

Bicaba, Zorobabel T.

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# Do financial reforms complementarity and reforms sequence matter for international capital inflows?

Zorobabel T. *BICABA*<sup>1</sup>

March 31, 2011

## Abstract

As economic reforms are mutually interdependent, a liberal policy package needs internal coherence. How can a coherent reform strategy be achieved for a well-balanced and functional economic system? In this paper, we analyze the relationship between financial reforms coherence and international capital inflows (foreign direct investments (FDI) and portfolio investments). We consider a package of eight financial reforms, comprising interest rate deregulation, credit ceiling and directed-credit programs liberalization, elimination of banking sector entry barriers, privatization of state owned banks, development of security markets and banking sector supervision measures. Complementarity is measured through the reciprocal of the Herfindahl-Hirschman concentration index. Using a sample of 91 countries observed over 32 years (1973-2004), the empirical results suggest that the manner with which financial reforms are implemented matters. Particularly, complementarity increases FDI inflows by 0.10 %. Moreover, complementarity tends to be associated with larger FDI and portfolio investment inflows for countries which have a high level of financial reform. Finally, when privatization of state owned banks and the adoption of a capital adequacy ratio based on the Basle I standards occur after other preliminary financial reforms, the returns to complementarity are higher. In others words, a balanced and relatively safe domestic financial system attracts more FDI and portfolio investments than a balanced but unsafe financial system.

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<sup>1</sup>PhD student at Paris School of Economics, University of Paris 1-Panthéon Sorbonne ,and CERDI, Zorobabel.Bicaba@malix.univ-paris1.fr.

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# 1 Introduction

One of the leading assumptions (paradigm) of neoclassical theory is that perfect competition in a given market leads to a Pareto optimal allocation of resources. However, in reality no market has yet reached a level of perfect competition; free markets always failed to allocate goods and services efficiently. This led many countries in the 70s and the 80s to substitute the state for failing markets. The financial market is a part of markets which traditionally has been subject to interventionism of the State. According to McKinnon and Shaw (1973), a financially repressed system is one in which the government decides who receives and grants credit and at which price. In such a system, the government can exercise or reinforce this control by regulating which financial institutions will be permitted to do business and how they will operate, by owning banks and other financial intermediaries, and by exercising control over international capital flows.

However, due to numerous government failures, a wide wave of liberalization has been implemented under impulsion of the IMF during the late 1980s and throughout the 1990s. This initiative can be characterized as a process of giving (again) the market the authority to decide who gets and grants credits and at which prices. In its most advanced shape, liberalization involves governments allowing entry into financial-services industry to any company which can satisfy objectively specified criteria based on prudential considerations (concerning capital, skills, reputation). This comprises giving banks autonomy to run their own affairs, withdrawing of ownership of financial institutions, and abandonment of control over international capital movements.

The main objective of the financial liberalization process is thus to increase efficiency of the market not only in terms of allocation of domestic resources but also in terms of external capital. In that way, it may constitute a signal for foreign investor. Firstly, it creates equality of competition between domestic firms and foreign firms in the domestic market or among domestic firms. On this subject, the removal or relaxation of credit controls and reserve restrictions can increase the willingness of foreign banks to participate in the banking sector as a result of market-based resource allocation and or as a result of costs reduction since the banks are not subject to high reserve requirements. In addition, as pointed out by Caprio et al (2001), the absence of entry barriers in the banking sector can motivate new players, both domestic and foreign, to enter the

financial market which in turn can promote more competitive behavior in the financial system. An increase in competitiveness forces an incumbent to improve efficiency (reducing interest rate spreads), to promote risk management, to adjust risk taking behavior, and to reduce its operation costs or to set prices at competitive levels. Secondly, security market liberalization can stimulate FDI directly by increasing alternative channels of investments and by creating opportunities for diversification to foreign investors. Also, capital market liberalization facilitates the process of mergers and acquisitions, and increases alternative sources of capital for domestic companies, including external financing.

However, liberalization does not always have the expected positive impact on welfare and in particular on capital inflows into the countries. Sometimes, when the impact of reforms does not materialize as expected, it can always be argued that some policy areas were left out and hindered the overall return of reform package (de Macedo and Martins, 2008). Several theories exist about restoring of market efficiency. The theory of the second-best (derived from neoclassical theory) suggests that in the presence of a large number of distortions, a piecemeal reform approach is unlikely to produce a good strategy and actually may reduce welfare. Consequently, a radial reform strategy achieving proportional reductions in all distortions at the same time<sup>2</sup> can be shown to be unambiguously welfare improving. However, according to de Macedo and Martins (2008), the difficulty and time needed to build institutions often leads to adoption of a compromise: some short-term deadweight losses are accepted to reap the long-term benefits of reforms. Besides, the adoption of a piecemeal approach of reforms is justified by the duration of political cycles which often are too short to engage several reform fronts at the same time.

Given these constraints, another idea of the manner of which welfare improving reforms can be implemented, comes from the fact that the existence of complementarity signals a benefit instead, i.e. the return of doing one reform is enhanced when other reforms are in place.

In the literature, several conclusions have been drawn on the chronology in the implementation of different reform areas. One of the most accepted conclusions concerns capital account liberalization. It suggests that if a country wants to maximize the gains from capital account liberalization, capital account liberalization should follow domestic financial market reforms, that

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<sup>2</sup>The idea of engaging several reforms in parallel may also reflect policy complementarities. This idea goes back to Edgeworth : doing more in one thing increases the returns to doing more of another

is, be subsequent to interest rate deregulation, removal of credit controls, to the elimination of barriers of entry in the banking sector, to the improvement of banking sector supervision and regulation (Fischer and Reisen, 1994; Bergsten and Williamson, 1990). Another relative consensus concerns the privatization of state owned banks which must be done at the same period or after the instauration or the development of security markets and capital account liberalization.

The aim of this paper is to investigate the impact of complementarity, and the sequence of different types of financial liberalization policies, on the magnitude of international capital flows into various countries. By using the Abiad, Destriagash and Tressels (2008) New financial liberalization database, it proposes an innovative approach to account for reforms coherence, which is measured as the reciprocal of the Herfindahl and Hirschman (HH) concentration index, and provides a decomposition of complementarity variation, which permits to find the reform sequences which provide the best capital inflow performance. Considering a sample of 91 countries observed over 32 years (1973-2004), the main findings are that reforms complementarity measured as the reciprocal of the HH index, has a positive (direct) effect on FDI inflows but does not directly affect portfolio investment inflows. Furthermore, this effect is heterogeneous according to the conditional distribution of complementarity and according to the level of financial reforms. Firstly, it seems that the effect of complementarity on FDI and portfolio investment inflows in the countries located on the upper side of the distribution of financial reform level is more important. Secondly, the effect of complementarity on portfolio investment inflows is enhanced by a number of additional reforms which are implemented. And finally, the implementation of privatization of state owned banks and/or the improvement of banking sector supervision and regulation reforms after other reforms have been implemented partially or fully, increase the returns of complementarity.

This paper is organized as follows: the second section examines the literature on the complementarity of financial reforms, the third section proposes an examination of theoretical arguments on the link between financial reforms level, their complementarity and FDI and portfolio investments inflows. The fourth focuses on the methodology. The fifth describes and the data and evaluates the impact of reforms complementarity and reforms sequence respectively on FDI inflows and portfolio investment inflows. The sixth section checks robustness of the main results and the last part concludes.

## 2 Complementarity and the sequence of reforms : an overview of the literature

Relatively little attention has been paid to complementarity in the vast literature relating the design and the scope of reforms to overall economic performance. According to Lora (1997), empirical studies are often not able to offer sufficiently precise recommendations about the sequence and pace of reforms or on the complementarity between the distinct areas of reforms and macroeconomic stability. The lack of precise information on the magnitude of reforms has been a major issue. Indeed, it prevented an assessment of the relative importance of various reform areas, but also a distinction amongst the effects of structural reforms and those flowing from macroeconomic stabilization. The early (normative) literature on reforms sequencing concentrated on the order of liberalization of trade and capital accounts, with some extensions to financial liberalization (Lora, 1997). Mussa (1982) suggests that the optimal sequence of reforms depends on both, economic and political criteria. For this author, the neoclassical economics benchmark is simple: if you can, do all reforms simultaneously that is, radical or big bang reform is the best reform strategy .

Dewatripont and Roland (1993) proposed a strategy different from the neoclassical one. They argued for unbundling due to its lower cost of experimentation compared to a big bang approach. This strategy can also be justified by the fact that at each stage of transition, there exist a choice between accepting the next set of reforms and reversing the previous one.

Subsequent research was more precise in identifying potential welfare gains or losses associated with different sequences. In that early literature, the arguments for one type of sequence or another were mostly economic . The strategy of sequencing reforms took all its importance when, following the crises in Argentina and Chile, the literature sought to explain the failure of reforms in terms of incorrect sequencing of reforms programs (see Edward, 1984 and McKinnon, 1993). A conventional wisdom came to argue for stabilizing the macroeconomic environment, implementing real-sector reforms, and developing a sound system of prudential supervision before starting on domestic financial deregulation (Williamson and Mahar, 1998).<sup>3</sup> Once that groundwork had been

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<sup>3</sup>Using a sample of thirty four (53) countries observed over 23 years, Williamson and Mahar (1998) found a certain empirical sequence in financial reforms. Firstly, the introduction of domestic financial liberalization occurs at least two years prior to deregulation, secondly the liberalization of entry into banking sector (for domestic and

laid, policymakers were advised to introduce market-based interest rates and eliminate controls on credit, relying on competition to prevent excessive interest rates and excessive or badly targeted allocation of credit. In the same direction, Williamson (1993) outlines the preconditions for removal of restrictions on inward flows, among which he recommends the establishment of a liberalized and healthy domestic financial system.

Finally, Rodrik (2003), points out that there is not a unique mapping from institutional functions. Therefore, liberal economic reforms are not the only path to achieve the goal of creating a full-fledged market economy capable of sustaining growth. He underlines the risk that such kind of reform is more likely to fall prey to the second-best argument if there is a tendency for ready-made policy packages (e.g. Washington-consensus type), and much less is known about local conditions.

### **3 Financial reforms complementarity, reforms sequence and international capital inflows: a theoretical analysis**

The subjacent logic here is that the inclusion of reforms in a reform package for a specific country at a given point in time should depend on their complementarity. We try to draw a logic sequence of financial reforms which can lead to better capital inflow performance, relying on the theoretical and empirical literature. We base upon the matrix of EBRD (European Bank of Reconstruction and Development) reform indicators which shows the main policy interdependences and provides examples of policy feedbacks by main policy blocks; the leading idea being that the implementation of a reforms block increases the return of the implementation of another one subsequently leading to international capital inflows. Eight financial reform areas are considered in our extended EBRD matrix. Finally, we sum up the EBRD policy linkage design into three arguments to illustrate the relationship between financial reforms complementarity and international capital inflows (FDI and portfolio investments).

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foreign banks) occurs at least two years prior to deregulation, thirdly the reduction of government ownership of banking sector to less than 40% occurs at least two years prior to deregulation, and finally, the presence of a system of prudential regulation and supervision adjusted for a market-based financial system.

- Argument 1: Easing resource allocation and financing mechanisms

The way in which different areas of financial reforms are implemented can ease resource allocation and affect international capital inflows. Indeed, concerning the complementarity between banking sector liberalization and capital account liberalization in transition countries, Buiters and Taci (2003), show that without an efficient domestic banking sector and deeper and more liquid domestic financial markets, only the subsidiaries of well-capitalized and liquid foreign enterprises, and a few domestic players in the oil and gas sectors, could hope to attract significant amounts of external finance. For instance, when they are implemented conjointly (or before) with state owned bank privatization, the measures for the development of securities markets and non-bank financial institutions can ease the mechanism of financing liberalization<sup>5</sup>. Furthermore, when banking sector reform and interest rate liberalization precede or are implemented simultaneously with privatization, this can lead to an improvement of credit allocation, being given the fact that public enterprises have always experienced the favor treatment allowed to priority sectors. In addition, large enterprise restructuring is undermined in the absence of financial discipline, typically imposed by the banking sector.

Another complementarity could be found between capital account liberalization and other financial reform areas. According to Prasad (2003), one possible motivation of capital account liberalization lies in the enhancement of the efficient global allocation of capital that brings an increase in economic growth, employment opportunity, and living standards in developing countries. In this sense, one can expect that the openness of capital accounts generates a signaling effect to foreign investors, showing that a country has a strong commitment to provide efficient economic policies and market discipline. However, Aizenman (2002) pointed out that it is difficult to sustain the effectiveness of capital control in the context of increased trade integration, high pressure from other domestic policies, or certain policies of other countries. Also, Buiters and Taci (2003) noted that the strengthening of the domestic financial sector, particularly the banking sector the main vehicle for the intermediation of both domestic and international financial flows (particularly in transition countries) is essential if these countries want to benefit and withstand

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<sup>5</sup>Because they increase the liquidity in the markets, facilitate the transactions and reduce their costs



Table 1: Extended ERDB policy linkages matrix

| -  | Large-scale privatization  | Small-scale privatization  | Competition policy: entry barriers  | Banking reform and interest rate liberalization           | Securities markets and non-bank financial institutions                  | Capital account liberalization  |
|--|--|--|---|---|---|---|
| Large-scale privatization                              | -  | Easing resource allocation                                       | Increases competition   | Improves conditions for credit activities                 | Development of capital markets  | -   |
| Small-scale privatization                              | Easing resource allocation                                       | -  | Increases competition   | Improves conditions for credit activities                 | Development of capital markets  | -   |
| Competition policy: entry barriers                     | Prevents excessive market power                                  | Prevents excessive market power                                  | -   | Better assessment of enterprises viability                | Better assessment of enterprises viability                              | Better allocation of external capital inflows in the most productive sector |
| Banking reform and interest rate liberalization        | Support of hard-budget constraints                               | Support of hard-budget constraints                               | Enhance mechanisms  | -   | Support of hard-budget constraints                                      | Easing financing mechanisms (particularly foreign credit)                   |
| Securities markets and non-bank financial institutions | Easing financing mechanisms                                      | Easing financing mechanisms                                      | Enhance mechanisms  | Improves conditions for credit activities                 | -   | -   |
| Capital account liberalization                         | Positive signal for foreign investors : Enhance entry of foreign | Positive signal for foreign investors : Enhance entry of foreign | Better allocation of external capital inflows in the most productive sector | Easing financing mechanisms (particularly foreign credit) | Development of capital market by reducing the cost of foreign financing | -   |

<sup>1</sup>Source: Macedo and Martins (2008) and author<sup>4</sup>

<sup>4</sup>The last column and row are added by the author

the risks associated with large, and potentially volatile, gross and net cross-border capital flows.

- Argument 2: Increasing competition

The way in which different reform areas are implemented over time could create a better competitive environment, which is favorable for foreign investments inflows. The sequence of the privatization of state owned banks and the removing of entry barriers in the financial sector can perfectly serve as an illustrative case. Indeed, the direct benefit of privatization of state owned banks is an increase in revenues from the sale of public assets and the limitation of public sector expenditures. Furthermore, given its role on the improvement of efficiency and productivity, transparency of public enterprises and on the the limitation of rent seeking, privatization of state owned banks can act as a clear signal that a country is more open to private investments. In addition, Montiel (2003) suggests that the monopoly power and the collusive price-setting in banking industries, mainly inherited from very strict regulation in bank entry, appears to distort the efficiency of resource allocations and reduces competitiveness<sup>6</sup> in the financial market. Thus, the absence of entry barriers in the banking sector can motivate new players, both domestic and foreign, to enter the financial market which can promote more competitive behavior in the financial system. Newcomers can participate in the banking market in many forms, such as establishing totally new banks, mergers and acquisitions of existing banks, and even joint ventures with domestic banks. The relaxation of entry barriers in the banking sector has both direct and indirect impacts on the increase of FDI flows. As a summary, if the privatization (large or small) of state owned banks is preceded or accompanied by the elimination of barriers to entry in the banking sector, one can expect that FDI and/or portfolio investment inflows increase.

- Argument 3: Increasing the liquidity and providing better information on profit opportunities

Security market development not only increases the size and liquidity of an economy by raising the number of both foreign and domestic players in the domestic market, but also facilitates an improvement in international risk-sharing, and lessens transaction costs. Consequently, it can stimulate FDI and portfolio investment directly by increasing alternative channels of investment

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<sup>6</sup>By creating substantial profit margins by setting low deposit rates and high lending rates

and creates opportunities for diversification to foreign investors. In addition, capital market liberalization makes the process of mergers and acquisitions easier and increases alternative sources of capital for domestic companies. Thanana Sompornserm (2009) noted that foreign companies which invest in a liberalized country can acquire funds not only from their headquarters, but also from an Initial Public Offering (IPO), or issue bonds which can create an incentive for foreign investors to enter the domestic markets.

Another complementarity relation is emphasized in the World Bank report (2007) which notes that in absence of entry barriers in banking sectors, the deregulation of interest rate controls may encourage foreign banks or financial institutions to enter the market due to increased opportunities for profit.

## 4 Methodology

The measurement of reforms complementarity and the construction of a comprehensible indicator of financial reforms sequence are on the main focuses of our study. For this purpose, this section proposes firstly to study the properties of reforms complementarity measured as the reciprocal of the Herfindahl-Hirschman concentration index; secondly, to analyze the relation between international capital (FDI and portfolio investments) inflows and reforms complementarity and reforms sequence by using a robust econometric strategy.

### 4.1 Measurement of reforms complementarity

In order to compute the reform complementarity index, we follow de Macedo and Martins (2008) and Coricelli and Maurel (2010) who measure the concentration of reforms by means of the Hirschmann-Herfindhal indicator and take the reciprocal of it as an index of reform complementarity (RC). The calculation of RC is as follows:

$$RC_{j,t} = \frac{1}{\sum_{i=1}^N \left( \frac{R_{ij,t}}{\bar{R}_{j,t}N} \right)^2} \quad (1)$$

Where N is the number of financial reforms areas, and  $\bar{R}_{j,t}$  is the average level of reforms, year by year, for a country j. over the financial dimensions indicated above; N is the number of

reforms and is equal to 8. A higher value of  $\bar{R}_{j,t}$  denotes a higher complementarity (and lower concentration). This indicator presents interesting mathematical properties for our study.

#### 4.1.1 Interpretation of changes in the complementarity variable

We build upon the decomposition of de Macedo and Martins (2008) which gives us a general interpretation of the variation of the complementarity index in comparison with the radial removing of distortions. Indeed, when countries are outside of d-equilibria<sup>7</sup>, the link between the distance to the radial and the change in complementarity can be derived from the following decomposition:

$$\frac{1}{RC} = \frac{1}{N} + \sum_{i=1}^8 \left( \frac{R_i}{\bar{RN}} - \frac{1}{N} \right)^2 \quad (2)$$

When all reforms are at the same level, their share in the total score  $\frac{R_{ij,t}}{\bar{R}_{j,t}N}$  is equal to  $1/N$  and therefore the measure of Euclidian distance to the radial denoted by RR is given by:

$$RR = N - \left[ \frac{1}{N} + \sum_{i=1}^8 \left( \frac{R_i}{\bar{RN}} - \frac{1}{N} \right)^2 \right]^{-1} = N - RC \quad (3)$$

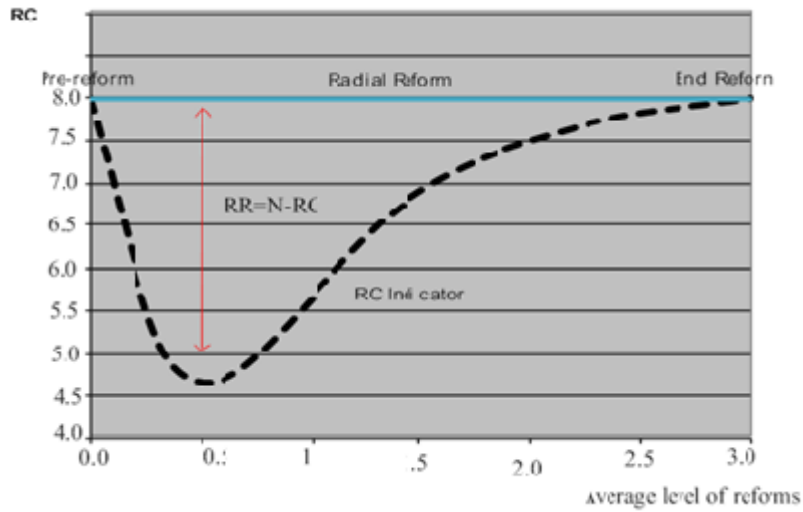
When a reform package is such that complementarity increases ( $\Delta RC > 0$ ), we get closer to the corresponding radial reform ( $\Delta RR < 0$ ). Because of the supermodularity property<sup>8</sup> of RC, only a simultaneous and proportional liberalization in all the reform areas permits an unambiguous increase unambiguously of the complementarity score. However, due to political and economic constraints, not all distortions can be removed at the same time. Therefore, complementarity can decrease during transition. Consequently, in the following sub-section we provide a general condition of an increase in the level of complementarity when the countries did not adopt a radial removing strategy.

Figure 1. provides a good illustration of interpretation of the reforms complementarity evolution in terms of distance to radial reform strategy namely the benchmark situation where

<sup>7</sup>If D2 and D1 are two d-equilibria, they can be characterized by  $D2=k.D1$ , where k can be seen as a proportional shift in all distortions simultaneously compared with the first-best situation.

<sup>8</sup>Let  $F(\cdot)$  be a function depending from two policy instruments  $(X, Y)$ , such as  $F(X, \bar{Y}) - F(\bar{X}, \bar{Y}) \leq F(X, Y) - F(\bar{X}, Y)$  (\*), where  $\bar{X} < X$  and  $\bar{Y} < Y$ .  $F(\cdot)$  is supermodular if the relation (\*) holds for every pairs of policy instruments.

Figure 1: Interpretation of change in Complementarity



<sup>2</sup>Source: de Macedo and Martins (2008) and Author

liberalization lead to the same level of reforms areas reach the same level and. As we can see, there are two corners situations with a high level of complementarity. At the beginning of reform process the complementarity level is very high, this level decreases gradually with the average level of reforms until a certain level of average reform after which this relationship become positive. This non-linearity could represent just a learning by doing process (in the financial liberalization implementation)in which several experiments of combination of financial reforms are necessary before policymakers start to understand and update progressively their knowledge on the linkages between the different reforms areas.

#### 4.1.2 General condition of change of the reform complementarity measure

It is important to know what we measure when we compute the marginal variation of capital inflows for a given variation reform complementarity. In this section, we provide a general condition for an increase in the complementarity level. Let us assume that  $RC_{j,t} = f(R_{1j,t}, \dots, R_{Nj,t})$  and that  $S_{ij,t}$  is the share of the reform area  $i$  in the total of reforms level for the country  $j$  at  $t$ . Then, the total differential of can be expressed as follows:

$$\begin{aligned}
dRC_{j,t} &= \sum_{i=1}^8 \frac{\partial f(R_{1j,t}, \dots, R_{Nj,t})}{\partial R_{ij,t}} dR_{ij,t} = \sum_{i=1}^8 \frac{\partial \left[ \sum_{i=1}^8 \left( \frac{R_{ij,t}}{R_{j,t}} \right)^2 \right]^{-1}}{\partial R_{ij,t}} dR_{ij,t} = \sum_{i=1}^8 \frac{\partial (\sum_{i=1}^8 s_{ij,t}^2)^{-1}}{\partial R_{ij,t}} dR_{ij,t} \\
&= \sum_{i=1}^8 (-1) \frac{\partial [\sum_{i=1}^8 s_{ij,t}^2]}{\partial R_{ij,t}} dR_{ij,t} \left[ \sum_{i=1}^8 s_{ij,t}^2 \right]^{-2}
\end{aligned} \tag{4}$$

With

$$\begin{aligned}
\frac{\partial [\sum_{i=1}^8 s_{ij,t}^2]}{\partial R_{ij,t}} dR_{ij,t} &= \sum_{i=1}^8 \left[ \frac{\partial s_{kj,t}^2}{\partial R_{kj,t}} + \sum_{i \neq k} \frac{\partial s_{ij,t}^2}{\partial R_{ij,t}} \right] = 2 [1 - s_{ij,t}] s_{ij,t} \frac{1}{\sum_{i=1}^8 R_{ij,t}} - 2 \sum_{k \neq i} s_{ij,t}^2 R_{ij,t}^{-1} \\
&= 2 \left( [1 - s_{ij,t}] s_{ij,t}^2 R_{ij,t}^{-1} - \sum_{k \neq i} s_{ij,t}^2 R_{ij,t}^{-1} \right)
\end{aligned} \tag{5}$$

As the reciprocal of the HH concentration index is one dimensional measure, the derivative of the share of reform area j when the financial area i changes is not equal to 0:  $2 \sum_{k \neq i} s_{ij,t}^2 R_{ij,t}^{-1}$  and then:

$$\begin{aligned}
dRC_{j,t} &= -2 \left( [1 - s_{ij,t}] s_{ij,t}^2 R_{ij,t}^{-1} - \sum_{k \neq i} s_{ij,t}^2 R_{ij,t}^{-1} \right) \frac{1}{[\sum_{i=1}^8 s_{ij,t}^2]^2} dR_{ij,t} \\
&= -2RC_{j,t}^2 \left( [1 - s_{ij,t}] s_{ij,t}^2 R_{ij,t}^{-1} - \sum_{k \neq i} s_{ij,t}^2 R_{ij,t}^{-1} \right) dR_{ij,t}
\end{aligned} \tag{6}$$

If only one financial reform area increased between t-1 and t (say  $dR_{1j,t} > 0$ ) it follows that:

$$\frac{dRC_{j,t}}{dR_{1j,t}} = -2RC_{j,t}^2 \left( [1 - s_{1j,t}] s_{1j,t}^2 R_{ij,t}^{-1} - \sum_{k \neq 1} s_{ij,t}^2 R_{ij,t}^{-1} \right) \tag{7}$$

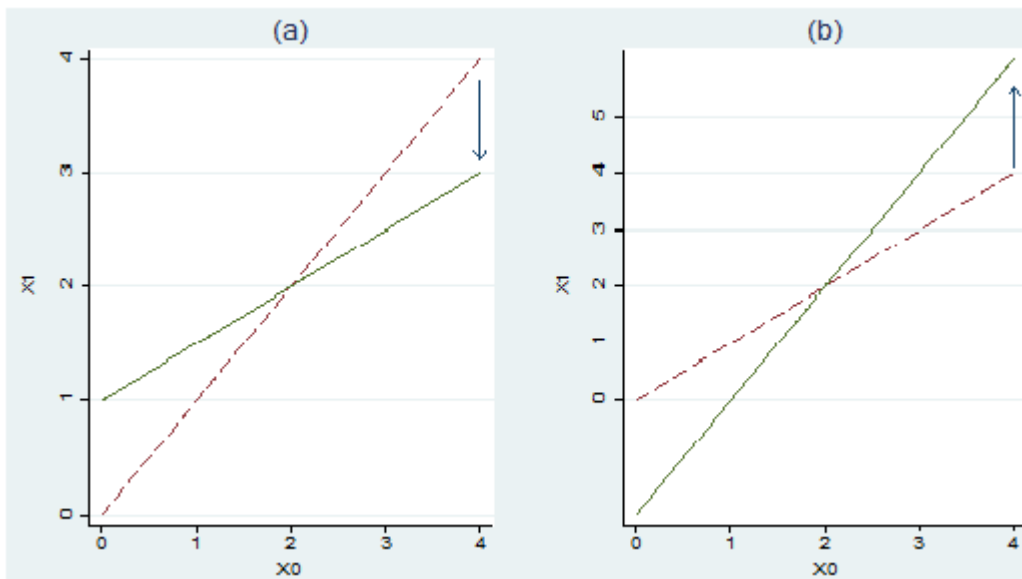
As we can see, the condition to have an increase in reforms complementarity when a given level of financial reforms area increases is that the following inequality must hold:

$$- \left( [1 - s_{1j,t}] s_{1j,t}^2 R_{ij,t}^{-1} - \sum_{k \neq 1} s_{ij,t}^2 R_{ij,t}^{-1} \right) > 0 \implies \sum_{k \neq 1} \left( \frac{\partial s_{ij,t}^2}{\partial R_{1j,t}} \right) > \frac{\partial s_{1j,t}^2}{\partial R_{1j,t}} \tag{8}$$

• **Illustration: Prais interpretation of RC variations**

Let  $X_0=(X_0^1, X_0^2, \dots, X_0^N)$  be the vector of financial reforms levels (for the N reforms areas) of in time  $t_0$  and  $X_1=(X_1^1, X_1^2, \dots, X_1^N)$  the vector of financial reforms levels in time  $t_1$ . According to S. J. Prais (1958), the slope of the 45° line provides a criterion of change in concentration. If the slope is unity, all reforms will have the same level at the beginning and the end of the period and concentration is unchanged. If the slope is greater than this (Figure b), reforms above the average in level will have increased their size in relation to those below it; concentration consequently increases (and complementarity decreases). If the slope is less than unity (Figure a ) concentration decreases (and therefore complementarity increases). In others words, we can say that if the reforms that are large at a certain date subsequently grow on the average more rapidly than small reforms level, then the reforms concentration index will have increased and therefore, the complementarity will have decreased. It is however not always realized that the obverse proposition does not hold; that is, if the large reform levels have grown less rapidly than the small reforms level then concentration does not necessarily decrease but in the case that it happens, we can expect an increase in the complementarity index.

Figure 2: Graphical illustration of change in Complementarity



<sup>3</sup>Source: Author calculations

## 4.2 Econometric strategy

### 4.2.1 Baseline Model

The specification (9) explores the link between financial reforms complementarity and international capital inflows.

$$CapitalInflows_{i,t} = \alpha_i + \beta X_{i,t} + \phi COMPL_{i,t} + \tau FL_{i,t} + \theta PUSH_{i,t} + \gamma PULL_{i,t} + \epsilon_{i,t} \quad (9)$$

where  $CapitalInflows_{i,t}$  denotes the measure of performance in the country  $i$  at period  $t$ ,  $\alpha_i$  is country's individual effects,  $X_{i,t}$  is a set of other control variables.  $FL_{i,t}$  denotes the level of financial reform in the country  $i$  at period  $t$ .  $COMPL_{i,t}$  is a variable which measures the financial reforms complementarity.

We expected that the both coefficients  $\phi$  and  $\tau$  are positive, which means that beyond the positive effect of the level of financial reforms, we expect that the implementation of well-balanced reforms attracts much more foreign capital in the countries.

### 4.2.2 Augmented models

We account for heterogeneity in the effect of complementarity by introducing a set of variables which are interacted with the complementarity index:

$$CapitalInflows_{i,t} = \alpha_i + \beta X_{i,t} + \psi(Z_{i,t}) + \theta PUSH_{i,t} + \zeta PULL_{i,t} + \epsilon_{i,t} \quad (10)$$

We retain four specifications as augmented models. These models correspond to different definitions of the function  $\psi(Z_{i,t})$ .

- Financial reforms complementarity conditional effect

A country could have a highly coherent economic system but have extremely market-unfriendly policies; one can think of autarchic state-planned systems. Conversely, a high level of some financial reforms can be associated with a low level of reforms complementarity. Consequently, it is appropriated to calculate an indicator that captures both the reform level and complementarity



(de Macedo and Martins, 2008). The first specification accounts simultaneously for these “two corner behaviors” issues by using the following strategy :

$$\psi(Z_{i,t}) = \phi COMPL_{i,t} + \gamma COMPL * FL_{i,t} + \tau FL_{i,t} \quad (11)$$

- Effect of complementarity conditional on the level of reforms under the assumption of discontinuity

The above specification for  $\psi(Z_{i,t})$  fails to separate the behavior of the countries which have a low level of reform and a high level of complementarity from the behavior of those which have a high level of reform and a low level of complementarity. Here, we include two specification which account for the effect of complementarity conditional on the level of reforms. The first considers the countries which are located below the sample median of financial reforms level ( $[1|FL_{i,t} < Median_{FL}]$ ). This variable can be defined as the product of reforms complementary index and the reforms level variable:

$$\psi(Z_{i,t}) = \phi COMPL_{i,t} + \gamma [1|FL_{i,t} < Median_{FL}] COMPL_{i,t} + \tau [1|FL_{i,t} < Median_{FL}] \quad (12)$$

The second specification takes into account the heterogeneity through the distribution of complementarity by distinguishing the countries which are located below the financial reforms level median in comparison with those which are located above ( $[1|COMPL_{i,t} < Median_{COMPL}]$ ):

$$\psi(Z_{i,t}) = \phi [1|COMPL_{i,t} < Median_{COMPL}] + \gamma [1|COMPL_{i,t} < Median_{COMPL}] FL_{i,t} + \tau FL_{i,t} \quad (13)$$

- Complementarity effect conditional on the number of reforms

In this sub-section, we consider that the countries could reach a high level financial reforms complementarity by implementing a low number of financial reforms which have very high scores or by implementing a high number of reforms with low scores or high scores. For this purpose, we introduce the following interaction term:

$$\psi(Z_{i,t}) = \phi COMPL_{i,t} + \gamma NumberREF_{i,t} COMPL_{i,t} + \tau NumberREF_{i,t} \quad (14)$$

We use a fixed effect panel method<sup>9</sup> to estimate these models. This representation permits us to exploit not only the cross section dimension but also the time dimension of our data.

## 5 Data and empirical results

### 5.1 Data and descriptive statistics

#### 5.1.1 Data sources

Our sample consists of 91 countries observed over 32 years, from 1973 to 2004. It comprises 22 advanced countries, 13 emerging Asia countries, 14 Sub Sahara countries (SSA), 17 Latin America and Carraibes countries (LAC), 18 transition countries and 18 Middle East and North Africa countries (MENA). The data are provided by Abiad and al’s new financial reforms database (2008), international financial statistics (IFS, 2009), Demirguc and al.’s financial structure database (2009), International Country Risk Guide (ICRG, 2008), World Development Indicators (WDI, 2009) and by the External Wealth of Nations dataset (2009).

#### 5.1.2 Variables description

- Capital inflows variables

We distinguish two capital inflows variables, namely the level<sup>10</sup> of FDI inflows and of Portfolio investments inflows<sup>11</sup> which are provided by the External Wealth of Nations dataset (Lane and Milesi-Ferretti, 2007a). To avoid the scale issue, we consider a logarithm transformation of capital inflows variable as follows:

$$Y = \text{Log}(1 + \text{CapitalInflows}_{i,t}) \quad (15)$$

We choose to focalize only on portfolio and FDI flows because of measurement errors issues on the others capital flows areas. Indeed, as pointed out by Alfaro et al. (2006a, 2006b), after

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<sup>9</sup>The results of Hausman (1978) specification test suggest that the fixed effects model is suited for the representation of individual effects being given our data structure :  $\text{Prob}(STAT > \chi^2(9)) = 0.0004$

<sup>10</sup>We use absolute FDI flows because if one were to use FDI inflow as a percentage of host countrys GDP instead, the measure would capture changes in the relative importance of foreign investment to the host country, but not changes in inflows directly (Neumayer, E (2005)).

<sup>11</sup>FDI and Portfolio investments inflows are evaluated basing upon “residence principle” of economic agents.

the debt crisis, data on debts contain great measurement errors. The principal reason is the lack of data on the debts between private agents exclusively. The debts data used here are issued by private economic agents (foreign banks mainly) but can be contracted by private or public sector. These debts, contrary to the FDI and portfolio investments, reflect not only the market incentives but also governments decisions.

- Financial reforms variables

The financial reforms variables are provided by Abiad et al. (2008) new financial reforms database, which takes into account the reforms in eight (8) financial areas, namely credit controls (that is credit directed and credit ceiling programs) and excessively high reserves requirements, interest rate controls, entry barriers, state ownership in the banking sector, capital account restrictions, prudential regulation and supervision of banking sector and securities markets policy. This database makes distinction between liberalization and reversal phases and takes into account the depth of liberalization by separating large reforms from other reform. We retain for this study a composite index (called  $RL_{i,t}$ ) which is computed as the average of the eight (8) reforms areas.

- Control variables

As control variables, we include the other internal (pull factors) and external (push factors) determinants of international capital inflows.  $PUSH_{i,t}$  represents a vector of global factors that makes the investments in developed countries less attractive relative to developing countries. We adopt two variables that are commonly used in the literature of the determinants of international capital flows. The first is U.S. GDP growth, and the second is the interest rate differential which is the difference between domestic and U.S. short-term deposit rates, as proxies for the push effects.

$PULL_{i,t}$  represents a vector of domestic factors that help recipient countries to attract capital from abroad. We employ the common domestic macroeconomic indicators such as inflation, domestic credit over GDP, domestic GDP growth, investments to GDP, local infrastructures (Phone Lines per 100 People) and trade openness, as proxies for the pull effect. We also include a set of regional dummies respectively for Sub Africa countries (SSA), Middle East and North

Africa countries (MENA), transition countries, Emerging Asia countries, Latin American and Caribbean countries and Advanced countries. For further details on the variables description see the Table 11 (See Annex).

### 5.1.3 Descriptive statistics

- Reforms complementarity and financial reforms level

A first view on the data suggests that the distribution of complementarity through various geographical regions is a very heterogeneous. According to the Table 2, Advanced countries have the higher level of financial reforms complementarity (5.616); conversely, the Sub Sahara Africa and Latin American countries have a lower level of financial reforms complementarity (with respectively 3.987 and 3.906).

Table 2: Distribution of financial reforms complementarity by region

| -               | SSA   | MENA  | Emerging Asia | Advanced | Latin America | Transition |
|-----------------|-------|-------|---------------|----------|---------------|------------|
| Complementarity |       |       |               |          |               |            |
| average score   | 3.987 | 4.202 | 4.473         | 5.616    | 3.906         | 5.027      |

<sup>4</sup>Source: Author calculations

- Preliminary statistics on the relationship between capital inflows and reforms complementarity

The preliminary descriptive statistics on the evolution of international capital (FDI and portfolio capital) inflows through the distribution of financial reforms complementarity scores suggest that both FDI and portfolio investment inflows increase with the complementarity score in the respective countries. Thus, the level of FDI and portfolio investment inflows in the last quartile of the complementarity distribution are respectively roughly nine (9) and ten (10) times more important than that in the previous quartile (Table 3.).

In addition, Table 5. reveals a very important heterogeneity in the performances of countries according to geographic regions. In particular, it indicates that whatever the region, the countries which have more complementary financial reforms also present a more important level of entrance

Table 3: The average FDI and portfolio investments inflows by complementarity quartiles

| -  | $X \leq p25$ | $p25 \leq X \leq p50$ | $p50 < X \leq p75$ | $X > p75$ |
|--|--------------|-----------------------|--------------------|-----------|
| FDI inflows (millions USD)               | 3178.473     | 8501.895              | 14588.68           | 127593.6  |
| Portfolio invest. inflows (millions USD) | 335.3381     | 1519.026              | 8833.266           | 96594.19  |

<sup>5</sup>Source: Author calculations

of FDI and portfolio investments. Our aim in the following section is to bring a robust empirical assessment of this relationship.

## 5.2 Empirical results

### 5.2.1 Financial reforms complementarity and international capital inflows

Table 7. provides the results of the estimation of the effect of financial reforms complementarity and financial reforms level on FDI (Column 1.) inflows and on the portfolio investment inflows (Column 5.). Firstly, the results emphasize the role of the level of financial reforms as an important determinant of both FDI and portfolio investments inflows. On average when the financial reforms level increases by one point, the corresponding variation of FDI inflows is roughly equal to 1.842%. These results are consistent with Buiters and Taci (2003), who noted that the reforms achievements and efforts have been the largest determinants of private capital flows in transition countries. Secondly, the column 1 of Table 7. reveals a positive and significant link between the complementarity and FDI inflows; which means that the countries which implemented financial reforms in a more balanced way received more FDI inflows than others. In order of size, one can say that when complementarity increases by one point FDI inflows increase by 10%.

[Table 7. here]

Column 5 of Table 7. suggests a positive but not statistically significant link between the reforms complementarity and portfolio investments inflows. This result indicates that the foreign portfolio investors do not react differently in presence of the high or low level of complementarity of the financial reforms. This last result can probably be explained by the existence of factors which make the effect of complementarity non homogeneous. The following sub-sections will help us

to highlight the presence of heterogeneity in the impact of complementarity.

The other controls variables have expected effect (trade openness, financial development, and the level of real GDP per capita affect positively international capital inflows).

### **5.2.2 The impact of complementarity conditional on financial reform distribution**

The effect of complementarity on FDI and portfolio investment inflows can depend on the level of financial reforms reached by each country. On the other hand, for countries which have roughly the same level of financial reforms, the location on the distribution of the level of financial reforms complementarity could lead to different behaviors. First, we suppose that there is no discontinuity in the effect according to the level reform or the complementarity score. Consequently, in the Columns 2. and 6. of Table 7., we interact two continues variables namely, the complementarity and the reform level. The results suggest that whatever the reform level, the manner that the financial reforms are implemented affects in the same way respectively FDI and portfolio investments inflows (the coefficients of the interaction term are not statistically significant). This result is probably due to the issue of corner situations. In fact, there are countries, e.g. ex-soviet countries which have high complementarity level but low level of financial reforms (because they are centralized).

For this reason, in Columns 3. and 7., we introduce a discontinuity in the effect of complementarity according to whether the countries are located above or below the median of the distribution of financial reforms level. The results are as follows. Firstly, according to Column 3. one can conclude that on average when countries are located below the median value of financial reforms level, their FDI inflows are lower by 0.145% than those which are located above the sample median of financial reforms distribution when the complementarity increases by a unit. In addition, to carry out reforms in more complementary way makes it possible to increase the entries of FDI by 0.358%. Secondly, about the effect of complementarity on the foreign portfolio investments, the Column 7. of Table 7. indicates a positive and statistically significant effect. On average the effect of the reforms complementarity on the foreign portfolio investments inflows is lower by 0.310% in the countries where the reform level is below the sample median. To sum up, implementing reforms in a balanced way increases the portfolio investments inflows by 0.567% when the countries are located above the median and by 0.257 % ( $=0.567\% - 0.310\%$ ) when they

are located below the median. As we can see, the effect of complementarity on portfolio investments is greater than the corresponding effect for the FDI inflows<sup>12</sup> when we introduce the discontinuity.

We also analyze the heterogeneity on the side of the complementarity distribution, while distinguishing the countries according to their position compared to median score of complementarity. Columns 4. and 8. suggest that there is no discontinuity in the effect of financial reform, which means that the effect of the level financial reform is uniform whatever the location on distribution of complementarity index (below or above the median value).

### 5.2.3 Reforms complementarity, number of additional reforms and capital inflows

In this section, we propose to emphasize the impact of complementarity if countries implement liberalization in new financial areas. If there is theoretically a nonlinear link between reform complementarity index and the number of financial reforms areas, an interesting question is: what is the effect of complementarity, given the fact that a country has implemented a set of new reforms in an area in which it was never liberalized? By introducing a variable for the number of additional reforms, we want to check if the effect of magnitude of financial reforms can be distinguished from that of the number of reforms.

The results of the estimations are consigned in Table 8. According to this table the reform level is still an important determinant of both FDI and portfolio investments inflows, but beyond this positive effect of the level (magnitude) of reforms, the number of additional reforms reduces respectively by 0.172% and 0.462% the level of FDI and portfolio investments inflows. However, when they are implemented in a balanced way, the number of additional reforms has a positive and significant effect on portfolio investments inflows. This result suggests that one of main channels through which the complementarity affects the portfolio investment inflows is the additional financial reforms which the countries implemented. For FDI investments inflows, the results reveal that only the manner in which the existing reforms was implemented matter. The coefficient of the interaction term between the complementarity and the additional number of reforms is not statistically significant.

~ [Table 8. here]

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<sup>12</sup>Which is equal to 0.213% (0.358% – 0.145%).

These result encourage us to assess the effect of the sequence of financial reforms on international capital inflows via a decomposition of RC variations.

#### **5.2.4 Assessment of the contribution of each financial reform to the effect of complementarity on capital inflows: the impact of sequence**

The previous results gave us the marginal variation of capital inflows for a total differential of the composite index of complementarity, that is, the weighted sum of marginal variation of each financial reform area. Particularly, in the case of sub-section 5.2.3, the assessment of the effect of complementarity conditional on additional financial reforms does not say us what reform contributes significantly to the effect and for how much; moreover, the additional reforms are not always followed by an increase in complementarity. In this section, we try to assess the effect of implementing a given reform at the end of reform process instead of another reform. Using the formula derived from the general condition of changing in complementarity index (see equation 5), we compute the contribution of each financial reform area and secondly, we use Prais's interpretation of RC changes to assimilate the positive variations of RC to a certain idea of sequence. Indeed, when a positive variation of one reform area coincides with an increase in the RC index, one can conclude that at  $t-1$ , at least, the corresponding reform area level was lower than the others reform areas.

Table 4. provides an idea on the predictive power of our method of sequence analysis. It represents the proportion of positive variations of each reform area which coincides with positive variations of complementarity from our decomposition, under the assumption that the variation of complementarity is only due to this reform area variation (i.e. *ceteris paribus*). As we can see, the extension of capital market is associated with an increase in complementarity in 75% of cases. Then, capital account liberalization, state owned banks privatization and the adoption of supervision and prudential regulatory measures are associated with an increase in complementarity respectively in 43.75%, 43.24% and 40.45% of cases. However, a better understanding of this univariate analysis, requires an identification of reforms which often occur at the same time. In fact, when several liberalization measures take place between  $t-1$  and  $t$ , the traceability of the effect each liberalization measure on the coherence of the global reform system is difficult to establish. Table 6. reveals that roughly 61% of reforms which occur at the same time involve



the extension of security market. Moreover, 25.86% of security markets extension are associated with a capital account liberalization.<sup>13</sup>

Table 4: Quality of reforms complementarity decomposition

| Reforms areas  | Percentage :<br><i>contribution to positive variation</i><br><hr/> <i>real positive variation</i> |
|--|---|
| Credit ceiling deregulation                                | 28.13   |
| Credit directed deregulation                               | 40.00   |
| Relaxation of Interest rates controls                      | 0.00  |
| Relaxation of entry barriers                               | —   |
| States owned banks privatization                           | 43.24   |
| Adoption of supervision and prudential regulatory measures | 40.45   |
| Capital account liberalization                             | 43.75   |
| Extension of security market                               | 75.00   |

<sup>6</sup>Source: Author calculations

Finally, our empirical strategy consists of creating a set of eight variables which are equal to the contribution of each reform area to the contribution of reform area k to complementarity changes if this contribution is positive and 0 otherwise. And in a second time, to estimate our basic empirical model in which the complementarity variable is replaced by these variables. We obtain the following model:

$$CapitalInflows_{i,t} = \alpha_i + \beta X_{i,t} + \phi_k Contribution_{i,t}^k + \tau FL_{i,t} + \psi PUSH_{i,t} + \gamma PULL_{i,t} + \epsilon_{i,t} \quad (16)$$

Where :

$$Contribution_{j,t}^k = \begin{cases} \frac{dRC_{j,t}}{dR_{kj,t}} & \text{if } \frac{dRC_{j,t}}{dR_{kj,t}} > 0 \\ 0 & \text{Otherwise} \end{cases} \quad k = 1, 2, \dots, 8 \quad (17)$$

<sup>13</sup>One way to account for the simultaneity of reforms efforts is to weight the marginal variation of RC by the reciprocal of correlation between the reforms areas in the case of two simultaneous reforms; in the case of several simultaneous reforms we can use principal component weights.

Because of the lack of observations, the variables which account for the positive contribution of the entry barriers liberalization and the positive contribution of the directed credit program deregulation to the complementarity are excluded from the estimations.

The parameter  $\phi_k$  provides us the effect of an increase in the coherence of the reforms system due to an increase in the the reform area k. As the increase in the coherence of reforms' system often coincides with a liberalization in the reform area k at the end of reform process, therefore when  $\phi_k > \phi_{k'}$ , the interpretation in term of sequence effect can be formulated as follows: “On average, to liberalize the reform area k instead of the reform sector k' at the end of reform process enables countries to attract more capital from abroad”.

Tables 9. and 10 show the results of the assessment of the effect of sequence on FDI and Portfolio investments respectively. The first important result is that the banking regulation and supervision measures, that is, the adoption of a capital adequacy ratio based on the Basel standards and other regulation measures in an environment where the interest rate is relatively liberalized, the allocation of credit deregulated and where the majority of state owned banks are privatized, increases both FDI and portfolio investments inflows. Besides, the effect of introducing more banking regulation and supervision on portfolio investment inflows (21.56%) is three times more important than the effect on introducing banking supervision and regulation measures on FDI inflows (6.932%).

The second interesting result is related to the implementation of state owned banks privatization. The column 4. in the Tables 9. and 10. suggests that, when the privatization occurs when the others financial areas are already reformed, it increases the FDI inflows by 10.07% and the portfolio investments by 22.85%. Paradoxically, the effect of capital account liberalization on FDI (and respectively on portfolio investments) inflows is the same that it contributes positively or negatively to the complementarity variation. This result is probably due to the high number of reversals to which the capital account liberalization is subject, particularly during crises periods. Another explanation is that the capital account liberalization always occurs at the same time with privatization or security market liberalization<sup>14</sup>.

These results indicate that a developed and relatively safe domestic financial system attracts

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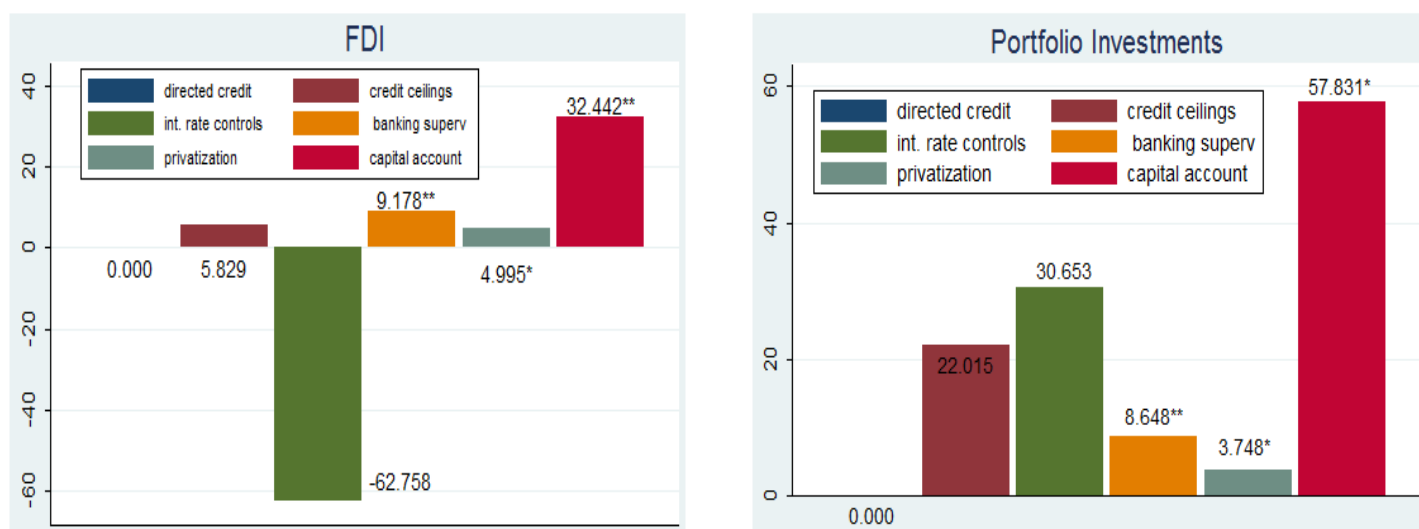
<sup>14</sup>The data show that 25.8% of security markets reforms effort occurs at the same date with the capital account liberalization.

much more FDI and portfolio investments than a developed but not safe financial system. They are consistent with conventional wisdom, which supports the idea of an implementation of the privatization only when the countries have already a relatively high level of reforms in the others financial areas. Particularly, they are consistent with the empirical sequence of Williamson and Mahar (1998) which indicates that state owned banks privatization and the presence of a system of prudential regulation and supervision adjusted for a market-based financial system are often preceded by other financial reforms. These results are also in line with the World Bank report (1997) which points out privatization process as one of the important factors in the rapid increase in foreign direct investments in developing countries, particularly in Latin America, during the 1980s and 1990s.

- Regional heterogeneity in the impact of financial reforms sequence

If the previous results emphasized the impact of the financial reforms sequence for the whole sample, however, Abiad et al. (2008) remarked that individual country data shows evidence of regional clustering: countries within certain regions have tended to liberalize their financial sectors at roughly the same time, and in roughly the same way. There are therefore some reasons to think that the impact of financial reforms sequence could be different according the region. The results of estimations tend to corroborate this intuition. Indeed, it seems that if for South Saharan Africa and Latin America countries (Figure 3 and Figure 4.) the most efficient sequence has been the one in which the capital account liberalization has been implemented at the end of the financial reform process, for the emerging Asia countries (Figure 5) on the contrary, the best sequence has been the one in which the privatization of states owned banks has been implemented at the end of reform process. In fact, the process of financial liberalization in East Asia was much more gradual than in Latin America. Countries opened up their financial sectors in small steps in the early 1980s, with the whole reform process stretching over a decade or more in most cases.

Figure 3: Empirical effect of financial reforms sequence: South Sahara Africa



<sup>7</sup>Note: (\*\*\*) (\*\*) (\*) mean respectively significant at 1%, 5% and 10%

## 6 Robustness checks

### 6.1 Financial reforms and trade openness complementarity

In this sub-section, we use an alternative definition of reforms complementarity, which include the trade openness as a component of the reforms complementarity index. In fact, Calvo and Vegh (1993) noted that the capital abundance of the early 1990s came at a time when several countries were already experimenting with trade liberalization and, more importantly, with exchange-rate-based stabilizations. Coricelli and Maurel (2010) propose to compute a weighted reciprocal of the HH index which includes our eight (8) financial reform areas and trade liberalization. Columns 1. and 4. of Table 11. show the results for the extended complementarity variable. These results are consistent with our previous results. The complementarity affects positively the FDI inflows with a higher magnitude.

### 6.2 Regression using an alternative definition of the periods

We run the estimations on four (4) year non-overlapping windows. The results shown in Columns 2. and 5. of Table 11. are consistent with previous results. Moreover, it seems that the magnitude

of the complementarity impact on capital inflows is roughly higher (0.1209%) than those found in the previous estimations.

~ [Table 11. here]

### 6.3 Endogeneity issues

The computation of complementarity involves financial reforms areas which are probably endogenous; consequently, we can also suspect that the complementarity variable suffers from an endogeneity issue. Indeed, an important amount of international capital inflows may exercise a pressure for implementing more reforms in many financial areas. Buiter and Taci (2003) remarked that FDI is supportive of structural reforms, which pay off in terms of a higher productivity growth regardless of the host country's initial conditions. However, Greene (2002, P.194) shows that the "uncorrelatedness" of the error term with a particular nonlinear function of explanative variables " $X_i$ " does not imply "uncorrelatedness" with " $X_i$ " itself, for that matter, with other nonlinear function of " $X_i$ ". By using the reciprocal of this assertion, we can express a doubt about the endogeneity of the complementarity variable. Nevertheless, we check if a hypothetic simultaneity bias between the complementarity and the international capital inflows could affect our results. For this purpose, we use the two steps generalized method of moments (GMM) estimator to deal with endogeneity issues. As instrumental variables, we choose the one period lag level of complementarity<sup>15</sup>.

The results of these estimations are shown in Columns 3. and 6. of Table 11. They are also consistent with our previous results.

## 7 Policy recommendations

Before providing some policies recommendations, it is important to note that the conventional recommendation in literature about the reforms sequence is often formulated as follows: "the earlier the better". However, from our empirical results two reformulations of that recommendation

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<sup>15</sup>It is reasonable to assume a learning-by-doing mechanism in the financial reforms implementation. Consequently, we can expect that the previous level of complementarity be correlated with its contemporaneous level. In addition, there is a priori no reason to think that the lag value of complementarity affects directly the capital inflows. Moreover, Stock and Yogo (2005) test and student test suggest that the one lag level of complementarity is not a weak instrument.

can be done.

The first reformulation of this view is that: “unless the country has reached a relatively high level of reforms in certain financial areas, wait until it is ready” (particularly for portfolio investments). In fact, we show that countries which have implemented their financial reforms in a balanced way attracted more portfolio investments only in the case where their initial level of financial liberalization is relatively high. However, this recommendation might not be too useful a policy advice for countries that eager to raise the living standards of their population now and later (Ventura and Broner 2010).

Thus, another reformulation is provided by the results on the effects of additional number of reform and on the effect of sequence: “each country must make sure that the additional reforms that it implements are more complementary with the existent ones”. Particularly, our recommendation is that state owned bank privatization and the adoption of regulatory and prudential supervision standards must be implemented when the other domestic reforms areas are already in place. According to Fisher and Reisen, under this sequence new external resources will be allocated efficiently (for privatization) and crises will be less likely (for safe financial system), interest rate convergence will be achieved (globally).

In addition, policymakers must increase communication about the positive effect of reforms and keep in mind political, social, institutional and external constraints.

## 8 Conclusion

The question of choice and timing in the implementation of reforms is one of the most accurate in economic literature. When a country has several failing markets, it can concern the “assault course” to want to find “an optimal strategy” of elimination the distortions. On one side, the neoclassic approach suggests a radial removing of all distortions, but political and economic constraints make this solution difficult to implement. On other side, decision-makers might choose to implement gradually the reforms. In such a case, it is crucial to find the desirable of sequence of reforms or to understand the complementarity links between all the reforms areas in order to increase the outcome of each additional reform. This paper used an innovative approach to evaluate the effect of complementarity on international capital inflows using a sample of 91

countries observed over 32 years. First, it showed that implementing financial reforms in a balanced way increases FDI inflows. Secondly, it showed that this effect is highly heterogeneous according to the location of countries on the distribution of financial reforms level, and according to the number of additional reforms. Furthermore, the effect of complementarity on the portfolio investments is significant and positive only for countries which are located above the median of sample's financial reform level. Thirdly, it revealed that when they are implemented after the other financial areas reforms, the privatization of state owned banks and the development of banking sector regulation and supervision have an important effect on FDI and portfolio investments inflows.

In terms of economic policy implications, this last result is relevant in the current context of global financial crisis which stressed the vulnerabilities of countries financial systems. Indeed, at the hour where the regulatory institutions try to build a new regulatory framework, namely Basel III<sup>16</sup>, the question of the efficiency of the latter versions of Basel standards on the stability of financial system and the economic performance of countries matter. In this sense, our results on the preconditions for gaining from Basel I standards adoption can serve as a guide for policymakers in the countries.

Even though this paper highlights the impact of reforms coherence on the capital inflows, several relevant questions are beyond its scope. Particularly, we do not account for the fact that liberal policies towards the unregulated entry of banks and the development of domestic debt markets, together with an opening of capital accounts (while macroeconomic conditions were dodgy), may sharply increase the vulnerability of the countries to crisis (Coricelli, 2001). Further research could explore this question. In addition, as pointed out by Rodrik (2003), there is not a unique mapping of institutional function and liberal economic reforms are therefore not the only path to achieving the goal of creating a full-fledged market economy capable of sustaining growth. Thus, we must keep in mind the fact that the research on the design of reforms tries to find some combinations which can enhance the economic performances but that these combinations are not dogmatic.

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<sup>16</sup>The draft Basel III regulations includes: "tighter definitions" of Common Equity; banks must hold 4.5% by January 2015, then a further 2.5%, totaling 7%, the introduction of a leverage ratio, a framework for counter-cyclical capital buffers, measures to limit counterparty credit risk, and short and medium-term quantitative liquidity ratios.

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## 9 Annexes

Table 5: FDI and portfolio investments inflows (millions USD) by region

|                       | SSA    |       | MENA    |         | LAC     |         | Transition |        | Emer. Asia |        |
|-----------------------|--------|-------|---------|---------|---------|---------|------------|--------|------------|--------|
|                       | FDI    | Port. | FDI     | Port.   | FDI     | Port.   | FDI        | Port.  | FDI        | Port.  |
| $X \leq p25$          | 901.2  | 167   | 7190.8  | 574.65  | 3359.1  | 294.97  | 718.51     | –      | 1524.1     | 27.72  |
| $p25 \leq X \leq p50$ | 2483.8 | 340.2 | 22602   | 1725.5  | 4806.26 | 1327.0  | 2573.1     | 108.60 | 3719.8     | 315.58 |
| $p50 < X \leq p75$    | 2828.4 | 199.1 | 23831.7 | 15837.8 | 14221.5 | 4043.5  | 11638.2    | 3844.2 | 7909.9     | 1595.4 |
| $X > p75$             | 15707  | 8697  | 107565  | 27882.8 | 32982.6 | 9685.75 | 14034.3    | 1865.6 | 8453.35    | 1752.2 |

Table 6: Number of simultaneous reforms

|                   | directed credit | credit ceilings | int rate controls | entry barriers | banking superv | privatization | capital account | Security-markets | Total |
|-------------------|-----------------|-----------------|-------------------|----------------|----------------|---------------|-----------------|------------------|-------|
| credit ceilings   | 6               |                 |                   |                |                |               |                 |                  | 6     |
| int rate controls |                 | 5               |                   |                |                |               |                 |                  | 5     |
| entry barriers    |                 |                 | 9                 |                |                |               |                 |                  | 9     |
| banking superv    |                 |                 |                   | 6              |                |               |                 |                  | 6     |
| privatization     |                 |                 |                   |                | 6              |               |                 |                  | 6     |
| capital account   |                 |                 |                   |                |                | 5             |                 |                  | 5     |
| Security-markets  | 14              | 4               | 8                 | 8              | 6              | 3             | 15              | –                | 58    |
| Total             | 20              | 9               | 17                | 14             | 12             | 8             | 15              |                  | 95    |

Table 7: TABLE A2. Homogeneous and heterogeneous effects

| VARIABLES                         | FDI                    |                        |                        | PORTFOLIO INVESTMENT   |                        |                        |                         |                       |
|-----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-----------------------|
|                                   | (1)                    | (2)                    | (3)                    | (4)                    | (5)                    | (6)                    | (7)                     | (8)                   |
| COMPL                             | 0.101*<br>(0.0521)     | 0.0989*<br>(0.0516)    | 0.358***<br>(0.0674)   |                        | 0.0051<br>(0.142)      | -0.0009<br>(0.148)     | 0.567***<br>(0.166)     |                       |
| COMPL*REF LEVEL                   |                        | 0.0173<br>(0.104)      |                        |                        |                        | 0.0589<br>(0.226)      |                         |                       |
| REF LEVEL                         | 1.842***<br>(0.309)    | 1.736***<br>(0.713)    |                        | 2.495***<br>(0.212)    | 4.650***<br>(0.825)    | 4.286***<br>(1.494)    |                         | 5.244***<br>(0.691)   |
| COMPL*Dummy[1 REFlevel ≤ median]  |                        |                        | -0.145**<br>(0.0674)   |                        |                        |                        | -0.310*<br>(0.175)      |                       |
| Dummy[1 REFlevel ≤ median]        |                        |                        | -0.338<br>(0.328)      |                        |                        |                        | -0.400<br>(0.894)       |                       |
| REFLEVEL*Dummy[1 COMPL ≤ median]  |                        |                        |                        | 0.049<br>(0.219)       |                        |                        |                         | -0.860<br>(0.654)     |
| Dummy[1 COMPL ≤ median]           |                        |                        |                        | -0.08<br>(0.0625)      |                        |                        |                         | 0.168<br>(0.198)      |
| US-local spread differential      | 1.1e-05<br>(3.0e-05)   | 1.2e-05<br>(3.2e-05)   | 7.1e-05**<br>(2.8e-05) | -1.8e-05<br>(2.5e-05)  | 9.4e-05<br>(8.4e-05)   | 9.8e-05<br>(8.1e-05)   | 0.00027***<br>(8.1e-05) | 9.6e-05<br>(7.9e-05)  |
| US per capita GDP growth          | -0.0066<br>(0.0045)    | -0.0066<br>(0.0044)    | -0.0085*<br>(0.0044)   | -0.00611<br>(0.0044)   | 0.0476***<br>(0.0137)  | 0.0474***<br>(0.0135)  | 0.0421***<br>(0.0143)   | 0.0437***<br>(0.0129) |
| Trade openness                    | 0.547***<br>(0.200)    | 0.543***<br>(0.203)    | 0.603***<br>(0.208)    | 0.329<br>(0.213)       | 1.369***<br>(0.447)    | 1.356***<br>(0.455)    | 1.502***<br>(0.464)     | 0.850*<br>(0.497)     |
| Phones lines per 100 hab.         | 0.0064**<br>(0.0025)   | 0.0063**<br>(0.0025)   | 0.0075***<br>(0.0025)  | 0.0060**<br>(0.0026)   | 0.0050<br>(0.0054)     | 0.0047<br>(0.0055)     | 0.0079<br>(0.0054)      | 0.0041<br>(0.0055)    |
| Financial development             | 0.268<br>(0.202)       | 0.262<br>(0.204)       | 0.278<br>(0.207)       | 0.294<br>(0.210)       | 0.902<br>(0.578)       | 0.883<br>(0.577)       | 0.967*<br>(0.568)       | 0.939<br>(0.589)      |
| Real GDP per capita               | 0.0001***<br>(2.7e-05) | 0.0001***<br>(2.7e-05) | 0.0001***<br>(2.7e-05) | 0.0001***<br>(2.9e-05) | 0.0002***<br>(4.9e-05) | 0.0002***<br>(4.8e-05) | 0.0002***<br>(5.1e-05)  | 0.0002***<br>(5e-05)  |
| Regime Institutions               | -0.0600<br>(0.0378)    | -0.0604<br>(0.0381)    | -0.0636<br>(0.0382)    | -0.0814**<br>(0.0344)  | -0.008<br>(0.0787)     | -0.0094<br>(0.0787)    | -0.0183<br>(0.0833)     | -0.0750<br>(0.117)    |
| Constant                          | 3.530***<br>(0.704)    | 3.566***<br>(0.747)    | 2.987***<br>(0.746)    | 4.587***<br>(0.775)    | -4.733***<br>(1.724)   | -4.609**<br>(1.828)    | -5.575***<br>(1.680)    | -2.869<br>(1.823)     |
| Obs                               | 1.522                  | 1522                   | 1522                   | 1585                   | 1510                   | 1510                   | 1510                    | 1573                  |
| R square                          | 0.829                  | 0.829                  | 0.823                  | 0.808                  | 0.690                  | 0.690                  | 0.685                   | 0.684                 |
| Method                            | FE                     | FE                     | FE                     | FE                     | FE                     | FE                     | FE                      | FE                    |
| NO of Countries                   | 80                     | 80                     | 80                     | 80                     | 80                     | 80                     | 80                      | 80                    |
| F-TEST JOINT EFFECTS              |                        |                        |                        |                        |                        |                        |                         |                       |
| H0: Compl=0 and Compl*REF LEVEL=0 | -                      | 1.87                   | 18.89***               | 0.83                   | -                      | 0.04                   | 6.68***                 | 1.10                  |

<sup>8</sup>Note: (\*\*\*), (\*\*) (\*) mean respectively significant at 1%, 5% and 10%. In addition, standards errors are clustered at country level to account for non spherical variance covariance matrix

Table 8: Additional number of reforms

| VARIABLES                      | Foreign DI            |                      |                     | PORTFOLIO INVESTMENT  |                      |                     |
|--------------------------------|-----------------------|----------------------|---------------------|-----------------------|----------------------|---------------------|
|                                | (1)                   | (2)                  | (3)                 | (4)                   | (5)                  | (6)                 |
| COMPL                          | 0.094***<br>(0.0551)  | 0.010*<br>(0.0551)   | 0.077<br>(0.119)    | -0.018<br>(0.144)     | -0.032<br>(0.145)    | -0.034<br>(0.145)   |
| COMPL*Number add. REFORM       | -                     | 0.016<br>(0.0128)    | -0.003<br>(0.0188)  | -                     | 0.051*<br>(0.0288)   | 0.055*<br>(0.0289)  |
| Number add. REFORM             | -0.088***<br>(0.0202) | -0.172**<br>(0.0680) | -0.059<br>(0.127)   | -0.202***<br>(0.0460) | -0.462***<br>(0.165) | -0.361**<br>(0.160) |
| REFORM LEVEL                   | 2.131***<br>(0.325)   | 2.121***<br>(0.324)  | 3.563***<br>(0.807) | 5.355***<br>(0.844)   | 5.322***<br>(0.837)  | 5.308***<br>(0.836) |
| Number add. REFORM Square      |                       |                      | 0.013<br>(0.0180)   |                       |                      | -0.048*<br>(0.0279) |
| Obs.                           | 1522                  | 1522                 | 1516                | 1510                  | 1510                 | 1510                |
| R-Square                       | 0.831                 | 0.832                | 0.640               | 0.697                 | 0.698                | 0.699               |
| <b>F-TEST JOINT EFFECTS</b>    |                       |                      |                     |                       |                      |                     |
| H0: Compl=0 and Compl*Number=0 |                       | 2.33*                | 0.21                |                       | 1.57                 | 1.81                |
| No Countries                   | 80                    | 80                   | 80                  | 80                    | 80                   | 80                  |
| Other Control Included         | YES                   | YES                  | YES                 | YES                   | YES                  | YES                 |

<sup>9</sup>Note: (\*\*\*), (\*\*), (\*) mean respectively significant at 1%, 5% and 10%. In addition, standards errors are clustered at country level to account for non spherical variance covariance matrix

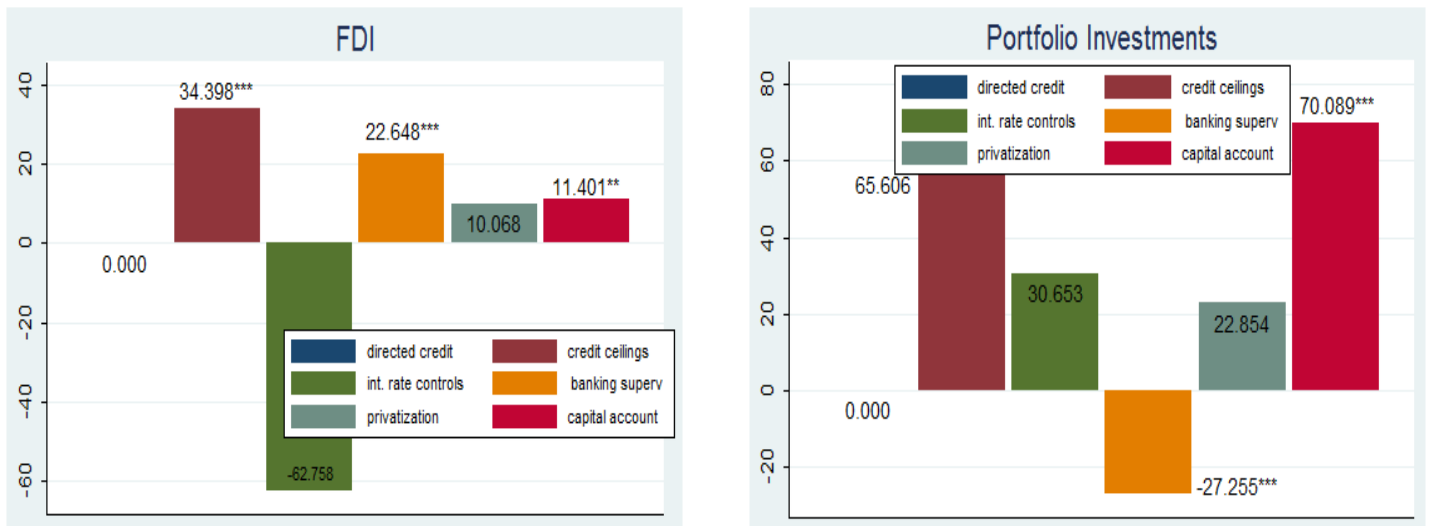
Table 9: Contribution of each area to Portfolio Investment inflows

| VARIABLES                          | (1)               | (2)              | (3)                 | (4)               | (5)              | (6)                  |
|------------------------------------|-------------------|------------------|---------------------|-------------------|------------------|----------------------|
| <b>CONTRIBUTIONS</b>               |                   |                  |                     |                   |                  |                      |
| Credit ceilings                    | 26.54*<br>(14.83) |                  |                     |                   |                  |                      |
| Interest Rate controls             |                   | 30.65<br>(29.85) |                     |                   |                  |                      |
| Banking supervision and regulation |                   |                  | 21.56***<br>(6.951) |                   |                  |                      |
| State owned banks privatization    |                   |                  |                     | 22.85*<br>(12.80) |                  |                      |
| Capital account liberalization     |                   |                  |                     |                   | 19.84<br>(16.40) |                      |
| Security markets liberalization    |                   |                  |                     |                   |                  | -69.65***<br>(0.783) |
| Obs.                               | 1573              | 1573             | 1573                | 1573              | 1573             | 1573                 |
| R-Square                           | 0.497             | 0.485            | 0.489               | 0.489             | 0.486            | 0.489                |
| No Countries                       | 80                | 80               | 80                  | 80                | 80               | 80                   |
| Other Control Included             | YES               | YES              | YES                 | YES               | YES              | YES                  |

Table 10: Contribution of each area to Foreign Direct Investment inflows

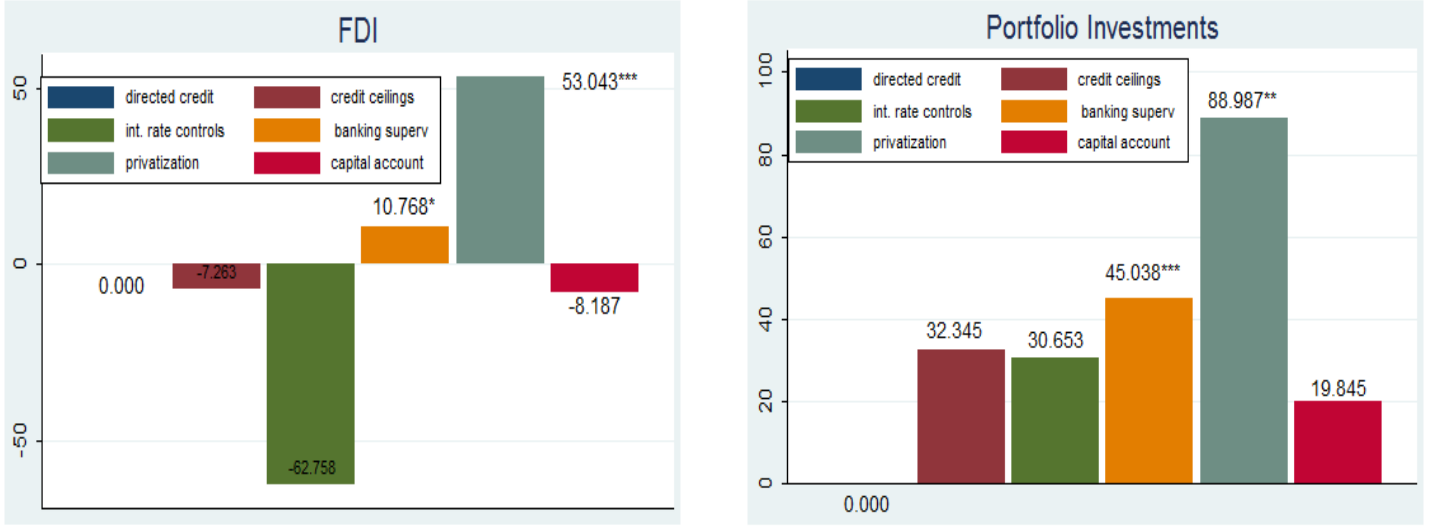
| VARIABLES                          | (1)              | (2)                  | (3)                 | (4)               | (5)               | (6)                  |
|------------------------------------|------------------|----------------------|---------------------|-------------------|-------------------|----------------------|
| <b>CONTRIBUTIONS</b>               |                  |                      |                     |                   |                   |                      |
| Credit ceilings                    | 9.572<br>(5.983) |                      |                     |                   |                   |                      |
| Interest Rate controls             |                  | -62.76***<br>(14.59) |                     |                   |                   |                      |
| Banking supervision and regulation |                  |                      | 6.932***<br>(1.938) |                   |                   |                      |
| State owned banks privatization    |                  |                      |                     | 10.07*<br>(5.092) |                   |                      |
| Capital account liberalization     |                  |                      |                     |                   | -8.187<br>(10.32) |                      |
| Security markets liberalization    |                  |                      |                     |                   |                   | -25.16***<br>(0.385) |
| Obs.                               | 1585             | 1585                 | 1585                | 1585              | 1585              | 1585                 |
| R-Square                           | 0.622            | 0.620                | 0.618               | 0.619             | 0.616             | 0.618                |
| No Countries                       | 80               | 80                   | 80                  | 80                | 80                | 80                   |
| Other Control Included             | YES              | YES                  | YES                 | YES               | YES               | YES                  |

Figure 4: Empirical effect of financial reforms sequence: Latin America and Caribbes



<sup>10</sup>Note: (\*\*\*), (\*\*), (\*) mean respectively significant at 1%, 5% and 10%

Figure 5: Empirical effect of financial reforms sequence: Emerging Asia countries



<sup>11</sup>Note: (\*\*\*), (\*\*) (\*) mean respectively significant at 1%, 5% and 10%

Table 11: Robustness checks

| VARIABLES                           | Foreign DI          |                     |                              | PORTFOLIO INVESTMENT |                       |                              |
|-------------------------------------|---------------------|---------------------|------------------------------|----------------------|-----------------------|------------------------------|
|                                     | Trade Openess       | Four year Windows   | IV regression (Two step GMM) | Trade Openess        | Four year Windows     | IV regression (Two step GMM) |
| COMPL                               | 0.195*<br>(0.108)   | 0.121*<br>(0.0668)  | 0.121***<br>(0.0271)         | -0.108<br>(0.254)    | -0.007<br>(0.191)     | -0.062<br>(0.0735)           |
| REFORM LEVEL                        | 0.843<br>(0.854)    | 2.203***<br>(0.405) | 1.900***<br>(0.166)          | 5.565***<br>(1.958)  | 5.401***<br>(1.096)   | 5.350***<br>(0.467)          |
| US minus Local Spread Differential  | 0.000<br>(3.4e-05)  | 0.000<br>(7.1e-05)  | 0.000<br>(2.4e-05)           | 0.000<br>(9.1e-05)   | -0.001***<br>(0.0002) | 0.000<br>(7.9e-05)           |
| US per capita GDP Growth            | -0.001<br>(0.0045)  | 0.011<br>(0.0194)   | -0.001<br>(0.0057)           | 0.047***<br>(0.0137) | 0.152***<br>(0.0574)  | 0.045***<br>(0.0146)         |
| Trade Openess                       | 0.669***<br>(0.206) | 0.021<br>(0.0945)   | 0.472***<br>(0.0706)         | 1.307***<br>(0.468)  | 0.217<br>(0.204)      | 1.265***<br>(0.181)          |
| Obs.                                | 1522                | 468                 | 1514                         | 1510                 | 465                   | 1502                         |
| Stock-Yogo stat 10% maximal IV size |                     |                     | 16.38                        |                      |                       | 16.38                        |
| Instrument Validity : F(1,1414)     |                     |                     | 1501.4***                    |                      |                       | 4681.58***                   |
| R-Square                            | 0.828               | 0.850               | 0.965                        | 0.690                | 0.731                 | 0.939                        |
| No Countries                        | 80                  | 80                  | 80                           | 80                   | 80                    | 80                           |
| Other Control Variables Included    | YES                 | YES                 | YES                          | YES                  | YES                   | YES                          |

Table 12: Variables description

| Variable   | Description  | Source   |
|--|--|--|
| Reform level   | To construct an index of financial liberalization, codes were assigned along the eight dimensions. Each dimension has various subdimensions. Based on the score for each subdimension, each dimension receives a 'raw score.'  | IMF: A new financial reforms database (Abiad and al. 2008) |
| FDI inflows  | Measure net purchases or sales by nonresidents of domestic assets. FDI category includes controlling stakes in acquired foreign firms (at least 10% of an entity's equity -in practice, however, most FDI holdings reflect majority control), as well as Greenfield investments  | Milesi and Ferretti , External wealth of Nations (2009)    |
| Portfolio investments inflows                                | Measure net purchases or sales by nonresidents of domestic assets. Portfolio equity holdings measure ownership of shares of companies and mutual funds below the 10% threshold that distinguishes portfolio from direct investment.  | Milesi and Ferretti , External wealth of Nations (2009)    |
| Elimination of credit controls and reserve requirements      | The index measures whether reserve requirements are restrictive, there are minimum amounts of credit that must be channeled to certain sectors and there are any credits supplied to certain sectors at subsidized rates. The policy is measured on a four point scale from 0 to 3.  | Abiad et al.(2008)   |
| Elimination of interest rate controls                        | The index measures whether deposit and lending rates are determined by the central bank or not. The policy is measured on a four point scale from 0 to 3.  | Abiad et al.(2008)   |
| Privatization of state owned banks                           | The index measures whether state-owned banks exit or state-owned banks do not consist of any significant portion of banks. The policy is measured on a four point scale from 0 to 3  | Abiad et al. (2008)  |
| Capital account liberalization                               | The index measures whether the exchange rate system is unified and a country have restrictions on capital inflows and outflows. The policy is measured on a four point scale from 0 to 3.  | Abiad et al. (2008)  |
| Security market liberalization                               | The index measures whether the security markets are developed and a country's security market is open to foreign investors. The policy is measured on a four point scale from 0 to 3.  | Abiad et al. (2008)  |
| Elimination of entry barrier in banking sector               | The index measures whether the government allows foreign banks to enter into a domestic market, the government allow the entry of new domestic banks or have they eased branching restrictions; the government allows banks to engage in a wider range of activities. The policy is measured on a four point scale from 0 to 3   | Abiad et al. (2008)  |
| Prudential regulations and supervision of the banking sector | This variable is computed from the responses of the following questions: 1. Does a country adopt risk-based capital adequacy ratios based on the Basle I capital accord? 2. Is the banking supervisory agency independent from the executives influence and does it have sufficient legal power? 3. Are certain financial institutions exempt from supervisory oversight? 4. How effective are on-site and off-site examinations of banks? The policy is measured on a six point scale from 0 to 6 | Abiad et al. (2008)  |
| Phones lines per 100 hab.                                    | Number of phones lines per 100 habitants   | World Development Indicators (WDI, 2009)                   |
| US-local spread differential                                 | Difference between the US interest rate and the local interest rate  | IMF: International financial statistics (2009)             |
| Real GDP per capita  | Real GDP per capita (Constant Prices: Laspeyres)   | IMF: financial structure database (beck and al., 2008)     |
| Financial development  | Private credit by deposit money bank/GDP   | IMF: financial structure database (beck and al., 2008)     |
| Regime Institutions Changes in political regime              |  | ICRG (2008)  |