

Determinants of and Differences in U.S. and Foreign Commercial Bank Profitability

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We study the factors driving the differences in profitability of large commercial banks in the United States and in EU and non-EU countries from 2004-2014. Most relevant bank-specific and macroeconomic variables are reviewed and selected from the literature. Pooled sample estimation and panel data tests are conducted associating these factors with Return on Equity. Our main findings are: macroeconomic factors have more impact on U. S. banks' profitability, while size and GDP growth significantly impact foreign banks' profitability. In comparing U. S. and EU banks, we find significant differences in the explanatory power of size, cash adequacy and real interest rate. The significance and contribution of this study are from the advancement of knowledge in the frontier of banking industry performance research and from the innovative direct comparison between U. S. and EU banks.

JEL Codes: G20, G21

1. Introduction

Extant finance literature has explored the profitability of commercial banks and this strand of research is ever ongoing. Being one of the most important parts in financial intermediation, commercial banks play a crucial role in the growth of the economy all over the world. Commercial banks in the United States are subject to various number of laws and regulations, while foreign banks are usually considered to be more lenient when it comes to government regulation in the financial industry. An efficient financial system and expanding economic conditions lead to positive outlooks on profitability, and some internal factors in the banks' management also impacts profitability.

In this paper, we review and find unanswered questions, select factors that are proven to be most relevant to profitability, and apply these variables in pooled-sample estimation, panel data analyses, and two-sample tests to answer the research questions. Specifically, we explore these research questions: in recent years what factors impact bank profitability, and how these factors differ in the U. S. and other regions of the world. We focus on United States and several foreign countries from European Union (EU) and Asia, and the period from 2004 to 2014.

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Xie & Deng

Our study examines the determinants and the differences between profitability of ten large commercial banks in the United States and select publically traded commercial banks in seven of the world's largest economies. The analysis focuses on a list of bank specific variables along with macroeconomic variables that jointly determine the dependent variable: profitability. The main findings are: (1) in both pooled cross section analysis and panel data estimation, macroeconomic factors consistently have significant impact on U. S. banks' profitability; (2) cash adequacy and capital adequacy both explain U. S. banks' profitability controlling for bank identity and seasonality, but size and market valuation fail to exhibit significant impact; (3) GDP growth and asset size are significantly associated with foreign banks' profitability; (4) this study also sheds light on the comparison between U. S. and EU regions: we discover significant differences in the explanatory power of size, cash adequacy and real interest rate.

The significance of our paper is that we utilize more recent and refined data (quarterly rather than annually) and control for seasonality, thus further advancing the frontier of U. S. bank profitability research. In addition, we directly compare the pooled sample test results from a group of U. S. banks and a group of EU banks, providing innovative findings in the international banking research subfield. Our study contributes to the literature by illustrating the interaction between and relative importance of various determinants of banking profitability through a set of comprehensive empirical analyses, criticizing and strengthening previous literature's findings and pushing the discussion forward.

The remaining of the paper consists of literature review and critique in regarding the determinants and differences of banking profitability in Section 2. A detailed description of the model, chosen variables and methodology and a brief background of the companies chosen for this research are provided in Section 3. Section 4 presents and discusses the empirical research and findings, and Section 5 concludes.

2. Literature Review

Profitability determinants for commercial banks include factors that are both internal and external. Internal profitability determinants are factors that are influences features of the specific bank, therefore often relating to bank management, revenue and expense control as well as the bank's potential for growth through leverage and investment objectives. The external determinants are factors affecting the overall economy such as GDP Growth as well as factors impacting financial markets' competitors and the legal environment. Different types of variables use different aspects of profit determination. Bank specific financial measures and ratios such as asset size, asset quality, capital adequacy, cost efficiency, and liquidity are common measures analyzed and found significantly associated with profitability (Bourke 1989; Berger 1995; Athanasoglou, Delis and Stakouras 2006; Zolkifli, Hamid and Janor 2015; Shirasu 2016). Macroeconomic factors such as the real GDP Growth rate, inflation, market interest rates and ownership are often found significant (Haslem 1968; Haslem 1969; Hoggarth, Milne, and Wood 1998).

A number of empirical research analyses have been conducted to determine banking profitability at different time periods, within different regions, and under different circumstances. All variables from this research are chosen from widely accepted previous scholarly studies. Haslem (1968; 1969) present a 2-year statistical analysis framework that examines the balance sheet and income statement ratios for all the member banks of the Federal Reserve System in

Xie & Deng

the United States. The study concludes that a number of key ratios exhibit a significant relation to profitability. Many of those statistically significant explanatory ratios relate to particular capital proportions, or factors that impact interest spread. While the real GDP growth exhibit a great deal of variability, the variable is not found to be statistically associated with the banking sector profits. Our paper incorporates similar variables to Haslem's study with the real GDP Growth rate as a measure of the environment and impact of the economy. The banks are operating under overall growth of factors such as supply and demand of the specific countries. Capital adequacy and logarithm of total assets are also in this paper under bank specific variables. The log of assets is similar to the reduction of the scale effect such as the control of cost differences in relation to bank size, while capital adequacy shows the general stability of the financial institutions.

The relationship between the return on equity (ROE) and bank characteristics, especially capital asset ratio, is examined by Berger (1995). The study concentrate on a sample of U. S. banks between the years 1983-1992 where there are a number of potential explanations of positive capital-earnings relationship. An evaluation of capital adequacy in this study indicates an increase in capital may raise expected earnings through reduced cost and distress. Our paper also directly examines capital to assets ratio and tests its effects on profitability.

In terms of macroeconomic factors, Hoggarth, Milne, and Wood (1998) provide a review concentrating on UK and Germany's financial stability. The authors conclude that the behavior of real GDP Growth fails to explain the variability of banking sector profits. They also review the relation between inflation and major bank earnings as interest rate is a major factor affecting loan decision. Their research on GDP Growth, interest rate and profits on United Kingdom and Germany's banks is highly relatable to our paper's focus of banking system profitability, and later in section 4.3 we comment on the differences in their findings and the results of our study.

Staikouras and Wood (2004) compose a cross section time series analysis examining European banks from 1994-1998. The results are that the profitability of European banks' profitability is not only influenced by factors related to their management decisions but also by factors related to changes in the external macroeconomic environment. Structure-performance relationship in European banking exhibits a positive effect on the concentration or market share variables on bank profitability. The level of interest rates is also related to the variability of GDP Growth rates. The joint effects of macroeconomic factors on bank profits are highly relevant to our study.

More recently, Petria, Capraru and Ilnatov (2015) study factors that influence bank profitability in the EU27 banking systems. They find that liquidity risk, diversification of business and economic growth all have significant impact on profitability. In our paper we focus on a similar group of internal and external factors, and since more of the foreign countries in our sample are from the EU region, this study is especially relevant to our research.

Athanasoglou et al. (2006) analyze a number of banks in the Southeastern European region over the 1998-2002 period. Bank profits are found to be not significantly relatable with real GDP per capita growth fluctuations. The authors also explore other potential impacts of capital on bank profitability through various banking positions and standings. Higher levels of capital give banks higher capability to weather through increased risk. Shirasu (2016) studies Japanese banks' investment activities and finds that during crisis periods (1990's and 2008),

Xie & Deng

bank's flight to liquidity is caused by both market liquidity pressure and funding liquidity needs, with in turn impact banks' spread and profitability. The market-related and liquidity-related factors influencing bank performance in these two studies help us shaping the framework and variable choices of our paper.

More research is conducted using samples from different regions of the world. Azam and Siddiqui (2004) compare the profitability of Pakistan local banks with foreign entry banks. They conclude that locally controlled commercial bank in Pakistan is more profitable measured by earnings per share. Pakistan's locally controlled banks are found to be more capital efficient. In the analysis of factors impacting profitability, net interest margin shows a positive significant association with ROE for the foreign sector. The capitalization level has a negative effective with ROE along with the finding of no significance with the GDP Growth. Similarly our paper utilizes ROE as the dependent variable and includes independent variables such as Capital adequacy and GDP Growth to explain the efficiency of the bank's investments and condition of the general economy and their relation to profit generation.

In a research for bank profitability of emerging markets by Olson and Zoubi (1994), costs, sizes, and macroeconomic factors are studied. The authors find profits negatively associated with cost measures. The greater the bank size, the greater the dependence on loans in return for revenue. A larger GDP Growth increase tends to positively correlate with higher profitability, and higher equity to asset ratio shows a positive relationship with bank profits. Zolkifli et al. (2015) compare Bahrain and Malaysian banks and find that capitalization is the most important factor associated with profitability, because liquidity risk and regulatory requirements both make larger banks with more liquid assets perform better.

Contrasting local banks and foreign banks that conduct business in a competitive environment has also been a highly scrutinized field. Claessens, Demirguc and Harry (2001) conclude with a main finding of foreign banks tend to have higher interest margins, profitability, and tax payments than domestic banks, especially in those that are developing countries. No significantly higher net interest margin or loan loss provision is found to be associated a foreign entry bank, and the authors indicate that this is evidence that foreign bank entry promotes healthy competition and greater efficiency in the domestic banking sector.

Ali (2005) compares the profitability of domestic and foreign banks operations in the Lebanese Market from 1993-2003. The study concludes that foreign banks are more profitable than domestic banks regardless of their ownership structure. Even though they operate in the same market, the domestic and foreign banks' profitability determinants are found to be different. Foreign banks are affected less strongly by the macroeconomic factors than domestic banks. Our paper adopts a similar empirical framework based on the determinants and differences between domestic and foreign financial institutions.

In sum, the literature collectively suggests that a linear multivariate model utilizing both internal and external factors should reveal some determinants of the profitability of the banking industry. This relation, however, is variant depending on regions, degree and pattern of regulations, local vs. foreign bank competition, and bank-specific economic environment. It remains unclear which factors perform more consistently in determining profitability, especially in the recent years. The literature is also silent about the comparison of such relations across different

Xie & Deng

regions of the world, especially among the developed economies where market is more efficient and profitability is a more informative measure of performance.

Recognizing the existing findings and focusing on unanswered questions especially regarding potential bank profit seasonality and direct comparison of U. S. versus other regions of the world, our analyses present a set of innovative findings and discussions. We include various variables in relation with the ROE, drawing on previous literature's findings and advancing them in a more refined, systematic and inclusive way. By adopting a diverse and more in-depth framework with variables including banks' assets, capital, cash, and earnings, as well as the economy's GDP growth rate and interest rate, we are able to compare and contrast the impacts and determinants of the bank's profitability. Our contribution to the literature is highlighted by the versatility of empirical method, completeness of factor consideration, refined data frequency and updated time period coverage, as well as new results illustrated in comparative analysis.

3. Methodology and Model

3.1 The Model

We collect quarterly data for U. S. banks and employ panel data models to estimate profitability determinants. Specifically, utilizing quarterly bank-specific and macroeconomic data for 10 U. S. banks spanning 11 years (44 quarters), we arrive at an N=440 balanced panel and estimate the three variations of Model 1 for every bank i and quarter t . The first estimation is pooled sample ordinary least squares (OLS) tests:

$$\text{Model 1.1: } ROE_{i,t} = \alpha + \beta_1 * \text{Size}_{i,t} + \beta_2 * \text{CashAdq}_{i,t} + \beta_3 * \text{CapAdq}_{i,t} + \beta_4 * \text{PE}_{i,t} + \beta_5 * \text{GDPGro}_t + \beta_6 * \text{RIR}_t + \varepsilon_{i,t}$$

The second model is panel data estimation controlling for bank fixed effect:

$$\text{Model 1.2: } ROE_{i,t} = \alpha_i + \beta_1 * \text{Size}_{i,t} + \beta_2 * \text{CashAdq}_{i,t} + \beta_3 * \text{CapAdq}_{i,t} + \beta_4 * \text{PE}_{i,t} + \beta_5 * \text{GDPGro}_t + \beta_6 * \text{RIR}_t + \varepsilon_{i,t}$$

The last model for U.S. banks is panel data estimation controlling for quarter fixed effect:

$$\text{Model 1.3: } ROE_{i,t} = \alpha_t + \beta_1 * \text{Size}_{i,t} + \beta_2 * \text{CashAdq}_{i,t} + \beta_3 * \text{CapAdq}_{i,t} + \beta_4 * \text{PE}_{i,t} + \beta_5 * \text{GDPGro}_t + \beta_6 * \text{RIR}_t + \varepsilon_{i,t}$$

Due to data availability issues, we utilize annual data for foreign banks in our empirical research. As such, pooled sample OLS tests are most appropriate, and we estimate the following Model 2 for every bank i and year t .

$$ROE_{i,t} = \alpha + \beta_1 * \text{Size}_{i,t} + \beta_2 * \text{CashAdq}_{i,t} + \beta_3 * \text{CapAdq}_{i,t} + \beta_4 * \text{PE}_{i,t} + \beta_5 * \text{GDPGro}_t + \beta_6 * \text{RIR}_t + \varepsilon_{i,t}$$

The advantage of our empirical methods is that we improve the data frequency and control for bank fixed effect and performance seasonality in the U. S. bank research. We also carefully examine for multicollinearity problems before conducting pooled sample cross section regressions.

3.2 Review of Variables

As a start, for the dependent variable in this study, we focus on the Return on Equity (ROE) to measure profitability as it is most relevant to shareholders. A caveat to note is that, while ROE is the best and most common measure of profitability, it is not immune from impacts of intentional actions such as changing the timing of cash flows and non-operational items in the earnings. Companies can legally manipulate their earnings, skewing the analysis using the ROE ratios. This shortcoming exists, however, for all performance measures based on earnings including Return on Assets (ROA) and Return on Invested Capital (ROIC).

Below we provide detailed definitions of the selected variables in our empirical study, a brief variable-specific summary of past literature, and their predicted relation with profitability.

Dependent variable: Return on Equity (ROE) – net profit divided by shareholders' equity. It measures the bank's profitability by calculating how much profit is generated as a proportion of the (book value of) fund invested by equity holders.

Bank asset size (Size) – Natural logarithm of Total Assets. Total assets is typically used as a proxy for a bank's size. The relation between size and profitability is usually positive (Zolkifli et al. 2015). However, it is also argued that the greater the asset size, the greater the risk-taking incentives are, and thus problems such as non-performing loans are more prone to happen and tend to hurt profitability (Lee 2008).

Cash adequacy (CashAdq) – total cash (or cash plus short-term investments) divided by total assets. This variable measures the bank's most liquid asset proportion, and its preparedness to cope with financial risks, at least in the short run. It is the primary measure of cash sufficiency and liquidity. It is predicted to have a positive relationship with bank profitability. However, holding a large amount of cash can have an opportunity cost effect in relation to investment and growth (Bourke 1989).

Capital adequacy (CapAdq) – total capital equity divided by total assets. This variable measures the safety and soundness of the bank's capital structure. A bank with high level of capital is assumed to handle any financial risks in the long run. Capital adequacy usually has a positive impact on bank profitability and is an important factor on the determination of profit ability through deposit. It has the potential to provide hedge against losses when current earnings are not enough (Olalekan and Adeyinka 2013).

P/E Ratio (PE) – Price to Earnings ratio. This ratio reveals banks' real stock market values in relation to earnings, and is often compared with their industry group or a benchmark. The ratio is estimated to have a positive relationship with the profitability (Wu 2014).

Economic Growth Rate (GDPGro) – Annual real gross domestic product growth rate in percentages. It measures the economy's overall activity, and this measure is after adjustment to inflation. It is one of the main indicators of a country's economic growth. In developed economy where systematic risk has more impact than idiosyncratic risk, virtually all business profitability is affected by GDP growth. For banks, economic growth has an impact on the supply of deposits and demand of loans/investments, thus directly related to profitability.

Xie & Deng

Real Interest Rate (RIR) – mid-term (5-year) real interest rate. This measure has been adjusted to inflation, showing the real cost to the borrower, and the real yield to the lender. It is the growth rate of purchasing power. Increase in interest rate tends to lead to a profit increase. It directly increases the yield on cash holdings and the proceeds that go straight to the bank's earnings. Interest rate is also likely to increase during a strong economy, exhibiting a positive relationship with profitability.

3.3 Sample Selection and Overview of Banks in the Sample

The sample of this study consists of data from ten large publicly traded commercial banks in the United States and twelve large publicly traded foreign commercial banks for the years of 2004-2014. The quarterly bank specific variables for the banks in the United States are calculated from data pulled from COMPSTAT. The bank specific financial measures for all foreign banks are retrieved from the company's annual reports. For foreign banks, all financial ratios are calculated using local currency denominated measures to avoid rounding imperfections caused by currency conversion. Size is, however, studied and compared in USD to ensure all banks are comparable across the board.

All macroeconomic variables are pulled from Federal Reserve data sources and the World Bank Group website. No bank-quarter or bank-year observation is lost in the merging of data. Finally we arrive at 440 bank-quarter observations for U. S. and 132 bank-year observations for foreign regions. As mentioned at the end of literature review, our sample is substantially more recent and with higher frequency, thus advancing the previous studies in a more refined, systematic and inclusive way.

Subject to data availability, ten largest public traded commercial banks in the United States are chosen for this research. Wells Fargo & Company (ticker: WFC) started in 1852 with a current market capitalization of \$283.27 Billion and a 27.47% for its current year profit margin (as of 2016). JP Morgan Chase (JPM) was founded in 1799 with a current market cap of \$241.19B and a profit margin of 26.89%. Bank of America Corp (BAC) started in 1874 with a current market cap of 180.18B and a profit margin of 20.25%. Citigroup Inc. (C) was found in 1812 with a \$162.04B market cap and a 20.74% profit margin. The Toronto-Dominion Bank (TD) was founded in 1855 and started business in America in 1973, and it currently has a market cap of \$77.76B and a profit margin of 16.71%. The PNC Financial Services Group Inc. (PNC) was founded in 1922 with a current market cap of \$47.39B and a 27.40% profit margin. SunTrust Banks Inc. (STI) was founded in 1891 with a current \$21.86B market cap and 23.83% profit margin. KeyCorp (KEY) was founded in 1849 with a current market cap of \$11.61B and a 23.18% profit margin. Home Bancshares Inc. (HOMB) was founded in 1998 with a current \$3.15B market cap and 34.93% profit margin. The TCF Financial Corporation (TCB) was founded in 1923 and currently has a market cap of \$2.68B and a 14.49% profit margin.

For the analysis on banks from the foreign regions, with a limitation of data availability and accessibility, twelve large banks from seven of the world's most developed economies are selected. The banks chosen are all publically traded, with ten of them from the EU region, and two more from Asia. All financial data was obtained through each bank's website under their published annual reports or SEC filings.

Xie & Deng

Banco Santander (ticker: SAN) was founded in 1857 with its headquarters in Boadilla del Monte, Spain. It has a market cap of \$83.65B USD and a profit margin at 17.99%, as of March 13, 2017. BNP Paribas (BNP) was founded in 1848 and is based in Paris, France. It currently has a \$76.26 USD market cap and a profit margin of 19.19%. Lloyds Banking Group PLC (LYG) was founded in 1695 and is headquartered in London, United Kingdom. It has a market cap of \$60.22B USD and a 14.54% profit margin. Union Bank of Switzerland (UBS) was founded in 1862 and is headquartered in Zurich, Switzerland. It has a market cap of \$58.67B USD and a profit margin of 11.67%. Banco Bilbao Vizcaya (BBVA) was founded in 1857 and is headquartered in Bilbao, Spain. It has a market cap of \$48.72B in USD and a profit margin of 16.63%. Barclays PLC (BCS) was founded in 1896 with its headquarters in London, United Kingdom. It has a \$47.45B USD market cap and a 10.67% profit margin. Credit Agricole (GCA) was founded in 1894, with its headquarters in Montrouge, France. It has a market cap of \$37.91B in USD and a profit margin of 23.58%. Deutsche Bank (DB) was founded in 1870 with its headquarters in Frankfurt am Main, Germany. It has a market cap of \$26.01B USD and a profit margin of -4.90%. Natixis (IXIS) was founded in 1919, the company was formerly known as Natexis Banques Populaires SA and changed its name to Natixis in 2006. Its headquarters is located in Paris, France. It has an \$18.91B USD market cap and 16.15% profit margin. Commerzbank (CBK) was founded in 1870 and is headquartered in Frankfurt am Main, Germany. It has a market cap of \$11B USD and a profit margin of 3.28%.

Mitsubishi UFJ Financial Group (MTU) was founded in 1880 and is based in Tokyo, Japan. It has an \$89.86B USD market cap and a 17.01% profit margin. China Construction Bank (601939) was founded in 1954 with its headquarters in Beijing, China. It has a current market cap of \$230B USD and a profit margin at 47.75%.

4. Empirical Analyses and Findings

4.1 Descriptive Statistics

The descriptive statistics of U. S. banks subsample (quarterly data) are presented in Panel A of Table 1. On average, the ten U. S. commercial banks have an ROE of 9.85%. The standard deviation of ROE is 11.46%, showing a sizable range of variations between a minimum of -97.30% and a maximum of 55.18%. Average total assets is \$773 billion, with a healthy 8.14% cash adequacy ratio. The mean capital adequacy is at \$8.86, typical of financial institutions. P/E ratio exhibits very wide variations, partially due to the turmoil caused by 2008 financial crisis, but average 17.08 is a sensible mean for the banking industry. As for macroeconomic factors, during the 440 quarters in the 2004-2014 period, we observe sluggish growth and negative real interest rate during the crisis period, as well as very healthy growth after 2009. Average GDP growth rate is 3.85%, and average mid-term real interest rate is 0.65%.

Xie & Deng

**Table 1:
Panel A: U.S. Banks - Descriptive Statistics**

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum
ROE	440	9.85%	11.08%	11.46%	-97.30%	55.18%
Assets (Billion USD)	440	773.39	333.87	818.55	0.81	2573.13
Size (Nat Log of Assets)	440	12.41	12.72	2.02	6.69	14.76
CashAdq	440	8.14%	4.48%	6.71%	1.52%	28.40%
CapAdq	440	8.86%	8.84%	2.16%	3.66%	15.48%
PE	440	17.08	12.67	79.71	-149.25	1562.25
GDPGro	440	3.85%	4.28%	2.47%	-3.19%	7.13%
RIR	440	0.65%	0.73%	1.19%	-1.47%	2.75%

Panel B of Table 1 presents the descriptive statistics for the foreign banks over the sample period, with a number of interesting observations. To start, the average ROE (10.86%) is higher than that of U. S. banks, with a narrower range of variations. These international banks are significantly larger than U. S. banks, as reflected in total assets. Furthermore, foreign banks exhibit more aggressive characteristics including lower cash adequacy ratio and lower capital adequacy ratio. This phenomenon is partially due to less strict regulation, and is also a result of expansionary monetary policy. Market valuation, proxied by P/E ratio, is completely the opposite: foreign banks have an average P/E of 2.81, way lower than that of U. S. banks (17.08). This comparison reflects very different perception of risk and sentiment towards banking industry in the foreign stock markets. Finally, as for macroeconomic factors, foreign countries exhibit generally lower economic growth (average GDP growth at 1.93%), mostly due to the slow growth in the EU region, and higher real interest rate (1.12%), mostly impacted by the high savings rate and interest rate in China.

**Table 1:
Panel B: Foreign Banks - Descriptive Statistics**

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum
ROE	132	10.86%	9.75%	13.12%	-64.31%	51.21%
Assets (Billion USD)	132	1523.33	1485.97	781.73	257.61	3809.28
Size (Nat Log of Assets)	132	14.08	14.21	0.59	12.46	15.15
CashAdq	132	3.69%	2.01%	4.16%	0.00%	19.38%
CapAdq	132	4.15%	3.82%	1.49%	1.39%	8.17%
PE	132	2.81	7.22	70.42	-685.33	130.11
GDPGro	132	1.93%	1.85%	3.28%	-5.60%	14.20%
RIR	132	1.12%	1.55%	1.90%	-10.70%	5.40%

Table 2 presents the Pearson correlations between dependent variable and independent variables, as well as among independent variables. Panel A reports U. S. banks and as expected, some degree of correlations are observed. Between ROE and the independent

Xie & Deng

variables, cash adequacy, GDP growth and real interest rate are found to be significantly correlated with ROE. However, among pairs of independent variables, fewer significant associations are present. Specifically, only size and real interest rate respectively exhibit a few correlation coefficients with some other variables. Multicollinearity seems to be a small concern in the empirical analyses to follow.

Table 2:
Panel A: U.S. Banks – Pearson Correlation (N=440)

	ROE	Size	CashAdq	CapAdq	PE	GDPGro	RIR
ROE	1						
Size	-0.0577 (0.2302)	1					
CashAdq	-0.1433 (0.0028)	0.6246 (<.0001)	1				
CapAdq	-0.0528 (0.2724)	-0.3773 (<.0001)	-0.0895 (0.0626)	1			
PE	-0.0168 (0.7279)	-0.0096 (0.8427)	-0.0345 (0.4738)	0.0504 (0.2953)	1		
GDPGro	0.3846 (<.0001)	-0.031 (0.5189)	-0.0115 (0.8111)	0.0425 (0.3772)	0.0330 (0.4911)	1	
RIR	0.1814 (0.0001)	-0.0736 (0.1258)	-0.1637 (0.0006)	-0.3608 (<.0001)	-0.0233 (0.6264)	0.1377 (0.0038)	1

P-values underneath correlation coefficients.

Panel B of Table 2 presents the Pearson correlations for the foreign bank analysis. Between ROE and each of the independent variables, size, cash adequacy and GDP growth are found to be significantly correlated with ROE. High correlation is sparse among pairs of independent variables though. Specifically, only capital adequacy and GDP growth rate respectively exhibit a few strong correlation coefficients with some other variables. Collectively, we demonstrate that correlation is a minimal concern in our empirical analyses.

Xie & Deng

Table 2:
Panel B: Foreign Banks – Pearson Correlation (N=132)

	ROE	Size	CashAdq	CapAdq	PE	GDPGro	RIR
ROE	1						
Size	-0.3741 (<.0001)	1					
CashAdq	0.1193 (0.1731)	0.0473 (0.5899)	1				
CapAdq	0.2188 (0.0117)	-0.1770 (0.0423)	0.6556 (<.0001)	1			
PE	0.1318 (0.1320)	-0.1441 (0.0993)	-0.0395 (0.6530)	0.0188 (0.8303)	1		
GDPGro	0.2939 (0.0006)	-0.1310 (0.1344)	0.4845 (<.0001)	0.2795 (0.0012)	0.0281 (0.7488)	1	
RIR	0.0451 (0.6073)	-0.0378 (0.6671)	-0.0210 (0.8107)	-0.0505 (0.5656)	0.0727 (0.4076)	0.0277 (0.7525)	1

P-values underneath correlation coefficients.

4.2 Empirical Analyses: U. S. Panel Data

Using U. S. bank quarterly data, we conduct multivariate tests in three styles and report the results in Table 3: first run a pooled sample OLS estimate in Model 1.1, then control for bank fixed effect in Model 1.2, and finally control for quarter fixed effect (seasonality) in Model 1.3. Model 1.1 presents an adjusted R-squared of 17.13%, indicating a moderate fit for the overall pooled cross section. In this pooled sample estimation, cash adequacy is found to be negatively significantly associated with ROE, while other bank specific factors lack explanatory power. Model 1.2 controls for bank fixed effect and the adjusted R-squared is improved to 28.85%. In this estimation, cash adequacy loses explanatory power, but capital adequacy is found to be positively significantly associated with ROE. In Model 1.3, when quarter fixed effect is controlled for, the results are very similar to the pooled estimation in Model 1.1. Other bank characteristics, namely size and P/E ratio, fail to exhibit explanatory power across all three models.

These results on bank specific factors indicate that seasonality is a lesser concern for bank performance variations, yet when individual banks are allowed to have unique intercept, the estimation stresses the importance of capital adequacy, which is the most important measure of asset safety and long-term solvency. The obtained somewhat weak association for the internal factors with profitability coincide with some of the previous studies. For example, Azam and Siddiqui (2004) shows similar results to the firm's capitalization, and Claessens et al. (2001) also find similar results with variables in relation to net interest margin or loan losses. U. S. banks are also very heavily regulated. Variables such as capital adequacy lack the necessary cross-sectional variation to be attributed to profitability variation.

Xie & Deng

Table 3 also presents strong findings regarding macroeconomic factors: GDP growth and real interest rate both are significantly positively related to ROE across all three models. These results indicate that in the past decade, macroeconomic conditions have been the main drivers of the performance of banking industry.

Table 3: U. S. Banks – Determinants of Return on Equity

	Model 1.1	Model 1.2	Model 1.3
Intercept	0.0257 (0.45)	suppressed	suppressed
Size	0.0028 (0.80)	0.0023 (0.12)	0.0028 (0.80)
CashAdq	-0.2662*** (-2.71)	0.0813 (0.48)	-0.2686*** (-2.76)
CapAdq	-0.1379 (-0.49)	1.4520*** (3.16)	-0.1352 (-0.48)
PE	-0.00005 (-0.73)	-0.00002 (-0.37)	-0.00003 (-0.41)
GDPGro	1.7428*** (8.42)	1.5785*** (7.27)	1.7354*** (8.44)
RIR	0.9427** (2.00)	2.3183*** (4.04)	0.9049** (1.93)
Bank Fixed Effect	No	Yes	No
Quarter Fixed Effect	No	No	Yes
# of Observations	440	440	440
Adj. R-square	17.13%	28.85%	20.00%

t-value underneath coefficient estimates.

*** for significance at 1%, ** at 5%, and * at 10%.

The results in this subsection highlights our contribution the literature by addressing different research questions from past literature (what factors determine profitability based, with concerns on bank fixed effect and the impact a *seasonal* time series trend?) and illustrating that macroeconomic factors dominantly determine profitability.

4.3 Empirical Analyses: Foreign Banks Pooled Sample

Using annual data, we estimate the foreign bank pooled sample Model 2 and report the results in Table 4. As we observe in the descriptive statistics, foreign banks have significantly larger size, and size in turn becomes the only bank specific factor that significantly affects profitability. It is interesting to note that GDP growth again exhibits a strong positive relationship with ROE. As most banks are from the economically troubled Eurozone in the recent decade, the overall economic growth has been an important stimulator for banking industry profits.

Xie & Deng

Table 4: Foreign Banks – Determinants of Return on Equity

Variable	Parameter Estimate	Standard Deviation	t Value	p Value
Intercept	0.9786***	0.2769	3.53	0.0006
Size	-0.0666***	0.0188	-3.53	0.0006
CashAdq	-0.2608	0.3790	-0.69	0.4927
CapAdq	1.3259	0.9696	1.37	0.1739
PE	0.0001	0.0001	0.92	0.3604
GDPGro	0.9988***	0.3694	2.70	0.0078
RIR	0.1889	0.5479	0.34	0.7309
N=132		Adj. R-square=18.18%		

*** for significance at 1%, ** at 5%, and * at 10%.

Interestingly, real interest rates no longer exhibit statistical significance as in the U. S. bank study. Many of the selected foreign banks are from the European Union. The volatile economy from the Eurozone in the past decade made the European Central Bank keep the interest rate continuously low rather than accurately reflecting the companies' performance, and such lack of interest rate variation has an impact on our empirical results. In other words, monetary policy in the United States seems to drive the economic activities and bank profitability more efficiently than do European Central Bank's policies.

The findings in this subsection are different from Hoggarth et al. (1998) as we illustrate that GDP growth is a significant factor explaining banking sector profitability, but our results are generally consistent with the more recent study in Petria et al. (2015). Our results are from most updated data spanning a time period during which sluggish economic growth was widespread, making the impact of a small scale of fluctuation in economic growth on the banking industry rather pronounced. Our findings contribute to the literature by reemphasizing the importance of macroeconomic factors, especially in developed economies in recent years.

4.4 Empirical Analyses: U. S. versus EU Comparison

Recognizing the different performance of determinant factors in explaining profitability, we continue to explore differences in the profitability determinant factors between the world's largest two economies: U. S. and EU region. Specifically, we conduct annual cross-section regressions in the U. S. and EU subsamples respectively (10 US banks and 10 EU banks each year), obtaining annual coefficient estimates for each of the six factors as well as the adjusted R-square in each subsample. Then we run a two sample t-test for each parameter series' intertemporal mean equality, based on the assumptions of unequal sample variances and sample independency.

Table 5 reports our findings. We document significant differences in the explanatory power of size, cash adequacy and real interest rate. These observations are related to the results from

Xie & Deng

Tables 3 and 4, showing that it is possible European banks are negatively affected by their larger sizes (and thus more stale and nonfunctional assets), but not US banks. In addition, cash adequacy represents safer depository institutions, thus bringing more profit in EU banks, but that relation may not hold true for US banks as they are generally perceived as safe whatsoever. Finally, as discussed in previous subsections, the monetary policy in manipulating interest rate worked more efficiently in the United States than in the EU area during our sample period.

Table 5: U. S. versus EU Banks – Comparison of Determinant Factors (N=77)

	Size	CashAdq	CapAdq	PE	GDPGro	RIR	Adj. R-square
Mean: US banks	0.0016	-0.3304	-0.4754	-0.0011	-1.0003	-1.2127	11.59%
Variance: US banks	0.0001	0.2612	0.9493	0.00002	15.3053	70.6710	0.82%
Mean: EU banks	-0.0610	5.1256	-2.7562	0.0037	-1.4030	5.4148	31.70%
Variance: EU banks	0.0047	26.0018	39.4491	0.0003	116.8188	57.0302	19.90%
Difference of mean	0.0627***	-5.4561***	2.2808	-0.0048	0.4027	-6.6274**	-20.11%*
t-stat	3.00	-3.53	1.19	-0.95	0.12	-1.95	-1.47
p-value	0.0061	0.0027	0.1307	0.1804	0.4546	0.0330	0.0854

*** for significance at 1%, ** at 5%, and * at 10%.

While it is not our intention to provide generalized conclusions on the differences between U.S. and EU banks, this subsection utilizes representative large banks from both economies and presents an innovative research design. The findings are very interesting in sense of directly contrasting the explanatory power of well documented factors. This subsection advances the knowledge in banking research regarding the performance-driver comparison between the world's largest two economies.

5. Summary and Conclusions

Profitability is an important performance measure of banks. This study uses most recent data and a comprehensive set of empirical methodologies, and provides some innovative findings. We examine the determinants of commercial bank profitability in the United States as well as seven other foreign developed countries. Models of pooled cross sectional estimation, panel data analyses and two-sample tests are applied to a dataset constructed from ten large U.S. commercial banks and twelve large foreign commercial banks from 2004 to 2014. We have the following three major sets of findings.

First, for macroeconomic factors, the one variable that consistently holds a significant relation with profitability is GDP Growth. The higher the economic growth, the better the health of the overall market, leading to better profitability. This holds true for both U.S. and the foreign banks, including those from developed economy such as Japan as well as those from more turbulent economic region in the past decade such as Europe. Real interest rate significantly impacts

Xie & Deng

the profitability of U. S. banks but not for foreign banks, perhaps because of the lack of interest rate variations (as a result of monetary policy) in the foreign regions during our sample period.

Second, in terms of bank-specific factors, asset size is the only variable found to be significantly associated with foreign banks' profitability. The performance of U. S. banks, however, are affected more by cash adequacy and capital adequacy, depending on whether or not bank identity and seasonality are controlled for. This observation reflects the more efficient mechanism of internal features influencing business results. Market valuation (P/E ratio) fails to explain profitability in either U. S. or foreign region, reflecting that market comprehension of earnings growth and bank value, as a forward-looking measure, may not be directly related to *contemporary* period profits, or may not be affected by profitability at all.

Finally, we contrast the explanatory power of determinant factors between U. S. and EU banks, providing some innovative findings. Specifically, we document significant differences in the coefficient estimates of size, cash adequacy and real interest rate, mostly due to the facts that US bank profitability are less negatively impacted by size, that cash adequacy represents safer depository institutions thus more business in EU but not necessarily in United States, and that the monetary policy in manipulating interest rate worked more efficiently in the United States than in the EU area.

With the limitation of data availability, differences in data frequency, and exclusion of redundant variables found in the literature, our study in this paper provides innovative findings and creates knowledge in the fields of bank performance and comparative study of regional economy and financial industries. A succeeding study utilizing more inclusive data will lead to more generalized conclusions and provides even more contribution.

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Xie & Deng

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