'Too-Big-to-Fail' and its Impact on Safety Net Subsidies and Systemic Risk

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Abstract

The recent financial turmoil and the bailouts of some large financial institutions in the US and Europe have raised major concerns that the increased size and complexity of financial institutions may give rise to negative ramifications for systemic risk. In this paper, we investigate whether banks exploit safety net subsidies by engaging in merger and acquisition activities (M&As) and rationally increase their risk taking behaviour to the detriment of the soundness of the banking sector. Using information on bank M&As between 1997 and 2008 for a sample of nine EU economies, we find that banks pay higher merger premiums in larger M&As. Moreover, merger premiums paid in the past are positively associated with higher possibility of becoming too-big-to-fail. Finally, we find no strong evidence that M&A activities tend to be positively related to the increase of systemic risk.

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1. INTRODUCTION

The term 'too-big-to-fail' (TBTF) was first widely used in a public policy context when the Continental Illinois National Bank was nationalised in 1984 in the US costing the Federal Deposit Insurance Corporation (FDIC) $1.1 billion dollars. In defending the action, Todd Conover, Comptroller of the Currency then stated in his testimony before the House Banking Committee on 19th September, 1984 that the regulators were unlikely to permit any one of the 11 largest multinational US banks to fail (including Continental Illinois). Although Conover did not specifically name the TBTF banks, Carrington (1984) gave a detailed report on this hearing and a list of banks was suggested in the following day's Wall Street Journal. These became TBTF banks at that time and provided a convenient sample for a handful of empirical studies. These 11 (more or less) largest banks became an often used criterion in the USA to define TBTF institutions (e.g., Sprague, 1986; O'Hara and Shaw, 1990; Kane, 2000; Morgan and Stiroh, 2005).

Bailouts of large financial institutions have always caught the attention of the public due to their high fiscal costs (Stern and Feldman, 2004). Financial institutions, and in particular banks, can grow large and complex through mergers and acquisitions (M&As) as well as organic growth (Hawkesby et al., 2007). However, these large institutions may pose a threat to the stability of the financial systems: if they were to fail the shock caused to the economy would be noticeably larger than that induced by the failure of a small institution (De Nicolo et al., 2003). For example, the failure of large banks will disrupt the provision of major financial services to the economy; winding down these insolvent banking firms will be costly and disorderly due to their complicated contractual relationships with many other institutions, which may trigger panics, bank runs, and a full-scale financial crisis (Stern and Feldman, 2004). To prevent any further damage to the economy, regulators throughout the world have provided ailing large banks with emergency lending from their central banks or direct cash and capital injections (e.g., Mishkin, 2006).

As far as market participants are concerned, they may gain a perception that these institutions are TBTF. Consequently, these banks may in turn enjoy favourable treatment from market participants and take advantage of this perception to exploit safety net subsidies (Mishkin, 2006). O'Hara and Shaw (1990) find that the 11 banks mentioned above experienced positive excess stock returns on the date of publication of the Wall Street Journal list after the Continental Illinois hearing, reflecting the favourable perceptions of market participants. Moreover, previous studies report that mergers undertaken by the largest banks result in an increase in market value for shareholders, while this is not the case for smaller banks, also suggesting that market prices reflect safety net subsidies for TBTF banks (Kane, 2000). The perception of being considered as TBTF also results in lower funding costs and higher credit ratings. Both these effects provide important competitive advantages over smaller banks (e.g., Soussa, 2000; Rime, 2005).

When banks try to achieve a TBTF status via M&A activities, systemic stability can be negatively affected in several ways. First of all, consolidation may help financial institutions

concentrate their activities within certain sectors/products and/or geographic locations. Overall systemic risk may increase as financial institutions become more interdependent due to similar business lines, investment portfolios, and common exposures. Second, when financial institutions engage in M&As they become larger as well as more complex (i.e. bancassurances or conglomerates) and this may lead to their activities becoming more opaque posing challenges for regulators. Third, cross-border M&As may also complicate issues further as uncertainties regarding the jurisdiction of national safety net arrangements and coordination problems between regulators arise.

It has been observed that the term TBTF may appear as a misnomer in some cases when bailed-out banks are not considerably large in size (Kaufman, 2003). Nevertheless, most of the literature uses size (assets, market share, or market capitalisation) of a bank, as the term TBTF suggests, to define whether a bank has TBTF status or not (e.g., Kane, 2000; Shull and Hanweck, 2001; Brewer and Jagtiani, 2007). Some other studies, however, have stressed that size alone may not be the only factor why some banks get rescued by the state (e.g. Todd and Thomas, 1990; Kaufman, 1994, 1996, 2003). The recent crisis has also clearly demonstrated that the possible spill-over effects of one bank's failure to other financial institutions arises as a result of this bank's systemic importance, in other words, the complexity of the business model, connectivity to others as well as size (Bank of England, 2009; IMF/BIS/FSB, 2009). To keep the use of terminology to a minimum, we will use the term TSITF throughout this study, broadly encompassing 'too-systemically-important-to-fail' institutions.

The recent financial crisis provides a timely case study for TSITF effects in the EU. Large scale banking bail-outs between 2008 and 2009 have raised serious concerns about the social and economic costs of TSITF. Some rescued banks appeared to be natural candidates of TSITF given their size and complexity (e.g., Royal Bank of Scotland) whereas others like Northern Rock appear less so. Moreover, European banking markets have gone through some far-reaching structural changes in recent years as part of the process of European integration in general, which may also help investigate TSITF effects. These changes are reflected in the following developments: in response to growing competition, many European banks have expanded significantly and diversified into more non-interest earning activities and/or expanded geographically (e.g., Barros et al., 2005; Laeven and Levine, 2007). Moreover, M&As between banks and other financial institutions have become more common than during the late 1990s (Goddard et al., 2007) so that some bancassurances or other conglomerates have been created. In particular, some pan-European banks have emerged (e.g. Dexia, Fortis and ING). Finally, some mega-mergers took place during the recent financial crisis as a part of governments' rescuing and/or restructuring plans. While these rescue measures may stalled further declines of consumer confidence into the financial system as a whole, these measure simultaneously have reinforced the necessity of a thought debate about TSITF.

This paper contributes to the TSITF policy debate by answering two key questions. First, did banks pay merger premiums in their domestic and cross-border M&As to achieve systemic importance (TSITF status)? Second, what are the effects of banks that achieved TSITF status on systemic risk?

To investigate the former we follow a two step approach. As suggested by Brewer and Jagtiani (2007) and Schmid and Walter (2009), we first investigate safety net subsidies by focusing on premiums paid in bank M&A activity. We find that banks pay higher premiums for larger M&As, presumably for obtaining greater TSITF benefits, i.e. safety net subsidies. The second stage involves using two measures of TSITF (banks that were saved during the crisis and the Fitch support rating) where we examine whether merger premiums (as well as bank size, complexity, interconnectedness, and GDP per capita) explain TSITF.

We investigate the impact on systemic risk by focusing on the stock return correlations among the TSITF banks as suggested by De Nicolo and Kwast (2002) and Hawkesby et al. (2007) and examine if these return correlations can be explained by merger premiums (as well as organic growth, interconnectedness and GDP per capita).

Overall, we find that EU banks pay higher merger premiums if their targets are larger. Also, banks that have been rescued or supported by their governments during the recent crisis have paid higher merger premiums in the past, which offers suggestive evidence that these banks exploit safety net subsidies. However, we do not find convincing evidence that past M&A premiums paid tend to be related to systemic risk.

The remainder of the paper is organised as follows: Section 2 presents a brief review of the TSITF literature, Section 3 outlines our methodology, and Section 4 describes the data set. We report on main results in Section 5, and Section 6 shows the results from robustness tests. Concluding remarks are presented in Section 7.

2. LITERATURE

Numerous studies have examined TSITF in banking. We present an overview of these studies in Table 1, whereby we classifies them according to the type of TSITF measure employed (asset size, market capitalization, market shares, rating and so on). The more recent studies, in particular those that cover the recent financial crisis, tend to 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 1 here*]

One strand of the literature on TSITF uses event studies to examine potential effects of safety net subsidies. For example, Kane (2000) uses a sample of 12 giant US banks between 1991 and 1998 and finds that these banks gain shareholder value from becoming larger via M&A activity. Pennacchi (2000), however, argues that argues that the motives for mergers vary from efficiency gains to market power enhancement and agency problems as well as seeking TSITF and it can be ambiguous to interpret which one is the primary motive. Instead of measuring stock returns, some other studies use merger premiums. For instance, Brewer and Jagtiani (2007) show that banks pay a premium in M&As to reach the threshold of being TSITF. Schmid and Walter (2009) also find that significant premiums are paid in mega-mergers. Penas and Unal (2004), on the other hand, focus on the effect of the largest banks' merger activities on bond returns. They find a gain in bond returns and a decline in credit spread after a merger, which points to the existence of TSITF.

Another strand of the literature measures specific benefits TSITF banks may enjoy. Soussa (2000) studies the Fitch IBCA's bank support ratings in 15 countries as an indicator of TSITF status. He finds that banks tend to be rated as 1 or 2 (i.e. they are most likely to receive official support) if they are larger and issue securities. Moreover, he examines the difference between a bank's standalone ratings (Fitch IBCA's Individual Rating) and inclusive ratings (Fitch IBCA's Long-term Credit Rating) of 120 banks from six countries, which reflects the value of safety net subsidies. The results show that TSITF banks receive significant official support compared to smaller banks. Similarly, Rime (2005) also analyses banks' ratings from Fitch IBCA and Moody's respectively in 21 industrialised countries during 1999 and 2003 and finds evidence that TSITF status has a significant and positive impact on bank's standalone ratings. Carbo et al. (2008) estimate differences in safety net benefits and in supervisory effectiveness for EU 15 countries excluding Greece and conclude by showing that banks from high-subsidy and low-restraint countries tend to conduct more cross-border M&A activities. Using the same sample and approach, Carbo et al. (2009) find that there are significant differences between banks that conduct cross-border mergers and other EU banks in terms of risk taking and access to safety net

subsidies. Hughes and Mester (1993) find a significant negative relationship between funding costs for US bank deposits and the size of the banks giving support to the existence of TSITF. Flannery and Sorescu (1996) test the TSITF effect on subordinated debenture yields and find that smaller banks pay higher spreads. More recently, Volz and Wedow (2009) examine large banks' CDS prices in 24 countries and find that CDS prices tend to be distorted if the bank is larger, which suggests that less market discipline can be exercised on those TSITF banks.

There are many studies that measure systemic risk using correlations of stock returns of large financial institutions. For example, Brasili and Vulpes (2005) analyse co-movements in bank risk for large European banks during the period 1994-2003. They find that EU-wide risk increased following the introduction of the Euro in 1999. Gropp and Moermann (2004) report that correlations between stock price returns for large banks increased during the 1990s in the EU. Hawkesby et al. (2003) report some degree of commonality in the movements in asset prices of large international financial institutions based in the UK. Hawkesby et al. (2007) also find a relatively high degree of commonality for a group of selected large complex financial institutions in the US and EU. However, there is a less developed literature that links consolidation to systemic risk. De Nicolo and Kwast (2002) examine the impact of consolidation among large and complex banks in the US on systemic risk (measured using correlations of stock returns). Their results show that despite an increase in systemic risk within the banking sector, the effects of consolidation appear to have eased in the latter half of the 1990s. In the EU, Amihud et al. (2002) study 214 EU cross-border bank mergers in the years 1985-1998 and find no significant change in these banks' risk exposures, a similar result is reported by Buch and DeLong (2008) in their analysis of 81 EU cross-border mergers during 1998-2002.

3. METHODOLOGY

In this study, we apply a two-stage analysis to examine whether EU banks exploit safety net subsidies by engaging in M&A activities. Subsequently, we examine the effects on systemic risk. Following Benston et al. (1995) and Brewer and Jagtiani (2007), we first use an event study to investigate the extent to which acquiring banks pay merger premiums to raise their systemic importance controlling for other possible determinants. The regression model of the first stage analysis is as follows:

$$PREM_i = \alpha + \beta_1 TASIZE_i + \beta_2 GEOF_i + \beta_3 BUSF_i + \beta_4 TGROW_i + \beta_5 RROAA_i + \beta_6 RCIR + \lambda CONTL_i + \varepsilon_i$$

(1)

where PREM is merger premiums of each merger deal in billion US dollars. Merger premiums are the difference between deal value and market capitalisation of the target 30 days before the transaction if the bank was listed. If the target was not listed, an accounting equivalent measure – target's equity value is used instead.

TASIZE is target's assets size relative to acquirer's. Schmid and Walter (2009) find that acquiring banks pay significant premiums in mega-mergers. Hernando et al. (2009) also find that larger targets are more likely to be acquired by other banks in the same country. We test whether banks generally pay more if the targets are relatively larger. We use a ratio of target's assets divided by acquirer's assets. GEOF is a dummy variable that takes a value of 1 for cross-border transactions and 0 for domestic transactions. Studies find that acquirers pay more premiums in interstate mergers in the US (Rogowski and Simonson, 1987; Brewer and Jagtiani, 2007). In this study, cross-border M&A deals involving acquirers from 9 EU countries and targets from different countries (not limited to the EU) tend to make acquirers' business model more complex and extend their potential safety net to host countries. Therefore, we assume that acquirers may pay more in cross-border M&As compared to domestic ones if they aim to grow more complex. BUSF indicates target's business focus. Acquiring firms in our study are either banks or mutual credit institutions and targets include all types of financial service providers. We assume that acquiring banks may pay a premium if targets have different business strategies, which will diversify acquirers' risk and increase their systemic importance. Brewer and Jagtiani (2007), however, find no strong evidence that acquirers pay premiums in deals that offer diversification. In this study, we use the ratio of the net interest income of the target firm to its total operating income measures the extent to which the target firm is focused on traditional core banking business. TGROW measures target's pre-merger growth. It has been suggested that acquiring banks may prefer fast-growing targets (Rhoades, 1987; Cheng et al., 1989; Beitel et al., 2004). TGROW is the target's assets growth rate over the year prior to the merger. Previous studies have reported that acquirers may prefer a target with efficiency potential measured with

reference to either profit or cost benchmarks (Pilloff, 1996). We use both a profit-based and a cost-based ratio to capture such potential: RROAA is the ratio of the target's return on average asset (ROAA) to the acquirer's ROA; and RCIR is the ratio of the target's cost-to-income ratio (CIR) and acquirer's CIR;[1] Finally, to control for economic development, CONTL is the logarithm of acquirer's home GDP per capita, which is measured one year prior to the transaction.

In the second stage, we use a logit model to assess whether merger premiums as well as other factors (organic growth, size, complexity, interconnectedness and the level of economic development) explain whether banks are TSITF. If a positive and significant relationship between merger premiums and TSITF is confirmed this indirectly suggests that banks engage in M&As to exploit safety net subsidies. We estimate the following logit model:

$$\text{Logit}(\text{TSITF}_i) = \alpha + \beta_1(\sum_{t=1997}^{2008}\text{APREM}_{i,t}) + \beta_2\text{ORGROW}(12)_i + \beta_3\text{SIZE}_i + \beta_4\text{COMP}_i +$$

$$\beta_5\text{CONN}_i + \lambda\text{CONTL}_i + \varepsilon_i$$

$$(2)$$

where TSITF is a dummy variable, which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank. We use two complementary TSITF thresholds in this analysis: the first measure relates to all banks that received rescue packages during 2008 and 2009; the second measure is banks rated 1 and 2 (those most likely to receive government support) according to the Fitch support rating in 2008. The explanatory variables of equation (2) are defined as follows:

$\sum_{t=1997}^{2008}\text{APREM}$ is the aggregate of a vector of annual merger premiums, which are the sum of a bank's merger premiums it paid (in billion US dollars) in various M&As (if any) in each year from 1997 to 2008. The coefficient on this independent variable indicates how the possibility of a bank becoming a TSITF bank changes when the merger premiums it pays in the past increase by one unit. In a separate test, we also study the effects of each year's merger premiums on the probability of obtaining TSITF status, so we expect to examine the development of the impact. A long time period is assumed necessary in this test to examine the TSITF effects, which also

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[1] *CIR is the costs of running a bank or financial firm, excluding interest expenses and loan-loss provisions, expressed as a percentage of income before loan-loss provisions.*

coincides with the growing trend of consolidation in major EU countries that starts from the late 1990s (ECB, 2000) until 2008 when some large M&As were conducted to rescue some failing banks. ORGROW(12) is a bank's organic growth rate. We measure another possible source of the increase in systemic importance of banks other than that incorporated in merger premiums, namely a bank's organic growth, as some banks may prefer this to take-over strategies. ORGROW(12) is the asset growth rate between 1997 and 2008 excluding the asset increase due to M&As (acquired targets' assets) during this period. SIZE is a bank's size measure as at December 2007. The link between the size of a bank and the effect that its distress or failure will bring about is generally regarded as a key factor in the assessment of its systemic importance (IMF/BIS/FSB, 2009). In this study, we use two separate size measures: 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 RESIZE – bank assets size divided by total assets of 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 operate banking, insurance and securities subsidiaries; operate internationally; and/or have exposures to complex 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 a bank's total subsidiaries. Interconnectedness, on the other hand, measures contractual relations with other institutions. In this study, we capture these relations by observing interbank lending activities (CONN). We again use two complementary measures: the first ABCONN is the natural logarithm of a bank's total interbank deposits in December 2007. The second, RECONN is the ratio of bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007. Finally, we include a country level control variable – CONTL, which is the GDP per capita of 2007. Bail-out policy is expected to vary in different countries. We use GDP per capita as it may be the case that less developed economies have less effective regulatory monitoring and more generous safety net subsidies (Carbo et al., 2008).

Next, we test for TSITF effects on systemic risk. We measure systemic risk using an indicator of bank interdependence derived from stock return correlations and estimate the following model:

$$\Delta INDEP_{i,t} = \alpha_1 + \beta_1 APREM_{i,t-1} + \beta_2 APREM_{i,t-2} + \beta_3 APREM_{i,t-3} + \beta_4 ORGROW(3)_{i,t-1} + \beta_5 \Delta CONN_{i,t} + \lambda \Delta CONTL + \varepsilon_i$$

(3)

where $\Delta INDEP$ is a TSITF bank's interdependence change compared to the previous year. According to De Nicolo and Kwast (2002) and Hawkesby et al. (2007) systemic risk can be indicated by the interdependence of large and complex banks in a banking system. They use the average of banks' bivariate correlations of stock returns in each year as a proxy for interdependence. In our paper, we measure a TSITF bank's average bivariate stock return correlations with the rest of the TSITF banks within its own country in a specific year, which therefore measures the interdependence the TSITF bank has on other peer banks. In equation (3)

we take the year-on-year difference of the correlations to measure change in interdependence (systemic risk change) of a TSITF bank.

As we assume that TSITF banks aggravate systemic risk through M&As when they grow more systemically important, we use a TSITF bank's past 3 years' merger premiums ($APREM_{i,t-1}$, $APREM_{i,t-2}$ and $APREM_{i,t-3}$) prior to the observation year to capture its M&A activities. It is reasonable to believe that it may take a few years for a bank to change its business model after taking over some targets. We again consider that organic growth of a TSITF bank may also play a role affecting systemic risk. $ORGROW(3)_{i,t-1}$ measures a TSITF bank's 3 years' asset growth excluding acquired assets before the observation year. Both merger premiums and organic asset growth reflect a TSITF bank's size change to some extent, in the same vein as equation (2). We also control for the change in bank's interconnectedness [2] $\Delta CONN$ which measures the change in TSITF bank's interbank deposits before the observation year. Finally, we use the change of GDP per capita to control for economic development factors as in equation (3).

As the number of banks that are publically listed is limited, we relax the TSITF threshold in this analysis as used in model (2). To test equation (3), as long as the bank has publically traded shares and was once bailed out recently or highly rated by the Fitch support rating, we observe its stock return correlations with other similar banks within its country to measure interdependence of TSITF banks. (We also exclude Portuguese and Dutch banks from this analysis because of their small sample size).

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[2] *We do not control for change in complexity in this analysis due to lack of information on the number of subsidiaries.*

4. DATA

As outlined above we commence our analysis by examining TSITF effects in nine EU countries namely Austria, Belgium, France, Germany, Greece, Netherlands, Portugal, Sweden and UK. According to Petrovic and Tutsch (2009) these countries experienced 70 bank rescues between October 2008 and June 2009.[3] Table 2 presents a list of rescued banks and outlines briefly the rescue measures taken. These banks define one of our TSITF measures in the study. However, this threshold may not be ideal for two reasons. First, some other systemically important banks may not be included in this list if they were not affected badly by the crisis to seek the protection of the safety net. Second, some studies find that when the banking system is weak, government may provide a blanket bail-out policy and less systemically important banks could be saved as well. In other words, the banking system experiences the 'too-many-to-fail' phenomenon instead (Brown and Dinc, 2009). It might be the case that governments in these EU countries practiced excessive regulatory forbearance during one of the worst global financial crises and saved all troubled banks. To take these possibilities into account, we complement the former TSITF measure with a market based indicator –Fitch IBCA's support ratings. According to Fitch IBCA, this rating gauges a government's propensity to support a bank and of its ability to support it. A support rating of 1 or 2 indicates an extremely high or high propensity to receive government support. We then have a second list of potential TSITF banks that includes 117 banks that held a 1 or 2 rating in September, 2008. Table 3 provides a list of these banks. Taking a closer look at the banks listed in Tables 2 and 3 suggests that they do not appear to overlap considerably: only about half of the failing banks were given high support ratings, which indicates that 'generous' rescue measures were taken by regulators in these EU countries.

[*Insert Table 2 here*]

[*Insert Table 3 here*]

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[3]*Ireland also had 6 banks that were rescued (Allied Irish Bank, Anglo Irish Bank, Bank of Ireland, Postbank EBS Building Society, Irish Nationwide Building Society), but it is excluded from our data sample as its M&As information was incomplete for analysis. Spain and Luxembourg only provided state guarantees to Caja Castilla-La Mancha and capital injections into Fortis Banque Luxembourg respectively. Therefore, these two countries are excluded as well.*

We obtain information on banks' M&As in nine EU countries between 1997 and 2008 from ThomsonOne Banker. In total, we identify 172 M&A transactions where acquirers take full control of targets (over 50% share control after a transaction). Acquirers are banks or mutual credit institutions and targets are defined as financial service providers (defined by ThomsonOne Banker to include banks, insurance companies, asset-management firms, credit institutions and brokerages). Table 4 lists a summary of mean merger premiums in billion US dollars (APREM) of nine EU banking sectors under study. It appears that merger activities took place at considerably different levels measured by the premiums paid as well as the number of transactions over 12 years, with 2001, 2006 and 2008 being overall the busiest years, while 2002, 2004 and 2007 remained relatively quiet.

[*Insert Table 4 here*]

We abstract banks' accounting information from BankScope. In total, we have 2281 banks in our final sample, which at least have more than 6 consecutive years' balance sheet and income statement data prior to 2008. Table 5 presents a statistical summary of all variables of equation (1), (2) and (3) other than APREM. Panel A shows that targets in EU banking M&As are on average nearly 70% as big as their acquirers. They also tend to perform well before the take-overs as their assets grow at a rate of 12% and they are more profitable than and at least as cost-efficient as acquiring banks. Also there are twice as many cross-border transactions than domestic ones. In Panel B, we find that banking firms had an average growth rate of 25% disregarding the asset acquisitions from M&As for 12 years' period. Moreover, banks vary considerably in terms of their size and business models. The largest bank accounts for over 30% of its home country's total banking system assets, while some other bank accounts for more than 45% of total interbank deposits and another institution shows no such engagement at all. Panel C of Table 5 lists dependent and independent variables of equation (3). Our M&A data start from 1997, so we measure the independence 3 years later and the first observation year is 2000. On average, since 2000, systemic risk of a banking system indicated by bank stock return independence in 7 EU countries has an increase rate of 2.4% (Netherlands and Portugal are not included because of their small sample size). Moreover, these TSITF banks tend to have fast asset growth and increasing reliance on inter-bank lending.

[*Insert Table 5 here*]

5. RESULTS

Table 6 shows the results from estimation of equation (1), which forms the first stage analysis to examine whether EU banks exploit safety net subsidies by engaging in M&A activities. As can be seen, the coefficient on TASIZE is positive and significant at the 1 percentage level, which suggests that merger premiums paid are positively associated with the size of targets in our sample. This result is generally consistent with previous studies (e.g. Schmid and Walter, 2009; Hernando et al., 2009). Other independent variables of this model, on the other hand, have no explanatory power. These results imply that banks tend to pay more for the size increase after M&As rather than targets' other characteristics that may also increase acquirers' systemic importance or have performance implications. We cautiously suggest that merger premiums appear to indicate the effects of TSITF.

[*Insert Table 6 here*]

In the second stage, we use a logit model to assess whether merger premiums as well as other factors (organic growth, size, complexity, interconnectedness, and the level of economic development) contribute to banks being TSITF. Finding a positive and significant association between merger premiums and TSITF would indirectly suggest that banks engage in M&As to exploit safety net subsidies. Table 7 and 8 contain the results from two estimations of equation (2) using rescued banks in the recent crisis and highly rated banks according to Fitch's support rating as our TSITF threshold respectively in 9 EU countries. The estimated coefficients on APREM1997-2008 tests whether banks are more likely to become TSITF if they pay excessively in M&As to gain more systemic importance. We find that in Table 7, where TSITF banks are defined as those banks rescued, APREM1997-2008 is positive and statistically significant in all model estimates. In Table 8 where Fitch support ratings are used to define our TSITF banks again the sign is always positive and significant in three out of five cases. Overall this provides reasonably strong evidence that banks pay merger premiums to exploit potential safety net subsidies. Organic growth measured by variable ORGROW(12), however, does not have any significant influence using rescued banks as TSITF (see Table 7), while it is negatively and significantly correlated with the probability of being supported by a government (see Table 8), which suggests that organic growth is not a major source of TSITF effects since the late 1990s in the EU countries under study.

[*Insert Table 7 here*]

[*Insert Table 8 here*]

In addition, the independent variable of equation (2) APREM1997-2008 is decomposed into twelve separate independent variables that indicate annual merger premiums between 1997 and 2008 to see the variations of TSITF effects over the study period. We rerun the model and results are reported in Tables 9 and 10. results from Table 9 show that the effects of APREM on the probability of being TSITF vary in different years, in 2 out of 12 years, in particular in 2001, we find evidence that contradicts our hypothesis; in 6 other years, we have stronger evidence that the coefficients on annual APREM are statistically positive. It is worth noting that the results from APREM2006 seem to suggest that rescued banks heavily engaged in M&As 2 years before they were bailed out. Also, the significance of the coefficients on APREM2008 in 3 estimations appears to confirm that rescued banks in the 9 EU countries are more likely to be encouraged by their regulators to take over other failing banks during the crisis. Table 10, in contrast, shows less evident results. Only in the final two years (2007 and 2008) out of 12 years, the coefficients on APREM are positive and significant, and in 1999 and 2000 we find opposite relationships. The weaker results at the annual level may suggest that an extended list of TSITF banks using market-based threshold might have obstructed the detection of the TSITF effects, and the threshold defining rescued banks as TSITF banks seems more appropriate.

[*Insert Table 9 here*]

[*Insert Table 10 here*]

The five variables that we use to control for different aspects of systemic importance (ABSIZE, RESIZE, COMP, ABCONN and RECONN) of a bank are all significantly and positively associated with a higher probability of being considered TSITF in all of four logit estimations. [4] Also, economies with relatively lower GDP per capita in the EU countries tend to have more TSITF banks. In other words these countries have a larger safety net, this result is in line with previous findings (Carbo et al., 2008). In our sample, Portugal and Greece, being the least developed EU countries, have comparatively large number of TSITF banks measured by

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[4] *We control for one aspect of systemic importance each time only as these variables seem to be highly correlated with each other (see Annex).*

either threshold. Finally, we assess the quality of our logit model based upon two criteria: model χ^2 and in-sample classification accuracy. The model χ^2 tests the joint significance of the regressors by comparing the likelihood of the model with that of a model with only the intercept. As shown in the four tables, the hypothesis that the coefficients of the independent variables are jointly equal to zero is rejected at the 1 percentage significance level in all specifications. To assess the prediction accuracy, we also report the percentage of TSITF banks that are correctly classified. The model appears to perform very well: the classification accuracy is all above 96% in four estimations.

Table 11 displays the results from the estimations of equation (3), which tests the impact of M&As of TSITF banks on systemic risk change measured by their bivariate stock returns correlations with other TSITF banks. The results from the first column show that TSITF banks' merger activities have immediate effects on systemic risk as the coefficient of $APREM_{i,t-1}$ is significantly positive at 5 percent level. However, $APREM_{i,t-3}$ has negative and significant influence on the systemic risk change at 5 percent level. These results seem to suggest that over a medium term (3 years in this case), M&As conducted by TSITF banks do not seem to negatively affect a banking sector's systemic stability. This result is consistent with similar studies in the EU (Amihud et al., 2002; Buch and DeLong, 2008). We also carry out two additional tests when testing past two years' merger premiums ($APREM_{i,t-1}$ and $APREM_{i,t-2}$) separately in the second and third columns of the table. $APREM_{i,t-1}$ does not have any significant influence in any of these two estimations, which suggest that there is no effects of M&As carried out by TSITF banks on systemic risk. Overall, we do not find strong and consistent evidence that TSITF banks' M&As have strong and consistent impact on systemic risk. TSITF banks' three years' asset growth rate before the observation year measured by ORGROW(3), on the other hand, does not have any correlations with systemic risk change. We use $\Delta CONN$ to control for the possibility that systemic risk can be exacerbated by the intensified contractual relationships between TSITF banks. This assumption is not supported by our findings from three estimations. Finally, the change of macroeconomic conditions measured by CONTL in equation (3) is insignificant in any of estimations.

[*Insert Table 11 here*]

6. ROBUSTNESS TESTS

In addition to the estimations we have described above, further investigations are necessary to scrutinise our findings. [5] First of all, when estimating equation (2), we use a pooled sample of 9 EU countries. However, the banking sectors of these countries may differ from each other to certain extent. Therefore, we test this equation using each country sub-sample instead, with the exception of Belgium, Greece, and Portugal due to their small banking sectors. We find that the results are generally consistent with the ones from the pooled sample tests. It should be noted, nevertheless, that bailed out banks in Austria tend to seek organic growth instead of M&As. Moreover, the negative sign of ORGROW(12) when using support rating as TSITF threshold is mainly driven by German banks as this independent variable is insignificant in other 5 countries' estimations. Second, we extend the time period prior to observation year from 3 years to 5 years in equation (3). We find the same results for first three years' premiums; the fourth year's merger premiums $APREM_{i,t-4}$ are also negatively and significantly correlated with the systemic risk change, while the ones of the fifth year are insignificant. Therefore, our main findings remain robust.

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[5] *The results of these tests are not presented in the paper. They are available upon request.*

7. CONCLUSION

In response to growing concerns whether banks increase their systemic importance to exploit safety net subsidies and pose a threat to the financial stability of an economy, we examine in this study the effects of TSITF on safety net subsidies and systemic risk using M&A information in 9 EU countries between 1997 and 2008.

In the first analysis, the results confirm that banks in these EU countries pay merger premiums mainly based on the size of their targets, which also suggests that merger premiums can be used as an indicator that how much EU banks pay to gain incremental systemic importance (size in this case) through M&As. In our second analysis, we study the correlations between the merger activities in the past indicated by total as well as annual merger premiums and the probability of being TSITF in recent financial crisis.

Our results provide suggestive evidence that banks engage in M&As to reach TSITF status and are prepared to pay significant merger premiums in exchange of this status. We consequently infer that TSITF banks exploit safety net subsidies. We also find that banks that were rescued during the recent crisis in the EU engaged in M&As before the recent financial turmoil. These banks' systemic importance, their possibility of being bailed out, and the cost of bail-outs have all risen.

Finally, we measure TSITF banks' stock return correlations to examine the level of interdependence among them, which we use in turn to show how much systemic risk these banks pose if any of them is to fail. We then test the impact of TSITF banks' M&As on their interdependence change over the years. The results highlight that, although there was a general increase of systemic risk in these EU countries, M&As have no strong effects on financial stability.

Overall, our findings may seem uncomfortable, as far as regulators are concerned. Specifically, this study casts doubts on the motives behind many banking M&As in the EU. Anti-trust implications may be overemphasized when authorities consider M&As. TSITF effects, on the other hand, do not seem to be addressed adequately. Our study also stresses the need to seriously consider measures that have been voiced by some regulators after the recent financial crisis, such as curbing bank size, higher capital and contingent capital requirements for systemically important banks, and removing risky business lines from bank operations to reduce their complexity.

References

BANK OF ENGLAND, "The Role of Macroprudential Policy", a discussion paper, 2009.

BARROS P. P., BERGLOF E., FULGHIERRI J., GUAL J., MAYER C., VIVES X., "Integration of European Banks: The Way Forward", Centre of Economic Policy Research, London.

BEITEL P., SCHIERECK, D., WAHRENBURG M., "Explaining M&A Success in European Banks", in *European Financial Management*, Vol. 10, 2004.

BENSTON G., HUNTER, W. C., WALL L., "Motivations for Bank Mergers and Acquisitions: Enhancing the Deposit Insurance Put Option Versus Earnings Diversification", in *Journal of Money, Credit and Banking*, Vol. 27, 1995.

BLACK H. A., COLLINS M. C., ROBINSON B. L., SCHWEITZER R. L., "Changes in Market Perception of Riskiness: The Case of Too-Big-To-Fail", in *Journal of Financial Research*, Vol. 20, 1997.

BRASILI A. – G. VULPES, "Co-movements in EU Bank's Fragility: a Dynamic Factor Model Approach", Paper presented at the EU Directorate-General for Economic and Financial Affairs 2nd Annual Research Conference, Brussels, 2005.

BREWER E. – J. JAGTIANI, "How Much Would Banks be Willing to Pay to Become 'Too-Big-to-Fail' and to Capture Other Benefits?", Federal Reserve Bank of Kansas City Research Working Paper RWP 07-05, 2007.

BROWN C., DINC I. S., "Too Many to Fail? Evidence of Regulatory Forbearance When the Banking Sector is Weak", in *Review of Financial Studies*, May, 2009.

CARBO S. V., KANE E. J., RODRIGUEZ F. F., "Evidence of Difference in the Effectiveness of Safety-Net Management in European Union Countries", in Journal of Financial Services Research, Vol. 34, 2008.

CARBO S. V., KANE E. J., RODRIGUEZ F. F., "Evidence of Regulatory Arbitrage in Cross-border Mergers of Banks in the EU", National Bureau of Economic Research Working Paper, No. 15447, 2009.

CARRINGTON T., "U.S. Won't let 11 Biggest Banks in Nation Fall", in *Wall Street Journal*, 1984.

CHENG D., GUP B., WALL, L. D., "Financial Determinants of Bank Takeovers", in *Journal of Money, Credit and Banking*, Vol. 21, 1989.

DE NICOLO G., BARTHOLOMEW P., ZAMAN J., ZEPHIRIN M., "Bank Consolidation, Internationalization, and Conglomeration: Trends and Implications for Financial Risk", IMF Working Paper, WP/03/158, 2003

DE NICOLO G. – M. L. KWAST, "Systemic Risk and Financial Consolidation. Are they Related?", in *Journal of Banking and Finance*, Vol. 26, 2002.

ECB, "Mergers and Acquisitions involving the EU Banking Industry – Facts and Implications", 2000.

FLANNERY M. J. – S. M. SORESCU "Evidence of Bank Market Discipline in Subordinated Debenture Yields: 1983-1991", in *Journal of Finance*, Vol. 51, N. 4, 1996.

GODDARD J., MOLYNEUX P., WILSON J. O. S., TAVAKOLI M., "European Banking: An Overview", in *Journal of Banking and Finance*, Vol. 31, 2007.

GROPP R. – G. A. MOERMANN, "Measurement of Contagion in Banks Equity Prices", in *Journal of International Money and Finance*, Vol. 23, 2004.

HAWKESBY C., MARSH I. W., STEVENS I., "Large Complex Financial Institutions: Common Influences on Asset Price Behaviour", in *Bank of England Financial Stability Review*, Vol. 15, 2003.

HAWKESBY C., MARSH I. W., STEVENS I., "Comovments in the Equity Prices of Large Complex Financial Institutions", in *Journal of Financial Stability*, vol. 2, 2007.

HERNANDO I., NIETO M. J., WALL L. D., "Determinants of Domestic and Cross-border Bank Acquisitions in the European Union", in *Journal of Banking and Finance*, Vol. 33, 2009.

HUGHES J. P. – L. J. MESTER, "A Quality and Risk-Adjusted Cost Function for Banks: Evidence on the 'Too-Big-to-Fail' Doctrine", in *Journal of Productivity Analysis*, Vol. 4, N. 3, 1993.

IMF/BIS/FSB, "Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations", Report to G20 Finance Ministers and Governors, 2009.

KANE E. J., "Incentives for Banking Megamergers: What Motives Might Regulators Infer from Event-Study Evidence?", in *Journal of Money, Credit, and Banking*, Vol. 32, N. 3, 2000.

KAUFMAN G. G., "Bank Contagion: A Review of the Theory of Evidence", in *Journal of Financial Services Research*, Vol. 8, N. 2, 1994.

KAUFMAN G. G., "Bank Failures, Systemic Risk, and Bank Regulation", in *Cato Journal*, Spring/Summer, 1996.

KAUFMAN G. G., "Too Big to Fail in US Banking: Quo Vadis?", in *Too Big to Fail: Policies and Practices in Government Bailouts*, Ed GUP B. E., Praeger Publishers, 2003.

LAEVEN L. – R. LEVINE, "Is There a Diversification Discount in Financial Conglomerates", in Journal of Financial Economics, Vol. 85, 2007.

MAYER T., "Should Large Banks be Allowed to Fail?", in *The Journal of Financial and Quantitative Analysis*, Vol. 10, N. 4, 1975.

MISHKIN F. S., "How Big a Problem is Too Big to Fail?", in *Journal of Economic Literature*, Vol. 44, 2006.

MORGAN D. P. – K. J. STIROH "Too Big to Fail after all These Years", in Staff Report No. 220, Federal Reserve Bank of New York, 2005.

O'HARA M. – W. SHAW, "Deposit Insurance and Wealth Effects: The Value of Being 'Too Big to Fail'", in *Journal of Finance*, Vol. 45, N. 5, 1990.

PENAS M. F. – H. UNAL, "Gains in Bank Mergers: Evidence from the Bond Markets", in *Journal of Financial Economics*, Vol. 74, 2004.

PENNACCHI G., "Comment on Incentives for Banking Megamergers: What Motives Might Regulators Infer from Event-Study Evidence?", in *Journal of Money, Credit, and Banking*, Vol. 32, 2000.

PETROVIC A., TUTSCH R., "National Rescue Measures in Response to the Current Financial Crisis", ECB Legal Working Paper Series, No. 8, 2009.

PILLOFF S. J., "Performance Changes and Shareholder Wealth Creation Associated with Mergers of Publicly Traded Banking Institutions", in *Journal of Money, Credit, and Banking*, Vol. 28, 1996.

RHOADES S. A., "Determinants of Premiums Paid in Bank Acquisitions", in *Atlanta Economics Journal*, Vol. 15, 1987.

RIME B., "Do 'Too Big to Fail' Expectations Boost Large Banks Issuer Ratings?", Working Paper, Systemic Stability Section, Swiss National Bank, 2005.

ROGOWSKI R. J. – D. G. SIMONSON, "Bank Merger Pricing Premiums and Interstate Banking", Paper presented at Financial Management Association Meetings, Las Vegas, US, 1987.

SCHMID M. M., WALTER I., "Do Financial Conglomerates Create or Destroy Economic Value?", in *Journal of Financial Intermediation*, Vol. 18, 2009.

SHULL B – G. Hanweck, "Bank Mergers in a Deregulated Environment: Promise and Peril", Quorum Books, Westport, 2001.

SOUSSA F., "Too Big To Fail: Moral Hazard and Unfair Competition?", Centre for Central Banking Studies, Bank of England, 2000.

SPIEGEL, M. M. – N. YAMORI, "The Evolution of 'Too-Big-To-Fail' Policy in Japan: Evidence from Market Equity Values", Working Paper PB00-01, Federal Reserve Bank of San Francisco, 2000.

SPRAGUE I. H., "Bailout", Basic Books, New York, 1986.

STERN G. H. – R. J. FELDMAN, "Too big to fail: the Hazards of Bank Bailouts", Brookings Institution Press, Washington DC, 2004.

TARASHEV N., BORIO C., TSATSARONIS K., "The Systemic Importance of Financial Institutions", in BIS Quarterly Review, 2009.

VOLZ M. – M. WEDOW, "Does Banks' Size Distort Market Prices? Evidence for Too-Big-to-Fail in the CDS Market", Discussion Paper, No. 06/2009, Deutsche Bundesbank, 2009.

Table 1

A summary of different thresholds of TSITF banks

TSITF thresholds	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, 2000	• 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 industrialised countries 1999-2003
	Volz and Wedow, 2009	• 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 capitalisation exceeds $20 billion in the US 1991-2004
	Volz and Wedow, 2009	• a bank's market capitalisation in 24 countries 2002-2007
Size measured by asset market share	Carrington, 1984 Sprague, 1986 O'Hara and Shaw, 1990 Flannery & 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 industrialised countries 1999-2003
Size is measured by the level of industrial output	Hughes and Mester, 1992	• a bank's commercial and industrial loans
Systemic importance measured by rating	Soussa, 2000	• a bank's Fitch IBCA Support Rating 1 or 2
Systemic importance measured by various Criteria	Todd and Thomas, 1990	• a bank's interbank exposure

	Nicolo and Kwast, 2002	22 large and complex banking organisations 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
	Volz and Wedow, 2009	• 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 2

List of rescued banks in nine EU countries 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	Recapitalisation (Euro 2.55 billion)
		Access to Euro 50 billion emergency loans
	Caisse Nationale des Caisses d'epargne	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

	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	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 (Holding) 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)
	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)
Portugal	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 BuildingSociety	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 & Bingley's	Nationalisation on 29th September, 2009

Note: [a]: State guarantees of Dexia were provided by Belgium, France and Luxembourg jointly.
Source: Petrovic and Tutsch, 2009

Table 3

List of banks in 9 EU countries rated as 1 or 2 according to Fitch IBCA support rating in September 2008

Austria	Bank Austria-UniCredit, Erste Bank Group AG, Kommunalkredit AG, Raiffeisen Zentralbank AG
Belgium	Banque de Crédit Professionnel, Dexia, Dexia Bank Belgium, Ethias Bank, Fortis, ING Belgium SA/NV, KBC Bank
France	Agence Française de Développement, Banque d'Orsay, Banque Espirito Santo et de la Vénétie, Banque Fédérale des Banques Populaires, Banque Fédérative du Crédit Mutuel, Banque Palatine, Banque PSA Finance, BNP Paribas, Caisse Nationale des Caisses d'Epargne, Calyon, Crédit Agricole Group, Crédit Agricole SA, Crédit du Nord, Crédit Foncier de France, Crédit Immobilier de France Développement, Crédit Industriel et Commercial, Crédit Lyonnais, Crédit Mutuel Nord Europe, Dexia Crédit Local SA, HSBC France, La Banque Postale, Natixis, RCI Banque, Société Générale, SOFINCO, Union de Banques Arabes et Françaises
Germany	Bayerische Hypo-und Vereinsbank AG, Bayerische Landesbank, BHF-Bank AG, Bremer Landesbank Kreditanstalt Oldenburg, Commerzbank AG, DekaBank Deutsche Girozentrale, Deutsche Bank AG, Deutsche Postbank AG, Deutsche Zentral-Genossenschaftsbank-DZ Bank AG, Dresdner Bank AG, Eurohypo AG, HSBC Trinkaus & Burkhardt AG, HSH Nordbank AG, Hypo Real Estate Bank AG, Hypo Real Estate Bank International AG, Hypothekenbank in Essen AG, IKB Deutsche Industriebank AG, KfW Bankengruppe, Landesbank Baden-Wuerttemberg, Landesbank Berlin AG, HELABA, Landesbank Saar, Landwirtschaftliche Rentenbank, LHB Internationale Handelsbank AG, LRP Landesbank Rheinland-Pfalz, NORD/LB, NRW BANK, Sachsen-Finanzgruppe, SEB AG, Wuestenrot Bank AG Pfandbriefbank
Greece	Agricultural Bank of Greece, EFG Eurobank Ergasias SA, Emporiki Bank of Greece SA, Marfin Egnatia Bank SA, National Bank of Greece SA
Netherlands	ABN Amro Holding NV, Fortis Bank Nederland (Holding) NV, Fortis NV, ING Bank NV, Rabobank Nederland
Portugal	Millennium bcp-Banco Comercial Português, Banco Portugues de Investimento SA, Banco Santander Totta SA, Caixa - Banco de Investimento SA, Caixa Geral de Depositos, Santander Totta SGPS,
Sweden	Nordea Bank AB, Skandinaviska Enskilda Banken AB, Stadshypotek AB, Svenska Handelsbanken, Swedbank AB, Swedbank Hypotek AB
UK	Abbey National Plc, Ahli United Bank (UK) Plc, Bank of New York Mellon (International) Ltd, Bank of Scotland Plc, Barclays Plc, Bristol & West Plc, British Arab Commercial Bank Ltd, Butterfield Bank (UK) Ltd, Citibank International Plc, Clydesdale Bank Plc, Credit Suisse International, Crown Agents Bank Ltd, Egg Banking Plc, Gulf International Bank (UK) Ltd, Heritable Bank Plc, HSBC Bank plc, Kaupthing Singer & Friedlander Ltd, Lloyds TSB Bank Plc, MBNA Europe Bank Ltd, NatWest, Nationwide Building Society, Northern Rock Plc, Royal Bank of Scotland Plc, Standard Bank Plc, Sumitomo Mitsui Banking Corporation Europe, UBS Ltd, Ulster Bank Ltd

Source: Fitch IBCA, 2008

Table 4

Summary of merger premiums in nine EU countries 1997-2008

Merger Premiums (US $ billion)	Mean	No. of deals	Standard Deviation	Sum
APREM 1997	0.0007	13	0.0159	1.7012
APREM 1998	0.0007	17	0.0170	1.6760
APREM1999	0.0021	19	0.0459	4.7671
APREM2000	0.0023	16	0.0465	5.1973
APREM2001	0.0036	18	0.0872	8.3017
APREM2002	0.0007	9	0.0208	1.5678
APREM2003	0.0009	14	0.0182	2.0480
APREM2004	0.0013	9	0.0419	2.8669
APREM2005	0.0027	16	0.0580	6.1818
APREM2006	0.0035	20	0.0650	7.9930
APREM2007	0.0008	9	0.0221	1.8812
APREM2008	0.0036	12	0.0771	8.2553
APRM1997-2008	0.0230	172	0.2542	52.4370

Note: APREM is the sum of merger premiums banks paid (in billion US dollars) in various M&As in each year in nine EU countries (Austria, Belgium, France, Germany, Greece, Netherlands, Portugal, Sweden and UK) from 1997 to 2008. APREM1997-2008 is the aggregate of the premiums paid during these twelve years. Merger premiums are the difference between deal value and market capitalisation of the target 30 days before the transaction if the bank was listed. If the target was not listed, an accounting equivalent measure – target's equity value is used instead.
Source: ThomsonOne Banker

Table 5

Summary of variables of model (1)-(3)

Panel A: Summary of independent variables of model (1)

Variables	Descriptions	Mean	Median	Maximum	Minimum	Standard Deviation
TASIZE	A ratio of target's assets divided by acquirer's assets	0.6741	0.6506	1.3363	0.2663	0.1859
BUSF	A ratio of target's interest income divided by its operating income	0.6153	0.6440	1.0559	0	0.2131
GROW	Target's asset growth rate (%) before merger	12.38%	8.10%	96.23%	-20.32%	0.1973
RROAA	A ratio of target's ROAA divided by acquirer's ROAA	1.8098	1.3645	10.9783	-7.2000	2.3840
RCIR	A ratio of target's CIR divided by acquirer's CIR	1.0358	0.9871	1.8136	0.3246	0.2892
GEOF	A dummy variable: Cross-border M&A =1 and Domestic M&A=0	No. of cross-border M&As:103				
		No. of domestic M&As:53				

Panel B: Summary of independent variables of model (2)

Variables	Descriptions	Mean	Median	Maximum	Minimum	Standard Deviation
ORGROW(12)	Bank's organic asset growth rate (%) (asset growth excluding asset increase due to M&As 1997-2008)	24.44%	10.83%	370.2%	-129.5%	0.5072
ABSIZE	Natural logarithm of a bank's asset in Dec 2007	7.4522	7.1314	14.8180	0.0953	1.9918
RESIZE	Bank assets size divided by total assets of banking sector in Dec 2007	0.0040	0.0001	0.3213	0	0.0210
COMP	Natural logarithm of a bank's total number of subsidiaries in Dec 2007	1.5871	1.3863	8.8899	0	1.4701
ABCONN	Natural logarithm of a bank's total interbank deposits in Dec 2007	5.3410	5.1093	13.0132	-2.3026	2.4790
RECONN	A ratio of bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007	0.0047	0.0001	0.4584	0.0000	0.0273

Panel C: Summary of dependent and independent variables of model (3)

Variables	Descriptions	Mean	Median	Maximum	Minimum	Standard Deviation
ΔINDEP	The change of stock return correlations with other TSITF banks' returns compared to previous year	0.0237	0.0222	0.3182	-0.3249	0.1246
APREMt-1	Merger premiums paid 1 year ago (US$ billion)	0.1566	0	9.0754	-1.7023	0.8757
APREMt-2	Merger premiums paid 2 years ago (US$ billion)	0.2648	0	25.1839	-1.7023	1.7098
APREMt-3	Merger premiums paid 3 years ago (US$ billion)	0.2499	0	25.1839	-1.7023	1.7055
ORGROW(3)	Previous 3 years' organic asset growth rate (%)	47.30%	23.60%	210.05%	-42.28%	1.4104
ΔCONN	The growth rate (%) of bank's interbank deposits compared to previous year	62.60%	17.20%	239.58%	-99.44%	2.7745
ΔCONTL	The change of GDP per capita compared to previous year	0.0797	0.0545	0.2959	-0.0882	0.0940

Source: Bankscope and ThomsonOne Banker

Table 6

Cross-country analysis of the determinants of banking merger premiums in 9 EU countries
1997-2008

TASIZE	0.1540^{***}
	(0.3894)
GEOF	0.1496
	(0.1457)
BUSF	0.0170
	(0.2882)
TGROW	0.0373
	(0.3093)
RROAA	-0.0033
	(0.0293)
RCIR	-0.0520
	(0.2413)
CONTL	0.2129
	(0.1633)
R^2	15.34%

Note: The table shows the results from the estimation of equation (1). Dependent variable is PREM, which is merger premiums of each merger deal in billion US dollars; TASIZE is a ratio of target's assets divided by acquirer's assets; GEOF is a dummy variable that takes a value of 1 for cross-border transactions and 0 for domestic transactions. BUSF indicates target's business focus, which is a ratio of the net interest income of the target firm to its total operating income; TGROW measures target's assets growth rate over the year prior to the merger; RROAA is the ratio of the target's return on average asset (ROAA) to the acquirer's ROAA; RCIR is the ratio of the target's cost-to-income ratio (CIR) and acquirer's CIR; CONTL is the logarithm of acquirer's home GDP per capita. Standard errors are reports in the parentheses. Three asterisks indicate significance levels of 1 percent.

Table 7

Cross-country analysis of impact of TSITF on safety net subsidies defining rescued banks in 9 EU countries as TSITF banks 1997-2008

APREM1997-2008	0.7722**	1.4226***	1.2786***	0.9925***	1.7141***
	(0.3213)	(0.3328)	(0.3178)	(0.3306)	(0.3501)
ORGROW(12)	0.0647	0.0261	-0.0039	-0.0165	-0.0211
	(0.3162)	(0.2929)	(0.3352)	(0.3007)	(0.3087)
ABSIZE	0.8151***				
	(0.0731)				
RESIZE		26.5448***			
		(3.8373)			
COMP			0.6759***		
			(0.0807)		
ABCONN				0.7259***	
				(0.0706)	
RECONN					18.4554***
					(2.8750)
CONTL	-6.2919***	-4.8177***	-5.4035***	-6.5528***	-5.1731***
	(0.9680)	(0.9448)	(0.9215)	(0.9591)	(0.8974)
Model χ^2	290.16***	186.79***	180.41***	266.38***	174.39***
Correctly classified	97.40%	97.40%	96.54%	97.08%	97.35%

Note: The table shows the results from the estimation of equation (2) using rescued banks between 2008 and 2009 as TSITF banks. Dependent variable TSITF is a dummy variable, which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank; APREM1997-2008 is the aggregate of a vector of annual merger premiums, which are the sum of a bank's merger premiums it paid (in billion US dollars) in various M&As (if any) in each year from 1997 to 2008; ORGROW(12) is a bank's organic growth rate, which is the asset growth rate between 1997 and 2008 excluding the asset increase due to M&As (acquired targets' assets) during this period; ABSIZE is the natural logarithm of a bank's assets; RESIZE is a market share indicator i.e. bank assets size divided by total assets of banking sector; COMP measures a bank's complexity in December 2007, which is 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 bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007; CONTL is the GDP per capita of 2007. Standard errors are reports in the parentheses. Two, three asterisks indicate significance levels of 5 and 1 percent, respectively.

Table 8

Cross-country analysis of impact of TSITF on safety net subsidies defining extremely high or high support ratings of banks in 9 EU countries as TSITF banks 1997-2008

APREM1997-2008	0.2332	0.9238***	0.9548***	0.4491	1.1586***
	(0.2954)	(0.3383)	(0.3186)	(0.3119)	(0.3339)
ORGROW(12)	-1.1867**	-0.7711**	-1.1613**	-1.2820**	-0.8667**
	(0.5221)	(0.3927)	(0.5273)	(0.5316)	(0.3972)
ABSIZE	0.9922***				
	(0.0691)				
RESIZE		43.4258***			
		(5.4084)			
COMP			0.8457***		
			(0.0778)		
ABCONN				0.9630***	
				(0.0712)	
RECONN					34.0359***
					(4.6834)
CONTL	-3.2907***	-1.2314	-3.4319***	-3.9569***	-1.5393
	(1.0162)	(1.1918)	(0.9590)	(1.0186)	(1.0881)
Model χ^2	449.38***	222.06***	242.34***	442.90***	208.92***
Correctly classified	97.31%	96.39%	95.91%	97.23%	96.32%

Note: The table shows the results from the estimation of equation (2) using banks rated as 1 or 2 according to Fitch support rating in 2008 as TSITF banks. Dependent variable TSITF is a dummy variable, which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank; APREM1997-2008 is the aggregate of a vector of annual merger premiums, which are the sum of a bank's merger premiums it paid (in billion US dollars) in various M&As (if any) in each year from 1997 to 2008; ORGROW(12) is a bank's organic growth rate, which is the asset growth rate between 1997 and 2008 excluding the asset increase due to M&As (acquired targets' assets) during this period; ABSIZE is the natural logarithm of a bank's assets; RESIZE is a market share indicator i.e. bank assets size divided by total assets of banking sector; COMP measures a bank's complexity in December 2007, which is 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 bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007; CONTL is the GDP per capita of 2007. Standard errors are reports in the parentheses. Two, three asterisks indicate significance levels of 5 and 1 percent, respectively.

Table 9

Cross-country analysis of annual impact of TSITF on safety net subsidies defining rescued banks in 9 EU countries as TSITF banks 1997-2008

APREM1997	25.2687	51.1720[**]	53.4986	32.8967[*]	52.9088[**]
	(20.3573)	(27.0319)	(41.4123)	(19.2620)	(24.8106)
APREM1998	0.8324	4.6083	6.8452[**]	2.0253	6.2876[*]
	(3.1852)	(3.5679)	(3.6988)	(3.3345)	(3.5175)
APREM1999	2.0844	-0.0102	2.0670	2.9421	2.0177
	(1.8966)	(2.1710)	(2.0267)	(2.0040)	(2.5060)
APREM2000	-2. 2887	-3.5613[*]	-2.4516	-2.1544	-4.8080[*]
	(1.8188)	(2.2910)	(2.0781)	(1.9629)	(4.2118)
APREM2001	-10.8174[**]	-11.7378[**]	-19.9414[*]	-12.4330[**]	-12.0405[**]
	(5.0972)	(5.1914)	(11.3562)	(5.1171)	(4.2118)
APREM2002	14.7568	3.5614	-7.0395	7.0654	6.3417
	(228.20)	(293.46)	(100.7203)	(289.51)	(604.38)
APREM2003	1.3103	7.5866	6.9108[*]	2.1456	6.9590
	(3.8807)	(4.6639)	(3.6745)	(3.9406)	(5.5952)
APREM2004	16.0456	28.9433[**]		14.6543	29.6657[**]
	(13.5831)	(14.5803)		(13.5095)	(14.8065)
APREM2005	0.5468	-0.5730	2.3151	0.4696	-1.4095
	(2.0254)	(2.9615)	(2.9190)	(2.0749)	(3.1846)
APREM2006	12.9702[***]	12.4172[**]	23.1868[*]	14.7660[***]	13.2018[**]
	(4.8026)	(5.5872)	(12.7272)	(5.2636)	(5.3660)
APREM2007	-5.4602	0.0660	-27.6206	-5.4035	-0.4128
	(8.7913)	(6.8578)	(27.0595)	(9.5085)	(8.9622)
APREM2008	1.3706	3.1573[**]	1.9122[*]	1.5433	3.5398[**]
	(1.0476)	(1.4107)	(1.0722)	(1.1631)	(1.4853)
ORGROW(12)	0.1205	0.0952	0.0498	0.0377	0.0600
	(0.2976)	(1.4108)	(0.3311)	(0.2901)	(0.2945)
ABSIZE	0.8144[***]				
	(0.0773)				
RESIZE		29.7804[***]			
		(4.5631)			
COMP			0.6202[***]		
			(0.0905)		

ABCONN				0.7304***	
				(0.0759)	
RECONN					21.5958***
					(3.2817)
CONTL	-6.5679***	-5.2389***	-5.7237***	-6.7885***	-5.4930***
	(0.9978)	(0.9553)	(0.9439)	(0.9923)	(0.9299)
Model χ^2	320.06***	235.47***	189.96***	300.11***	232.78***
Correctly classified	97.74%	97.79%	97.29%	97.58%	97.75%

Note: The table shows the results from the estimation of equation (2) using rescued banks between 2008 and 2009 as TSITF banks. Dependent variable TSITF is a dummy variable, which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank; APREM1997-2008 is decomposed into twelve individual independent variables in this estimation, which are the annual merger premiums (in billion US dollars) in various M&As (if any) in each year from 1997 to 2008; ORGROW(12) is a bank's organic growth rate, which is the asset growth rate between 1997 and 2008 excluding the asset increase due to M&As (acquired targets' assets) during this period; ABSIZE is the natural logarithm of a bank's assets; RESIZE is a market share indicator i.e. bank assets size divided by total assets of banking sector; COMP measures a bank's complexity in December 2007, which is 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 bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007; CONTL is the GDP per capita of 2007. Standard errors are reports in the parentheses. Two, three asterisks indicate significance levels of 5 and 1 percent, respectively.Aprem2004 drops in the third column as it perfectly predicts TSITF=1. Standard errors are in parentheses. One, two, three asterisks indicate significance levels of 10,5 and 1 percent, respectively.

Table 10

Cross-country analysis of annual impact of TSITF on safety net subsidies defining extremely high or high support ratings of banks in 9 EU countries as TSITF banks 1997-2008

APREM1997	-24.9454	-1.9421	-13.1506	-19.1391	7.3729
	(19.1812)	(23.7824)	(18.6552)	(19.8299)	(19.2373)
APREM1998	-5.0236	-1.3561	0.9063	-3.7206	0.1490
	(4.0157)	(5.4135)	(4.9368)	(3.8385)	(5.1044)
APREM1999	-1.5204	-8.3096[**]	-1.0861	-0.6718	-11.7679[***]
	(2.0450)	(3.6141)	(1.8321)	(1.9934)	(2.8405)
APREM2000	-0.4035	-4.0586[**]	0.3363	0.2650	-1.3718
	(1.4245)	(1.8806)	(1.4274)	(1.4969)	(1.9511)
APREM2001	-0.3468	0.4590	0.6304	-0.1133	0.5552
	(1.0302)	(1.0650)	(0.9408)	(1.0300)	(1.0430)
APREM2002	57.1121	38.9537	33.5447	49.9566	35.2066
	(53.6803)	(155.28)	(49.1435)	(60.4682)	(146.91)
APREM2003	-3.9874	-0.0459	3.3317	-3.2487	0.0746
	(3.6119)	(5.4849)	(3.5866)	(3.6165)	(8.4739)
APREM2004	3.7286	16.7263	0.1215	2.0604	15.0201
	(13.4654)	(15.2616)	(4.1056)	(10.613)	(17.0954)
APREM2005	-0.6690	1.2543	0.8446	-1.5337	-2.5843
	(13.4653)	(2.0743)	(1.8922)	(1.9638)	(3.2356)
APREM2006	4.2204	-5.6072	1.4510	6.3905	2.3781
	(3.7165)	(3.4305)	(3.0796)	(4.1080)	(5.6006)
APREM2007	33.9205	98.8288[*]	26.9554	33.6894	92.4545[*]
	(34.6863)	(54.5069)	(37.3359)	(35.3446)	(54.6374)
APREM2008	2.3205	6.5354[*]	2.4792	2.2511	8.0816[*]
	(2.5876)	(3.4864)	(2.0616)	(2.3594)	(4.8530)
ORGROW(12)	-1.1301[**]	-0.7100[*]	-1.0955[**]	-1.2151[**]	-0.8371[*]
	(0.5320)	(0.3979)	(0.5380)	(0.5402)	(0.4046)
ABSIZE	1.0070[***]				
	(0.0722)				
RESIZE		51.5905[***]			
		(6.6440)			
COMP			0.8420[***]		
			(0.0816)		

ABCONN				0.9703^{***}	
				(0.0737)	
RECONN					39.5988^{***}
					(5.4641)
CONTL	-3.6128^{***}	-1.6446	-3.6920^{***}	-4.1535^{***}	-1.6442
	(1.0261)	(1.1407)	(0.9554)	(1.0357)	(1.1218)
Model χ^2	462.53^{***}	254.51^{***}	249.74^{***}	453.65^{***}	242.86^{***}
Correctly classified	97.45%	95.95%	96.19%	97.28%	96.81%

Note: The table shows the results from the estimation of equation (2) using banks rated as 1 or 2 according to Fitch support rating in 2008 as TSITF banks. Dependent variable TSITF is a dummy variable, which takes the value of 1 if a bank is defined as a TSITF bank and 0 for a non-TSITF bank; APREM1997-2008 is decomposed into twelve individual independent variables in this estimation, which are the annual merger premiums (in billion US dollars) in various M&As (if any) in each year from 1997 to 2008; ORGROW(12) is a bank's organic growth rate, which is the asset growth rate between 1997 and 2008 excluding the asset increase due to M&As (acquired targets' assets) during this period; ABSIZE is the natural logarithm of a bank's assets; RESIZE is a market share indicator i.e. bank assets size divided by total assets of banking sector; COMP measures a bank's complexity in December 2007, which is 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 bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007; CONTL is the GDP per capita of 2007. Standard errors are reports in the parentheses. Two, three asterisks indicate significance levels of 5 and 1 percent, respectively. Standard errors are in parentheses. One, two, three asterisks indicate significance levels of 10,5 and 1 percent, respectively.

Table 11

Cross-country analysis of the impact of TSITF banks' M&As on systemic risk 1997-2008

$APREM_{i,t-1}$	0.0230**	0.0139	0.0144
	(0.0106)	(0.0096)	(0.0097)
$APREM_{i,t-2}$	-0.0032		-0.0047
	(0.0096)		(0.0097)
$APREM_{i,t-3}$	-0.0232**		
	(0.0106)		
ORGROW(3)	-0.0159	-0.0159	-0.0158
	(0.0104)	(0.0104)	(0.0104)
ΔCONN	0.0073	0.0076	0.0076
	(0.0054)	(0.0055)	(0.0055)
CONTL	0.0150	-0.0057	-0.0030
	(0.1054)	(0.1060)	(0.1064)
R^2	6.05%	2.89%	3.05%

Notes: This table shows the results from the estimation of equation (3). Dependent variable ΔINDEP is a TSITF bank's interdependence change, which is the difference between a TSITF bank's average bivariate stock return correlations with the rest of the TSITF banks within its own country in a specific year and the ones of the previous year; $APREM_{t-1}$, $APREM_{t-2}$ and $APREM_{t-3}$ are a TSITF bank's past 3 years' merger premiums (in billion US dollars) prior to the observation year; ORGROW(3) measures a TSITF bank's 3 years' asset growth excluding acquired assets before the observation year; ΔCONN measures the change in TSITF bank's interbank deposits before the observation year; CONTL is the change of GDP per capita to control for economic development factors. Standard errors are in parentheses. Two asterisks indicate significance levels of 5 percent.

Annex

Correlations between various independent variables that measure systemic importance

	ABSIZE	RESIZE	ABCONN	RECONN
ABSIZE	-	-	-	-
RESIZE	-	-	-	-
ABCONN	0.8682	0.3823	-	-
RECONN	0.4234	0.9061	-	-
COMP	0.7428	0.4944	0.6616	0.4369

Notes: This table shows the correlations between various independent variables that measure different aspects of systemic importance of a bank (size, complexity and interconnectedness) in equation (2). ABSIZE is the natural logarithm of a bank's assets; RESIZE is a market share indicator i.e. bank assets size divided by total assets of banking sector; ABCONN is the natural logarithm of a bank's total interbank deposits in December 2007; RECONN is the ratio of bank's interbank deposits divided by total bank deposits (excluding its own share) in December 2007; COMP measures a bank's complexity in December 2007, which is the natural logarithm of the number of a bank's total subsidiaries.