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BANK DIVERSIFICATION AND VALUATION: INTERNATIONAL EVIDENCE

Using a panel of the largest 800 banks from 31 OECD countries between 1998-2012 we investigate whether the diversity of financial institutions affects their valuations. That is whether banks with more diversified operations trade at a premium (reduce risk) or discount (are too complex). We look at both asset diversity and income diversity and price to book and Tobin's q as measures of value. Looking at the whole set we find that it is difficult to empirically verify the role of bank diversity on bank valuations. However, when banks are divided into small, medium and large banks we find that bank diversity may add value in the case of small banks but probably destroys it in the case of the largest banks.

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BANK DIVERSIFICATION AND VALUATION: INTERNATIONAL EVIDENCE

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Abstract

Using a panel of the largest 800 banks from 31 OECD countries between 1998-2012 we investigate whether the diversity of financial institutions affects their valuations. That is whether banks with more diversified operations trade at a premium (reduce risk) or discount (are too complex). We look at both asset diversity and income diversity and price to book and Tobin's q as measures of value. Looking at the whole set we find that it is difficult to empirically verify the role of bank diversity on bank valuations. However, when banks are divided into small, medium and large banks we find that bank diversity may add value in the case of small banks but probably destroys it in the case of the largest banks.

Key words: bank valuations, bank diversity, economies of scale, agency problems, bank size,

JEL Classifications: G21, G24, G34, L22

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NON-TECHNICAL SUMMARY

The objective of this paper is to study the impact of bank diversity on their market value. We look at two measures of bank diversity – **asset diversity** and **income diversity** - and study their impacts on two measures of banks' value - the **price to book ratio** and **Tobin's q**. The methodological approach we apply is based on microeconomic panel modelling and our sample encompasses circa 800 banks from 31 countries around the world. Our work follows a similar methodology to Leaven and Levine (2007) although we have the benefit of data both immediately before and after the global financial crisis.

Our key findings suggest that:

- It is very **difficult to identify the causal impact** of diversity on the valuation of banks since it is difficult to measure directly the potential roles of the economies of scale, agency problems and other factors underlying changes in market valuations.
- Looking at the sample as a whole, although it is difficult to empirically verify the role of bank specialisation for bank valuations, we find that the **diversity impacts are insignificant or negative rather than positive**.
- Dividing the sample into three subsamples: **small, medium and large** banks, we find that bank diversity may **add value in the case of small banks**, while it probably **destroys it in the case of the largest banks**. Diversity does not seem to matter much for mid-sized banks.
- Dividing the sample according to the **geographical location** of banks, we find that **European, Asian and North American banks may lose out** at greater diversification of their operations, while **South American and Australian banks may benefit** from it.

To recap, the most vulnerable in terms of how diversity and potential agency problems impact their value, are the largest banks from Europe, Asia and North America. Smaller banks from South America and Australia may potentially reap some benefits from the exploitation of the economies of scale.

INTRODUCTION

The costs and benefits of large diversified banks is contested in applied finance and in the design of public policy in response to the global financial crisis. Theoretical and empirical papers provide conflicting predictions about the impact of greater diversity of banking activities on the performance of financial intermediaries, and in particular the biggest, systematically important financial institutions. Policy makers have considered limiting the size and activities of bank activities, most notably in the US and UK, popularly known as the Volcker Rule and the Vickers Report.

This paper attempts to quantify the impact of bank diversification on bank valuations. We analyse the role of diversification for the markets' assessment of individual banks value, which determines the ability of individual banks to raise funding in capital markets, and the amount of dividend paid to shareholders. This allows us to explain the mechanisms of the functioning of large, diversified banks in the environment of capital markets, and contribute to the current policy debate on banking regulation.

We investigate whether large banks are priced differently by the market than small banks, and whether there is a role for country specific factors and national regulations.

Theory provides conflicting predictions about the impact of diversity of activities on the performance of financial institutions. The works by Diamond and Rajan (1991), and Chen and Lin (2009), suggest that banks may benefit from diversification through the economies of scale. During the process of making loans banks acquire information that may facilitate the efficient provision of other financial services, including underwriting of securities, and vice versa. Financial conglomerations may ease information asymmetries and use internal capital markets to allocate resources efficiently, diversifying income flows (Gertner, Scharfstein, Stein, 1994). On the other hand, the works by Leaven and Levine (2005), and Jensen (1996) suggest that diversification of activities within a single bank may intensify agency problems. Large financial institutions may be exposed to inefficiencies in the design of managerial incentive contracts; it may also be more difficult to align the incentives of outsiders and insiders (Rotemberg, Saloner, 1994). The insiders may expand the range of financial activities if the diversification allows them to extract private benefits from the institution. Therefore, as Leaven and Levine (2005) suggest, even if the diversification lowers the market valuation insiders will still diversify if their extra private benefits exceed the losses that they incur from the drop in market valuation.

Empirically, it has been proving very difficult to identify the causal impact of diversity on the valuation of banks. It is difficult to measure directly the potential roles of the economies of scale, agency problems and other factors underlying changes in market valuations (Levine,

Leaven, 2012, Leaven, Levine, 2007, Calomiris, Nissim, 2007, Berger and Humphrey, 1997). Berger and Humphrey (1997) argue that since it is difficult to price different activities, it is automatically very difficult to identify the presence of economies of scale in financial services. Vender, Veder; D'Souza, Lai; Turkmen, Yigit find evidence of complementarities between lending and investment-related services. At the same time the works by Leaven and Levine (2005) suggest the opposite. The objective of this paper is to verify empirically the hypothesis that bank diversification has an impact on bank valuations.

From policy perspective, the issue of scale and complexity of the banking system has been widely discussed in national and international fora. Over the last 15 years the banking sector has undergone radical transformations. It has significantly grown in size, and the growth has been concentrated in the largest banks which have become more leveraged. The ESRB (2014) provides a very good diagnosis of the state of the banking sector in Europe, together with policies designed to reduce overbanking and bank risk taking due to moral hazard. The four policy innovations – CRD IV, Single Supervisory Mechanism, Bank Recovery and Resolution Directive, and a Single Resolution Mechanism are necessary steps towards a healthier banking system. As argued by the ESRB (2014), a further tool to control the size of large banks could be implementing more aggressive antitrust policies which would address the problem of the size of the banking system, as well as the problem of its concentrated structure. This paper adds to this debate and argues that bank size matters from the perspective of bank valuation.

DATA AND METHODOLOGY

The primary data source for the analysis in this paper is Bankscope. The sample encompasses banks from in 31 OECD countries on five continents: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, Netherlands, Norway, Poland, Portugal, Republic of Korea, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK, US.

Table 1. Country coverage

Euro Area	132	Other EU	93	North America	360
Austria	11	Czech Republic	1	US	345
Belgium	5	Hungary	2	Canada	15
Finland	5	Poland	13	South America	16
France	30	Denmark	29	Mexico	9
Germany	21	Sweden	3	Chile	7
Greece	8	UK	45	Asia	141
Ireland	2	Other Europe	53	Japan	109
Italy	26	Norway	19	South Korea	32
Luxembourg	2	Switzerland	34	Australia	8
		EU		Australia	8
Netherlands	6	Associate/Neighbour	28		
Portugal	4	Turkey	7		
Slovakia	4	Israel	21		
Slovenia	3				
Spain	5	Total Europe	306	TOTAL	831

Source: Bankscope

In total, we look at 831 publicly listed OECD banks, over the period 1998-2012. The sample covers 306 banks from Europe, 360 banks from North America, 141 banks from Asia, 16 banks from South America and 8 banks from Australia. We look at both micro- and macroeconomic variables that may be taken into account by investors when assessing the market value of individual banks.

The primary source of information about the performance and characteristics of individual banks are banks' balance sheets and income statements; we also extract information and indicators derived from banks' stock data. The analysis is complemented by macroeconomic indicators - we use data from national databases.

BANK VALUATIONS

This paper applies two indicators of bank value: the ratio of price to book value, and an indicator of Tobin's q - the ratio of market value to book value of a bank, approximated by the ratio of market capitalisation and total liabilities to bank's total assets. We remove outliers from the series. Figures 1 and 2 show annual values averaged across all banks together with standard deviations, for both variables. Tobin's q for individual banks is calculated as the sum of the market value of common equity and the book value of total debt divided by the book value of total assets. It is designed to measure the present value of future cash flows divided by the replacement cost of tangible assets. The price to book ratio is a very similar measure which compares a stock's market value to its book value.

Figure 1. Tobin's q

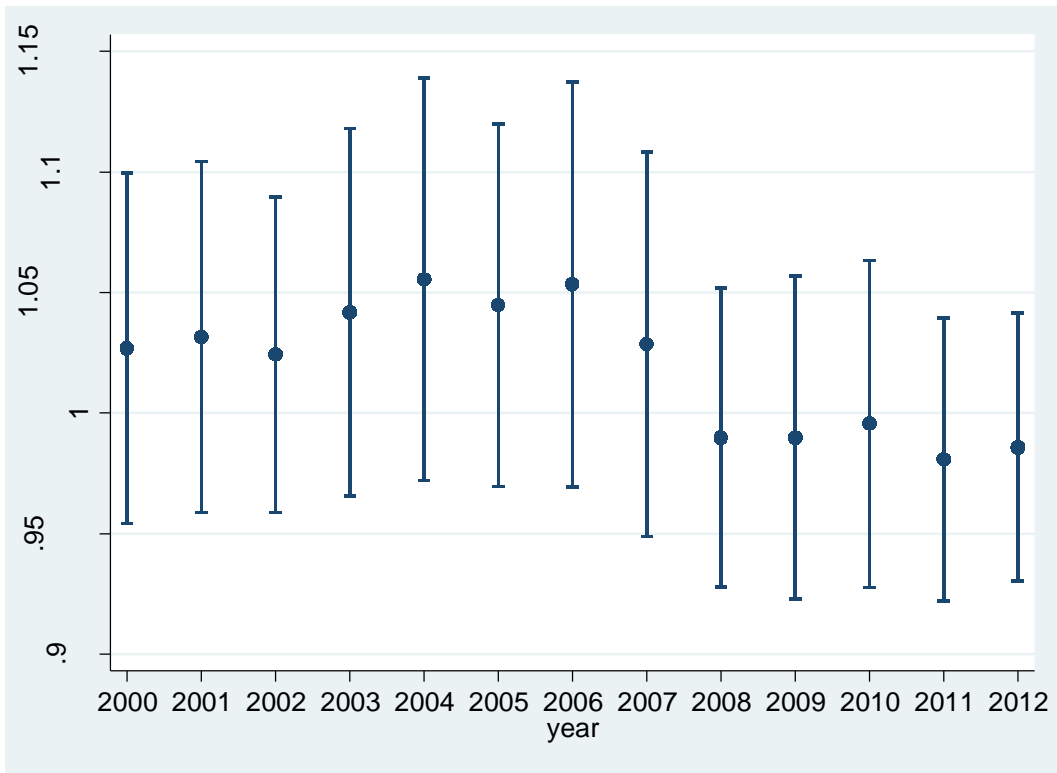
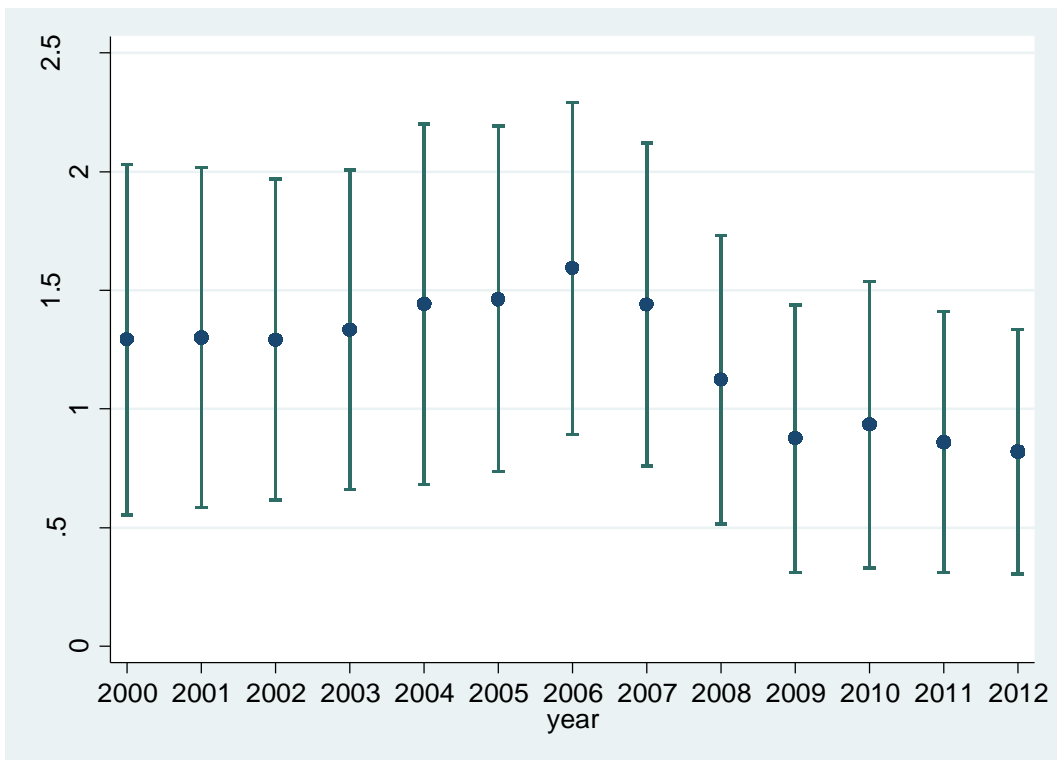


Figure 2. Price to book ratio



The paths of both variables are relatively similar and both charts show that the value of banks has decreased following the global financial crisis. The ratio of market to book value remained relatively high up until 2007. In 2008 the market value dropped below the book value. The low ratio of market to book value may indicate that either the banking sector as a whole (we look at year averages across all banks) became undervalued relative to its fundamentals, or the banks were suffering from hidden losses.

The literature offers several explanations as for why the market value of banks dropped so significantly after the crisis.

First, as argued by Huizinga and Leaven (2009), some banks may have purposefully understated their losses, especially those related to mortgage activity. Banks classified their mortgage-backed securities as held-to-maturity rather than as available for sale, increasing the difference between the amortized cost and fair value of a bank's mortgage-backed securities portfolio. Banks with greater mortgage exposure reported low rates of loan loss provisions and charge-offs.

Second, as argued by Colomiris and Nissim (2012) the market values of loan and deposit relationships could have been affected by changes in market conditions that do not have an impact on book values. For example, the crisis was associated with a change in monetary policy and a decline in interest rates. The low interest rates reduced the value of zero or low-interest deposits to banks.

Third, the value of different sources of income has changed (Colomiris, Nissim, 2012). For example, mortgage servicing fees may have been perceived as highly valuable before the crisis and less so after the crisis (because of inter alia rising mortgage defaults, or declining interest incomes earned on mortgages).

Fourth, in light of the crisis investors may have changed their views about the desirability of some bank practices. For example, higher leverage was looked upon favourably by investors because it was a source of greater returns on equity. After the crisis, high leverage started to be perceived as a source of risk and instability.

Fifth, banks' engage in carry trade, borrowing short and lending long. Changes in interest rates, and especially those in the term structure of interest rates, affect banks' profitability. This depends on the extent to which they engage in the carry trade.

Figures 1 and 2 also depict the scale of the standard deviations for both the Tobin's q and price to book ratio. Both charts suggest that the standard deviation has decreased somewhat after the crisis. This may result from the fact that the crisis has contributed to a better assessment of individual banks' value.

BANK DIVERSIFICATION

The focus of this paper is the impact of diversification of banks. We follow Levine and Leaven (2007) and use two measures of bank diversity.

First, we construct an asset-based indicator of diversification which measures bank diversification across different types of assets. It is calculated as:

$$1 - \left| \frac{(\text{net loans} - \text{other earning assets})}{\text{total earning assets}} \right|$$

Asset diversity takes values between 0 and 1. It is increasing in the degree of diversification.

Second, we construct a n indicator which measures the degree of diversification across different source of income. The income diversity measure is calculated as:

$$1 - \left| \frac{(\text{net interest income} - \text{other operating income})}{\text{total operating income}} \right|$$

Again, the indicator takes values from the range 0 and 1, and it is increasing in the degree of diversification.

Figure 3 and 4 show the key characteristics of the two measures, over time.

Figure 3. Asset diversification

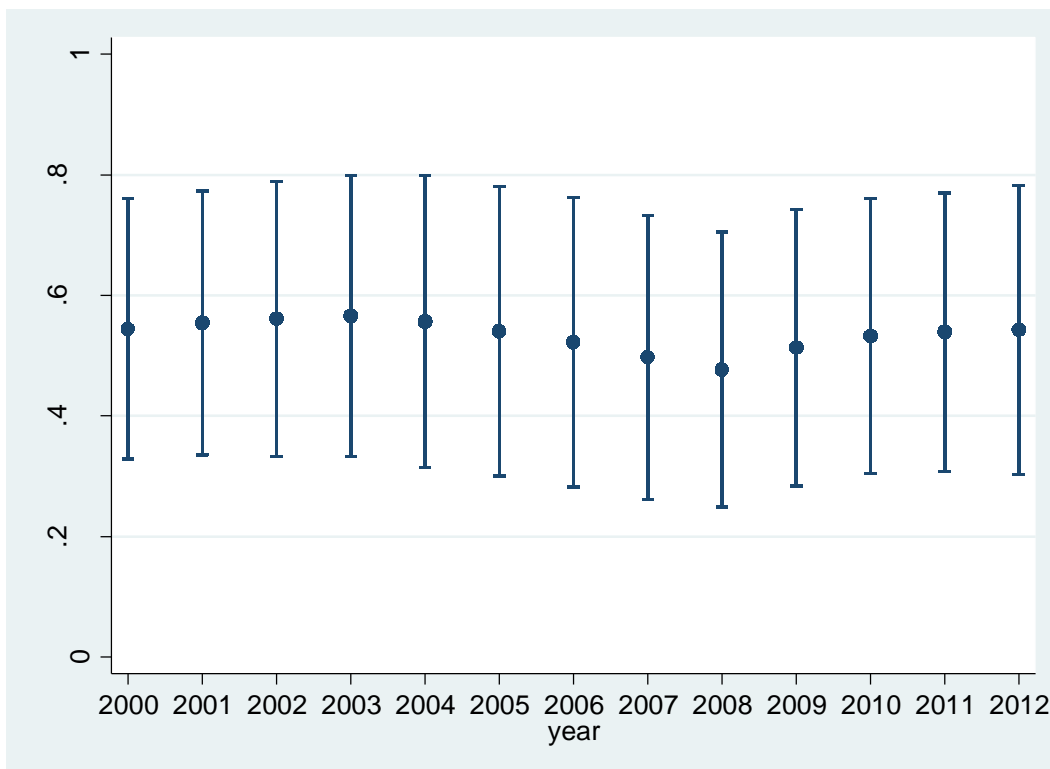
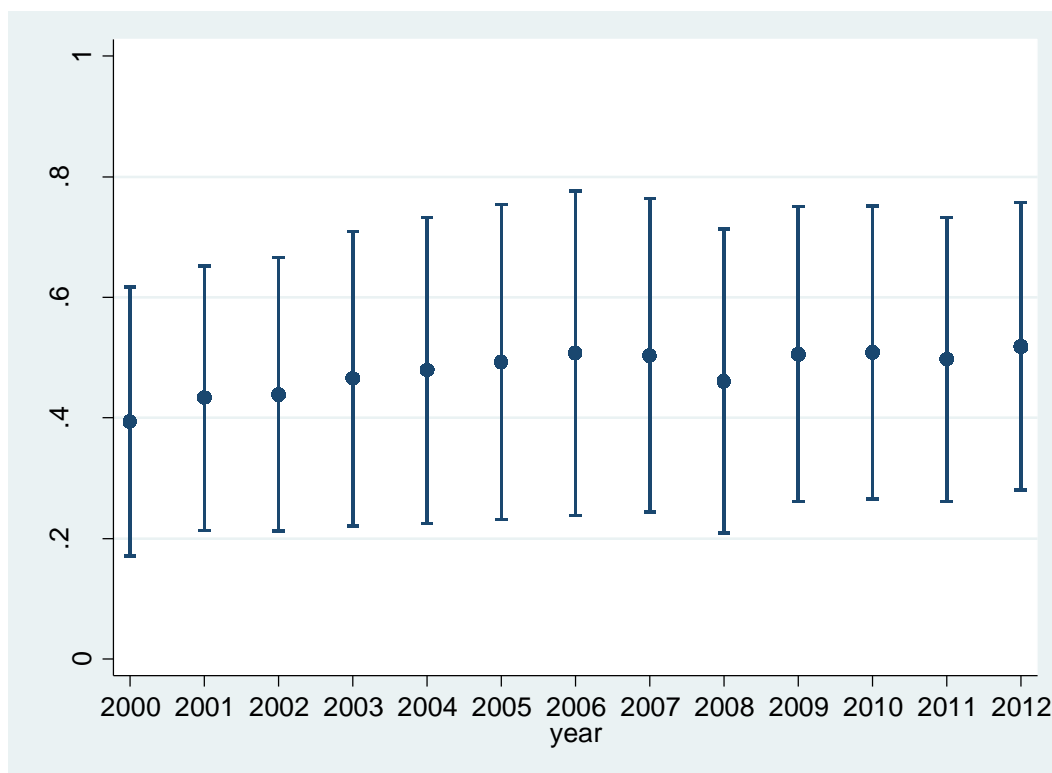


Figure 4. Income diversification



The mean of both measures of diversity is around 0.55-0.6 suggesting that, on average, most banks attempt to keep their portfolios relatively balanced, and avoid high agency costs. The asset diversity and income diversity measures are complementary in that asset diversity is based on stock variables, and income diversity is based on flow variables. The standard deviation range remains relatively stable over the sample. The standard deviation widens marginally in the run up to the crisis.

METHODOLOGY

To quantify the impact of diversity on banks' valuations we estimate a set of panel equations. Apart from the key variables – the income and asset diversity measures - we include a set of control variables encompassing both micro- and macrovariables. The control microvariables describe the behaviour and performance of individual banks and they include: assets' growth, operating income growth, the ratio of deposits to total liabilities, and the ratio of equity to total assets. The control macrovariables are individual countries' GDP, inflation, and interest rates.

The equation that we estimate is specified as follows:

$$V_{i,j,t} = \alpha_0 + \alpha_1 div_{i,j,t} + \alpha_2 dlog(assets)_{i,j,t} + \alpha_3 dlog(oi)_{i,j,t} + \alpha_4 dl_{i,j,t} + \alpha_5 ea_{i,j,t} + \beta_1 GDP_{j,t} + \beta_2 IR_{j,t} + \beta_3 INF_{j,t} + \varepsilon_{i,j,t}$$

Where:

V – measures of market value of banks: Tobin's q and market-to-book ratio. Both variables vary over banks i, countries j, and time t.

Div – measures of diversification with respect to assets and income

Assets – bank total assets

Oi – operating income

DL – ratio of deposits to liabilities

EA – ratio of equity to total assets (a measure of leverage)

GDP – GDP growth

IR – interest rates

INF – inflation.

In case of income diversity equations we also include net interest income to total operating income, and in case of asset diversity equations loans to total earning assets. These two variables correspond to individual banks' activity measures – they are included to control for the mixture of activities conducted by each bank and therefore to identify the relationship between valuation and diversity per se. (see Leaven, Levine (2007), and Chen and Lin (2009)). The equations were estimated using the general to specific estimation approach. Apart from controlling for specific bank-level traits and country characteristics, we also use fixed effects.

ESTIMATION RESULTS

We study the impact of asset diversity and income diversity on banks' price to book value. In table 1 we present the results of regressing two measures of bank valuations – Tobin's q and price to book ratio on income and asset diversity, respectively. We are pooling the data over different banks, therefore we also include individual bank dummy variables. In the first four columns we present the results for the tobin's q as a regressand and asset and income diversity, respectively, as regressors. In the last four columns the regressand is the price to book ratio. Control variables are the same across all regressions, with the exception of net interest income to total operating income in the case of income diversity regressions, and loans to total earning assets in the case of asset diversity regressions. These two variables – net interest income to total operating income, and loans to total earning assets – allow us to control for the fact that banks engage in different mix of financial activities: loans and less

traditional activities that require investments in assets, and deposits and non-interest generating activities.

Table 2. Bank valuations and bank diversity - results

	Tobin's q				Price to book			
	Income diversity		Asset diversity		Income diversity		Asset diversity	
	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
Constant	1.11	76.57	1.05	75.83	1.97	16.31	1.55	13.34
Crisis 2007	-0.05	-29.64	-0.05	-30.53	-0.37	-27.35	-0.38	-28.41
Diversity	0.00	-0.13	0.00	-0.68	0.00	0.05	-0.07	-1.43
Net interest income to operating income	-0.04	-3.24			-0.14	-1.37		
Loans to total earning assets			0.03	2.65			0.49	5.53
Total assets	0.04	8.58	0.04	8.23	0.28	6.43	0.35	7.79
Total Operating income	0.01	2.42	0.01	2.45	-0.04	-1.42	-0.07	-2.40
Deposits/liabilities	-0.06	-5.35	-0.04	-3.63	-0.72	-7.86	-0.65	-6.96
Equity/assets	0.00	0.15	0.00	0.04	-1.13	-5.12	-1.32	-5.53
GDP growth	0.003	9.62	0.003	9.75	0.030	10.39	0.030	10.38
Interest rates	0.004	8.91	0.004	8.10	0.061	15.88	0.056	14.42
Inflation	0.00	-3.41	0.00	-3.12	0.01	1.31	0.01	1.38
R squared adj	0.62		0.62		0.68		0.68	

The regressions above confirm that it is difficult to test for the role of bank diversity on bank valuations empirically using the sample as a whole. The first two columns show the impact of diversity, both income diversity and asset diversity on Tobin's q. The last two columns show the impact of income and asset diversity on price to book ratio. We cannot unequivocally state that bank diversity and specialisation destroy value. In three cases out of four bank diversity does not matter for how the market values banks in OECD countries (see third line, the first three columns). The impact of asset diversity on price to book ratio is significantly negative (third line, fourth column). In none of the cases the impact of diversity on bank valuations is positive. This may suggest that, although it is difficult to empirically verify the role of bank specialisation for bank valuations, the diversity impacts are insignificant or negative rather than positive.

We include several control variables into the equation that describe microeconomic characteristics of individual banks. The ratio of deposits to liabilities would be expected to signal higher valuations since deposits are generally an inexpensive source of funding and they are also enjoying government subsidized insurance. The above estimates suggest that

higher deposit to liabilities ratios may affect banks' market valuations negatively – this can particularly apply to the pre-crisis period where higher leverage was perceived favourably by the markets since it implied higher returns on equity. We also control for the book value capitalisation of the bank that is the equity to assets ratio. A well capitalised bank would be perceived by the markets as more valuable than a bank exposed to risks through undercapitalisation. In the run up to the crisis, banks could have, however, switched to lower quality capital. Next, we control for the past performance of individual banks including the growth rate of total assets and total operating income to proxy for growth opportunities.

We also include macroeconomic (country-level) variables that vary over time. These include GDP growth rates, inflation and interest rates. The positive relationship between GDP growth and bank valuations reflects the correlation between stocks valuations and the business cycle. Inflation can affect bank performance and may influence bank decisions to diversify into non-lending financial services (Levine, Leaven, 2005). Finally, we control for interest rates.

Below we examine the robustness of the results with regard to the size of individual banks. We divide our sample of over 800 banks into three subsamples: 25 per cent of the smallest banks, 25 per cent of the largest banks and the remaining mid-size banks. We then estimate Tobin's q and price to book ratio equations with regard to both asset and income diversity, as previously. All other control variables, including activity measures, remain unchanged.

Table 3 below reports results for the equation where Tobin's q is the dependent variable and income diversity is our main explanatory variable of interest. The regression shows that the smallest banks may benefit from bank diversity. In column 1 of table 3 we provide estimates of the impact of income diversity on Tobin's q for the 25 per cent of the smallest banks in the sample that is banks whose total assets do not exceed 835.2 million USD. Size is often thought to affect performance and valuation of banks through economies of scale. Due to their limited size, the small banks may not fully exploit the cost advantages or operational efficacy that come with broadening of the scope of their activities. Medium banks which encompass the majority of banks in our sample (total assets from the range 835.2 million USD and 21592.1 million USD) seem to be indifferent to the structure of their incomes. Income diversity proves to be insignificant when determine the value of mid-size banks. The most interesting case is that of the largest banks. The relationship between Tobin's q and income diversity is negative for the largest banks that is banks whose total assets exceed 21592.1 million USD. This may suggest that if a bank becomes too big, there may arise agency problems and potential conflicts between the insiders and stakeholders may appear affecting banks' valuations.

Table 3. Tobin's q and income diversity – the role of the bank size

	Tobin's q - income diversity					
	25% smallest banks		medium size banks 25-75%		25% largest banks	
		t-Stat		t-Stat		t-Stat
Constant	1.08	23.05	1.11	76.57	1.14	53.47
Crisis in 2007	-0.04	-9.53	-0.05	-29.64	-0.03	-14.57
Income diversity	0.1	5.13	<i>0.0</i>	<i>-0.13</i>	-0.02	-2.35
Net interest income to operating income	0.02	0.49	-0.04	-3.24	-0.05	-3.15
Total assets	0.05	3.9	0.04	8.58	0.04	4.55
Total Operating income	-0.01	-1.12	0.01	2.42	0.01	1.65
Deposits/liabilities	-0.13	-3.69	-0.06	-5.35	-0.1	-5.34
Equity/assets	0.17	2.74	0.004	0.15	-0.01	-0.11
GDP growth	0.006	5.34	0.003	9.62	0.002	5.57
Interest rates	0.002	1.57	0.004	8.91	0.006	7.5
Inflation	-0.005	-1.8	-0.003	-3.41	-0.003	-2.89
R squared adj	0.59		0.62		0.68	

The same type of the analysis is conducted for the remaining pairs of the dependent and exogenous variables. We investigate the impact of asset diversity on Tobin's q and the role of income and asset diversity for price to book ratio. Detailed estimates are shown in appendix 1, and below we present a summary of the results with respect to the main variables of interest.

Table 4. The role of the bank size - summary

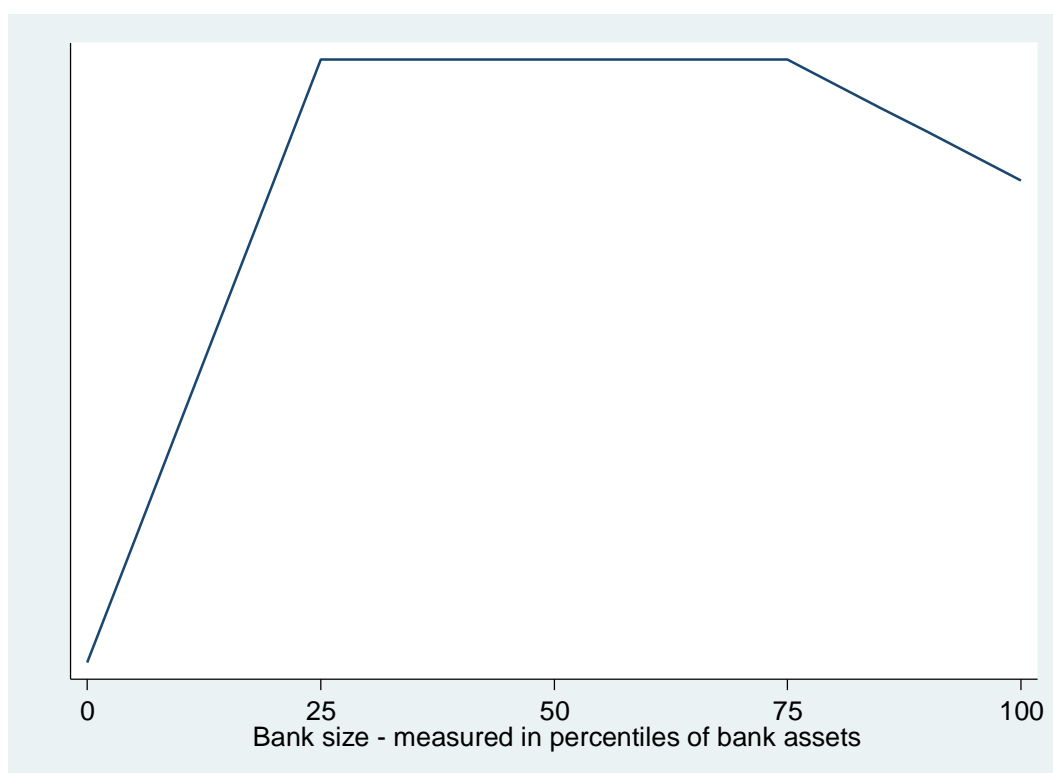
	Tobin's q		Price to book	
	Income diversity	Asset diversity	Income diversity	Asset diversity
Small banks	positive	x (positive)	positive	x (negative)
Medium banks	x (negative)	x (negative)	x (positive)	x (positive)
Large banks	negative	x (positive)	x (negative)	x (positive)

x denotes insignificance (the sign of the insignificant coefficient is reported in brackets)

The estimations confirm the previous result that the impacts of diversity and specialisation on the performance and valuation of banks are surrounded by substantial uncertainty and are difficult to verify empirically. However, the estimations allow us to draw several conclusions. While one could assume that smaller banks can benefit from enhancing the scope of their activities (see table 4, first row), it is rather questionable whether big banks benefit to the same extent (see table 4, third row). In banks that are too big, diversity may destroy value rather than create it. The potential agency problems are likely to result in stock markets devaluing the largest banks. The mid-sized banks neither benefit nor lose out on the expansion of the scope of their activities. In all analysed cases the impact of bank diversity on bank valuations is not significant (see table 4, second row).

Figure 5 shows a stylised chart of the impact of bank diversity on bank valuations depending on the size of the bank.

Figure 5. The impact of bank diversity on bank valuations depending on the size of the bank



Next, we study whether the impact of diversification on banks' value depends on individual regions in the OECD. We divide our sample of banks from 31 OECD countries into five subsamples. We analyse European, North American, South American, Asian and Australian banks. The European banks encompass banks from Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovenia, Slovakia, Spain, Poland, Hungary, Czech Republic, Sweden, UK, Switzerland, Norway, Turkey, Island.

The North American banks encompass banks from the US and Canada, while the South American ones – from Mexico and Chile. Japanese and South Korean banks constitute the sample of Asian banks. Australian banks are analysed separately. We calculate diversity elasticities for all groups of banks. Table 5 below presents results for Tobin's q and income diversity.

Table 5. Tobin's q and income diversity – the role of regional differences

	Tobin's q - income diversity	
	Coeff	t-Stat
Constant	1.12	78.83
Crisis in 2007	-0.05	-29.22
Europe: OE, BG, FN, FR, GE, GR, IR, IT, LX, NL, PT, SL, SR, SP, PO, HU, CR, SD, UK, SW, NO, TR, IS	-0.02	-2.02
North America: US, CN	-0.01	-0.98
South America: MX, CL	0.01	0.25
Asia: JP, SK	-0.04	-2.52
Australia	0.08	0.78
Net interest income to operating income	-0.05	-4.37
Total assets	0.04	8.52
Total Operating income	0.01	2.36
Deposits/liabilities	-0.06	-5.31
Equity/assets	0	0
GDP growth	0.003	9.79
Interest rates	0.004	9.01
Inflation	-0.003	-3.6
R squared adj	0.62	

The results suggest that in particular in the case of European and Asian banks, bank diversity and specialisation may destroy banks' value. The elasticity of bank value with regard to bank diversity is negative and significant. For American banks the relationship between income diversity and Tobin's q is negative, but insignificant. In the case of South American banks the relationship is positive but insignificant.

We then conduct estimations for the remaining pairs of the dependent variables (Tobin's q and price to book ratio) and the main explanatory variables (income and asset diversity; the control variables remain the same) for the same group of countries. Table 6 below summarises the results.

Table 6. The role of regional differences - summary

	Tobin's q		Price to book	
	Income diversity	Asset diversity	Income diversity	Asset diversity
Europe: OE, BG, FN, FR, GE, GR, IR, IT, LX, NL, PT, SL, SR, SP, PO, HU, CR, SD, UK, SW, NO, TR, IS	negative	x	negative	x

North America: US, CN	x	x	x	negative
South America: MX, CL	x	positive	x	positive
Asia: JP, SK	negative	x	negative	positive (low)
Australia	x	positive	x	x

x denotes insignificance

On the basis of the above estimations one can conclude that the European, Asian and possibly North American banks lose out at greater diversification of their operations. South American, and potentially Australian banks may benefit from a higher degree of specialisation. This may result from, inter alia, lower level of bank services saturation in South America and scope for further expansion.

CONCLUSIONS

This paper has looked at the role of asset and income diversity on bank valuations. We analyse the behaviour and stock market performance of over 800 banks in over 30 countries and find that bank diversity may add value in the case of small banks, while it probably destroys it in the case of the largest banks. Taking into account, the geographical location of banks, we find that European, Asian and North American banks lose out at greater diversification of their operations, while South American and Australian banks may benefit from it.

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ANNEX 1. BANK SIZE - EQUATIONS

	Tobin's q - asset diversity					
	25% smallest banks		medium size banks 25-75%		25% largest banks	
		t-Stat		t-Stat		t-Stat
Constant	1.00	21.75	1.05	85.05	1.10	55.01
Crisis in 2007	-0.05	-10.81	-0.05	-30.57	-0.04	-14.35
Asset diversity	0.01	0.50	<i>0.00</i>	<i>-1.10</i>	0.01	0.69
Loans to total earning assets	0.20	5.87	0.03	2.84	-0.01	-0.64
Total assets	0.06	4.46	0.04	8.26	0.04	4.99
Total Operating income	-0.01	-1.15	0.01	2.57	0.00	1.03
Deposits/liabilities	-0.12	-3.38	-0.04	-3.80	-0.10	-5.80
Equity/assets	0.05	0.70	0.000	0.00	0.03	0.39
GDP growth	0.007	6.65	0.003	9.52	0.002	5.33
Interest rates	-0.001	-0.66	0.004	8.21	0.006	7.32
Inflation	-0.006	-2.39	-0.002	-2.78	-0.003	-2.36
R squared adj	0.62		0.62		0.67	

	Price to book - income diversity					
	25% smallest banks		medium size banks 25-75%		25% largest banks	
		t-Stat		t-Stat		t-Stat
Constant	2.17	6.88	1.97	16.31	2.19	10.76
Crisis in 2007	-0.32	-9.39	-0.37	-27.35	-0.37	-16.63
Income diversity	0.36	2.56	<i>0.00</i>	<i>0.05</i>	-0.09	-0.96
Net interest income to operating income	-0.18	-0.70	-0.14	-1.37	-0.14	-0.87
Total assets	0.36	3.61	0.28	6.34	0.45	5.59
Total Operating income	-0.22	-3.26	-0.05	-1.42	-0.01	-0.26
Deposits/liabilities	-1.09	-4.47	-0.72	-7.86	-0.94	-5.43
Equity/assets	-0.86	-2.04	-1.13	-5.12	-2.98	-3.52

GDP growth	0.031	3.68	0.030	10.39	0.027	6.81
Interest rates	0.040	5.07	0.061	15.88	0.079	10.57
Inflation	0.032	1.54	0.010	1.31	0.003	0.29
R squared adj	0.63		0.68		0.75	

	Price to book - asset diversity					
	25% smallest banks		medium size banks 25-75%		25% largest banks	
		t-Stat		t-Stat		t-Stat
Constant	1.62	4.50	1.45	13.98	2.10	11.22
Crisis in 2007	-0.34	-9.52	-0.38	-28.31	-0.38	-16.33
Asset diversity	-0.21	-1.35	<i>0.05</i>	<i>1.47</i>	0.05	0.61
Loans to total earning assets	0.99	3.55	0.57	7.01	-0.03	-0.18
Total assets	0.39	3.74	0.35	7.78	0.48	6.25
Total Operating income	-0.19	-2.87	-0.07	-2.35	-0.11	-2.52
Deposits/liabilities	-1.13	-4.36	-0.65	-7.00	-1.03	-6.21
Equity/assets	-0.29	-0.56	-1.317	-5.50	-2.86	-3.48
GDP growth	0.042	4.78	0.030	10.35	0.025	6.35
Interest rates	0.022	2.74	0.057	14.66	0.078	10.36
Inflation	0.014	0.66	0.010	1.37	0.007	0.68
R squared adj	0.64		0.68		0.75	

ANNEX 2. WORLD REGIONS – EQUATIONS

	Tobin's q - asset diversity	
	Coeff	t-Stat
Constant	1.04	74.54
Crisis in 2007	-0.05	-30.60
Europe: OE, BG, FN, FR, GE, GR, IR, IT, LX, NL, PT, SL, SR, SP, PO, HU, CR, SD, UK, SW, NO, TR, IS	0.01	0.81
North America: US, CN	-0.01	-0.76
South America: MX, CL	0.16	3.98
Asia: JP, SK	-0.01	-0.99
Australia	0.01	0.04
Net loans to total earning assets	0.03	2.79
Total assets	0.04	8.28
Total Operating income	0.01	2.38
Deposits/liabilities	-0.04	-3.56
Equity/assets	0.00	0.10
GDP growth	0.003	9.65
Interest rates	0.004	8.00
Inflation	-0.002	-2.99
R squared adj	0.62	

	Price to book - income diversity	
	Coeff	t-Stat
Constant	2.03	17.07
Crisis in 2007	-0.37	-26.98
Europe: OE, BG, FN, FR, GE, GR, IR, IT, LX, NL, PT, SL, SR, SP, PO, HU, CR, SD, UK, SW, NO, TR, IS	-0.20	-2.36
North America: US, CN	0.09	1.11
South America: MX, CL	-0.01	-0.04
Asia: JP, SK	-0.43	-3.26
Australia	2.27	3.13
Net interest income to operating income	-0.17	-1.69
Total assets	0.29	6.53
Total Operating income	-0.05	-1.64
Deposits/liabilities	-0.72	-7.88
Equity/assets	-1.16	-5.25

GDP growth	0.031	10.72
Interest rates	0.062	16.08
Inflation	0.007	0.99
R squared adj	0.68	

	Price to book - asset diversity	
	Coeff	t-Stat
Constant	1.50	12.63
Crisis in 2007	-0.38	-28.31
Europe: OE, BG, FN, FR, GE, GR, IR, IT, LX, NL, PT, SL, SR, SP, PO, HU, CR, SD, UK, SW, NO, TR, IS	0.00	-0.06
North America: US, CN	-0.14	-1.88
South America: MX, CL	1.52	4.42
Asia: JP, SK	0.20	1.76
Australia	-1.35	-0.87
Net loans to total earning assets	0.46	4.96
Total assets	0.34	7.64
Total Operating income	-0.07	-2.37
Deposits/liabilities	-0.60	-6.37
Equity/assets	-1.37	-5.70
GDP growth	0.029	10.29
Interest rates	0.057	14.44
Inflation	0.011	1.56
R squared adj	0.68	