

# Real Effective Exchange Rate Volatility

## Institutions and Financial Integration: A Dynamic Panel Data Approach

Santiago Caram<sup>1</sup>

<sup>1</sup>UCEMA  
University of CEMA

UNLP  
National University of La Plata

Arnoldshain Seminar XIV "Institutions, Trade, and Economic Policy",  
October 10-3-2016

- 1 Motivation
  - Traditional Theories
  - Real Effective Exchange Rate Definition

- 1 Motivation
  - Traditional Theories
  - Real Effective Exchange Rate Definition
- 2 Empirical Evidence
  - Static Analysis
  - The Institutional Framework
  - Dynamic Approach

# Outline

- 1 Motivation
  - Traditional Theories
  - Real Effective Exchange Rate Definition
- 2 Empirical Evidence
  - Static Analysis
  - The Institutional Framework
  - Dynamic Approach
- 3 Concluding Remarks
  - Appendix: The Case of Argentina

# Introduction

- What are the main channels in which REER volatility propagates?

# Introduction

- What are the main channels in which REER volatility propagates?
- Are Financial Integration and Capital Account Liberalization necessary or sufficient conditions to mitigate the impact of exchange rate volatility?
- Trade Openness (Sjaastad) vs Financial Integration (Le Fort), which instrument is more reliable?
- Are there successful recipes? Prudential Policies (Gradualism) vs Shock Policies: What is the best course of action?

# Introduction

- What are the main channels in which REER volatility propagates?
- Are Financial Integration and Capital Account Liberalization necessary or sufficient conditions to mitigate the impact of exchange rate volatility?
- Trade Openness (Sjaastad) vs Financial Integration (Le Fort), which instrument is more reliable?
- Are there successful recipes? Prudential Policies (Gradualism) vs Shock Policies: What is the best course of action?
- Alternative Approach:

# Introduction

- What are the main channels in which REER volatility propagates?
- Are Financial Integration and Capital Account Liberalization necessary or sufficient conditions to mitigate the impact of exchange rate volatility?
- Trade Openness (Sjaastad) vs Financial Integration (Le Fort), which instrument is more reliable?
- Are there successful recipes? Prudential Policies (Gradualism) vs Shock Policies: What is the best course of action?
- Alternative Approach:
  - Healthier Institutions (e.g. a higher respect for political and civil rights) can be associated with a lower Country Risk-Premium.
  - Central Bank Independence: a good sign of institutional strength.
  - Currency Crisis: can be regarded as a breach of trust in the currency itself.



# Literature Revision

- Healthier Institutions reduce uncertainty and provide the right incentives. (North)
- Strong influence of the Country Risk-Premium as the linkage between capital flows and aggregate demand, hence a source of volatility. (Avila)

# Literature Revision

- Healthier Institutions reduce uncertainty and provide the right incentives. (North)
- Strong influence of the Country Risk-Premium as the linkage between capital flows and aggregate demand, hence a source of volatility. (Avila)
- Volatility from the Fundamentals (e.g. changes in public spending, terms of trade, among others) may generate a higher REER volatility. (Caporale-Amor-Rault).
- Strong evidence in favor of Trade Openness as an instrument to reduce volatility. (Calderon)
- Financial Integration: Mixed Evidence; on the one hand it may increase public spending volatility. On the other, it can generate a disciplinary direct effect by reducing it.
- Capital Account Liberalization: Increases efficiency in consumption smoothing and should have a stabilizing effect by favoring risk diversification. (Le Fort)

# Real Effective Exchange Rate: The Definition

- $REER_t = \frac{NEER_t * CPI_t}{CPI_t^{Foreign}}$
- Where  $NEER_t$  is the Nominal Effective Exchange Rate of the country,  $CPI_t$  is the consumer price index of the country and  $CPI_t^{Foreign}$  is the geometrically weighted average of CPI indices of trading partners.

# Correlations

**Table 1**  
**Correlations Full Panel by Exchange Rate Regime**

	Fixed		Intermediate		Floating	
	P.Corr	P-value	P.Corr	P-value	P.Corr	P-value
$\sigma$	1.000		1.000		1.000	
BSE	0.155	(0.070)	0.126	(0.040)	0.097	(0.497)
$\Delta M2$	0.188	(0.038)	0.266	(0.000)	0.398	(0.003)
$\Delta TT$	0.255	(0.006)	0.339	(0.000)	0.346	(0.020)
$\Delta PS$	0.284	(0.001)	0.578	(0.000)	0.318	(0.017)
$\Delta AWP$	0.209	(0.024)	0.061	(0.344)	0.240	(0.077)
$\Omega$	0.718	(0.000)	0.425	(0.000)	0.358	(0.006)
O	-0.261	(0.002)	-0.260	(0.000)	-0.059	(0.663)
FI1	-0.109	(0.195)	-0.127	(0.038)	-0.341	(0.009)
FI2	-0.119	(0.158)	0.059	(0.333)	0.264	(0.045)
NFA	0.049	(0.561)	-0.072	(0.241)	0.056	(0.674)
KA	-0.277	(0.001)	-0.191	(0.002)	-0.452	(0.000)
T	0.189	(0.170)	0.194	(0.025)	0.300	(0.136)
M	0.178	(0.623)	-0.279	(0.135)	-0.477	(0.034)
I	-0.324	(0.041)	0.053	(0.538)	-0.099	(0.538)
$\theta$	-0.235	(0.006)	-0.207	(0.001)	-0.303	(0.025)
R	-0.275	(0.001)	-0.234	(0.000)	-0.334	(0.013)
$\zeta_{FREE}$	-0.348	(0.000)	-0.235	(0.000)	-0.445	(0.001)
$\zeta_{NOT-FREE}$	0.202	(0.016)	0.217	(0.000)	0.276	(0.039)
$\Gamma$	-0.206	(0.055)	-0.284	(0.001)	-0.683	(0.002)
E	-0.201	(0.060)	0.262	(0.002)	0.645	(0.005)

# Descriptive Statistics

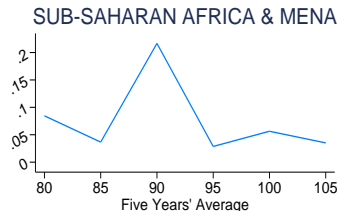
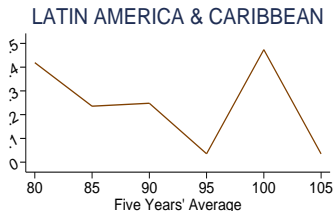
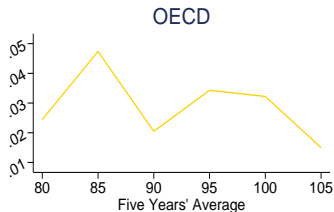
- Correlations showed that regardless the exchange rate regime, the fundamentals as well as the institutional variables (e.g. country risk-premium among others) were highly significant and correlated to our main variable.

**Table 2: REER Volatility by Groups**

	80	85	90	95	100	105	<i><b>Total</b></i>
OECD	0.077	0.085	0.082	0.066	0.068	0.062	0.060
LAT-CAR	0.125	0.129	0.132	0.118	0.117	0.110	0.144
AFRICA	0.117	0.128	0.115	0.109	0.111	0.107	0.126
ASIA-HI	0.095	0.106	0.103	0.072	0.080	0.068	0.073
Source: own calculations							

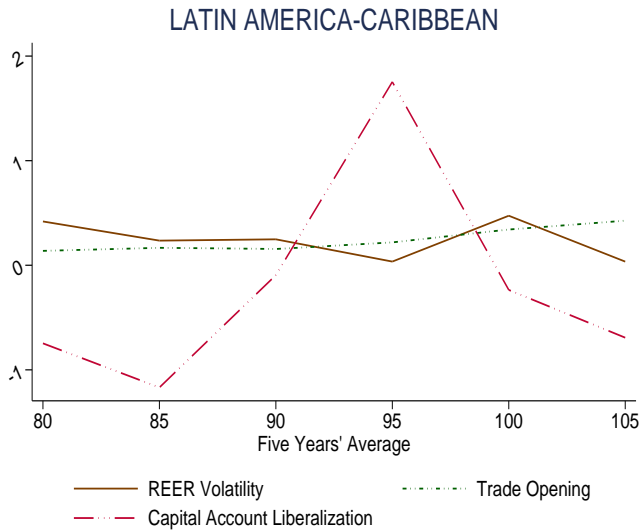
# Clear Contrast for the Different Groups

## Real Effective Exchange Rate Volatility Group Analysis



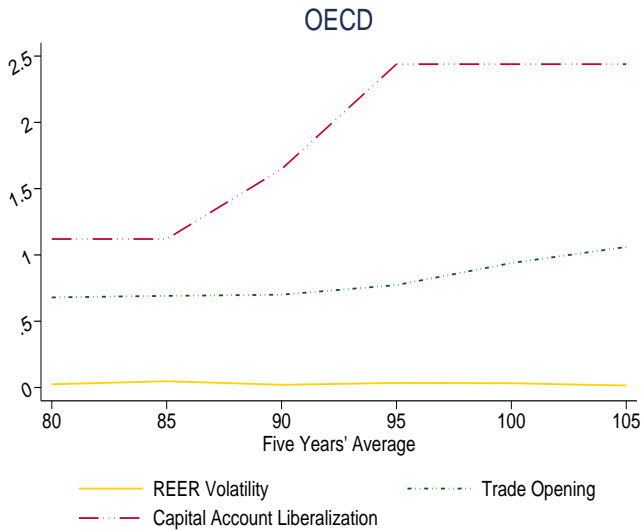
Source: own calculations

# LAT-CAR Performance Against Different Policies



Source: own calculations

# OECD Performance Against Different Policies



Source: own calculations



# Some Comments About the Evidence Found

- Mixed results. Some group of countries suffered premature opening (LAT-CAR), whereas others were more successful (OECD).

# Some Comments About the Evidence Found

- Mixed results. Some group of countries suffered premature opening (LAT-CAR), whereas others were more successful (OECD).
- Prudential policies are more likely to succeed, rather than premature liberalization of capital account.
- No matter how we group the sample of countries, all of the fundamentals as well as the institutional variables were highly correlated to our main variable.

# Some Comments About the Evidence Found

- Mixed results. Some group of countries suffered premature opening (LAT-CAR), whereas others were more successful (OECD).
- Prudential policies are more likely to succeed, rather than premature liberalization of capital account.
- No matter how we group the sample of countries, all of the fundamentals as well as the institutional variables were highly correlated to our main variable.
- However, is there a way to measure the Institutional channel? Let's check it out...

# The Institutional Approach

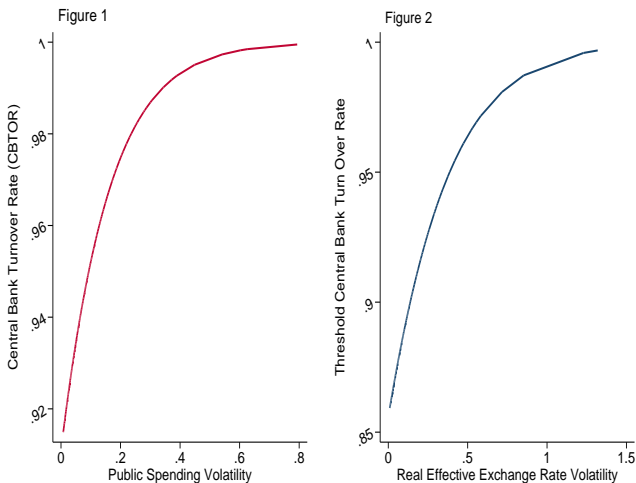
- Central Bank Independence (CBI) is paramount to avoid monetary policy misalignments since it may prevent fiscal dominance. (Cukierman, Webb, Neyapti)
- De Facto and De Jure Independence are variables that may help to measure the impact of monetary policy over REER volatility.

# The Institutional Approach

- Central Bank Independence (CBI) is paramount to avoid monetary policy misalignments since it may prevent fiscal dominance. (Cukierman, Webb, Neyapti)
- De Facto and De Jure Independence are variables that may help to measure the impact of monetary policy over REER volatility.
- What impact can a higher (lower) respect for political and civil rights have?
- By using data from the Freedom House, we can create a country Risk-Premium variable normalized between 0 and 1 that can be regarded as a proxy of confiscatory risk.

# The Importance of the Central Bank

## Central Bank Independence Full Sample: Five Years' Average (1980-2010)

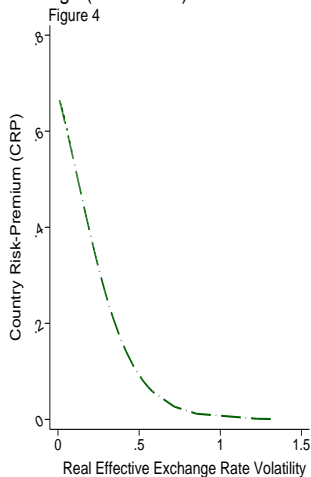
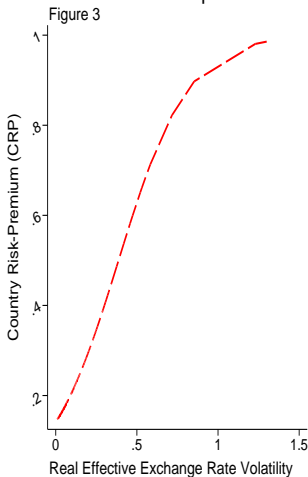


Source: own calculations

# The Importance of the Country Risk-Premium

## Real Effective Exchange Rate vs Country Risk-Premium

Full Sample: Five Years' Average (1980-2010)



Source: own calculations

# Dynamic Panel Estimation

## Strategy

- Estimate the following equation:

$$Y_{it} = \gamma Y_{it-1} + \eta X_{it} + \psi F_{it} + \delta Z_{it} + \varepsilon_{it} + \mu_{it} \quad (1)$$

- Remark:
  - Dependent Variable (REER volatility) may change across time.
  - We have to deal with unobserved heterogeneity between countries.
  - We must control for endogeneity issues (i.e. reverse causality).
  - Therefore, the A-B approach is adequate to estimate equation (1).



# Two Step Arellano-Bond Regressions (System)

Full Sample 80 Countries: Five Years Average for 1980-2010						
Dependent Variable: Real Effective Exchange Rate Volatility ( $\sigma$ )						
Explanatory Variables	Full Panel Regressions		Regressions by Groups			
	Model [I]	Model [II]	OECD	LAT-CAR	AFRICA	ASIA-HI
$\sigma_{t-1}$	0.221*** (3.15)	0.208** (2.13)	-0.794*** (-5.41)	0.364*** (3.39)	0.409** (2.63)	-0.772** (-2.42)
BSE	-0.006 (-0.41)	-0.001 (-0.08)	0.001 (0.11)	-0.005 (-0.22)		0.118* (2.04)
$\Delta M2$	0.019 (1.42)	0.020* (1.83)		0.081** (2.85)	0.162** (2.45)	
$\Delta TT$	-0.706* (-1.71)	-0.419 (-1.63)	0.954** (2.43)	-1.217*** (-4.28)		-0.008 (-0.02)
$\Delta AWP$	0.056 (0.21)	0.123 (0.34)				
$\delta PS$	0.418*** (3.13)	0.344*** (3.00)	-0.428** (-2.85)	0.550** (2.18)		0.085 (0.19)
O	-0.042** (-2.57)	-0.018 (-1.44)	-0.033*** (-3.04)	0.110* (1.98)	-0.096*** (-3.18)	-0.055** (-2.64)
FI1	-0.025* (-1.97)		-0.030*** (-2.78)	2.701*** (3.10)		
FI2	0.009* (1.97)		0.011*** (2.77)	0.069* (2.01)	0.068** (2.79)	0.003** (2.38)
NFA				0.000[1] (1.51)		
$\Omega$	0.813*** (2.72)	0.674** (2.52)		2.501*** (4.21)	0.125 (0.34)	0.467 (1.61)
$\zeta_{Free}$	-0.028* (-1.81)		-0.101*** (-5.00)			-0.098** (-2.98)
$\zeta_{Not Free}$		0.052* (1.80)		0.001 (0.00)	0.013 (0.54)	
Err					0.055** (2.10)	0.040** (2.89)
Constant	0.023 (0.94)	0.014 (0.85)	0.140*** (4.18)	-0.199*** (-5.30)	-0.295*** (-3.12)	
Observations	264	264	73	76	107	50
Countries	80	80	29	17	22	12
AR(1) Test	0.017	0.024	0.060	0.051	0.048	0.000
AR(2) Test	0.154	0.163	0.463	0.154	0.512	0.514
Sargan Test	0.131	0.071	0.143	0.080	0.975	0.103
Hansen Test [2]	0.277	0.504	0.952	1	0.544	1

Note: t-statistics in parentheses, \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

[1] The real coefficient of NFA is (0.0000005421), therefore it is highly insignificant.

[2] If the p value of this test (with a Chi2 distribution) is closed to 1, it will not compromise consistency of the estimator.

# Results

- It can be observed that volatility not only depends on its fundamentals (i.e. PS, TT, O, among others), but also Institutions and Financial Integration fulfil an important role.
- Currency Crisis (i.e. compulsory devaluations) had a positive and significant effect, particularly for the LAT-CAR group. Nonetheless, for the OECD countries the variable was not significant at all.
- A lower Country Risk-Premium (given by a higher respect of political and civil rights) signified a fall of 10.59% in REER volatility for OECD countries and 10.26% for Asian-High Income countries.
- Conversely, a higher Country Risk-Premium increased 5.32% REER volatility for the full sample.
- If we group the countries according to their per-capita income, the institutional variables will remain significant.

# Conclusions I

Institutions fulfil an important role since...

# Conclusions I

Institutions fulfil an important role since...

- A higher respect for political and civil rights indicates a lower Country Risk-Premium, hence, a lower likelihood of REER volatility increments, since the investors will be more likely to sink physical capital onto the economy.
- Conversely, a lower respect of political and civil rights denotes a higher Country Risk-Premium; thus, the likelihood of increments in REER volatility will be higher.

# Conclusions I

Institutions fulfil an important role since...

- A higher respect for political and civil rights indicates a lower Country Risk-Premium, hence, a lower likelihood of REER volatility increments, since the investors will be more likely to sink physical capital onto the economy.
- Conversely, a lower respect of political and civil rights denotes a higher Country Risk-Premium; thus, the likelihood of increments in REER volatility will be higher.
- Central Bank Independence should be regarded with more caution since...

# Conclusions I

Institutions fulfil an important role since...

- A higher respect for political and civil rights indicates a lower Country Risk-Premium, hence, a lower likelihood of REER volatility increments, since the investors will be more likely to sink physical capital onto the economy.
- Conversely, a lower respect of political and civil rights denotes a higher Country Risk-Premium; thus, the likelihood of increments in REER volatility will be higher.
- Central Bank Independence should be regarded with more caution since...
  - It is a potential source of fiscal dominance.
  - It measures the degree of independence of the Central Bank Governor from the executive power.
  - While the analysis is only based on the 'De Facto' definition, it is interesting to evaluate its impact, particularly for LAT-CAR countries.

# Conclusions II

As for the fundamentals, it is important to highlight that...

# Conclusions II

As for the fundamentals, it is important to highlight that...

- The most powerful instrument to reduce volatility is trade opening, since in both regressions (i.e. groups or per-capita income), its sign was negative and significant at 1%.
- Financial Integration and Capital Account Liberalization generate mixed effects. On the one hand, they foster stability and discipline while on the other, they can enhance public spending volatility.



# Conclusions II

As for the fundamentals, it is important to highlight that...

- The most powerful instrument to reduce volatility is trade opening, since in both regressions (i.e. groups or per-capita income), its sign was negative and significant at 1%.
- Financial Integration and Capital Account Liberalization generate mixed effects. On the one hand, they foster stability and discipline while on the other, they can enhance public spending volatility.
- Accordingly, it would be desirable to apply prudential policies regarding capital account liberalization, since 'the prints from the past' due to bad political decisions may generate scenarios with more volatility.

# How was the Argentinian Performance?

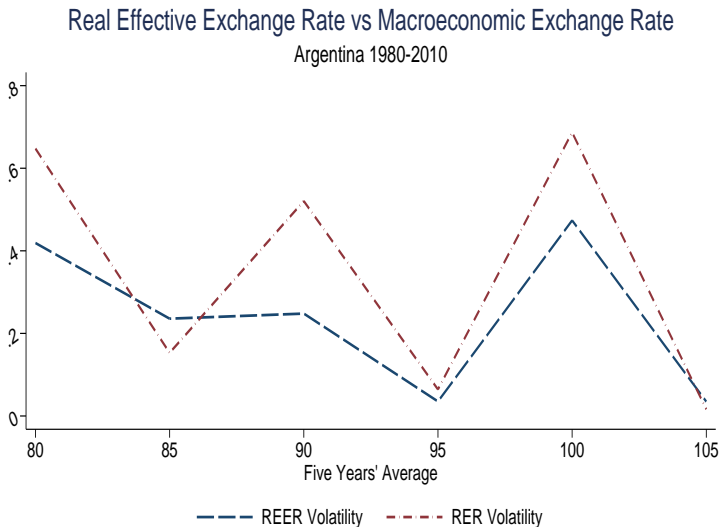
- Assuming that REER follows the movements of RER, we can evaluate the Argentinian performance for the span of 1980-2010. Where:
- $$RER = \frac{NER^{ARG} * WPI^{US}}{CPI^{ARG}}$$

**Table 4: REER vs RER Volatility (Five Years' Average)**

	80	85	90	95	100	105	<i><b>Total</b></i>
REER	0.419	0.236	0.248	0.035	0.474	0.034	0.241
RER	0.648	0.153	0.521	0.064	0.687	0.016	0.348

Source: own calculations

# Real Effective Exchange Rate vs Real Exchange Rate

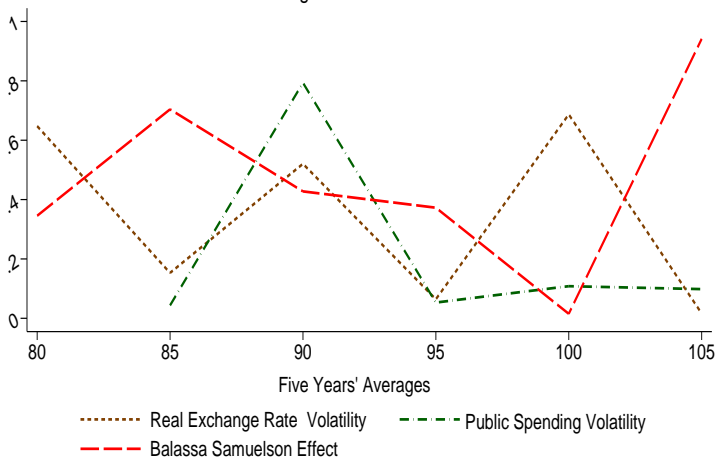


Source: own calculations

# The Fundamentals and its impacts over Volatility

## Real Exchange Rate Volatility vs Domestic Shocks

Argentina: 1980-2010



Source: own calculations

# Some comments About Argentina

- There is a converse relationship between the Balassa-Samuelson Effect (BSE) and RER volatility.

# Some comments About Argentina

- There is a converse relationship between the Balassa-Samuelson Effect (BSE) and RER volatility.
  - The higher the volatility of annual growth rate of real gdp (BSE) was, the lower RER volatility. In other words, its internal purchasing power (i.e. its level) was also lower. (Average 85)

# Some comments About Argentina

- There is a converse relationship between the Balassa-Samuelson Effect (BSE) and RER volatility.
  - The higher the volatility of annual growth rate of real gdp (BSE) was, the lower RER volatility. In other words, its internal purchasing power (i.e. its level) was also lower. (Average 85)
  - The lower the volatility of annual growth rate of real gdp (BSE) was, the higher RER volatility. Hence, its internal purchasing power was higher. (Averages 100-105)

# Some comments About Argentina

- There is a converse relationship between the Balassa-Samuelson Effect (BSE) and RER volatility.
  - The higher the volatility of annual growth rate of real gdp (BSE) was, the lower RER volatility. In other words, its internal purchasing power (i.e. its level) was also lower. (Average 85)
  - The lower the volatility of annual growth rate of real gdp (BSE) was, the higher RER volatility. Hence, its internal purchasing power was higher. (Averages 100-105)
- Accordingly, the higher the real wages, the more costly in real terms the economy becomes. Hence, the government feels the temptation of using 'devaluations' as an instrument to enhance the production of T goods to compensate the BT deficits. This situation may lead to a higher RER volatility scenarios.
- It can be inferred that one of the major sources of volatility comes from changes in productivity (BSE).



# More Insights

- Q1: Yet...Are there more channels in which volatility propagates? How can we tackle Financial Policies and Capital Account Liberalization in Argentina? As Avila puts it, is there an antidote against the Argentinian risk?
- Q2: Can we measure the welfare loss of Argentinian volatility? Does currency manipulation generate a substitution or income effect?
- Q3: Is it possible that a policy randomly hits the target of a lower volatility?

# Thanks!

email: [scaram14@cema.edu.ar](mailto:scaram14@cema.edu.ar)