Financial Dollarization in Emerging Markets: An Insurance Arrangement

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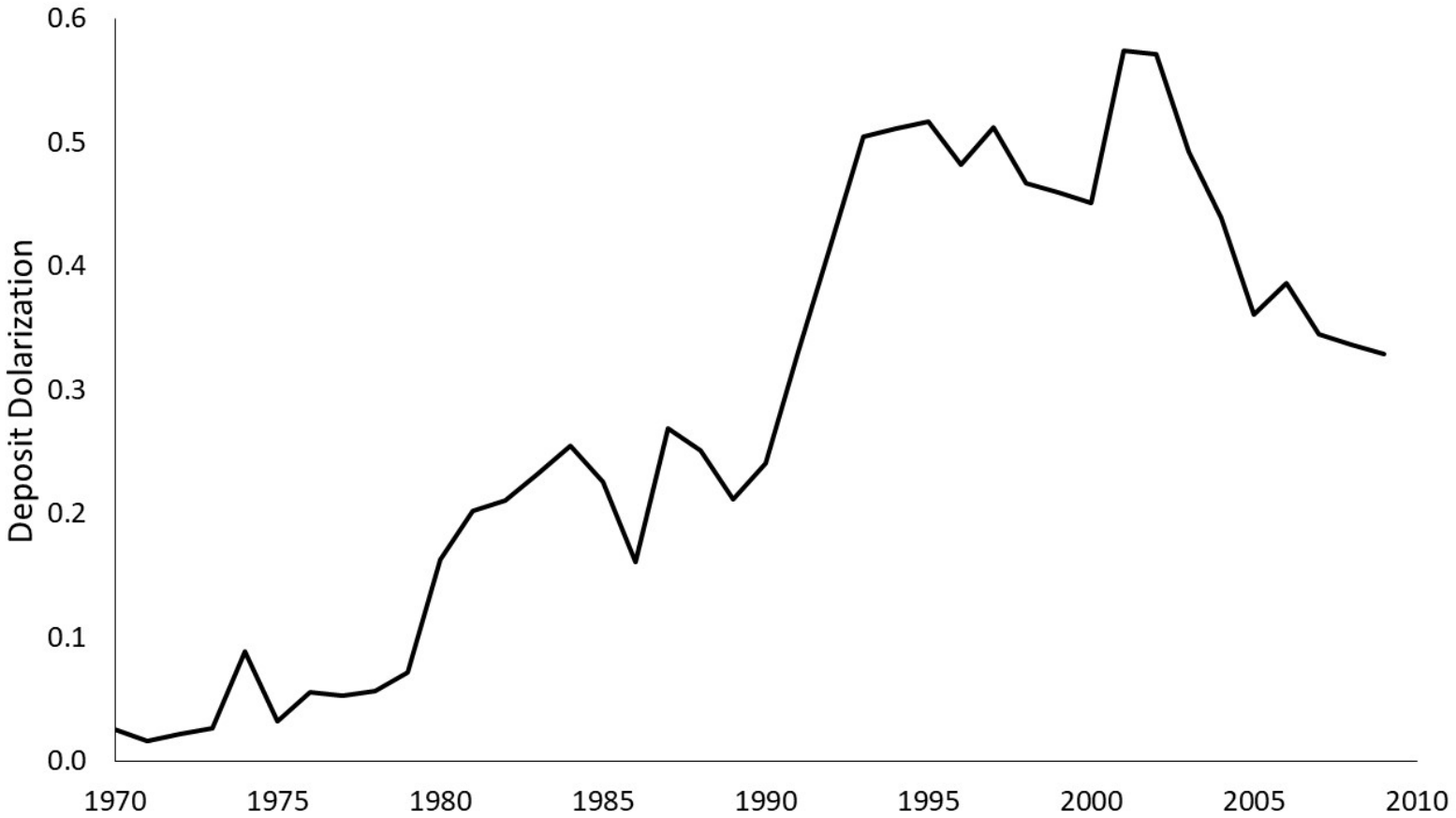
Motivation

Emerging markets are characterized by "Financial Dollarization"

- Credit Dollarization $\rightarrow$ Firms borrow in foreign currency (FC)
- Deposit Dollarization $\rightarrow$ Households save in FC



Dollarization: Pros vs Cons

- Dollarization: Interpreted as source of financial fragility
- Balance sheet effects (Aoki, Benigno, Kiyotaki (2016))
  - Mismatch: Local currency revenue vs dollar debt
  - Exchange rate depreciation $\rightarrow$ Hurt balance sheets
  - Lower investment, higher unemployment
- Private benefits of holding dollars
  - Limits on dollarization counterproductive

Result

- A model with endogenous dollarization
- Interest rate spread

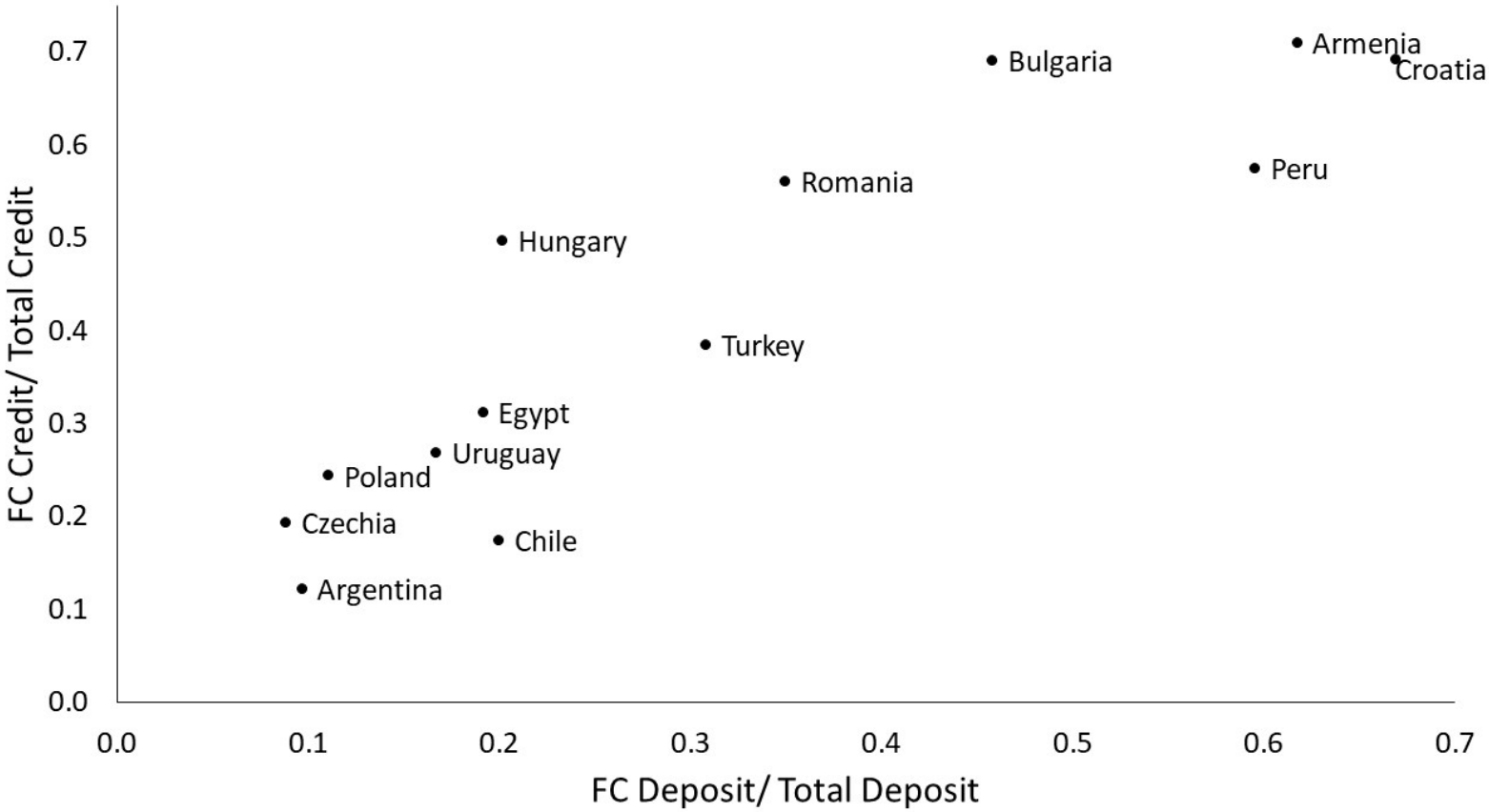
- Dollarization: Useful insurance purpose
  - Income smoothing for households

- Household Dollar deposits $\rightarrow$ Credit Dollarization

- Policies to limit dollarization $\rightarrow$ Reduce welfare
  - Protectionism

Facts: Deposit and Credit Dollarization

- Deposit Dollarization and Credit Dollarization correlated



Facts: Deposit Dollarization as Hedge

- Relation between GDP and Exchange rate
- I run the following regression

$$\Delta \log(GDP_t) = \alpha + \beta \Delta \log\left(\frac{S_t}{P_t}\right) + \epsilon_t$$

- S_t : Exchange rate, LCU per USD
- P_t : CPI
- $\hat{\beta} < 0$: Purchasing power of USD is countercyclical
- Dollarized economies $\longrightarrow \hat{\beta} < 0$
- Non-Dollarized economies $\longrightarrow \hat{\beta}$ small or > 0

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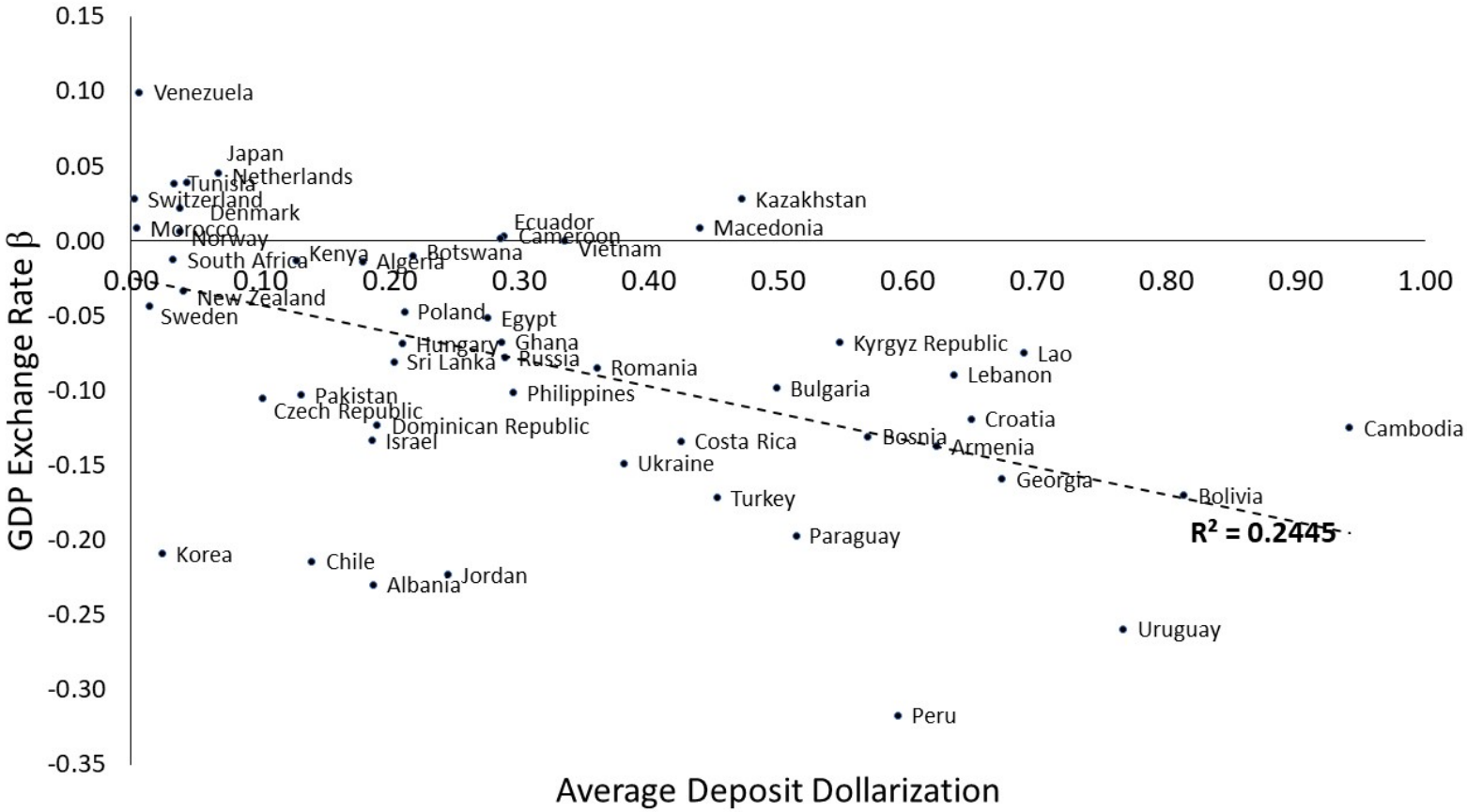
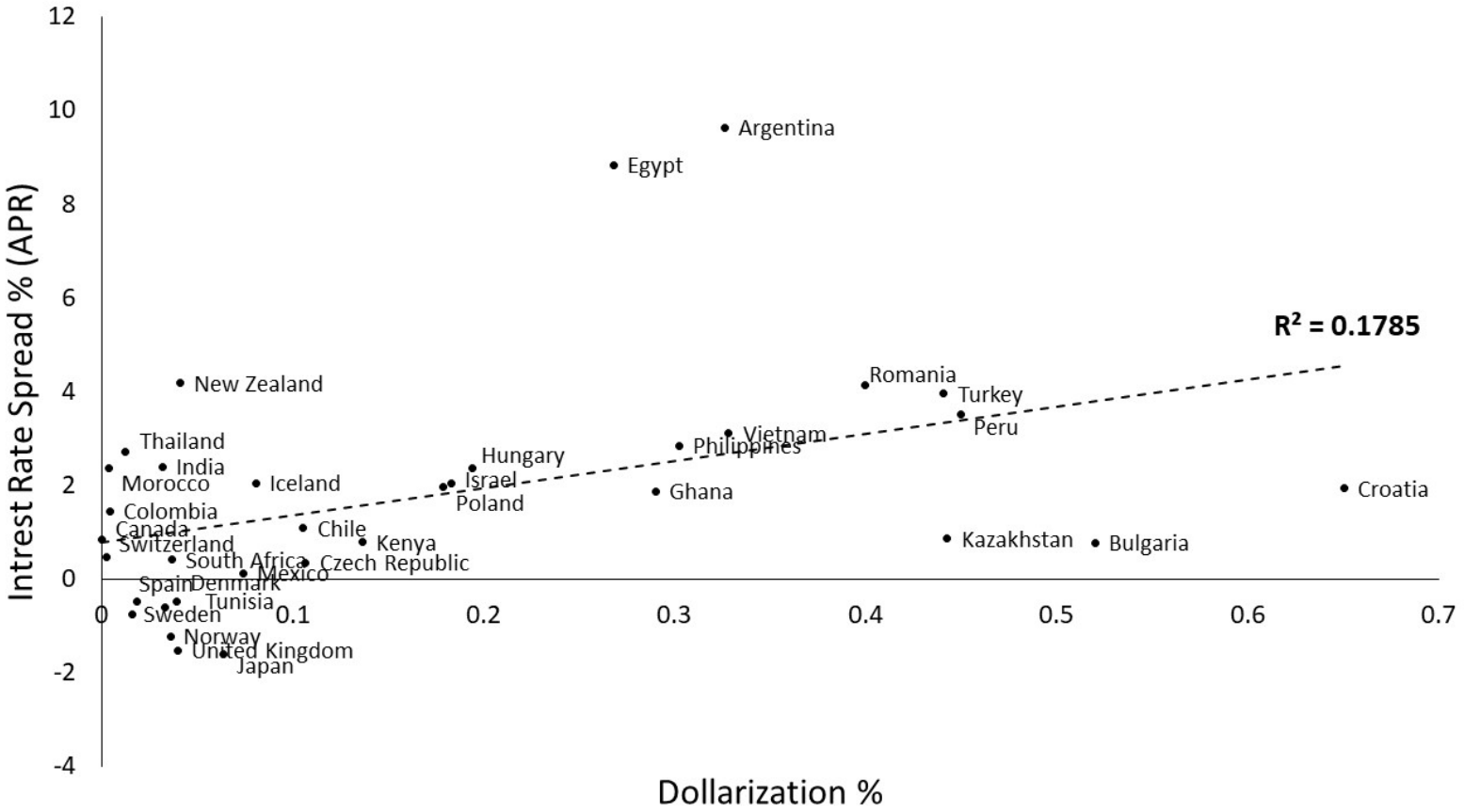
Facts: Deposit Dollarization as Hedge

- Dollarization high: Depreciations $\rightarrow$ Low growth
  - β (ΔER,ΔGDP) < 0



Facts: Dollarization and Interest Rates

- Higher dollarization $\rightarrow$ interest rate spread

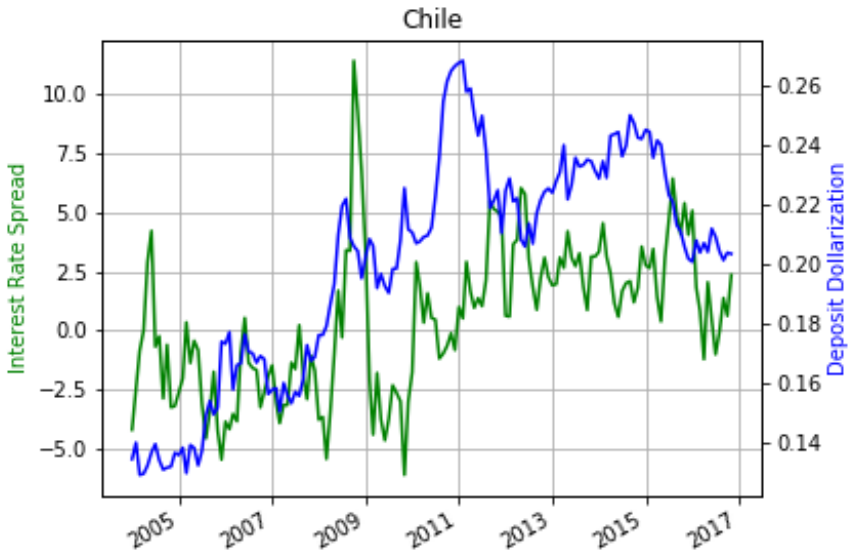


Facts: Dollarization and Interest Rates

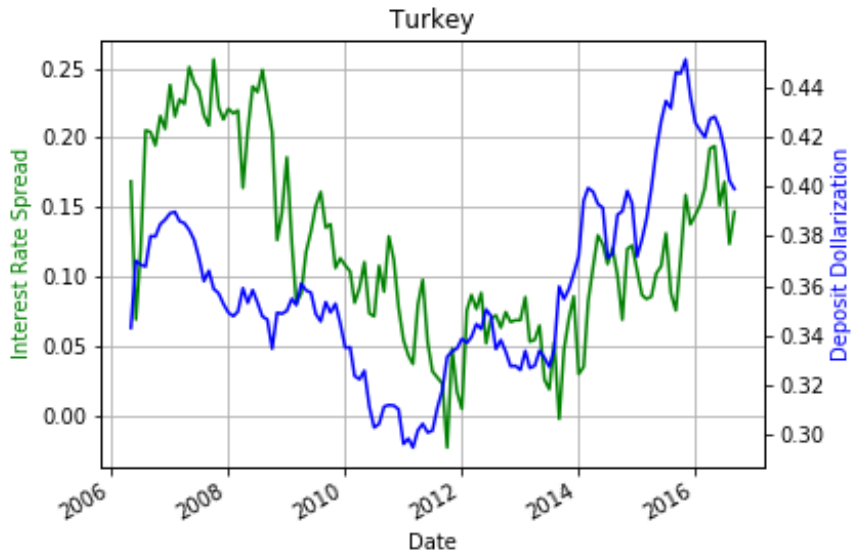
- Dollarization comove with interest rate spread
- Spread:

$$R_t^L \left(\frac{P_t}{\mathbb{E}(P_{t+1})} \right) - R_t^F \left(\frac{P_t}{P_{t+1}} \frac{\mathbb{E}(S_{t+1})}{S_t} \right)$$

- Central Bank Survey of Expectations



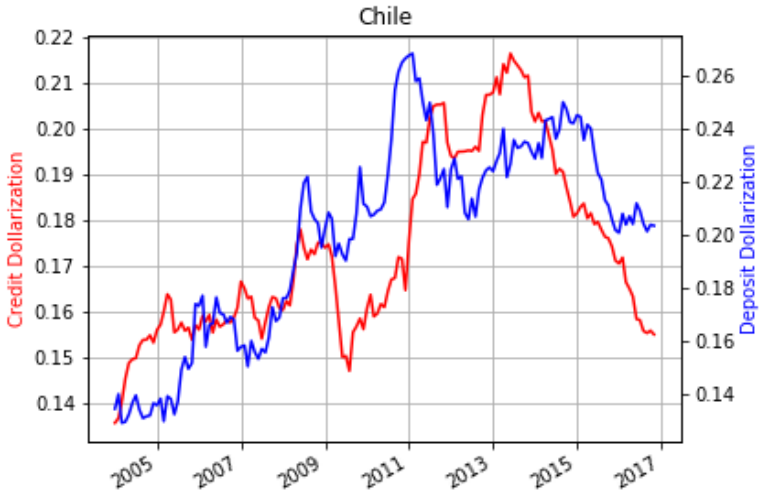
$\rho = 0.47$



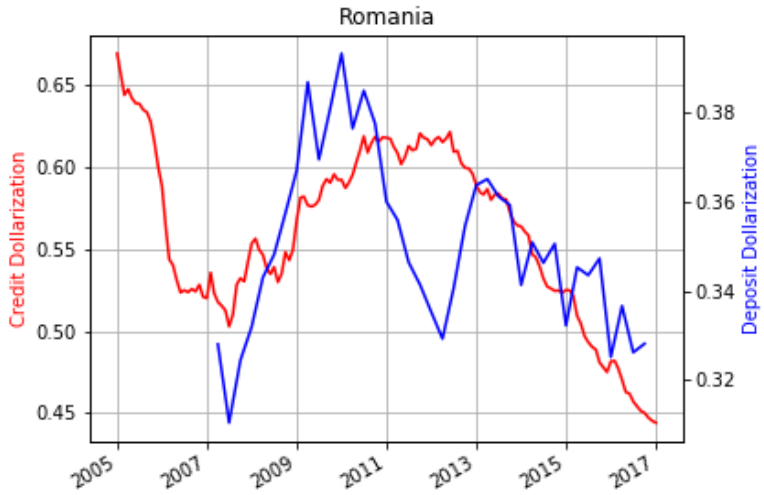
$\rho = 0.37$

Facts: Credit and Deposit Dollarization

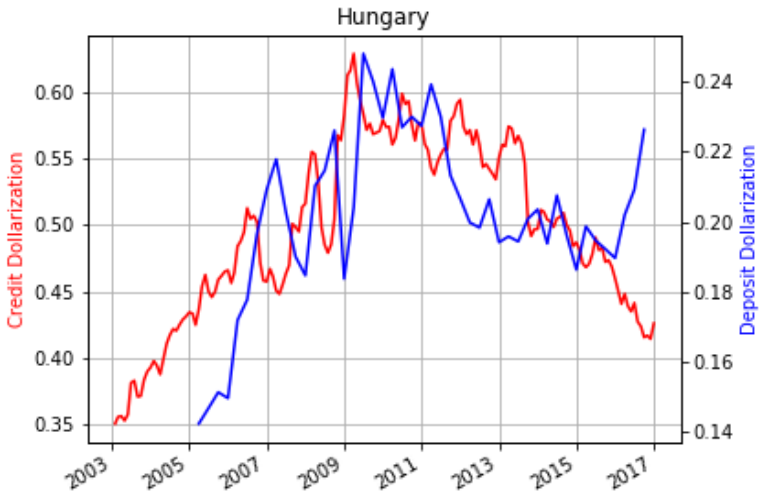
- Credit and Deposit dollarization comove



$\rho = 0.71$



$\rho = 0.48$



Interpretation of the Facts

- Households hold dollars $\rightarrow$ Demand for hedging
  - Exchange rate depreciates in recessions
- Supply of local currency saving is low
  - Local interest rates are higher
  - Limited participation of foreigners, "Original Sin"
- Firms induced to engage in risky dollar borrowing
  - Compensated because of interest rate spread
- Credit & Deposit Dollarization linked: Insurance mechanism whereby firms provide insurance to households.
- Limiting Dollarization limits this insurance mechanism

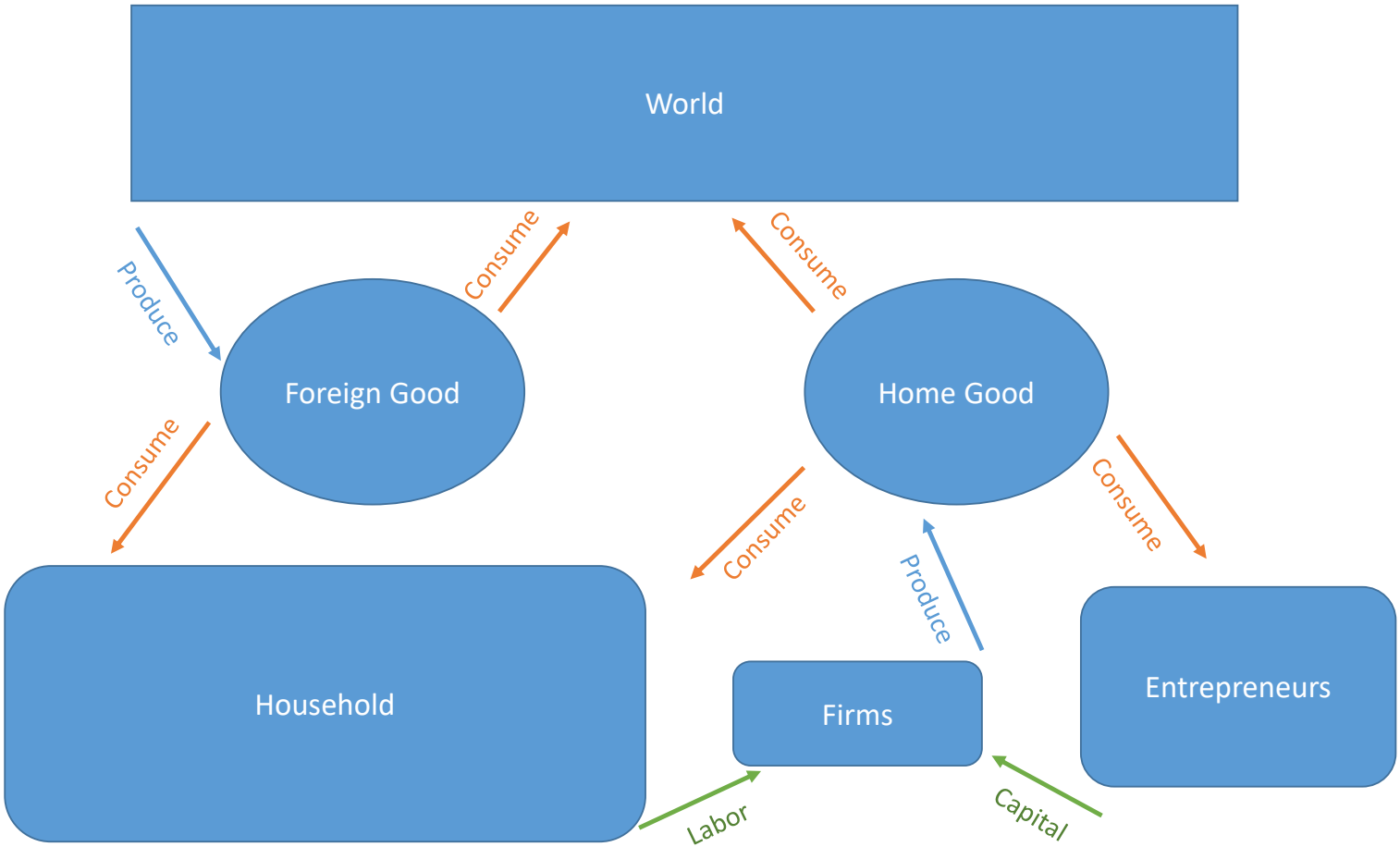
Literature

- Effects of global financial conditions on emerging markets
  - Neumeyer and Perri (2005); Gertler, Gilchrist and Natalucci (2007); Fernández-Villaverde et al (2011); Aoki, Benigno and Kiyotaki (2016)
- Emerging markets interest rate spread
  - Martin (2013), Hassan (2013), Gabaix and Maggiori (2015)
- Balance sheet effects of dollarization
  - Bleakley and Cowan(2008); Rancieri et al (2010); Dalgic et al (2017)
- Small open economy with financial frictions
  - Bernanke, Gertler and Gilchrist (1999); Gertler, Gilchrist and Natalucci (2007); Faia(2007); Christiano et al (2011);
- Dominant role of the US Dollar
  - Eichengreen and Hausmann(1999), Maggiori et al (2017), Gourinchas, Rey and Govillot (2019), Gopinath et al (2019)
- Dollarization and Financial Crises
  - Christiano, Dalgic, Nurbekyan (2017)

The Model

- Risk averse households: Demand for dollar deposits
  - Dollar saving as an insurance
  - Corr(ΔC, ΔER) < 0
- Limited participation of foreigners
  - Domestic firms need to provide the insurance
- Risk averse firms: Require compensation for risk
  - Interest rate spread: $R_t^l - E_t\left(R_t^f \frac{S_{t+1}}{S_t}\right) > 0$
- Interest rate spread $\rightarrow$ Price of insurance

The Model-Goods Market



Households

- Consume Home good ($c_{h,t}$) and Foreign Good ($c_{f,t}$)
- Investments in Home d_t and Foreign f_t assets

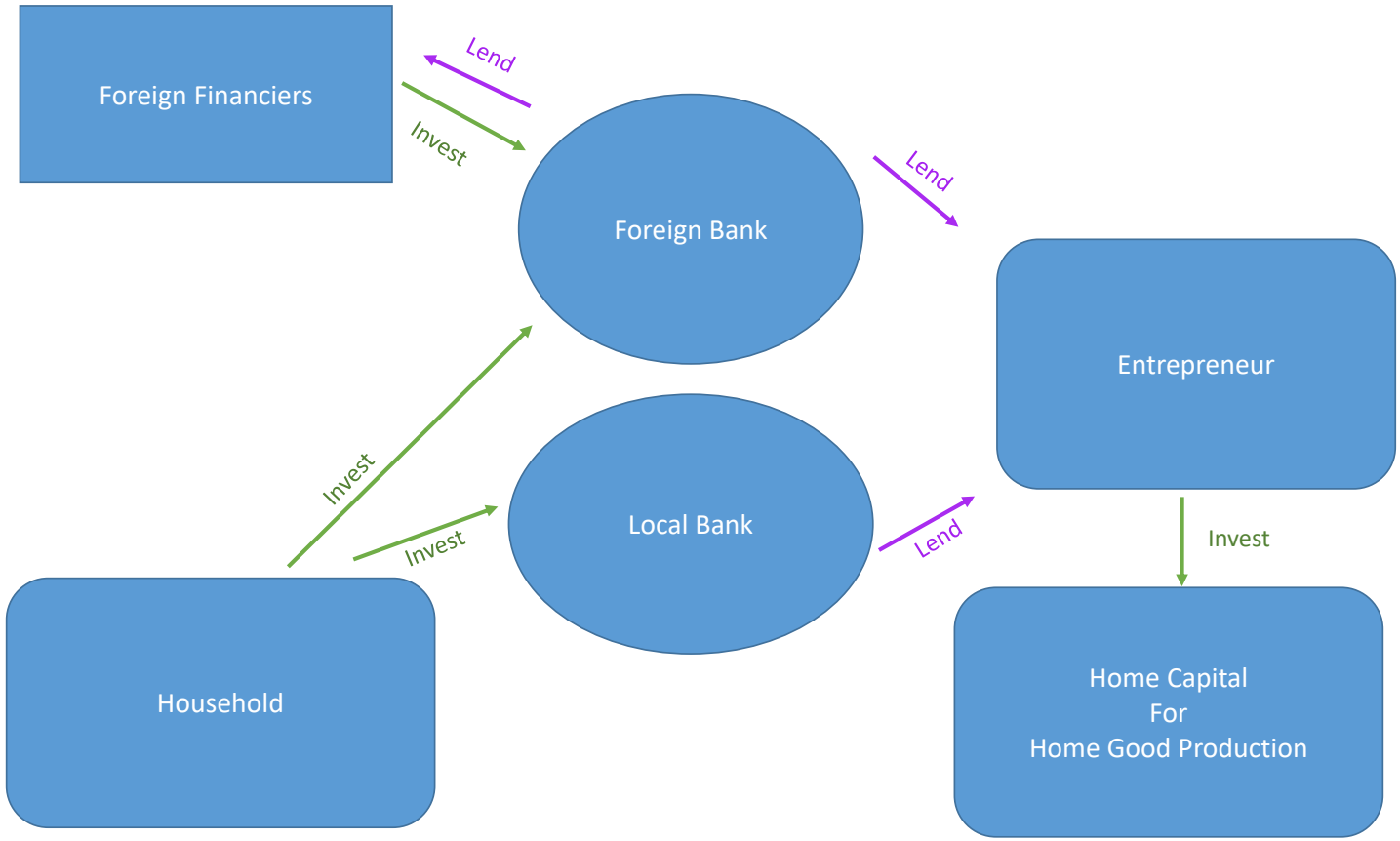
$$\max \sum_t \beta^t \mathbb{E}_t u(C_t, l_t)$$

$$C_t = \left(\omega^{\frac{1}{\sigma}} c_{h,t}^{\frac{\sigma-1}{\sigma}} + (1-\omega)^{\frac{1}{\sigma}} c_{f,t}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

- Budget constraint

$$P_t C_t + \overbrace{d_t}^{\text{Home Asset}} + \overbrace{f_t}^{\text{Foreign}} = \overbrace{w_t l_{h,t}}^{\text{Labor}} + d_{t-1} \overbrace{R_{t-1}}^{\text{Local Rate}} + f_{t-1} \overbrace{\frac{S_t}{S_{t-1}}}^{\text{ER}} \overbrace{R^f_{t-1}}^{\text{Foreign Rate}}$$

The Model-Financial Markets



Entrepreneurs

- Operates capital for production
- Have access to Local and Foreign funds
- Subject to financial frictions
  - Costly State Verification (CSV)
  - Limited liability, costly to observe efficiency
- Each bank offers a menu of contracts which specifies an interest rate and leverage
  - Gale and Hellwig (1985)
- Entrepreneur net worth determines (N_t) the amount of investment
- Financial accelerator
  - Exchange rate depreciation hurts entrepreneur balance sheet
  - Effects of exchange rate are amplified

Shocks and Covariance

- Export demand shock x_t (Martin (2013), Hassan (2013))
  - Foreigners demand less Home good: $x_t \downarrow$
    - ★ Depreciation $S_t \uparrow$: Foreign good more expensive
    - ★ Endowment effect, HH is net buyer of foreign good
    - ★ Dollar borrowing $\rightarrow$ Balance sheet effects
    - ★ Lower investment, lower wages
- Interest Rate Shock (N&P (2005); Gertler et al (2007))
  - $R_t^f \uparrow$
    - ★ Investment $\downarrow$: Cost of borrowing $\uparrow$ + Balance sheet effects
    - ★ Consumption $\downarrow$: Wages $\downarrow$ + Price of composite good $\uparrow$
    - ★ $Cov(S_t, C_t) < 0$
- Productivity shock z_t
- Volatility shock σ_{Rt}
  - Moves the spread
  - Fernández-Villaverde et al (2011)

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Parameters

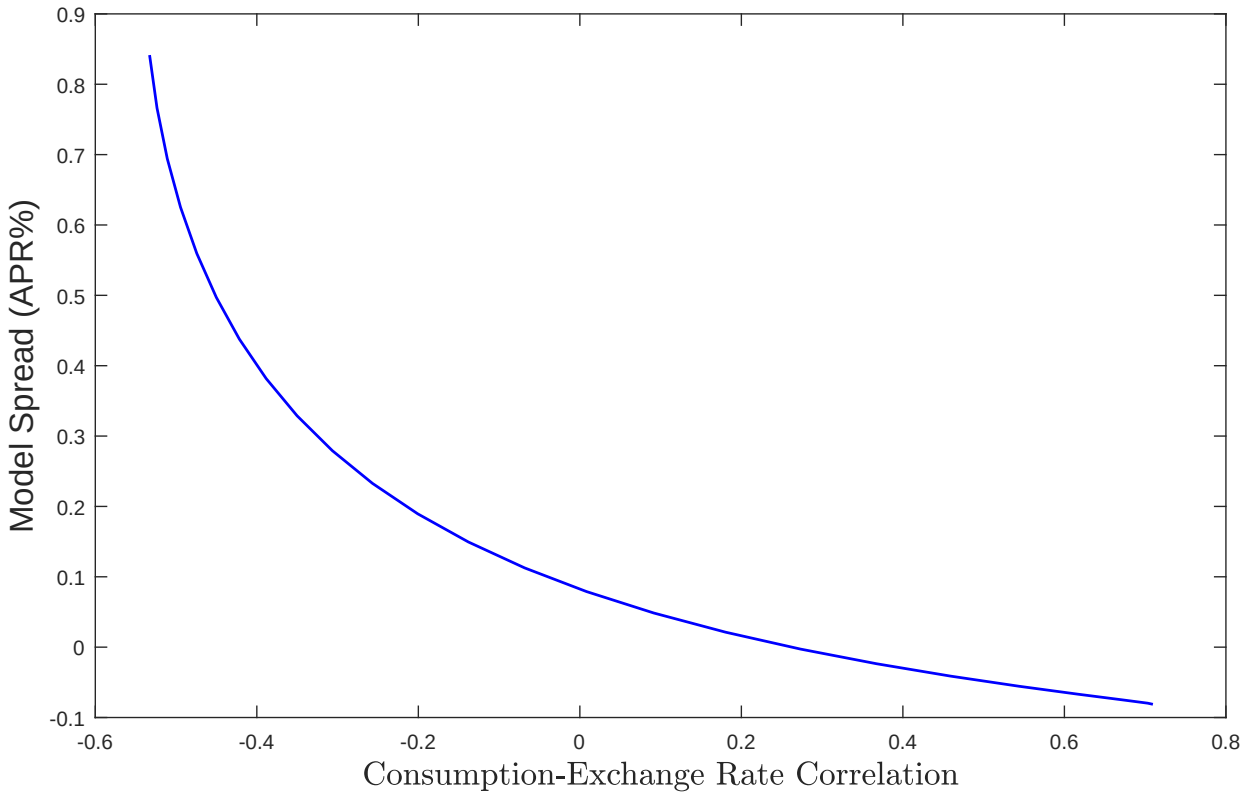
Parameter	Value	Explanation	
β	$(1.03)^{-1/4}$	Discount factor	Steady state 3% annual rate
R	$1/\beta$	Steady state interest rate	
ω	0.7	Home Bias	Import/Consumption
σ	1.5	CES elasticity	Faia 2007, Backus et al (1992)
γ	5	Risk aversion	Neumeyer and Perri (2005)
			Fernández-Villaverde et al (2013)
ϕ	7.7	Inverse Frisch elasticity	Christiano et al (2011)
$\bar{d}$	13.3	SS level of local assets	Deposit dollariztion: 33%
$\bar{f}$	4.45	SS level of foreign assets	Credit dollarization: 41%
$L^f = L^l$	2.04	Steady state leverage	Dalgic et al(2017)
α	0.36	Capital Share	
φ	1	Elasticity of export demand	Gertler and Gilchrist (2005), Aoki et al (2016)
σ_e	0.26	Entrepreneur cross section sdev	Faia 2007, Gertler and Gilchrist (2005)
μ	0.12	Monitoring cost	Faia 2007,Gertler and Gilchrist (2005)
$F(\cdot)$	Lognormal	Entrepreneur distribution	Faia 2007, Gertler and Gilchrist (2005)
			Christiano et al (2011)
ρ_R	0.96	Interest rate shock persistency	Data, Fernández-Villaverde et al (2013)
σ_R	0.0025	Interest rate shock	Fernández-Villaverde et al (2013)
σ_z	0.08	Technology shock	Output Volatility 3%
σ_x	0.04	Export shock	RER Volatility 4%
$\sigma_{\sigma R}$	0.25	Interest rate volatility shock	VIX Index
$\rho_{\sigma R}$	0.72	Volatility shock persistence	VIX Index

Results

Moment	Model	Bulgaria	Chile	Peru	Hungary	Turkey
σ Industrial Output	3.25%	3.52%	2.16%	3.76%	3.22%	4.24%
σ Real exchange rate	4.25%	6.85%	4.15%	4.43%	2.34%	7.09%
Corr(FC Deposit, FC Credit)	0.58	0.35	0.71	0.34	0.46	0.43
Corr(FC Deposit, Spread)	0.71	0.33	0.47	0.27	0.19	0.37

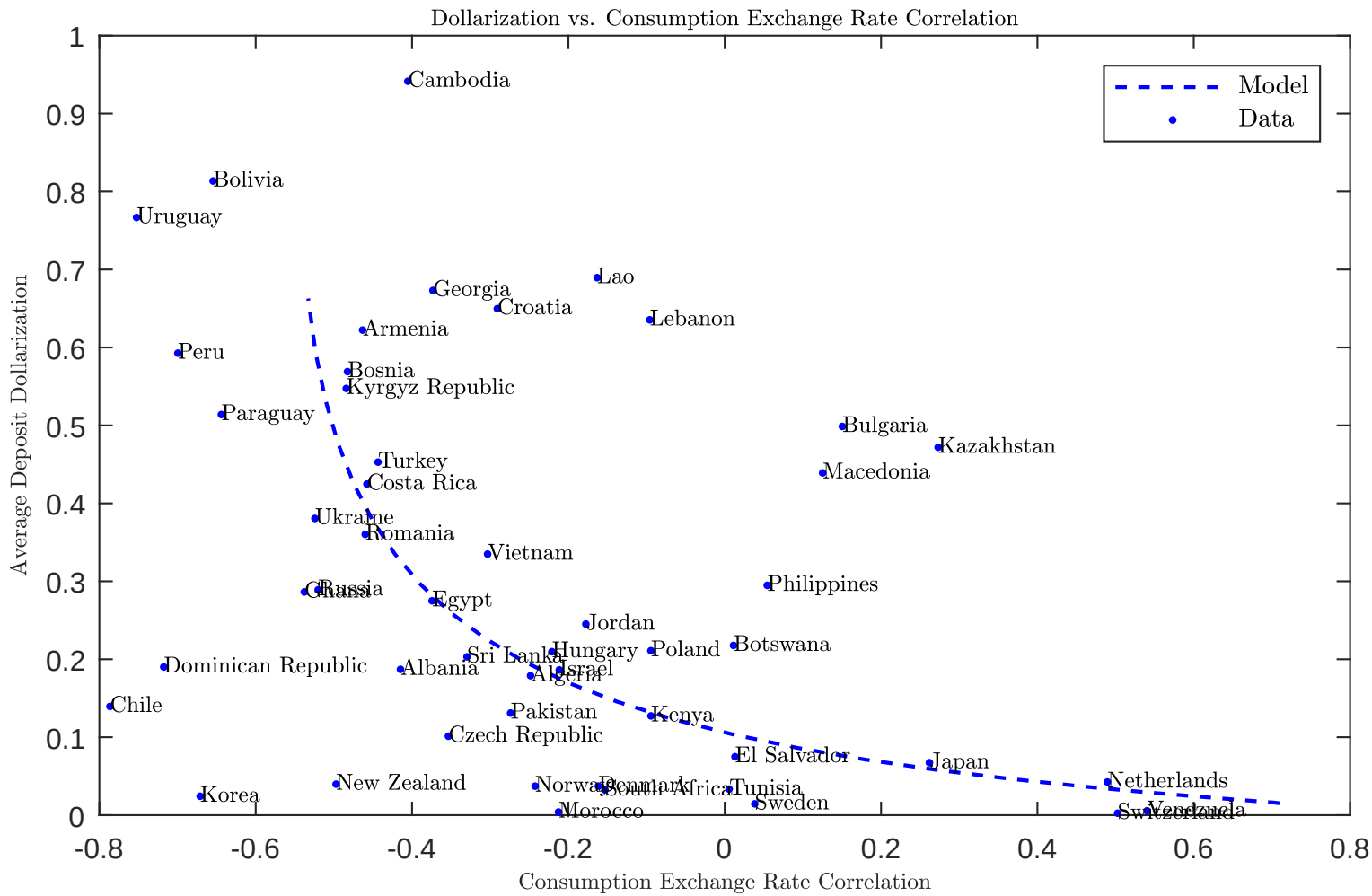
Results

- I move consumption-ER Correlation
  - SS interest rate spread is generated endogenously
  - Level of spreads is lower than the data



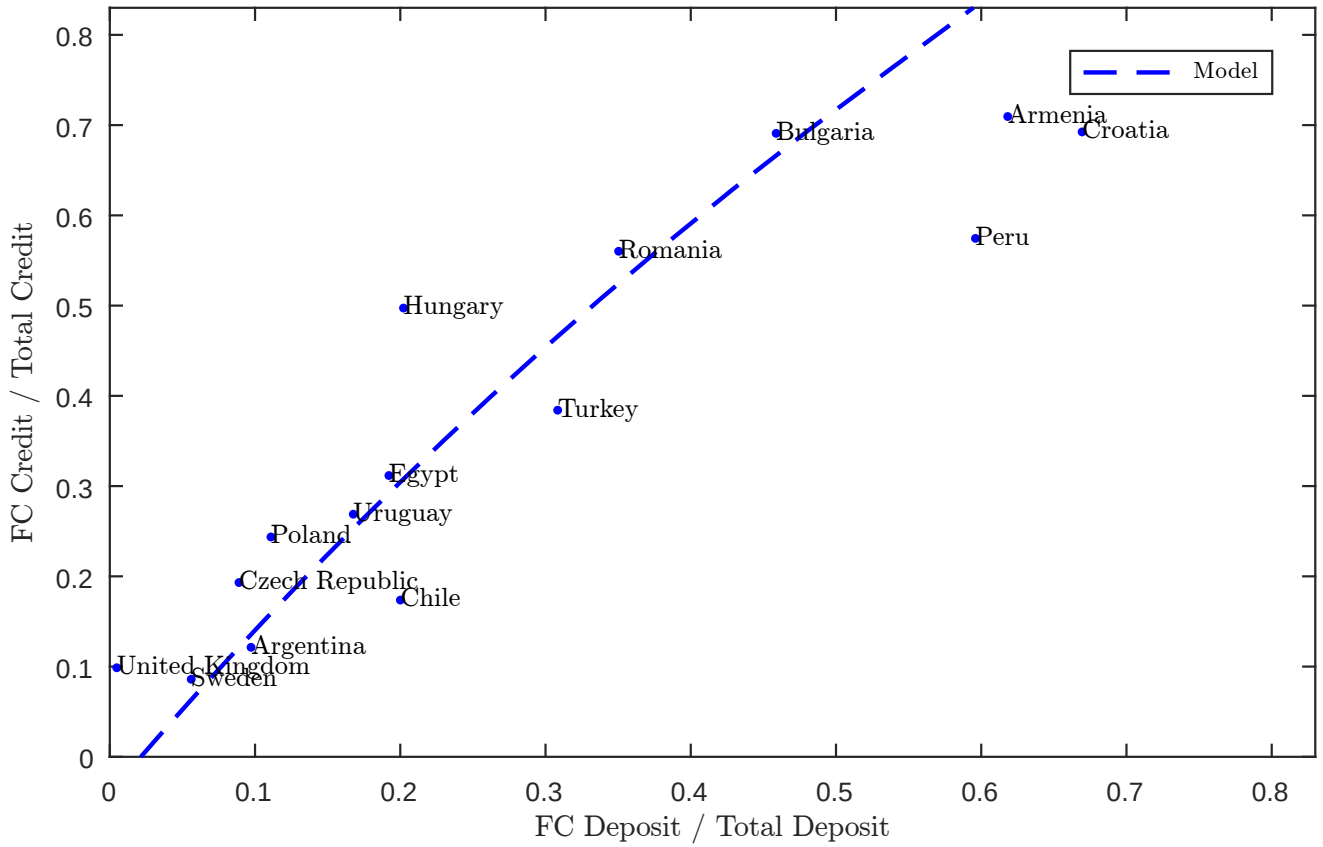
Results

- Corr(ΔC, ΔER) $\rightarrow$ Dollarization
- More negative correlation $\rightarrow$ Higher Dollarization



Results

- Credit & deposit dollarization related in steady state



Benchmark - Frictionless International Finance

- Imagine risk neutral deep pocket international investors
- Any expected risk premium is erased

$$R_t = R_t^f \mathbb{E}\left(\frac{S_{t+1}}{S_t}\right)$$

- Credit dollarization $\rightarrow 0$
  - Entrepreneurs do not like risk
- Deposit dollarization $\rightarrow 1$
  - Invest in dollars as long as $cov(C, S) < 0$

Policy Exercise: Limit Household Dollar Deposits

- Preventing household dollar deposits
  1. Baseline: Access to foreign assets
  2. Policy: Households need to pay tax hold foreign assets
  3. Intenational investors: Risk neutral investors

	Baseline	Tax on Dollar Deposits	International Investors
Deposit Dollarization	33.6%	7.68%	100%
Credit Dollarization	43.7%	17.2%	0%

Policy Exercise: Limit Household Dollar Deposits

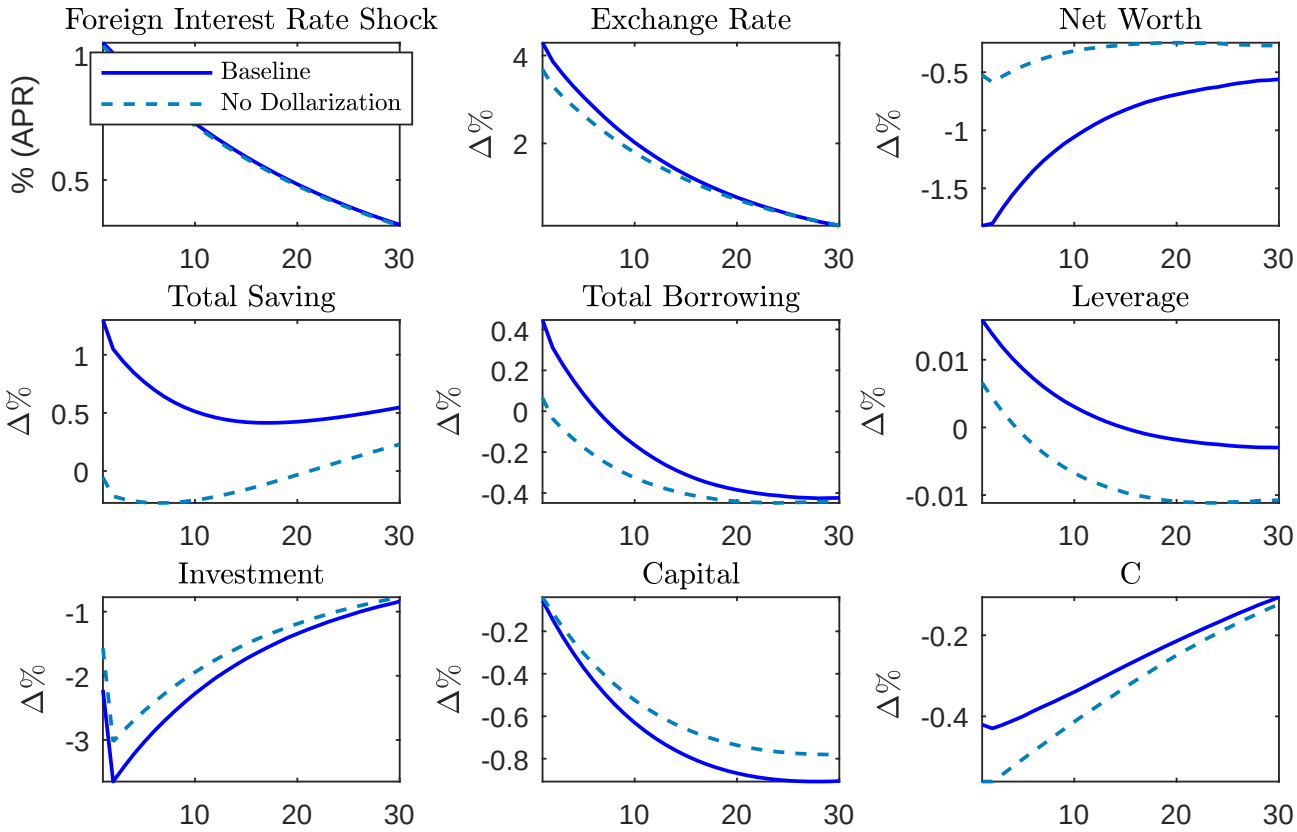
	Tax on Dollar Deposits	International Investors
ΔWelfare (In C-units)	-0.42%	16%
$\%\Delta\lvert\text{cov}(\Delta C, \Delta S)\rvert$	58.62%	-61.3%
Δ Capital	-0.53%	24.4%
ΔTotal Saving	5.32%	-11.02%
Δ Entrepreneur Net Worth	-1.81%	10.6%

Preventing Dollarization lowers welfare

- GE: Local rates go up $\rightarrow$ Lower investment, output
- Lower capital $\rightarrow$ Lower entrepreneur net worth
- Lower wages + higher saving $\rightarrow$ Lower consumption

Balance Sheet vs Insurance

- Foreign interest rates go up!
- Policy makes the economy more vulnerable



Conclusion

- Increase in dollar credit is a source of worry
  - Currency mismatch in non-financial sector
- Credit Dollarization $\rightarrow$ Driven by Households' desire for insurance
- Restrictions on dollarization: Counterproductive
  - Undermine a valuable insurance arrangement
  - Improves trade balance
- Other Considerations
  - Limitation on Monetary Policy (For later)
  - Implicit government guarantees (Burnside et al, 99)