Expert Journal of Economics, Volume 3, Issue 1, pp. 14-21, 2015
 ISSN 2359-7704
Economics.ExpertJournals.com

Effect of Financial Liberalization on the Probability of Occurrence of Banking Crises

Ramzi FARHANI, Ghrissi MHAMDI*,
Abdelkader AGUIR, Mounir SMIDA

University of Sousse, Tunisia
MO2FID Research Unit

This study examines the relationship between financial liberalization and the advent probability of banking crises because of institutional quality. We used a logit panel data for a sample of fifty developing countries during the period (1990-2014). The results show that there is a positive relationship between financial liberalization and banking crises and the strengthening of institutional quality overcomes the problem of banking crises.

Keywords: *banking crises, financial liberalization, institutional quality.*

JEL classification: *G01, G11, G15*

1. Introduction

Recently, several economies have undergone major transformations, regulatory and institutional in nature. These changes have altered the functioning of institutions and capital markets. The origin of these changes comes mainly from financial liberalization in the 1980s and which affected almost all emerging countries. McKinnon and Shaw (1973) analyzed the phenomenon of "financial repression" which is characterized by excessive government intervention in financial activity. Financial liberalization has been proposed as a response to this situation because it improves the efficiency of investment and eventually economic growth. Overall, financial liberalization has been broken down into three major reforms. This is the liberalization of the movement of capital, the opening of financial markets to international operators and deregulation in lending and deposit rates to increase interbank competition. The proliferation of crises in countries such as Mexico (1995), Asian countries (1997), Brazil (1998), and Turkey (2001) opened the debate on the benefits of deregulation of financial activity.

It is generally accepted that the economic theory of liberalization opposes school financial repression to that of neo-structuralisms. The first finds its theoretical origins in the work of two economists from Stanford McKinnon and Shaw School (1973). Both authors present financial liberalization as an effective and simple strategy to accelerate economic growth. This financial liberalization has been proposed as a response to what

* Corresponding Author:
Ghrissi Mhamdi, University of Sousse, MO2FID Research Unit, Faculty of Economic Sciences and Management, Department of Economics, 4023 Tunisia

Article History:
Received 3 February 2015 | Accepted 8 March 2015 | Available Online 18 March 2015

Cite Reference:
Farhani, R., Mhamdi, G., Aguir, A., and Smida, M., 2015. Effect of Financial Liberalization on the Probability of Occurrence of Banking Crises. *Expert Journal of Economics*, 3(1), pp.14-21

the authors called "Financial Repression". However, Taylor (1983) and Van Wijnbergen (1983) challenged the validity of this analysis. Starting from a structural view of the economy, they felt that a policy of financial liberalization rather leads to slower economic growth.

In this context, Roubini and Sala-i-Martin (1992) were the first to prove empirically that there's a negative effect between financial repression and economic growth. For them, a liberalized economy is growing faster than so-called repressed economy. For his part, Honing (2008) showed that the mobility of capital has major benefits for the economies concerned, particularly when it comes to the efficient allocation of resources. The new funds represent a new source of financing for domestic investment. It provides new opportunities for these countries to diversify risk and promote subsequent financial development. These words are affirmed by Emran and Stiglitz (2009), which stipulate that a liberalized and competitive market is seen as a necessary condition for the success of the private sector promoting financial development.

As regards the effects of crises, Caprio and Klinderberger (1996) identified 117 crises since the seventies decade in ninety-three countries. These authors confirm that banking crises in developing countries have been tougher and more expensive than those that have affected more advanced economies. In contrast to the latter, the cost of crisis resolution in less developed countries exceeded 10% of GDP (Venezuela 18%, Mexico 15%, Bulgaria 14%). Incidentally, Plihon and Miotti (2001) state that *"The emerging countries of Latin America and Asia have been particularly affected by the banking crisis, the cost was often considerable."*Confirming the point of view of Caprio and Klinderberger, they reported estimates of the cost to the taxpayer to rescue the banking systems involved. Thus, these costs have been estimated at 15% of GDP for Mexico (Peso crisis in 1994-1995) and Venezuela. Compared to the crises of US savings banks in the 1980s (3.5% of GDP) and banking crises in Scandinavia (5-7% of GDP), these costs are relatively high. In the same vein, a study by Honohan and Klingebiel (2000) on a group of thirty four countries with economies in transition in the period 1970-2000 confirms that banking crises emerge additional losses to the economy as , reduced investment and consumption mainly due to credit rationing.

Contrary to the prevailing theory in the 1980s, the proliferation of banking and financial crises, particularly in Asia and Latin America, has led some researchers to review the effects of this liberalization or even question it. Indeed, the number of such attacks has increased significantly and even quadrupled from 1970 as well as a large number of banking crises was preceded by measures that promoted economic liberalization (Kaminsky and Reinhart 1996) , (Caprio and Klingebiel 1996).

Miotti (2001) Kunt and Detragiache (1998) have demonstrated the existence of a close relationship between the banking and financial crises and financial liberalization policies in emerging countries. Alfaro and Hammel (2007), Kim and Kenny (2007), believe that in developing countries, financial liberalization is a vital and necessary step to abandon financial repression and lead to a situation of sustainable growth.
However, Ranciere et al. (2006) conclude that the literature has spawned two completely divergent currents. The first considers that it strengthens the financial development and contributes to sustainable economic growth. The second states that financial liberalization leads to excessive risk-taking. It increases the volatility of macroeconomic indicators and is responsible for the recurrence of banking crises.

It is in this context that lies our empirical investigation test. We will try and verify empirically whether financial liberalization, in its three dimensions (of the domestic financial sector, financial markets and capital account) helped trigger banking crises. In addition, our study is whether the strengthening of the institutional framework mitigates the likelihood of banking crises in developing countries. We studied a panel composed of fifty developing countries (the countries of Asia, Latin America, Africa and the Middle East) that have experience more or less successful in terms of financial openness. Our study spans the period from 1980 to 2014. The choice of this period is justified by the fact that it represents the episodes of financial deregulation and banking crises movements that affected many developing countries and the availability of data for some of these countries.

2. Empirical Methodology

In order to identify the impact of the liberalization of the domestic financial sector, stock markets and the capital account and the effect of institutional quality on the probability of occurrence of banking crises in developing countries, we have resorted to estimates by modeling logit panel data.

The dependent variable in our model represents the banking crises defined as follows:

$$y_{it} = \begin{cases} 1 \; if \; crises \\ 0 \; otherwise \end{cases}$$

with i = {1, ..., N}; t = {1, ..., T}

This type of regression investigates the relationship between a binary response variable and several explanatory variables. She returns to test the probability of occurrence of crises by encoding (0,1). This coding choice (0.1) is traditionally held by the dichotomous models.

Thus, the holding pattern, in this case, is the following:

$$y_{it} = \hat{\beta} X_{it} + \varepsilon_{it}$$

with i = {1, ..., N}, t = {1, ..., T}

and

$$y_{it} = \begin{cases} 1 \; if \; crises \\ 0 \; otherwise \end{cases}$$

y is the vector of dummies variables of banking crises, $\hat{\beta}$ represents the vector of unknown N coefficients to estimate, X is the matrix of explanatory variables and ε residue matrix. y_{it} denotes the vector of binary variables taking the value of a banking crisis in the country *i* in year (t) and the zero otherwise, we can write:

$$P_i = \Pr ob(Y_{it} = \frac{1}{X_i}) = F(\beta X_i)$$

or

$$E(Y_{it}) = \Pr ob(Y_{it} = 1) * 1 + \Pr ob(Y_{it} = 0) * 0 = \Pr ob(Y_{it} + 1) = Pi$$

"i = 1,..., N

The function F is, the repair function of the logistic:

$$F(\theta) = \frac{e^{\theta}}{1 + e^{\theta}} = \frac{1}{1 + e^{-\theta}} = \cap(\theta)$$

According Hurlin (2003), the logit model defines the probability associated with the event $Y_i = 1(p(Y_{it} = 1))$: Probability of occurrence of banking crises or even high bank fragility in country i in year (t)

$$Modèle \log it P_i = \cap(\beta X_{it}) = \frac{1}{1 + \exp(-\beta X_{it})}; \forall i = 1, ..., N$$

The most commonly used to estimate the parameters of the logistic regression method, consists of the maximum likelihood method. The latter provides estimators good statistical properties.

More concretely, a logistic coefficient indicates that for each additional unit of Xi, the logit increases β. From a practical point of view, the likelihood of the dichotomous logit model is written as follows:

$$L(y, \beta) = \prod_{i=1}^{N} \prod_{t=1}^{T} P_i^{y_{it}} * (1 - P_i)^{1 - y_{it}}$$

The logarithm of the likelihood and given by the following relationship:

$$LnL(y, \beta) = \sum_{i=1}^{N} \sum_{t=1}^{T} \left\{ y_{it} * Ln\left[F(X_i \beta)\right] + (1 - y_{it}) * Ln\left[1 - F(X_i \beta)\right] \right\}$$

It is the function of the multi-variable logit model.

The purpose of these econometric models is to explain the birth of an event with the help of a number of explanatory variables.

3. Data Description

Financial liberalization is identified because of three elements: the deregulation of the domestic financial sector, liberalization of stock markets and the opening of the capital account. As part of our study, we will remember these three dimensions of financial liberalization. Thus, financial liberalization indicator is a composite index of three aspects of financial deregulation.

$$LF = \frac{1}{3} LSFI + \frac{1}{3} LMF + \frac{1}{3} LCC$$

$$SI. \begin{cases} = 1, & financial\ repression \\ = 2, & partial\ liberalization \\ = 3, & total\ liberalization \end{cases}$$

For measuring variables of internal and external financial liberalization we will use in our study, Kaopen indicator developed by Chinn and Ito (2005) to measure the degree of restrictions on capital account. In fact, the last update made in 2011, provides an indicator for more than 180 countries over the period (1970-2011).

This indicator mainly constructed by the method of principal component analysis, has the advantage that it seeks to measure the intensity of restrictions on capital account, not its presence or not. In addition, it covers a growing number of countries (170 countries) for a long period (1970 to 2011). It varies between 1.7 and 2.6. The higher the value, the greater the country in question the capital account is liberalized. In other words, this index takes higher values when that country is more open to international transactions.

To measure the degree of liberalization of stock markets, we retain, a result, the ratio:

$$\frac{portfolio\ flows\ as\ shares + portfolio\ flows\ as\ bonds}{GDP}$$

By definition, portfolio flows in shares representing the sum of the representative of Foreign Action Certificates and national securities held by foreign investors. While portfolio flows in bonds represent bonds purchased by foreign investors.

Theoretically there are two effects of liberalization of financial markets. The first has a positive and significant effect on the probability of occurrence of banking crises, as Miotti and Plihon shows (2001).

The second one, the market liberalization reduces the probability of banking crises by encouraging the development of monetary and financial instruments allowing banks greater diversification of their risks.

To measure the degree of domestic financial liberalization, we had reference to the study by Hamdi Khalfaoui that uses two key indicators to assess the level of development of indirect finance through the degree of channeling capital to the private sector and efficiency of financial intermediation. These indicators are:

- Credits granted to the private sector as a percentage of GDP (CSP) expressed in logarithm. The expected sign is negative justified by the fact this ratio and more, the banking sector is less developed and this can create a banking crisis. It indicates the ability of banks to mobilize and improve its allocation.
- The broad money as a percentage of GDP (M2) e é expressed in logarithms: it represents resents payment methods which is added to almost liquidity.

This indicator reflects the liquidity of the economy and it is supposed to have a positive sign. Thus, if the economy recorded a significant growth rate of the money supply in the sense of M2, it may cause a banking crisis. This variable was extracted from the database of the World Bank.

About banking variables, we used to study Kibritcioglu (2002), to identify a monthly index, similar to that of the pressure on the foreign exchange market. The purpose of the adoption of this index is to measure and predict episodes of fragile banking sector.

In particular, the author has shown that there are three main greatness in the consolidated balance sheet of banks that may be useful in the construction of the index of fragility of the banking sector, namely, bank deposits, loans to the private sector, and external liabilities of domestic banks.

Fluctuations of indicators and likely to prove the fragility of the banking sector in a country. These variables were extracted from the database "Financial Statistics International "from the IMF.

However, deflated nominal series, we used the GDP deflator extracted from the World Bank database and this because of the unavailability of data for the entire sample price indices in the database IMF data. Once deflated series, the index of banking sector fragility (FSB) can be calculated as follows:

$$FSB_t = \frac{\left(\frac{DB_t - \mu_{db}}{\sigma db}\right) + \left(\frac{CBSP_t - \mu_{cbsp}}{\sigma_{cbsp}}\right) + \left(\frac{EEB_t - \mu_{eeb}}{\sigma eeb}\right)}{3}$$

where:

FSB_t = fragility of the banking sector

DB_t = annual variation of banking deposits year t

$\mu et \sigma$ = represents respectively the arithmetic mean and the standard deviation of variables.

$CBSP_t$ = annual change in bank credits to the private sector

EEB_t = annual change in commitments exteriors domestic banks

If the FSB index is between -0.5 and 0, so the banking system is considered in average period of fragility. But, if FSB is less than -0.5, so the banking sector is considered highly vulnerable to systemic crises. To arrive at a base in binary form, we have transformed the FBS values so that gives the value 1 at any FSB and 0 at any FSB . In total, an index of banking sector fragility (FSB) is constructed and transformed for the entire sample consists of forty developing countries over the period (1980-2011).

To assess the impact of institutional variables on the probability of banking crises and empirically test whether the quality of the institutional structure is a determinant of banking crises in developing countries, we have used as a measure of degree of institutional quality, the 'legal systems and property rights "indicator. This indicator is composed of five variables which are: the rules of law, judicial independence, legal system integrity, the existence of objective being and protection of intellectual property. This variable was extracted from the database of "The International Country Risk Guide" (2009). However, and given that this variable is available only for frequencies during the five-year period (1980-2000) and the institutional quality variable does not change in the short term but it changes very slowly, it was considered the value corresponding to the year (t) remains the same until the year (t + 4). This method was proposed by Chinn and Ito (2005), whose objective is to annually exploit available data on five years.

The variable is between 0 and 10, the higher its value, the higher the institutional framework of the country in question is solid, and vice versa.

We selected four macroeconomic and financial variables that are likely to capture the effect of macroeconomic shocks and financial situation on the occurrence of banking crises. As a macroeconomic variable, we basically chose two indicators Knowledge:

- Inflation (The expected sign of this variable is positive.
- The level of ctivityreport economic (the expected sign of this variable is negative.
- Financial variables used in this study are:
- The ratio M2/international exchange reserves expressed in logarithm: This indicator represents the ability of banks to face its External commitments. Thus, more the ratio is high, more the economy is vulnerable to investor confidence crisis. From where the expected sign should be positive.

$$\frac{M_2}{international\ exchange\ reserves}$$

4. Empirical Results

This study draws on studies and Lukkarila Komulainen (2003) and Eichengreen and Arteta (2002), Wyplosz (2001) and Williamson and Mahar (1998) focused on the impact of internal and external liberalization of banking instability. The proposed model is as follows:

$$Prob(CB_{it} = 1) = F(\alpha X_{it-1} + \beta LF_{it})$$

As stated above, the Kaopen indicator constructed by Chinn and Ito (2005), which varies between 1.7 and 2.6 is a liberalization indicator. Thus the higher its value, the greater the country's capital account in question is liberalized. Estimating the effect of liberalization of the capital account on the probability of banking crises give the following results:

Table 1. *The effect of liberalization of the capital account on the probability of banking crises*

Variable	Coefficient	Std Error	Z-Statistic	P > | z |
Kaopen	-0 .11325	0.04426	-2.55	0.010
M2\Reserve	0.07030	0.02141	3.28	0.015
GDP	-0.07846	0.01671	-4.96	0.000
GDC	-0.01421	0.06144	-0.23	0.818
IR	0.00211	0.00832	0.25	0.800
Constant	-0.86126	0.20028	-4.30	0.000
Log likelihood	-584.247			
No. of obs.	880			
Waldchi2 (5)	26.50			

The results presented in this table show that the opening of the capital account negatively affects the probability of banking crises. Thus, liberalization of the capital account is not the main cause of banking crises. This has been validated by Komulainen and Lukkarila (2003), which suggest that the opening of the capital account is not the cause of crises in emerging markets, but the current crisis because of these can probably be deteriorating fundamentals. This result corroborates those of Shehzad and De Haan (2009). They have actually found that some aspects of financial liberalization reduce the likelihood of systemic crises, conditional on adequate banking supervision. Eichengreen and Arteta (2002), the opening of the capital account does not contribute to a banking crisis. While the liberalization of domestic financial sector can lead to banking crises. In addition, Bonfiglioli and Mendicino (2004) have shown, following a dynamic panel study of a sample of 90 developed and developing countries, the countries that have liberalized their capital accounts are less confronted with the advent of crises that the savings bank financially repressed. Both authors justify this by the fact that economic agents appeal to international capital markets for financing in times of banking crises.

However, our results contradict those of the study by Ranciere et al. (2006), which examines the relationship between financial liberalization, financial crises and economic growth. They broke down the impact of financial deregulation on economic growth in two effects: a direct effect on growth and an indirect effect that reflects the growth costs associated with a high frequency of financial crises. They consider that financial openness does not promote the growth of the economy because of the emergence of crises. According to them, financial deregulation has a positive effect on economic growth and also increases significantly the probability of the twin crises (banking crises and currency crises). Financial control variables, the ratio "M2 / Foreign Reserves" are statistically significant and positive (+2.32). This ratio is positively related to the probability of a banking crisis. This finding has been confirmed by Cartapanis (2002). The variable "domestic credit growth" is not significant. Thus, in our study, this variable has no effect on the probability of banking crises in developing countries in line with our predictions.

The variable "economic growth" is statistically significant and negatively related to the probability of occurrence of banking crises. A decrease in the growth of the economy is strongly associated with the likelihood of the emergence of banking crises. The test results of the impact of financial liberalization on the probability of banking crises and illustrated in the following table:

Table 2. *The impact of financial liberalization on the probability of banking crises*

Variable	coefficient	Std Error	Z-statistic	P> | Z |
LMB	-0.12535	0.04126	-3.03	0010
M2\Reserve	0.06030	2810.02	2. 64	0.021
GDP	-0.06846	0.01871	-3.65	0.003
GDC	-0.01321	0.05134	-0.25	0.806
IR	1210.00	7120.00	0.169	0.868
Constant	-0.76126	0370.20	3.799	0.002

Log likelihood	- 611.325			
No. of obs.	880			
Waldchi2 (5)	58.36			

With LMB is the effect of market liberalization as measured by the sum of portfolio flows in equities and flows of portfolio in bonds to GDP, the probability of banking crises during the period (1990-2011) in developing countries.

The liberalization of financial markets is affected by a negative and statistically significant sign (-3.03). These results reject the null hypothesis of our study suggests that market liberalization helps to increase the probability of banking crises. The finding that the opening of financial markets exerts significant negative effects on the probability of occurrence of banking crises can be explained by the fact that the deregulation of financial markets leads to the creation of new monetary and financial instruments best suited to the management of risk (derivatives). It allows banks to diversify better the best risk and minimize their losses later.

5. Concluding Remarks

This study showed that the probability of banking crises is negatively correlated with the opening of the capital account. This has been validated by Komulainen and Lukkarila (2003) have shown that the liberalization of the capital account is not the cause of the crises, but the main reason probably lies in the deteriorating fundamentals. On the other hand, market liberalization negatively affects the frequency of banking crises in emerging countries.

On the other hand, the effect of the internal financial deregulation of financial markets and the capital account on the probability of banking crises is negligible when it is accompanied by an adequate supervisory system and a strong institutional environment.

Finally, we can conclude that the results we have reached throughout this paper show the existence of a negative relationship between external financial liberalization and banking crises. In addition, the results clearly suggest that strengthening the institutional framework could weaken the likelihood of banking crises especially in periods of financial deregulation. In other words, it tends to stimulate banking instability or if the institutional environment is fragile.

References

Alfaro, L., Hammel, E., 2007. Capital flows and capital goods, *Journal of International Economics*, 72 (1), pp.128-150

Arestis, P., 2003. Financial Sector Reforms in Developing Countries with Special Reference to Egypt. *SSRN Journal*, Levy Economics Institute Working Paper No. 383 [online] Available online: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=425821 [Accessed on 10 Jan. 2015]

Arestis, P., Demetriades, P., 1999. Financial Liberalization: The experience of developing countries, *Eastern Economic Journal*, 25(4), pp.441-457.

Bonfiglioli A., Mendicino, C., 2004. *Financial Liberalization, Bank Crises and Growth: Assessing the Links*, Economics and Finance, Working Paper no. 567, [online] Available online: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1002285 [Accessed on 13 Dec. 2014]

Caprio, G.Jr., Klingebiel, D., 1996. Bank Insolvencies: Cross-country experience, World Bank Policy Research Working Paper, no. 1620, [online] Available online: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=636119 [Accessed on 13 Dec. 2014]

Cartapanis, A., 2003. Vers une prévention macro-prudentielle des crises financières internationales. *Revue d'économie financière*, 70(1), pp.89-100.

Chinn, M.D., Ito, H., 2005. *What matters for financial development? Capital controls, Institutions, and Interactions*, National Bureau of Economic Research, Working Paper, no. 11370, [online] Available online: http://www.nber.org/papers/w11370 [Accessed on 13 Oct. 2014]

Daniel, B., Jones, J., 2007. Financial Liberalization and Banking Crises in emerging economies, *Journal of International Economics*, 72(1), pp.202-221.

Eichengreen, B., Arteta, C., 2000. Banking Crises in Emerging Markets: Presumptions and Evidence, *Financial Policies in Emerging Markets*, pp 47-94.

Fisher, K.P., Smaoui, H., 1997, *From financial to banking failure Liberalization: Starting on the wrong foot?*, University of Laval Canada, Working Paper, no. 3, [online] Available online: http://128.118.178.162/eps/fin/papers/9706/9706005.pdf [Accessed on 27 Oct. 2014]

Honig, A., 2008. Addressing causality in the effect of capital account liberalization on growth, *Journal of Macroeconomics*, 30 (4), pp.1602-1616.

Honohan, P., 1997. *Banking System Failures in Developing and Transition Countries: Diagnosis and Prediction*, Bank for International Settlements, Working Paper no. 39, [online] Monetary and Economic Department – BASLE, Available online: http://www.bis.org/publ/work39.pdf [Accessed on 13 Dec. 2014]

Icard, A., 2002. *Stabilité financière et contrôle prudentiel*. BIS symposium at the BEAC Colloqium "Rôle et fonction d'une banque centrale à l'ère de la globalisation" [online] Bis.org Available at: http://www.bis.org/speeches/sp021121.htm [Accessed on 10 Nov. 2014].

Kaminsky, G., Reinhart, C., 1999. The Twin Crises: the Causes of Banking and Balance-of-Payment Problems, *American Economic Review*, 89(3), pp.473-500.

Kaminsky G., Schmukler, S.L., 2003. Short-Run Pain, Long - Run Gain: The Effects of Financial Liberalization, International Monetary Fund - Working Paper WP / 03/34, [online] IMF.org Available at: http://www.imf.org/external/pubs/ft/wp/2003/wp0334.pdf [Accessed on 10 Nov. 2014]

Kibritcioglu, A., 2002. Excessive Risk-Taking, Banking Sector Fragility, and Banking Crises, University of Illinois at Urbana-Champaign, [online] Available at: http://business.illinois.edu/working_papers/papers/02-0114.pdf [Accessed on 21 Oct. 2014]

Komulainen, T., Lukkarila, J., 2003. What drives financial crises in Emerging Markets?, *Emerging Markets Review*, 4(3), pp.248-272.

McKinnon, R., 1973. *Money and Capital in Economic Development*, Washington: Brookings Institution

Plihon, D., Miotti, L., 2001. Libéralisation Financière, Spéculation et Crises Bancaires, *Économie Internationale*, 85, pp 3-36

Ranciere, R., Tornell, A., Westermann, F., 2006. Decomposing the effects of financial Liberalization: Crisis vs. growth, *Journal of Banking and Finance*, 30(12), pp.3331-3348.

Shehzad, C.T., De Haan, J., 2009. *Financial Liberalization and Banking Crises*, [online] Available online: http://www.finance-innovation.org/risk09/work/6450490.pdf [Accessed on 9 Nov. 2014]

Williamson, J., Mahar, M., 1998. A survey of Financial Liberalization, *Essays in International Finance* no. 211, International Finance Section, Department of Economics and Princeton University, Princeton, New Jersey: Princeton Universtity

Wyplosz, C., 2001. *How Risky is Financial Liberalization in the Developing Countries?*, Discussion Paper Series No. 14., [online] Available online: https://faculty.fuqua.duke.edu/~charvey/Spur/Wyplosz_How_risky_is.pdf [Accessed on 17 Nov. 2014]