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Does the Equity Market affect Economic Growth?

By: Kwame Fynn

December 15, 2011

Econ 381: Introduction to Econometrics

Professor Gary Krueger

This paper examines the impact of the stock market primarily on economic growth using panel data from 1990-2010. I apply Generalized Least Squares techniques for fixed effects with the exclusion of the subgroup 2005-2010 which uses random effects. The effect of the stock market on growth is

based on country-specific effects and varies in different time periods.

1. Introduction

Since the mid 1980's the world has experienced explosive growth in financial sector development of over 750%. By 2007, the value of the global stock market reached an all-time high of \$64.6 trillion representing 116% of global GDP. Has this growth in the financial sector led to growth in the real economy or has it been an unrelated coincidence?¹ Following the Great Recession in 2007-2009, the financial markets lost over \$15 trillion in wealth in a period of 14 months, leading to an increasing focus of policy makers on the role of the financial sector and its linkages with the real sector. Figure 1 shows that during the Great Recession, the difference between the size of the stock market and the economy was at its largest, a value of \$26.4 trillion. Empirical research on the linkages between the equity market and growth in the real economy in the 1990s showed a positive relationship primarily through the creation of liquidity² to increase savings and investment (Levine & Demirgüç-Kunt, 1996).

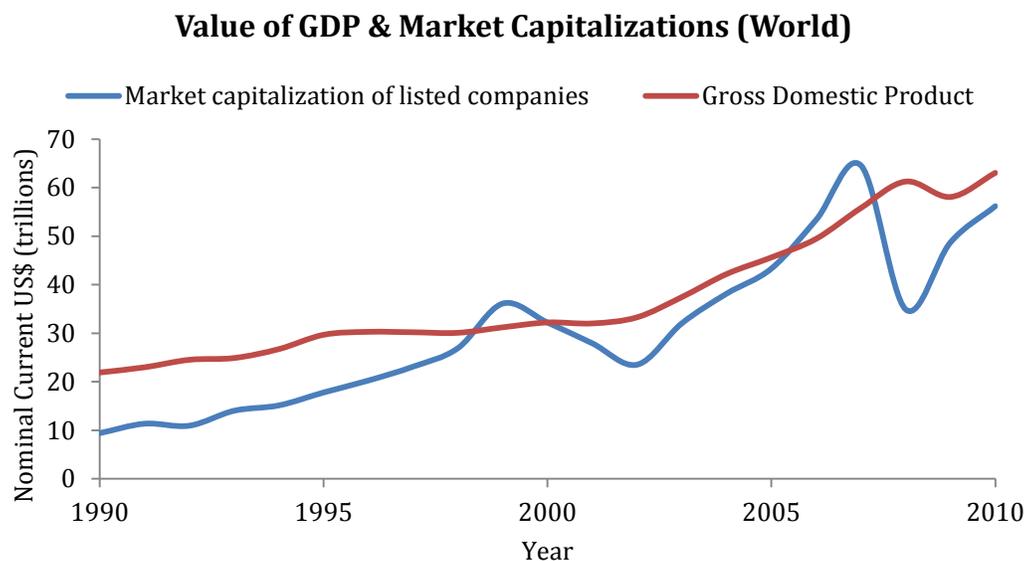


Figure 1: The size of the global economy and equity market in nominal values

¹ In the U.S. this relationship is often termed the links between Wall Street and Main Street.

² Liquidity is the ability of an asset to be converted in a market place without substantially affecting the price of the asset. This reduces the risk and increases the profitability of investments.

This paper investigates the role of the equity market, based on its ability to create liquidity for investors, on economic growth and on the industrial, manufacturing and service sectors. This paper is divided into six sections. The second section of my paper provides an academic review of the literature, focusing on econometric theory that examines the ability of the stock market to create liquidity in the economy. The third section introduces a conceptual model which relates the equity market to economic growth in the presence of other variables. Section 4 describes the ideal data, Section 5 provides a description of my actual data and model, and Section 6 analyzes and critiques my actual regression results. The study of financial markets and economic growth remains an area of increasing interest in econometric research; thus, the seventh section concludes with possible areas of future research.

2. Literature Review

2.1. Basic Economic Theory-The role of the Stock Market

Financial systems are capable of influencing savings rates, investment decisions, technological innovation, and subsequently long-run growth (Levine, 2004). Well-functioning stock markets allow private and public firms to raise capital by selling equity through an Initial Public Offering (IPO) or a secondary offering respectively. The primary advantage of the stock market is to create liquidity; however, the relationship between increased liquidity and growth is theoretically ambiguous. Additionally, stock markets encourage specialization, acquisitions and dissemination of information (Williamson, 1986). Enhanced liquidity can reduce the savings rate in investor uncertainty is reduced or if the income effect dominates the substitution effect. In this paper however, I focus on the positive effect of the stock market on economic growth. Liquid stock markets (a) increase the incentive to invest and the efficient allocation of capital, (b) improve corporate governance and reduce the principal agent problem³, (c) reduce the risk of investing, and (d) diversify portfolio risk (Beck, 2003). Empirical research provides conflicting predictions

³ The principal agent problem arises as a result of incomplete or asymmetric information creates a conflict of interest or moral hazard when an agent hires a principal to undertake specific duties.

relative to the direction of causality between growth and the equity market. According to Levine, more developed financial systems promote growth; however, in 1994, Stiglitz showed that economic development stimulates demand for financial services, which, in turn, brings about a more developed financial sector.

By providing information, the equity market entices savers to invest in economic activities they deem most profitable since they are likely to gain a return on their investment. Concurrently, firms are able to raise capital to finance their activities to develop and grow. Through stock ownership, liquid markets enhance corporate control by aligning the interest of managers and owners (Jensen & Murphy, 1990). Additionally, the value of an underperforming listed company can be appraised through the market value of its stocks in consideration of a takeover, and its acquisition through stock purchases. Levine suggests that liquidity, which is the ability to quickly sell off investments, is a key factor in attracting investors. As a result of the feasibility of trading, there is a reduced liquidity risk of investing in activities requiring long-term capital commitments. Additionally, savers can diversify their portfolios in order to hedge against idiosyncratic risk.

2.2. Previous Empirical Research

Previous empirical literature provides varying measures and methodologies on the effect of the stock market on economic growth. Research shows a positive relationship; however, there are discrepancies relative to stock market measurements, data types, the relationship between stock markets and financial intermediaries and the direction of causality.

Generally, previous research using cross-country data supports the hypothesis that financial development leads to economic growth. Levine and Zervos (1996), use the regression equation:

$$GROWTH = \alpha X + \beta(STOCK) + \varepsilon_i$$

where X is a set of control variables, $GROWTH$ is the real GDP/capita growth rate and $STOCK$ represents measurements of the stock market. This methodology employs the use of ordinary least

squares regressions and posits that economic growth is a result of stock market development. However, cross-sectional analysis assumes that countries have similar economic structures, population and technology levels (Arestis & Demetriades, 1997) and ignores conceptual effects such as changes in economic policies. The use of time-series data illuminates hidden details in averaged results, accounts for country specific shocks, and enables a formal test of causality. The use of Vector Auto Regression⁴ by Aresits and Granger-Causality test⁵ (Shan , Morris, & Sun, 2001) shows that causality differs among countries and depends on various external macroeconomic factors. Using data on modern industrialized countries, Shan shows a reverse and two-way causality between the stock market development and economic growth. To focus on long-run growth and alleviate the impact of business cycles, modern research uses panel data consisting of averaged five year periods. Initial values of the dependent variables are used to control for simultaneity, country specific effects and endogeneity in a Generalized Method of Moments⁶ (Levine & Beck, 2002) and show a significantly positive relationship between growth in the economy and stock market. Evidently, empirical research fails to concisely explain the direction of causality, thus offering room for further research.

Empirical research encompasses various indicators of stock market development, such as size, liquidity, international integration and risk diversification (Levine & Zervos, 1996). Size is measured as market capitalization⁷ as a percentage of GDP. Liquidity can be measured in two forms, namely, (a) the value of traded shares as a percentage of total market capitalization (the turnover ratio) which measures trading relative to the size of the stock market, and (b) the ratio of total shares traded to GDP. These variables account for how active and liquid a market is. A higher

⁴ Vector Auto Regression (VAR) techniques are able to explain linear interdependencies among multiple time series by describing how an endogenous variable develops relative to time however this econometric methodology is beyond my current econometric capability.

⁵ Granger causality test tests the hypothesis test to determine if one time series is capable of forecasting another variable however advanced methods of this econometric methodology is currently beyond my econometric capability.

⁶ Generalized Method of Moments estimates parameters on the basis of moment conditions which are functions of the model parameters. This econometric methodology is currently beyond my econometric capability.

⁷ Market Capitalization represents the market value of shares available.

turnover ratio, then, depicts a lower transaction cost. Further research by Levine shows that market size is an insignificant indicator of stock market development because the mere listing of a firm on an exchange does not necessarily spur growth. Productivity growth accounts for technological changes, improved quality of goods and services, and the amelioration of resource allocation, providing a better measure of economic growth relative to physical capital accumulation.

Firms raise capital through debt and/or equity; thus, empirical research focuses on the impact of the equity market in the presence of the debt capital market. To measure the ratio of liquid liabilities to GDP, before 1998, broad money divided by GDP was used; however, this lacked conceptual strength by including the activities of both central and commercial banks. To account for the ability of the private sector to issue debt, commercial bank loans and other private sector deposit-taking banks relative to GDP provided a stronger measure of bank credit (Levine & Zervos, 1998).

The strength of the link between the stock market and economic growth is assessed using both instrumental and initial conditions variables. Initial condition variables include initial real GDP per capital and average schooling to account for physical and human capital accumulation respectively. As postulated by Lucas in 1988, independent of the stock market, human and physical capital affect economic growth. Additionally, instrumental variables rectify endogeneity, estimate a direction of causality, and enhance our sensitivity analysis. Economists include macroeconomic factors such as political stability, monetary and fiscal policies⁸. In the presence of other variables that may influence economic growth, the stock market development maintains a positive relationship with growth (Levine & Beck, 2002).

3. Conceptual Model

I will use the methodology from previous empirical studies using panel data as my conceptual model (Levine & Beck, 2002). This model analyzes the cross-country growth regression using

⁸ These observations were compiled primarily from empirical research from Levine, Zervos, and Beck between 1993 and 2004.

instrumental and initial conditions variables with the inclusion of time dummies to account for time-specific effects.

$$y_{i,t} - y_{i,t-1} = \alpha y_{i,t-1} + \beta' X_{i,t} + \eta_i + \epsilon_{i,t}$$

y = logarithm of real per capita GDP, X = set of explanatory variables excluding lagged per capita GDP

η = unobserved country-specific effects, ϵ = error term where subscripts i and t , represent country and time periods respectively.

Explanatory variables include a measure for human capital and economic policy conditions which account for the black market, openness to trade, inflation and government expenditure.

Assuming the coefficient of stock market development is β_1 , this model primarily tests the following hypothesis in the presence of other explanatory variables:

$H_0: \beta > 0$ (There is a positive relationship between growth and the stock market)

$H_A: \beta \leq 0$ (There is no or a positive relationship between growth and the stock market)

4. Ideal Data

To test the hypothesis of a positive relationship between equity market development and economic growth, I would ideally require data consisting of all countries with a stock market over a long period of time, preferably 30 years with dummy variables to account for changes in economic policy over time; however, there is inadequate stock market data for developing countries. Country specific case-studies have shown strengths and direction of causality, so it would be beneficial to account for varying economic regimes; however, this begs the question of whether the stock market is beneficial to some or to all countries.

To account for the effect of the stock market on growth, I would need variables which estimate productivity growth/total factor productivity using labor and capital productivity; however, this is based on the assumption that all countries have the same production function. Economic theory is

ambiguous on influential measures of political stability and effective implementation of policy. As a result, government consumption relative to GDP acts as a proxy for political corruption, non-productive public expenditures or taxation. (Bekaert, Harvey, & Lundblad, 2000). As shown by Boyd, Levine, and Smith in 2000, the price level has a negative effect on financial development (Levine & Beck, 2002)

The use of time-series data will enhance our test of causality whereas panel data will examine the relationship by accounting for the effect of business cycles and short-term changes in the economy.

5. Actual Data and Model

By modifying the conceptual model provided by Levine and using panel data, my actual model tests the hypothesis of a positive relationship between the stock market and growth in the presence of control variables.

$$Growth = \alpha(Turnover\ Ratio) + \beta_1(Private\ Sector\ Credit) + \beta_2(Human\ Capital) + \beta_3(Government\ Consumption) + \beta_4(Inflation) + \epsilon$$

In this model, I measure the dependent variable, *Growth*, using real GDP/capita, industrial, manufacturing and services sector growth. Turnover ratio is our measure of stock market development. Our control factors include Private Sector Credit, Human Capital, Government Consumption and Inflation. These variables account for the debt capital market, human capital growth, government effectiveness and monetary policy respectively. Table 1 below summarizes the hypothesis test I will implement based on previous empirical research.

Variable	Null Hypothesis	Alternative Hypothesis
<i>Turnover Ratio</i>	$\alpha > 0$	$\alpha < 0$
Private Sector Credit	$\beta_1 > 0$	$\beta_1 < 0$
Human Capital	$\beta_2 > 0$	$\beta_2 < 0$
Government Consumption	$\beta_3 < 0$	$\beta_3 > 0$
Inflation	$\beta_4 < 0$	$\beta_4 > 0$

Table 1: Hypothesis Test based on previous empirical research.

The panel data I used is averaged over three non-overlapping 5 year periods and a 6 year period and was obtained from the World Bank (World dataBank). It consists of 50 developed and developing countries between 1990 to 2010. My data does not meet the necessary specifications of my ideal data since I do not have access to the black market premium which has been used by Levine (2002).

In order to account for the effect of the stock market on economic sectors, I incorporate growth in the industrial, service and manufacturing sectors. Additionally, I generate dummy variables to account for G7 countries, BRIC economies, and pre- and post Great Recession periods.⁹ I exclude Russia, the largest exporter of oil to generate another dummy variable for Brazil, India and China. Over the past two decades, growth in Russia has been spurred by an increase in oil prices whereas growth in Brazil, India and China is based on the productivity of capital and labor.

6. Results

Overall, the stock market does not have a positive effect on economic growth for my entire sample of 50 countries and the BRICs. However, stock market development is positively related to economic growth for G7 countries, Brazil, India and China. Relative to other industries, there is a positive relationship between the equity market and the manufacturing industry. For G7 countries current period growth is negatively impacted by the previous period turnover ratio; however, this relationship is the reverse for Brazil, India and China. We observe Russia to be an outlier and this may be attributed to the surge in oil prices significantly contributing to their economic growth. From my results the Great Recession seems to generate a discrepancy between long-term economic growth and the stock market development. Accounting for both periods pre-2005 and post-2005, equity markets were important in the manufacturing, services and industrial sectors; however, this

⁹ G7 countries (France, Germany, United States, United Kingdom, Italy, Japan and Canada) are a political and economic group with large economies.

BRIC economies are Brazil, Russia, India and China. These are developing countries deemed to be at a similar stage of economic development. These economies combined account for more than a quarter of the world's land area and more than 40% of world population.

is not observed by taking all time periods into consideration. Additionally, only the service sectors in Brazil, India and China agree with economic theory without rejecting any of the null hypotheses.

Turnover Ratio

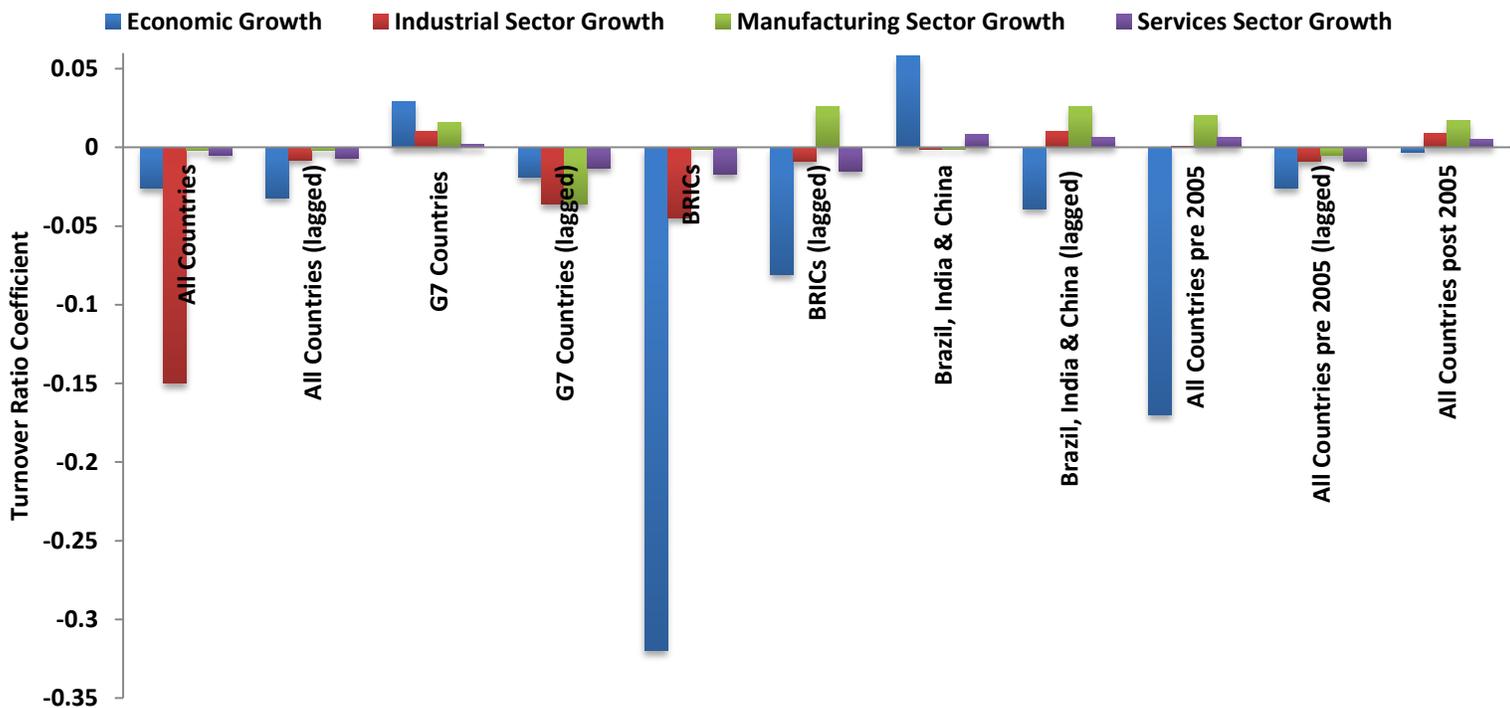


Figure 2: The effect for the Turnover Ratio on growth.

I also observe inconsistent results pertaining to my control variables¹⁰. A decrease in previous period inflation rates for G7 countries positively affected growth in the economy and the various sectors included in the study. However, during the 2005-2010 period, increasing inflation positively affected growth. Human capital and previous period private sector credit had the greatest impact on the BRIC economies between 1990 and 2010. With the exclusion of the overall effect for all countries, government consumption as a percentage of GDP positively affects growth in the manufacturing sector. This begs the question of whether certain industries benefit from the activities of the financial sector or if the main cause of growth is attributable to the public sector or the government.

¹⁰ Plots for the control variables have been appended as Appendix C.

Previous period measures of our independent variables seem to be a better measure of current economic growth as seen from the residual plots (Appendix D). By lagging all variables, I alleviate potential endogeneity and reduce homoscedasticity thus my data is more consistent with previous empirical research relating the stock market to economic growth.

7. **Conclusion**

This paper examines the hypothesis that stock market development leads to economic growth. The study yields positive effects for some economies and some sectors; thus, I fail to outwardly reject the null hypothesis that turnover ratio is greater than zero. The effect of the equity market on economic growth varies per region and time periods.

The results shown in this paper are partially consistent with previous research (Levine & Zervos, 1998) on the effects of the stock market on different sectors of the economy. However, it is important to note some limitations of this study. By excluding openness to trade, I fail to account for the international integration of the stock market. Although shares are traded on the domestic exchange, listed firms include multinational companies and large exporters.

Secondly, economic regimes and external factors differ across countries and impact growth in different ways as observed from the rise in oil prices in Russia. This raises the question of whether the stock market development is a global phenomenon or if it varies on a case-by-case basis as shown by region specific studies (Shan , Morris, & Sun, 2001).

Future research should focus on the direction of causality between the stock market and growth. Does growth spur financial development or is the relationship reversed? Although I fail to find a positive relationship between the stock market and economic growth across all regions and countries, evidently, the stock market affects industries differently. Thus research should focus on which sectors benefit the most from the equity market.

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