recapitalized'. Some banks were nationalized or forced to merge with other banks as rescue measures. They were, however, too few to be included as one of the outcomes for a multinomial probit regression. As these banks meanwhile received capital injection from their governments to be nationalized or for the merger deals, we classify these banks as 'banks that were recapitalized'.

[13] Acquiring bank's home country's Deposit Insurance Strength index (ADEP) in 2007 is an equally-weighted sum of 3 components as follows: there is an explicit deposit insurance system; deposit insurance premiums are risk-adjusted and the deposit insurance system requires co-insurance.

[14] Receiver operating characteristic (ROC) curves are used to describe and compare the performance of diagnostic technology and diagnostic algorithms. In this study, an area of 100 under the ROC curve would imply completely deterministic bail out probabilities.

[15] Results of these robustness tests are not presented in the paper. They are available upon request.

[16] In general, average stock price correlations for all TSITF banks in 6 EU countries (Sweden, Portugal and Netherlands are excluded due to lack of data) increase from 0.317 in

1997 to 0.395 and 0.471 in 2007 and 2008. This is consistent with findings from Brasili and Vulpes (2005), Gropp and Moermann (2004), Hawkesby et al.(2003), Hawkesby et al. (2007).

[17] See De Nicolo et al. (2004) for details.

[18] The results are not shown here to preserve space and they are available from the authors on request.

[19] For example, see Feldman and Stern (2010) and Blinder (2010) for a review of The Squam Lake Report on financial reform.

[20] In the US, Dodd-Frank has made changes to the review of mergers and acquisitions that allow the Federal Reserve to consider financial stability implications of such actions. The act also refines rules on the maximum size a financial firm can achieve through merger or acquisition.

Table I. Summary of TSITF studies classified by TSITF thresholds employed

TSITF threshold	List of studies	Details of thresholds
Size measured by assets	Mayer (1975)	• Large banks
	Kane (2000)	• the 12 largest banks in the US 1991-1998
	Spiegel and Yamori (2004)	• the 10 largest banks in Japan 1995-1998
	Shull and Hanweck (2001)	• the 10 largest banks in the US
	Brewer and Jagtiani (2007)	• a bank's total assets exceed $100 billion in the US 1991-2004 • the largest 11 banks in the US 1991-2004
	Rime (2005)	• logarithm of a bank's assets in 21 industrialized countries 1999-2003
	Völz and Wedow (2011)	• a bank's monthly asset value provided by Moody's in 24 countries 2002-2007
Size measured by market capitalisation	Kane (2000)	• the largest 12 banks in the US 1991-1998
	Brewer and Jagtiani (2007)	• a bank's total market capitalization exceeds $20 billion in the US 1991-2004
	Völz and Wedow (2011)	• a bank's market capitalization in 24 countries 2002-2007
Size measured by asset market share	Carrington (1984) Sprague (1986) O'Hara and Shaw (1990) Flannery and Sorescu (1996) Black et al. (1997) Morgan and Stiroh (2005)	• the largest 11 banks in the US in terms of asset market share (bank's assets/total banking assets) 1984
	Penas and Unal (2004)	• a bank's assets exceed two percent of whole banking assets
	Rime (2005)	• a bank's assets/total banking assets in 21 industrialized countries 1999-2003
Size is measured by the level of industrial output	Hughes and Mester (1993)	• a bank's commercial and industrial loans
Systemic importance measured by rating	Soussa (2000)	• a bank's Fitch IBCA Support Rating 1 or 2

- to be continued -

TSITF threshold	List of studies	Details of thresholds
Systemic importance measured by various criteria	Todd and Thomson (1990)	• a bank's interbank exposure
	De Nicolo and Kwast (2002)	• 22 large and complex banking organizations in the US 1988-1999 • have significant on and off balance sheet activities • offer a broad range of products and services at the domestic and international levels • participate extensively in large value payment and settlement systems • are of substantial size
	Kaufman (1994, 1996, 2003)	• a bank's deposits provide a large share of money supply • banks that are the largest lenders to households, businesses, and governments • banks that operate much of the payment system • banks that are closely interconnected to each other through interbank deposits and loans
	Völz and Wedow (2011)	• a bank's assets/GDP in 24 countries 2002-2007
	Tarashev et al. (2009)	• a financial institutions' probability of default (e.g. Moody's KMV) • degree of size concentration (e.g. liabilities/total market liabilities) • a financial institutions' exposure to common or systematic risk factors (imposing a single-common-factor structure on the Moody's KMV estimate of the institution's asset-return correlations)
	Bank of England (2009)	• size (e.g. a bank's total assets/total banking assets) • interconnectedness (e.g. a bank's interbank liabilities/ total banking assets)
	IMF/BIS/FSB (2009)	• size (e.g. a bank's total assets and liabilities/GDP) • lack of substitutability • interconnectedness (e.g. consolidated international claims, CDS) • leverage • liquidity risks and large mismatches • complexity

Table II. **List of rescued banks in 9 EU countries between October 2008 and June 2009**

The table presents a list of banks in Austria, Belgium, France, Germany, Greece, Netherlands, Portugal, Sweden and the UK that were rescued by their own governments (Dexia's state guarantees were provided by Belgium, France and Luxembourg jointly) between October 2008 and June 2009.

Country	Name of the bank	Rescue measures
Austria	Erste Bank Group AG	State guarantees (Euro 6 billion) Recapitalisation (Euro 1 billion)
	Kommunalkredit AG	State guarantees (Euro 5.2 billion) Recapitalisation (Euro 1.2 billion) Nationalisation on 5th January, 2009
	Austrian Clearingbank AG	State guarantees (Euro 4 billion)
	Volksbanken AG	State guarantees (Euro 3 billion) Recapitalisation (Euro 1 billion)
	Raiffeisen Zentralbank AG	State guarantees (Euro 4.25 billion) Recapitalisation (Euro 1.75 billion)
	Hypo Alpe-Adria-Bank International AG	State guarantees (Euro 1.35 billion) Recapitalisation (Euro 0.9 billion)
Belgium	Dexia	State guarantees (Euro 150 billion)[a] Recapitalisation (Euro 3 billion)
	Fortis	State guarantees (Euro 150 billion) Recapitalisation (Euro 15.9 billion)
	Fortis NV/SA	Recapitalisation (Euro 9.4 billion) Nationalisation on 5th October, 2008 Acquisition by BNP Paribas
	Fortis Bank Netherlands NV	Recapitalisation (Euro 2.04 billion)
	KBC	Recapitalisation (Euro 7 billion)
	Ethias Group	Recapitalisation (Euro 1.5 billion)
France	Dexia	State guarantees (Euro 150 billion) [a] Recapitalisation (Euro 3 billion)
	Banque Fédérale des Banques Populaires	Recapitalisation (Euro 0.95 billion) Access to Euro 50 billion emergency Loans Merger with Caisse Nationale des Caisses d'epargne with Euro 5 billion capital injection
	BNP Paribas SA	Recapitalisation (Euro 2.55 billion) Access to Euro 50 billion emergency loans
	Caisse Nationale des Caisses d'epargne (CNCE)	Recapitalisation (Euro 1.1 billion) Access to Euro 50 billion emergency loans Merger with Banque Federale des Banques Populaires with Euro 5 billion capital injection

- to be continued -

Country	Name of the bank	Rescue measures
	Crédit Agricole	Recapitalisation (Euro 3 billion) Access to Euro 50 billion emergency loans
	Crédit Mutuel	Recapitalisation (Euro 1.2 billion) Access to Euro 50 billion emergency loans
	Société Générale SA	Recapitalisation (Euro 1.7 billion) Access to Euro 50 billion emergency loans
	Banque PSA Finance	Access to Euro 50 billion emergency loans
	Caisse centrale du Credit Immobilier de France	Access to Euro 50 billion emergency loans
	GE Capital SAS	Access to Euro 50 billion emergency loans
	Groupe RCI Banque	Access to Euro 50 billion emergency loans
	Societe des Paiements Pass- S2P	Access to Euro 50 billion emergency loans
Germany	Aareal Bank	State guarantees (Euro 4 billion) Recapitalisation (Euro 0.53 billion)
	Bayern LB	State guarantees (Euro 15 billion)
	HSH Nordbank AG	State guarantees (Euro 30 billion) Recapitalisation (Euro 3 billion)
	Hypo Real Estate AG	State guarantees (Euro 52 billion)
	IKB	State guarantees (Euro 5 billion)
	SdB	State guarantees (Euro 6.7 billion)
	Sachsen LB	State guarantees (Euro 2.75 billion)
	Nord LB	State guarantees (Euro 20 billion)
	Commerzbank AG	Recapitalisation (Euro 10 billion)
Greece	Agricultural Bank of Greece SA	Recapitalisation (Euro 0.675 billion)
	Alpha Bank SA	Recapitalisation (Euro 0.95 billion)
	Aspis Bank SA	Recapitalisation (Euro 0.09 billion)
	Attica Bank SA	Recapitalisation (Euro 0.1 billion)
	EFG Eurobank Ergasias SA	Recapitalisation (Euro 0.95 billion)
	General Bank of Greece SA	Recapitalisation (Euro 0.18 billion)
	Millennium Bank SA	Recapitalisation (Euro 0.065 billion)
	National Bank of Greece SA	Recapitalisation (Euro 0.35 billion)
	Piraeus Bank SA	Recapitalisation (Euro 0.37 billion)
	Proton Bank SA	Recapitalisation (Euro 0.079 billion)
Netherlands	Fortis Bank Nederland NV	State guarantees (Euro 7.85 billion) Recapitalisation (Euro 1.96 billion) Nationalisation on 3rd October, 2008
	ING Bank NV	State guarantees (Euro 11.4 billion)
	NIBC Bank N.V.	State guarantees (Euro 4.8 billion)

- to be continued -

Country	Name of the bank	Rescue measures
	SNS Bank N.V.	State guarantees (Euro 5.488 billion) Recapitalisation (Euro 0.75 billion)
	Aegon N.V.	Recapitalisation (Euro 3 billion)
	ING Groep N.V	Recapitalisation (Euro 10 billion)
Portugual	Banco Espirito Santo	State guarantees (Euro 1.5 billion)
	Banco Finantia	State guarantees (Euro 0.1billion)
	Banco Internacional do Funchal	State guarantees (Euro 055 billion)
	Banco Invest	State guarantees (Euro 0.025 billion)
	Banco Privado Portugues	State guarantees (Euro 0.45 billion)
	Caixa Geral de Depositos	State guarantees (Euro 2 billion)
	Banco Portugues de Negocios S.A	Nationalisation on 11th November, 2008
Sweden	Carnegie Investment Bank AB	State guarantees State loans (Euro 0.225 billion)
	SBAB	State guarantees
	Swedbank AB	State guarantees
	Swedbank Hypotek AB	State guarantees
	Volvofinans Bank AB	State guarantees
UK	Abbey National Plc	State guarantees
	Barclays Bank Plc	State guarantees
	HBOS	State guarantees
	HSBC Bank Plc	State guarantees
	Lloyds TSB Bank Plc	State guarantees Recapitalisation (Euro 19 billion)
	Nationwide Building Society	State guarantees
	Royal Bank of Scotland Plc	State guarantees Recapitalisation (Euro 22.9 billion)
	Standard Chartered Bank	State guarantees
	Northern Rock Plc	Nationalisation on 22nd February, 2008
	Bradford and Bingley's	Nationalisation on 29th September, 2009

(Source: Petrovic and Tutsch, 2009)

Table III. **Summary statistics of variables in *Equation [2]***

Summary statistics of variables in Equation [2]					
Variable	Description	Mean	Median	StDev	No. of observations
PREM	Merger premiums. See *Equation [3]* for details	1.126	0.825	1.369	162
MPOW	Market power difference between acquirer and target	2.324	1.192	5.703	162
RROA	Profit efficiency difference between acquirer and target	1.978	1.452	1.68	162
RCIR	Cost efficiency difference between acquirer and target	1.116	1.011	0.653	162
AGECY	Percentage of acquirer's block shareholders	0.167	0.130	0.167	162
TLEV	Target's equity-to-asset ratio	0.104	0.075	0.095	162
TFOC	Target's interest income divided by its operating income	0.611	0.636	0.213	162
TGROW	Target's 3 years average pre-merger asset growth	11.90%	7.60%	0.191	162
TSUP	Target's home country Supervisory Strength Index	6.65	6	2.3	162
TCON	Target's home country 3-bank assets concentration (CR3) ratio	38%	28%	0.056	162
RSIZE	Total asset of acquirer and target divided by acquirer's	1.143	1.016	0.313	162

Table IV. **Summary statistics of variables in *Equation [4]***

Summary statistics of variables in *Equation [4]*							
Variable	Description	Mean	Median	Maximum	Minimum	StDev	No. of observations
SUBD	Sum of the safety net benefits	0.001	0	0.481	0	0.014	4380
ASUP	Acquirer's home country's Supervisory Strength Index	4.6548	4	10	4	1.2613	4380
ADEP	Acquirer's home country Deposit Insurance Strength Index	1.1667	1	2	1	0.3727	4380

Table V. **Summary statistics of safety net subsidy measure in M&As**

Country	Bank name	Total Subsidy	Average Subsidy	Cross-border Subsidy	Domestic Subsidy
Austria	Bank Austria-UniCredit Bank Austria AG	0.019	0.019	0	0.019
	BAWAG PSK Group	0.084	0.042	0.036	0.048
	Bank Styria	0.023	0.023	0.023	0
	Erste Group Bank AG	0.297	0.037	0.275	0.022
	Meinl Bank AG	0.020	0.020	0.020	0
	Raiffeisen Zentralbank Oesterreich AG - RZB	0.147	0.036	0.147	0
	Sparkasse Niederoesterreich	0.026	0.026	0	0.026
	Volksbanken Holding regGenmbH	0.065	0.032	0.043	0.022
Belgium	Almanij	0.019	0.019	0	0.019
	Banque Artesia-Artesia Bank	0.015	0.015	0.015	0
	Dexia	0.097	0.032	0.097	0
	Fortis	0.038	0.038	0.038	0
	ING-ING Belgium SA/NV	0.018	0.018	0	0.018
	KBC Group	0.023	0.023	0.023	0
France	Crédit Mutuel	0.014	0.014	0	0.014
	BNP Paribas SA	0.166	0.027	0.144	0.022
	Caisse Centrale des Banques Populaires	0.013	0.013	0	0.013
	CNCE	0.019	0.019	0	0.019
	Crédit Agricole Group-Crédit Agricole	0.203	0.029	0.124	0.079
	Crédit Foncier de France	0.020	0.020	0	0.020
	Crédit Lyonnais	0.081	0.040	0.081	0
	Groupe Caisse d'Epargne	0.114	0.022	0	0.114
	HSBC France	0.098	0.032	0	0.098
	Société Générale SA	0.481	0.028	0.431	0.050
Germany	Bayerische Hypo-und Vereinsbank AG	0.118	0.029	0.053	0.065
	Bayerische LBS	0.031	0.031	0.031	0.031
	Commerzbank AG	0.097	0.032	0.076	0.021
	Deutsche Bank AG	0.091	0.030	0.091	0
	Deutsche Genossenschaftsbank DG BANK	0.060	0.030	0.036	0.024
	Deutsche Postbank AG	0.058	0.029	0	0.058
	Deutsche Zentral-Genossenschaftsbank-DZ Bank AG	0.030	0.030	0	0.030
	Dresdner Bank AG	0.073	0.036	0	0.073
	LBS Bausparkasse Schleswig-Holstein-Hamburg AG	0.032	0.032	0	0.032
	Nord LB	0.039	0.019	0	0.039

- to be continued -

Country	Bank name	Total Subsidy	Average Subsidy	Cross-border Subsidy	Domestic Subsidy
Greece	Alpha Bank SA	0.115	0.038	0.075	0.040
	EFG Eurobank Ergasias SA	0.147	0.029	0.074	0.073
	Marfin Egnatia Bank SA	0.030	0.030	0	0.030
	National Bank of Greece SA	0.170	0.034	0.140	0.030
	Piraeus Bank SA	0.141	0.023	0.066	0.075
Netherlands	ABN Amro Holding NV	0.151	0.030	0.151	0
	F. van Lanschot Bankiers NV	0.052	0.026	0	0.052
Portugal	Millennium bcp-Banco Comercial Português, SA	0.079	0.026	0.031	0.048
	Banco Finantia SA	0.010	0.010	0.010	0
Sweden	Nordea Bank AB	0.108	0.038	0.077	0.031
	Skandinaviska Enskilda Banken AB	0.060	0.030	0.060	0
	Svenska Handelsbanken	0.073	0.024	0.073	0
	Swedbank AB	0.080	0.040	0.040	0.040
UK	Abbey National Plc	0.035	0.035	0	0.035
	Bank of Scotland Plc	0.024	0.024	0.024	0
	Barclays Bank Plc	0.063	0.031	0.035	0.028
	HSBC Holdings Plc	0.400	0.033	0.375	0.025
	Lloyds TSB Bank Plc	0	0	0	0
	Royal Bank of Scotland Plc	0.066	0.033	0.025	0.042
	Standard Chartered Plc	0.224	0.037	0.224	0

Table VI. **Determinants of banking merger premiums in 9 EU countries**

The table shows the results from the estimation of *Equation [2]* using a stochastic cost frontier model for a sample of 9 EU countries for the period of 1997 to 2007. Data are from Thomson One Banker and Bankscope. The dependent variable is PREM, which is the premium paid in merger deals. MPOW is the target's Lerner Index divided by the acquirer's Lerner Index and measures potential market power gains. RROA and RCIR measure profit and cost efficiency potential gains respectively: two variables are the ratios of target's ROA or CIR divided by acquirer's ROA or CIR, respectively. AGECY is the number of acquirer's block shareholders. TLEV is the equity-to-asset ratio of the target in the fiscal year before the M&A announcement. TFOC is the ratio of the net interest income of the target to its total operating income the year prior to the transaction. TGROW is the target's average assets growth rate over the three years prior to the merger. TCON is a target's market 3-bank assets concentration measure CR3 the year before the merger. TSUP captures target's home country's supervisory strength. RSIZE is defined as the ratio of the sum of target's asset size and the acquirer's asset size divided by acquirer's asset in the year preceding the merger. Z-statistics are in parentheses. Note: ***/**/* indicates that the coefficient estimates are significantly different from zero at 1%/5%/10% level.

Dependent variable:	**PREM**
MPOW	0.158***
	(3.67)
RROA	0.030
	(0.52)
RCIR	0.191
	(1.29)
AGECY	0.022
	(0.44)
TLEV	0.123
	(1.11)
TFOC	-0.022
	(-0.14)
TGROW	0.222
	(1.01)
TSUP	0.733***
	(3.44)
TCON	0.174*
	(1.74)
RSIZE	-0.422
	(-1.15)
Ancillary statistics	
No. of observations:	162
LR test of $\sigma_u^2 = 0$	50.92***

Table VII. **Correlations between safety net subsidies and systemic importance indicators**

The table shows the correlation coefficients of safety net subsidies measured and various indicators that measure the systemic importance of a banking institution. Data are from Thomson One Banker and Bankscope. SUBD is the sum of the safety net benefits derived from the estimation of *Equation [2]* using a stochastic frontier model. ABSIZE is the natural logarithm of a bank's assets in December 2007. MAKSH is the bank assets size divided by banking sector total assets in December 2007. COMP measures a bank's complexity in December 2007 as the natural logarithm of the number of a bank's total subsidiaries. ABCONN is the natural logarithm of a bank's total interbank deposits in December 2007. RECONN is the ratio of a bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007. *P-values* are in parentheses.

	SUBD	ABSIZE	MAKSH	COMP	ABCONN	RECONN
SUBD	1	-	-	-	-	-
	(0.0000)					
ABSIZE	0.24	1	-	-	-	-
	(0.0000)	(0.0000)				
MAKSH	0.40	0.37	1	-	-	-
	(0.0000)	(0.0000)	(0.0000)			
COMP	0.33	0.66	0.33	1	-	-
	(0.0000)	(0.0000)	(0.0000)	(0.0000)		
ABCONN	0.21	0.85	0.31	0.61	1	-
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	
RECONN	0.28	0.35	0.81	0.28	0.32	1
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Table VIII. **Systemic risk implications of TSITF- a binomial probit regression analysis**

The table shows the marginal effects of probit estimations of *Equation [4]* defining TSITF banks as those rescued between 20
a dummy variable taking the value 1 if the bank is defined as a TSITF bank and 0 otherwise. SUBD is the sum of the safety r
Equation [2] using a stochastic frontier model. ASUP and ADEP are a bank's home country's Supervisory Strength Index and
respectively. Standard errors are clustered on the country level and in parentheses. Country dummies are included but not shown. N
estimates are significantly different from zero at 1%/5%/10% level.

Dependent variable:	**Pr (TSITF bank/ non TSITF bank)**
SUBD	0.3148***
	(0.0457)
ASUP	0.0024***
	(0.0000)
ADEP	0.0017**
	(0.0007)
Country dummy	Yes
Ancillary statistics	
Pseudo R^2	34.75%
Type I error	0.09%
Type II error	80.03%
Area under ROC curve	91.03%
Correctly classified	98.77%
Observations	4380

Table IX. **Systemic risk implications of TSITF- a multinomial probit regression analysis**

The table shows marginal effects of multinomial probit estimations of *Equation [4]* defining TSITF banks as those rescued b
TSITF is multinomial taking the value of 1 if an acquiring bank is defined as a non-TSITF bank, 2 for a TSITF bank rescued by
for a TSITF bank rescued via recapitalization including nationalization and forced mergers. In each estimation, TSITF=1 is speci
of the safety net benefits from the estimation of *Equation [2]* using a stochastic frontier model. ASUP and ADEP are acquiring b
Index and Deposit Insurance Strength Index in 2007 respectively. Standard errors are clustered on the country level and in par
coefficient estimates are significantly different from zero at 1%/5%/10% level.

Outcome	State guarantees	Recapitalization
SUBD	0.1600**	0.3510*
	(0.0739)	(0.1812)
ASUP	0 .0028**	0.0019
	(0.0011)	(0.0028)
ADEP	0.0051*	-0.0022
	(0.0028)	(0.0104)
Ancillary statistics		
Wald $\chi 2$		91.02***
Observations		4380

Table X. **Systemic risk implications of TSITF- robustness test I-V**

Panel A shows the marginal effects of probit estimations of *Equation [4]* defining TSITF banks as those rescued between 2008 and 2009. I which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank. SUBD is the sum of the safety net benefits deriv regression. ASUP and ADEP are a bank's home country's Supervisory Strength Index and Deposit Insurance Strength Index in 2007, respectivel level and in parentheses. Country dummies are included but not shown.

Panel B shows the regression results of *Equation [4]* defining TSITF banks as bank's total assets weighted by its home country's GDP in 2 derived from the estimation of *Equation [2]* using a stochastic frontier model. ASUP and ADEP are a bank's home country's Supervisory Stren in 2007, respectively. Standard errors are clustered on the country level and in parentheses. Country dummies are included but not shown.

Panel C shows the marginal effects from probit estimations of *Equation [4]* defining TSITF banks as those rescued between 2008 and 20 Austria, Belgium, Greece, Netherlands, Portugal and Sweden; Sub-sample II includes France, Germany and the UK. Dependent variable TSITF if a bank is defined as a TSITF bank and 0 for a non-TSITF bank. SUBD is the sum of the safety net benefits derived from estimation of *Equat* and ADEP are a bank's home country's Supervisory Strength Index and Deposit Insurance Strength Index in 2007, respectively. Standard e parentheses. Country dummies are included but not shown.

Panel D shows a two-stage test for exogeneity of SUBD in the probit estimations of *Equation [4]*. We run the first stage OLS regression SU variables: MAVAL (bank's total M&A deal value) and MANUM (deal number) in natural logarithm between 1997 and 2008. We save th estimation. We then present the marginal effects of the second stage of probit estimations of *Equation [4]*. TSITF is the dependent variable, whi if a bank is defined as a TSITF bank and 0 for a non-TSITF bank between 2008 and 2009. SUBD is the sum of the safety net benefits derived fro frontier model. RESID is the residuals derived from first stage OLS regressions. For reasons of brevity, the control variables are not shown. Stand in parentheses. Country dummies are included but not shown.

Panel E shows the marginal effects of probit estimations of *Equation [4]* defining TSITF banks as those rescued between 2008 and 2009. I which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank. CROSUBD is the sum of the cross-border merger d of *Equation [2]* using a stochastic frontier model. DOMSUBD is the sum of the domestic merger deals' safety net benefits derived from estima model. ASUP and ADEP are a bank's home country's Supervisory Strength Index and Deposit Insurance Strength Index in 2007, respectively. S and in parentheses. Country dummies are included but not shown.

Panel F shows the marginal effects of probit estimations of *Equation [4]* defining TSITF banks as those rescued between 2008 and 2009. I which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank. AVSUBD is the mean value of the safety net benefit OLS regression. ASUP and ADEP are a bank's home country's Supervisory Strength Index and Deposit Insurance Strength Index in 2007, re country level and in parentheses. Country dummies are included but not shown.

Panel G shows the marginal effects of probit estimations of *Equation [4]* defining TSITF banks as those rescued between 2008 and 2009. I which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank. BANKSUBD is the sum of the bank merger deals *Equation [2]* using a stochastic frontier model. NBANKSUB is the sum of the non-bank merger deals' safety net benefits derived from estima model. ASUP and ADEP are a bank's home country's Supervisory Strength Index and Deposit Insurance Strength Index in 2007, respectively. S and in parentheses. Country dummies are included but not shown.

Note: ***/**/* indicates that the coefficient estimates are significantly different from zero at 1%/5%/10% level.

Panel A: Robustness test I		**Panel B: Robustness test II**		**Panel C: Robustness test III**			**Panel D: Robust**
							Stage one
Dependent variable:	**Pr (TSITF bank/ non TSITF bank)**	Dependent variable:	**Asset/GDP**	Dependent variable:	**Pr (TSITF bank/ non TSITF bank)**		Dependent variable:
SUBD	0.01479***	SUBD	4.0574*	SUBD	1.1006***	0.2514***	MAVAL
	(0.0044)		(1.8583)		(0.2724)	(0.0418)	
ASUP	0.0027***	ASUP	0.0026***	ASUP	0.0457***	0.0039***	MANUM
	(0.0003)		(0.0000)		(0.0022)	(0.0003)	
ADEP	0.0021	ADEP	0.0363***	ADEP	0.2072***	0.0066***	Country dummy
	(0.0014)		(0.0009)		(0.0113)	(0.0003)	R^2
Country dummy	Yes	Country dummy	Yes	Country dummy	Yes	Yes	Observations
Pseudo R^2	25.12%	R^2	12.72%		Sub-sample I	Sub-sample II	**Stage Two**
Observations	4378	Observations	4380	Pseudo R2	26.35%	32.61%	Dependent variable:
				Observations	782	3598	SUBD
							RESID
							Control variables
							Country dummy
							Pseudo R^2
							Observations

Panel E: Robustness test V			
Dependent variable:	**Pr (TSITF bank/ non TSITF bank)**		
CROSUBD	0.3076***	0.3983***	
	(0.0790)	(0.0901)	
DOMSUBD	0.3260***		0.5421***
	(0.0804)		(0.0760)
ASUP	0.0024***	0.0027***	0.0018***
	(0.0001)	(0.0000)	(0.0001)
ADEP	0.0017**	0.0013***	0.0041***
	(0.0008)	(0.0007)	(0.0003)
Country dummy	Yes	Yes	Yes
Pseudo R^2	34.76%	32.67%	26.34%
Observations	4380	4380	4380

Panel F: Robustness test VI	
Dependent variable:	**Pr (TSITF bank/ non TSITF bank)**
AVSUBD	0.9101***
	(0.0394)
ASUP	0.0023***
	(0.0001)
ADEP	0.0011
	(0.0008)
Country dummy	Yes
Pseudo R^2	36.61%
Observations	4380

Panel G: Robustness test VII	
Dependent variable:	**Pr (TSITF bank/ non TSITF bank)**
BANKSUBD	0.2932***
	(0.0436)
NBANKSUBD	0.4443**
	(0.2068)
ASUP	0.0023
	(0.0001)
ADEP	0.0020
	(0.0007)
Country dummy	Yes
Pseudo R^2	34.80%
Observations	4380

Table XI. **Determinants of banking merger premiums in the EU – Robustness test**

The table shows the results from the estimation of *Equation [2]* with two additional variables: LGBONUS and AGE using a stochastic cost frontier model for a sample of 9 EU countries for the period of 1997 to 2007. LGBONUS is the logarithmic transformation of 1 plus the total cash bonus received by the CEO. AGE is the log transformation of CEO age. Other variables remain unchanged. Z-statistics are in parentheses. Note: ***/**/* indicates that the coefficient estimates are significantly different from zero at 1%/5%/10% level.

Dependent variable:	**PREM**
MPOW	0.103
	(1.31)
RROA	0.168
	(1.28)
RCIR	0.230
	(0.54)
AGECY	0.024
	(0.44)
TLEV	-0.140
	(-0.64)
TFOC	-0.279
	(-1.14)
TGROW	0.721
	(1.53)
TSUP	0.826*
	(1.84)
TCON	0.241
	(1.17)
RSIZE	-1.843
	(-0.87)
LGBONUS	0.001
	(0.02)
AGE	1.748
	(1.07)
Ancillary statistics	
No. of observations:	54
LR test of $\sigma_u^2 = 0$	22.82**

Table XII. **Correlation between safety net subsidy gains and change in interdependency**

This table shows the correlation between TSITF bank's safety net subsidies gained in an M&A transaction and the change in interdependency with other TSITF banks in the same country. SUBD is the safety net benefits from the estimation of *Equation [2]* using a stochastic frontier model. Change in total interdependency (ΔINDEP) is calculated by the year-on-year percentage change of bivariate share return correlations with a bank's peer.

Country	Year	TSITF bank	$SUBD_t$	$\Delta INDEP_{t+1}$
Austria	2006	Volksbanken Holding	0.043	0.002
Austria	2006	RZB AG	0.039	-0.210
Austria	2005	RZB AG	0.046	0.150
Belgium	2007	KBC Groep NV	0.023	-0.152
Belgium	2006	Dexia	0.026	0.008
Belgium	2005	Fortis SA/NV	0.038	0.220
Belgium	2003	ING Belgium Bank	0.018	-0.224
Belgium	2000	Dexia SA	0.036	0.116
France	2007	BNP Paribas SA	0.028	0.016
France	2007	Société Générale SA	0.019	0.059
France	2007	Société Générale SA	0.022	0.059
France	2006	Crédit Agricole SA	0.023	0.145
France	2006	Crédit Agricole SA	0.042	0.145
France	2006	Société Générale SA	0.026	0.103
France	2006	BNP Paribas SA	0.017	0.119
France	2006	Société Générale SA	0.030	0.103
France	2005	Société Générale SA	0.036	0.092
France	2005	Société Générale SA	0.025	0.092
France	2004	Société Générale SA	0.008	0.012
France	2004	Société Générale SA	0.031	0.012
France	2003	BNP Paribas SA	0.032	-0.118
France	2002	Crédit Agricole	0.038	-0.092
France	2002	Crédit Agricole SA	0.033	-0.092
France	2002	Société Générale SA	0.030	-0.097
France	2001	BNP Paribas SA	0.033	0.119
France	2001	BNP Paribas SA	0.024	0.119
France	2001	BNP Paribas SA	0.028	0.119
France	2001	Société Générale SA	0.035	0.131
France	1999	Société Générale SA	0.045	0.240
France	1998	Société Générale SA	0.009	-0.300
France	1997	Société Générale SA	0.041	0.079
France	1997	Société Générale SA	0.024	0.079
France	1997	Société Générale SA	0.028	0.079

- to be continued -

Country	Year	TSITF bank	$SUBD_t$	$\Delta INDEP_{t+1}$
Germany	2007	Commerzbank AG	0.047	0.169
Germany	2005	Commerzbank AG	0.021	0.169
Germany	2001	Commerzbank AG	0.029	0.023
Germany	1998	Deutsche Bank AG	0.016	-0.062
Germany	1998	Deutsche Bank AG	0.032	-0.062
Greece	2006	EFG Eurobank Ergasias SA	0.041	-0.078
Greece	2006	National Bank of Greece SA	0.036	-0.038
Greece	2006	EFG Eurobank Ergasias SA	0.033	-0.078
Greece	2006	National Bank of Greece SA	0.037	-0.038
Greece	2005	Piraeus Bank SA	0.021	0.036
Greece	2005	Alpha Bank AE	0.043	0.013
Greece	2005	Piraeus Bank SA	0.026	0.036
Greece	2003	National Bank of Greece SA	0.030	-0.093
Greece	2003	Piraeus Bank SA	0.019	-0.066
Greece	2001	Piraeus Bank SA	0.007	-0.245
Greece	2001	EFG Eurobank Ergasias SA	0.02	-0.182
Greece	2000	National Bank of Greece SA	0.037	-0.018
Greece	1999	Piraeus Bank SA	0.043	-0.582
Greece	1999	Piraeus Bank SA	0.025	-0.582
Greece	1999	Alpha Credit Bank	0.032	0.024
Greece	1998	National Bank of Greece SA	0.030	-0.007
Greece	1998	EFG Eurobank SA	0.025	0.046
Greece	1998	EFG Eurobank SA	0.028	0.046
Sweden	2007	Svenska Handelsbanken AB	0.019	0.116
Sweden	2006	Swedbank AB	0.040	-0.014
Sweden	2006	Nordea Bank AB	0.044	0.004
Sweden	2001	Nordbanken	0.031	0.143
Sweden	2001	Svenska Handelsbanken AB	0.023	0.111
Sweden	2000	Skandinaviska Enskilda Banken	0.033	0.262
Sweden	1999	Nordbanken Holding AB	0.033	-0.037
Sweden	1999	Skandinaviska Enskilda Banken	0.027	0.029
Sweden	1999	Svenska Handelsbanken AB	0.031	0.047
Sweden	1997	Swedbank	0.040	0.220

- to be continued -

Country	Year	TSITF bank	$SUBD_t$	$\Delta INDEP_{t+1}$
UK	2007	Standard Chartered PLC	0.022	-0.107
UK	2006	Standard Chartered Bank PLC	0.048	0.147
UK	2006	HSBC Holdings PLC	0.041	0.182
UK	2006	HSBC Holdings PLC	0.030	0.182
UK	2005	Standard Chartered PLC	0.044	0.111
UK	2004	HSBC Holdings PLC	0.025	-0.066
UK	2003	HSBC Holdings PLC	0.037	-0.076
UK	2003	RBS Group PLC	0.025	-0.105
UK	2002	HSBC Holdings PLC	0.025	-0.076
UK	2002	HSBC Holdings PLC	0.035	-0.076
UK	2001	HSBC Bank PLC	0.036	0.076
UK	2000	Bank of Scotland PLC	0.024	0.199
UK	2000	HSBC Holdings PLC	0.045	0.221
UK	2000	Standard Chartered PLC	0.023	0.123
UK	2000	HSBC Holdings PL	0.035	0.221
UK	1999	Royal Bank of Scotland Group	0.041	0.013
UK	1999	Standard Chartered Bank PLC	0.042	-0.043
UK	1999	HSBC Holdings PLC	0.037	-0.176
UK	1999	HSBC Holdings PLC	0.032	-0.176
		Correlation coefficient:	0.08	
		Significance level	47.01%	