Impact of the Financial Sector on Economic Growth in Developed Countries

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Abstract

Economists have extensively examined the relationship between financial sector size and economic growth in both developed and developing economies. In the early 20th century, economists established a positive correlation between these two variables. In the 1990s, empirical evidence affirmed that a growing financial sector is a catalyst for economic growth. More recent research has suggested a diminishing relationship between the variables in developed and developing economies. The current study examines this relationship by determining whether excessive financial sector growth in developed countries leads to negative economic growth when specific model specifications are met. The results indicate that a diminishing relationship exists only in the banking sector, a specific component of the financial sector. Otherwise, the effect appears to be a positive linear one. The research provides noteworthy differences in the subgroups created for the econometric analysis, which shows that in certain conditions, the positive linear relationship between finance and growth in European Union (EU) countries is far greater than that of non-EU countries. Overall, this research suggests that a more granular country breakdown may be useful in understanding the nuances of the relationship.

1. Introduction

The relationship between countries' financial sectors and economic growth has been a focal point of economic analysis for the past century. To grasp the significance of this relationship, it is crucial to evaluate both the structures and roles of countries' financial sectors concerning their economies. Countries have developed complex financial systems consisting of various types of financial contracts, institutions, and markets to alleviate the costs of both carrying out transactions and assembling information.

The financial sector promotes economic stability in carrying out transactions by reducing risk involving liquidity. When this risk is lessened, individuals and institutions can more efficiently exchange their assets for purchasing power at a set price. Ultimately, this can be a catalyst for economic growth as agents feel no restriction to either hold or sell their assets, giving them the freedom to conduct their transactions as often as they desire. The financial sector also bolsters economic growth by providing credit and offering information to the public regarding the conditions of firms in the economy. The financial sector's two main vehicles that perform this crucial task of minimizing information costs are financial intermediaries and stock markets. Financial intermediaries, such as banks, can produce more efficient markets and lower the costs for both individuals and groups conducting business activities. Stock markets can help gather information about firms and distribute it to the public. It is a reoccurring trend that as stock markets grow and their liquidity increases, individuals become more motivated to learn about firms. People are more willing to invest when they feel they can make an informed judgment about the firms in which they are looking to invest. As a result of improved resource allocation, there will be a free flow of capital, which coincides with enhanced economic growth (Levine, 1997).

The financial sector plays a pivotal role in sustained economic growth. Economists have previously stated that this phenomenon occurs as a country's financial sector grows to up to 3.5% of its total employment. However, Law and Singh (2014) cited that both the Bank for International Settlement and the International Monetary Fund claim that finance is only good for economic growth up to a point because it experiences diminishing returns. One potential consequence of a larger financial sector is that talented individuals are pulled away from other industries, ultimately hurting the economy. Overall, through established economic institutions backing the relationship between finance and growth, it has become common for financial sectors to grow too fast for their respective countries' economies (Cecchetti & Kharroubi, 2012).

This paper examines the relationship between the financial sectors, including their components, and the economic growth of 36 developed countries, including both European Union (EU) and non-EU countries from 2000 to 2012. The countries in the sample span multiple continents, and many of these countries have financial systems and labor forces with radically different structures. This research hypothesizes that the growth of the financial sector and its components in developed countries, in and out of the EU, helps to foster economic growth. However, at a certain threshold, additional increases in the size of the financial sector and its components are detrimental to economic growth.

2. Literature Review

2.1 Finance–Growth Relationship

Economists have long analyzed the crucial role of finance in both initiating and sustaining economic growth. Schumpeter (1934) asserted that the banking sector drives economic growth by facilitating efficient investing and that it offsets negative economic shocks and increases competition. These notions still hold true, and it is clear that there is a need for

strong financial systems composed of various elements to promote economic well-being. Even though economists postulated for decades that this positive relationship exists, there was a lack of empirical evidence. King and Levine (1993) found evidence to support the finance–growth relationship by showing the relationship between a state's level of financial development—represented by the ratio of liquid liabilities and the level of credit granted to the private sector—and positive economic growth.

Levine (1997) reaffirmed that individuals and firms want to acquire information, form and sustain contracts, and make transactions. Levine (2004) discussed five specific channels from both financial markets and institutions that catalyze economic growth, further supporting the finance–growth relationship. These channels greatly alter the dynamics of saving and investing in a country and often lead to economic growth. For example, he articulated that finance promotes a channel for economic growth by simplifying the exchange of goods and services and by supplying various payment services and merging the savings from numerous investors. Overall, these outlets reinforce the notion that finance is not just a byproduct of economic development, but rather an impetus for economic growth in countries.

2.2 Law of Diminishing Returns

There is evidence that finance promotes growth but only to a certain point. Cecchetti and Kharroubi (2012) supported this notion by showing that finance drives growth as long as the financial sector was 3.5% or less of the country's total employment. They suggested that if the financial sector surpasses this threshold, it hinders economic growth. One reason for diminishing economic growth once the financial sector reaches a certain level is that finance attracts talented employees from other industries to pursue careers in finance. Cecchetti and Kharroubi (2012) suggested that finance in relation to economic growth follows the law of diminishing returns.

They specifically highlighted New Zealand and Thailand in their rationale because the two countries demonstrated the inverted U-shaped effect, in which countries that depend heavily on the financial sector for economic growth often stop growing.

Law and Singh (2014) also reaffirmed the negative quadratic relationship between the two variables, reiterating that too much finance leads to negative economic growth. They argued that the competition over the acquisition of resources must be balanced across all sectors in an economy. When the financial sector becomes too large, other sectors will struggle to obtain resources, which hinders economic growth. Cecchetti and Kharroubi (2012) added that a financial system can become bloated, amplifying speculation, diminishing savings, and leading to the mismanagement of resources. Ultimately, economic growth begins to decline, reaffirming the nonlinear relationship between finance and economic growth.

Law and Singh (2014) also explained that in countries with intermediate levels of financial development, the financial system has a large, positive effect on economic growth. Meanwhile, in countries with low or high levels of financial development, the financial system has little to no effect on economic growth. One of the causes of this decline and stagnation in economic growth is the negative relationship the banking sector has with growth when the relationship is analyzed linearly. Law and Singh also discussed the usefulness of their research for policy makers, arguing that they should no longer focus on the size of the financial sector but rather the efficiency of financial intermediaries. Building off the previous literature, they enforced the empirical evidence between the two variables as well as the nonlinear relationship between finance and economic growth.

2.3 The Financial Systems of EU Countries and Non-EU Countries Differ Greatly

Allen et al. (2004) discussed the noteworthy differences between the financial systems of EU and non-EU countries. Banking systems back the financial systems of countries in the EU, making the structure of the financial system heavily based on bank loans. For example, EU households put a significant amount of their assets into banks compared to non-EU households. Additionally, Allen et al. pointed out that other monetary financial institutions, such as money market funds and credit institutions, play a far more important role in EU countries than in non-EU countries. Finally, Therese (2015) posited that non-EU countries are structured differently because they are backed more by markets and tend to have stronger security markets in their financial systems as noted by the capital market financing ratio in the EU of less than 50% versus 69% and 66% in the United States and the United Kingdom, respectively.

2.4 Contribution to Previous Literature

There is empirical evidence from the subset of developed countries used in this research that a positive linear relationship between financial sector size and economic growth exists. This finding reinforces King and Levine's (1993) findings regarding the nature of the relationship between the variables. However, it goes against the notion of a diminishing relationship that both Law and Singh (2014) and Cecchetti and Kharroubi (2012) found. This research introduces a new contribution that the positive linear relationship for EU countries is significantly greater than that of non-EU countries. The structural differences in financial systems noted by Allen et al. (2004) could account for the difference. Finally, this analysis provides empirical evidence that the banking sector, which is a specific component of the financial sector, displays a diminishing relationship with economic growth when considering the entire sample of developed countries.

3. The Data Set

The data are from a balanced panel of 36 countries from 2000 to 2012. The countries in the panel used to estimate the models are from five different continents: North America, South America, Europe, Asia, and Australia. There is a total of 468 observations, and each observation covers a given country in a given year. The data are from the Harvard Dataverse.

In the data, five countries (Canada, Israel, New Zealand, Norway, and Slovakia) omitted values for certain variables such as population density, though the years that are missing are not common across the five countries. Each of the missing values are imputed with averages, which is done by taking the mean of the non-missing values for a variable for a given country in the years that the data are present. The final step in this process is to apply that country's average to wherever there are missing data.

This research will analyze eight different variables in the data set: gross domestic product (GDP) growth rate, financial sector size, banking sector size, a financial crisis dummy, an EU country dummy, population density, capital, and debt. GDP growth rate represents the rate of change in the GDP per capita. Financial sector size is the logarithm of the percentage of domestic credit provided by the financial sector over the total GDP in first differences. Banking sector size is the logarithm of the percentage of domestic credit provided by the banking system over the total GDP and is also in first differences. For the financial crisis variable, if the country experienced a financial crisis in the given year, it is denoted with a value of 1, whereas if the country did not experience a financial crisis in the given year, it is denoted with a value of 0. For the EU country variable, countries in the EU have a value of 1, and countries not in the EU have a value of 0. The rationale for this is that EU and non-EU countries' financial systems are structured differently. Financing in EU countries predominantly stems from bank loans rather than capital markets, whereas financing in non-EU countries does not. Additionally, banking

systems in the EU are larger than those of non-EU countries (Allen et al., 2004). Population density reflects the current population divided by the area of the country in square kilometers. Capital represents the ratio of bank capital plus reserves to total assets. Debt measures the total public debt of the government as a percentage of GDP. The population density and debt variables all have extreme right skews, indicating that the residuals may exhibit a similar pattern. Logarithmic transformations will help with this problem as well as allow for a percentage-based interpretation of the coefficients.

Table 1

Means of Analysis Variables for All Countries

Variables	**N**	**Mean**
Population Density	468	123.77 people/km^2
Capital/Total Assets	468	7.048%
Debt/GDP	468	54.31%
GDP Growth Rate	468	2.174%
Crisis	468	19.02%
ln (FS Size)	468	0.039
ln (BS Size)	468	0.045

Table 1 identifies the mean of each analysis variable for the entire sample of countries. The average population density for all of the observations is 123.77 people per square kilometer. Next, on average, capital accounts for 7.048% of total assets in both EU and non-EU countries. The average debt of the full sample of countries accounts for 54.31% of the GDP. Next, the GDP growth rate of all of the observations is 2.174%. Finally, from 2000 to 2012, for 19.02% of the time, the full sample of countries experienced a financial crisis.

Table 2

Descriptive Statistics of Analysis Variables for EU Countries

Variables	N	Mean
Population Density	299	122.79 people/km^2
Capital/Total Assets	299	6.804%
Debt/GDP	299	52.30%
GDP Growth Rate	299	2.385%
Crisis	299	23.41%
ln (FS Size)	299	0.043
ln (BS Size)	299	0.055

Table 2 indicates the mean of each analysis variable for just the EU countries in the sample. The average population density for the EU countries is 122.79 people per square kilometer, which is slightly smaller than the full sample of countries. On average, capital accounts for 6.804% of total assets in just EU countries, which is slightly less than the entire sample of countries. The average debt of the EU countries in the sample accounts for 52.30% of the GDP, which is less than the full sample of countries. The GDP growth rate is 2.385% of EU countries, which is slightly more than the entire sample of countries.

Table 3

Descriptive Statistics of Analysis Variables for Non-EU Countries

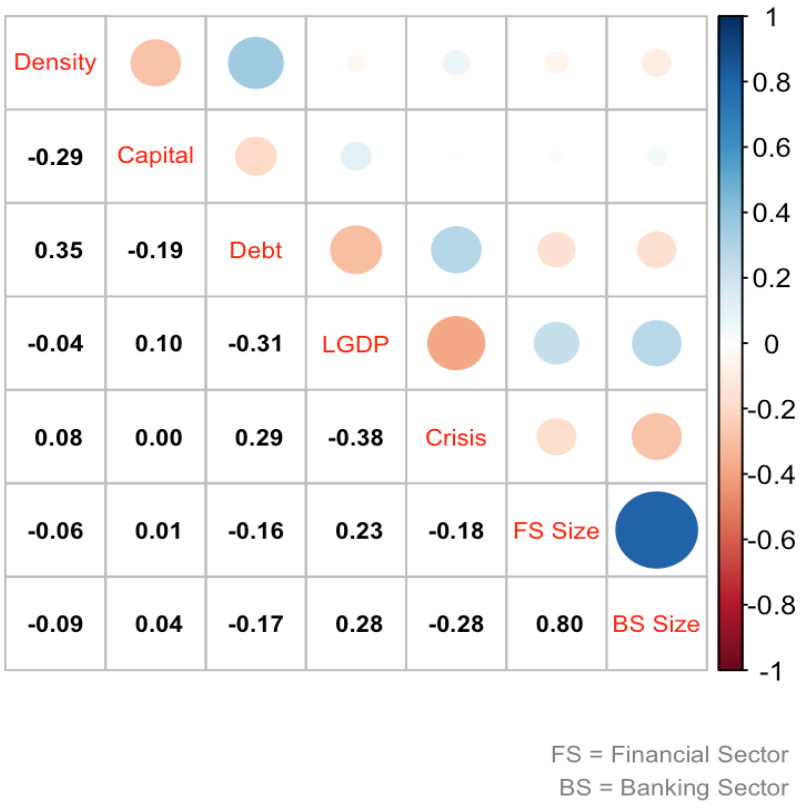
Variables	N	Mean
Population Density	169	125.49 people/km^2
Capital/Total Assets	169	7.478%
Debt/GDP	169	57.87%
GDP Growth Rate	169	1.799%
Crisis	169	11.24%
ln (FS Size)	169	0.030
ln (BS Size)	169	0.026

Table 3 displays the mean of each analysis variable for the non-EU countries in the sample. The average population density for the non-EU countries is 125.49 people per square kilometer, which is larger than the full sample of countries as well as the subset of EU countries. On average, capital accounts for 7.478% of total assets in non-EU countries, which is again larger than the entire sample of countries and the subset of EU countries. The average debt of the non-EU countries in the sample accounts for 57.87% of the GDP, which is greater than that of the entire sample of countries and the subset of EU countries. The GDP growth rate is 1.799% in non-EU countries, which is less than the average of the entire sample as well as the subset of EU countries. It was more common for an EU country in the sample to experience a financial crisis during 2000–2012 than a non-EU country in the sample. The size of the financial sector is larger in EU countries than in non-EU countries. The banking sector, which is a component of the financial sector, is also larger in EU countries than in non-EU countries.

This research checks all the variables in the models for multicollinearity as shown below in Figure 1. Almost all the variables displayed in the correlation matrix have correlation coefficients below the 60% threshold, a rule of thumb for evaluating multicollinear relationships. The one exception involves the two variables, financial sector size and banking sector size. These variables have a correlation coefficient of 77%, indicating a strong positive correlation. Thus, in the methodology section, these two variables will not be used simultaneously in any of the models.

Figure 1

Correlation Matrix of Analysis Variables



4. Methodology

This analysis involved seven fixed-effects models that predict the GDP growth rate, which is the dependent variable. The primary independent variable in the first five regression models is financial sector size. This variable is represented with a quadratic term in the first model and a logarithmic term in the following four models. In the last two regression models, banking sector size replaced financial sector size as the primary independent variable. The research included multiple models to check for the robustness of the coefficients of both financial sector size and banking sector size to determine whether these coefficients were independent of the method applied. Additionally, the research had the same dependent variable in all of its models because the goal is to compare the models. The four control variables are financial crisis, population density, capital, and debt. A Hausman test was initially conducted,

which rejected the null hypothesis that the random-effects model is a better fit than the fixed-effects model. Therefore, fixed-effects models were used in all model iterations in the following sections.

4.1 Outliers-Included Models With Financial Sector as the Primary Independent Variable

The outliers-included model with financial sector size being represented with a quadratic term contained all the countries in the sample. Financial sector size is a quadratic term in order to test for a diminishing relationship. It is a multivariate least squares regression model with time and entity fixed effects and is specified as follows (α_t is the time fixed effects, and μ_i is the entity effects):

$$\ln(\mathbf{gdp}_{it}) = \boldsymbol{\beta_0} + \boldsymbol{\beta_1} * \boldsymbol{fsize}_{it} + \boldsymbol{\beta_2} * \boldsymbol{fsize}_{it}^{\,2} + \boldsymbol{\beta_3} * \ln(\mathbf{popden}_{it}) + \boldsymbol{\beta_4} * \boldsymbol{capital}_{it} + \boldsymbol{\beta_5} * \ln(\boldsymbol{debt}_{it}) + \boldsymbol{\beta_6} * \boldsymbol{crisis}_{it} + \boldsymbol{\alpha_t} + \boldsymbol{\mu_i} + \boldsymbol{\varepsilon_{it}}$$

The outliers-included model with the financial sector being a logarithmic term contained all the countries in the sample. Financial sector size is a logarithm in order to test for a positive relationship. It is a multivariate least squares regression model with time and entity fixed effects and is specified as follows (α_t is the time fixed effects, and μ_i is the entity effects):

$$\ln(\mathbf{gdp}_{it}) = \boldsymbol{\beta_0} + \boldsymbol{\beta_1} * \ln(\boldsymbol{fsize}_{it}) + \boldsymbol{\beta_2} * \ln(\mathbf{popden}_{it}) + \boldsymbol{\beta_3} * + \boldsymbol{\beta_4} * \boldsymbol{capital}_{it} + \boldsymbol{\beta_5} * \ln(\boldsymbol{debt}_{it}) + \boldsymbol{\beta_6} * \boldsymbol{crisis}_{it} + \boldsymbol{\alpha_t} + \boldsymbol{\mu_i} + \boldsymbol{\varepsilon_{it}}$$

The data used in these models include the six outliers representing observations that have an absolute value of the imputed financial sector size less than 0.5. The six observations that

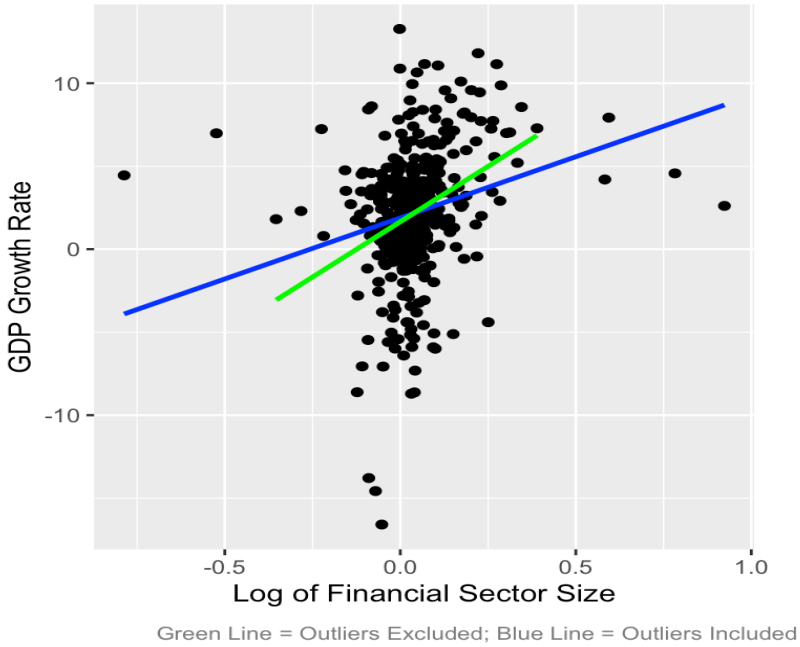
were outliers were Denmark in 2000, Canada in 2001, South Korea in 2001, Sweden in 2000 and 2001, and Iceland in 2008. The six outliers that exist in the data for the first model are influential because the entire system was being driven by those observations. These observations were removed in the following three models in an attempt to eliminate selection bias. When disregarding these specific countries in certain periods, a different conclusion can be observed. Often, it is important to consider how the typical countries in a system behave independent of outlier behavior. The results from the following three models now reflect how the vast majority of the observations behave.

All the outliers except Iceland in 2008 are present as a result of the dot-com bubble bursting. In the 1990s, there was a worldwide e-commerce boom. Shortly after this period of rapid economic growth, the dot-com bubble burst as the stock market crashed, causing the outliers in the sample. This bubble in the stock market was due to the enormous amount of speculation regarding internet-related companies in the late 1990s (Goodnight & Green, 2010). In 2008, Iceland experienced a financial sector size decline of more than 0.5 because of a severe financial sector crisis that occurred after the collapse of its inflated banking industry. Iceland was hit much harder than most other countries, creating an outlier in the sample (Baudino et al., 2020).

The scatter plot below (Figure 2) plots GDP growth rate against financial sector size with the entire sample of observations. The blue regression line in Figure 2 includes the outliers from the entire sample of countries, while the green regression line excludes them. The slope of the green regression line was twice as large as the blue regression line with the outliers. This indicates that, without the outliers, the financial sector has a substantially larger positive effect on economic growth for the typical countries in the data set.

Figure 2

GDP Growth Rate vs. Log of Financial Sector Size



4.2 EU and Non-EU Countries Outliers-Excluded Model With Financial Sector as the Primary Independent Variable

In this model, if the absolute value of the imputed financial sector size of an observation is greater than 0.5 then the observation is disregarded. This ultimately excludes the six observations mentioned previously. The model is a multivariate least squares regression model with time and entity fixed effects and is specified the same way as the outlier-included model that has financial sector size as a logarithmic term.

4.3 EU Countries Model With Outliers Excluded With Financial Sector as the Primary Independent Variable

The outliers excluded with the EU countries model are a subset of the sample containing only the countries in the EU. If the absolute value of the imputed financial sector size of an EU

country is greater than 0.5, then the observation is disregarded, ultimately excluding three observations: Denmark in 2000 and Sweden in 2000 and 2001.

4.4 Non-EU Countries Model With Outliers Excluded With Financial Sector as the Primary Independent Variable

The non-EU countries model with outliers excluded is a subset of the sample containing only the countries that are not in the EU. If the absolute value of the imputed financial sector size of a non-EU country is greater than 0.5, then the observation is disregarded, ultimately excluding three observations: Canada in 2001, Korea in 2001, and Iceland in 2008.

4.5 Outliers-Included Model With Banking Sector as Primary Independent Variable

The outliers-included model with banking sector size being represented with a quadratic term contained all the countries in the sample. Banking sector size is a quadratic term in order to test for a diminishing relationship. It is a multivariate least squares regression model with time and entity fixed effects and is specified as follows (α_t is the time fixed effects, and μ_i is the entity effects):

$$\ln(\mathrm{gdp}_{it}) = \beta_0 + \beta_1 * bsize_{it} + \beta_2 * bsize_{it}^{\,2} + \beta_3 * \ln(\mathrm{popden}_{it}) + \beta_4 * capital_{it} + \beta_5 * \ln(debt_{it}) + \beta_6 * crisis_{it} + \alpha_t + \mu_i + \varepsilon_{it}$$

The data used in this model includes the four outliers representing observations that have an absolute value of the imputed banking sector size less than 0.5. The four observations that are outliers were Denmark in 2000, Iceland in 2008, Japan in 2001, and Sweden in 2001. The four outliers that exist in the data for the first model are influential because the entire system is driven

by those observations. These observations are removed in the following model to eliminate selection bias.

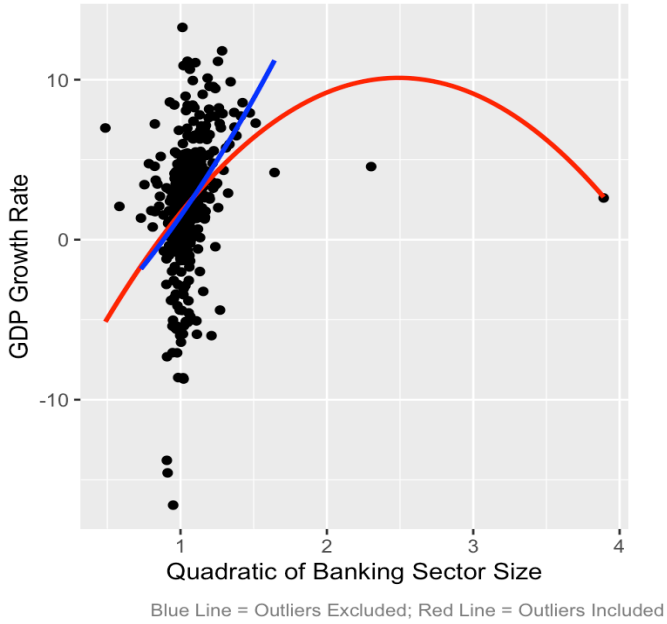
4.6 EU and Non-EU Countries Outliers-Excluded Model With Banking Sector as the Primary Independent Variable

In this model, if the absolute value of the imputed banking sector size of an observation is greater than 0.5, then the observation was disregarded. This ultimately excludes four observations mentioned previously. The model is a multivariate least squares regression model with time and entity fixed effects and is specified the same way as the outlier-included model that has the banking sector as a quadratic term.

The scatter plot below (Figure 3) displays a red regression line that shows a diminishing effect. The blue regression line indicates that the diminishing effect is lessened for the core of the sample when the four outliers are disregarded in the scatterplot. The presence of the diminishing effect displayed in the red regression line only exists because of the outliers such as Denmark in 2000.

Figure 3

GDP Growth Rate vs. Quadratic of Banking Sector Size



5. Results

Table 4 presents the results of the five models where financial sector size is the primary independent variable. These models are presented in Table 4 in the same order as they were discussed in the previous section. Table 5 presents the results of the two models where banking sector size is the primary independent variable. These models are presented in Table 5 in the same order as they were discussed in the previous section. In both tables, key variables are presented in the body of the table and other useful statistics are presented below.

Table 4

Regression Outputs for Models When Financial Sector Size Is the Primary Independent Variable

	(1) Outlier Included with Quadratic	(2) Outlier Included with Logarithm	(3) Outlier Excluded with Logarithm	(4) Model4 Outlier Excluded with Logarithm (EU Only)	(5) Model5 Outlier Excluded with Logarithm (non-EU)

VARIABLES	lgdp	lgdp	lgdp	lgdp	lgdp
fsize	3.895				
	(4.963)				
sqrfsize	-0.315				
	(1.758)				
lnfsize		3.282**	6.872***	8.058***	5.061*
		(1.353)	(2.008)	(2.908)	(2.659)
popden	-1.334	-1.469	-3.521	-3.298	-5.269
	(4.512)	(4.479)	(4.550)	(7.640)	(5.082)
capital	0.0659	0.0633	0.103	0.00840	0.170
	(0.121)	(0.121)	(0.122)	(0.186)	(0.147)
debt	-2.983***	-2.958***	-2.930***	-3.194***	-2.417***
	(0.641)	(0.628)	(0.639)	(0.910)	(0.843)
crisis	-2.423***	-2.444***	-2.164***	-2.244***	-1.500*
	(0.462)	(0.462)	(0.467)	(0.596)	(0.794)
Constant	15.21	19.30	27.36	29.37	28.71
	(18.69)	(18.69)	(18.95)	(34.05)	(18.50)
Observations	468	468	462	296	166
R-squared	0.217	0.214	0.228	0.251	0.172
Number of id	36	36	36	23	13

Standard errors in parentheses

***p < .01, **p < .05, *p < .1

Table 5

Regression Outputs for Models Where Banking Sector Size Is the Primary Independent Variable

VARIABLES	(6) Outlier Included with Quadratic lgdp	(7) Outlier Excluded with Quadratic lgdp
bsize	8.196***	-25.62**
	(2.833)	(11.10)
sqrbsize	-1.484**	14.51***
	(0.690)	(5.079)
popden	-2.179	-1.986
	(4.469)	(4.440)
capital	0.0605	0.0844
	(0.120)	(0.120)

debt	-2.912***	-2.813***
	(0.626)	(0.625)
crisis	-2.108***	-2.245***
	(0.475)	(0.472)
Constant	15.25	31.62*
	(18.55)	(19.07)
Observations	468	466
R-squared	0.226	0.243
Number of id	36	36

Standard errors in parentheses

***p < .01, **p < .05, *p < .1

5.1 Outliers-Included Models With Financial Sector as the Primary Independent Variable

The first regression in the outliers-included models contains the quadratic of financial sector size to see if it has a diminishing relationship with GDP growth rate. The p-value for financial sector size was 0.858, which indicates that there is not a statistically significant relationship between the two variables. The coefficient for financial sector size is negative, which does provide evidence for a diminishing relationship, but because it is not a statistically significant variable, this relationship does not exist in the data.

Since a diminishing relationship did not exist in the first model with the outliers included, it will be modified where financial sector size now has a logarithmic transformation rather than a polynomial one. The second model was examined to see if a positive linear relationship exists between the financial sector size and GDP growth rate. In this model, the financial sector size coefficient was positive and significant, indicating that, on average, a 1% change in a country's financial sector size implied a 3.28% change in GDP. The control variables, population density and capital, were both not statistically significant. The coefficients of the other two control variables, the logarithm of debt and the binary variable crisis, were both negative and statistically significant.

The diminishing effect is not present in the outliers-included model where financial sector size is a quadratic term. A potential reason for why this relationship is not present is that the countries in the sample used for this model are all developed. This may indicate that the diminishing relationship found in previous literature is a feature of development from poor to rich countries. The second outlier-included model contains financial sector size as a logarithmic term. This model provides evidence for a positive linear relationship between the two variables where the diminishing point has been surpassed. Due to this occurrence, the following three regression models contain the logarithm of financial sector size as the primary independent variable to further examine the relationship that it has with GDP growth rate.

5.2 EU and Non-EU Countries Outliers-Excluded Model With Financial Sector as the Primary Independent Variable

In the outliers-excluded model, if the absolute value of the imputed financial sector size of an observation is greater than 0.5, then the observation is disregarded. This ultimately excludes six observations. Looking at the coefficient for financial sector size in the second model, there is a statistically significant relationship at the 95% level of significance between financial sector size and GDP. However, the effect has more than doubled compared to the previous model, going from 3.28 to 6.87. The change represents the outlier effect because the outliers in the initial model decreased the slope of the regression line for financial sector size. Clearly, in the second model, there is a much stronger positive linear relationship between financial sector size and GDP growth rate. The relationship between the two variables now reflects the norm for the behavior of the countries in any year for the sample because of the exclusion of the six anomalous cases. The control variables, population density and capital, were again not statistically significant in the second model as in the first, whereas the other two

control variables, debt and financial crisis, are statistically significant. The coefficients for all the control variables are more robust in the second model compared to the first model. This suggests that the two models had the same sign and significance for all the variables.

5.3 EU Countries Model With Outliers Excluded With Financial Sector as the Primary Independent Variable

The next model consists of EU countries in years where they have an absolute value of the imputed financial sector size of an EU country that is less than 0.5. Again, looking at the coefficient for financial sector size in the third model, it is apparent that there is a statistically significant and positive relationship at the 95% level of significance between financial sector size and GDP. However, the effect is now even stronger than that of the first and second models (i.e., 8.06%).Thus, a 1% change in a country's financial sector size implies an 8.06% change in GDP on average. The control variables still display the same relationship with GDP growth rate, and the coefficients for the control variables are robust. The findings in the first three models reinforce the finance and growth theory by King and Levine (1993) but not the diminishing effect relationship found in studies from Cecchetti and Kharroubi (2012) and Law and Singh (2014).

Likely, the diminishing effect between financial sector size and economic growth did not exist in the first three models because the countries in the sample are all developed. At the same time, Cecchetti and Kharroubi (2012) and Law and Singh (2014), who found diminishing returns in the relationship, examined both developed and developing countries. Because the sample in this study only had developed countries, the data pass the diminishing point in the first three models. This research hypothesizes that the diminishing factor is largely due to the shift from developing to developed countries, but once only developed countries are examined, there is just

an effect of constant economic growth. Overall, the developed countries in the data for the first three models showed that the larger the financial sector grows on average, the more growth is experienced.

5.4 Non-EU Countries Model With Outliers Excluded With Financial Sector as the Primary Independent Variable

The final model is composed of non-EU countries in years where they have an absolute value of the imputed financial sector size of a non-EU country that is less than 0.5 and excludes outliers. Looking at the coefficient for financial sector size in the outlier-excluded with non-EU countries model, there is not a statistically significant relationship between financial sector size and GDP at the 95% level of significance. The relationship between financial sector size and economic growth begins to disappear in developed countries when the EU countries and outliers are disregarded. This occurrence contradicts the claim by King and Levine (1993) that, on average, more finance tends to lead to more growth. For this subset of countries during these years, the relationship as described by King and Levine (1993) is not observed. The fourth model in this econometric analysis reaffirms what Cecchetti and Kharroubi (2012) and Law and Singh (2014) established: if a specific group of countries is selected in a panel, diminishing returns between the variables occur when the financial sector becomes too large.

It was interesting that at the 90% significance level, the relationship between financial sector size and economic growth is significant in the fourth model. This effect is greater than in the first model but less than in the second and third models. Thus, on average, a 1% change in a country's financial sector size implies a 5.06% change in GDP. All the control variables still display the same relationship with the GDP growth rate, and the coefficients for these control variables are robust.

5.5 Outliers-Included Model With Banking Sector as the Primary Independent Variable

This model displays a negative statistically significant relationship between the quadratic of banking sector size and the GDP growth rate. Ultimately, the results from this regression model provide empirical evidence of a diminishing relationship between banking sector size and GDP growth rate for the group of developed countries in the sample. This diminishing relationship is not observed when using the quadratic of financial sector size in the original model. The financial sector size and banking sector size variables are highly correlated with each other, but they behave differently related to the GDP growth rate. Thus, the 23% gap in their correlation explains the difference in the way that they interact with the GDP growth rate. All the control variables still display the same relationship with the GDP growth rate as in the previous models, and the coefficients for these control variables are robust.

5.6 Outliers-Excluded Model With Banking Sector as the Primary Independent Variable

This model excludes the outliers, and as a result, the diminishing effect goes away completely. The quadratic of banking sector size is now statistically significant, showing a positive exponential effect between it and the GDP growth rate. Again, the control variables still display the same relationship with the GDP growth rate as in the previous models, and the coefficients for these control variables are robust.

6. Conclusion

This research examines the relationship between the financial sector and economic growth using data from 36 developed countries between 2000 and 2012. None of the models where financial sector size is used as the primary independent variable display a diminishing effect. Even though a diminishing effect is not displayed in the models with financial sector size, a linear effect exists when financial sector size is a logarithmic term. For example, in the models

looking at both EU and non-EU countries where financial sector size is the primary independent variable, a constant positive linear relationship between financial sector size and GDP growth rate is displayed on average. The analysis of these developed countries reaffirms the Schumpeterian and Levinian notion that more finance leads to economic growth.

However, the model with the entire sample of observations and banking sector size as a quadratic term confirms a diminishing effect exists between the two variables. Ultimately, this suggests that more finance does not always lead to more economic growth when certain components of the financial sector of developed countries are examined. The results support those of Cecchetti and Kharroubi (2012) and Law and Singh (2014), who also presented a diminishing relationship, but their econometric analysis used countries with both developed and developing economies.

This research provides new empirical evidence suggesting that the relationship between finance and economic growth in developed countries can be modeled as a positive linear one or as a diminishing one depending on the context in which the data are viewed. Also, this analysis displays that the positive linear relationship between the financial sector and GDP growth rate is far stronger in EU countries than in non-EU countries. The difference, as stated in the literature review regarding the structure of their financial systems, could very well be the catalyst for the results. This research has important implications regarding policy because policy makers need to be informed regarding the optimal amount of financial investment for a thriving economy. Policy makers can benefit from better understanding the fact that finance has the potential to create economic growth. However, in certain situations, too large of a banking sector can cause negative economic growth, ultimately raising unemployment rates and poverty levels in developed countries. As a result of policy makers becoming better informed on this important

topic, they can implement policies regarding finance that will support a healthy economy. Policy makers can focus on first recognizing what kind of a financial sector they have and then creating policies that support achieving the financial sector's intended purpose: to reduce the costs of transactions and of acquiring information.

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