(Version: February 2016)

Pay Dispersion and Bank Performance: The Role of Culture and Law

Ellen Pei-yi Yu[1] and Bac Van Luu[2]

[1] **Corresponding author**: Ellen Pei-yi Yu

Affiliation: Birkbeck College, Department of Management, University of London, Malet Street, Bloomsbury, London, WC1E 7HX, UK.

Email address: ellen.yu@bbk.ac.uk

[2] Bac Van Luu

Affiliation: Russell Investments, Rex House, 10 Regent Street, London, SW1Y 4PE, UK

Pay Dispersion and Bank Performance: The Role of Culture and Law (Version: February 2016)

Abstract

We examine the impact of executive pay dispersion on firm performance and valuation in a global sample of banks. The pay dispersion variable is measured using our hand-collected dataset comprised of banks chosen from OECD countries and banks from China and India. Controlling for cultural differences across countries using Hofstede's four cultural dimensions, we test whether the equity fairness (favouring smaller pay dispersion) or tournament theory (arguing for higher pay dispersion) are better descriptions of the relationship between pay dispersion and performance. We find that the equity fairness theory prevails in most sub-groups of our sample, with the exception of Common Law developed country banks, where there is no significant relationship between pay dispersion and performance or valuation. With regard to the cultural variables, we find for our sample banks in Developed Countries that Individualism is positively associated with market valuation while Uncertainty Avoidance has a negative effect.

Keywords*: Executive Compensation; Pay dispersion; Cultural differences; Individualism*

JEL codes: *G20, G21, G28, G34, J33, M52*

1. Introduction

We study the impact of executive pay dispersion on operational firm performance and valuation using a global sample of banks, for which detailed management compensation data is available. Our sample includes banks chosen from OECD countries and banks from China and India. Controlling for cultural differences across countries using Hofstede's four cultural dimensions, we test whether the equity fairness theory (favoring smaller pay dispersion) or tournament theory (arguing for higher pay dispersion) are better descriptions of the relationship between pay dispersion and performance. We find supporting evidence for the equity fairness theory in most sub-groups of our sample, i.e. Developed Countries overall, Civil Law countries and Developing Countries. Common Law Country banks are the exception, where there is no significant relationship between pay dispersion and performance or valuation.

There has been a long-standing debate in the executive compensation literature as to whether higher or lower pay dispersion can enhance organizational performance. In sport, previous studies obtain supporting evidence for the tournament theory and suggest that golfers' performance improves as prized differentials increase. For professional racing drivers, pay dispersion also has a positive impact on both individual performance and driver safety. On the other hand, a baseball game relies on individual efforts as well as corporation between team members and is said to benefit from greater equity in pay.

However, the issue of pay dispersion has not received much attention in the banking literature and the main contribution of our paper is to fill this gap using a study with global scope. We examine whether the banking industry is more like a round of golf or a baseball game in terms of the impact of pay dispersion. In particular, we look at pay dispersion at the top executive level and test whether the tournament theory or the equity fairness theory is applicable to bank performance. The need for such research has gained in importance and urgency recently as compensation issues have figured quite prominently in larger discussions concerning the relationship between the effective corporate governance and bank performance. Moreover, policymakers care about the design of executive pay at banks because the systemic importance of

banks and the use of taxpayer money to rescue failing institutions distinguish them from non-financial corporations.

Since we use international data to examine the extent to which executive pay dispersion affects bank performance and valuation, we wonder how this relationship may be affected by institutional, legal and other relevant structural differences across countries. One contribution of the paper is to incorporate the notion that cultural factors may have an impact on how pay dispersion influences firm performance and valuation. For example, the dysfunctional effect of pay dispersion on team performance may be stronger in cultures that are characterized as more collectivist. In our regressions, we thus control for cultural country differences using the four cultural dimensions of Hofstede (2010): (a) Individualism versus Collectivism (b) Power Distance (c) Masculinity versus Femininity (d) Uncertainty Avoidance. We find that the models incorporating these control variables are well-specified and cultural variables have interesting effects on firm performance and valuation. For example, the results in our sample of Developed Country banks suggest that Individualism is positively associated with market valuation while Uncertainty Avoidance has a negative effect.

The remainder of this paper is organized as follows. In Section 2, we survey the separate literatures on pay dispersion and cultural differences in Finance research. In Section 3, we describe our theoretical model. In Section 4, we report the empirical results. We summarize and conclude in Section 5.

2. Literature review

2.1. Tournament vs. Equity Fairness Theory

Prior research on compensation and performance first investigated chief executive pay, then expanding the scope to the compensation of the entire managerial team. For example, Aggarwal and Samwick (2003) suggest that pay-performance sensitivity increases with the span of authority. Barron and Waddell (2003)

found that higher rank managers have a greater proportion of incentive-based compensation in pay packages than do lower ranked executives. Overall, the early literature into executive compensation has primarily focused on issues related to the level and structural mix of compensation packages, and their sensitivity to firm performance (e.g. Kale, Reis and Venkateswaran, 2009; Aggarwal and Samwick, 1999). However, studies on the impact of executive compensation in the financial and banking sector are scarce. One exception is Becht, Bolton and Röell (2011) who suggest that more shareholder power can lead to more risk taking, therefore equity-based incentives for executives can lead to excessive risk taking.

Tournament theory (Grund and Westergaard-Nielsen, 2008; and Kale, Reis and Venkateswaran, 2009) predicts that compensation across managers will be more dispersed than under the equity fairness theory. The tournament theory is also known as the hierarchical pay hypothesis in the literature. It was first developed by Lazear and Rosen (1981) who contend that compensation spreads are not based on marginal productivity, but rather on relative differences between the individuals. In the presence of a tight positive relationship between employee effort and output, efficiency can be secured by the widening of pay dispersion across the corporate hierarchy towards top positions. Good examples of the applicability of the tournament theory can be found in professional sports.

The theory of equity fairness (Wade, O'Reilly and Pollock, 2006) indicates that large pay dispersion can increase envy and dysfunctional behavior among team members. This may give rise to negative effects of pay disparity on firm performance. According to Lazear (1989), wage dispersion does not only affect the final team output but also the way this output is produced. Members of high-inequality teams behave less cooperatively and act more selfishly than members of teams with a compressed wage structure.

Comparative studies are relatively rarer. Beaumont and Harris (2003) investigate whether a hierarchical or compressed wage structure has a positive impact on organizational performance by employing UK manufacturing micro-data in five industrial sectors.

2.2. Cultural differences

We include Hofstede's (1980, 2001) cultural dimensions as control variables when exploring the impact of pay dispersion on bank performance. While the inclusion of cultural dimensions is common in the business and management literature, cultural variables have only recently gained acceptance in the finance literature (Aggarwal and Goodell 2014a). In an early contribution to the literature, Stulz and Williamson (2003) find that cultural variations, proxied by differences in religion and language, can help to explain how investor protection diverges across countries. More recently, researchers use Hofstede's cultural dimensions with some success in explaining cross-country differences in asset pricing and corporate finance studies. In the realm of corporate finance, Aggarwal and Goddell (2014b) document that access to financing and good investor protection is associated with the cultural dimensions of Uncertainty Avoidance and Masculinity. Zheng al al (2012) explore the impact of culture on corporate debt maturity structure. Aggarwal, Kearny and Lucey (2012) incorporate Hofstede's cultural variables in gravity models of foreign portfolio investment (FPI). Breuer, Rieger and Soypack's (2014) study indicates that corporate dividend payout policy is also impacted by behavioral variables, including the cultural dimensions of loss aversion and ambiguity aversion. With regard to corporate mergers, Ahern, Daminelli and Fracassi (2014) find that three cultural dimensions (Trust, Hierarchy, and Individualism) influence the volume and the gains from such transactions. Culturally distant countries experience fewer mergers and synergies are smaller.

Studies on the impact of culture on asset prices have emerged, following the research by Chui, Titman and Wei (2010) who detect a significant relationship between the cultural dimension of Individualism and stock market momentum. Beugelsdijk and Frijns (2010) examine the influence of culture and cultural distance on international asset allocation. Anderson et al (2011) also investigate the effect of culture on international diversification in institutionally managed portfolios. Nguyen and Truong (2013) find that countries

exhibiting greater Individualism and lower uncertainty avoidance also have stock markets with higher information content and Eun et al (2014) find that stock prices co-move more in collectivistic (i.e. less individualistic) countries. These studies suggest that culture may be an important omitted variable in cross-country asset pricing studies. Research on the impact of culture on pay has been even rarer and, to our knowledge, our paper is the first to examine the influence of culture and pay dispersion on performance and valuation of banks.

3. Theoretical model

Since theory does not provide strong arguments in favor of the equity fairness or the tournament theory, the nature of the relationship between executive pay dispersion and bank performance remains an empirical question. This study fills the empirical gap by investigating the relationship between pay dispersion at the top executive level and bank performance. Our theoretical model has been inspired by the following two studies: (1) a translog profit function introduced by Mullineaux (1978) which is used to estimate economies of scale and efficiency (2) a pay-dispersion model proposed by Franck and Nüesch (2011), which focuses on the impact of intra-team pay dispersion on German soccer team productivity. By modifying and combining these two models, we are able to address the potential problems of relying on reduced-form estimation.

3.1 Modeling bank performance

In previous studies of the pay dispersion-performance relationship, scholars commonly use reduced-form models although the control variables used in these reduced-form models can be somewhat arbitrary. In our opinion, the unique nature of the banking industry, i.e. the combination of labor, interest and capital to produce banking services, is captured more fully by incorporating the characteristics of the translog profit function rather than a reduced form model. Therefore, our theoretical model is based on a modified hybrid profit function which is transcendental logarithmic (translog) and Cobb-Douglas in the prices of outputs, inputs and the quantities of fixed factors of production.

One of the most widely used flexible functional forms for a profit function is the transcendental logarithmic function form since this form is easily adaptable to include multiple banking outputs and multiple banking inputs. A typical full translog profit function (Mullineaux, 1978) in "output prices", "prices of variable inputs" and "quantities of the fixed factors" can be expressed as follows:

$$\begin{aligned}\ln profit = a_0 &+ \sum_{i=1}^{m} a_i \ln(output_i) + \sum_{j=1}^{n} b_j \ln(input_j) + \sum_{k=1}^{p} c_k \ln(fixedfactor_k) \\ &+ \frac{1}{2}[\sum_{i=1}^{m}\sum_{k=1}^{m} g_{jk} \ln(output_i)\ln(output_k) + \sum_{j=1}^{n}\sum_{k=1}^{n} h_{jk} \ln(input_j)\ln(input_k) \\ &+ \sum_{k=1}^{j=p}\sum_{j=1}^{p} l_{kj} \ln(fixedfactor_k)\ln(fixedfactor_j)] + \sum_{i=1}^{m}\sum_{j=1}^{n} q_{ij} \ln(output_i)\ln(input_j) \\ &+ \sum_{i=1}^{m}\sum_{k=1}^{p} r_{jk} \ln(output_i)\ln(fixedfactor_k) + \sum_{j=1}^{n}\sum_{k=1}^{p} s_{jk} \ln(input_j)\ln(fixedfactor_k),\end{aligned} \tag{1}$$

where:

profit is defined as total revenue minus the cost of the variable factors of production,

output are the m bank output prices,

input are the prices of the n variable inputs,

and *fixedfactor* are the p quantities of the fixed factors of production.

The theory of the translog profit function provides us with a solid background to explain why output prices, prices of variable inputs and quantities of fixed factors can serve as control variables for our model of executive pay dispersion and bank performance. One common limitation in previous studies is that such control variables were rarely considered when the relationship between pay dispersion and firm performance (team performance) is investigated.

3.2 Modelling pay dispersion

Most empirical studies investigating the effect of pay dispersion on firm performance can be divided into linear and non-linear models. The existing literature largely concentrates on linear effects (Hibbs and Locking, 2000), while Grund and Westergaard- Nielsen (2008) and Franck and Nüesch (2011) propose that the relationship between intra-team wage differentials and team performance is less likely to be linear under the two competing paradigms discussed earlier – the tournament theory and the equity fairness theory. Tournament theory asserts that the intra-team wage structure can be viewed as an incentive design that attracts talent and stimulates individual effort. The theory can be articulated by assuming that the banking firm's performance total performance TP_t is a positive function of pay dispersion x, here measured at the top executive level of banks:

$$TP_T = \alpha + \alpha x^r . \qquad (2)$$

By assuming $\alpha > 0$ and $r > 0$, a positive impact of wage inequality on productivity through the magnitude and the slope is posited. However, under the equity fairness theory team performance reacts negatively to the increase of wage dispersion. This negative relationship can be shown as

$$TP_{EF} = -bx^t , \qquad (3)$$

where $b > 0$ and $t > 0$. The overall effect of executive pay dispersion on banking firm performance would be the sum of these two equations, where ax^r represents the positive impact proposed by the tournament theory and $-bx^t$ represents the negative impact proposed by the equity fairness theory (Grund and Westergaard- Nielsen, 2005; Franck and Nüesch, 2011):

$$TP(x) = \alpha + TP_T(x) - TP_{EF}(x) = \alpha + \alpha x^r - bx^t \qquad (4)$$

Based on equation (4), the values of a, b, r and t will determine the shape of the function of company performance. A linear relationship only exists if $r = t = 1$. If $r > t$, the function of company performance will be U-shaped with a local minimum at $(tb / ra)^{1/(r-t)}$, while with $r < t$ an inversely U-shaped will be formed. If non-linearities as modelled here are present in the relationship between pay dispersion and performance, it may explain why the results of previous empirical studies using linear effects vary considerably.

These three equations summarize most of the previous empirical findings examining linear effects ($r = t = 1$) and non-linearity (when $r \neq t$) in the relationship between pay dispersion and firm performances. To allow for potential non-linearity in our study, we include a linear term of *paydisp* and the quadratic term $paydisp^2$ into our theoretical model. Since Franck and Nüesch (2011) indicate that the Gini coefficient and the coefficient of variation (CV) are strongly correlated, we adopt the coefficient of variation (CV) of total compensation as our only indicator of the variable of pay dispersion in this study. The coefficient of variation (CV) is a normalized measure of dispersion of a probability distribution and is computed as the ratio of the standard deviation to the mean.

3.3 Combined model and variable definitions

In standard production theory, profits come from the flow of output during the production period. However, banks earn profits on various outputs such as different types of loans and bank services. In the banking literature, the three key input variables commonly adopted in a conventional profit translog function are interest costs, labor costs and capital costs (Mullineaux, 1978; Berger, Hancock and Humphrey, 1993). In the modern banking industry, these three factors still remain the key input variables for banking firms in order to produce either traditional banking outputs or innovative banking services. The quantity of fixed inputs cannot be changed during the production period. For example, the average size of the bank firm and the regulatory environment can be viewed as fixed factor variables.

Our main model is in equation (5), which is based on the combination of a pay dispersion model and a modified translog profit function applied to the banking industry. Based on our previous discussion of modelling pay dispersion, we include a linear term and the quadratic term of pay dispersion in the model. In addition to our original performance indicator, the variable of "Profit", we also investigate two further performance measures that relate to the market's valuation of banks, Tobin's Q and Price-to-Book (P/B) ratios. If compensation includes stock options, executives may target market valuations and share prices rather than operational performance measures such as profit. In equation (5), we also control for the impact from different bank regulatory systems, capital adequacy, and corporate governance variables while we investigate the relationship between the variable of pay dispersion at the top executive level and these indicators of bank performances. Overall, there are 4 categories of variables in our major equation: (a) banking firms' performance indicators, (b) banking firms' inputs (c) banking firms' outputs and (d) control variables with regards to the different regulatory systems, capital adequacy and corporate governance.

$$performance_{it} = a_0 + r\left(paydisp_{it}\right) + s\left(paydisp_{it}\right)^2 + a\ln\left(output_{it}\right) + \sum_{j=1}^{n} b_j \ln\left(input_{jit}\right) + c\ln\left(fixedfactor_{it}\right)$$
$$+ \frac{1}{2}\left[g\ln\left(output_{it}\right)\ln\left(output_{it}\right) + \sum_{j=1}^{n}\sum_{k=1}^{n} h_{jk}\ln\left(input_{jit}\right)\ln\left(input_{kit}\right) + l\ln\left(fixedfactor_{it}\right)\ln\left(fixedfactor_{it}\right)\right]$$
$$+ \sum_{j=1}^{n} q_j \ln\left(output_{it}\right)\ln\left(input_{jit}\right) + r\ln\left(output_{it}\right)\ln\left(fixedfactor_{it}\right) + \sum_{j=1}^{n} s_j \ln\left(input_{jit}\right)\ln\left(fixedfactor_{it}\right)$$
$$+ \sum_{j=1}^{n} m_j\left(control_{jit}\right), \qquad \textbf{(5)}$$

where the control variables $control_j$ are the dummy variables for widely owned and CEO duality, the variable of capital adequacy, the variable of default risk, and dummy for development status, respectively.

Bank Performance Indicators

Undoubtedly, bank profit should be chosen as one of our performance indicators. However, more than one proxy for bank performance was adopted since we would also like to examine whether pay dispersion is

reflected in the way that the stock market values banks. Therefore, the profit indicator is employed as the measure representing operational performance, while Tobin's Q and the P/B ratio (Caprio, Laeven and Levine, 2007) are also adopted as indicators of the market valuation of our sample banks.

Banking Firms' Inputs

For estimating the prices of banking firms' inputs, we include interest price and labor price as the two input variables, which are also commonly viewed as key inputs in the banking literature on the translog profit function and translog cost function (Yu and Luu, 2003).

Banking Firms' Outputs

We consider that the modern banking industry has more diversified businesses rather than simply operating on the traditional banking loan business. In contrast to previous studies in banking (Berger, Hancock and Humphrey, 1993), which mainly use loan rates, the variable of output is defined by us as the sum of interest income and investment income divided by total earning assets.

Other Control Variables

1) Corporate governance variables

In our view, corporate governance structures are likely to affect the association between firm performance and pay dispersion. We therefore include the following two variables: "controlling ownership" and "CEO duality".

i. Controlling ownership

We classify a bank as having a controlling owner if the shareholder has voting rights that sum to 10% or more, otherwise, we classify the banks as widely held. In previous research, it was argued that 10% voting rights are frequently sufficient to exert control (La Porta, Lopez-de-Silanes and Shleifer, 2002). We observe in our sub-sample of banks from Developing Countries that banks are not generally widely-held.

ii. CEO duality:

We include this variable into our major equation for examining whether the combined roles of the CEO and board chairman in the same person could affect the association between firm performance and pay dispersion.

2) Size

In order to control for additional bank-specific characteristics, we include the logarithm of each bank's total assets as the indicator of the size factor since "bank size" may influence valuations (Caprio, Laeven and Levine, 2007; Yu and Luu, 2003). The size of the bank firm has been adopted as our fixed factor. The quantity of fixed inputs cannot be changed during the production period.

3) Capital Adequacy

Tier 1 Capital is included in our model as one of our control variables to control for the impact from different regulatory restrictions on banks. Although most countries have indicated their intention to adopt the much more detailed set of recommendations contained in Basel II and III, not all of our sample countries adopted the Basel Committee's original recommendations on capital regulations and official supervision. Differences in Tier 1 capital ratios across these sample banks may also be a reflection of differences in regulatory restrictions on banks across countries.

4) Legal origins

Many studies investigate effects of law and regulations for corporations. In order to investigate the impact from different regulatory systems, we classify our sub-sample banks from developed - OECD countries according to the origin of their legal systems into Common Law and Civil Law countries.

3.4 Cultural dimensions

Some theories of pay determination, e.g. the efficiency wage theory, postulate that compensation is not driven only by economic motives and notions of fairness can have a bearing on organizational behavior. It is a natural extension of this idea to ask whether cultural divergences have a bearing on how pay and pay

dispersion impacts on firm performance. According to Hofstede (2010), "culture" is like the collective programming of the mind distinguishing the members of one group of people from others. The values that distinguish country cultures from each other can be statistically categorized into four groups, which we use to control for the cross-country cultural differences between the 20 countries in our sample[3]. These four dimensions are: (a) Power Distance (PDI), (b) Individualism (IDV), (c) Masculinity (MAS) and (d) Uncertainty Avoidance (UAI). The values range from 0 to 100.

The dimension of Power Distance measures the degree to which the less powerful members of a society accept the fact that power is distributed unequally. Inhabitants of countries with high values of power distance accept a hierarchical order in which individuals have their place and they do not need further justification for this hierarchy. In societies with low power distance, people aim to equalize the distribution of power and demand rationalization for inequalities of power. Individualism quantifies the degree of interdependence a society maintains among its members. In highly individualist societies, people look after themselves and their immediate family only, whereas people belong to larger groups that take care of them in exchange for loyalty in collectivist societies. A high value on the Masculinity dimension indicates that a society values competition, achievement and success. A low score on the dimension (describing a society which is characterized as feminine) suggests that compassion for others and the quality of life are more important than winning and standing out. Finally, Uncertainty Avoidance (UAI) appraises the way that a society deals with the ambiguities of an uncertain future. In countries with a high score for UAI, people feel

[3] The measurement of culture is based on comprehensive studies by Hofstede on how values in the workplace are influenced by culture among IBM employees, starting in the late 1960's. Subsequent studies validating the earlier results include such respondent groups as commercial airline pilots and students in 23 countries, civil service managers in 14 counties, 'up-market' consumers in 15 countries and 'elites' in 19 countries. In the 2010 edition of the book "Cultures and Organizations: Software of the Mind", scores on the dimensions are listed for 76 countries, partly based on replications and extensions of the IBM study on different international populations and by different scholars. We use these values for our study.

threatened by uncertainty and have created mechanisms for avoiding these ambiguous or unknown situations.

4. Data and empirical results

In this section, we report and interpret our empirical results.

4.1. Data sources

The greatest challenge, and one of the contributions of the paper, is to generate the data of executive pay dispersion for 92 sample banks worldwide. The sample banks from our first sub-group have been chosen from the top 500 OECD (Organisation for Economic Co-operation and Development) banks by asset size. Banks were included in the study only if their relevant executive remuneration data was available from annual reports or Thomson One databases so we are able to generate the executive pay dispersion data for each sample bank. Finally, based on the annual compensation dataset, we generate the pay dispersion variable for each sample bank in each sample year by computing the mean and standard deviation of the compensation of the top 3-5 executives. In this study, we use actual compensation to determine pay dispersion and we define "the total annual compensation" for each managerial team member as the total cash value of all pay components in that sample year, including salary, cash bonus, equity options and other compensations. The following table (see Table 1) reports the average executive pay dispersion for each of our sub-sample banks. We compute the mean and standard deviation of the compensation of the top 3-5 executives in each of our sample banks. Our mean dispersion (coefficient of variation) of management compensation is 0.3977 with an interquartile range of 0.2839, suggesting considerable smaller sample cross-sectional variability of pay dispersion compared with the previous literature. We find that the estimated average executive pay dispersions in Common Law and Civil Law are significantly higher than those in

Developing countries. Moreover, among our five groups, banks from Common Law countries have the highest average executive pay dispersion.

Table 1 Executive pay dispersion of our five groups

Our sub-sample banks	Worldwide 92 banks	Developed 63 banks	Developing 29 banks	Common Law 27 banks	Civil Law 36 banks
Executive Pay Dispersion	0.3977 (0.2839)	0.4673 (0.2723)	0.2515 (0.2509)	0.5016 (0.2440)	0.4274 (0.2978)

We summarize our estimation methods for each variable and their definition in Table 2.

Table 2 Definitions of variables in our model and their estimation methods

Variable	Definition
Pay dispersion indicators	
(paydisp)	In this study, we adopt the coefficient of variation (CV) as the indicator of the pay dispersion.
(paydisp) ^{2}	The coefficient of variation (CV) squared has also been included.
Banking firms' performance indicators	
Total profit	The variable of **profit** is defined as total revenue minus the cost of the variable factors of production.
Pre-tax profit margin	Pre-tax profit margin = [Pretax Income (Losses)] / (Net Revenue)
Return om Equity (ROE)	ROE = (net income available for common shareholders) / (average total common equity)
Tobin Q	Tobin Q = (market capitalization + liabilities + preferred equity + minority interest) / (total assets)
P/B ratio	P/B ratio = (share price) / (book value per share)
Output prices	
Output	Output = (interest income) / (earning assets) More precise definition of our "Output" is as follows: Output = [(interest income) + (investment income)] / [(marketable securities)+(short term securities)+(total loans)+(interbank assets)+(long term investments and long-term receivables)]
Input prices	
Labor price	In this study, we define the factor of labor price as the average wage rate of bank officers. Labor input price = (personnel expense) / (number of employees)
Interest input price	Interest price = (Interest expense) / (average interest bearing liabilities)
Quantities of fixed factors	
Bank size	The logarithm of each bank's total assets
Control variables	
Corporate governance factors	**Widely owned** We define controlling ownership as being present when a shareholder owns more than 10%, otherwise the bank is widely owned. widely owned = 1, otherwise controlling ownership is present, not widely owned = 0
	CEO duality In this study, we assume that if CEO and Chairman are different=1, otherwise the same=0.
Capital adequacy	Tier 1 capital ratio = Tier 1 capital / risk-weighted assets.

Default risk	Default risk = (Non-performing asset) / (total assets)
Dummy variable for development status	A group for Developed Countries = 1 A group for Developing Countries =0

The following table presents the descriptive statistics of all variables in this study.

Table 3 Descriptive statistics of all variables (Currency: US dollar)

	Abbreviation of variable	Mean	Median	Maximum	Minimum	Standard deviation
Bank asset size (measurement unit: million US dollars)	Size	597572.2	290816.7	3649800	4136.773	724035.3
Pre-tax profit	Profit	4718.660	2200.030	48923.34	13.23800	6431.091
Interest price (%)	Interest	4.087504	3.689700	20.33500	0.589900	2.141603
Default risk (%)	Defaultr	1.912710	0.886850	34.82890	0.000000	3.186683
Output	Output	0.048843	0.044700	0.192053	0.007140	0.020660
Capital adequacy - Tier 1 capital ratio (%)	Tier1	9.855876	9.310000	32.00000	-1.470000	3.118807
Labor price	Laborp	0.084283	0.073436	0.504750	0.005875	0.072025
ROE	Roe	11.88407	14.12185	42.32480	-156.5255	14.27658
Pretax profit margin (%)	pretaxmargin	22.11411	28.11740	85.26910	-535.5368	40.55895
Tobin Q	Tobinq	1.030052	1.017750	1.619800	0.941800	0.061815
P/B ratio	Pb	1.549660	1.333900	8.127300	0.024800	1.065410
Pay dispersion	Paydisp	0.397701	0.345394	1.459283	0.000000	0.283854

The following table lists the scores on the four different cultural dimensions for each sub-sample group.

Table 4 Pay Dispersion vs Culture Dimensions for our five sub-sample banks

Our sub-sample banks	Worldwide 92 banks	Developed 63 banks	Developing 29 banks	Common Law 27 banks	Civil Law 36 banks
Individualism vs Collectivism (Hofstede's Individualism index; score)	61.6413 (23.9453)	75.0318 (13.3617)	32.5517 (13.9516)	84.9259 (8.4454)	67.6111 (11.4250)
Power Distance (Hofstede's Power Distance index; score)	54.1630 (19.7682)	42.8889 (12.8845)	78.6552 (1.4948)	37.4444 (2.8647)	46.9722 (15.6758)
Masculinity versus Femininity (Hofstede's Masculinity index; score)	55.1413 (16.6106)	52.2064 (19.0883)	61.5172 (4.9827)	60.0741 (5.6417)	49.5278 (21.8058)
Uncertainty Avoidance Index (Hofstede's Uncertainty Avoidance index; score)	52.5109 (19.8781)	60.8095 (18.6302)	34.4828 (4.9827)	45.5926 (5.3322)	72.2222 (16.7942)

4.2. Econometric procedure

We analyze our unbalanced panel data by employing the following econometric procedure. Firstly, we examine our data using the likelihood ratio test. The null hypothesis of the likelihood ratio test is the intercepts are the same for each bank and for each year. If this null hypothesis is accepted, our data can simply be pooled and panel least squares can be employed. If this null is rejected, then it is not valid to impose the restriction that the intercepts are the same across all banks. As a consequence, panel least squares cannot be adopted in this case but a panel approach – the fixed effects model or random effects model - must be employed. Secondly, we employ the Hausman test to decide whether the fixed effects model or random effects model suits our panel data better. For the fixed effects model, it is possible to allow for both entity-fixed effects and time-fixed effects within the same model. The random effects could be along either the cross-sectional or period dimensions. However, since we have missing data in our dataset, we cannot have time variation and cross-section variation at the same time when the random effects model is employed in our study.

Overall, we find that the random effects model suits our data better and this is consistent with the arguments put forward by Brooks (2008) that the random effects model is more appropriate when the sample entities have been randomly selected from the population. A fixed effects model is more plausible when the entities in the sample effectively constitute the entire population. Moreover, we adopt the White diagonal as our coefficient covariance method, which is robust to heteroskedasticity (Reed and Ye, 2011).

4.3. Discussion of results

We analyze our unbalanced panel data by employing the same econometric procedures described in 4.2. for each of our subsamples. After estimating the pay-dispersion model represented in equation (5), we carry out Wald tests on both coefficients of the linear and the quadratic term of the variable of executive pay dispersion.

We start by pooling all of our sample banks, but do not report the results because the diagnostic results suggest that doing so does not produce an adequate model. We find that the residuals of these global regressions are not normally distributed, even after adding cultural variables to equation (5) in order to control the cross-country difference. Therefore, it is not appropriate to pool all of our sample banks. Instead, we divide our sample into further four smaller sub-samples: a group of Developing (29 banks in Developing Countries), a group of Developed (63 banks in Developed Countries), a group of Civil Law countries (36 banks) and a group of Common Law countries (27 banks) – see Appendix B (Table A2). We start by discussing the results for banks in the Developed Country subsample using Tobin's Q (Table 5) and P/B (Table 6) as the dependent variable. We obtain reasonable adjusted R^2 for these regressions ranging from 76.61% to 78.19%. All of the residual distributions of these regressions for the three performance indicators are also normal, although the linear term and the quadratic terms of pay dispersion are only statistically significant for the two indicators of market valuation – the P/B ratio and the Tobin's Q ratio, but not the log(Profit) variable. The coefficients of the pay dispersion variables are consistent across the cultural control variables used, i.e. negative for the linear and positive for the quadratic term. Both sets of empirical results for Tobin's Q and the P/B ratio can be interpreted as supporting evidence of equity fairness, except for very high pay dispersion (U-shaped impact curve). The U-shaped relationship between the variable of pay dispersion and these two indicators of market valuation is depicted in Figure 2 and Figure 3. For most values of pay dispersion, the impact is negative, supporting the equity fairness theory although the tournament theory is corroborated for extremely high pay dispersion. With regard to the cultural variables, we find that two of the four cultural dimensions have a significant on the performance indicators. Individualism is positively associated with P/B and Tobin's Q while Uncertainty Avoidance has a negative relationship with the market valuation indicators.

Table 5 Analyses on Tobin's Q - "a group of Developed – 63 banks from Developed Countries"

Performance indicators	**Tobin Q**

		Individualism	Power Distance	Masculinity	Uncertainty Avoidance
C			0.7883* (0.4001)	0.7745* (0.4044)	1.0238*** (0.3646)
Pay dispersion	-0.0690** (0.0290)	-0.0903*** (0.0280)	-0.0674** (0.0294)	-0.0069** (0.0290)	-0.0712** (0.0281)
(Pay dispersion) ^{2}	0.0630*** (0.0213)	0.0752*** (0.0217)	0.0615*** (0.0217)	0.0630*** (0.0212)	0.0619*** (0.0213)
Cultural Index		Individualism 0.0007*** (0.0002)	Power Distance -7.45E-05 (0.0002)	Masculinity -6.10E-05 (0.000162	Uncertainty Avoidance -0.0003*** (9.74E-05)
log(output)					
log(interestp/100)					
log(laborp)					
log(size)					
0.5*log(output)*log(output)					
0.5*log(interestp/100)*log(interestp/100)					
0.5*log(laborp)*log(laborp)					
0.5*log(size)*log(size)					
log(output)*log(interestp/100)		-0.0317** (0.0159)			
log(output)*log(laborp)					
log(output)*log(size)					
log(interestp/100)*log(laborp)	0.0329** (0.0153)	0.0314** (0.0135)	0.0317** (0.0157)	0.0342** (0.0157)	0.0304** (0.0147)
log(interestp/100)*log(size)					
log(laborp)*log(size)					
Widely-owned	0.0131*** (0.0044)	0.0097** (0.0041)	0.0133*** (0.0044)	0.0130*** (0.0044)	0.0123*** (0.0042)
(defaultr/100)	-0.7318*** (0.1899)	-0.6692*** (0.1597)	-0.7389*** (0.1942)	-0.7377*** (0.1866)	-0.7348*** (0.1706)
(tier1/100)			0.2379* (0.1414)		
Adjusted R^2	0.7998	0.8125	0.7969	0.8004	0.8057

Figure 1 - Developed Tobin Q

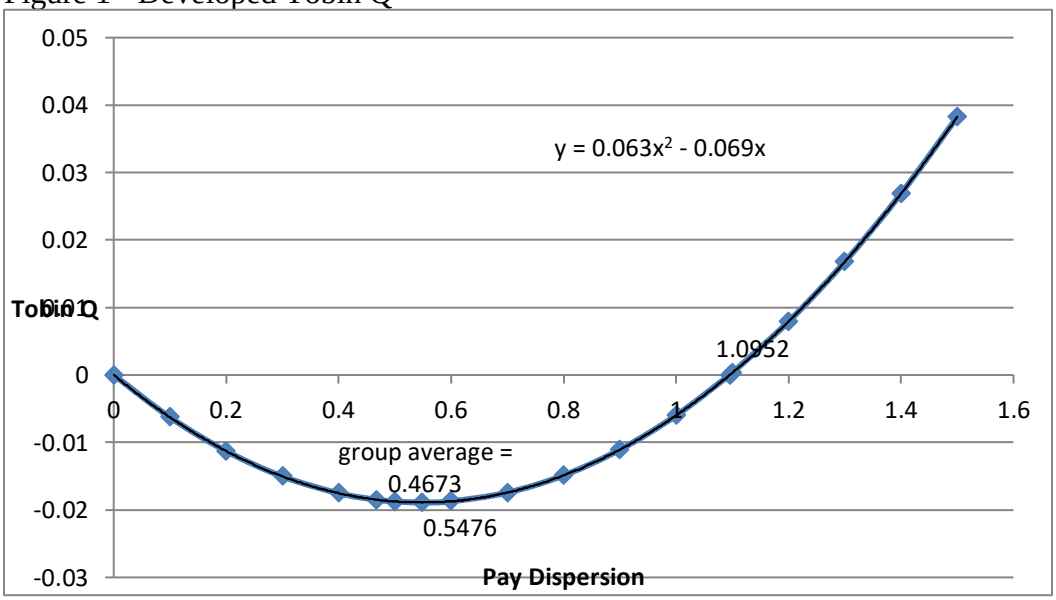
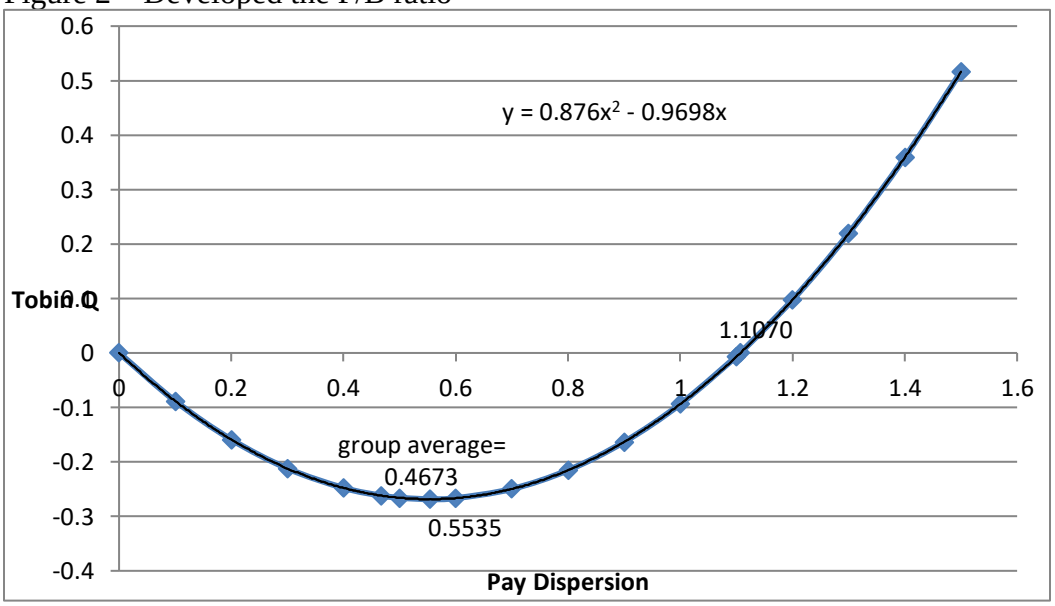


Table 6 Analyses on the P/B ratio - "a group of Developed – 63 banks from Developed Countries"

Performance indicators	**P/B ratio**				
		Individualism	Power Distance	Masculinity	Uncertainty Avoidance
C				-25.3483 (11.4150)	
Pay dispersion	-0.9698* (0.5291)	-1.1131* (0.5982)	-0.2312 (0.6362)	-0.6505 (0.6455)	-0.5080 (0.6048)
(Pay dispersion) ^{2}	0.8760** (0.3821)	0.9342** (0.4601)	0.3438 (0.5068)	0.6750 (0.5276)	0.5054 (0.4662)
Cultural Index		Individualism	Power Distance	Masculinity	Uncertainty Avoidance
		0.0202*** (0.0045)	-0.0117*** (0.0039)	0.0099* (0.0050)	-0.0115*** (0.0029)
log(output)					
log(interestp/100)					
log(laborp)					
log(size)		3.2398*** (1.0881)	2.9391*** (1.1071)	4.4287*** (1.2149)	2.6675** (1.1118)
0.5*log(output)*log(output)					
0.5*log(interestp/100)*log(interestp/100)					
0.5*log(laborp)*log(laborp)	1.1717** (0.5180)	1.7250*** (0.5102)	1.3285** (0.6327)	1.2507** (0.6208)	1.5605*** (0.5932)
0.5*log(size)*log(size)	-0.0929* (0.0555)	-0.1892*** (0.0711)	-0.1848** (0.0740)	-0.2702*** (0.0826)	-0.1625** (0.0734)
log(output)*log(interestp/100)					
log(output)*log(laborp)					
log(output)*log(size)					
log(interestp/100)*log(laborp)					
log(interestp/100)*log(size)					
log(laborp)*log(size)		0.4670** (0.1891)		0.4830* (0.2048)	

Widely-owned	0.2149*** (0.0760)				
(defaultr/100)	-11.8308*** (2.3645)	-15.0125*** (2.6800)	-18.0724*** (3.7633)	-15.9818*** (4.0637)	-16.8424*** (2.8629)
(tier1/100)		-11.5952*** (2.7397)	-10.0559*** (2.7705)	-10.5769*** (2.8532)	-10.6607*** (2.6761)
Adjusted R^2	0.7819	0.8383	0.6185	0.5754	0.6407

Figure 2 – Developed the P/B ratio



To study whether the institutional and legal structure of Developed Countries has a bearing on the impact of pay dispersion on bank performance, we divide it into two smaller groups: a group of Civil Law countries and a group of Common Law countries. We observe that the average pay dispersion of the sub-sample of Common Law countries is 0.5016, which is slightly higher than the average pay dispersion of the sub-sample of Civil Law country at 0.4274 (Table 1).

We first discuss banks from Civil Law countries. Although the regression residuals for the indicator of log(profit) are not normally distributed, they are normal for the two indicators of market valuation, P/B and Tobin's Q ratio, with adjusted R^2 ranging from 85.35% to 90.45%, i.e. our model is well-specified. The linear term and the quadratic terms of pay dispersion are only statistically significant for the two market valuation indicators. The results for Tobin's Q ratio and the P/B ratio are consistent so we only report the

empirical results for the P/B ratio in Table 7. Our overall results can be interpreted as supporting evidence of equity fairness, except for very high pay dispersion (U-shaped impact curve). We visualize the relationship between the variable of pay dispersion and the P/B ratio in Figure 3. The results for Tobin's Q ratio and the P/B ratio are consistent and can be interpreted as supporting evidence of equity fairness, except for very high pay dispersion (U-shaped impact curve). Like for Developed Countries overall, very high pay dispersion is beneficial to bank performance in Civil Law Countries. However, on average, pay dispersion in this group is 0.4274 and on the left-hand side of the U-shaped curve. This lends support to the equity fairness theory for most observed values of pay dispersion. However, we do not obtain consistent empirical results with regard to the impact of the cultural variables on bank performance and valuation.

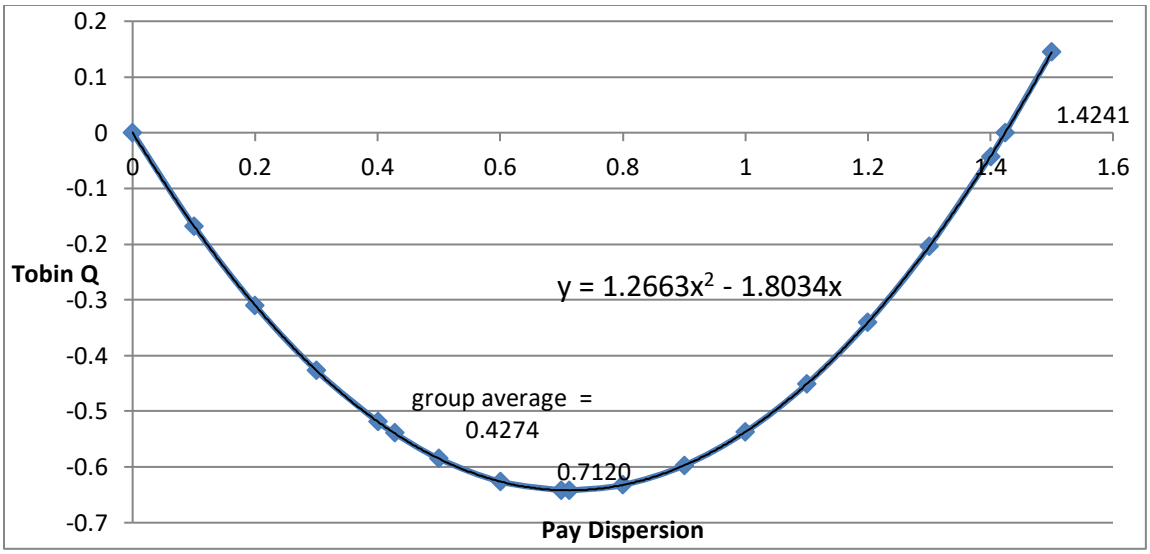
Table 7 Analyses on the P/B ratio - a "group of Civil Law" – 36 banks from the Civil Law countries

Performance indicators	**P/B ratio**				
		Individualism	Power Distance	Masculinity	Uncertainty Avoidance
C					
Pay dispersion	-1.8034*** (0.5147)	-0.9562 (0.6827)	-1.4941*** (0.4815)	-1.6009*** (0.4651)	-1.5375*** (0.4852)
(Pay dispersion) ^{2}	1.2663*** (0.4068)	0.5452 (0.4979)	1.0507*** (0.3864)	1.1351*** (0.3749)	1.0821*** (0.3857)
Cultural Index		Individualism	Power Distance	Masculinity	Uncertainty Avoidance
		0.0211** (0.0100)	-0.0071** (0.0033)	0.0114*** (0.0036)	-0.0081* (0.0047)
log(output)					
log(interestp/100)					
log(laborp)					
log(size)		3.3468* (1.7057)			
0.5*log(output)*log(output)	2.5187* (1.2754)	4.0068** (1.7230)		2.2762* (1.1539)	2.5862** (1.2833)
0.5*log(interestp/100)*log(interestp/100)					
0.5*log(laborp)*log(laborp)	1.6115*** (0.4644)	1.9941*** (0.6331)	1.3937*** (0.4821)	1.1839*** (0.4366)	1.4758*** (0.4656)
0.5*log(size)*log(size)					
log(output)*log(interestp/100)		-2.4415** (1.0949)			
log(output)*log(laborp)				1.4087* (0.8288)	
log(output)*log(size)		0.3898* (0.1995)			
log(interestp/100)*log(laborp)					

log(interestp/100)*log(size)		-0.3295*** (0.1232)			
log(laborp)*log(size)		0.6182** (0.2813)		0.4602** (0.2077)	
Widely-owned	0.1276* (0.0735)		0.2246** (0.0907)	0.2583*** (0.0891)	0.1829** (0.0826)
(defaultr/100)	-6.9496* (3.7985)	-23.3533*** (4.5766)	-10.1148** (4.1821)	-12.9223*** (4.0730)	-9.1994** (3.8618)
(tier1/100)		-13.0748*** (3.7947)			
Adjusted R^2	0.8535	0.7180	0.8582	0.8711	0.8508

The effect of pay dispersion on market valuation is also economically significant. As an illustrative example, we compute the impact of a one standard deviation change of pay dispersion from the mean on P/B for the sample banks in the group of Civil Law countries. The mean of executive pay dispersion in that group of banks is 0.4274 and the standard deviation is 0.2978 (See Table 1). Table 5 reports both of the linear term and the quadratic term of the executive pay dispersion as statistically significant for the P/B ratio, hence the relationship can be written as $y = \alpha + \beta x + \gamma x^2$, where y denotes P/B, x is pay dispersion and α and β are the regression coefficients on the linear and the quadratic term. Using the empirical result without controlling for cultural differences, the marginal impact of a one-standard deviation increase in pay dispersion on P/B is calculated as $\frac{\partial y}{\partial x} \times \sigma_x = (\beta + 2\gamma x)\sigma_x$. Evaluated at the mean of pay dispersion μ_x this gives (-1.8034 + 2*1.2663*0.4274) * 0.2987 = -0.2147. Since the mean of the P/B ratio in this subsample is 1.0654, the P/B change is 20.15% of the mean. Hence a one-standard deviation increase in pay dispersion lowers the P/B ratio by around 20%, all else equal, which is an economically significant effect.

Figure 3 – Civil Law the P/B ratio



Finally, the empirical results of the group of Common Law are reported in Table 8. We obtain good values for adjusted R^2 which range from 82.79% to 85.87%, while the residuals for all of the regressions are normally distributed as well. We find that the linear and quadratic terms of pay dispersion have no impact on the three bank performance indicators. Based on our empirical findings, we conclude that neither the tournament theory nor the equity fairness theory is applicable to the relationship between executive pay dispersion and banks' performance in Common Law countries. None of the cultural dimensions have a statistically significant impact on bank performances. We only show the empirical results for the P/B ratio as our bank performance indicator.

Table 8 Analyses on the "group of Common Law" – 27 banks

Performance indicators	**The P/B ratio**				
		Individualism	Power Distance	Masculinity	Uncertainty Avoidance
C			-68.8242** (29.7236)		
Pay dispersion	0.0014 (1.2696)	0.2336 (1.3814)	-0.9696 (1.3223)	0.1846 (1.3519)	
(Pay dispersion) ^{2}	-0.0084 (1.0590)	-0.2606 (1.1995)	0.8943 (1.0984)	-0.2264 (1.1684)	
Cultural Index		Individualism 0.0119 (0.0174)	Power Distance -0.1563 (0.1039)	Masculinity 0.0064 (0.0083)	Uncertainty Avoidance

log(output)					
log(interestp/100)					
log(laborp)					
log(size)	7.7824* (3.9412)		12.3375** (4.6754)		
0.5*log(output)*log(output)					
0.5*log(interestp/100)*log(interestp/100)					
0.5*log(laborp)*log(laborp)					
0.5*log(size)*log(size)	-0.5760** (0.2810)		-0.8869*** (0.3155)		-0.5534* (0.3171)
log(output)*log(interestp/100)					
log(output)*log(laborp)					
log(output)*log(size)					
log(interestp/100)*log(laborp)					
log(interestp/100)*log(size)					
log(laborp)*log(size)					
Widely-owned			0.6394* (0.3197)		
(defaultr/100)	-9.9962*** (1.7676)	-8.4548*** (3.0030)	-12.8108*** (2.7920)	-8.3967*** (2.8021)	-9.5484*** (2.1907)
(tier1/100)					
Adjusted R^2	0.8566	0.8308	0.8237	0.8299	0.8190

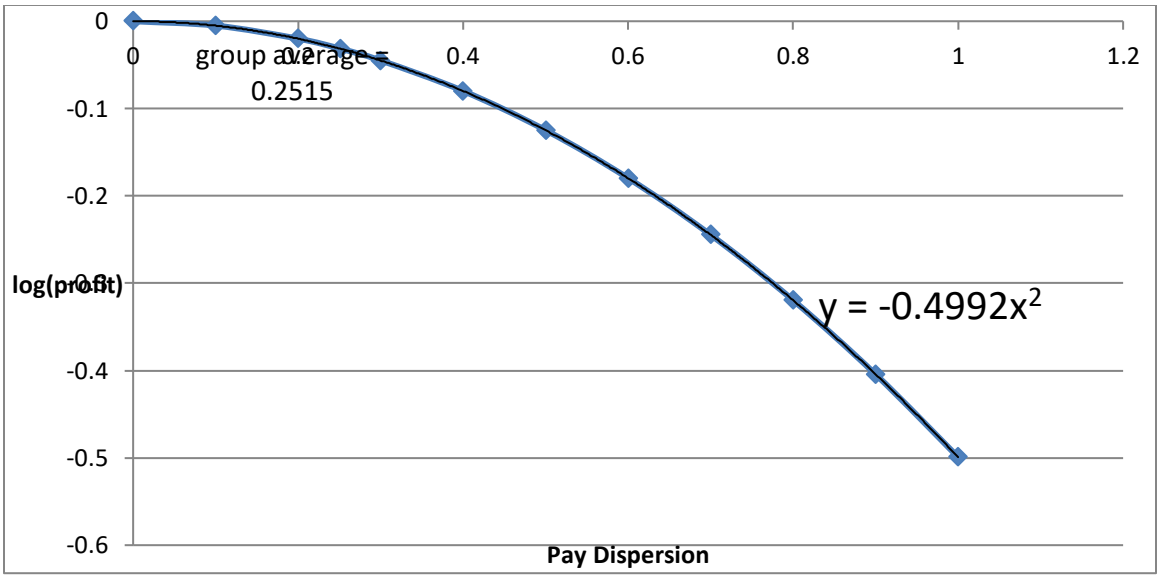
Lastly, the empirical results for the sub-sample of Developing Country banks are reported in Table 9. We find that the residual distributions of these regressions are normal for the log(profit) indicator only, indicating that the translog profit specification is appropriate for our sub-sample of Developing Countries. Furthermore, the relationship between the variable of executive pay dispersion and the log(profit) indicator is depicted in Figure 4. The coefficient of the quadratic term of pay dispersion is negative and significant at 1% level, providing supporting evidence of the equity fairness theory for our sample banks in Developing Countries. Our empirical results can be interpreted as implying that greater pay dispersion has a negative impact on bank performance in China and India. The average executive pay dispersion of our sub-sample of Developing Country banks is 0.2515 (see Table 1) and we observe that total executive compensation is mostly composed by salary and the cash bonus in this sub-sample. As for the cultural control variables, we find that the Power Distance index is negatively associated with the with the bank operation performance indicator, log(profit). Similar to the results for the valuation indicators in Developed Countries, the Individualism index is positively associated with the bank operation performance indicator, log(profit). For

the index of Uncertainty Avoidance, we find that it is negatively associated with operational performance, which is also consistent with earlier results for Developed Country valuations.

Table 9 Analyses on "a group of Developing" – our banks from Developing Countries (29 banks)

Performance indicators	**Log(Profit)**				
		Individualism	Power Distance	Masculinity	Uncertainty Avoidance
C					
Pay dispersion	-0.4111 (0.2815)	-0.2782 (0.2288)	0.2782 (0.2288)	0.2782 (0.2288)	0.2782 (0.2288)
(Pay dispersion) ^{2}	-0.4992* (0.2819)	-0.4301* (0.2295)	-0.4301* (0.2295)	-0.4301* (0.2295)	-0.4301* (0.2295)
Cultural Index		Individualism 0.0133** (0.0059)	Power Distance -0.1242** (0.0552)	Masculinity -0.0373** (0.0166)	Uncertainty Avoidance 0.0373** (0.0166)
log(output)					
log(interestp/100)					
log(laborp)					
log(size)	2.8143*** (0.6186)	2.8547*** (0.5442)	2.8547*** (0.5442)	2.8547*** (0.5442)	2.8547*** (0.5442)
0.5*log(output)*log(output)					
0.5*log(interestp/100)*log(interestp/100)					
0.5*log(laborp)*log(laborp)					
0.5*log(size)*log(size)					
log(output)*log(interestp/100)					
log(output)*log(laborp)		0.6600* (0.3588)	0.6600* (0.3588)	0.6600* (0.3588)	0.6600* (0.3588)
log(output)*log(size)					
log(interestp/100)*log(laborp)					
log(interestp/100)*log(size)					
log(laborp)*log(size)	0.1774*** (0.0659)	0.1867*** (0.0589)	0.1867*** (0.0589)	0.1867*** (0.0589)	0.1867*** (0.0589)
Widely-owned					
Ceodual					
(defaultr/100)	-17.3771*** (4.7873)	-18.2121*** (4.5979)	-18.2121*** (4.5979)	-18.2121*** (4.5979)	-18.2121*** (4.5979)
(tier1/100)	3.4764* (1.4611)	3.6065*** (1.3181)	3.6065*** (1.3181)	3.6065*** (1.3181)	3.6065*** (1.3181)
Adjusted R^2	0.9956	0.9960	0.9960	0.9960	0.9960

Figure 4 - Developing Profit


0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
0
0.2
0.4
0.6
0.8
1
1.2
group average = 0.2515
y = -0.4992x2
log(profit)
Pay Dispersion

We summarize all of our empirical results in the Table below.

Table 10 Summary of empirical results

Performance indicators	Log(Profit)	Tobin Q	The P/B ratio
Developed Countries (63 banks)	Neither*	Equity fairness theory; except for very high pay dispersion, the tournament theory holds (U-shaped impact curve) Individualism: positive + Power distance: not significant Masculinity: not significant Uncertainty Avoidance: Negative –	Equity fairness theory; except for very high pay dispersion, the tournament theory holds (U-shaped impact curve) Individualism: positive + Power distance: Negative - Masculinity: positive + Uncertainty Avoidance: Negative –
Civil Law (36 banks)	Neither*	Equity fairness theory; except for very high pay dispersion, the tournament theory holds (U-shaped impact curve) Individualism: not significant Power distance: not significant Masculinity: not significant Uncertainty Avoidance: not significant –	Equity fairness theory; except for very high pay dispersion, the tournament theory holds (U-shaped impact curve) Individualism: positive + Power distance: Negative - Masculinity: positive + Uncertainty Avoidance: Negative –
Common Law (27 banks)	Neither	Neither	Neither
Developing Countries (29 banks)	Equity fairness theory Individualism: positive + Power distance: Negative – Masculinity: Negative – Uncertainty Avoidance: positive +	Neither*	Neither*

* Residuals of regression non-normal

5. Conclusion

We examine the impact of executive pay dispersion on bank performance and valuation, controlling for cultural differences across countries. In our subsample of civil law countries, where bank performance is

measured by either by Tobin's Q or by the P/B ratio, the overall impact of pay dispersion is mostly negative and we find supporting evidence of the equity fairness theory, except for very high levels of dispersion. There is a non-linear effect as banks would perform best when there is either very low or very high executive pay dispersion. This U-shaped effect of executive pay dispersion in this sub-sample is also found in German professional soccer teams (Franck and Nüesch 2011) where medium levels of pay dispersion produce the weakest team performance. For developing country sample banks in China and India, the empirical results of the profit indicator also show that greater executive pay dispersion has a negative impact on bank profit.

In our subsample of common law developed countries, however, we find no evidence of a significant impact of pay dispersion on bank performance. Our overall conclusion is that teamwork is favored over tournament in most groups of our sample. Lower pay dispersion is mostly effective in enhancing bank performance in a significant section of sample banks, i.e. Civil Law and Developing countries, China, and India. With regard to the cultural variables, we find that two of the four cultural dimensions have a significant impact on the valuation indicators for our sample banks in Developed Countries. Individualism is positively associated with P/B and Tobin's Q while Uncertainty Avoidance has a negative relationship.

Acknowledgements

We appreciate the comments received from Robert DeYoung, Yuji Sakurai and Shann Turnbull during the 6th IFABS Conference in Lisbon. Moreover, many thanks to Craig Moorcroft, Terry Parker and Zhenhua Wang for their kind support in collecting data.

References

Aggarwal R., Goodell J.W., 2014a. National cultural dimensions in finance and accounting scholarship: An important gap in the literatures? Journal of Behavioral and Experimental Finance 1, 1-12.

Aggarwal R., Goodell J.W., 2014b. Cross-national differences in access to finance: Influence of culture and institutional environments. Research in International Business and Finance 31, 193-211.

Aggarwal R., Kearney C., Lucey B., 2012. Gravity and culture in foreign portfolio investmenet. Journal of Banking and Finance 36, 525-538.

Aggarwal R., Samwick A., 1999. The Other Side of the Trade-off: The Impact of Risk on Executive Compensation. Journal of Political Economy 107, 65-105.

Aggarwal R, Samwick A., 2003. Performance incentives within firms: the effects of managerial responsibility. Journal of Finance 58, 1613-50.

Ahern, K. R., Daminell, D., Fracassi, C., 2014. Lost in translation? The effect of cultural values on mergers around the world. Journal of Financial Economics, forthcoming.

Anderson, C. W., Fedenia, M., Hirschey M., Skiba, H., 2011. Cultural influences on home bias and international diversification by institutional investors. Journal of Banking and Finance 35, 916-934.

Barron J., Waddell G., 2003. Executive rank, pay and project selection. Journal of Financial Economics 67, 305-349.

Beaumont P. B., Harris, R. I. D., 2003. Internal Wage Structure and Organisational Performance. British Journal of Industrial Relations 41, 53-70.

Becht M., Bolton P., Röell A., 2011. Why bank governance is different. Oxford Review of Economic Policy 27, 437-463

Berger A. N., Hancock D., Humphrey D. B., 1993. Bank efficiency derived from the profit function. Journal of Banking and Finance 17, 317-347.

Beugelsdijk S., Frijns B., 2010. A cultural explanation of the foreign bias in international asset allocation. Journal of Banking and Finance 34, 2121-2131.

Breuer W., Rieger, M. O., Soypak, K.C., 2014. The behavioral foundations of corporate dividend policy a cross-country analysis. Journal of Banking and Finance 42, 247-265.

Brooks, C., 2008. Introductory Econometrics for Finance. Cambridge University Press, Cambridge.

Caprio, G., Laeven, L., Levine, R., 2007. Governance and Bank Valuation. Journal of Financial Intermediation 16, 584–617.

Chui, A. C.W., Titman, S., and Wei, K.C. J, 2010. Individualism and Momentum around the World, Journal of Finance 65, 361-392.

Eun, C. S., Wang L., Xiao S. C., 2014. Culture and R^2. Journal of Financial Economics, forthcoming.

Franck E., Nüesch S., 2011. The effect of wage dispersion on team outcome and the way team outcome is produced. Journal of Applied Economics 43, 3037-3049.

Grund C., Westergaard-Nielsen N., 2008. The Dispersion of Employees' Wage Increases and Firm Performance. Industrial and Labor Relations Review 61, 485-501.

Hibbs, D. A., Locking, H., 2000. Wage dispersion and Productive Efficiency: Evidence for Sweden. Journal of Labor Economics 18, 755-782.

Hofstede, G., 1980. Culture's Consequences: International Differences in Work-Related Values. Sage Publication, Beverly Hills, CA.

Hofstede, G., 2001. Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations. Sage Publication, Beverly Hills, CA.

Kale J.R., Reis E., Venkateswaran V., 2009. Rank-order Tournament and Incentive Alignment: the Effect on Firm Performance. Journal of Finance 64, 1479-1512.

La Porta R., Lopez-de-Silanes F., Shleifer A., 2002. Government ownership of banks. Journal of Finance 57, 1147-1170.

Lazear E. P., Rosen S., 1981. Rank-order tournaments as optimum labor contracts. Journal of Political Economy 89, 841-64.

Lazear, E. P., 1989. Pay equality and industrial politics. Journal of Political Economy 97, 561-580.

Mullineaux, D. J., 1978. Economies of scale and organizational efficiency in banking: a profit-function approach. Journal of Finance 33, 259-280.

Nguyen, N. H., Truong, C., 2013. The information content of stock markets around the world: A cultural explanation. Journal of International Financial Markets, Institutions and Money 26, 1-29.

Reed WR, Haichun, Y (2011) Which panel data estimator should I use? Applied Economics 43: 985-1000.

Shleifer A., Wolfenzon, D., 2002. Investor protection and equity markets. Journal of Financial Economics 66, 3-27.

Stulz, R. M., Williamson, R., 2003. Culture, openness and finance. Journal of Financial Economics 70, 313-349.

Wade J.B., O'Reilly C.A., Pollock T.G., 2006. Overpaid CEOs and Underpaid Managers: Fairness and Executive Compensation. Organization Science 17, 527-44.

Yu, P., Luu, B.V., 2003. Banking mergers: the impact of financial liberalization on the Taiwanese banking industry. Review of Quantitative Finance and Accounting 20, 385-413.

Zheng, X., Ghoul S. EI., Guedhami O., Kwok C.C.Y., 2012. National culture and corporate debt maturity. Journal of Banking and Finance 36, 468-488.

Appendix A.

Table A1. List of sample banks - 92 banks worldwide

(1) Banks from OECD countries	
Country	Bank
Belgium	Dexia
	KBC Group-KBC Groep NV/KBC Groupe SA
Ireland	Allied Irish Banks plc
	Bank of Ireland
USA	Citigroup Inc
	Fannie Mae-Federal National Mortgage Association
	Goldman Sachs Group Inc
	JP Morgan Chase & Co.
	Merrill Lynch & Co., Inc.
	Metlife, Inc.
	Morgan Stanley
	Wells Fargo & Company
Spain	Banco Bilbao Vizcaya Argenaria SA
	Banco de Sabadell SA
	Banco Santander SA
	Bankinter SA
	Caja de Ahorros del Mediterraneo CAM
Portugal	Banco BPI SA
Netherlands	Bank Nederlandse Gemeenten NV, BNG
	ING Groep Nv
	SNS Reaal NV
Australia	Bank of Western Australia Limited
	Commonwealth Bank of Australia
	Macquarie Group Ltd
	National Australia Bank Limited
Switzerland	Credit Suisse Group AG
Denmark	Danske Bank A/S
Norway	DnB Nor ASA
Austria	Erste Group Bank AG
	Raiffeisen Bank International AG
UK	Barclays Plc
	HSBC Holdings Plc
	Lloyds Banking Group Plc
	Royal Bank of Scotland Group Plc (The)
	Standard Chartered Plc
Sweden	Swedbank AB
Finland	OP-Pohjola Group
Italy	Banca Carige SpA
	Banca Popolare dell'Emilia Romagna
	Banca Popolare di Milano ScaRL
	Banca Popolare di Sondrio
	Credito Emiliano SpA
	Intesa Sanpaolo
	Mediobanca SpA
	UBI Banca
	UniCredit SpA
Canada	Bank of Nova Scotia (The) -Scotiabank
	Banque Nationale du Canada-National Bank of Canada
	Canadian Imperial Bank of Commerce CIBC

	Laurentian Bank of Canada
	Manulife Bank of Canade
	Royal Bank of Canada RBC
	Toronto Dominion Bank
	Bank of Montreal
Germany	Commerzbank AG
	Deutsche Bank AG
	Deutsche Postbank AG
	LBB Holding AG-Landesbank Berlin Holding AG
France	BNP Paribas
	Credit Agricole S.A.
	Natixis
	Societe Generale
	Credit Industrial et commercial
(2) Banks from Developing Countries	
Country	Bank
India	Allahabad Bank
	Andhra Bank
	Bank of Baroda
	Bank of India
	Canara Bank
	Central Bank of India
	Corporation Bank Ltd.
	HDFC Bank Ltd
	ICICI Bank Limited
	Indian Bank
	Indian Overseas Bank
	State Bank of India
	Syndicate Bank
China	Agricultural Bank of China Limited
	Bank of Beijing Co Ltd
	Bank of China Limited
	Bank of Communications Co. Ltd
	China CITIC Bank Corporation Limited
	China Construction Bank Corporation
	China Merchants Bank Co Ltd
	China Minsheng Banking Corporation (private bank)
	Industrial & Commercial Bank of China (The) - ICBC
	Industrial Bank Co Ltd
	Shanghai Pudong Development Bank
	Huaxia Bank Co. Ltd.
	Bank of Nanjing Co. Ltd.
	China Everbright Bank Co. Ltd.
	Ping An Bank Co. Ltd. (private bank)
	Bank of Ningbo Co. Ltd.

Appendix B.

Table B1. Common Law vs Civil Law countries

Common Law	There are 27 banks in our sample belong to this category and these banks are from ○ Ireland ○ USA ○ Australia ○ UK ○ Canada
Civil Law	There are 36 banks in our sample belong to this category and these banks are from ○ Belgium ○ Spain ○ Portugal ○ Netherlands ○ Switzerland ○ Denmark ○ Norway ○ Austria ○ Sweden ○ Finland ○ Italy ○ Germany ○ France