



January 2013

Financial Development And Human Development In The European Union

Sasa Ostojic

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FINANCIAL DEVELOPMENT AND HUMAN DEVELOPMENT IN THE EUROPEAN UNION

by

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Bachelor of Arts, University of North Dakota, 2013

A Thesis

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Science

Grand Forks, North Dakota

December

2013

This thesis, submitted by Sasa Ostojic in partial fulfillment of the requirements for the Degree of Master of Science in Applied Economics from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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PERMISSION

Title Financial Development and Human Development in the European Union
Department Applied Economics
Degree Master of Science in Applied Economics

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Sasa Ostojic
December 4, 2013

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ACKNOWLEDGMENTS

I would like to thank all of my professors and particularly Dr. Daniel Biederman, my thesis chair. I would also like to thank my thesis committee members Dr. David Flynn and Dr. Prodosh Simlai as well as Dr. Cullen Goenner. Finally I would like to thank my classmate Chikezie Okoli for providing input and my family for their support along the way.

ABSTRACT

The relationship between finance and economic growth is often studied using GDP per capita growth. This paper aims to focus on the richness of human life, not the richness of the economy. Thus, the Human Development Index is used to test the relationship between financial development and human development. By focusing on a sample limited to the European Union, the many criticisms associated with the use of an index can be mitigated. At this moment there is not a universally accepted measure of financial development. Use of measures from past literature allowed for consistency with past works. The results show that financial development has a strong positive relationship with human development and that several characteristics of the financial system are highly correlated with human development.

CHAPTER I

INTRODUCTION

Economic growth is possibly the most common topic of study in the field of economics. Often the case is that either a change in gross domestic product or gross national income is used as a measure of growth. However, as stated by Amartya Sen, the basic idea behind economic development is to advance the richness of human life, rather than the richness of the economy. Thus, a measure that does not attempt to include a multifaceted approach to growth can be considered slightly misleading if it is intended to measure development. The reason is that economic growth is studied due to its positive impact on the lives of those taking part in the economy. However, utilizing the human development index, a study can more directly determine the impact a variable of interest has on human development.

The purpose of this study is to determine the impact of several measures of the financial system, specifically financial development, on human development in the European Union. The relationship between financial development and economic growth was tested by calculating the correlation between variables and using regression analysis controlling for time fixed effects and country specific random effects. The purpose of limiting the study sample to the European Union was to make the study more specific to one particular region of the world. Several criticisms of human development are based on the idea that it cannot be equally measured across cultures and regions. In addition to

making the human development index more applicable, the European Union can act in unison to undertake any policy that may be beneficial to human development across the region.

This paper will proceed to explain the methods used to calculate human development and the justification for using the human development index. The role of the financial sector in the economy will be briefly discussed along with the past works that established the theory that financial development and growth are positively related. Before further explaining the methods utilized to test the relationship, variable selection will be discussed along with the organization of the panel data. The paper will conclude with an explanation and the author's interpretation of the results of the econometric analysis as well as a discussion of potential implications for follow-up studies.

CHAPTER II

WHAT IS HDI?

The human development report, launched in 1990 through the United Nations Development Programme, created an index by which human development can be measured on an equal scale for countries around the world. The human development index (HDI), measured from zero to one, is based on three dimensions: living standard (income), education, and health. Four indicators in total are used to measure the three dimensions or components, which are then grouped using a geometric mean to create the HDI. Prior to 2010, an arithmetic mean and slightly different indicators were used to calculate HDI. Each dimension was calculated using a maximum and minimum value referred to as “goalposts” using equation 1 below. For the sake of consistency, raw data for each indicator were collected from the human development report and the HDI value for each year was recalculated using identical goalposts. By utilizing consistent goalposts the HDI was made comparable from year to year.

$$\text{Dimension Index} = (\text{Indicator} - \text{Minimum}) / (\text{Maximum} - \text{Minimum}) \quad (1)$$

Gross National Income per capita (GNIpc) in purchasing power parity terms in constant 2005 international dollars was used as the indicator of income for the calculation of the living standard index or GNI index. The maximum and minimum goalposts for GNIpc were \$107,721 and \$100 respectively. The natural log of each value was used to reflect the diminishing importance of income as GNIpc increases.

Two indicators, mean years of schooling for adults ages 25 and above and expected years of schooling for children of school entering age were combined to calculate the education index component of HDI. The goalposts for mean years of schooling were 13.2 years and 0. The goalposts for expected years of schooling were 20.6 and zero. Each indicator of education was first rescaled using its goalposts as in equation 1. Then the geometric mean of the two values was calculated creating the combined education index. The goalposts for the combined education index were .951 and 0. To obtain the education index of each country the combined education index of a particular country was scaled using equation 1 and its goalposts. Life expectancy at birth was the indicator of health. The goalposts for life expectancy were 83.2 years and 20 years. Again utilizing equation 1, the life expectancy or health index was calculated.

Until 2005, data for HDI were available on a ten-year occurrence dating back to 1980. Thus, for each country there are a maximum of four observations of HDI if observed by decade. It would be better to have more observations, as for any study in that case, but it would be misleading to measure HDI on a yearly or short-term basis for the purpose of increasing observations, since it is a long-term variable that would be expected to change slowly over time. The 1990, 2000, and 2010 values of HDI were used for the analysis conducted in this study.

The human development index has been the target of much criticism in the literature. Logically, it would be ideal to have additional variables or components such as opportunity, equality, minority rights, access to technology, class mobility, safety and security, and personal freedoms included in a measure of human development. However, some of these values coincide with one of the three components already taken into account

in the HDI, for example, access to technology and income. The argument that cannot be made convincingly is that any of the components in the HDI should be excluded. Any measure of human development must include health, education, and income. Others have claimed that the human development index does not take into account different values across cultures. This has led to the creation of the Islamic-Human Development Index by Anto (2011). However, the cultural criticism has been bypassed by focusing on the European Union, a topic that will be further discussed in the sample selection section of this paper.

The human development index was deemed an appropriate proxy for the measure of human development or welfare because as found by Noorbakhsh (1998), the difference between HDI and several suggested alternatives to HDI such as the modified human development index, MHDIF1¹, MHDIF2, LE, AEA, AGDP, and the BORDA composite index across a sample of 174 countries is minimal. Noorbakhsh concluded that the majority of these measures yielded very similar results to the HDI and that none of them could lead to the claim that HDI is not appropriate or that they are more so. The Islamic HDI, too, found similar results as the HDI, having a 0.94 correlation coefficient with the latter when tested by Anto (2011).

¹ MHDIF1 and MHDIF2 represent the modified human development index using two different methods of weighing the components

CHAPTER III

THE ROLE OF THE FINANCIAL SYSTEM IN THE ECONOMY

The financial system plays a vital role in the economy of a country. According to Levine (1997), the function of the financial system can be broken down into five basic categories: facilitating risk amelioration, allocating resources, monitoring managers and exerting corporate control, mobilizing savings, and facilitating exchange. Several of the functions are highly correlated and can ultimately be boiled down to the cost of acquiring information and the cost of transactions.

Economies benefit greatly from the existence of financial institutions. Financial institutions deal with large amounts of money and are highly incentivized to obtain information. With the large amount of money financial institutions possess, the average cost to collect information is lower for them than it would be for any individual investor, not to mention the time required to obtain information according to Saunders & Cornett (2011). Often this is referred to as economies of scale. Economies of scale allow financial institutions to become more efficient to lower information costs. Much as was the case in collecting information, financial institutions lower transaction costs by making very large transactions reducing the average cost of a transaction.

In addition to economies of scale lowering costs, financial institutions are highly specialized in determining the worthiness of an individual to receive a loan. Thus, they indirectly contribute to invention and entrepreneurship by selecting for the most deserving

borrowers by allocating resources. Efficient financial markets and institutions allow for the transfer of funds between those with a surplus to those with a shortage. Credit allocation could be considered the most important basic function of the financial markets and institutions. According to King & Levine (1993b) financial systems stimulate economic growth by accelerating productivity in four ways through their affect on entrepreneurial activities. Their findings were that financial systems select the most promising projects, mobilize resources to those projects, allow investors to diversify risk associated with investing in uncertain entrepreneurial activities, and reveal the potential rewards to engaging in innovation relative to utilizing existing techniques or products.

Financial institutions also arise to provide an increase in liquidity to the population. If the maturity on a security was longer than convenient, investors would choose not to purchase the security. However, by investors or households placing their money in an account with a financial institution they have access to their funds, increasing their liquidity, and still receive some form of interest payment. The financial institutions then turn around and invest this money in what is referred to as mobilization of savings.

The discussion of the role of financial institutions and financial markets in the economy is a very broad topic and one to which whole textbooks are often dedicated. The brief discussion presented here is to familiarize the reader as to why this study is of great importance. The works of Levine (1997) and Saunders & Cornett (2011) provide a much more in depth discussion of the topic.

CHAPTER IV

THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT AND HUMAN DEVELOPMENT

The relationship between financial development and human development finds its roots in the past studies of the relationship between financial sector development and economic growth. The study of the relationship between financial sector development (FSD) or financial structure and economic growth was and still is a common topic of study today. Over time the topic has diverged into many similar yet different genres of the original idea. The topic can be traced back to the research of Joseph Schumpeter who in 1911, believed that economic growth could be promoted by a financial system, as cited in King & Levine (1993a). Raymond Goldsmith would go on to test the idea in his now famous publication "Financial Structure and Development". Goldsmith (1969) studied the relationship between FSD and growth by using GDP per capita as a proxy for growth and financial intermediary assets divided by gross national product as financial sector development. Goldsmith's study would be expanded upon by King & Levine (1993a) who increased the sample size from 35 to 80 countries and included four variables for financial sector development testing the association of these variables with GDP per capita growth and two components of growth, physical capital accumulation and improvements in "efficiency." The results were in agreement with their past results in King & Levine (1992), which found that financial indicators were significantly correlated with growth. Levine & Zervos (1998) made further progress by testing the relationship between banking

development and stock market liquidity with long run economic growth. After controlling for many factors they found that banking development and stock market liquidity were both positively correlated with growth.

Rousseau & Wachtel (2005) acknowledged that the relationship between finance and growth had been deeply studied and proved. However, they tested to see if the relationship had changed over time. With the addition of newly available data controlling for country specific effects, Rousseau & Wachtel found the relationship had lost its significance. However, when they tested King and Levine's original data they came to the same conclusion as in the past. Rousseau and Wachtel attributed the change in the relationship to the liberalization of the financial sector upon the publication of King & Levine (1993), making the claim that while in the past countries with larger financial sectors grew with higher rates, the way they obtained those larger financial sectors may be of importance.

The causal relationship between FSD and growth is often described using economic theory. Liang & Reichert (2006) tested the causal relationship using a Granger Causality test in both developing/emerging countries and advanced countries. Along with their own multivariate regression model they compared their results to that of the Odedokun (1996) multifactor production model for the developing/emerging countries. Liang & Reichert, in line with Patrick (1966), describe a "demand-following" relationship as one where causation runs from economic growth to financial sector development and a "supply-leading" relationship as the opposite. Their multivariate regression approach found a supply leading relationship, however, the Granger causality tests along with their single equation individual country estimates pointed to a diminishing relationship when

compared to the Odedokun results. This suggests that there may be a reduced emphasis on the supply leading relationship. Liang & Reichert (2007) expanded on their previous work by breaking FSD down to various measures finding that as countries developed there was a shift from relying on basic banking services to capital markets. Similar to Liang and Riechert (2006, 2007), Caporale, Rault, Sova, & Sova (2009), tested the relationship regarding the ten newest members of the European Union. Caporale et al. (2009) broke financial development down to three variables: domestic credit to private sector, banking efficiency, and stock market capitalization. Of the three variables, the latter two showed to have a causal relationship with economic growth but not domestic credit to the private sector. The authors contributed this lack of a significant relationship between credit and growth possibly to the banking crises at the beginning of the transition period.

More recently, literature has taken a focus on the relationship that finance has with income and particularly the income of the poor. Beck, Demirguc-Kunt, & Levine (2007) utilized the same data set as in this paper, a dataset created by them, as well as borrowed data from Dollar & Kraay (2002), to determine how financial development affects the poor by isolating the lowest quintile of income. They discovered that financial development disproportionately helped the poor, with 60% of that help coming through aggregate growth and the remaining 40% coming from reduction in inequality. Their results were in line with that of Dollar & Kraay (2002), who found that economic growth leads to growth in income for the poor. Both papers stated that policies of growth should be pursued. However, Beck et al. (2007) wrote that more research needed to be done to determine the effect of particular policies on poverty alleviation. Rewilak (2013) concurred with both Dollar & Kraay (2002) and Beck et al. (2007) in that the poorest quintile income rose and

fell in proportion with the average income. However, Rewilak found that financial development affected income in the lowest quintile differently across different regions.

Income being a component of the human development index is a vital part of human development. The relationship between economic growth and human development should be highly positive and robust, because theoretically economic growth should lead to a greater income, ultimately, leading to a greater standard of living. When income rises, investment will increase improving healthcare and technological progress by channeling surplus funds to entrepreneurs with a use for it. In addition, more funding will be available for investment in education.

The assumption of a positive relationship between economic growth and human development is a simple conclusion at which to arrive. The natural transition in literature from economic growth to income paved the way for the next step, human development. Outreville (1999) found a positive correlation between the human development index and financial development. Outreville (1999) was a unique case because Outreville utilized the human development index in his study prior to the previously mentioned studies of income determination. It is possible however, that previous authors passed over the idea of using the HDI, because of the previously discussed drawbacks presented with it, drawbacks that have been mitigated by sample selection.

CHAPTER V

SAMPLE SELECTION

The sample size of the study was narrowed down to the European Union to give the study a more in depth look at one of the most important economies in the world. In 2012, the European Union reported a gross domestic product of \$16.63 trillion and a population of 509 million people (World Bank, 2012). The European Union, founded in 1993, is an economic and political union of 28 unique member countries. However, these countries have many characteristics in common that allowed them to come together and form the European Union. Over time the countries can be expected to become more homogeneous as they continue to further cooperate in politics and engage in trade.

The counties of the European Union share similar cultures and ethnic backgrounds according to the Eurobarometer 2012 poll that found 72% of the EU-27² study participants classified themselves as Christians. In addition, 88% of the study respondents from the EU-27 claimed their parents were born in the country in which they live ("Discrimination in the EU," 2012). Thus, despite their language barrier, many of the countries in the European Union share a similar belief structure and core values. Putting aside their cultural similarities, 17 members of the EU also share a common currency, the Euro. The formation of the EU and, in 1999, the Eurozone, assisted to further increase inter-EU trade as well as allowing citizens of member countries to move more freely across borders than in the past.

² Croatia was not included in the poll because it was not an EU member at the time of the study. However, a majority of the Croatian population is Catholic.

Politically each of the 28 countries in the EU have democratically elected governments that uphold a court and legal system that ensure the basic rights and property rights of all citizens. Together as members of the EU, each country has representation in the European Parliament and the Council of the European Union. In association with the European Commission they can act to implement policy and ensure compliance with the established laws.

The limitation of the study sample to the 28 member countries of the European Union has several advantages and disadvantages. The biggest disadvantage to the sample limitation is the decreased number of observations. Additionally any potential insight received from the study can only be concluded to be true for the European Union. However, the benefits of focusing on the EU over the entire world outweigh the costs. The benefits being, the accurate application of the human development index, causality, and potential policy implications. As was discussed earlier, the human development index is often criticized for not being equal across cultures. However, focusing exclusively on the EU, a relatively homogenous Christian sample, has mitigated the potential problems. Additionally, in 2012, 26 out of the 28 members were found to have “very high” human development and the two other countries were found to be of “high” human development in accordance with the 2012 human development index ranking (United Nations Development Programme, 2012).

The similarity in human development also allows for the assumption of causality running from financial development to human development to be formed in a reasonable manner. According to Liang & Reichert (2006 & 2007), causality in the relationship

between economic growth and financial development was dependent on the level of economic development in the country. Often times in the study of economic growth and financial development, causality is difficult to test because of the strain from the limited number of observations available for testing. By focusing on countries with similar development we can make the assumption of causality being supply leading.

The European Union, through its legislative body and the European Central Bank can establish policy to act in accordance with the findings of the study. However, the same could not be stated for a worldwide study because it would be too broad and require further analysis for individual countries to establish possible policy goals.

CHAPTER VI

VARIABLE SELECTION AND DATA ORGANIZATION

The financial structure of a country was simplified into two categories, the banking sector and the capital markets. Three characteristics of the banking sector were measured, size, efficiency, and profitability. Banking sector size was measured as the sum of the deposit money bank assets and central bank assets to GDP. Banking sector efficiency was calculated as bank credit to bank deposits and banking sector profitability was measured as the return on equity. To measure the development of a particular country's banking sector, the ratio of deposit money bank assets to central bank assets was calculated. An empirically larger value for the ratio deposit money bank assets to central bank assets would intrinsically point to a more developed banking sector because as discussed by Beck, Demirguc-Kunt, and Levine (2007), it would mean less reliance on the central bank.

The capital market in a particular country consists of the stock market and the bond market. The size of the stock market was measured as stock market capitalization to GDP. The liquidity of the stock market was measured simultaneously using two different methods, stock market turnover ratio and stock market total value traded to GDP. As discussed in Beck et al. (2007), the value traded to GDP measure of liquidity may be susceptible to a price effect. Stock market turnover ratio is a better measure of the liquidity of the stock market relative to size, but the total value traded to GDP measure describes better the liquidity that the stock market provides the economy. Similarly the

size of the bond market was measured as the capitalization of the bond market to GDP for both the public and private bond market separately. Data for the bond market was not available for all 28 countries. Thus, fewer observations were used in the description of the relationship between human development and the bond market.

Utilizing the same technique as Beck and Levine (2002), principle component analysis, two additional measures were created, structure-aggregate and finance-aggregate. Structure-aggregate was used to measure the role of markets in a particular country compared to that of banks. Structure-aggregate was calculated as the first principle component of two variables, structure-size and structure-activity. The former was calculated as the natural log of the stock market capitalization to GDP divided by the private credit to GDP. While the latter was calculated as the natural log of the stock market total value traded to GDP divided by the private credit to GDP.

Finance-aggregate was used as a measure of the overall financial development of a financial system in a particular country. Finance-aggregate was also calculated as the first principle component of two variables, finance-activity and finance-size. Finance-activity was calculated as the natural log of product of private credit to GDP and stock market total value traded to GDP. Finance-size was calculated as the natural log of the sum of private credit to GDP and stock market capitalization. However, as stated by Beck and Levine, "There is no single, fully satisfactory measure of financial development".

To control for any changes in spending, public spending on education as a percentage of GDP and healthcare expenditure as a percentage of GDP were included in the analysis. Along with spending, net exports to GDP was included, because a country that exports many goods may observe an increase in human development over time. The

natural log of electric power in kilowatt-hours consumption per capita was used as a proxy for technological progress. Technological progress could lead to an increase in human development and more specifically life expectancy over time.

The majority of the financial structure data used in this paper was obtained from a recently updated financial structure database created by Beck, Demirguc-Kunt, and Levine (2000) via the World Bank. The dataset as a whole had several gaps requiring the use of arithmetic averaging over five year periods to allow for a more consistent set of observations. Multiple options were considered. The first option was to simply use the values at the corresponding time. However, the idea was abandoned due to the inappropriate weight given to a single observation that was not accurately representative of the sample, as well as random missing values falling on the date that would have otherwise been selected. The other options remaining were to calculate five year and ten year averages, as well as weighted averages. Five-year averages were used for consistency and the prevention of overlap. The five-year average also introduced a slight lag effect because values five years prior to the HDI measurement were included in the calculation of the averages. This allowed for any potential delayed effects to be included in the analysis. Financial structure and control variable observations were first collected at the country level annually dating back as far as possible, in this case 1960. However for several of the countries, observations were only available starting in 1990, thus, the study was limited to the time period from 1990 to 2010. Country level data were averaged in such a manner to create an average of observations from 1986 through 1990 to make up the 1990 observation. An identical process was also used for 2000 and 2010. The data were then pooled to create a panel data set to study the relationship in the EU.

CHAPTER VII
ECONOMETRIC ANALYSIS

The most basic insight into the general relationship between finance and human development can be achieved by the examination of the correlation coefficient between the two variables. Correlation of HDI and its components with the financial variables were calculated using equation 2 where F represents a financial variable, E is the expected value, μ represents the expected value of F and HDI, and σ represents the standard deviation of F and HDI.

$$\rho_{F,HDI} = E[(F - \mu_F)(HDI - \mu_{HDI})] / (\sigma_F \sigma_{HDI}) \quad (2)$$

The calculated correlation coefficient is a number between negative one and positive one. With a positive one value the two variables are perfectly positively correlated. When the coefficient is negative one, the two variables are perfectly negatively correlated, in both cases linearly so. When the correlation coefficient is zero the variables are independent.

As can be seen in table 1, each of the financial measurements was statistically significant and positively correlated at the 10% level with HDI, with the exception of public bond market size. The finance-aggregate measure was found to have the largest correlation with human development, with a correlation coefficient of 0.7564 significant at the one percent level. Both measures of stock market liquidity were highly correlated with the HDI as well as banking size and development. Stock market size was also correlated

with the HDI at nearly a 0.5 correlation coefficient. Structure-aggregate, though correlated with the HDI, was not among the most highly correlated. However, structure-aggregate was significantly correlated with all three components of the HDI.

Table 1: Correlation of financial variables with the HDI and its components

Variable	HDI	GNI Index	Education Index	Life Expectancy Index
Bank Size	0.5063*** (0.000)	0.5993*** (0.000)	0.2206** (0.0401)	0.6907*** (0.000)
Bank Efficiency	0.3215*** (0.0019)	0.1441 (0.1731)	0.3200*** (0.0017)	0.1579 (0.1284)
Bank Profitability	0.2162* (0.1096)	0.2491* (0.0641)	0.0958 (0.4824)	0.1820 (0.1793)
Bank Development	0.4727*** (0.000)	0.4081*** (0.0001)	0.3882*** (0.0001)	0.4694*** (0.000)
Stock Mkt. Size	0.4995*** (0.000)	0.6987*** (0.000)	0.1146 (0.3483)	0.4917*** (0.000)
Stock Mkt. Turnover Ratio	0.4789*** (0.000)	0.3147*** (0.0085)	0.3501*** (0.0032)	0.4846*** (0.000)
Stock Mkt. Value Traded	0.5662*** (0.000)	0.4423*** (0.0001)	0.3674*** (0.0019)	0.5689*** (0.000)
Public Bond Mkt. Size	0.207 (0.1189)	0.1166 (0.3834)	0.1301 (0.326)	0.2998** (0.0211)
Private Bond Mkt. Size	0.3773*** (0.0053)	0.4179*** (0.0018)	0.2862** (0.0377)	0.228* (0.1007)
Structure-Aggregate	0.4185*** (0.0003)	0.3941*** (0.0008)	0.2584** (0.032)	0.3442*** (0.0038)
Finance-Aggregate	0.7564*** (0.000)	0.8133*** (0.000)	0.3144*** (0.0085)	0.8087*** (0.000)
Population Growth	0.1508 (0.1321)	0.3914*** (0.0001)	-0.1545 (0.112)	0.2576*** (0.0061)
Education Expenditure	0.5074*** (0.000)	0.3577*** (0.0004)	0.5098*** (0.000)	0.2939*** (0.004)
Healthcare Expenditure	0.6404*** (0.000)	0.5895*** (0.000)	0.4700*** (0.000)	0.5542*** (0.000)
Net Exports	0.4622*** (0.000)	0.6095*** (0.000)	0.2514*** (0.0112)	0.3062*** (0.0018)
Electric Power Consumption	0.6631*** (0.000)	0.6888*** (0.000)	0.5009*** (0.000)	0.5148*** (0.000)

Notes: ***denotes statistical significance at the 1% level, ** 5% level, and * 10% level

Judging from the results in table one, it can be expected that financial-aggregate, the measure of overall financial development of a financial system, will be the most significant variable in the overall regression models. However, at this point in the analysis it is safe to say that there is a high correlation between the financial system and human development no matter how you measure the financial system.

Ordinary least squares was used to test the significance and impact of each financial variable on HDI and its components by including the aforementioned control variables as well as time fixed effects and country specific random effects using equation 3 shown below. The notation used in equation 3 is described in detail in table 2.

$$\hat{y} = b_0 + b_1(F) + b_2(NX) + b_3(H) + b_4(E) + b_5 \ln(K) + b_6(P) + a_i + C_i + u_{it} \quad (3)$$

Table 2: Notation used in equation 3

Notation	Description
\hat{y}	HDI, GNI index, Life Expectancy Index, or the Education Index
F	Financial Structure variable
NX	Net Exports as to GDP
H	Healthcare Expenditure as a percentage of GDP
E	Public Spending on Education as a percentage of GDP
K	Electric power consumption per capita (kWh/capita)
P	Population Growth
b_0	Constant term
b_1	Coefficient on the Financial variable
b_2	Coefficient on net exports
b_3	Coefficient on the time variable
b_4	Coefficient on healthcare expenditure as a percentage of GDP
b_5	Coefficient on the public spending for education as a percentage of GDP
b_6	Coefficient on the natural log of electric power consumption per capita (kWh/capita)
a_i	Time specific fixed effects
C_i	Country specific random effect
u_{it}	Error term

Utilizing regression analysis the beta coefficients and statistical significance for each financial variable were calculated. The focus of the regressions was on the statistical significance of the financial variables, because it serves as a direct test of the hypothesis that financial structure has an impact on human development. Initially HDI and its components were regressed on each financial variable individually.

As can be seen in table 3, bank profitability and bank development were statistically significant at the five and one percent level respectively. In addition to banking profitability and development, public and private bond market size along with finance-aggregate were statistically significant at the one percent level.

To understand how each of the financial variables interacts with the components of the HDI individually, the same regression analysis as above was repeated with the components serving as the dependent variable. The results of the regressions with the life expectancy index as a dependent variable are listed in table 4. The only variables that were statistically significant were bank development, value traded, private and public bond market, and finance-aggregate. However, by restricting the acceptable significance level to one percent, only public bond market size and financial-aggregate are statistically significant in improving life expectancy.

Table 3: Individual Regression with HDI as dependent variable

VARIABLES	(1) HDI	(2) HDI	(3) HDI	(4) HDI	(5) HDI	(6) HDI
Bank Size	-9.00e-05 (7.86e-05)					
Bank Efficiency		3.11e-05 (4.24e-05)				
Bank Profit			0.000436** (0.000196)			
Bank Development				0.000843*** (0.000304)		
Stock Mkt. Size					3.64e-05 (0.000101)	
Turnover Ratio						7.74e-05 (5.82e-05)
Constant	0.325*** (0.0680)	0.341*** (0.0648)	0.291*** (0.0874)	0.314*** (0.0660)	0.284*** (0.0710)	0.269*** (0.0789)
Observations	72	73	56	72	69	69
Countries	28	28	28	28	28	28
Variables	(7) HDI	(8) HDI	(9) HDI	(10) HDI	(11) HDI	
Value Traded	9.16e-05* (5.43e-05)					
Public Bond		0.000434*** (0.000149)				
Private Bond			0.000177*** (6.62e-05)			
Structure-Aggregate				0.00343 (0.00233)		
Finance-Aggregate					0.0107*** (0.00389)	
Constant	0.276*** (0.0793)	0.366*** (0.0440)	0.413*** (0.0696)	0.312*** (0.0757)	0.417*** (0.0621)	
Observations	69	58	53	69	69	
Countries	28	23	22	28	28	

Notes: Robust Standard errors are reported in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

Table 4: Individual Regressions with the Life Expectancy Index as dependent variable

	(12)	(13)	(14)	(15)	(16)	(17)
VARIABLES	Life Exp.	Life Exp.	Life Exp.	Life Exp.	Life Exp.	Life Exp.
Bank Size	3.39e-05 (4.88e-05)					
Bank Efficiency		-4.44e-06 (3.00e-05)				
Bank Profit			0.000222 (0.000192)			
Bank Development				0.000404* (0.000213)		
Stock Mkt. Size					2.58e-05 (8.50e-05)	
Turnover Ratio						3.63e-05 (4.80e-05)
Constant	0.668*** (0.0602)	0.663*** (0.0577)	0.621*** (0.0699)	0.647*** (0.0586)	0.646*** (0.0641)	0.633*** (0.0635)
Observations	72	73	56	72	69	69
Countries	28	28	28	28	28	28
	(18)	(19)	(20)	(21)	(22)	
Variables	Life Exp.	Life Exp.	Life Exp.	Life Exp.	Life Exp.	
Value Traded	7.03e-05* (3.99e-05)					
Public Bond		0.000296*** (0.000112)				
Private Bond			0.000112* (6.35e-05)			
Structure-Aggregate				0.00246 (0.00195)		
Finance-Aggregate					0.00801*** (0.00229)	
Constant	0.635*** (0.0667)	0.741*** (0.0839)	0.749*** (0.104)	0.664*** (0.0682)	0.749*** (0.0764)	
Observations	69	58	53	69	69	
Countries	28	23	22	28	28	

Notes: Robust Standard errors are reported in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

For the education index and income (GNI index), healthcare expenditure as a percentage of GDP was excluded as a control variable, because theoretically, healthcare

expenditure should not lead to an increased education index or an increased income, even though they may be correlated.

Table 5: Individual Regressions with the Education Index dependent variable

VARIABLES	(23) Education	(24) Education	(25) Education	(26) Education	(27) Education	(28) Education
Bank Size	-0.000174 (0.000164)					
Bank Efficiency		8.84e-05 (0.000109)				
Bank Profit			0.000276 (0.000285)			
Bank Development				0.000991* (0.000524)		
Stock Mkt. Size					-0.000241 (0.000190)	
Turnover Ratio						0.000136 (9.41e-05)
Constant	0.0131 (0.135)	0.0845 (0.131)	0.155 (0.184)	-0.00410 (0.124)	0.0593 (0.123)	0.151 (0.136)
Observations	86	88	56	86	69	69
Countries	28	28	28	28	28	28
Variables	(29) Education	(30) Education	(31) Education	(32) Education	(33) Education	
Value Traded	4.47e-05 (0.000110)					
Public Bond		0.000605 (0.000385)				
Private Bond			0.000246 (0.000160)			
Structure-Aggregate				0.00306 (0.00472)		
Finance-Aggregate					0.00279 (0.00606)	
Constant	0.145 (0.133)	0.142 (0.150)	0.256 (0.180)	0.169 (0.133)	0.174 (0.163)	
Observations	69	58	53	69	69	
Countries	28	23	22	28	28	

Notes: Robust Standard errors are reported in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

The results of the education regressions listed in table 5, show that only bank development was significant at the ten percent level in improving education, while the complete opposite was the case for the GNI per capita, the income index.

Table 6: Individual Regressions with the Income Index dependent variable

	(34)	(35)	(36)	(37)	(38)	(39)
VARIABLES	GNI Index	GNI Index	GNI Index	GNI Index	GNI Index	GNI Index
Bank Size	8.23e-05 (5.26e-05)					
Bank Efficiency		9.30e-05** (3.97e-05)				
Bank Profit			0.000657** (0.000297)			
Bank Development				0.000713 (0.000446)		
Stock Mkt. Size					0.000303** (0.000129)	
Turnover Ratio						1.76e-05 (5.91e-05)
Constant	0.161* (0.0920)	0.154** (0.0759)	0.0742 (0.147)	0.0871 (0.0926)	0.263** (0.132)	0.163 (0.139)
Observations	86	88	56	86	69	69
Countries	28	28	28	28	28	28
	(40)	(41)	(42)	(43)	(44)	
Variables	GNI Index	GNI Index	GNI Index	GNI Index	GNI Index	
Value Traded	0.000137*** (5.20e-05)					
Public Bond		0.000316** (0.000128)				
Private Bond			0.000152* (8.43e-05)			
Structure-Aggregate				0.00470 (0.00367)		
Finance-Aggregate					0.0223*** (0.00564)	
Constant	0.181 (0.135)	0.351*** (0.136)	0.426*** (0.123)	0.209 (0.138)	0.478*** (0.102)	
Observations	69	58	53	69	69	
Countries	28	23	22	28	28	

Notes: Robust Standard errors are reported in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

Table 6 shows that bank efficiency and profitability, stock market size and public bond market size were all significant at the five percent level in determining the GNI index. In addition to private bond market size and the finance-aggregate being significant at the ten and one percent level respectively.

The financial variables, that were statistically significant and in possession of at least two observations per country, were included in a final regression. The purpose of the two-step process was to limit omitted variable bias and to compare the various characteristics and measurements of financial development simultaneously. After the formation of a final regression for HDI and each component, a joint F-test was conducted to test the joint significance of the financial variables. With multiple financial variables in a single regression, the potential for multicollinearity among the variables arose. Since each of the financial variables is measuring the characteristics of the financial system, they were correlated with each other. To account for correlation between financial variables, the correlated variables were regressed on each another along with the correlated control variables. The residuals obtained were used in place of the original variable.

The final regression results are listed in table 7. Two grouped regressions were calculated for the HDI. Regression 45 included the variable of banking profitability. However, due to the lower number of observations, 56 total, a second group regression was calculated for the HDI. The second regression for HDI also served as a test of robustness. Regression 45 showed that bank profitability, finance-aggregate, and bank development were each significant at the one, five, and ten percent level respectively. As an additional test of robustness, an F-test was performed to determine if the three variables were jointly significant. With a p-value of 0.000 it can be concluded that the variables are jointly

significant at the one percent level. This was also the case in regression 46 where the two variables, finance-aggregate and bank development, were found to be jointly significant even though banking development was individually only significant at the ten percent level. Finance-aggregate on the other hand was found to be highly significant, at the one percent level. Group measures were not created for the life expectancy index and the education index because only one variable had sufficient observations and enough statistical significance. Regression 47 was a regression of the GNI index on four variables, bank profitability, bank efficiency, stock market size, and the finance-aggregate. Bank profitability, finance-aggregate, and bank efficiency were statistically significant at the 1% level as well as positively related to the GNI index. In addition to their high individual significance, the variables are found to be jointly significant.

Table 7: Multi-Financial Variable Regressions with results from F-test

Regression VARIABLES	(45) HDI	(46) HDI	(47) GNI Index
Bank Profit	0.000483*** (0.000108)		0.000787*** (0.000229)
Bank Development	0.000444* (0.000269)	0.000433 (0.000287)	
Finance-Aggregate	0.00952** (0.00388)	0.0103*** (0.00391)	0.0247*** (0.00753)
Bank Efficiency			0.000169*** (4.99e-05)
Stock Mkt. Size			-4.72e-05 (0.000101)
Constant	0.340*** (0.0735)	0.325*** (0.0608)	0.188* (0.103)
Observations	56	68	56
Countries	28	28	28
Probability > F	0.000	0.0117	0.000

Notes: Robust Standard errors are reported in parenthesis, *** p<0.01, ** p<0.05, * p<0.1

CHAPTER VIII

DISCUSSION

The conducted analysis found that no single financial variable was significantly related to all the components of human development. However, financial development, as measured by the finance-aggregate variable, had a highly significant and positive relationship with human development, primarily through a positive relationship with income and health. The positive relationship with income is in agreement with Beck, Demirguc-Kunt, & Levine (2007) and Dollar & Kraay (2002). The results also reach a similar conclusion to Beck & Levine (2002). Testing to determine whether a bank-based or market-based financial system had an impact on human development, as measured by structure-aggregate, was found to be insignificant when included in regression analysis, while market-based financial systems were positively correlated with human development. Beck & Levine (2002) did not find evidence that the structure of a financial system, whether bank-base or market-based, led to better financing of the expansion of industries. However, they found that the overall financial development did lead to industry growth.

The results of the analysis point to a high correlation and significance of financial development and other financial characteristic measures with human development. However, causality was not tested due to limitations of the data. The paper relies on theory to provide the direction of causality from financial development to human development. Nevertheless, overwhelming evidence seems to point to a strong relationship between

finance and human development in the European Union. If the assumption of a positive relationship between economic growth and human development holds, the results are in agreement with King & Levine (1992, 1993a).

A potential criticism that could arise is that the observations of the countries that were missing in 1990 were not random and were because several of these countries were non-existent at the time. When the 1990 values were excluded and the tests were conducted using only 2000 and 2010 observations, the results were robust.

Additionally, at this moment there does not exist a universally accepted measure of financial development. The use of measures created by Beck & Levine (2002) and Beck, Demirguc-Kunt, & Levine (2000) allowed for some consistency but should a more appropriate measure of financial development arise it should be utilized. The same can be said about the human development index. Should a more appropriate index arise, it should be used to further study the relationship.

CHAPTER IX

CONCLUSION

The theoretical relationship between human development and financial development in the European Union has been strongly supported by empirical evidence presented in this paper. The aggregate measure of financial development, as used by Beck and Levine (2002) in testing the relationship between finance and industry growth, was found to be highly correlated and significant in determining human development. In addition to the measure of financial development, bank development, bank profitability and bank efficiency, created by Beck, Demirguc-Kunt, & Levine (2000) were somewhat significant. Stock market size and liquidity, as well as bond market size and banking sector size were positively correlated with human development.

The next step in research could go one of two ways. The sample size could either be increased to obtain a more generalized view of the relationship or the sample could be limited to a specific country analysis. If the European Union was interested in improving human development via financial development, then the most appropriate path would be to implement a policy to both increase the size and the overall financial activity of the financial systems in member countries. To determine which policy would do just that would require further study.

APPENDICES

APPENDIX A

Table 8: Control Variable Results for Individual Regressions with HDI

REGRESSION	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	HDI	HDI	HDI	HDI	HDI	HDI
Net Exports	3.24e-06 (0.000632)	0.000144 (0.000653)	-4.79e-05 (0.000717)	0.000444 (0.000738)	0.000181 (0.000587)	0.000347 (0.000620)
Health Expenditure	0.00189 (0.00251)	0.00105 (0.00221)	0.00506*** (0.00172)	0.00200 (0.00197)	0.000501 (0.00186)	-0.000310 (0.00244)
Electric Consumption	0.0500*** (0.00957)	0.0474*** (0.00867)	0.0558*** (0.0111)	0.0417*** (0.00859)	0.0537*** (0.00985)	0.0560*** (0.0108)
Education Expenditure	0.000495 (0.00426)	0.000796 (0.00398)	0.000348 (0.00402)	0.000188 (0.00352)	0.00253 (0.00397)	0.00265 (0.00399)
Pop. Growth	0.0189*** (0.00710)	0.0171*** (0.00543)	0.0114 (0.00738)	0.0153*** (0.00505)	0.0101 (0.00656)	0.00924 (0.00671)
Year 2000	0.0411*** (0.00639)	0.0407*** (0.00634)		0.0378*** (0.00594)	0.0400*** (0.00611)	0.0376*** (0.00485)
Year 2010	0.0709*** (0.00686)	0.0672*** (0.00767)	0.0236*** (0.00326)	0.0621*** (0.00697)	0.0680*** (0.00610)	0.0657*** (0.00511)
REGRESSION	(7)	(8)	(9)	(10)	(11)	
VARIABLES	HDI	HDI	HDI	HDI	HDI	
Net Exports	0.000324 (0.000606)	0.000173 (0.000790)	0.000282 (0.000676)	0.000277 (0.000615)	0.000763 (0.000596)	
Health Expenditure	-0.000202 (0.00254)	-0.000218 (0.00136)	-0.00296 (0.00220)	0.00110 (0.00205)	-0.000695 (0.00199)	
Electric Consumption	0.0552*** (0.0109)	0.0443*** (0.00507)	0.0424*** (0.00879)	0.0510*** (0.0106)	0.0407*** (0.00822)	
Education Expenditure	0.00275 (0.00397)	0.000736 (0.00280)	-0.000119 (0.00293)	0.00167 (0.00380)	0.00168 (0.00306)	
Pop. Growth	0.00952 (0.00691)	0.0134* (0.00711)	0.00216 (0.00787)	0.0112* (0.00637)	0.00248 (0.00673)	
Year 2000	0.0375*** (0.00498)	0.0455*** (0.00350)	0.0540*** (0.00591)	0.0370*** (0.00571)	0.0363*** (0.00475)	
Year 2010	0.0643*** (0.00488)	0.0725*** (0.00410)	0.0824*** (0.00650)	0.0666*** (0.00589)	0.0600*** (0.00671)	

Notes: Robust Standard errors are reported in parenthesis, *** p<0.01, ** p<0.05, * p<0.10

APPENDIX B

Table 9: Control Variable Results for Individual Regressions with Life Expectancy

REGRESSION	(12)	(13)	(14)	(15)	(16)	(17)
VARIABLES	Life Exp.	Life Exp.	Life Exp.	Life Exp.	Life Exp.	Life Exp.
Net Exports	0.000587 (0.000363)	0.000562 (0.000348)	1.47e-05 (0.000494)	0.000804** (0.000396)	0.000620 (0.000383)	0.000655 (0.000401)
Health Expenditure	0.00117 (0.00162)	0.00180 (0.00150)	0.00870*** (0.00199)	0.00237* (0.00142)	0.00301** (0.00142)	0.00278* (0.00159)
Electric Consumption	0.0214*** (0.00687)	0.0219*** (0.00674)	0.0248*** (0.00892)	0.0192*** (0.00618)	0.0228*** (0.00736)	0.0245*** (0.00732)
Education Expenditure	0.000334 (0.00207)	0.000410 (0.00210)	-0.000270 (0.00278)	0.000509 (0.00199)	0.00126 (0.00251)	0.00121 (0.00256)
Pop. Growth	0.0190*** (0.00592)	0.0200*** (0.00581)	0.0308*** (0.00771)	0.0194*** (0.00544)	0.0229*** (0.00681)	0.0232*** (0.00705)
Year 2000	0.0202*** (0.00462)	0.0202*** (0.00440)		0.0180*** (0.00459)	0.0173*** (0.00499)	0.0161*** (0.00456)
Year 2010	0.0460*** (0.00655)	0.0465*** (0.00619)	0.0168*** (0.00366)	0.0421*** (0.00692)	0.0409*** (0.00648)	0.0395*** (0.00576)
REGRESSION	(18)	(19)	(20)	(21)	(22)	
VARIABLES	Life Exp.	Life Exp.	Life Exp.	Life Exp.	Life Exp.	
Net Exports	0.000655* (0.000381)	0.000352* (0.000201)	0.000549** (0.000221)	0.000642* (0.000378)	0.000978** (0.000418)	
Health Expenditure	0.00261* (0.00152)	0.000755 (0.00124)	-0.00176 (0.00126)	0.00360** (0.00148)	0.00276* (0.00155)	
Electric Consumption	0.0246*** (0.00782)	0.0130 (0.00897)	0.0149 (0.0113)	0.0211*** (0.00788)	0.0124 (0.00878)	
Education Expenditure	0.00123 (0.00254)	0.000942 (0.00199)	0.000192 (0.00197)	0.000493 (0.00257)	0.000589 (0.00231)	
Pop. Growth	0.0232*** (0.00684)	0.0121** (0.00602)	0.00544 (0.00444)	0.0243*** (0.00695)	0.0194*** (0.00730)	
Year 2000	0.0151*** (0.00422)	0.0239*** (0.00375)	0.0288*** (0.00417)	0.0149*** (0.00469)	0.0135*** (0.00397)	
Year 2010	0.0374*** (0.00573)	0.0540*** (0.00606)	0.0616*** (0.00643)	0.0394*** (0.00540)	0.0329*** (0.00607)	

APPENDIX C

Table 10: Control Variable Results for Individual Regressions with the Education Index

REGRESSION	(23)	(24)	(25)	(26)	(27)	(28)
VARIABLES	Education	Education	Education	Education	Education	Education
Net Exports	-0.000303 (0.00141)	-0.000125 (0.00127)	-0.000362 (0.00117)	-0.000115 (0.00139)	3.50e-05 (0.00128)	-1.57e-05 (0.00123)
Health Expenditure						
Electric Consumption	0.0779*** (0.0171)	0.0665*** (0.0167)	0.0717*** (0.0228)	0.0686*** (0.0156)	0.0699*** (0.0168)	0.0587*** (0.0179)
Education Expenditure	-0.000102 (0.00697)	0.000760 (0.00678)	0.00110 (0.00831)	-0.00107 (0.00655)	0.00647 (0.00776)	0.00571 (0.00772)
Pop. Growth	-0.0131 (0.00975)	-0.0152* (0.00791)	-0.0223 (0.0146)	-0.0184** (0.00788)	-0.0127 (0.0159)	-0.0173 (0.0151)
Year 2000	0.110*** (0.0111)	0.109*** (0.0117)		0.105*** (0.0118)	0.0976*** (0.0107)	0.0863*** (0.00908)
Year 2010	0.165*** (0.0117)	0.155*** (0.0124)	0.0505*** (0.00674)	0.151*** (0.0124)	0.146*** (0.0121)	0.135*** (0.0101)
REGRESSION	(29)	(30)	(31)	(32)	(33)	
VARIABLES	Education	Education	Education	Education	Education	
Net Exports	-0.000172 (0.00129)	-0.000790 (0.00172)	-0.000113 (0.00170)	-0.000182 (0.00133)	-0.000152 (0.00140)	
Health Expenditure						
Electric Consumption	0.0595*** (0.0176)	0.0591*** (0.0179)	0.0480** (0.0217)	0.0573*** (0.0177)	0.0567*** (0.0197)	
Education Expenditure	0.00596 (0.00784)	0.000623 (0.00765)	0.00136 (0.00835)	0.00503 (0.00765)	0.00530 (0.00779)	
Pop. Growth	-0.0151 (0.0155)	0.00719 (0.0193)	-0.0126 (0.0224)	-0.0144 (0.0151)	-0.0162 (0.0172)	
Year 2000	0.0908*** (0.00951)	0.0968*** (0.0106)	0.102*** (0.0133)	0.0899*** (0.00994)	0.0911*** (0.0106)	
Year 2010	0.139***	0.140***	0.145***	0.141***	0.139***	

APPENDIX D

Table 11: Control Variable Results for Individual Regressions with the Income Index

REGRESSION	(34)	(35)	(36)	(37)	(38)	(39)
VARIABLES	GNI Index	GNI Index	GNI Index	GNI Index	GNI Index	GNI Index
Net Exports	0.00135** (0.000673)	0.00147** (0.000576)	0.000201 (0.000965)	0.00147** (0.000585)	0.000584 (0.00087)	0.000892 (0.000860)
Health Expenditure						
Electric Consumption	0.0683*** (0.0112)	0.0688*** (0.00891)	0.0782*** (0.0169)	0.0707*** (0.00985)	0.0553*** (0.0160)	0.0678*** (0.0166)
Education Expenditure	0.000517 (0.00297)	-0.000144 (0.00243)	0.00134 (0.00412)	-0.000760 (0.00244)	0.00179 (0.00390)	0.00211 (0.00405)
Pop. Growth	0.0171*** (0.00559)	0.0193*** (0.00590)	0.0267*** (0.00944)	0.0140*** (0.00425)	0.0212*** (0.00761)	0.0225*** (0.00750)
Year 2000	0.00113 (0.00588)	0.00519 (0.00558)		0.000910 (0.00592)	-0.00494 (0.00690)	0.000913 (0.00571)
Year 2010	0.00888 (0.00650)	0.0121* (0.00620)	0.00676 (0.00531)	0.00931 (0.00731)	0.00493 (0.00671)	0.0102 (0.00748)
REGRESSION	(40)	(41)	(42)	(43)	(44)	
VARIABLES	GNI Index	GNI Index	GNI Index	GNI Index	GNI Index	
Net Exports	0.000981 (0.000846)	0.00156* (0.000872)	0.00135** (0.000613)	0.000937 (0.000789)	0.00192*** (0.000527)	
Health Expenditure						
Electric Consumption	0.0660*** (0.0161)	0.0460*** (0.0163)	0.0390*** (0.0149)	0.0634*** (0.0167)	0.0349*** (0.0118)	
Education Expenditure	0.00192 (0.00403)	0.00103 (0.00208)	-0.000153 (0.00168)	0.000783 (0.00380)	-0.000376 (0.00274)	
Pop. Growth	0.0217*** (0.00780)	0.0185*** (0.00449)	0.0142*** (0.00518)	0.0236*** (0.00773)	0.00769 (0.00667)	
Year 2000	-0.00363 (0.00579)	0.00918* (0.00536)	0.0171*** (0.00461)	-0.00254 (0.00788)	-0.00988* (0.00558)	
Year 2010	0.00350 (0.00719)	0.0151** (0.00706)	0.0186*** (0.00700)	0.00984 (0.00789)	-0.0112 (0.00979)	

APPENDIX E

Table 12: Correlation amongst variables

VARIABLE	Bank Size	Bank Efficiency	Bank Profit	Bank Development	St. Mkt. Size	Turnover Ratio
Bank Size	1					
Bank Efficiency	0.3178*	1				
Bank Profit	-0.0543	-0.0454	1			
Bank Development	0.1826	0.0553	0.0845	1		
St. Mkt. Size	0.4113*	-0.0049	0.3017	0.2611	1	
Turnover Ratio	0.3614*	0.2964	0.0139	0.0637	0.1894	1
Variable	Value Traded	Public Bond Size	Private Bond Size	Structure Aggregate	Finance Aggregate	
Value Traded	1					
Public Bond Size	0.1237	1				
Private Bond Size	0.1672	0.1094	1			
Structure Aggregate	0.5557*	0.3021	0.1011	1		
Finance Aggregate	0.6728*	0.0882	0.3397	0.5109*	1	
Net Exports/GDP	0.1635	-0.1602	0.2104	0.2578	0.4095*	
Electric/capita	0.3527*	-0.1527	0.2894	0.4105*	0.5628*	
Health Expenditure	0.4695*	0.0248	0.5409*	0.2741	0.5209*	
Educ. Expenditure	0.2994	0.0549	0.5124*	0.3016	0.3634*	
Pop. Growth	0.2817	-0.0864	0.1152	0.1586	0.6378*	
Variable	Net Exports/GDP	Electric per capita	Health Exp.	Educ. Exp.	Pop. Growth	
Net Exports/GDP	1					
Electric Consumption per capita	0.6701*	1				
Health Expenditure	0.3180*	0.5722*	1			
Educ. Expenditure	0.1925	0.4511*	0.3819*	1		
Pop. Growth	0.2519	0.0608	0.0104	-0.1322	1	

Notes: * Denotes 1% statistical significance

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