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***Dollarization, Inflation and Foreign  
Exchange Markets:  
A Cross-Country Analysis  
(preliminary)***

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**Hail Park and Jong Chil Son\***  
**KHU and HUFS**

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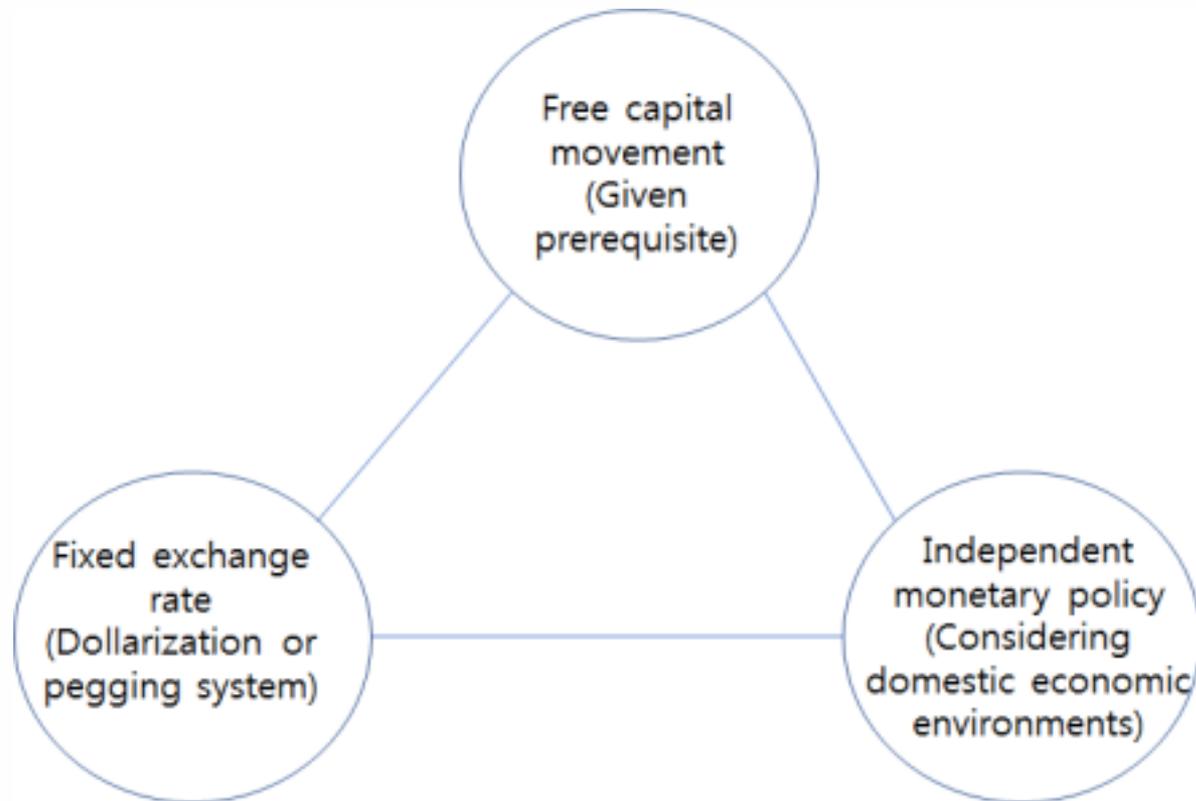
# I. Introduction

- Dollarization can have some benefits. (Balino et al. 1999; Kokenyne et al., 2010)
  - It is a sign of increasing integration in the world economy.
    - Closer integration can enhance development of domestic financial markets.
    - Dollarization may mitigate exchange rate risk for foreign investors.
    - Lending in foreign currency with low credit cost can have positive impact on domestic consumption and investment.
  - So there can be a optimal level of dollarization depending on structural factors

# I. Introduction

- Dollarization also can have significant disadvantages
  - Limiting effectiveness of monetary policy (Ize et al., 2005)
    - Giving up independent monetary and foreign exchange market policies based upon the local currency
  - Closely relating dollarization with unstable and high inflation, exchange rate volatility and undisciplined monetary policy (Nozaik, 2006)
  - Highly dollarized financial system being more vulnerable to crises (Nicole et al. 2005; Fischer et al., 2013; Yeyati, 2006)
  - Dollarization deepening impact of fxr channel on inflation (Ize and Yeyati, 2005; Leiderman et al., 2006)
- Maybe deterring natural developments of local financial and foreign exchange markets
  - Sustainable economic growth maybe seriously depend on its own policies heavily associated with domestic currency

# I. Introduction



- In short, impossible trinity is a good simplicity of costs of dollarization
  - Given free capital movements, a (monetary) authority only can choose one between fixed exchange rate and independent monetary policy

# I. Introduction

- Previous literature on path-through between inflation and foreign exchange rates
  - The path-through has been lesser accounting power since 2000 due to flight to quality toward US\$ in advanced economies. (Gopinath and Itskhoki, 2007)
  - Dollarized economy can have increasing transmission channels on inflation both from domestic currency depreciation and appreciation of US dollar itself through foreign exchange rates. (Ize and Yeyati, 2005; Leiderman et al. 2006)
  - Conventional path-through: relative US \$ appreciation (= depreciation of domestic currency) can raise the imported good' domestic prices through foreign exchange rate, and subsequently heighten general price level.
- Still less known on the path-through mechanism in dollarized economies across various types of foreign exchange regimes

# I. Motivation

- Against this backdrop, we conduct rigorous empirical investigations on dollarized economies across foreign exchange regimes and the degree of dollarization
  - Determinants of dollarization
  - Path-through mechanism between fx and inflation under dollarized economies
  - Still less known and this paper can fill the gap in the literature

## II. Empirical analysis

- Country-level panel data
  - Selecting countries following Reinhart et al. (2003): foreign currency deposit ratio > 20%; 9 countries overlapped with those in Kokenyne et al. (2010)
  - Verifying whether the factors are different across country groups
    - Fixed vs. floating exchange rate regimes; de-dollarized vs. dollarized countries
- Empirical specification on driving factors for dollarization
  - Following Kokenyne et al. (2010) specification
  - $$\Delta Dollarization_{it} = \beta_i + \beta_1 \Delta Dollarization_{it-1} + \beta_2 fxr\_g_{it-1} + \beta_3 \Delta rer_{it-1} + \beta_4 inf_{it-1} + \beta_5 Others_{it-1} + \varepsilon_{it}$$
    - *Dollarization*: *flia\_sav*, ratio of foreign liabilities over saving deposits
    - *fxr\_g*: proxy for exchange rate's flexibility, rising values implying depreciation of local currency against US dollar,
    - $\Delta rer$ : proxy for real exchange rate's flexibility, rising values implying real depreciation of local currency against US\$
    - *inf*: inflation
    - *Others*: openness (*open*), GDP growth (*y\_g*) and government effectiveness (*govt\_eff*)

## II. Data: Countries and periods

- Most variables: yearly from 1995 to 2016
- flia\_sav: ratio of foreign liabilities over saving deposits
  - Yearly from 1995 to 2008
  - Liberia, Jordan, Argentina, Angola: from 1995 to 2013~2016

Area	Countries
Asia	Armenia, Cambodia, Indonesia, Laos, Mongolia, Pakistan
South America	Argentina, Costa Rica, Honduras, Jamaica, Mexico, Nicaragua, St. Kitts and Nevis, Uruguay
Europe	Belarus, Poland, Russia, Slovenia, Ukraine
Middle East and Northern Africa	Egypt, Israel, Jordan, Turkey
Central and Southern Africa	Angola, Liberia, Sao Tome and Principe, Tanzania, Zambia

## II. Data: Descriptions

- Foreign liability ratio as a alternative to foreign currency deposits
  - Inevitably, we cannot access foreign currency deposit statistics in public databases
- To mitigate the differences between two statistics
  - Using yearly changes not the level itself
  - The degree of representation
    - De-dollarized economies 20.3% vs. dollarized economies 32.6%

## II. Data: Basic stats

- D.xxx: implying yearly difference
  - Variables appears to have the unit roots; converting stationary series through transformation using growth rates or differences
- flia\_sav: largely consistent with those in Reinhart et al (2003)
  - 1996~2001 averages: flia\_sav around 28% vs. Reinhart et al.(2003) around 43%

Variables	Mean	S. D.	Min	Max
flia_sav (%)	28.4	25.8	0.3	153.0
D.flia_sav (%p)	0.3	12.2	-77.3	81.6
inf (%)	27.6	204.9	-2.3	4145.1
fxr_g (%)	10.6	32.9	-220.8	384.1
rer	125.8	49.2	9.8	431.0
D.rer	-1.6	21.0	-125.0	173.7
y_g (%)	4.3	5.4	-35.9	72.4
open (%)	69.1	35.1	6.0	152.0
govt_eff	-0.3	0.7	-2.0	1.4
D.govt_eff	0.01	0.1	-1.0	0.9

# II. Determinants of Dollarization

- Random and fixed effect models; standard errors in parentheses; \* implying usual each significant level
  - Random effect: capturing cross-country features
  - Fixed effect: capturing within-country characteristics over time
  - Dependent variable: yearly change in foreign liability ratio over saving deposits

Variables	Random effect	Fixed effect	Fixed effect	Fixed effect
L.D.flia_sav	0.1147* (0.0584)	0.0382 (0.0604)	0.0652 (0.0592)	0.3305*** (0.0879)
L.inf	0.1853* (0.0720)	0.2118*** (0.0738)	0.1805*** (0.0499)	
L.fxr_g	-0.2505** (0.1121)	-0.3569*** (0.1216)	-0.2829*** (0.0555)	
L.D.rer	-0.0002 (0.0606)	0.0519 (0.0665)		-0.1301* (0.0718)
L.y_g	-0.2037 (0.1498)	-0.2636 (0.1625)	-0.2789* (0.1632)	-0.1395 (0.1514)
L.open	-0.0161 (0.0187)	-0.1190 (0.0747)	-0.0650 (0.0729)	-0.2621*** (0.0807)
L.D.govt_eff				-5.0889 (7.3627)
# of obs.	263	263	273	131
# of countries	23	23	24	23
Adj. R sq./ within R sq.	0.2579	0.0995	0.1025	0.2607

## II. Determinants of Dollarization

- Overall consistent with stylized facts in previous literature
  - Deepening factors for dollarization: higher inflation; less flexible exchange rate; poor economic performances; less trade-openness
  - Various statistical significances across specifications

## II. Panel Estimations: Floating vs. pegging

- Exchange rate regimes: Floating vs. Pegging (soft or hard)
  - Floating as of today: Armenia, Indonesia, Israel, Mexico, Mongolia, Poland, Russia, Slovenia, Tanzania, Turkey, Ukraine, Uruguay, Zambia
  - Pegging as of today: Angola, Argentina, Belarus, Cambodia, Costa Rica, Egypt, Honduras, Jamaica, Jordan, Laos, Liberia, Nicaragua, Pakistan, Sao Tome., St. Kitts and Nevis (currency board)
    - Soft peg: managed within bands; crawling peg
    - Hard peg: fixed or currency board

## II. Panel Estimations: De-dollarized vs. dollarized

- De-dollarized vs. dollarized countries as of 2008
  - De-dollarized index
    - Foreign currency ratio < 20%
  - De-dollarized
    - Indonesia, Israel, Mexico, Tanzania, Argentina, Egypt, Honduras, Liberia, Pakistan
  - Dollarized
    - Armenia, Mongolia, Poland, Russia, Slovenia, Turkey, Ukraine, Uruguay, Zambia, Angola, Belarus, Cambodia, Costa Rica, Jamaica, Jordan, Laos, Nicaragua, Sao Tome., St. Kitts and Nevis

## II. Panel Estimations

### Groups of Countries According to Exchange Rate Regimes<sup>1)</sup> and Degree of Dollarization<sup>2)</sup>

	Floating	Pegging
De-dollarized <sup>3)</sup>	Israel, Indonesia, Mexico, Tanzania	Argentina, Egypt, Honduras, Liberia, Pakistan
Dollarized	Armenia, Mongolia, Poland, Russia, Slovenia, Turkey, Ukraine, Uruguay, Zambia	Angola, Belarus, Cambodia, Costa Rica, Jamaica, Jordan, Laos, Sao Tome, Principe, St. Kitts

- Notes: 1) Exchange regimes based on the year of 2016  
2) Degree of dollarization based on the year of 2008  
3) Foreign deposit ratio is below 20% as of 2008.

## II. Key characteristics by groups of countries

- Not much differences across floating and pegging countries
  - On average, growth rates in fx is greater in pegging regimes; maybe discrete and big revaluations by authorities
- Some differences across de-dollarized and dollarized economies
  - Fluctuations in inflation and foreign exchange market looks more stable in de-dollarized economies

Variables	Floating fx	Pegging fx	De-dollarized	Dollarized
	Average	Average	Average	Average
flia_sav (%)	29.9	27.5	20.3	32.6
inf (%)	14.4	39.5	8.3	36.3
fxr_g (%)	9.1	11.8	6.0	12.8
rer	137.7	116.0	113.7	131.9
y_g (%)	3.9	4.6	4.3	4.3
open (%)	61.9	78.8	48.9	80.6

## II. Determinants of Dollarization

- Some difference across the fx regimes
- Much differences across the degree of dollarization
  - Raising effects of inflation on dollarization come from mostly dollarized countries.
  - Significant and large effects on de-dollarized process: real economic performances, active trades and real appreciation

Variables	FX regime		Degree of dollarization	
	Floating	Pegging	De-dollarized	Dollarized
L.D.flia_sav	0.0485 (0.0815)	0.0134 (0.0980)	-0.0424 (0.0985)	-0.0113 (0.0802)
L.inf	0.3221*** (0.1217)	0.1980* (0.1176)	0.0706 (0.1829)	0.2129** (0.0985)
L.fxr_g	-0.3639** (0.1626)	-0.3879* (0.2257)	-0.5529*** (0.1688)	-0.2865* (0.1685)
L.D.rer	0.0578 (0.0771)	0.0846 (0.1604)	0.2434*** (0.0899)	-0.0620 (0.0882)
L.y_g	0.0216 (0.2467)	-0.4045* (0.2262)	-0.5010*** (0.1612)	0.0037 (0.2918)
L.open	-0.0210 (0.1228)	-0.1502 (0.0990)	-0.4972*** (0.1088)	-0.0358 (0.0991)
# of obs.	138	125	106	157
# of countries	12	11	8	15
Within R sq.	0.1398	0.0945	0.3049	0.1272

# III. Inflation and fx markets under dollarization

- Path-through mechanism in dollarized economies across various types of foreign exchange regimes

$$\begin{aligned} inf_{it} = & \beta_i + \beta_1 \Delta Dollarization_{it-1} + \beta_2 fx\_g_{it-1} + \beta_3 \Delta rer_{it-1} \\ & + \beta_4 inf_{it-1} + \beta_5 y\_g_{it-1} + \varepsilon_{it} \end{aligned}$$

# III. Inflation and fx markets under dollarization

- All independent variables having signs consistent with hypothetical expectations
  - The degree of dollarization can accelerate domestic inflation by itself.
  - Depreciation of domestic currency has significant and positive effects on inflation through imported prices' hike.
  - Relative local price stability against that in the US in terms of goods (= real local depreciation) can help to stabilize the local inflation.

Variables	Random effect	Fixed effect	Fixed effect	Fixed effect
L.inf	-0.0592*** (0.0086)	-0.0498 (0.0092)		-0.0524*** (0.0076)
L.D.flia_sav	0.2455** (0.1029)	0.2151* (0.1093)	0.2993*** (0.1104)	
L.fxr_g	1.2138*** (0.0619)	1.0511*** (0.0755)	0.7280*** (0.0486)	1.0390*** (0.0608)
L.D.rer	-0.3067*** (0.0554)	-0.2193*** (0.0606)	-0.0604 (0.0551)	-0.2584*** (0.0492)
L.y_g	0.8983*** (0.2603)	0.6060** (0.2925)	0.2589 (0.2971)	0.7493*** (0.2127)
# of obs.	367	365	366	521
# of countries	27	27	27	27
Adj. R sq./ within R sq.	0.9649	0.4863	0.4403	0.4764

## II. Panel Estimations: Inflation and foreign exchange rate

- Quantitative analyses by averages in the country group
  - 1%p increase in foreign liability ratio → 0.2 ~ 0.3%p increase in inflation
  - 1%p depreciation (appreciation) of local currency → 0.7~1.2%p increase (decrease) in inflation
  - 1% increase in real GDP → 0.6~0.9%p increase in inflation

# III. Inflation and fx markets under dollarization

- The effect of domestic currency's depreciation on inflation is greater in pegging fx regime
- The path-through effects in de-dollarized economies having smaller and less significant on inflation. No significance in degree of dollarization; domestic factors look more crucial for determining inflation.
- The degrees of depreciation and dollarization being very important factors; external factors on inflation look essential in dollarized economies.

Variables	FX regime		Degree of dollarization	
	Floating	Pegging	De-dollarized	Dollarized
L.inf	0.0935 (0.1020)	-0.0579*** (0.0120)	0.2321* (0.1288)	-0.0553*** (0.0108)
L.D.flia_sav	0.2680*** (0.0750)	-0.0583 (0.1842)	0.0221 (0.0753)	0.4253*** (0.1427)
L.fxr_g	0.6003*** (0.1330)	1.1094*** (0.1013)	0.0855 (0.1138)	1.1490*** (0.0907)
L.D.rer	-0.1633*** (0.0643)	0.0158 (0.1060)	-0.0202 (0.0606)	-0.0598 (0.0799)
L.y_g	0.3785* (0.2262)	0.4116 (0.4405)	0.1177 (0.1243)	0.5221 (0.4720)
# of obs.	159	286	123	242
# of countries	12	15	9	18
Within R sq.	0.4669	0.5291	0.1261	0.5576

# III. Inflation and fx markets under dollarization

- Quantitative analyses by averages in the country groups
  - 1%p depreciation (appreciation) → 0.6%p inflation rise (fall) in floating vs. 1.1%p rise (fall) in pegging
  - 1%p depreciation (appreciation) → no effects on inflation in de-dollarized vs. 1.1%p inflation rise (fall) in dollarized

# IV. Conclusion

- Determinants of dollarization are overall similar to those of previous discussions.
  - High inflation, rigid or sticky exchange rate fluctuations, a slump of the real economy and qualitative deterioration of economic institutions
  - Not much differences across the fx regimes but much differences across the degree of dollarization
    - Raising effects of inflation on dollarization come from mostly dollarized countries.
    - Significant and large effects on de-dollarized process: real economic performances, active trades and real appreciation

## IV. Conclusion

- High dollarization and a high depreciation rate of domestic currency are found to increase inflation.
  - On de-dollarized countries: the pass-through effect and the degree of dollarization have no significant effect on inflation
  - On dollarized countries: foreign exchange related variables are found to have significant effects on inflation
- The effect of such exchange rate fluctuations on the inflation rate would be reduced when the degree of dollarization is eased or when adopting a floating exchange rate system