The probability of sudden stop of capital flows - the case of Albania

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THE PROBABILITY OF SUDDEN STOPS OF CAPITAL FLOWS: THE CASE OF ALBANIA

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ABSTRACT

The main goal of this paper is to develop a better understanding of international capital flows based on the episode of sudden stop concept. First, we compute a sudden stop indicator (or our binary variable) in order to analyze movements in foreign capital flows. Second, the probability of these episodes is estimated as a function of some economic fundamentals by running a probit estimation with quarterly data over the period 2004–2012.

Keywords: Sudden stop, Capital Flows, probit model

JEL Classification: C51, C82, C87, F21, F32

I. INTRODUCTION

International capital flows can play an increasingly vital role in the business cycles of a country. They can bring substantial economic benefits to both lending and borrowing countries, especially during episodes of financial crises. However, capital flows have proved too often to be unstable, whilst the global crisis that started in mid-2007 brought an abrupt stop to the sustained rise in international financial integration over the previous decade [Milesi-Ferretti and Tille (2010)]. Calvo (1998) and Calvo and Reinhart (2000) imply that, unlike developed economies, emerging market economies may frequently lose their access to the international capital markets, with capital flow surges being followed by large and sharp negative cut-off swings. These episodes, denoted as sudden stops by Calvo, Izquierdo and Mejia (2004, 2008), refers to those events that meet the following two conditions: first, they should start when the first changes in capital flows falls one standard deviation below the mean. Second, they should be "*unexpected*" (*i.e.* the variation in capital flows should be at least once two standard deviations below its sample mean), and "*persistent*" (it should end when the variation exceeds one standard deviation below its sample mean).

The phenomena of sudden stop results from a drastic shift of the supply curve of foreign funds as private foreign residents suddenly stop lending to domestic residents. The shift is driven by foreign creditors' panic, which arises due to either a domestic financial crisis or contagion effects due to crises elsewhere. However, they can also be driven by domestic investors, who switch to larger positions in foreign securities not necessarily consent with the view that the domestic country is being cut off from international financial markets or the economic performance. Conceptually, a sudden stop of international capital flows may render the country insolvent or dramatically reduce the productivity of its existing capital, leading to a possible currency (unwanted pressures for currency appreciation),

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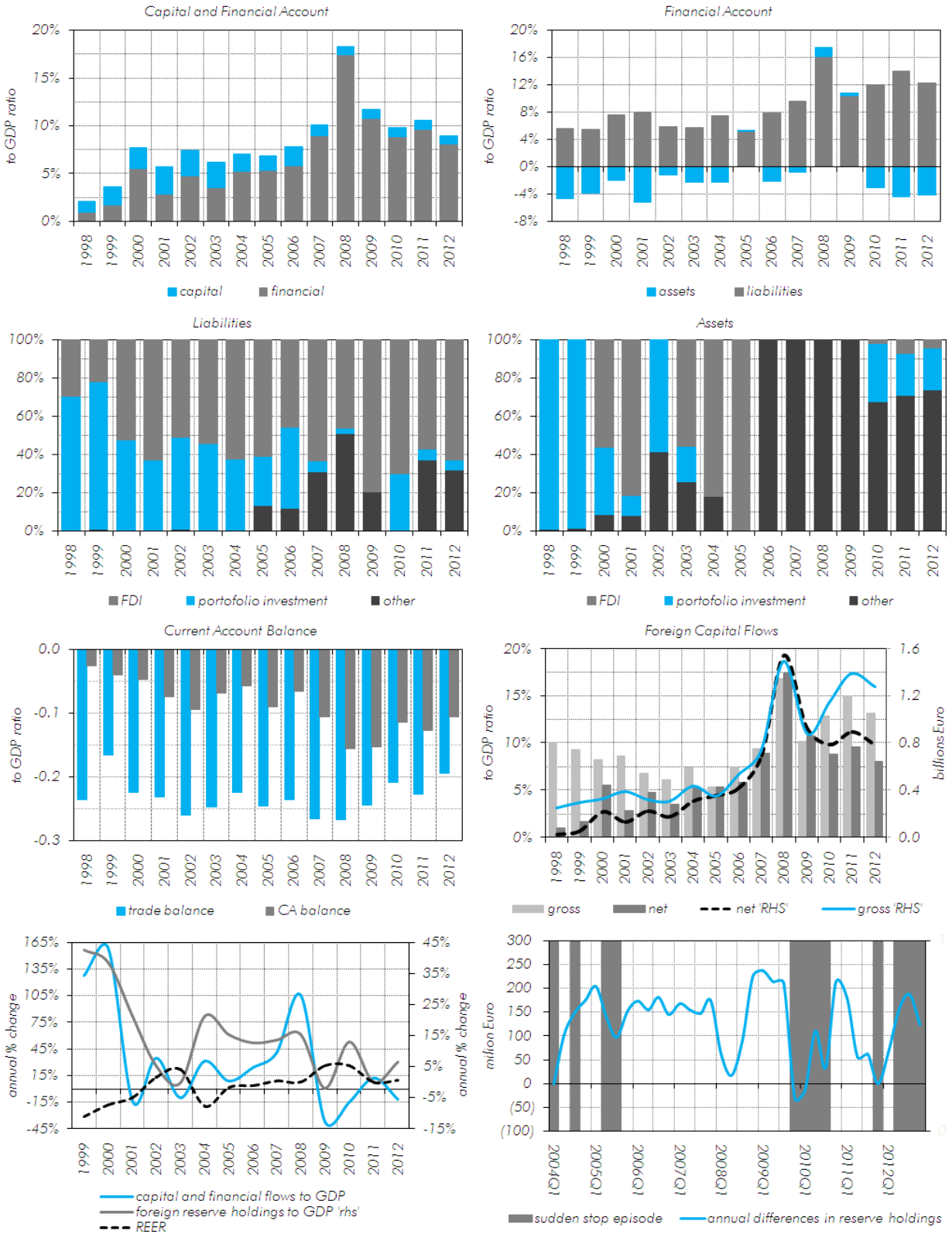
The views expressed herein are of the authors and do not necessarily reflect the views of the Bank of Albania.

banking or debt crises and domestic inflation [Calderón and Kubota (2011)]. On the outflow stage they can contribute to currency and financial crises that impose great economic costs [Broner, Didier and Schmukler, (2010)]. Therefore, it is crucial for policymakers to identify the relative importance of the shocks underlying the sudden stop.

The globalization process has promoted substantial foreign assets flows as financial capital through the relocation of production to developing and transition countries. In Albania, the transition progress is accompanied by relocation in capital flows composition, moving from public sector to private sector. Whislt government is managing persistently capital flows (borrowings) to finance fiscal deficit and other public investments, private entities are getting more involved or integrated in capital markets[2]. Albania has received significant amount of capital flows (Graph 1), reaching each year an average of around 6.0% of the total national income during 1998 – 2006. This amount more than doubled during 2007 – 2010, even though it has diminished in the following two years. In the case of Albania, capital inflows have been driven by flows in financial account through liabilities especially in forms of foreign direct investments (FDI). But private sector's shares in other investment forms such as bank credits and international debt securities are getting more important during recent years. As such, FDI have turned into a dominant factor in building up financial liabilities and in the performance of capital and financial transactions. The magnitude and character of FDI is determined mainly by the process of the privatization of strategic sectors. Overall, capital inflows have served to finance the persisten current account deficit. They have also contributed to the accumulation of foreign reserve holdings by the monetary authority, but (Graph 1) patterns in capital and financial account have been contantly reflected in stock of reserves and tendency in exchange rate. On the other hand, unlike different successful transition economies in the region, Albania has absorbed less FDI even though it presents relatively less restrictions to foreign investors' activity relative to other South East European countries and offers great potentials in certain areas like tourism, infrastructure, energy, agribusiness, etc., which, for capital markets, make it a good opportunity to invest[3]. In addition, with a persistent current account deficit, accordingly[4] the Albanian economy is more likely to experience a sudden stop episode. From a policy point of view, according to Frankel and Jovanovic (1981) and Shijaku (2012), the patterns in capital and financial account's episodes have to be managed in terms of supporting international receips and payment and fulfilling the criterio of reserve to months of imports holdings such as to secure macroeconomic and financial stability perspective. On the other hand, Jeanne and Rancière (2006, 2009) link the episodes of sudden stops with reserve holdings and recommend raising the stock relatively to the likelihood of negative episodes in capital and financial account. Thus, given that patterns in capital inflows are reflected in terms od reserve holding and exchange rate, it is quite important to consider what might cause and the effects of macroeconomic indicators the sudden stop of capital inflows.

[2] See: Bank of Albania Annual Report and Balance of Payment Buletin over 2000 – 2012.
[3] See also Shijaku (2012).
[4] See: Calvo *et. al.* (2004, 2008), Cavallo and Frankel (2008), Kaminsky (1998) and Edwards (2009).

Graph 1: Current Account and Foreign Direct Investment, 1996 – 2012



Source: Bank of Albania and author's calculations

The main aim of this paper is to identify the episodes of sudden stop and examine its determinants by distinguishing the different sources of the decline in the financial account of the balance of payments. We follow the procedure outlined in Guidotti, Sturzenegger and Villar (2004) to define a sudden stop as the reduction in the financial account that is at least one standard deviation below the mean and exceed 5 percent of GDP. Then, we base our empirical analysis on the determinants of the probability of sudden stops through a probit model developed by Jeanne and Rancière (2006, 2009). We study a number of determinants of sudden stops, including the degree of trade and financial openness, domestic and economic growth level, short-term debt and currency appreciation in creating the conditions for sudden stops. Results support the view that Albania has experienced episodes of sudden stops, but they have been more frequently after the financial and global crises. The likelihood of sudden stop is found to be dictated negatively and significantly by domestic growth rate and positively by risk linked to fiscal and debt policies. Increasing financial openness and linkages makes the Albania more vulnerable to sudden stops caused by either local or global investors. Further, Albania is found to be more prone to inflow-driven sudden stops, rather than to outflow-driven sudden stops. Finally, the probability of sudden stop is found to take a U-shape. In diminishing after 2005Q01, it reaches at nearly 15%, but rising after the financial and economic crisis to the level of 32%.

This paper consists of four sections. Following the introduction in Section 1, the following Section explains the methodology and the data. Section 3 presents the empirical results with limited dependent variables techniques. The material concludes in section 4.

II. THE METHODOLOGY AND DATA

A. SUDDEN STOPS: DEFINITIONS

The episodes of sudden stops, according to *Calvo et. al.* (2004, 2008), refers to those events that meet the following two conditions: first, they should start when the first changes in capital flows falls one standard deviation below the mean. Second, they should be "*unexpected*" (*i.e.* the variation in capital flows should be at least once two standard deviations below its sample mean), and "*persistent*" (it should end when the variation exceeds one standard deviation below its sample mean). In line with Guidotti *et. al.* (2004), we identify a sudden stop at time *t* when the financial account fall at least one standard deviation below the mean and exceed 5 percent of Gross Domestic Product (GDP) relatively to the previous period, expressed mathematically as follows:

$$\Delta k_t < \mu(\Delta k_t) - \sigma(\Delta k_t) \quad (1)$$

and

$$k_t < k_{t-1} - 5\% \quad or \quad \Delta k_t < -5\% \quad (2)$$

Where, k_t represent the capital flows to GDP ratio, Δ is the difference operator, μ and σ represent the mean and standard deviation operators, respectively.

In line with Calderon and Kubota (2011), we follow the methodology devised by Cowan, Alejandro and Christopher (2008) to distinguish between inflow-driven and outflow-driven sudden stops. Hence, we calculate the contribution of the decline in net inflows to each sudden stop episode, S', as:

$$SS_t^I = \frac{I_t}{I_t + O_t} \quad (3)$$

Where, I_t and O_t represent the capital inflows and outflows to GDP ratio, respectively. Accordingly, an inflow-driven sudden stop takes place if $SS_t^I > 0.75$ during a sudden stop episode. An outflow-driven sudden stop occurs if $SS_t^I < 0.25$.

B. DETERMINANTS OF SUDDEN STOPS

The empirical research on the episodes of sudden stops has usually chosen the set of forcing variables which determines the likelihood of sudden stops from the related literature on currency crisis, banking crisis and current account reversals. The focus has mostly been on the soundness of macroeconomic policy framework, the health of external and fiscal accounts, and the fragility in the financial sector. To put this formally, we follow the methodology explained by Jeanne and Rancière (2006, 2009) and the model takes the form:

$$P(SS = 1/X) = \Phi(X'\beta) \tag{4}$$

Where, SS is our dependant binary variable that takes the value of 1 when there is a sudden stop and 0, otherwise as defined by Guidotti, *et. al.* (2004); X and β represents a vector of explanatory variables and parameters that influence the outcome SS, P and Φ represent the probability of a sudden stop occurring given X and the probit function. We specify the model as a latent variable equation and assume that there exists a random variable SS such that:

$$SS_t = X_t'\beta + \varepsilon_t \tag{5}$$

Where, ε_t represent the error term and $\varepsilon_t \sim iid(0, \sigma^2)$.

Jeanne and Rancière (2006, 2009) estimate an empirical equation for the probability of sudden stop, SS, based on a set of country-specific economic fundamentals through a Probit model. Their preferred specification, among a set of 24 potential regressors, included the domestic economic performance, currency's real appreciation, an indicator the health or/and the position of public sector, an index of country openness to financial flows, the ratio of foreign liabilities to money in the banking sector. In line with their work, our equation is specified in a framework that distinguishes among macroeconomic indicators for the determinants of the probability of sudden stop episodes. As such, our specified model takes the form as follows:

$$SS_t = \beta_0 + \sum_{i=1}^{p} \beta_i X_{t-i} + \varepsilon_t \tag{6}$$

Where, β_0 is a vector of constant term, β_i are the coefficient to be estimated, X are vectors given by,

$$X = [\gamma, \delta, \omega, \tau, Z]$$

Where, γ is a measure of domestic economic performance, δ represents an indicator for the health or/and the position of public sector; ω and τ represent a banking system developing and a country financial liberalization index; Z is a set of other control variables that can also contribute to the model specification robustness check purposes [Cavallo and Frankel (2004)] such as the deviation of real effective exchange rate REER from the equilibrium level (π) to account for the currency's real appreciation, trade openness index (η), the annual rate of inflation (ρ) to control for inflationary pressure and macroeconomic stability [Calderón and Kubota (2011)]; the spread between foreign

and domestic interest rate (ι) to control for possible speculative effects in portfolio investments; and foreign economic performance (γ^f) to account for the effect of push factors. Other indicators are as previously specified.

Considering macroeconomic theory, economic performance, as measured by the growth rate of GDP, is consistent important in affecting capital inflow episodes driven by foreigners. It is expected that investors are more likely to cut funding to countries with weaker growth, raising the likelihood of sudden stops taking place [Milesi-Ferretti and Tille (2010) and Forbes and Warnock (2011)]. In return, the economic performance of foreign financial or trade partners is also important, but is ambiguous due to the wealth and substitutions effects. On the one hand, higher economic performance is expected to increase wealth for foreign partners, leading to higher inflows in host countries and reduce the likelihood of sudden stops taking place. Milesi-Ferretti and Tille (2010) found that strengthens of growth in trading partners is also associated with a more pronounced boost in inflows. However, a standard portfolio profit maximisation theory would suggest that investors would rather prefer to invest in the home country rather than abroad[5]. In addition, countries with sounder and more stable macroeconomic policy framework are less likely to experience a sudden stop episode [Bordo, *et. al.* (2007) and Calderón and Kubota (2011)]. Growing fiscal deficits and deteriorating public debt dynamics would deteriorate fiscal solvency and can significantly induce sudden stops through channels that link debt crises and currency crises, since it reduce the attractiveness of domestic bonds for foreign investors [Jeasakul (2005), Milesi-Ferretti and Tille (2010) and Forbes and Warnock (2011)]. Sayek (2009) assumes that capital inflows are shifted between home and host countries to minimize the negative effects of facing inflation taxes in both the home and the host country. Hence, as a risk indicator, we would expect that higher inflation rate would be associated with reduction in capital inflow and in increase in the likelihood of a sudden stop.

Moreover, the extent of original sin can also seriously impact the balance sheet of firms and especially the banking sector [Bordo, *et. al.* (2007), Dooley, (2000) and Mishkin, (2003)]. Accordingly, exchange rate depreciation weakens the domestic currency value of liabilities. This may lead to a possible banking crisis as the collateral backing bank loans deteriorates and a debt crisis if public debt is in hard currency and tax revenues are in local currency. Both of them can generate currency crises and increase the probability of sudden stops. Hence, we expect both π and δ to have a positive coefficient. Calderón and Kubota (2011) believe that episodes of sudden stops are mitigating by a country exposure to international good and asset markets. Forbes and Warnock (2011) imply that a prominent factor is also the degree of financial market liberalization and integration with global financial markets. Several papers[6], however, have argued that the relationship between banking and financial market development and integration and capital portfolio inflows may be positive linked. Furceri, Guichard and Rusticelli (2011) suggest that financial integration in principle allows for better international allocation of saving and investment, but also increases vulnerabilities associated with international capital flows. Jeanne and Rancière (2006, 2009) and Milesi-Ferretti and Tille (2010) also expected both ω and τ to be positively related to the likelihood of a sudden stop, arguing that countries with greater banking and financial development and integration with the rest of the world are likely to be most severely affected by the turmoil in global banking. As for the global increase in risk aversion, this would in principle have a more severe effect on the countries that rely more heavily on foreign saving. Indeed, the global financial crisis has also demonstrated that the financial transmission of shocks across countries is now faster and more complex than in previous decades.

[5] See: Forbes (2008).
[6] See: Martin and Rey (2004), Gruber and Kamin (2008) and Calderón and Kubota (2011).

In return, a country is more likely to experience a sudden stop or retrenchment if a country with which it has strong financial or trade linkages has recently experienced a similar episode. Bordo, *et. al.* (2007) suggests that the degree of trade openness can play an important but ambiguous role. It can make a country more vulnerable to sudden stops simply because it may be more exposed to foreign shocks. But it can also make a country less vulnerable because it can facilitate the current account adjustment needed once a sudden stop occurs. Finally, based on a portfolio theory, we would expect that investors might speculate between home and host countries in surge of higher rate of profitability. Therefore, we would expect that raising spreads would be associated negatively with the likelihood of sudden stops.

C. DATA

The sudden stop model is based on a framework that distinguishes among macroeconomic determinants, such domestic and foreign economic performance, currency's real appreciation, health or/and the position of public sector, trade openness, capital account liberalization, banking and financial development, risk indicators and spread between home and host countries' rate of return. In our specified models, the sudden stop (SS) indicator is based on the capital and financial account in the Balance of Payment and represents the net inflows. The indicator on γ represents the Albanian annual real domestic growth rate and γ^f stands for the annual real economic growth rate of Eurozone-17. The indicator of δ represents the ratio of Albanian total public debt to nominal GDP ratio. ω and τ represent the net foreign asset (NFA) to domestic money supply ratio and the foreign capital and financial flows to nominal GDP ratio. Considering the set of Z control variables, π expresses the deviation of REER from the equilibrium level is estimated by the HP filter. The series on trade openness (η) represent the sum of total import + exports to nominal GDP ratio. Data on inflation rate (p) represents the annualized inflation rate generated as [dlog(CPI)x400]. Finally, ι represents the spread between 12 month domestic deposit and euribor rate. All indicators enter the model as annual percentage change, apart from π, ι and p. The data on exports and imports of goods and services, REER, NFA, money supply and domestic 12 months deposit rate are taken from Bank of Albania. The data on Consumer Price Index (CPI) and real economic growth rate are taken from the Albanian Institute of Statistics (INSTAT). The data on total public debt are taken from the Ministry of Finance and those on 12 months euribor rate are taken from the European Central Bank (ECB). The rest of the data are taken from the Bank of Albania.

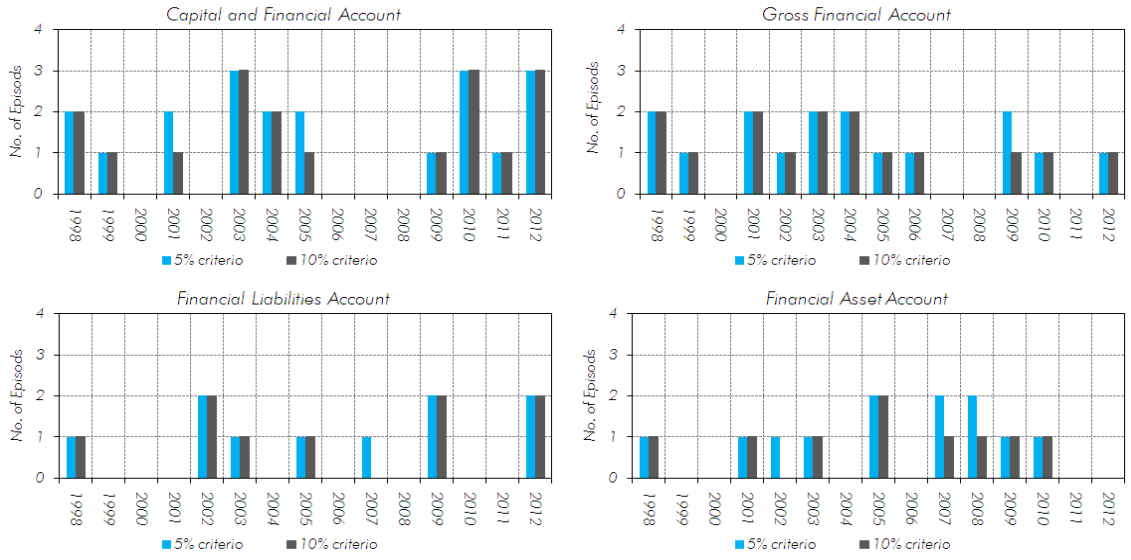
III. EMPIRICAL RESULTS AND DISCUSSION

The episode of sudden stop model considers quarterly data from 1998Q01 to 2012Q04 based on criteria outlined through eq. (1) and (2). To maximise the chances of detecting sudden stops episodes, we follow Calvo *et. al.* (2004) and work with quarterly data, since lower frequency data may hide the origin of these episodes. To compute a sudden stop indicator (or our binary variable) we used the annual variation change in the capital and financial account to GDP ratio. We also used three other different definitions of the financial account to GDP ratio. The results of sudden stop indicator episodes are outlined in Graph 2. They demonstrate that during this period we can identify around 20 episodes of sudden stops in net capital flows based on the 5% criterion and slightly around 18 when the criterion is raised at 10%. The number of episodes is smaller when the event is distinguished through other capital account in the balance of payment. For example, we found 16 episodes of sudden stops based on the gross capital flows. This number is around 10 and 12 for the liabilities and assets capital flows. However, among the different episodes, we found out that the number of episodes diminish and even disappear during the year 2003 to 2008. This period is characterized by a debt reducing and sounder fiscal policy, higher economic growth, boost in banking lending and

development system. Based on Calderon and Kubota (2011) and Cowan *et. al.* (2008) Table 4 support the view that sudden stop of capital are more driven by internal (pull) rather external (push) factors.

Next, we discuss the role of macroeconomic policy and indicator framework. The specified sudden stop model considers quarterly data from 2004Q01 to 2012Q04 based on eq. (6). This period is considered more reliable given the privatization of some major banks (Saving Bank) and innovation in banking sector and the full liberalitiosation of capital and financial account after the agreement of the Association and Stabilisation Agreement with the European Union[7]. After conducting Augmented Dickey Fuller and Philips Peron unit root tests (Table 2) we find conclusive evidence only on δ, ω and ι, which in the specified model are included in first difference. Table 1 summarises the results according to the Probit model techniques. The results are also based on model diagnostic tests. The statistical value of the regression determination coefficient (*McFadden* R2) is relatively high and a set of diagnostic tests conducted on the model specification reveal no problems with respect to serial correlation (Q-statistic and Squared Residuals) and Goodness-of-fit test (Hosmer-Lemeshow). Empirical results (Table 1) all together with test on the Expectation-Prediction Evaluation for Binary Specification (Table 3) have brought up some vital information for decision-making process. Results show that in all cases and as expected the real economic growth is negatively associated to the likelihood of a sudden stop taking place. This shows that higher GDP growth would subsequently reduce the likelihood of sudden stop. The impact is found to be the highest among the statistically significant coefficients. In contrast, we found a higher likelihood of sudden stops in cases of greater fiscal imbalances and a higher debt burden since δ *has a* positive and statistically significant magnitude. While looking at other debt risk indicators (such as short term debt and total stock of domestic debt both to GDP ratio), we also find that as their ratio raise so does the vulnerability to sudden stops in the case of Albania. Although, their effect was found smaller such results demonstrate that foreign investors do pay attention to different fiscal risk indicators.

Graph 2: Calculating episodes of sudden stop based on eq. 1 and 2



Source: Author's calculations

[7] See: Law no. 8269 dated 23. 12. 1997 "On Bank of Albania", Article 60, paragraph 3, letter "d" and "dh", Law no. 9662 dated 18.12. 2006 "On banks in the Republic of Albania", Law no. 8648 dated 28. 07. 2000 "On the ratification of the protocol membership of the Republic of Albania in the Marrakesh Agreement", Law no 9590 dated 27. 07. 2006 "On the ratification of Association and Stabilisation Agreement", Article 60, 61, 62 and 70.

Banking system development and innovation and financial linkages, as capturer by larger financial flows - are found to have positive sign. Both coefficients are statistically significant at conventional level, the later has the smallest impact. This implies that under tighter international financial linkages there is greater likelihood to be more vulnerable to sudden stops. The same results hold when we included in our regression, FDI net and gross to GDP ratio. Jeanne and Rancière (2006 and 2009) and Milesi-Ferretti and Tille (2010) found also a positive relationship between banking development and financial liberalization and raising vulnerabilities associated with international capital flows. The confident on the degree of trade openness is negative, but statistically insignificant. According to Bordo *et. al.* (2007) this support the view openness makes the adjustment process easier, but development in current account are not significantly linked to those on capital account and therefore the likelihood of sudden stops, mostly due to low level of engagement in international trade. These results are also in line with findings by Jeanne and Rancière (2006 and 2009) and Calderón and Kubota (2009) who found that the external trade shocks does not seem to play a role in elevating the propensity of the country to sudden stops. We also fail to find a significant relationship among inflation pressure, foreign economic growth and spread level. The later is found to have a higher impact, even though all coeffients have their expected theoretical sign. The results on γ^* support the view that in the case of Albania only domestic growth is consistently important in affecting capital flow episodes driven by foreigners. Hence, stronger growth is correlated with a higher probability of surges and lower probability of stops and is in line with empirical results by Forbes and Warnock (2011). However, π enters the model with a positive and significant coefficient. Hence, deprecation of currency above the potential level increases significantly the probability of experiencing a sudden stop. Our estimated show that a raise by 1pp would boost the possibility to have a sudden stop by around 0.334pp.

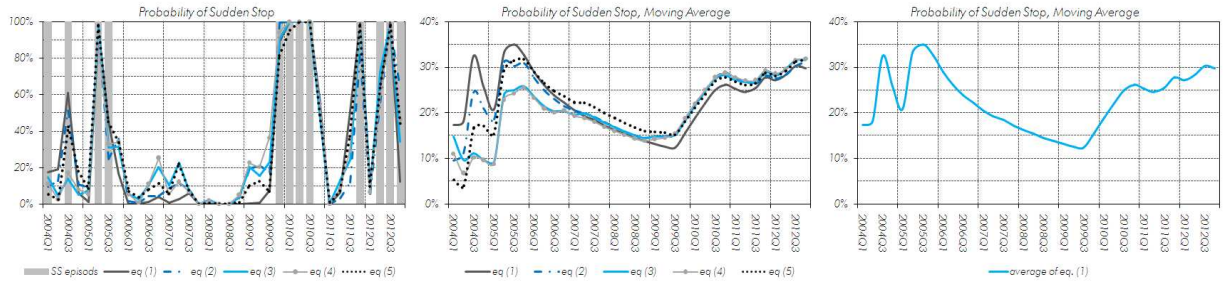
Table 1: The Probit estimations for the probability of Sudden Stop, Dependent Variable: SS

Method: ML - Binary Probit (Quadratic hill climbing) *Sample: 2004Q1 2012Q4; Included observations: 36* *Convergence achieved after 6 iterations; Covariance matrix computed using second derivatives*					
Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
c	*1.773****	*1.608****	*1.590****	*1.496****	*1.642***
γ_{t-1}	*-0.508***	*-0.382***	*-0.413***	*-0.379***	*-0.438**
$\Delta\delta_{t-2}$	*0.381***	*0.242****	*0.247***	*0.212****	*0.241***
$\Delta\omega_{t-4}$	*0.312***	*0.205***	*0.225***	*0.200***	*0.220***
τ_{t-1}	*0.014****	*0.008***	*0.009****	*0.008****	*0.009****
π_{t-3}	*0.334***				
η_{t-3}		*-0.092*			
ρ_{t-1}			*0.035*		
γ^*_{t-1}				*-0.068*	
$\Delta\iota_{t-4}$					*-0.688*
McFadden R^2	*0.64*	*0.55*	*0.51*	*0.51*	*0.53*
AIC	*0.79*	*0.90*	*0.95*	*0.96*	*0.93*
SIC	*1.05*	*1.17*	*1.22*	*1.22*	*1.19*
LR statistic	*29.52*	*25.39*	*23.52*	*23.34*	*24.51*
Prob(LR statistic)	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
S.E. Regr	*0.30*	*0.33*	*0.35*	*0.35*	*0.33*
H-L statistic	*4.6*	*3.1*	*6.5*	*7.3*	*7.8*
Prob. Chi-Sq(2)	*0.80*	*0.93*	*0.59*	*0.51*	*0.46*
*Based on: * (1%), **(5%), ***(10%) level of significance;*					

Source: Author's calculations

With regard to other findings (Table 3), results demonstrate that overall the specified models capture averagely 22 out of 24 non-sudden stops signals and 9 out 12 of sudden stop episodes. In total the models capture precisely 31 out of 36 episodes. On average, the models capture 86.1% the sign of the episodes. With around 92.5% compared to only 73.3, results support the view that specified models are more accurate in identifying the none rather the sudden stop episodes, even though at these levels they are very high. Among all specified models, model (1) seems to out-perform the rest of other models. Finally, based on Jeanne and Rancière (2006, 2009), we estimated and/or calibrated an average probability of sudden stop of capital. Analysis (Graph 3) supports a high correlation between the episodes and the probability for a sudden stop to accure. Findings demonstrate that during 2005Q01 to 2009Q03, the likelihood of sudden stop is relatively low. This is an expected result given the higher economic growth and the sounder fiscal policy under the deficit and debt cuts. But, probability increases mostly and greatly after the financial and economic crises, even though during 2011 the low probability may be due to the major privatization that occurred during that period and the recipient of nearly €100 million portfolio investments in forms of deposits due to the crises in the neighbour country, Greece. Overall, the probability of sudden stop has been decreasing since 2005Q01 to reach at nearly 15%. The estimated figure is with 0 – 25% range found by Jeanne and Rancière (2006 and 2009) for developing and emerging economies. However, the likelihood takes a U-shape by mid-2009 to reach somewhat 32% by the end of 2012 mostly due the ex-ante effect of financial and economic crises and also to domestic soundness of domestic fiscal policy and economic performance. From a policy management framework, according to Jeanne and Rancière (2006 and 2009), this support the view that Bank of Albania should maintain more international reserve holdings.

Graph 3: Calculating the probability of sudden stop.



Source: Author's calculations

IV. CONCLUSION

The main goal of this paper is to develop a better understanding of international capital flows based on sudden stop concept. Thus, one major focus is to compute a probability of the likelihood of the sudden stop episodes and distinguish among the macroeconomic indicators that determine the sudden stops of foreign capital flows. First, we follow Guidotti, *et. al.* (2004), Calvo, *et. al.* (2004, 2008) and Calderon and Kubota (2011) to compute a sudden stop indicator (or our binary variable) in order to analyze movements in foreign capital flows. Then, in line with Jeanne and Rancière (2006, 2009), the probability of sudden stop is estimated as a function of some economic fundamentals by running a probit estimation of the probability of sudden stop.

Our findings support the view that Albania has experienced episodes of sudden stops, but they have been more frequently after the financial and global crises. Empirical analysis finds that the likelihood of sudden stop is dictated negatively and significantly by domestic growth rate and positively by risk linked to fiscal and debt policies. Increasing financial openness and linkages makes the Albania more vulnerable to sudden stops caused by either local or global investors. Further, Albania is found to be more prone to inflow-driven sudden stops, rather than to outflow-driven sudden stops. Finally, the probability of sudden stop is found to take a U-shape. In diminishing after 2005Q01, it reaches at nearly 15%, but rising after the financial and economic crisis to the level of 32%.

However, as Forbes and Warnock (2011) reveals a key point to consider in the future is the fact that focusing on net capital flows instead of gross capital flows may miss important dynamics in capital flow movements. Although net capital flows may be the variable of interest for certain analyses, disaggregating capital flows by type of investor is important to better understand the nature and composition of the flows. In return, this might be one possible reason why foreign risk was found to have a slightly and not significant effect on the probability of sudden stop when measured based on net flows.

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APPENDIX

Table 2: Unit Root Test[a], period 2004:1 – 2012:04

Variable	Augmented Dicky Fuller (ADF) test						Phillips-Peron (PP) test					
	Level			First difference			Level			First difference		
	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None
ss	[.0000]	[.0003]	[.0000]	[.0228]	[.0384]	[.0058]	[.0000]	[.0000]	[.0000]	[.0256]	[.0324]	[.0076]
γ	[.0047]	[.0011]	[.0259]	[.0000]	[.0000]	[.0000]	[.0064]	[.0011]	[.0248]	[.0000]	[.0000]	[.0000]
γ^*	[.0036]	[.0017]	[.0030]	[.0052]	[.0260]	[.0003]	[.1440]	[.1757]	[.0412]	[.0033]	[.0173]	[.0002]
ω	[.0448]	[.1459]	[.0036]	[.0000]	[.0000]	[.0000]	[.2756]	[.6257]	[.0443]	[.0000]	[.0000]	[.0000]
η	[.0149]	[.0357]	[.0015]	[.0010]	[.0069]	[.0001]	[.0001]	[.0004]	[.0000]	[.0000]	[.0000]	[.0000]
ρ	[.0000]	[.0000]	[.2852]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]
ι	[.6463]	[.3614]	[.4739]	[.0140]	[.0523]	[.0008]	[.7104]	[.3894]	[.4593]	[.0168]	[.0563]	[.0010]
τ	[.0048]	[.0051]	[.0004]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]	[.0000]
δ	[.1807]	[.3248]	[.0225]	[.0000]	[.0000]	[.0000]	[.1442]	[.2383]	[.0162]	[.0000]	[.0000]	[.0000]
π	[.0079]	[.0200]	[.0004]	[.0028]	[.0123]	[.0001]	[.0061]	[.0085]	[.0003]	[.0000]	[.0000]	[.0000]
a automatic lag selection based on Schwarz Info Criterion (SIC)												

Source: Authors' calculations

Table 3: Expectation-Prediction Evaluation for Binary Specification, Success cut-off: C = 0.5

Model	(1)			(2)			(3)			(4)			(5)		
Dep=	0	1	Total	0	1	Total	0	1	Total	0	1	Total	0	1	Total
P(Dep=1)<=C	21	2	23	22	2	24	23	4	27	22	4	26	23	4	27
P(Dep=1)>C	3	10	13	2	10	12	1	8	9	2	8	10	1	8	9
Total	24	12	36	24	12	36	24	12	36	24	12	36	24	12	36
Correct	21	10.0	31.0	22.0	10.0	32.0	23.0	8.0	31.0	22.0	8.0	30.0	23.0	8.0	31
% Correct	87.5	83.3	86.1	91.7	83.3	88.9	95.8	66.7	86.1	91.7	66.7	83.3	95.8	66.7	86.1
% Incorrect	12.5	16.7	13.9	8.3	16.7	11.1	4.2	33.3	13.9	8.3	33.3	16.7	4.2	33.3	13.9
Total Gain*	-12.5	83.3	19.4	-8.3	83.3	22.2	-4.2	66.7	19.4	-8.3	66.7	16.7	-4.2	66.7	19.4
% Gain**	NA	83.3	58.3	NA	83.3	66.7	NA	66.7	58.3	NA	66.7	50.0	NA	66.7	58.3
E(# of Dep=0)	21.4	2.6	24.0	20.8	3.2	24.1	20.5	3.5	24.0	20.4	3.5	23.9	20.7	3.3	24.0
E(# of Dep=1)	2.6	9.4	12.0	3.2	8.8	12.0	3.5	8.5	12.0	3.6	8.5	12.1	3.3	8.7	12.1
Total	24	12.0	36.0	24.0	12.0	36.0	24.0	12.0	36.0	24.0	12.0	36.0	24.0	12.0	36.0
Correct	21.4	9.4	30.8	20.8	8.8	29.6	20.5	8.5	29.0	20.4	8.5	28.8	20.7	8.7	29.4
% Correct	89.1	78.2	85.5	86.7	73.1	82.2	85.3	70.7	80.4	84.9	70.5	80.1	86.1	72.7	81.7
% Incorrect	10.9	21.8	14.5	13.3	26.9	17.8	14.7	29.3	19.6	15.1	29.5	19.9	13.9	27.3	18.4
Total Gain*	22.5	44.9	29.9	20.1	39.8	26.6	18.6	37.4	24.9	18.3	37.1	24.6	19.5	39.4	26.1
%Gain**	67.4	67.3	67.4	60.2	59.6	59.9	55.9	56.1	56.0	54.8	55.7	55.2	58.4	59.0	58.7

**Change in % Correct from default (constant probability) specification; **Percent of incorrect (default) prediction corrected by equation*

Source: Authors calculations