RISK MANAGEMENT AT THE FINANCIAL SECTOR LEVEL AND DEVELOPMENT IN DEVELOPING COUNTRIES*

1. Introduction

According to the *2014 World Development Report, Risk and Opportunity: Managing Risk for Development,* mismanaged risks result in many crises and development losses. When crises happen it is thus critical to switch from unplanned and *ad hoc* responses to proactive, systematic, and integrated risk management. Yet, when individuals take risks on voluntarily in the pursuit of opportunity, a trade-off arises: one must compare expected returns to potential losses of a course of action. And this trade-off is more intense when a higher return is possible only if one is willing to take more risk. Such is the case with financial investments, where higher yields are usually associated with riskier positions (see, for instance, Bodie *et al*., 2011).

Individuals and societies are affected by shocks that are generated by a constantly changing world. People are vulnerable when they are especially susceptible to losses from negative shocks due to a combination of high exposure, weak internal conditions, and deficient risk management. For instance, a highly leveraged financial entity that has taken very risky positions without countervailing hedges is vulnerable to a financial shock which may occur suddenly.

Since protection alone cannot completely eliminate the possibility of adverse outcomes, insurance can help pad the impact of negative shocks. In some instances, specialized markets in the financial system provide insurance for particular risks. Insurance and protection together allow people to better prepare for risk and risk preparation tends to be positively related to national income across economies.

People can successfully confront systemic risks, which are beyond

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the means of individuals or households to handle alone, by sharing their risk management with others. In fact, a primary reason for why groups or systems form in the first place may often be due to their need to manage risk and pursue opportunity collectively. Systems can support people's risk management in diverse yet complementary ways. As the size of idiosyncratic risks increases, the financial sector can provide effective tools and mechanisms for people to manage potential losses due to large idiosyncratic shocks such as the loss of job by the head of the household or a house severely damaged by a fire. The financial system would be in a good position to facilitate useful risk management tools such as savings, insurance, and credit, while managing its own risks in a responsible way.

Yet, we also need to keep in mind that systems do mutually interact, often complementing and even sometimes substituting for each other's risk management functions. For example, several mechanisms of protection and insurance that are provided by the financial system can complement and ameliorate households' self-protection and self-insurance while supplying enterprises with financial products so that they remain dynamic and continue to provide income and employment to people. In addition, the relative importance of systems varies with the level of development. As countries develop economically, contributions from the financial system become relatively more important.

The current study empirically examines the effect of selected indicators related to risk management at the financial sector level on economic development. Based on data from the World Bank, we use a sample of eighty-two[1] developing economies and find that selected indicators related to risk management at the financial sector level

[1] The sample consists of the following countries: Albania, Algeria, Angola, Armenia, Azerbaijan, Bangladesh, Belarus, Benin, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Democratic Republic of Congo, Republic of Congo, Costa Rica, Dominican Republic, Ecuador, Egypt, El Salvador, Georgia, Ghana, Guatemala, Guinea, Haiti, Honduras, India, Indonesia, Jordan, Kazakhstan, Kenya, Lao PDR, Lebanon, Liberia, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Moldova, Morocco, Mozambique, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Romania, Russian Federation, Senegal, Serbia, Sierra Leone, South Africa, Sri Lanka, Sudan, Syrian Arab Republic, Tanzania, Thailand, Togo, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Yemen Republic, and Zambia.

do have a statistically significant effect on economic development in these countries. Regression results show that cross-developing country variations in purchasing power parity *per capita* gross national income can be explained by its linear dependency on the percentage of people aged 15 and over who have personally paid for health insurance, the percentage of the same cohort using informal savings, the percentage of the same cohort using informal credit, bank assets as a percentage of the GDP, and bank savings as a percentage of the GDP.

Statistical results of such empirical examination will assist governments in developing countries identify risk management strategies at the financial sector level that may be used as powerful instruments for economic development.

This paper is organized as follows. In the next section, a selected review of the economic literature on the impact of risk management at the financial sector level on economic development is presented. Next, the formulation of a statistical model to be estimated is discussed. Theoretical underpinnings for the inclusion of explanatory variables are presented in this section. Statistical results are reported in the subsequent section. A final section gives concluding remarks as well as policy recommendations.

2. Literature review

Miller (1986) argues successfully that financial markets can provide more and better tools and services to more people in an efficient way when they are competitive while not being subject to distortions. In fact, these markets can help people face risks of varying frequency, intensity, and nature, whether they are of an idiosyncratic or systemic nature. Unfortunately, while about 40 percent of people in high-income economies do not make use of financial instruments at all, the percentage is much higher at about 70 percent in low- and middle-income countries. Similarly, while 45 percent of individuals in high-income economies use financial savings tools and 14 percent of them use credit, only 17 percent and 8 percent, respectively, do so in low- and middle-income countries.

Diamond and Dybvig (1983) point out that a primary reason for the inherent instability of the financial system lies in the mismatch between the duration of banks' assets (long-term) and liabilities (short-term). A failure of the financial system to manage its own risk can adversely affect people, either directly by denying them access to

finance or indirectly by hindering available credit for the enterprise sector and putting a strain on public finances, thus resulting in loss of jobs, income, and wealth. As observed by Laeven and Valencia (2012), from 1970 to 2011, the average cumulative loss of output during the first three years of the 147 banking crises that hit 116 countries was a third of GDP in developed countries and one-quarter of GDP in emerging economies.

There may be synergies and trade-offs among financial inclusion, depth and stability. It is defined as being compliant with laws and regulations. When banks enjoy greater and more diversified savings and thus rely less on reversible foreign capital, the stability of the financial system can be enhanced by greater financial inclusion and depth (see, for instance, Han and Melecky, 2013 and Cull *et al.*, 2012). However, a major issue for all countries is the provision of the correct amount of credit. In fact excessive annual growth of credit of 25 percent, 40 percent, and 70 percent, predated the banking crises in Thailand (1997), Colombia (1982), and Ukraine (2008), respectively.

The state can contribute to the effective risk management of the financial sector by providing a sound financial infrastructure, which comprises institutions that facilitate financial intermediation such as payment systems, credit information bureaus, and collateral registries. Brix and McKee (2010), for example, point out that Mexico and South Africa have passed legislation that set up ombudsmen to resolve disputes in consumer finance in order to protect consumers. According to Gupta (2013), mobile network operators in the Philippines are allowed to take on many banking operations, attesting to the fact that competition may result in innovation in financial inclusion. Sometimes, the state can take charge to promote financial inclusion by using innovative techniques. Such is the case of India's National Rural Employment Guarantee Act, which has enhanced outreach to poor people living in rural areas by introducing government-to-person payments using a bank account (see World Bank, 2012).

Another way in which the government can help risk management of the financial sector is by passing legislation that establishes macroprudential regulatory frameworks that take into account the interconnectedness of financial institutions and markets and that deal with the financial system as a whole (see Borio, 2003 for an excellent discussion of the differences between the traditional, microprudential regulatory framework and a macroprudential regulatory framework).

Finally, the state needs to recognize the trade-offs and synergies among financial inclusion, depth, and stability. Maimbo and Melecky

(2013) show that even though more than two-thirds of countries make a commitment to achieve both financial development goals and systemic risk management as part of their strategy, in 90 percent of them their national financial sector strategies do not take into account specific trade-offs between these two goals.

In this paper, we empirically examine the effect of selected indicators related to risk management at the financial sector level on economic development in developing countries. In the next section we formulate a statistical model to be estimated using data from the World Bank for a sample of eighty-two developing economies.

3. The statistical model

If we assume that various indicators related to risk management at the financial sector level linearly affect the level of *per capita* GDP in a developing country, we can state the following statistical model:

$$\begin{aligned} PPPGNI = {} & \beta_0 + \underset{(+)}{\beta_1}\text{SavFinInst} + \underset{(+)}{\beta_2}\text{LoanFinInst} + \underset{(+)}{\beta_3}\text{PersHealIns} \\ & + \underset{(-)}{\beta_4}\text{InformSav} + \underset{(-)}{\beta_5}InformCred + \underset{(+)}{\beta_6}BankAssts \\ & + \underset{(+)}{\beta_7}BankSavgs + \underset{(+)}{\beta_8}Credit + \varepsilon \end{aligned} \tag{1}$$

where *PPPGNI* = Purchasing Power Parity GNI *per capita*, in dollars in 2012.

SavFinInst = Percentage of people aged 15 and over who have saved at a financial institution, in 2011[2].

LoanFinInst = Percentage of people aged 15 and over who have obtained a loan from a financial institution, in 2011[3].

[2] This is the percentage of respondents aged 15 and over who report saving or setting aside any money by using an account at a formal financial institution such as a bank, credit union, microfinance institution, or cooperative in the past 12 months.

[3] This is the percentage of respondents aged 15 and over who report borrowing any money from a bank, credit union, microfinance institution, or other financial institution such as a cooperative in the past 12 months.

PersHealIns = Percentage of people aged 15 and over who have personally paid for health insurance, in 2011[4].

InformSav = Percentage of people aged 15 and over who have used informal savings, in 2011[5].

InformCred = Percentage of people aged 15 and over who have used informal credit, in 2011[6].

BankAssts = Bank assets as a percentage of GDP, 2005-10 average[7].

BankSavgs = Banks savings as a percentage of GDP, in 2011[8].

Credit = Share of credit in the GDP, in 2011[9].

ε = Random error term, with mean 0 and uniform variance.

Since financial markets can efficiently provide more and better instruments and services to more people and help them face risks, we choose to include as explanatory variables the percentage of people aged 15 and over who have saved at a financial institution and those who have acquired a loan from a financial institution in the past 12 months to capture the effect of the use of formal

[4] This is the percentage of respondents aged 15 and over who have personally purchased health or medical insurance (in addition to any nationally provided health insurance).

[5] This is calculated as the difference between the percentage of respondents aged 15 and over who have "saved any money in the past year" and those who "saved at a financial institution in the past year".

[6] This is calculated as the difference between the percentage of respondents aged 15 and over who have obtained a "loan in the past year" and those who obtained a "loan from a financial institution in the past year". The percentage of people who have obtained a loan in the past year is the percentage of respondents who borrowed money in the past 12 months from a formal financial institution, a store (by using installment credit), family or friends, an employer, or another private lender.

[7] Bank assets to GDP is the ratio of total assets held by deposit money banks to GDP. Assets include claims on the domestic real nonfinancial sector (which includes central, state, and local governments); nonfinancial public enterprises; and the private sector. Deposit money banks consist of commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.

[8] Banks savings to GDP is the sum of domestic demand, time, and savings deposits in deposit money banks, expressed as a share of GDP.

[9] Credit to GDP is the ratio of domestic private credit to the real sector by deposit money banks to GDP.

financial risk-management tools on economic development. We expect the coefficient estimates of both variables to have a positive sign.

Specialized markets in the financial system can provide insurance for particular risks such as health risks. Because health insurance can help pad the impact of a negative shock such as an illness, it allows people to better prepare for risk which in turn tends to positively affect development. We thus choose to include the percentage of people aged 15 and above who have personally paid for health insurance as an explanatory variable and expect that the higher this share in a developing country, the more likely the country is preparing for risk, hence the higher its level of economic development.

To capture the effect of the financial systems structure on development, we include the share of bank assets in the GDP as explanatory variable and expect the coefficient estimate of this variable to have a positive sign. Another way in which the financial sector can impact risk management and thus economic development is through the provision of tools of saving and credit. Saving tools (such as bank deposits and liquid securities) allow people to accumulate buffers for rainy days while credit instruments (such as education or mortgage loans) ease financing constraints, enabling them not only to smooth consumption following adverse shocks but also to exploit opportunities with more flexibility. To estimate this impact we use the shares of bank savings and of credit in the GDP and expect their coefficient estimates to have a positive sign.

Since formal insurance markets are often missing in developing countries, individuals rely on self-insurance, which is often pursued through relatively expensive and inefficient means such as the holding of durable assets (e.g., jewelry) that can be sold in the event of an adverse shock. Similarly, many families in those countries participate in informal, community-based risk sharing while new risk management tools are being provided by microfinance and micro-insurance programs. To capture the negative effect of informal insurance and credit arrangements on economic development, we use the percentage of people aged 15 and over who have used informal savings in the past year and those who have used informal credit in the past 12 months and expect their coefficient estimates to have a negative sign. Data for all variables are from the *2012* and *2014 World Development Reports* and the *2013 World Development Indicators*.

4. Empirical results

Table 1 gives least-squares estimates of regression coefficients in equation (1) for a sample of eighty-two developing economies. The goodness of fit of the model to the data is rather good as indicated by the value of 0.355 of the adjusted coefficient of determination. We observe that three explanatory variables are not statistically significant, namely the percentage of people aged 15 and over who have saved at a financial institution, that of those who have acquired a loan from a financial institution in the past 12 months, and the share of credit in the GDP and that the coefficient estimate of the percentage of people aged 15 and over who have saved at a financial institution does not have the anticipated positive sign. We also observe that the coefficient estimate of banks savings as a percentage of GDP does not have the expected positive sign as well.

Table 1 - *Empirical Results (Full Model)*

	Coefficient Estimates	*t-Statistics*
Intercept	7434.599	3.288
SavFinInst	-1.943	-0.026
LoanFinInst	54.689	0.467
PersHealIns	141.546	2.296*
InformSav	-81.755	-1.575***
InformCred	-79.017	-1.863**
BankAssts	124.744	1.898**
BankSavgs	-79.679	-1.888**
Credit	16.440	0.295

Adjusted R^2 = 0.355.
* Significant at the 2.5 percent level.
** Significant at the 5 percent level.
*** Significant at the 10 percent level.

We suspect that these results may be due to the severe collinearity between this variable and the other explanatory variables. As the fraction of people aged 15 and above who have personally paid for health insurance increases by one percentage point, we would expect a $142 increase in purchasing power parity gross national income *per capita*, other things being equal. On the other hand, a one percentage point increase in the share of bank assets in the GDP is expected to lead to a $125 increase in *per capita* gross national

income, *ceteris paribus*. However, as the fraction of people aged 15 and above who have used informal savings in the past year increases by one percentage point, we expect *per capita* gross national income to decrease by $182, holding other variables constant. Likewise, a one-percentage point increase in the fraction of people aged 15 and above who have used informal credit in the past year is expected to lead to a $79 decrease in purchasing power parity *per capita* gross national income, *ceteris paribus*.

Using the backward elimination stepwise method we arrive at a revised model, the regression results of which are reported in Table 2. We note that the goodness of fit of the model to the data is slightly

TABLE 2 - *Empirical Results (Revised Model)*

	Coefficient Estimates	*t-Statistics*
Intercept	8164.010	4.345
PersHealIns	145.829	2.574*
InformSav	-82.209	-1.641***
InformCred	-86.397	-2.173**
BankAssts	139.481	3.058*
BankSavgs	-80.812	-2.237**

Adjusted R^2 = 0.376.
* Significant at the 1 percent level.
** Significant at the 2.5 percent level.
*** Significant at the 10 percent level.

better as indicated by the higher value of 0.376 of the adjusted coefficient of determination. We observe that all five explanatory variables are statistically significant at the 10 percent or lower level and that the coefficient estimate of banks savings as a percentage of GDP continues to have the unexpected negative sign. As mentioned above, we suspect that this is possibly due to the strong collinearity between this variable and the other explanatory variables included in the model, as indicated by the sample correlation coefficient matrix reported in Table 3.

We observe that the effect of the fraction of people aged 15 and above who have personally paid for health insurance and that of the fraction of people aged 15 and above who have used informal savings in the past year are roughly the same as was the case in the full model. All else equal, a one-percentage point increase in

TABLE 3 - *Sample Correlation Coefficient Matrix*

	SavFinInst	*LoanFinInst*	*PersHealIns*	*InformSav*	*InformCred*	*BankAssts*	*BankSavgs*
SavFinInst	1						
LoanFinInst	0.266	1					
	2.467						
PersHealIns	0.363	0.095	1				
	3.482	0.854					
InformSav	-0.073	-0.145	-0.157	1			
	-0.656	-1.314	-1.424				
InformCred	-0.253	-0.335	-0.136	0.294	1		
	-2.343	**-3.184**	-1.232	**2.750**			
BankAssts	0.594	0.201	0.426	-0.326	-0.341	1	
	6.606	**1.839**	**4.206**	**-3.086**	**-3.243**		
BankSavgs	0.700	0.186	0.369	-0.244	-0.276	0.904	1
	8.765	**1.689**	**3.548**	**-2.253**	**-2.570**	**18.934**	

Note: Bold t-statistics imply statistical significance at the 10 percent or lower level.

the fraction of people aged 15 and above who have personally paid for health insurance is expected to lead to a $146 dollar increase in *per capita* GNI. We also observe that as the fraction of people aged 15 and above who have used informal savings in the past year in a developing country increases by one percentage point, it is expected that *per capita* purchasing power parity GNI will decrease by $82, *ceteris paribus*. Similarly, a one percentage point increase in the fraction of people aged 15 and above who have used informal credit in the past year is expected to lead to a decrease of $86 in *per capita* gross national income, all else equal. Finally, as the share of bank assets in the GDP increases by one percentage point, we would expect *per capita* GNI to increase by $140, *ceteris paribus*.

5. CONCLUSION

In this paper we use a statistical model and data from a sample of eighty-two developing economies to empirically analyze the impact of selected indicators related to risk management at the financial sector level on the level of *per capita* GNI. From the statistical results we are able to draw the following conclusions:

1. Within the set of developing economies in this study, the higher the percentage of people aged 15 and above who have personally

paid for health insurance in a developing country, the higher its level of *per capita* income. Governments in these countries need to foster a financial sector aimed at encouraging a larger segment of their population to better prepare for risk by actively participating in a health insurance scheme, private and public.

2. Developing countries in which a large fraction of their population uses informal savings and credit tend to have a lower level of *per capita* income. Financial institutions in these countries need to reach out to a larger segment of their population in order to provide these people with risk management tools such as savings and credit. This, in turn, is expected to stimulate economic development.
3. Developing countries that have a higher percentage of their GDP in the form of bank assets do experience a higher level of development. Efforts should then be aimed at encouraging deposit money banks such as commercial banks and other financial institutions that accept transferable deposits, such as demand deposits, to hold more assets such as claims on the domestic real nonfinancial sector (which includes central, state, and local governments); nonfinancial public enterprises; and the private sector.

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ABSTRACT

This paper examines the impact of risk management at the financial sector level on economic development in developing countries. Based on data from the World Bank, we use a sample of eighty-two developing economies and find that selected indicators related to risk management at the financial sector level do have a statistically significant effect on economic development in these countries. We observe that the coefficient estimate of one explanatory variable does not have its anticipated sign due possibly to the severe degree of collinearity among several explanatory variables. Regression results show that cross-developing country variations in purchasing power parity *per capita* gross national income can be explained by its linear dependency on the percentage of people aged 15 and over who have personally paid for health insurance, the percentage of the same cohort using informal savings, the percentage of the same cohort using informal credit, bank assets as a percentage of the GDP, and bank savings as a percentage of the GDP.

Statistical results of such empirical examination will assist governments in developing countries identify risk management strategies at the financial sector level that may be used as powerful instruments for economic development.

Keywords: Financial Sector Risk Management, Purchasing Power Parity Per Capita GNI, Informal Savings, Informal Credit, Developing Countries, Bank Assets, Bank Savings

JEL Classification: O12, O15, O40

RIASSUNTO

Il risk management nel settore finanziario e crescita dei paesi in via di sviluppo

In questo studio si esamina l'impatto del risk management nel settore finanziario sulla crescita dei paesi in via di sviluppo. Sulla base dei dati della Banca Mondiale, è stato costruito un campione di 82 economie in via di sviluppo e i risultati mostrano che indicatori relativi al risk management nel settore finanziario hanno un effetto statisticamente significativo sulla crescita economica di questi paesi. Si osserva peraltro che la stima del coefficiente di una variabile esplicativa non presenta il segno atteso, probabilmente a causa di un elevato grado di collinearità tra differenti variabili esplicative. Dai risultati della regressione si evince che le variazioni cross-country nella crescita del reddito nazionale pro capite possono essere spiegate dalla quota di cittadini di 15 anni e oltre che hanno personalmente pagato l'assicurazione sanitaria, dalla quota che utilizza i risparmi, dalla quota che usa il credito informale, dagli asset bancari quali percentuali del PIL e dai risparmi bancari quali percentuali del PIL.

I risultati di questo studio empirico potranno essere utili ai paesi in via di sviluppo al fine di individuare le strategie di risk management nel settore finanziario che possono essere di utilità per la crescita economica.