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Notes:
This is a simplified (100 page) version of my original PhD thesis on Financial Development, Economic Growth and Stock Market Volatility. It focuses mainly on the empirical results that were found for the economy and the stock market of Bangladesh, and involves a substantial amount of econometric modelling.

For Time Series investigation, I used Co-integration, GARCH volatility and Granger Causality testing methods to confirm the results. Data are from the IMF, World Bank and Dhaka Stock Exchange.


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CHAPTER 1
INTRODUCTION & RESULTS OVERVIEW

1.1 Objectives and research questions

This study examines the *Finance – Growth Nexus* and the *Stock Market Infrastructure* in Bangladesh. Our objective is to answer the following questions. 1) What has been the impact of finance (banks and stock markets) on economic growth? 2) What are the determinants of bank development and stock market development?

1.2 What is financial development, and why is it important?

The financial sector represents the institutions in an economy offering financial services to consumers and firms. It can include everything from banks, stock exchanges and insurers, to credit unions, microfinance institutions and local money lenders. The focus here though shall be on the formal financial sector, that is, financial intermediaries or commercial banks, and the stock market which we will also refer to as the equity market.

The basic argument made by the New Growth or Endogenous Growth theory is that financial development helps to enhance liquidity of the financial system by reducing the amount of investment capital that is ‘lost’ in the intermediation process between savers and borrowers.\(^1\) Banks – and to an extent the equity markets – thus make it easier for investors to diversify and to minimize risk (particularly liquidity risk\(^2\)), and economic growth of GDP is accelerated via higher physical capital accumulation. While we agree with the main thrust of the New Growth theory, throughout the course of this study we intend to show that this definition needs to be sufficiently enriched in order to allow a greater role for interactions within the financial sector along with other feedback effects.

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\(^1\) See Levine (1997, 2004) for a literature review.

\(^2\) We note here that the model by Pagano (1993b) also uses risk diversification and liquidity-externalities to explain the growth in firm listings and investor trading on the stock exchange.
1.3 Why look at Bangladesh?

Over the past three decades Bangladesh experienced gradual regulatory and structural changes as financial liberalization, financial development, and deregulation became key priorities of government policy (Bangladesh Bank, 2006). This priority reflects the pressure for a more liberalized financial sector and market-orientated economy by the World Bank, IMF and other agencies. Bangladesh has addressed the problems in its financial sector by attempting to ease various restrictions and by strengthening regulatory supervision. The country has attempted to improve the operation of its financial sector by enhancing the growth of banks to a large degree and the stock market to a smaller degree.

As a result, the financial sector has displayed strong growth over a 25-year period (see figures 1 and 2 below). GDP, bank indicators and stock market indicators have trended strongly upward. This motivates a study of the relationships which could possibly be driving such growth.

It is of huge interest to empirically assess the effects of such financial policy reform and structural change for the economy. No study to our knowledge currently exists for Bangladesh which examines these issues in relation to both bank activity and stock market activity. The analysis for the Dhaka Stock Exchange in particular is new to the field. We use the latest econometric time-series techniques (the Pesaran, Shin, and Smith (2001) cointegration procedure) to offer a critique of existing theoretical work on the finance-growth relationship, along with GARCH and Granger Causality tests to investigate the stock market.
Figure 1
Graphs of real and financial variables: 1980-2005

(a) Real GDP per capita
(b) Real capital stock / output

c) Quasi-money / GDP
(d) Private-credit / GDP

(e) Number of listed companies
Assessing the performance of the financial sector

In table 1 below we present summary statistics of important real and financial variables for the economy. In terms of bank development, both the Quasi-money/GDP ratio and the Private-credit/GDP ratio displayed upward trends of similar magnitude over the full period 1980-2005. These two respective bank indicators displayed average 5-year growth rates of 6.60% and 7.44%. Looking at indicators of real development, GDP per capita grew at an average 5-year rate of 2.22%, while the capital stock grew faster at 4.69%. It is interesting to note that the change in the capital stock over time shows a similar pattern to the change in the financial indicators. In addition, the stock market has been impacted positively in the process of development. The number of companies approaching the stock market for listings\(^3\) has been steadily rising at an average 5-year rate of 10.92%. It is therefore apparent that Bangladesh’s financial sector (both in terms of its banks and its stock market) has shown signs of development over the last two and a half decades, and that economic growth has steadily increased too. However the bank development ratios

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\(^3\) While the number of listed securities has been constantly rising, it does not immediately follow that the total equity finance raised from issues has correspondingly risen. Indeed we have no way of knowing exactly how much capital all listed companies managed to obtain from their listings as only data for some of the larger companies was available for a handful of years. However, we may still make the assumption, based on the fact that IPOs of firms are almost always heavily oversubscribed by investors in Bangladesh, that firms are accustomed to issuing equity both publicly and privately.
have been low. This suggests that economic growth, whilst being consistent, has the potential to be greater.

Table 1
Summary Indicators of Real and Financial Development: 1980-2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Real GDP per capita</th>
<th>Real capital stock / output</th>
<th>Quasi money/GDP</th>
<th>Private credit/GDP</th>
<th>Listed companies</th>
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</thead>
<tbody>
<tr>
<td>1980</td>
<td>10826</td>
<td>68.91</td>
<td>7.20</td>
<td>5.77</td>
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<td>1981</td>
<td>10970</td>
<td>75.87</td>
<td>7.59</td>
<td>6.96</td>
<td>25</td>
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<td>1982</td>
<td>10958</td>
<td>83.93</td>
<td>8.14</td>
<td>7.34</td>
<td>28</td>
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<tr>
<td>1983</td>
<td>11121</td>
<td>90.31</td>
<td>10.35</td>
<td>9.26</td>
<td>43</td>
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<td>1984</td>
<td>11415</td>
<td>95.79</td>
<td>11.91</td>
<td>12.12</td>
<td>56</td>
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<tr>
<td>1985</td>
<td>11504</td>
<td>102.77</td>
<td>12.16</td>
<td>13.44</td>
<td>69</td>
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<tr>
<td>1986</td>
<td>11716</td>
<td>108.60</td>
<td>13.39</td>
<td>13.16</td>
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<td>1987</td>
<td>11878</td>
<td>115.05</td>
<td>14.65</td>
<td>13.68</td>
<td>85</td>
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<td>1988</td>
<td>11863</td>
<td>123.17</td>
<td>13.75</td>
<td>14.94</td>
<td>101</td>
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<td>1989</td>
<td>11901</td>
<td>130.91</td>
<td>17.13</td>
<td>16.57</td>
<td>116</td>
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<td>1990</td>
<td>12325</td>
<td>134.33</td>
<td>16.83</td>
<td>16.66</td>
<td>134</td>
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<td>1991</td>
<td>12449</td>
<td>140.11</td>
<td>17.72</td>
<td>15.92</td>
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<tr>
<td>1992</td>
<td>12780</td>
<td>143.25</td>
<td>18.25</td>
<td>14.55</td>
<td>145</td>
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<td>1993</td>
<td>13664</td>
<td>147.45</td>
<td>18.87</td>
<td>15.29</td>
<td>153</td>
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<td>1994</td>
<td>13397</td>
<td>152.77</td>
<td>20.49</td>
<td>16.27</td>
<td>170</td>
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<td>1995</td>
<td>13551</td>
<td>157.23</td>
<td>20.06</td>
<td>20.88</td>
<td>183</td>
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<td>1996</td>
<td>13983</td>
<td>162.76</td>
<td>20.37</td>
<td>21.60</td>
<td>186</td>
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<td>1997</td>
<td>14435</td>
<td>167.79</td>
<td>21.24</td>
<td>22.79</td>
<td>202</td>
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<td>1998</td>
<td>14686</td>
<td>173.93</td>
<td>21.66</td>
<td>23.24</td>
<td>208</td>
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<tr>
<td>1999</td>
<td>15303</td>
<td>181.08</td>
<td>23.83</td>
<td>24.41</td>
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<tr>
<td>2000</td>
<td>15996</td>
<td>186.18</td>
<td>26.40</td>
<td>25.56</td>
<td>221</td>
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<tr>
<td>2001</td>
<td>16411</td>
<td>191.94</td>
<td>27.66</td>
<td>26.71</td>
<td>230</td>
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<tr>
<td>2002</td>
<td>16307</td>
<td>199.42</td>
<td>29.30</td>
<td>28.93</td>
<td>239</td>
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<tr>
<td>2003</td>
<td>17355</td>
<td>203.38</td>
<td>31.11</td>
<td>28.75</td>
<td>247</td>
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<tr>
<td>2004</td>
<td>18099</td>
<td>209.69</td>
<td>32.54</td>
<td>30.14</td>
<td>250</td>
</tr>
<tr>
<td>2005</td>
<td>18726</td>
<td>215.45</td>
<td>34.35</td>
<td>31.65</td>
<td>262</td>
</tr>
</tbody>
</table>

Source: World Bank and IMF online databases; author’s own calculations

Table 2
5-Year Average Growth Rates

<table>
<thead>
<tr>
<th>Period</th>
<th>Real GDP per capita</th>
<th>Real capital stock / output</th>
<th>Quasi money/GDP</th>
<th>Private credit/GDP</th>
<th>Listed companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981-1985</td>
<td>1.23</td>
<td>8.34</td>
<td>11.40</td>
<td>18.80</td>
<td>26.53</td>
</tr>
<tr>
<td>1986-1990</td>
<td>1.40</td>
<td>5.51</td>
<td>6.82</td>
<td>4.50</td>
<td>14.24</td>
</tr>
<tr>
<td>1991-1995</td>
<td>2.07</td>
<td>3.20</td>
<td>3.64</td>
<td>5.36</td>
<td>6.47</td>
</tr>
<tr>
<td>2001-2005</td>
<td>3.33</td>
<td>2.96</td>
<td>5.41</td>
<td>4.41</td>
<td>3.47</td>
</tr>
<tr>
<td>Average</td>
<td>2.22</td>
<td>4.69</td>
<td>6.60</td>
<td>7.44</td>
<td>10.92</td>
</tr>
</tbody>
</table>
1.4 What this thesis will attempt to do

Given the pressing need for higher economic growth of GDP in Bangladesh, what role, if any, can the financial sector play?

**Model 1: The Finance-Growth Nexus**

*Model 1* says that both banks and stock markets enhance economic growth, economic growth leads to bank development, and banks and stock markets are complementary in the process of development. *Model 1* therefore encompasses a number of different mechanisms. This allows for greater insights to be achieved as well as stronger policy recommendations to be given.

**Model 2: The Stock Market Infrastructure**

*Model 2* (two sub-models: 2A and 2B) says that the listing of shares by firms and the trading of shares by investors are related, trading volume and conditional price volatility reflect information flow arrivals to the stock market, and stock returns are causally related to trading volume.

Why these two separate models, *Model 1* and *Model 2*? In addition to establishing relationships within the finance-growth nexus where banks and stock markets are shown to coexist in the process of development, the stock market itself will be shown to develop according to its own infrastructure. What this means is that, although the stock market may be tied to the overall growth process and to the development of banks (as in *Model 1*), the stock market in Bangladesh is also impacted by the development of its own factors. Stock market liquidity or trading, the number of listed shares, and the trading volume – price volatility aspects are all important for equity markets (as in *Model 2*).

This thesis argues that *Model 1* together with *Model 2* adequately captures the main dynamics of the Finance-Growth Nexus and Stock Market Infrastructure in Bangladesh.
1.5 The five main effects

Not only is evidence for such relationships of interest in its own right. This thesis for the first time attempts to unify the two areas in the literature – the finance-growth nexus and stock market infrastructure – that were previously considered to be separate. And we do it for the case of Bangladesh, one of the poorest countries in the world, but one that we think has a huge potential to grow its financial sector.

The five main effects (or relationships) which help drive this structural model of the financial system and real economy are identified as the following:

(i) **Finance - to - Growth**
(ii) **Growth - to - Finance**
(iii) **Banks - to - Stock Market**
(iv) **Market Listing - to - Stock Trading**
(v) **Stock Trading - to - Return Volatility**

**The finance-to-growth effect**

Banks and the stock market can accelerate GDP growth via physical capital accumulation. This result is established through a liquidity provision argument and it is the main theoretical prediction of the Greenwood and Smith (1997) model. The bank development indicator is the finance-to-growth effect is quasi-money/GDP, while the stock market indicator is the number of listed companies.

**The growth-to-finance effect**

Economic growth leads to bank development. More GDP growth leads to more bank branches entering the financial sector, and higher competition will usually reduce the cost of financial intermediation. The level of private credit – which here now represents bank development – is then increased. This is the main theoretical prediction of Harrison, Sussman and Zeira (2004).
The banks-to-stock market effect

There are strong reasons to expect why a connection between bank development (private credit) and stock market development (number of listed companies) might occur. As more bank debt is issued, companies may issue more equity to counter moral hazard concerns and also to take advantage of higher equity prices, so that essentially equity development is the by-product of bank development. This is the main theoretical prediction of Besanko and Kanatas (1993).

The listing - trading effect

As more companies list their shares on the stock exchange, trading in those shares is expected to increase. This higher trading in shares will again encourage more firms to list their shares, thereby leading to multiple equilibriums. This ‘listing-trading’ effect is identified in the Pagano (1993b) model and establishes how the stock market may essentially develop according to its own forces. Market liquidity (investor trading) and the number of listed companies (initial public offerings or secondary offerings of shares) are thus essential drivers of stock market development.

The volume - volatility and trading - stock return effect

The persistence in volatility and other features of stock returns is well documented in the literature. But what drives the volatility process? These theoretical predictions are put forward in the Lamoureux and Lastrapes (1990) and the Suominen (2001) models. In LL (1990), trading volume flow acts as a proxy for information arrival to the market, and inserting this variable into the GARCH model reduces the volatility persistence parameter. This mean trading volume is responsible for the volatility clustering over time. In addition, Suominen (2001) extends the framework to a causal relationship between trading volume and market returns.

When considered together, these ‘five main effects’ combine to make the finance-growth nexus and stock market infrastructure.
1.6 Main contributions – What do our results show?

This is the first major work that relates financial development and financial structure to the process of economic development in Bangladesh using advanced time-series techniques. The analysis for the Dhaka Stock Exchange (DSE) by itself represents a new contribution to the literature. As above, we separate our results into two main blocks.

*Model 1’s* results on the finance-growth nexus are the following.
1.6.1 Results for Model 1: “The Finance – Growth Nexus”

- *Bank development has enhanced growth.* For Bangladesh, the channel of finance-to-growth operates via the capital stock with bank deposits representing financial development.
- *The growth-enhancing effect is only when banks enter with the stock market.* In other words, the financial sector needs to be seen in its aggregate form if a positive finance-to-growth effect is to be observed.
- *Banks and stock markets are complementary.* Bank activity appears to promote stock market activity. Stock markets benefit from more bank development.
- *Economic growth leads to more bank development.* With greater GDP growth, Banks respond to greater demand by extending more credit.

Model 2’s results on the stock market infrastructure are the following.

1.6.2 Results for Model 2: “The Stock Market Infrastructure”

- *Trading in stocks leads to more shares being listed.* As long as companies decide to list shares and investors wish to trade in them, the stock market expands, and can thus develop somewhat independently, of both the banks and the overall growth process.
- *Trading can predict stock returns and stock returns can predict trading.*
- *Trading can improve the prediction of future volatility.*
- *Trading value is superior to trading volume in all econometric modelling.*

1.7 Empirical Results for Bangladesh: Overview

Findings for Model 1: ‘The Finance-Growth Nexus’

*Banks Accelerate Economic Growth*

(i) Bank development and stock market development help to accelerate economic growth in Bangladesh. A cointegrating relationship between Physical Capital accumulation, Quasi-money/GDP and the number of listed companies is found in which the bank variable and stock market variable are the long run forcing variables in the relationship.
The positive finance-growth relationship obtained in this work also agrees with the findings of previous researchers who find that indicators of banks and stock markets are important in explaining growth for various countries (both advanced and developing).

**Growth drives Bank development**

(ii) There is a second cointegrating relationship, this time going in the reverse direction. With bank development now represented by Private-Credit/GDP and economic growth represented by Real GDP per capita, it is growth now which is observed to be the long-run forcing variable for banks. This highlights an additional chain in the finance-growth relationship for Bangladesh. Growth can drive the process of financial development.

**Bank development drives Stock Markets**

(iii) We find evidence of complementarity between banks and the stock market. A cointegrating relationship is found between bank development (Private-Credit/GDP) and the number of listed companies on the stock exchange. The long run forcing variable in this relationship is the bank variable. This result demonstrates the effect of financial interaction, or financial innovation, for the overall development of the financial sector in Bangladesh, whereby higher bank development leads to equity market development.

Findings for Model 2: ‘The Stock Market Infrastructure’

**(A) Stock Trading drives Market Listing**

(iv) There is a cointegrating relationship between the value of shares traded on the stock exchange and the number of listed securities. Such a relationship means that, even though banks and the growth process lead to stock market growth (as in Model 1), the infrastructure within the stock market itself can be stimulated by encouraging greater trading participation in the equity market. Note that it is only when trading value (or turnover) is used as the indicator of investor trading that a cointegration relationship is verified: when we use trading volume we cannot detect evidence for cointegration.

**(B) Trading Volume & Trading Value drives Stock Returns**

(v) GARCH results in Model 2B show that incorporating trading activity results in conditional volatility models that are more stable. Except for one case, there was little
reduction in the GARCH persistence parameters. This however may be explained by the fact that the conditional variance continues to remain due to overall trading dynamics. Granger Causality results also indicate that the stock return (and returns volatility) is somewhat predictable using trading indicators. In conditional volatility and causality tests, and like the ARDL results, trading value displays better effects than trading volume. This suggests that future work should focus on why value rather than volume of trade is well-suited in forecasting price behaviour on stock markets.

1.9 Executive Summary of Empirical Results

In the context of the Bangladesh economy (1980 – 2005) and the Dhaka Stock Exchange (1990 – 2005; 1995 – 2007), the following conclusions are drawn from our analysis:

- (1) Banks together with the stock market accelerate economic growth;
- (2) Economic growth accelerates Bank development;
- (3) Banks and Stock Markets are complementary.
- (4) Stock Market listings and Investor Trading are complementary;
- (5) Trading volume – Price Volatility effects occur on the stock exchange.

These results are in line with previous findings made by other researchers, but they also throw a new light on financial structure evolution. Our new results indicate that Bangladesh, a developing country at an early stage of development, could have massive potential to grow rapidly in coming years in its financial and real economy.

More details on these empirical results are shown in the subsequent chapters.
2.0 Conclusion

We have presented an overall theoretical framework for what we call the “Finance-Growth Nexus and Stock Market Infrastructure”. We have attempted to justify why banks have a key position in accelerating economic growth, and why the stock market exists to complement the banking sector. The stock exchange may also develop to some extent on its own and thereby contribute also to growth. The framework is built around ‘five main effects’. Together these combine to produce the Finance-Growth Nexus and Stock Market Infrastructure – a story of a bi-directional relationship between Finance and Growth in which both the financial structure and the process of development are endogenously determined.

2.1 Policy Implications for Regulators

For Bangladesh but also for the emerging countries in general, a number of recommendations can be made. The main policy recommendation for financial regulators is on improving the overall health and stability of the financial system, with special emphasis placed on strengthening banking supervision and other factors relating to bank development. Banks are the lifeblood of the economy and occupy a key position for GDP economic growth. At the same time, however, the stock market should be promoted and effectively regulated. This is because a rich variety of equity market dynamics are present on the Stock Exchange, including a channel between banks and equity markets, and within the stock exchange itself, between trading volume and volatility of returns. Banks and stock markets can therefore be viewed as complementary despite having separate and unique roles, roles which nevertheless tend to become increasingly connected over time.

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