World Review of Business Research
Vol. 5. No. 1. January 2015 Issue. Pp. 39 – 57

Aftermath of the U.S. Subprime Mortgage Crisis of 2007-09: A Comparison among USA, Bangladesh and Vietnam

Muhammad Mahboob Ali*, Anisul M. Islam**, Chu V. Nguyen***
and Joe Glenn Smith****

The objective of this study is to empirically determine how the U.S. subprime mortgage crisis of 2007-09 affected the Bangladesh economy such that the findings may provide policy makers with some basis for formulating policy responses to future such crises. The findings suggest that Bangladesh experienced only a small reduction in trade flows and that the impact of the crisis on the Bangladesh economy coincides with the U.S. For comparison, results for Vietnam suggest that had the crisis originated in the Middle East, from where Bangladesh received the predominance of its expatriate transfers, the impact of the crisis would have been more severe. Accordingly, Bangladeshi policy makers should be aware of this pattern in designing their future actions in response to international financial crises: not only the magnitude of the disruption matters but also where it originates and the kind of financial flows that are principally affected.

Field of Research: Global financial crisis, Bangladesh, Vietnam, USA.

1. Introduction

Mian, et al. (2013) observe a possible political economy explanation for why financial crises often lead to prolonged economic slumps and why it becomes difficult to reach a policy consensus in the aftermath of a financial crisis, as crises likely bring gridlock through polarization and gridlock in turn may delay needed reforms thus making recovery slower.

In the age of globalization, where technological advances shrink spatial dimensions of the world economy, component open economies have become as intertwined as a spider's web. With the birth of GATT and the World Trade Organization (WTO), international trade volumes have increased exponentially. Unprecedented international capital mobility due to the advancement in communication technologies has been an impetus for nations to advance their economies and dramatically improve their social welfare outcomes in the last third of the twentieth century. Ironically, the increase in the mobility of international financial capital can often be the source of financial crises of global proportion as the sudden reduction in international trade flows abruptly disrupts national economic activities.

In the current era of international economic integration, the U.S. subprime mortgage crisis is not the first nor will it be the last far-reaching financial calamity as the European debt

*Professor ,Department of Business Administration ,Daffodil International University, Bangladesh and Chairman, Center for Breakthrough thinking in Bangladesh.email:pipulbd@gmail.com
**Professor of Economics and Director of Economics and International Business Degree Programs, University of Houston-Downtown, USA. Email: islama@uhd.edu
***Associate Professor of Economics, University of Houston-Downtown, USA. Email: NguyenChu@uhd.edu
**** Adjunct Professor of Economics and Accounting, University of Houston-Downtown, USA. email: joegsmith@netzero.net

crisis provides a vivid testimony of this contention. The objective of this study is to ascertain empirically how international economic crisis affected the Bangladeshi and Vietnamese economies so that empirical findings may provide policy makers with some basis for formulating responses to future such crises.

The impact of the 2007-09 U.S. subprime mortgage collapse on a developing economy is presumed to be at least three-fold. First, because globalization interconnects the U.S. and most developing economies much closer, increased trade volumes between the U.S. and these countries result. Second, when a crisis pushes a major advanced economy like the U.S. into recession, its demand for imports necessarily decreases thereby causing an immediate strain on its developing trading partner. Third, legal and illegal expatriates from the developing economy to the more developed and oil-rich economies can be a significant source of financial capital inflow in the form of financial support to their families such that these transfers likewise become severely interrupted when the expatriate host countries experience a financial crisis. Moreover, due to the nature of their jobs, guest worker employment is dislodged well before that of their native counterparts. Some of these guest workers return home while others remain but can no longer earn as much as they had previously when the host economy was in the expansionary phase. The effects of altered trade flows and reductions in repatriated funds are magnified further still through the foreign trade expenditure multiplier. And while a BRICS bank has now emerged, it will not be so easy to replace the World Bank or the IMF and will at best only serve as a regional rather than a more influential global bank.

The discounting process to equity valuations used by investors to incorporate news, such as portending crisis, depends on the characteristics of population size and its temperament, the politics, and the nature of the economy. Therefore, in order to study the issue of global financial crisis and the resilience of Bangladesh and Vietnam, the principal research question of the study will be how best to cope with the aftermath of a global crisis and whether (or when) a new economic order in the global arena will materialize. With the above issues in mind, the remainder of the paper organized as follows.

Section 1 presents the literature review focusing on those papers which discuss the initial effects of the crisis, both in Bangladesh and Vietnam separately and the global economy as a whole. Section 2 discusses the current the state of the Bangladesh and Vietnam economy and finance. Section 3 describes the methodology of the study, with Section 4 discussing results and analysis. Lastly, the conclusion and policy implications of the study are presented in Section 5.

2. A Brief Literature Review on the Origin and sources of the 2007-09 Global Crisis

Increased globalization and more interconnected world economies have benefited many countries, but at the same time, created increased vulnerabilities of economic and financial crises quickly spreading from one country to another. It is now well recognized that the 2007-09 global recession was massive in its impact not only on the U.S. economy where it originated, but also on many other economies across the world. The debate on the origin and sources of the crisis is still being debated and perhaps would continue in the future.

Regarding the origin of the financial crisis in the U.S. and the subsequent global contamination, the economics and finance literatures are replete with a variety of theories to explain why the U.S. sub-prime mortgage market collapsed and how the global economic contraction ensued. Some authors took a systemic approach, such as Wolf (2013), who, all too predictably (and exasperatingly), evoked the nagging socialist diatribe condemning capitalism itself and its foundational and inherently 'unfair' private property tenants as the obvious (vile) culprit. Others, like Hassan (2013), although in a far less accusatory tone, nonetheless boldly proffered a 'whole new approach' to the resource allocation problem that would be needed as both free enterprise and central planning were both failing. Still others, like Mankiw (2010) and Taylor (2010), sided at the other end of the spectrum argued based on the neo-classical orthodoxy of Milton Friedan and his Nobel-winning criticism that in fact it is Keynesian counter-cyclical policy itself which were the sources (ironically) of the very disturbances these policies were supposed to correct.

Finally, along somewhat similar lines, Helenius (2011) interpreted the crash in terms of the Soviet economist Kondratiev and his Wave Theory, or Long Waves Theory today, hypothesizing that business cycles are the inevitable but otherwise unpredictable result of 50-100 year-long historical, political and social forces (an idea closely akin to another relatively recent theoretical development, this time in the mathematics community; namely, chaos theory).

But far, the 'majority report,' as summarized again by Hassan (2013), identified three fundamental sources for the U.S. financial bubble; namely, excessive risk-taking behavior through excessive leveraging and shorting by U.S. financial institutions, the overall complexity of mortgage derivative products and failure to discount them properly, and poor enforcement by regulatory agents and processes creating moral hazards which in turn spawned the resulting reckless speculation.

According to Brunnermeier (2009) and Mizen (2008), the traditional "originate and hold" model of mortgage financing had been transformed into a ultra-risky "originate and distribute" model as financing structure by creating collateralized debt obligations together with insurance instruments for them called credit default swaps. Adding fuel to the fire, they continued, were the rating agencies who themselves did not fully understand these highly sophisticated derivative products and structures thus providing faulty opinions at best, and negligent at worst. Similarly, Tanvir and Chowdhury (2011) echoed the similar sentiment by noting that even the most experienced investors were not really aware of the inherent dangers posed by these "engineered" financial products.

Finally, regarding the breakdown of regulatory oversight, Helleiner and Pagliari (2008) argued that the failure began with the financial institutions themselves who abandoned their own internal control protocols and central fiduciary corporate governance roles owing to plain base greed aroused by the enormous and regular flow of profits – 'well-deserved' – for their clever financial engineering work. And as both Brunnermeier (2009) and Mizen (2008) again noted, U.S. regulators were prohibited from exercising their otherwise properly ascribed monitoring functions by housing laws enacted in the 1970s regarding required lending practices to low income borrowers, thereby paving the way for the moral hazard incentive to raise its (ugly) head as such loans were (and continue to be) backed by the federal government; the inevitability of the intrinsic moral hazard problem outcome was insightfully (and delightfully) illustrated by Roodposhti and Goudarzi (2009) using a game theory approach.

In the immediate wake of the global financial crisis, several additional key outcomes and observations should be highlighted. In terms of its magnitude and historical significance on global trade flows, Wynne and Kersting (2009) write that the world trade declined by a magnitude that was twice that of the Great Depression period, 32% versus 15%, respectively, in the first year alone. As Blanchard (2008) observed, the initial sub-prime market loss in U.S. was miniscule compared to the subsequent amplified effects on the global economy – 20 times – and the global equity market - 100 times. As a response, as attested by Hassan (2013), governments of most if not all of industrialized countries administered massive bailout packages – more than $1 billion in debt-equity swaps for U.S.-based Chrysler alone – and allocated massive amounts of liquidity injections – in excess of $7 trillion – to revive their sinking economies. As Loser (2009) explained, badly shook confidence in global financial institutions and markets intensified fundamental solvency concerns and thus triggered a cascading series of bankruptcies, forced mergers, and public interventions. Similarly, Rosengren (2012) emphasized that because of the underlying uncertainty about the value of collateral, investors panicked once large losses on subprime mortgage assets and complex products amplified. But broadly speaking, Anwar (2009) argued that it was institutional failure in the form of both market and government breakdowns that were, in the final analysis, responsible for the crisis.

Lastly, from a fundamental perspective, Ahmed (2014) and Acemoglu, et al. (2004) argued, sensibly, that economies with better-defined property rights, stable rules of law, free market competition and minimized rent-seeking behavior would have far better performance and faster growth recovery in the aftermath of the global financial shock than those without.

Aziz (2014) argues that policies and reforms have followed successive financial crises which have contributed significantly towards strengthening the resilience of financial systems and economies across the world. Going forward, however, financial crises are inevitable and our efforts will never be enough to prevent the next mega tidal wave. Moreover, the next such event is unlikely to be identical to those experienced previously. The exact manifestation of a future financial crisis will be different amid a vast and rapidly changing social landscape. The lesson to be drawn is that crisis prevention, while important, will not be sufficient. But policy makers nonetheless need to be prepared as much as possible to deftly navigate their economies through these storms.

3. Impact on Bangladesh, Vietnam and Selected Asian Economies

Many predictions were made concerning the fate of the Bangladesh economy as a result of the financial crisis ranging from benign to dire. Islam and Quddus (2008) cautioned that because the Bangladesh export market was highly concentrated in a few rich country markets, exceeding 90% of total export earnings derived from the U.S. and the EU, 75%, most of which derived from the ready-made garments they country leading employer, the impact would be severe. Imam (2009) who hedged by saying that Bangladesh may not be affected that much at all, at least in the short run, where the ultimate impact on growth depends largely on how long the recession lasts and the depth and severity of the effects globally.

Actual results however were somewhat mixed but lean to the much less severe end. Reza and Khan (2011) pronounced that Bangladesh on the whole was relatively unscathed by the crisis. Similarly, Ahmed and Mujeri (2009) concluded that Bangladesh in general emerged without serious harm in contrast to other countries in the Asia-Pacific region, especially other LDCs while Quibria (2010) even found a more than doubling in per capita income from about $9 in 1990 to $20 in 2008 despite the lack of usually compensating FDA during the crisis period. Moreover, Ali and Islam (2010) observed weak co-movements of

Bangladesh economy with that of the U.S. economy even at a time when domestic political crisis (when no elected government was in office) was coinciding with the global crisis.

Mostly favorable results also emerged for Bangladesh at the microeconomic level. Concerning capital markets, Ali, Islam and Wise. (2011) reported record gains in the country's two main stock indices during the global crisis. This was attributed by the above authors along with Mansur (2013) and Carassco and Mukhopadhyay (2010) to the fact that Bangladesh had a low overseas investment exposure, particularly from the toxic assets originating from the U.S. (Ali, Islam and Wise (2011). Like the macroeconomy, these strong results in the Bangladesh capital and financial markets differed markedly from those experienced by many other emerging economies, including Indonesia, cited by Goeltom (2009), and South Korea. However, others, like Mansur (2013), pointed to a slowing of domestic aggregate demand and a falling price level resulting in excess liquidity promulgating throughout the banking system.

Regarding impact on Bangladesh industrial sector immediately post-crisis, outcomes were also not much serious. To reduce the severity of any possible adverse impacts, many small businesses had taken various cost-cutting measures such as increasing work hours, reducing fringe benefits, reducing capacity utilization, even some business closures in addition to price-cuttting. In contrast, however, Ahmed (2014) cited actual improvements (growth) in other sectors such as agriculture, the backbone of the Bangladesh economy, whereas Ali and Islam (2010), conversely, commented on a festering energy crisis (shortages, blackouts, rationing) plaguing the country.

The impact upon Bangladesh's foreign sector shortly after the crisis appeared to have been mostly positive. According to both the World Bank (2011) and Chowdhury and Habib (2009), the recession did not significantly affect international trade flows nor financing activities. In addition, as reported by Bangladesh Bank (2011), as well multiple other sources, including Ali, Islam and Wise (2011) and Ali and Islam (2010), the country did rather well in the area of foreign exchange reserves, which surprisingly even increased along with a moderate appreciation of the Taka against the U.S. dollar (Mansur (2013) and Ali, Islam and Wise (2011). However, while taka appreciation and, particularly, general dollar depreciation, at this time in turn, slowed most countries' overall export growth, again as noted by Mansur (2013), Ali, Islam and Wise (2011) and Ali and Islam (2010) that, despite the currency substitution effects, Bangladesh exports in fact remained rather resilient, especially in the RMG (readymade garments) industry, the other mainstay of the economy. The industry did perform well perhaps due to low value added products that Bangladesh exports that are purchased by low income consumers in the Bangladesh's rich country export markets (Ali, Islam, and Wise (2011)). Finally, the country's foreign sector also benefited, as tendered by Ali, Islam and Wise (2011) that the country's import sector benefitted from falling world prices on import-intensive raw materials, industrial machinery, energy, and food imports.

The main negatives to the open economy at this time were two-fold. First, as suggested by Mansur (2013), was a moderation in wage remittances, the largest source of Bangladesh's foreign-sourced income, and reaching 10% of gdp by 2013 according Ahmed (2014), as the effects of the global crisis impacted the labor markets of the adversely affected Bangladesh's manpower export markets and thus somewhat adversely affecting the employment of Bangladeshi expatriates. But the biggest factor affecting the country's foreign sector appears to have been a precipitous albeit continuing long-term trend of foreign aid and FDI inflows as discussed by Mansur (2013) as well as Ali and Islam (2010), who reported a drop in foreign investments from a level of nearly $800 million in 2007 to $650 million in 2008.

As to the initial predictions, both the World Bank (2009) and the Asian Development Bank (2009) portended that this crisis would severely impact many developing countries, particular in South Asia, Pakistan, India, Sri Lanka, and Maldives, were the more vulnerable in the first stages of the crisis than some other South Asian countries like Bangladesh, Nepal and Bhutan, where these economies, it was believed, would suffer severely from second round effects – a feedback loop – that would likely occur through a significant slowdown later in exports, remittances, and foreign private capital inflows. Roodposhti et al. (2009) examined the intensity of the correlation between main stock markets in different countries and found that these correlations have increased since 2001 suggesting that economies more interlinked with the U.S., where this crisis originated, would be more adversely affected. And while by no means alone, Ahmed (2013) warned of pending commodity and oil price bubbles, particularly and acutely in the Middle East as exacerbated by the ongoing 'Arab Spring.' Likewise, but more broadly, Ali and Islam (2010) advised of substantial price hikes in food and energy in the global markets.

Bastagli and Holmes (2014) argued that developments in Bangladesh, Kenya, Pakistan and Viet Nam countries provide examples of ways in which linkages across sectors are being strengthened, including for instance through the development of integrated shock response plans in Bangladesh and Kenya. Looking forward, as the frequency and intensity of a range of covariate shocks are likely to increase in all four countries, stronger collaboration and integration across sectors is an additional critical element to effective shock response.

For developing economies in general, and especially for Bangladesh which did not have an elected government during the global crisis, central interventions in the form of licensing and permits, as well as issuance of statutory directives, together with the ownership of private institutions and control of public institutions by the politically well-connected, often result in monopoly and oligopoly either explicitly or implicitly. These concentrated market structures coupled with the political connections of a few powerful individuals and pervasive corruption invariably lead to cartels and price-fixing. Additionally, about 50% of the Bangladesh economy is unrecorded. These phenomena hinder the effectiveness of national economic policy actions and result in asymmetric adjustment in product and service pricings, as well as drive an unfair distribution of national income in favor of the few. In all, these factors have diminished the efficiency and resilience of the Bangladesh economy and prevented it from coping effectively with the contagion from this most recent international financial crisis.

Politically, the diplomatic front should help facilitate the country's export sector. However, the results of a survey conducted by Bangladesh-based Center for Breakthrough Thinking indicated that 72 percent of the of 1000 non-resident Bangladeshi respondents working in the U.S., the U.K., Japan, Australia, Thailand, France, Germany and Nepal never experienced any positive activities and initiatives by their embassies to promote Bangladesh businesses abroad.

Clearly, the inefficient and ineffective nature of government interventions enacted to manage and offset the negative impact of reduced capital in-flows made the Bangladesh economy very vulnerable to the international economic recession. In addition, the flow of expatriate funds Bangladeshi workers send home from overseas is a significant source of financial capital inflow for Bangladesh. Fortunately, as the crisis originated in the U.S., not from the major source of expatriate funds that comes to Bangladesh from the Middle East.

It is to be noted here that Globalization has created an international division of labor related to trade flows that in turn induce a pattern of leading-lagging impacts of financial crises between developed and developing trading partners. Additionally, the pattern of “free” labor mobility, legal or otherwise, from developing to developed countries has increased financial capital flows in the opposite direction, a flow which is very unstable owing to the insecurity of the employment and earnings of these guest workers. There is also the possibility of a synergic effect of the two phenomena.

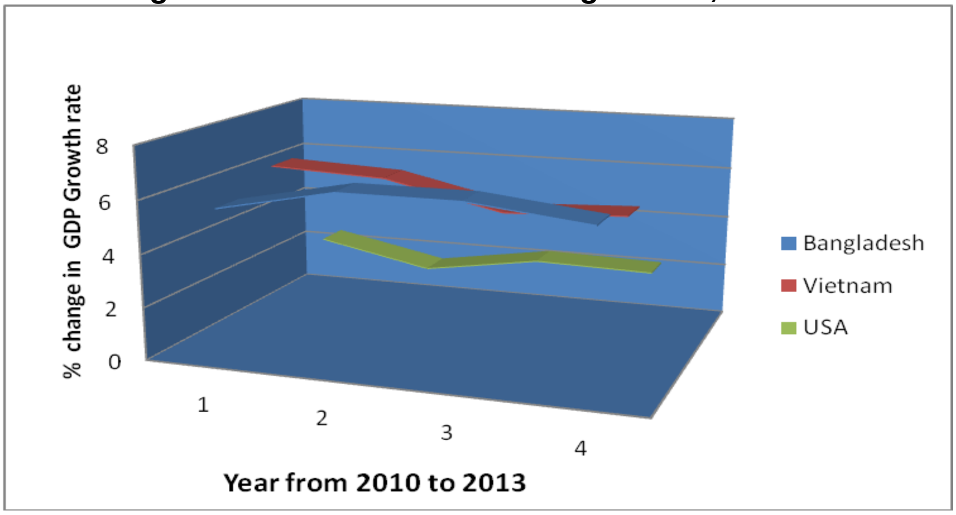
As to financial markets, the sheer number of financial instruments in the country is simply not sufficient. Banking shares dominate overall equity prices and some commercial and merchant banks are able to skirt the regulatory guidelines and rules of the Bangladesh Bank (the central Bank) as well as the Securities and Exchange Commission by manipulating share prices of different companies to increase their profits. Though Bangladesh Bank requires all commercial banks to submit information regarding their equity portfolios, most banks do not comply.

The Bangladesh industrial sector, particularly the information and communication technology segment, is still in its infancy and thus cannot compete in the international market to generate sufficient export earnings. Also, Bangladesh's export items have low price elasticity as these are targeted toward relatively lower income groups in the export markets.

The crisis will undoubtedly affect at least the non-competitive firms in the garments industry, perhaps as much as 50 percent of the sector was predicted to collapse. The eventuality of this scenario will lead to the six to seven hundred thousand female workers in the RMG sector to become unemployed. The troubling sign of such an outcome is that orders for Bangladesh garments decreased between 8 to 9 percent during August-October 2008. Additionally, not only female workers but also large numbers of male workers in the export-led growth industries are similarly losing their jobs due to the reduction in export sales. Interestingly, about 80 per cent of total export earnings come from the USA and Europe.

Figure:1 shows the percentage change in GDP growth rate from 2010 to 2013 for Bangladesh,Vietnam and the USA.

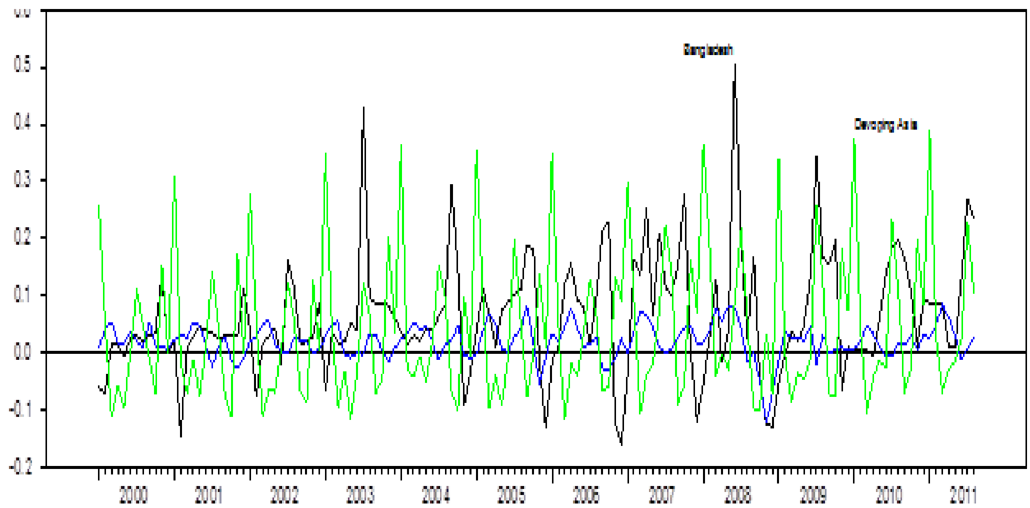
Figure 1: % Change in GDP Growth rate- Bangladesh ,Vietnam and the U.SA.



Source: Authors' calculations based on data from World Bank, http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

Bangladesh economic infrastructure may also contribute to an asymmetric co-integration between domestic and international prices. Figure 2 describes the annualized monthly changes in price indices in Bangladesh, advanced economies, and developing Asia.

Figure 2: Annualized monthly changes in general price indices in Bangladesh, Advanced Economies, and Developing Asia: January 2000 to August 2011.



Source: Authors' calculations based on data from IMF, International Financial Statistics CD Rom, 2009.

Bangladesh Central Bank Governor Dr. Rahman (2012) argued that in the post-crisis economic slowdown, financial markets and institutions in advanced economies are also failing to meet the financing needs of small businesses including startups. These are languishing in a credit crunch, as financial institutions have swung to extreme risk aversion from the opposite pre-crisis focus of quick-gain speculative excesses. This financial exclusion of small businesses is impeding recovery of output growth and employment creation. For both developing and developed economies, a sustained recovery path to stable output growth and job creation requires a fundamental reorientation of financial sector goals and motivations away from speculative excesses foaming credit bubbles towards socially and environmentally responsible inclusive financing of all productive initiatives.

Further, Rahman (2014) described that fallouts of the crisis reached Bangladesh shores pretty fast due to trade and financial channels in the integrated global economy. He observed that in the trade channel, demand weakness in North America and Europe caused by chains of insolvencies and wide-scale job losses sharply weakened exports from the manufacturing hubs in this region. He also pointed out that this region faced substantial net withdrawal of financial investments from the North American and European economies in crisis, and the availability of fresh inflows also narrowed sharply.

Tables 1 and 2 provide selected economic indicators (estimated) of Bangladesh and Vietnam, respectively.

Table 1

Selected Economic Indicators (%) - Bangladesh	2014	2015
GDP Growth	5.6	6.2
Inflation	7.5	6.5
Current Account Balance (share of GDP)	-0.5	-1.5

Source: Asian Development Outlook (ADO) 2014; ADB estimates.

Table 2

Selected Economic Indicators (%) - Vietnam	2014	2015
GDP Growth	5.6	5.8
Inflation	6.2	6.6
Current Account Balance (share of GDP)	4.1	3.0

Source: ADB estimates

Huy (2014) examined the impacts of external financing on market risk for the listed firms in the Vietnam airlines and tourism industry following the financial crisis 2007-2009. First, by using quantitative and analytical methods to estimate asset and equity beta of the 10 listed companies using a proper traditional model, he found that the resulting beta values were reasonable for many institutions in general. Second, under several different leverage ratio scenarios (30% and higher and 20% and lower) from 2011 financial reports, he reports that the risk level, measured by equity and asset beta mean, decreased (0,306) when leverage increased to 30% and it increased (0,413) if leverage decreased down to 20%. Third, in changing the leverage amounts, he also found the dispersion of risk level, measured by asset beta variance decreased if the leverage increases to 30%, with the asset beta variable value quite small, indicating leverage efficiency.

To investigate the time lag and asymmetric linkages between changes in the Bangladesh price index to those of other countries, pair-wide correlations between current changes in the Bangladesh index to changes in other series and their lags are calculated. The empirical results are summarized in Table 3. A closer look at Table 3 reveals lagging correlations between the Bangladesh price level and the price indices in advanced economies and developing Asia.

Table 3: Pair-wide correlations between current changes in Bangladesh price index to changes in indices in developing Asian countries and advanced economies and their lags.

Annualized Monthly Changes in General Price Index in Developing ASIA	Annualized Monthly Changes in General Price Index in Bangladesh		Annualized Monthly Changes in General Price Index in Advance Economies
Current month	-0.0681	0.2042	Current month
One month ago	-0.0325	0.1976	One month ago
Two months ago	0.0827	0.1585	Two Months ago
Three months ago	-0.0487	0.1751	Three months ago
Four months ago	-0.1654	0.2608	Four months ago
Five months ago	-0.0349	0.1150	Five months ago
Six months ago	0.1321	0.0607	Six months ago
Seven months ago	0.1442	-0.1329	Seven months ago
Eight months ago	0.3144	-0.3244	Eight months ago
Nine months ago	0.0941	-0.3694	Nine months ago
Ten months ago	-0.1559	-0.2850	Ten months ago
Eleven months ago	-0.0636	-0.1653	Eleven months ago
Twelve months ago	-0.1187	0.0369	Twelve months ago

Source: Authors' calculations based on data from IMF, International Financial Statistics, 2011. Bangladesh Economy during the U.S. Subprime Mortgage Crisis and Temperament in the Country

4. Methodology

In order to respond proactively to a contagion emanating from an international crisis, policy makers should have some basis to "forecast" or "predict" how economic units in the economy collectively will react to the portending crisis originating in another country or countries, given the current states of their economies. Empirical results based on event study may provide governments with such a basis for designing policies to respond to international crises which, unfortunately, will likely occur more often than not in the current age of globalization. As such, an event study has been done in this article.

Fortunately, long-horizon event study methodologies have been developed. The impetus for the event study methodology is the assumption that financial markets are rational as well as efficient in the sense that information moves equity prices and the effects of an event will be reflected immediately in security prices and hence in market indices. Therefore, the economic impact of a crisis can be measured using financial market data observed over a relatively short period. In contrast, if measured directly by productivity, the process could require many months or even years of observation.

4.1 Event Study

Event study has been so widely accepted theoretically and in practice that "the Security and Exchange Commission (SEC) regularly uses event studies to measure illicit gains captured by traders who may have violated insider trading or other securities laws. Event studies are also used in fraud cases where the court must assess damages caused by a fraudulent activity," (Bodie, Kane and Marcus 2009, p. 356). Interestingly, after rigorous analyses and comparisons of the power of the constant returns model to other models using monthly data, Brown and Warner concluded that “[t]his result is striking: It suggests that the simple model, the Mean Adjusted Returns method, is no less likely than either of the other two to detect abnormal performance when it is present,” (Brown and Warner, 1980).

This study uses the constant mean returns model of the event study methodologies to investigate the impact of the U.S. subprime mortgage shock on the Bangladesh economy. Returns will be indexed in event time, τ. Following McKinlay (1997, pp. 19-20), the approach used here defines $\tau = 0$ as the event date, $\tau = T_1 + 1$ to $\tau = T_2$ represents the event window, and $\tau = T_0 + 1$ to $\tau = T_1$ constitutes the estimation window. Let $L_1 = T_1 - T_0$ and $L_2 = T_2 - T_1 - 1$ be the lengths of the estimation window and the event window, respectively. Given the above-defined notations, the statistically motivated constant mean returns model, applied to the index on the market portfolio of country i, can be expressed as follows:

$$R_{it} = \mu_i + \varepsilon_{it}, \tag{1}$$

where R_{it} is the period-*t* return on the market portfolio of country *i*, μ_i is the constant mean of returns on the market portfolio of country *i*, ε_{it} is the period-*t* disturbance term of the return on the market portfolio for country *i*, and $\varepsilon_{it} \sim i.i.d.(0, \sigma^2_{\varepsilon_i})$.

With the parameter estimate of equation (1), $\hat{\mu}$, one can measure and analyze the abnormal returns. Let $AR_{i\tau}$, $\tau = T_1 + 1, \ldots, T_2$, be the L_2 abnormal returns for country *i* in the event window. Using the constant mean returns model to measure the normal return, the sample abnormal return in the event window is:

$$AR_{i\tau} = R_{i\tau} - \hat{\mu}_i. \tag{2}$$

The abnormal return is really the disturbance term of the constant mean returns model calculated on an “out-of-sample basis”. Methodologically, the calculated abnormal returns are accumulated through time to draw an overall comparison. As articulated by McKinlay (1997, p. 21), “The concept of cumulative abnormal return is necessary to accommodate a multiple period event window.” Define $CAR_i\ (\tau_1, \tau_2)$ as the cumulative abnormal returns of the market portfolio of country *i*, (CAR_i) from τ_1 to τ_2 where $T_1 \leq \tau_1 < \leq \tau_2 \leq T_2$. The individual country’s market portfolio of abnormal returns can be aggregated using $AR_{i\tau}$ from (2). The CAR_i from τ_1 to τ_2 is the sum of the included abnormal returns.

$$CAR_i[\tau_1, \tau_2] = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau} \tag{3}$$

Naturally, the average abnormal return on the market portfolio of country *i* can be calculated using $AR_{i\tau}$ from (2) for the event period, $\tau = T_1 + 1, \ldots, T_2$; i.e. L_2 periods as follows:

$$\overline{AR_{i\tau}} = \frac{1}{L_2} \sum_{\tau=T_1+1}^{T_2} AR_{i\tau} : \tag{4}$$

An important question is as the subprime mortgage crisis pushed U.S. stock prices on an oscillating downward path, how did Bangladesh stock prices behave? The calculated average abnormal returns for both the U.S. and Bangladesh stock price indices and their variances in the event window can be used to test the hypothesis that the reduction in average abnormal return on the Bangladesh market portfolio is statistically the same as that for the U.S. The set of null and alternate hypotheses can be stated in equation (5). The testable hypothesis for this question can be set up by the following null hypothesis, (H_0), and alternative hypothesis, (H_a). As shown by Anderson et al. (2006, pp. 399-389), the above descriptive statistics can be used to calculate the two-tailed t-statistic and its degrees of freedom to test the set of hypotheses in (5). Although testing the set of null and alternative hypotheses stated in equation (5) may not be dispositive to the question, it may nonetheless scientifically lend credence or repudiate qualitative observations.

$$H_0 : \overline{AR_{CL\tau}} - \overline{AR_{US\tau}} = 0 \qquad\qquad H_a : \overline{AR_{CL\tau}} - \overline{AR_{US\tau}} \neq 0 \qquad (5)$$

Statistically, if $x_i, x_j; s_i^2, s_j^2$; and n_i, n_j are respectively two sample averages, their corresponding variances, and their sample sizes, the *t-statistics* and their degrees of freedom for testing the above set of hypothesis (5) can be calculated as follows:

$$t = \frac{(x_i - x_j)}{\sqrt{\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}}} \quad , \qquad df = \frac{\left(\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}\right)^2}{\frac{1}{(n_i - 1)}\left(\frac{s_i^2}{n_i}\right)^2 + \frac{1}{(n_j - 1)}\left(\frac{s_j^2}{n_j}\right)^2}$$

5. Event Study Analysis and Results

As previously mentioned, the U.S. subprime mortgage crisis affects a developing country like Bangladesh through at least two channels: trade flows and remittances from its expatriates overseas. In the case of U.S. financial event, the crisis originated in the U.S. but most of the sources of Bangladesh's remittances are from other countries particularly from the Middle East. To gain some insight into the situation where most of the remittances that a developing country receives are from the country where the crisis originates, this study includes Vietnam in the investigation. The rationale for including Vietnam is twofold: first, in contrast to Bangladesh, most of the expatriate funds that Vietnam has received come from the U.S. and second, one of the authors of this study has previously investigated the impact of the U.S. subprime mortgage crisis on Vietnam. However, it is very possible that the nature of the relationship between Vietnam and the U.S. and that of the U.S. and Bangladesh are quite different, in which case the impact of the contagion would not be expected to be the same in Bangladesh as in Vietnam.

This study uses monthly share (equity) price data for the U.S., Vietnam and Bangladesh obtained from the International Financial Statistics published by the International Monetary Fund from January 2001 through December 2009. As mentioned earlier, May 2007 was selected as the event month of the U.S. financial crisis. This selection will provide 64 observations (from January 2001 to May 2006) for estimating the mean of equity returns and 43 observations (from June 2006 to December 2009) for calculating their abnormal and cumulative abnormal return on equity for Bangladesh, the U.S., and Vietnam. This selection is to avoid the synergic impacts of the U.S. subprime mortgage crisis and the problem in the European Union.

The calculation results are summarized in Table 4 and the line graph of the calculated abnormal returns are presented in Figure 3. Additionally, the t-statistics and their degrees of freedom for testing the set of hypotheses (5) between U.S. vs. Vietnam, U.S. vs. Bangladesh, and Vietnam vs. Bangladesh and their degrees of freedom are 0.4360 with 50 degrees of freedom, 1.022 with 51 degrees of freedom, and 0.4590 with 83 degrees of freedom, respectively. Based on these calculated t-statistics, none of the null hypotheses can be rejected at any conventional significant levels. Thus, the empirical findings suggest the that the U.S. subprime mortgage crisis similarly influences the U.S., Bangladesh and Vietnam equity markets.

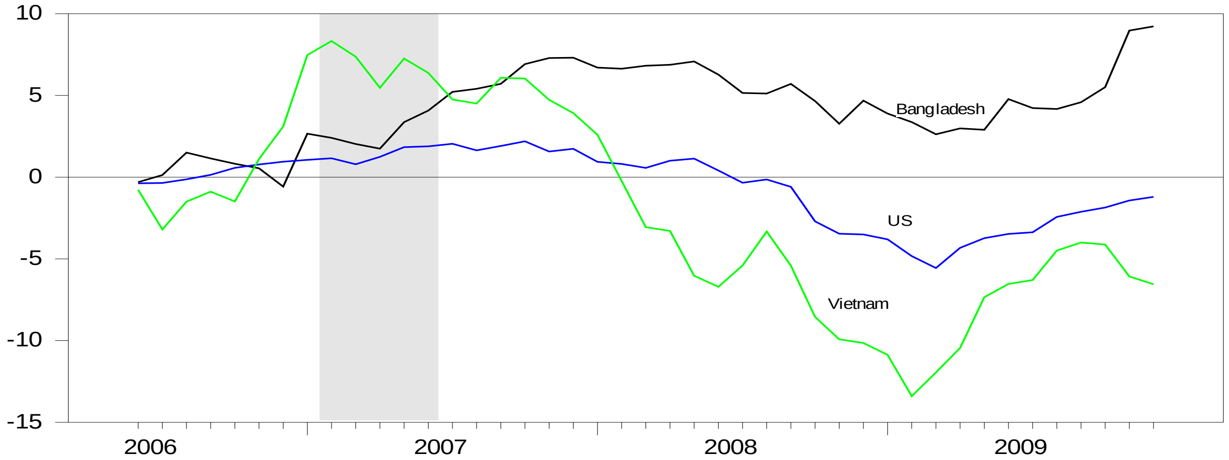
Table 4: Abnormal and cumulative abnormal return on equity for Bangladesh, the U.S. and Vietnam

U.S.		Vietnam		Event Window	Bangladesh		
AR_{US}	CAR_{US}	AR_{VN}	CAR_{VN}	τ	AR_{BD}	CAR_{BD}	*Date*
-0.37	-0.37	-0.77	-0.77	-11	-0.94	-0.30	2006-06
0.02	-0.36	-2.42	-3.20	-10	-2.59	0.13	2006-07
0.23	-0.13	1.70	-1.50	- 9	1.53	1.50	2006-08
0.28	0.14	0.61	-0.88	- 8	0.45	1.15	2006-09
0.43	0.57	-0.60	-1.49	- 7	-0.77	0.82	2006-10
0.20	0.78	2.60	1.11	- 6	2.43	0.54	2006-11
0.17	0.95	2.00	3.11	- 5	1.83	-0.57	2006-12
0.11	1.06	4.37	7.47	- 4	4.20	2.66	2007-01
0.09	1.15	0.86	8.33	- 3	0.69	2.40	2007-02
-0.36	0.79	-0.95	7.37	- 2	-1.12	2.03	2007-03
0.46	1.24	-1.91	5.47	- 1	-2.07	1.74	2007-04
0.60	1.84	1.79	7.26	0	1.62	3.37	2007-05
0.05	1.89	-0.88	6.38	1	-1.05	4.07	2007-06
0.16	2.04	-1.62	4.75	2	-1.79	5.22	2007-07
-0.40	1.64	-0.25	4.50	3	-0.42	5.41	2007-08
0.27	1.91	1.57	6.08	4	1.41	5.71	2007-09
0.28	2.19	-0.05	6.03	5	-0.21	6.92	2007-10
-0.62	1.57	-1.30	4.73	6	-1.47	7.29	2007-11
0.17	1.74	-0.81	3.92	7	-0.98	7.31	2007-12
-0.80	0.94	-1.33	2.59	8	-1.50	6.70	2008-01
-0.13	0.81	-2.83	- 0.23	9	-2.99	6.64	2008-02
-0.24	0.57	-2.83	- 3.06	10	-3.00	6.82	2008-03
0.44	1.01	-0.23	- 3.29	11	-0.39	6.87	2008-04
0.13	1.13	-2.74	- 6.03	12	-2.91	7.08	2008-05
-0.73	0.41	-0.68	- 6.71	13	-0.85	6.28	2008-06
-0.75	-0.34	1.31	- 5.40	14	1.14	5.15	2008-07
0.20	-0.14	2.08	- 3.32	15	1.91	5.12	2008-08
-0.45	-0.59	-2.09	- 5.41	16	-2.26	5.70	2008-09
-2.11	-2.70	-3.14	- 8.55	17	-3.30	4.65	2008-10
-0.75	-3.46	-1.37	- 9.92	18	-1.54	3.27	2008-11
-0.05	-3.50	-0.22	-10.14	19	-0.39	4.69	2008-12
-0.30	-3.80	-0.73	-10.87	20	-0.89	3.89	2009-01
-1.03	-4.83	-2.53	-13.40	21	-2.70	3.37	2009-02
-0.73	-5.56	1.45	-11.95	22	1.28	2.62	2009-03
1.24	-4.32	1.50	-10.45	23	1.33	2.98	2009-04
0.59	-3.73	3.10	- 7.35	24	2.94	2.90	2009-05
0.26	-3.47	0.81	- 6.53	25	0.65	4.78	2009-06
0.10	-3.37	0.24	- 6.29	26	0.07	4.23	2009-07
0.94	-2.43	1.80	- 4.49	27	1.64	4.17	2009-08
0.31	-2.12	0.49	- 4.00	28	0.33	4.59	2009-09
0.26	-1.86	-0.13	- 4.12	29	-0.29	5.51	2009-10
0.43	-1.43	-1.95	- 6.07	30	-2.12	8.97	2009-11
0.22	-1.20	-0.48	- 6.55	31	-0.64	9.22	2009-12

Source: Authors' calculations based on data from IMF, International Financial Statistics, 2011.

Additionally, as Figure 3 shows, the cumulative abnormal returns on the Vietnam, the Bangladesh and the U.S. market portfolios increase significantly twelve months prior to the selected event month (May 2007) of the selected event window, indicating bull market conditions were present in all three countries. However, five months prior to the selected event month (the shaded area), the patterns of the Vietnam monthly cumulative abnormal returns oscillated around a steep downward trend, while these figures for both the U.S. and the Bangladesh equity markets are similar and increasing. These qualitative observations may be attributable to the impact of the drop in expatriate fund flows from the U.S. to Vietnam as aforementioned.

Figure 3: Cumulative abnormal returns on market equity portfolio from June 2006 to December 2009.



Source: Authors' calculations based on data from IMF, International Financial Statistics, 2011.

6. Conclusions and Implications

This study examines the state of the Bangladesh economy during the U.S. subprime mortgage crisis and empirically determines the pattern of its contagion. As any other poor and developing country, Bangladesh has a multitude of expatriates working overseas. These expatriates are a source of significant inflows of funds to the home country. In this age of globalization, negative dimensions such as the problem of the U.S. subprime mortgage crisis should be expected to be transmittable to other countries and Bangladesh is no exception. Fortunately for Bangladesh, the crisis originated in the U.S. while most Bangladeshi expatriates were working in the Middle East when the subprime mortgage crisis pushed the U.S. economy into its most severe recession since the Great Depression of the 1930s. Bangladesh appears to have experienced only modest reduction in international trade flow albeit as magnified by the foreign trade multiplier.

Some of the common characteristics of developing economies such as Bangladesh, which affects market performance and result in monopoly and oligopoly (implicitly or explicitly) include extensive government interventions in the form of the granting of licenses and permits, central directives, the ownership of private institutions and control of public entities by a few individuals who are politically well-connected. These monopolistic and oligopolistic market structures, coupled with political connections and corruption, invariantly lead to cartels and price-fixing. These phenomena definitely hinder the effectiveness of national economic policy actions and result in asymmetric adjustments in product and service pricings, as well as an unfair distribution of national income in favor of the few.

The silver lining of the U.S. subprime mortgage crisis for the Bangladeshi development strategy is that it served as a stress test for the economy. This stress test may reveal structural deficiencies needed to be corrected to cope with contamination from future crises. Additionally, the findings of the empirical analysis presented here may be used as a basis for policy makers to formulate future national economic policy to better prepare for the next crisis. However, the task of isolating and measuring the total impact of an international economic crisis originating in one country and spreading to another using real sector data would take years even decades to complete because actual activities will occur over time and hence measurements of them for analysis have to be collected as they are available. To shorten the time, long-horizon event study methodologies are used in this empirical investigation. The impetus for the event study methodology is the assumption that financial markets are rational and efficient in the sense that information moves equity prices and the effects of an event will therefore be reflected immediately in security prices and financial market indices. Therefore, the economic impact of a crisis can be measured using financial market data observed over a relatively short time horizon. In contrast, if measured directly by productivity, the process may require many months or even years of observation.

As discussed above, the U.S. subprime mortgage crisis affects developing countries through at least two channels: through trade flows and through the remittances of their expatriates overseas. In the case of U.S. financial debacle, the crisis originated there but most of the sources of Bangladesh's remittances are from other countries. To gain some insight into the situation where most of the remittances that a developing country receives are from the country where the crisis originates, this study includes Vietnam in the investigation. The rationale for including Vietnam was twofold: first, most of the expatriate funds that Vietnam receives is from the U.S. and second, one of the authors of this study had already investigated the impact of the U.S. financial crisis on Vietnam.

The empirical findings confirm the expected contagion of the U.S. subprime mortgage crisis to other countries. The pattern of impact, i.e., of leading or coincident nature, depends on whether the country under consideration suffers only from a modest reduction in only the trade flow or in both trade flow and remittances by the country's expatriates. Since Bangladesh experienced only the reduction in trade flow, the empirical results reveal that the impact of the crisis on the Bangladesh economy is coincident with the U.S. As the results for Vietnam suggest, were the crisis originated in the Middle East, the impact of the crisis will be leading. Bangladeshi policy makers should be aware of this pattern in designing their future policies in response to an international financial crisis: not only the magnitude of the crisis matters but also where the crisis originates.

The global economy today is so intertwined and interconnected that the world economic order should do all that it can to prepare for financial crises to mitigate to the extent possible. Proactive policy formulation and execution should be emphasized not only at the level of individual nation but at that of the collective globe. And such will be well served if rigorous corporate governance regimes can be ensured free of any sorts of manipulation. Most certainly, there will be some changes in the current global financial system but it needs a long-term *generational* consciousness among world leaders. Creation of a BRICS bank cannot fundamentally change the world economic order but it needs more attention and support from world leaders to facilitate the rise of a more prosperous world with less conflict and excessive greed.

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