The long-term role of non-traditional banking in profitability and risk profiles: Evidence from a panel of U.S. banking institutions

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ABSTRACT

The goal of this empirical study is to identify empirically and on a panel basis how non-traditional bank activities affect directly the profitability and risk profiles of the financial institutions involved in such activities. Through a dataset that covers 1,725 U.S. financial institutions involved in non-traditional bank activities spanning the period 2000-2013 and the methodology of panel cointegration, the empirical findings document that non-traditional bank activities exert a positive effect on both the profitability and the insolvency risk. The results could be important for regulators given they could serve as a pre-warning signal that sends a clear message to regulators about the potential systemic risk that exists within the financial markets.

Keywords: non-traditional bank activities; profitability; insolvency risk; U.S. banks; panel data
JEL Classifications: G20; C33

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1. Introduction

The introduction of the U.S. Gramm-Leach-Bliley Act of 1999 eliminated any functional barriers between commercial and investment bank activities, allowing the U.S. banks to offer a full range of financial services. At the same time, the adoption of the securitization model in which banks allocate their funding not only to lending activities, but also to asset securitization, provided the field for additional funding mechanisms, known as non-traditional items. As a result, the new banking model gave rise to a reduced need of traditional bank services, to the presence of higher systematic risks, and to the need of more effective regulation (Cetorelli and Persitiani, 2012; Claessens and Ratnovski, 2013). Gambacorta and van Rixtel (2013) argue that the recent financial crisis triggered a reassessment of the argument that non-traditional bank activities can offer value added to banks' profitability.

The non-traditional bank activities, such as items associated with securitization, investment banking, advisory fees, venture capital, and non-hedging derivatives, are totally differentiated from traditional bank activities, i.e. deposit taking and lending functioning (Pozsar et al., 2010), while they can be a substantial source of systemic risk, both directly and through their interconnectedness with the traditional bank activities. Higher levels of diversifications make the bank system too complex and, thus, substantial agency problems may arise.

The goal of this work is to shed light on the empirical identification about how non-traditional activities conducted by U.S. banks influence their profitability-risk trade-off. The novelties of the paper come to fill certain voids in the relevant literature, such as: i) by considering a very recent period –including the financial crisis 2007 event- that no other study has done it before, ii) a number of robustness empirical tests that sharpen the interpretation of our findings and lend clear support to our baseline results, and iii) by providing the extent to which disaggregated non-traditional bank activities contribute to profitability and risk profiles.

The empirical findings provide evidence that such non-traditional bank activities exert a positive effect on both the profitability and the risk profiles of banking institutions involved in such activities. In terms of the disaggregation framework, the findings show that there is not any unified behavior across all the components of such non-traditional bank activities. For a number of components, related to mortgage-backed securities, there is a statistically significant value-creating and risk-increasing empirical finding, albeit it is smaller vis-à-vis the aggregate outcome, implying that these components require banks to take relatively long-term stakes in assets. These findings highlight the need of regulatory bodies to better monitor the market that ignited the financial crisis event.

This paper is related to the corporate finance literature and to the role of diversification costs emerging from non-traditional activities along with the effects on the regular bank system's valuations and risk profiles. This literature has exemplified the limited diversification gains in terms of higher profitability and reduced risk for those institutions that attempt to diversify their portfolios of activities, i.e. traditional and non-traditional activities, while a number of studies in the literature supports the view that banks must focus on those lines of business that their management has a comparative advantage over alternative activities. The main strand in this literature focuses on the regulatory arbitrage obtained by the business of non-traditional banking (Acharya et al., 2013). According to this view, banks conduct non-traditional bank activities so as to circumvent regulatory capital requirements which might increase the fragility and the collapse of the system. This paper is related to this strand in the sense that it also examines the impact of such non-traditional bank activities on the fragility of the banking system.

Section 2 provides a review of the literature of non-traditional bank activities, while Section 3 discusses the data and presents the empirical analysis. Finally, concluding remarks and policy implications are provided in section 4.

2. Literature review

One main strand of the literature highlights the need of the financial institutions to be involved in non-traditional bank activities due to the presence of gains. Myers and Rajan (1998) offer the differences in asset mix as an explanation for the tendency of banking institutions to be involved in activities away from the

traditional bank zone, differences that motivate bank managers to trade against banks' interests. Cornett et al. (2002) and Deng et al. (2007) present evidence that non-traditional bank activities are expected to reduce the cost of debt, while Mester (2010) supports that banks experience high economies of scale and benefits by expanding their portfolio of activities into non-traditional items, while any attempt to restrain them from doing so would have unintended consequences.

By contrast, in the strand of the literature that documents the negative side of non-traditional bank activities, a large number of studies have stressed the negative side of non-traditional bank activities. More specifically, Stiroh (2004a,b) and Stiroh and Rumble (2006) investigate whether small U.S. banks experience diversification gains from being involved in non-traditional activities. The results reveal the negative impact of non-traditional bank related activities on banks' performance, while for the case of U.S. financial holding companies they provide strong evidence that non-traditional bank activities contribute substantial to the deterioration of banks' risk profiles. Laeven and Levine (2007) highlight that the diversification of activities does not bring the benefits (i.e., higher returns, efficient allocations of resources, and economies of scope that boost valuations) expected, but it intensifies agency problems across certain groups of those institutions' stakeholders with further negative implications on both their profitability and their value. Schmid and Walter (2009) document that the banking sector, by expanding its functional operation into non-traditional activities, leads to predominantly value discounts, with the only exceptions being those where combinations between commercial bank and insurance activities as well as between commercial and investment bank activities do exist.

In terms of the impact of non-traditional bank activities on banks' risk profiles, DeJonghe (2010) displays that banking institutions that are heavily involved in non-traditional activities are characterized by higher risks, which makes them more vulnerable to a number of market and macroeconomic shocks. He also argues that this new source of systematic risk exacerbates not only overall financial instability, but also high fluctuations in the real economy. Demircqus-Kunt and Huizinga (2011) provide evidence that banks that highly diversify their activities portfolios are riskier because not only they heavily depend on non-interest income as the principal source of their revenues, but also because they chose to do so.

Brunnermeier et al. (2012) provide evidence that the components of noninterest income equally contribute to systematic risk, while the values of involved institutions are reduced across both components. DeYoung and Torna (2012) argue that certain components of non-traditional items, such as fee-for-service income, do not lead to reduced values only for the case of healthy banks, while the opposite is true for financially distressed institutions. Gambacorta and van Rixtel (2013) also argue that non-traditional bank activities have not resulted in higher profitability, lower earnings volatility, and lower levels of systematic risks, while any benefits originated from such items seem to be related to specific geographical and loan portfolio diversification characteristics. Their results receive empirical support by Fiordelisi and Marques-Ibanez (2013) who support that the presence of positive effects out of diversification is limited to certain geographical bank activities as well as to loan portfolio diversification.

There is also an empirical study which does not provide clear cut results relative to the impact of non-traditional bank activities on banks' risk-adjusted returns. In particular, Baele et al. (2007) investigate whether there are long-term benefits from the involvement of banking institutions into non-traditional activities. Their results are relatively mixed, indicating the presence of a positive effect on those institutions' value and a negative (nonlinear) effect on their risk profiles, leading to lower risk-adjusted returns.

Although the above studies have focused solely on the U.S. banking system, a small number of others explore how the profitability and risk profiles of non-U.S. banks are affected by their involvement in non-traditional bank activities. Acharya et al. (2006) find significant diseconomies of scope due to the involvement of Italian banks in non-traditional activities, while Mercieca et al. (2007) use a sample of small European banks and document the presence of negative effects derived from diversified bank activities. Finally, the study by Bakk-Simon et al. (2012) provides an overview of the non-traditional bank system in the Euro area. The size of this system is relatively smaller in comparison to that of the U.S., representing less than half of the total assets of the banking sector. The non-traditional bank system in Europe is diverse across countries, reflecting differences in legal and regulatory structures, while securitization issuance is smaller in volume and remains less developed than in the U.S. They also highlight the increase in Euro banks'

reliance on funding from the financial sector, with the bulk of the financing originating from other financial institutions (OFIs) that includes non-traditional bank entities.

3. Empirical Analysis

3.1. Methodological issues

Following a version of the Rivard and Thomas (1997) framework, specifications of the profitability and risk equations capture the relationship of profitability and risk levels by allowing risk to contribute to the determination of profitability, while risk itself is determined by other bank control variables. Thus, the regression equations yield:

$$ROA_{it} = \alpha_i + \beta_1 IR_{it} + \beta_2 NTR_{it} + \beta_3 LA_{it} + \beta_4 CAR_{it} + \beta_5 NONPL_{it} + \beta_6 HHI_t + \beta_7 P_t + \beta_8 RCY_t + \beta_9 DUMCR * NTR_{it} + \varepsilon_{it} \quad (1)$$

$$IR_{it} = \alpha_i + \beta_{10} NTR_{it} + \beta_{11} LA_{it} + \beta_{12} CAR_{it} + \beta_{13} NONPL_{it} + \beta_{14} HHI_t + \beta_{15} P_t + \beta_{16} RCY_t + \beta_{17} DUMCR * NTR_{it} + \eta_{it} \quad (2)$$

where i = 1, …, N for each bank in the panel and t = 1, …, T refers to the time period. The parameter α_i allows for the possibility of bank-specific fixed effects. ROA (return of assets) defines bank's profitability, while IR is the insolvency risk index. Although the primary interest is the investigation of non-traditional bank activities on firms' profitability and risk profiles, we also control for a number of bank-specific as well as economy-specific characteristics that could affect both profitability and risk profiles. In particular, NTR defines total non-traditional activities (defined in the Data Section), LA is the ratio of loans to assets, serving as a proxy for liquidity, CAR is the equity to assets ratio, NONPL is the ratio of non-performing loans that measures the quality of the main assets of banks, HHI is the Herfindahl-Hirschman Index that captures oligopolistic conditions, P proxies consumer prices, and RCY is real per capita income. Finally, DUMCR is a dummy variable that captures the recent financial crisis event and takes zero values up to 2006, and one onwards. The residuals ε_{it} and η_{it} represent deviations from long-run

equilibrium. The interaction term between the non-traditional bank activities and the crisis dummy reflects the impact of these activities during the crisis period.

In terms now of the model described by equations (1) and (2), profitability is expressed as a function of internal determinants, i.e. factors that are mainly influenced by a bank's management decisions and policy objectives, such as the level of liquidity, capital adequacy, and expenses management, and external determinants, i.e. industry-related determinants, such as the competitive degree of the bank sector, as well as macroeconomic-related determinants, such as economic growth and inflation (Athanasoglou et al., 2005). Liquidity risk is an important determinant of bank profitability. We would expect a positive relationship between liquidity and profitability (Eichengreen and Gibson, 2001). In addition, lower capital ratios suggest a relatively risky position, and thus we would expect a negative coefficient on this variable (Berger, 1995). However, higher levels of equity could decrease the cost of capital, leading to a positive impact on profitability (Molyneux and Thornton, 1992), while an increase in capital may raise expected earnings by reducing the expected costs of financial distress, including bankruptcy (Berger, 1995). The literature argues that operating expenses affect positively the profitability of a financial institution (Molyneux and Thornton, 1992), while Mamatzakis et al. (2005) provide evidence that a non-collusive behavior among banks suggests the presence of a contestable market.

Finally, bank profitability is sensitive to macroeconomic conditions despite a larger use of financial engineering techniques to manage risks associated with business cycles. Higher economic growth encourages banks to lend more and permits them to charge higher margins as well as improving the quality of their assets. Neely and Wheelock (1997) use per capita income and suggest that this variable exerts a strong positive effect on bank earnings. Another proxy for the effect of the macroeconomic environment on bank profitability is inflation. The question is how mature an economy is so that future inflation can be accurately forecasted and, thus, banks can accordingly manage their operating costs. As such, the relationship between the inflation rate and profitability is ambiguous and depends on whether or not inflation is anticipated, though most studies observe a positive relationship between inflation and bank performance (Molyneux and Thornton, 1992).

Finally, we make use of the panel cointegration methodology to control for potential endogeneity biases as well as for omitted variable concerns. In addition to bank fixed effects, we also control for the clustering effect across banks, given the interconnectedness of banks in the non-traditional bank markets. To this end, we make use of the Thompson (2011) methodology which computes standard errors that are robust to the presence of the clustering effect.

3.2. Data

Our dataset covers a number of full services U.S. financial institutions that are involved in non-traditional bank activities. Therefore, the dataset involves a wide range of such activities, such as structured asset-backed securities (ABS), collateralized debt obligations (CDOs) backed by loans (CDOL), CDOs backed by ABS (CDOABS), CDO-squareds (CDOs of CDOs of ABS)-(CDO2), CDO-cubeds (CDOs of CDO-squareds)-(CDO3), tender-option bonds (TOB), asset-backed commercial paper (ABCP), single-seller mortgage conduits (SMC), multi-seller conduits (MSC), and single-seller credit card conduits (SCC), spanning the period January 2000-April 2013. Data on non-traditional bank activities are available from the Flow of Funds Accounts of the United States and the Federal Reserve Bank of New York. We define as total non-traditional activities the sum of the above components (NTR).

Our panel is composed of annual data for 1,725 banks. We consider investment and commercial banks. Investment banks and commercial banks conduct much of their business within the non-traditional bank system. It should be noted that the sample used is less than the total number of observations in the database because the information has been filtered using two criteria: (i) outliers; and (ii) those observations without data for any of the variables necessary for estimating profitability and risk profiles have been dropped. We use unconsolidated statements since they are preferred to avoid relevant differences in profit and loss statements and balance sheets of headquarters and subsidiaries compensating each other.

Following Rivard and Thomas (1997), profitability is measured as the bank's average accounting return on assets (ROA), defined as the before-tax profits divided by total assets. The type of risk analyzed in this paper is insolvency risk, which is

present because a bank may be unable to meet obligations to creditors. The insolvency risk index (IR) is a ratio in which the numerator is a measure of volatility of earnings and the denominator is the sum of the expected earnings plus a measure of the owner's equity. Specifically, it is calculated as the standard deviation of ROA divided by the sum of average ROA and the average equity assets ratio. It is a better measure of bank risk than the volatility risk (the standard deviation of ROA), because it accounts for the fact that banks with the same volatility risk may have higher expected ROA and equity-to-asset ratios, and hence are less likely to be at high risk.

To control for all the other variables that could affect profitability, we make use of: the ratio of loans to assets (LA), serving as a proxy for liquidity. Capital-to-asset ratio is another important variable affecting bank risk, proxied by the equity to assets ratio (CAR), while the ratio of non-performing loans measures the quality of the main assets of banks (NONPL). It is always true that the NOPL ratio is negatively related to profitability and positively related to bank risk. Next, we employ data for the Herfindahl-Hirschman Index (HHI) [on a state-wide basis] to capture oligopolistic conditions in the sector and consumer prices (P) and real per capita income (RCY) to capture the impact of macroeconomic conditions. Finally, we introduce a dummy variable that attempts to capture the recent financial crisis event (DUMCR) and takes zero values up to 2006, and one onwards. Bank data are obtained from the BankScope database, while the HHI and the macroeconomic variables are obtained from the Bloomberg database.

3.3. Results

We begin with examining the order of integration for each variable using several panel unit root tests: Levin and Lin (2002), Harris and Tzavalis (1999), Maddala and Wu (1999), Breitung (2000) and Hadri (2000). The three non-panel variables (i.e., HHI, P and RCY) are tested through the ADF Dickey-Fuller test. The results (available upon request) show that all variables under study are characterized as I(1) variables. Given that the respective variables are integrated of order one, we estimate the Pedroni (1999; 2004) heterogeneous panel cointegration test to determine whether a long-run equilibrium relationship exists. The panel

cointegration findings (also available upon request) reject the null hypothesis of no cointegration at the 1% significance level in both equations.

Next, the fully modified OLS (FMOLS) estimation approach for heterogeneous cointegrated panels is estimated to determine the long-run equilibrium relationship. As shown in Table 1 and in terms of equation (1), the results show that the coefficient of non-traditional bank activities exerts a positive and statistically significant at the 1% level effect on profitability. In particular, a dollar increase in non-traditional bank activities increases profitability by 11.6 cents, while in terms of equation (2) a dollar increase in non-traditional bank activities leads to 15.9 cents increase in insolvency risk. According to Baltagi et al. (2012), cross-sectional dependence is not much of a problem in micro panels (with few years and large number of cases), therefore, our results could be used in a valid manner. Finally, when we ran the FMOLS regressions without the NTR variable, then both R^2s decreased substantially from 0.56 and 0.56 to 0.47 and 0.42 for the profitability and risk equations, respectively.

The empirical findings confirm theoretical arguments that banks use their capital to co-invest in newly securitized loans (Fostel and Geanakoplos, 2008; Schleifer and Vishny, 2010). At the same time, the fact that banks also expand their leverage to perform those purchases, tends to increase the risk of having to liquidate their portfolio holdings at below fundamental values when any problem (either from the internal or the external environment) arises, with such liquidations to further destabilizing not only security prices, but also lending terms and, finally, the real economy.

The results are also linked to Adrian and Shin's (2008) theory of procyclical leverage and credit availability based on the optimizing behavior of financial intermediaries in which volatility is shown to be countercyclical, allowing banks to take more leveraged bets (higher risks) when experience higher profitability. In addition, our findings are associated to the Boot and Ratnovski (2012) arguments, according to which, non-traditional bank activities create frictions, i.e., time inconsistencies in the allocation of capital between long-term businesses and short-term trading activities that undermine the relationship franchise and risk-shifting processes in which the incentives to use trading to boost risk and benefit

shareholders are high. As a result, banks can overexpose themselves to trading, compared to what is socially optimal, or ex ante optimal, for their shareholders.

The findings are partially consistent to those reached by a number of studies in the literature (Laeven and Levin, 2005; Stiroh, 2004a,b; among others) relative to the fact that non-traditional activities have a positive and statistically significant impact on banks' performance (i.e. profitability), while they also affect positively their risk profiles, thus, intensifying agency problems. Although the primary interest of those banks is to exploit economies of scope in their financial intermediation activities by diversifying their portfolio of activities, it seems that on an aggregate level such economies of scope are strong enough to compensate for the negative results (i.e., on risk profiles) associated with such non-traditional activities. Our empirical findings are also partially consistent to those reached by Demirguc-Kunt and Huizinga (2009) who document that such non-traditional activities add to revenues, but they simultaneously further increase banks' risks.

[Insert Table 1 about here]

The significance of the interaction term between non-traditional bank activities and the crisis dummy signifies that non-traditional banking has been largely exposed to the recent financial crisis. In particular, both the negative coefficient of the interaction term in equation (1) and the positive coefficient of the interaction term in equation (2) document that non-traditional banking is vulnerable and fragile to run-like events. A number of core funding markets froze up as financial institutions lost the confidence to lend to one another. For instance, borrowing limits were reduced, the terms of transactions shortened, haircuts on private securities were accepted as collateral widened, and the range of securities accepted as collateral narrowed down to all but the safest, while markets for various asset-backed securities collapsed, i.e. especially, markets for mortgage-backed securities and various other structured products essentially closed. Finally and in terms of the control variables, the signs turn out to be as theoretically expected.

3.4 Robustness

We embark upon a number of robustness tests to investigate the validity of our results related to alternative definitions of the banks' performance in terms of

profitability and risk profiles, to the role of the size, to the individual contribution of each item involved in the non-traditional activities to such performance, to the separation between investment and commercial banks, and, to the quantitative investigation over the period before and after the recent financial crisis event.

It is well recognized that large banks tend to be more active in engaging in non-traditional banking due to the complexity of products involved and the associated costs in acquiring such knowledge (Claessens et al., 2012). In addition, size is expected to affect profitability and risk profiles through economies of scale (Lang and Stulz, 1994), while large banks involved in both traditional and non-traditional activities are characterized by organizational deficiencies related to different technologies employed (Williamson, 1988; Stein, 2002; Mercieca et al., 2007), while small banks are less active participants in non-traditional banking. Therefore, we test whether the obtained results above can vary with bank size by making explicitly the distinction between large and small banks. The criterion for separating the aggregate sample of banks into two subsamples is the median of their assets. All banks above the median are classified as large banks (i.e., 357 banks), while those below the median are classified as small banks (i.e., 1,368 banks). The new panel FMOLS estimates are reported in Table 2. They show that the impact of non-traditional bank activities (NTR) on both the profitability and risk profiles turns out to be stronger for the case of large banks vis-à-vis the case of small banks (i.e., in terms of profitability, the figures are 0.196 vs 0.057 for large and small banks, respectively, while in terms of risk, the figures are 0.188 vs 0.061 for large and small banks, respectively). Finally, at the bottom of the table we report a test to investigate the difference in estimated coefficients on profitability and risk across large and small banks, with p-values shown in brackets. The test confirms that the difference in the estimated coefficients is significant in both the profitability and risk cases.

[Insert Table 2 about here]

To ensure the robustness of our results, we also consider alternative measures of profitability and risk profiles. In particular, profitability is defined as Return on Equity (ROE) and as the interest margin, i.e. the difference between banks' interest revenues and their interest expenses (INT). This can be regarded as an *ex-post*

interest rate spread. The net interest margin is generally seen as a very reliable measure of banks' long-term revenue structure (Purnanandam, 2007). Despite the rising importance of fee-based income as a proportion of total income, interest margins remain a key element of bank net cash flows and after-tax earnings. In other words, despite earnings diversification, variations in interest income remain a key determinant of changes in the profitability for the majority of banking institutions. In terms of the risk profile, alternatively we use the measure of the liquidity risk, proxied by the TED spread (TED). Non-traditional banking creates conditions for the conversion and aggregation of liquidities. This kind of the high-risk operation system is an underlying danger for the sudden interruption and collapse of the entire financial system, as it was the case during the recent financial crisis. During economic downturns, these hidden risks are exposed and indefinitely enlarged. The new stream of FMOLS estimates are reported in Table 3. Once again, the estimates provide similar results.

Additionally, we consider how a popular measure of bank risk affects the empirical findings reached above. This alternative measure of bank risk is the Sharpe ratio (SHARPE), defined as the excess mean return on equity (with the risk-free rate represented by the 3-month Treasury bill) divided by the standard deviation of the return on equity (Demircuc-Kunt and Huisinga, 2009), i.e. the Sharpe ratio is a risk-adjusted rate of return. With data on 3-month T-bills and bank equity prices (obtained from the Bloomberg database), the results show that the coefficient of non-traditional bank activities exerts a positive and statistically significant effect on profitability. In particular, a dollar increase in non-traditional bank activities increases profitability by 12.7 cents, while a dollar increase in non-traditional bank activities leads to 16.4 cents increase in the Sharpe ratio. Therefore, the results remain qualitatively similar, albeit they indicate a stronger impact of the non-traditional bank activities on both the profitability and risk profiles. The results generally remain consistent with the idea that non-traditional bank activities have a simultaneous positive impact on both the profitability and risk profiles of banking institutions. Such activities, as a diversification channel, add to the risk undertaken by market investors and do not reduce the risk-taking of market participants, suggesting that increasing shares of non-traditional bank activities in bank

portfolios are associated with a higher probability of insolvency and lower risk-adjusted returns.

[Insert Table 3 about here]

In this strand of robustness testing we consider the explicit categories included in the definition of non-traditional items and defined in the Data Section. In particular, we make use of the nine-way taxonomy of non-traditional items that will allow us to estimate the impact of certain separate non-traditional channels could have on profitability and risk. Therefore, we consider the individual (disaggregated) effects of the nine components of the NTR variable along with the definitions of profitability and risk as ROA and IR, respectively. After testing and confirming the presence of cointegration (the results are available upon request), the effects of each non-traditional bank activity on profitability (Panel 1) and risk (Panel 2) are reported in Table 4. They show that there is not a unified behavior across the components of such (disaggregated) non-traditional bank activities. In eight out of ten components (i.e., ABS, CDOL, CDOABS, CDO2, CDO3, TOB, SMC, and MSC) there is a statistically significant value-creating and risk-increasing empirical finding, albeit it is smaller vis-à-vis the aggregate outcomes reported in Table 1. A potential explanation for this line of differentiation may be lying on the fact that the eight non-traditional components require banks to take relatively long-term stakes in assets, while the opposite is true for the remaining two components. Alternatively, considering that our analysis includes the recent financial crisis event, while the former group involves mortgage-backed securities which comprise the market that ignited this event, the empirical results highlight the importance of mortgage-related items for the documented positive impact on risk, emerging from rapid declines in the prices of mortgage-related securities (Ivashina and Scharfstein, 2008).

[Insert Table 4 about here]

This part of robustness testing performs an additional test of the baseline results displayed in Table 1. In particular, it considers the separation between investment (21) and commercial banks (1,704). A growing majority of studies are finding evidence that investment banks that focus entirely on non-traditional revenues

activities experience increased risk-taking (Demsetz and Strahan, 1997). In addition, streams of non-interest revenues appear to be more volatile than traditional loan-based revenue streams and highly expose investment banks to risk from increased operating leverage (DeYoung and Roland, 2001). After testing and confirming the presence of cointegration (the results are again available upon request) for both types of banks, the new results for investment banks (Panel 1) and commercial banks (Panel 2) are reported in Table 5. The results document that the impact of non-traditional bank activities retains the positive signs for both the profitability (ROA) and the insolvency risk (IR) variables. However, the impact of such activities turns out to be stronger for the case of investment banks, indicating that such activities are associated with higher systematic risks for investment vs commercial banks. We also report a test for the difference in estimated coefficients on profitability and risk, with p-values shown in brackets. The test confirms that the difference in the estimated coefficients for investment and commercial banks is statistically significant.

[Insert Table 5 about here]

Finally, in this strand of robustness testing we split our sample into two periods. We refer to the period from 2000 to 2006 as 'the pre-crisis' period, and the period from 2007 to 2013 as "the post-crisis" period. Bank failure studies have concluded that bank failures have been intensified during the recent financial crisis (Altunbas et al., 2011; Cole and White 2012). After confirming again the presence of cointegration in both periods (the results are available upon request), the new empirical findings over the first period (Panel 1) and over the second period (Panel 2) are displayed in Table 6. The results indicate that over the post-crisis period, the impact of non-traditional bank activities on profitability tends to be weaker (0.214 vs 0.126), while it turns out to be stronger on the insolvency risk (0.085 vs 0.138). Finally, the table reports a test for the difference in estimated coefficients over the pre- and post-crisis periods, with p-values shown in brackets. The test confirms that the difference in the estimated coefficients for the pre- and post-crisis period is significant in both the profitability and risk cases.

The new findings document that the impact of financial crisis event seems to have further exposed the weaknesses adhered to the guarding against the re-

emergence of systematic risks. Over the post-crisis period, banks experienced an increase in their riskiness and a decrease in their profitability as the risks they had undertaken before the eruption of the crisis materialized. At the same time, after the eruption of the crisis they continued to be involved in risky non-traditional activities and were not optimizing their business lines. They were simply trying to stay afloat, with their balance sheets and income statements being largely determined by the binding external constraints they were facing. This stressed situation largely contributed to a stronger impact on their insolvency risks and potentially increased the chances that these banks could fail. The financial crisis highlighted that such non-traditional bank activities embraced higher systematic risks, leading to a worse trade-off between profitability (returns) and insolvency risks. The new evidence also indicates that banks failed to properly internalize the associated risks in their individual decision-making processes, supporting the introduction of stronger macro-prudential policies and more efficient regulatory frameworks.

[Insert Table 6 about here]

4. Concluding remarks

This research paper studied the quantitative influence of non-traditional bank activities on profitability and insolvency risk for a number of U.S. financial institutions involved in such activities over the period January 2000-April 2013. The methodology of panel cointegration found that the introduction of non-traditional banking directly affects (positively) profitability and (positively) insolvency risk, suggesting that this type of activities is relevant for the fragility and the future of the entire banking system. Our results were robust to a number of robustness tests related to alternative definitions for profitability and risk profiles, the role of the size, the contribution of individual non-traditional items, the separation between commercial and investment banks, and the separation of the time span into the period before and after the recent crisis event.

The empirical findings seem to partially disagree with traditional arguments put forward by the theory of intermediations about the positive effects that banking institutions can experience by diversifying their portfolio of activities. The results also provide support to the question posed in the majority of studies in the relevant literature on why, given the negative impact the non-traditional activities have on

the risk profile of banking institutions, they continue such a diversification strategy. The earlier empirical literature on risk-adjusted returns provided overwhelming pertinent evidence, without employing the high-powered econometric techniques of this paper. Moreover, arguments in favor of such movements included improved earnings stability, improved X-efficiencies, and improved scale and scope economies. Coyne et al. (2004), however, argued that such expectations had been overestimated.

In relevance to the implications derived from our empirical findings, the results could serve as a pre-warning function that sends a clear message to regulators about the potential systemic risk that exists within the financial markets. Regulators should expand and intensify their supervisory resources over banks involved in non-traditional activities. Basel III requirements are not the sole answer. The recent crash was originated outside the traditional bank activities zone, while Basel III does not intervene in the banks' business model, but only imposes certain capital and liquidity constraints that depend entirely on the riskiness of banks' business. Hence, how to regulate the whole financial system, in a way that the systematic risk can be minimized, becomes the next challenge for regulators.

Potential venues for future research involve the investigation of volatility spillovers across traditional and non-traditional banking as well as the inclusion of non-traditional transactions and institutions from other international bank markets.

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Table 1. FMOLS estimates: Baseline results. The model is described by:

$ROA_{it} = \alpha_i + \beta_1 IR_{it} + \beta_2 NTR_{it} + \beta_3 LA_{it} + \beta_4 CAR_{it} + \beta_5 NONPL_{it} + \beta_6 HHI_t + \beta_7 P_t + \beta_8 RCY_t + \beta_9 DUMCR * NTR_{it} + \varepsilon_{it}$

$IR_{it} = \alpha_i + \beta_{10} NTR_{it} + \beta_{11} LA_{it} + \beta_{12} CAR_{it} + \beta_{13} NONPL_{it} + \beta_{14} HHI_t + \beta_{15} P_t + \beta_{16} RCY_t + \beta_{17} DUMCR * NTR_{it} + \eta_{it}$

	ROA	**IR**
IR	-0.086	—
	(-9.83)*	
NTR	0.116	0.159
	(7.82)*	(11.5)*
LA	0.078	-0.067
	(5.74)*	(-6.72)*
CAR	0.079	-0.116
	(5.47)*	(-6.45)*
NONPL	-0.085	0.226
	(-6.58)*	(7.49)*
HHI	0.086	-0.092
	(5.49)*	(-6.42)*
P	0.074	0.085
	(5.61)*	(5.96)*
RCY	0.093	-0.096
	(7.13)*	(-6.38)*
DUMCR*NTR	-0.217	0.084
	(-5.68)*	(6.15)*
R^2	0.56	0.56
R^2 (without the NTR)	0.47	0.42

Notes: NTR=total non-traditional activities, ROA=average accounting return on assets, IR=the insolvency risk index, NTR=total non-traditional activities, LA=the ratio of loans to assets, CAR=the equity to assets ratio, NONPL=the ratio of non-performing loans, HHI=the Herfindahl-Hirschman Index, P=consumer prices, RCY=real per capita income, DUMCR=a dummy variable that captures the recent financial crisis event and takes zero values up to 2006, and one onwards. The interaction term between the non-traditional bank activities and the crisis dummy reflects the impact of these activities during the crisis period.
t-statistics are reported in parentheses. * denotes statistical significance at the 1% level.

Table 2. FMOLS estimates: Large vs small banks

	Large banks		Small banks	
	ROA	**IR**	**ROA**	**IR**
IR	-0.127	___	-0.062	___
	(-8.46)*		(-5.17)*	
NTR	0.196	0.188	0.057	0.061
	(8.36)*	(10.4)*	(5.32)*	(5.48)*
LA	0.115	-0.122	0.062	-0.081
	(7.35)*	(-6.39)*	(4.84)*	(-5.26)*
CAR	0.108	-0.146	0.058	-0.116
	(6.19)*	(-6.91)*	(4.95)*	(-5.18)*
NONPL	-0.239	0.284	-0.118	0.205
	(-8.91)*	(7.82)*	(-5.33)*	(6.24)*
HHI	0.095	-0.114	0.052	-0.077
	(6.18)*	(-6.86)*	(5.09)*	(-5.52)*
P	0.087	0.094	0.049	0.071
	(6.25)*	(6.33)*	(5.16)*	(5.28)*
RCY	0.147	-0.129	0.109	-0.104
	(8.83)*	(-6.85)*	(5.36)*	(-5.42)*
DUMCR*NTR	-0.264	0.119	-0.217	0.106
	(-5.94)*	(7.06)*	(-5.61)*	(6.36)*
R^2	0.62	0.61	0.51	0.50
Difference of Coefficients Large-Small		ROA: [0.01]	IR: [0.01]	

Notes: Similar to Table 1.

Table 3. FMOLS estimates: Alternative measures of profitability and risk

	ROE	**TED**	**INT**	**TED**
TED	-0.079	____	-0.066	____
	(-7.62)*		(-5.48)*	
NTR	0.105	0.142	0.117	0.136
	(6.69)*	(9.45)*	(6.12)*	(6.28)*
LA	0.071	-0.062	0.065	-0.071
	(5.58)*	(-6.28)*	(5.49)*	(-6.53)*
CAR	0.072	-0.139	0.063	-0.144
	(6.14)*	(-5.61)*	(5.77)*	(-5.26)*
NONPL	-0.076	0.212	-0.082	0.253
	(-6.30)*	(6.53)*	(-6.81)*	(6.22)*
HHI	0.069	-0.078	0.058	-0.071
	(5.83)*	(-6.25)*	(5.48)*	(-5.49)*
P	0.071	0.079	0.078	0.073
	(5.82)*	(5.48)*	(5.61)*	(5.66)*
RCY	0.068	-0.114	0.094	-0.137
	(6.73)*	(-6.87)*	(6.52)*	(-6.28)*
DUMCR*NTR	-0.202	0.082	-0.239	0.073
	(-5.91)*	(5.77)*	(-6.34)*	(5.19)*
R^2	0.53	0.52	0.57	0.54

Table 3 continued

	ROA	SHARPE
SHARPE	-0.103	____
	(-5.91)*	
NTR	0.127	0.164
	(6.25)*	(6.53)*
LA	0.096	-0.085
	(5.85)*	(-6.89)*
CAR	0.091	-0.162
	(6.48)*	(-5.94)*
NONPL	-0.085	0.247
	(-5.74)*	(6.97)*
HHI	0.075	-0.088
	(5.72)*	(-6.70)*
P	0.083	0.092
	(5.62)*	(5.89)*
RCY	0.074	-0.135
	(6.82)*	(-6.91)*
DUMCR*NTR	-0.253	0.096
	(-6.19)*	(5.92)*
R^2	0.56	0.57

Notes: ROE=Return on Equity (ROE), INT=risk: the interest margin, TED=TED spread, SHARPE=the Sharpe ratio. The remaining are similar to Table 1.

Table 4. FMOLS estimates: Disaggregated items

NTR:	ABS	CDOL	CDOABS	CDO2	CDO3	TOB	ABCP	SMC	MSC	SCC
1. ROA										
IR	-0.084	-0.057	-0.066	-0.072	-0.063	-0.079	-0.026	-0.082	-0.070	-0.019
	(-5.24)*	(-5.16)*	(-4.97)*	(-5.18)*	(-5.06)*	(-5.63)*	(1.04)	(-6.12)*	(-5.93)*	(-0.64)
NTR	0.095	0.105	0.083	0.092	0.104	0.081	0.016	0.105	0.109	0.036
	(6.12)*	(5.58)*	(6.28)*	(5.84)*	(5.72)*	(6.25)*	(1.03)	(6.35)*	(5.61)*	(1.13)
LA	0.082	0.091	0.072	0.084	0.092	0.083	0.078	0.094	0.105	0.061
	(4.81)*	(5.73)*	(5.93)*	(6.32)*	(5.44)*	(6.15)*	(5.49)*	(4.94)*	(5.93)*	(5.46)*
CAR	0.065	0.115	0.094	0.124	0.096	0.113	0.106	0.085	0.117	0.075
	(6.43)*	(5.18)*	(5.38)*	(5.69)*	(4.83)*	(6.12)*	(5.27)*	(5.62)*	(4.82)*	(4.91)*
NONPL	-0.064	-0.084	-0.096	-0.104	-0.075	-0.064	-0.073	-0.110	-0.116	-0.064
	(-5.34)*	(-6.31)*	(-6.15)*	(-5.38)*	(-5.49)*	(-4.81)*	(-5.19)*	(-5.61)*	(-4.94)*	(-5.22)*
HHI	0.053	0.081	0.064	0.059	0.082	0.065	0.079	0.103	0.074	0.055
	(5.32)*	(6.51)*	(5.86)*	(5.93)*	(5.88)*	(4.93)*	(6.14)*	(5.58)*	(4.72)*	(4.39)*
P	0.053	0.062	0.073	0.081	0.074	0.081	0.046	0.095	0.082	0.059
	(5.26)*	(5.80)*	(5.12)*	(5.37)*	(6.04)*	(5.62)*	(4.39)*	(5.42)*	(5.71)*	(4.62)*
RCY	0.082	0.094	0.072	0.109	0.122	0.074	0.031	0.071	0.085	0.036
	(6.30)*	(6.73)*	(6.27)*	(6.83)*	(5.84)*	(6.48)*	(4.55)*	(5.61)*	(5.73)*	(4.29)*
DUMCR*NTR										
	-0.173	-0.075	-0.127	-0.131	-0.094	-0.086	-0.054	-0.105	-0.079	-0.052
	(-5.16)*	(-5.35)*	(-6.48)*	(-5.92)*	(-5.27)*	(-5.60)*	(-4.32)*	(-5.73)*	(-5.48)*	(-3.86)*
R^2	0.38	0.42	0.39	0.42	0.40	0.41	0.33	0.48	0.40	0.34
2. IR										
NTR	0.072	0.084	0.069	0.086	0.092	0.096	0.023	0.109	0.095	0.025
	(5.23)*	(5.84)*	(5.85)*	(5.45)*	(5.29)*	(6.58)*	(1.19)	(6.58)*	(5.48)*	(1.20)
LA	-0.077	-0.083	-0.066	-0.072	-0.080	-0.075	-0.066	-0.072	-0.095	-0.048
	(-4.28)*	(-5.32)*	(-5.37)*	(-6.25)*	(-5.63)*	(-6.54)*	(-5.92)*	(-5.48)*	(-5.36)*	(-5.68)*
CAR	-0.058	-0.087	-0.076	-0.094	-0.068	-0.083	-0.085	-0.093	-0.087	-0.052
	(-6.36)*	(-5.84)*	(-5.85)*	(-5.94)*	(-4.39)*	(-6.26)*	(-5.71)*	(-5.28)*	(-5.24)*	(-4.16)*
NONPL	0.059	0.081	0.085	0.094	0.072	0.049	0.066	0.085	0.086	0.048
	(5.48)*	(6.15)*	(6.52)*	(5.85)*	(5.94)*	(4.75)*	(5.94)*	(5.11)*	(4.45)*	(5.36)*
HHI	-0.061	-0.062	-0.072	-0.082	-0.074	-0.053	-0.093	-0.095	-0.083	-0.042
	(-5.24)*	(-6.17)*	(-5.60)*	(-5.36)*	(-5.62)*	(-4.38)*	(-6.45)*	(-5.84)*	(-5.26)*	-(4.98)*
P	0.064	0.073	0.081	0.073	0.060	0.075	0.069	0.091	0.061	0.048
	(5.66)*	(5.26)*	(5.28)*	(5.74)*	(5.45)*	(5.23)*	(4.25)*	(5.21)*	(5.14)*	(4.21)*
RCY	-0.066	-0.076	-0.059	-0.093	-0.072	-0.052	-0.034	-0.063	-0.075	-0.029
	(-5.03)*	(-6.31)*	(-5.73)*	(-6.31)*	(-5.44)*	(-5.82)*	(-4.72)*	(-5.17)*	(-5.36)*	(-4.95)*
DUMCR*NTR										
	0.139	0.082	0.176	0.125	0.108	0.112	0.116	0.126	0.139	0.074
	(5.64)*	(5.59)*	(6.89)*	(5.28)*	(5.74)*	(5.38)*	(5.28)*	(5.38)*	(5.81)*	(5.61)*

R^2	0.39	0.45	0.42	0.46	0.36	0.37	0.31	0.45	0.44	0.42

Notes: Similar to Table 1.

Table 5. FMOLS estimates: Investment vs commercial banks

	Investment banks		**Commercial banks**	
	ROA	**IR**	**ROA**	**IR**
IR	-0.107	__	-0.073	___
	(-5.32)*		(-5.21)*	
NTR	0.138	0.193	0.084	0.161
	(6.29)*	(7.54)*	(5.44)*	(6.40)*
LA	0.061	-0.058	0.095	-0.053
	(5.42)*	(-5.23)*	(5.28)*	(-5.33)*
CAR	0.072	-0.147	0.086	-0.156
	(5.78)*	(-6.28)*	(5.80)*	(-5.82)*
NONPL	____	____	-0.096	0.259
			(-6.37)*	(5.61)*
HHI	0.106	-0.083	0.125	-0.092
	(5.98)*	(-5.91)*	(6.13)*	(-5.64)*
P	0.093	0.102	0.086	0.090
	(5.88)*	(5.63)*	(5.47)*	(5.35)*
RCY	0.109	-0.116	0.114	-0.098
	(6.34)*	(-6.82)*	(6.45)*	(-5.74)*
DUMCR*NTR	-0.274	0.125	-0.258	0.146
	(-5.82)	(6.59)*	(-5.52)*	(6.15)*
R^2	0.59	0.58	0.52	0.50
Difference of Coefficients Investment-Commercial		ROA: [0.00]	IR: [0.00]	

Notes: Similar to Table 1.

Table 6. FMOLS estimates: Pre-crisis vs post-crisis periods

	Pre-crisis		Post-crisis	
	ROA	**IR**	**ROA**	**IR**
IR	-0.049	__	-0.089	__
	(-5.12)*		(-5.73)*	
NTR	0.214	0.085	0.126	0.138
	(7.22)*	(6.14)*	(6.39)*	(6.43)*
LA	0.039	-0.061	0.061	-0.068
	(5.15)*	(-5.35)*	(5.62)*	(-5.74)*
CAR	0.056	-0.102	0.104	-0.161
	(5.14)*	(-5.71)*	(6.48)*	(-6.28)*
NONPL	-0.052	0.148	-0.092	0.207
	(-5.24)*	(6.12)*	(-6.47)*	(6.62)*
HHI	0.068	-0.063	0.073	-0.068
	(5.36)*	(-5.26)*	(5.69)*	(-5.31)*
P	0.038	0.074	0.060	0.092
	(5.06)*	(5.15)*	(5.58)*	(5.83)*
RCY	0.071	-0.087	0.094	-0.106
	(5.26)*	(-5.26)*	(6.61)*	(-5.76)*
R^2	0.47	0.49	0.58	0.55
Difference of Coefficients Pre-post	ROA: [0.03]		IR: [0.01]	

Notes: Similar to Table 1.

The long-term role of non-traditional banking in profitability and risk profiles: Evidence from a panel of U.S. banking institutions

Highlights

- We study the impact of non-traditional banking on risk-adjusted returns
- 1,725 U.S. banks spanning the period 2000-2013
- We make use of the methodology of panel cointegration
- The results document a positive effect on risk-adjusted returns
- The results are highly important for regulators.