Exchange Rate Undervaluation and Economic Growth: The Trade- versus The Financial Risk Channel

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Debate on impact of Exchange Rate Misalignment on growth

Real exchange rate misalignment (overvaluation and undervaluation) is bad for growth

Traditional View (Washington Consensus Williamsons 1990)

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Though overvalued exchange rate hurt growth, undervalued exchange rate promotes it

Rodrik, 2008

Financial risk channel is also important in that exchange rate depreciation weakens the balance sheet of the borrower (government or corporate sector) whose liabilities expand relative to assets. This hurts growth

Hofmann et al. (2017)

We contribute to this debate by:

❖ Empirically examining the impact of these channels in the panel growth-regression framework proposed by Rodrik (2008)

❖ Main contribution lies in introducing the financial risk channel captured by the fraction of the sovereign risk-premium that is predicted by exchange rate volatility of the currency which has the dominant share in the external liability

❖ In addition, we have also ascertained the negative impact of overvalued exchange rate on growth

❖ Lastly, we also studied the impact of exchange rate regimes on growth

Methodology:

❖ We use the following modified version of Rodrik (2008) framework and estimate a fixed effect model.

$$Growth_{it} = \alpha + \beta \ln(RGdph_{it-1}) + \delta Underval_{it} + \gamma \widehat{Spread}_{it-1} + f_t + f_i + \mu_{it}$$

where :

Growth: percentage change in real GDP per capita on purchasing power parity basis

RGdph: *Real GDP per capita* on purchasing power parity basis

Underval: the extent of estimated undervaluation

Spread: Sovereign Risk Premium

Ft: time fixed effects,
Fi: is the country fixed effect

Other controls:
i. Government consumption/GDP
ii. Terms of Trade
iii. Inflation
iv. Gross domestic savings /GDP
v. Fuel imports to exports
vi. External debt to GDP
vii. Net Capital inflows

Data

❖ Data Sources:

      Penn World Tables version 9,

      World Development Indicators,

      International Monetary Fund,

❖ Data Coverage:

    A panel of High and middle (both upper and lower) income countries as per the World Bank classification

    5-years average from 1950-2014

Data conti...

Measurement of undervaluation

❖ Real exchange rate is defined as:

$$RER_{it} = ln\left(\frac{XRAT_{it}}{PPP_{it}}\right)$$

❖ *Where* XRAT and PPP are expressed as national currency units per U.S. dollar.

❖ *Real exchange rate is adjusted for productivity differential (*Balassa-Samuelson effect)

$$\ln(RER_{it}) = \alpha + \beta\, ln(RGDPCH_{it}) + f_t + \mu_{it}$$

❖ **Undervaluation** is computed as:

$$underval_{it} = \ln(RER_{it}) - \ln(\widehat{RER}_{it})$$

Data conti...

Measurement of sovereign risk premium

i. The sovereign spread between yield on six-month local currency sovereign bond and yield on the corresponding sovereign bond of the U.S

ii. Two step procedure is followed to refine the measure of risk premium:

    a. This sovereign spread is regressed on its own lag, the bilateral exchange rate volatility and a set of control variables

$$Spread_{it} = \alpha_i + \beta spread_{it-1} + \delta \sigma_{it}^{er} + \gamma Z_{it} + \epsilon_{it}$$

    a. we use fraction of the sovereign risk-premium that is predicted by exchange rate volatility of the currency which has the dominant share in the external liability

$$\widehat{Spread_{it}} = \widehat{\alpha_i} + \widehat{\beta} spread_{it-1} + \widehat{\delta} \sigma_{it}^{er}$$

Results: Financial Risk Channel short circuit the undervaluation positive impact

Estimates of the Effect of Undervaluation on Growth (Fixed Effects)

VARIABLES	Aggregate			Middle Income		
	(1)	(2)	(3)	(4)	(5)	(6)
Log of initial income	-0.0750***	-0.103***	-0.112***	-0.0876***	-0.120***	-0.129***
	(0.00537)	(0.0103)	(0.0102)	(0.00723)	(0.0130)	(0.0115)
Log of undervaluation	**0.0396***	**0.0401***	**0.0196**	**0.0494***	**0.0383**	**-0.00129**
	(0.00740)	**(0.0118)**	**(0.0132)**	**(0.0104)**	**(0.0157)**	**(0.0157)**
Lag of Financial risk			**-0.278***			**-0.425***
			(0.0882)			**(0.310)**
Observations	844	326	268	473	168	155
R-squared	0.312	0.354	0.466	0.387	0.504	0.495
Number of countries	174	82	81	89	39	37

Results: Financial Risk Channel also short circuit the saving channel

Estimates of the Effect of Undervaluation on components of GDP (Fixed Effects)–Middle Income

VARIABLES	consumption	consumption	Investment	investment	Savings	Savings
Log of initial income	-0.0687**	-0.0234	-0.0320**	-0.0487**	0.0215***	0.0233***
	(0.0290)	(0.0397)	(0.0154)	(0.0223)	(0.00214)	(0.00183)
Log of undervaluation	**-0.115***	**-0.206***	**-0.0347****	**-0.0445***	**0.00823***	**0.00193**
	(0.0327)	**(0.0471)**	**(0.0173)**	**(0.0265)**	**(0.00241)**	**(0.00217)**
Lag of Financial risk		**1.273***		**-0.501**		**-0.158***
		(0.742)		**(0.417)**		**(0.0342)**
Observations	233	161	233	161	233	161
R-squared	0.161	0.301	0.170	0.204	0.923	0.976
Number of countries	41	38	41	38	41	38

Results: robust to endogeniety

Generalized Method of Moments Estimates of the Effect of Undervaluation on Growth

VARIABLES	Developing		
	Growth	Growth	Growth3
Log of undervaluation	**0.0291***	**0.0148***	**-0.00304**
	(0.00618)	**(0.00346)**	**(0.00925)**
Log of initial income	-0.0137***	-0.0200***	-0.0103***
	(0.00222)	(0.00130)	(0.00116)
Financial risk			**-1.049***
			(0.282)
Hansen test of over identifying restrictions	.032	.246	.831
Observations	1,110	296	249
Number of cross	119	52	51

Results: robust to alternate measure of undervaluation

	Impact of Undervalued Exchange Rate on Growth					
	Aggregate Panel			Middle Income		
VARIABLES	growth	growth	growth	growth	growth	growth
Log Initial Income	-0.0732***	-0.0895***	-0.103***	-0.0942***	-0.121***	-0.115***
	(0.00312)	(0.00644)	(0.00835)	(0.00502)	(0.0102)	(0.0142)
Log of Undervaluation (new)	**0.0471***	**0.0393***	**0.0236***	**0.0594***	**0.0417***	**-0.00950**
	(0.00290)	**(0.00606)**	**(0.00804)**	**(0.00432)**	**(0.00902)**	**(0.0136)**
Log of Financial Risk			**-0.145***			**-0.102**
			(0.0842)			**(0.240)**
Constant	0.564***	0.720***	0.880***	0.700***	0.952***	1.000***
	(0.0239)	(0.0518)	(0.0678)	(0.0373)	(0.0821)	(0.111)
Observations	1,689	567	411	822	233	161
R-squared	0.325	0.330	0.359	0.424	0.511	0.531
Number of cross	179	88	84	90	41	38

Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Results: financial sector development is another robust check

VARIABLES	(1) growth	(2) growth	(3) growth	(4) growth
Initial Income	-0.0750***	-0.0771***	-0.0763***	-0.0738***
	(0.00537)	(0.00600)	(0.00601)	(0.00583)
undervaluation	**0.0396***	**0.0477***	**0.0617***	**0.0598***
	(0.00740)	**(0.00831)**	**(0.0113)**	**(0.0112)**
Financial development (IMF)		**0.0519***	**0.0505**	
		(0.0308)	**(0.0307)**	
Financial Dev * undervaluation			**-0.0806***	**-0.0824***
			(0.0439)	**(0.0440)**
	(4.49e-05)	(4.63e-05)	(4.62e-05)	(4.63e-05)
Constant	0.608***	0.609***	0.601***	0.592***
	(0.0444)	(0.0482)	(0.0483)	(0.0480)
Observations	844	705	705	705
R-squared	0.312	0.323	0.327	0.324
Number of cross	174	141	141	141

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
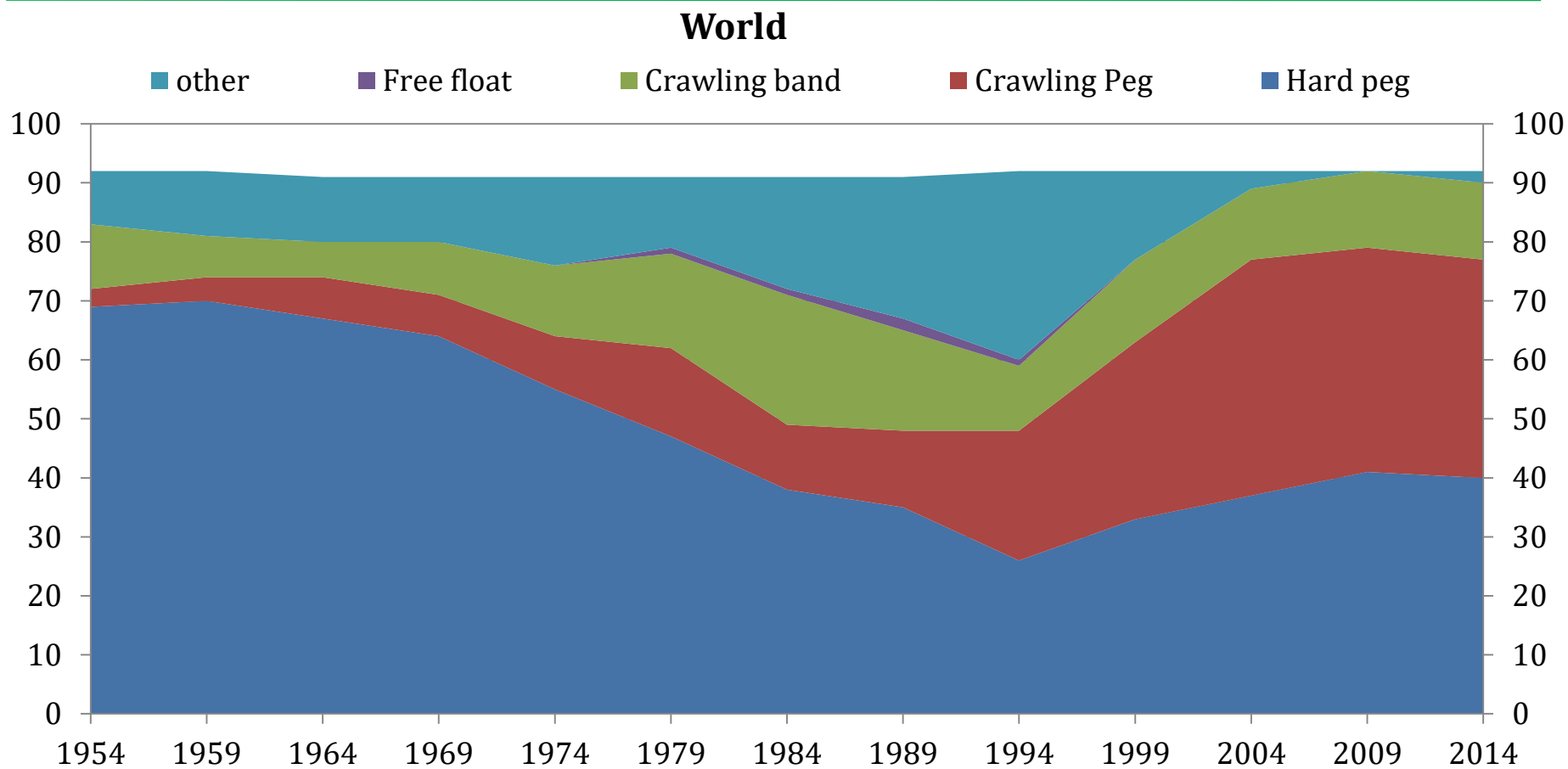
Results: overvalued exchange rate is also bad

Impact of overvalued Exchange Rate on Growth

VARIABLES	Aggregate	Middle Income
Log of Initial Income	-0.0732***	-0.0942***
	(0.00312)	(0.00502)
Overvaluation	**-0.0471***	**-0.0594***
	(0.00290)	**(0.00432)**
Constant	0.564***	0.700***
	(0.0239)	(0.0373)
Observations	1,689	822
R-squared	0.325	0.424
Number of cross	179	90

Impact of Overvalued Exchange Rate on Composition of Growth of Middle Income Countries

| VARIABLES | Share of | | |
	agriculture	industry	services
Log of initial income	-0.843	-3.844	4.705*
	(2.777)	(2.358)	(2.748)
Overvaluation dummy	**-3.114**	**-1.009**	**4.068****
	(1.971)	**(1.674)**	**(1.951)**
Constant	32.76	54.12***	12.99
	(23.93)	(20.33)	(23.69)
Observations	154	154	154
R-squared	0.088	0.114	0.089
Number of cross	38	38	38

There is strong support for disastrous impact of overvalued exchange rate on growth (Razin and Collins1997, Johnson Ostry, and Subramanian 2007, Rajan and Sunramanlan, 2006, Easterly, 2005).
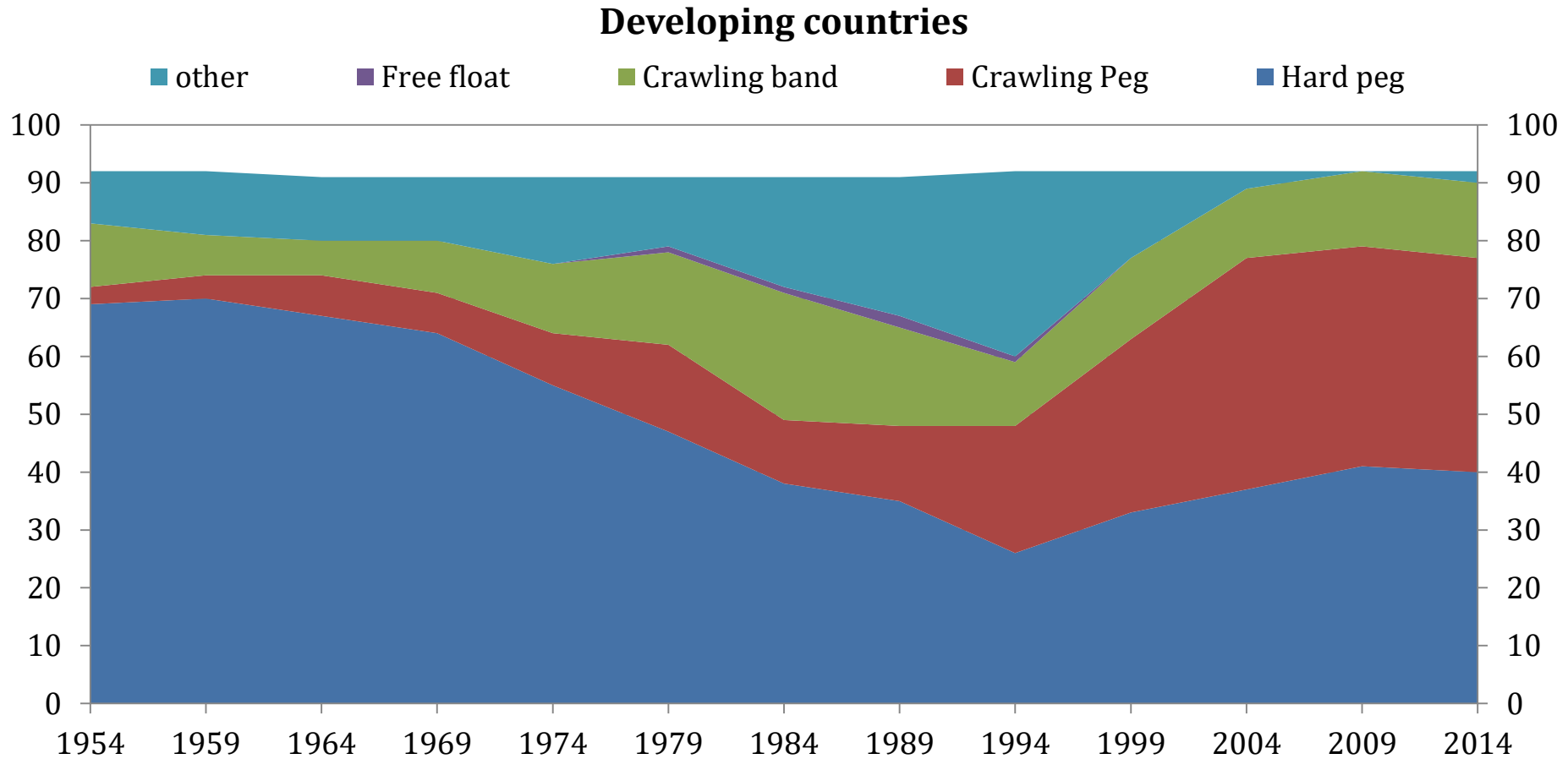
Policy implication

Allow greater flexibility in exchange rates so that it does not deviate from its fundamentals in the medium term
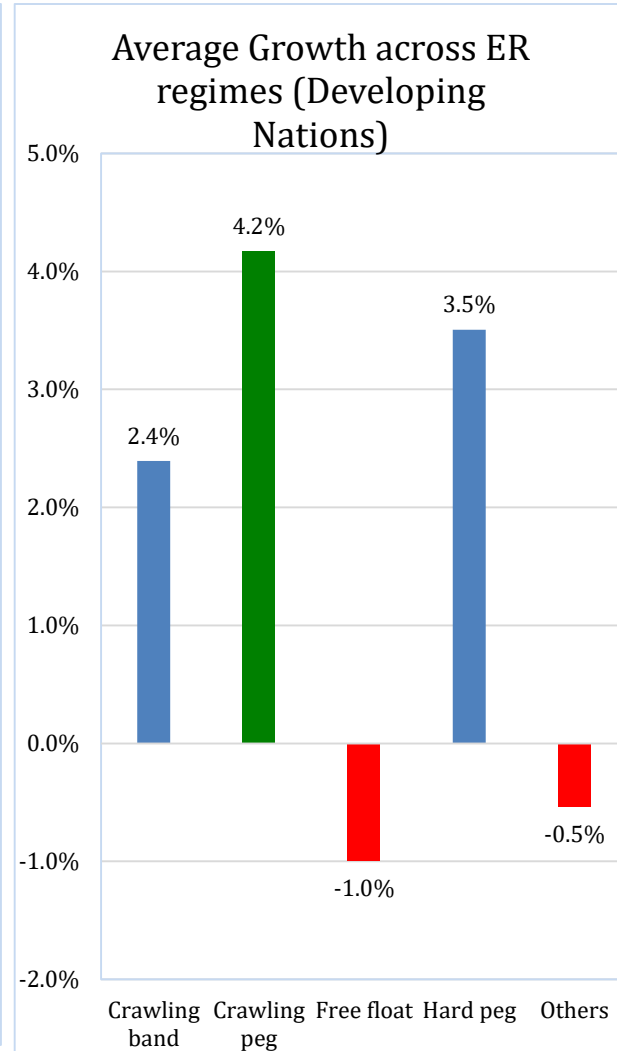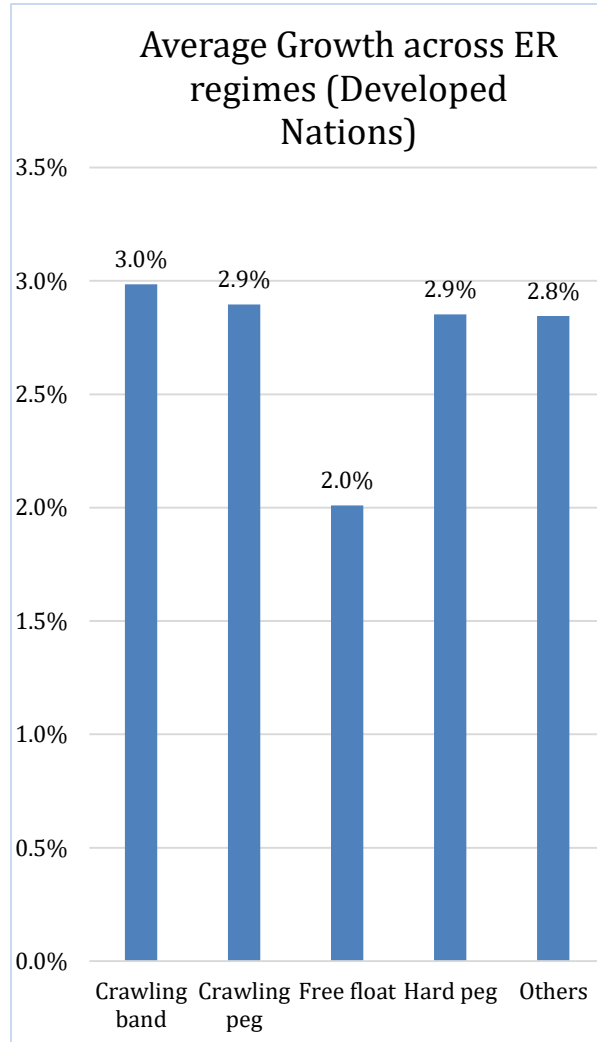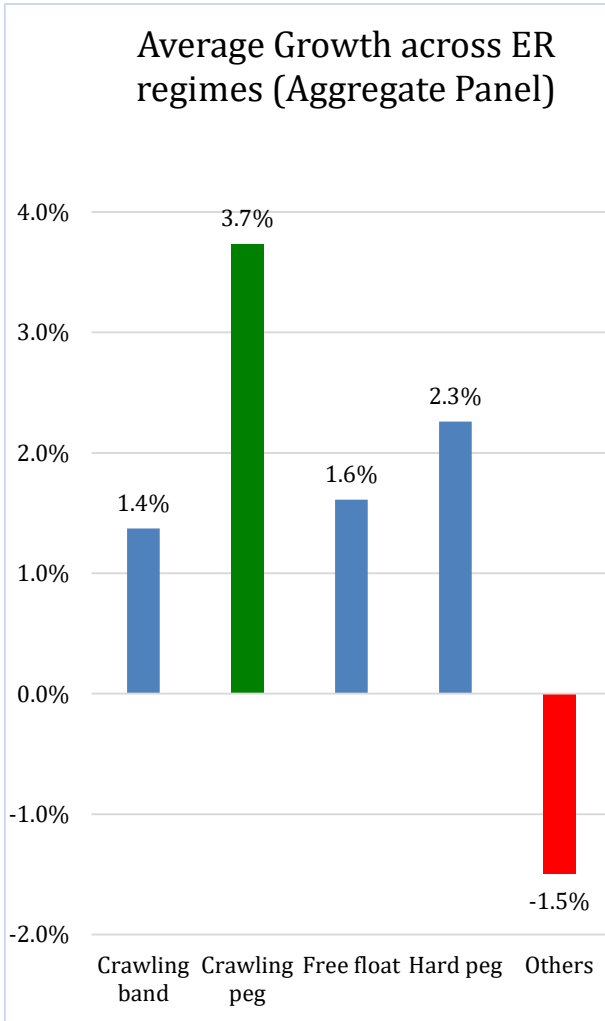
Policy implication: Greater flexibility in exchange rate that does not necessarily mean free float

World
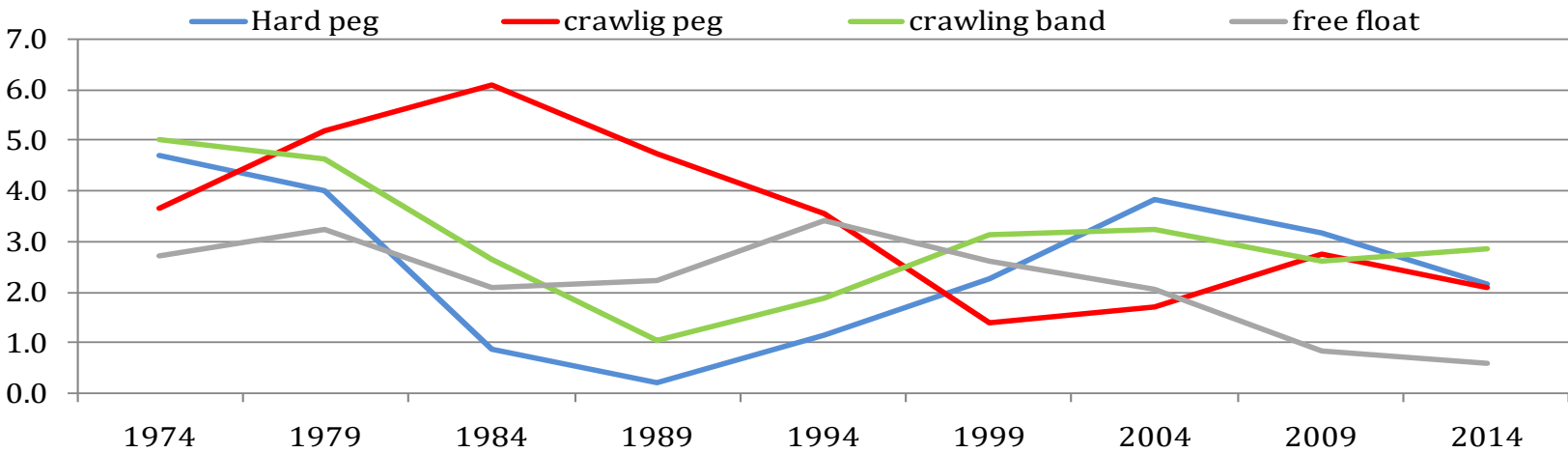
Policy implication: Greater exchange rate flexibility cont---

Developing countries

Legend: other · Free float · Crawling band · Crawling Peg · Hard peg

43% 40% 14% 0% 2%

Policy implication: Average growth is high in crawling peg countries

Average Growth across ER regimes (Aggregate Panel)

- Crawling band: 1.4%
- Crawling peg: 3.7%
- Free float: 1.6%
- Hard peg: 2.3%
- Others: -1.5%

Average Growth across ER regimes (Developed Nations)

- Crawling band: 3.0%
- Crawling peg: 2.9%
- Free float: 2.0%
- Hard peg: 2.9%
- Others: 2.8%

Average Growth across ER regimes (Developing Nations)

- Crawling band: 2.4%
- Crawling peg: 4.2%
- Free float: -1.0%
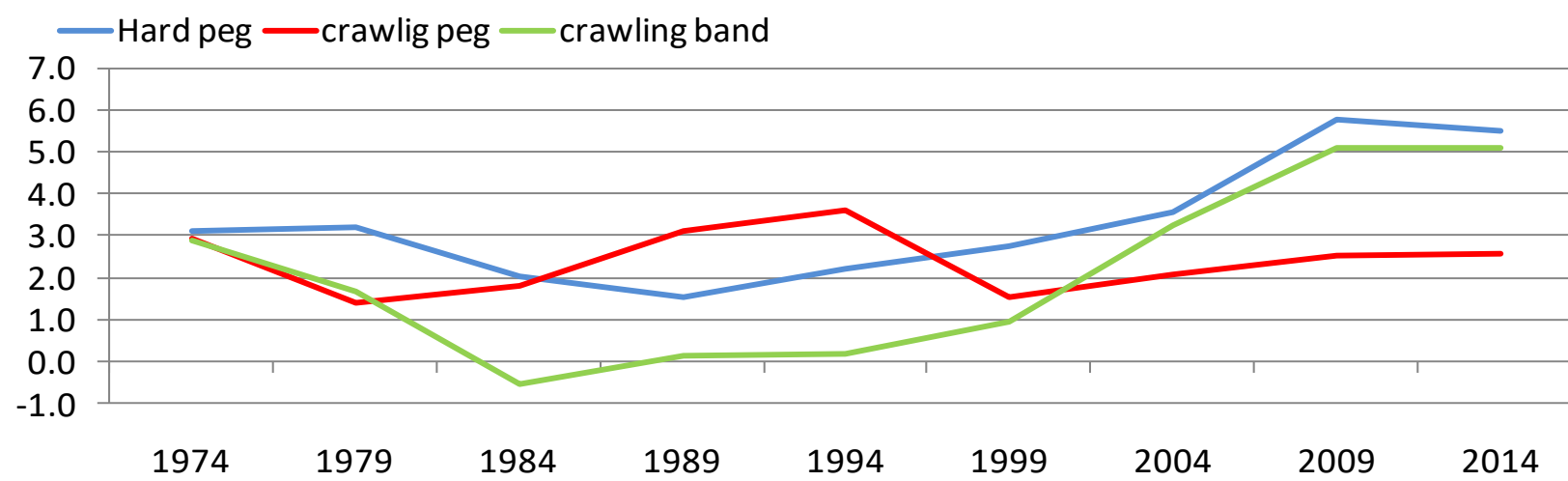- Hard peg: 3.5%
- Others: -0.5%

Policy implication: In recent decade, ER flexibility (crawling bands) is associated with better growth
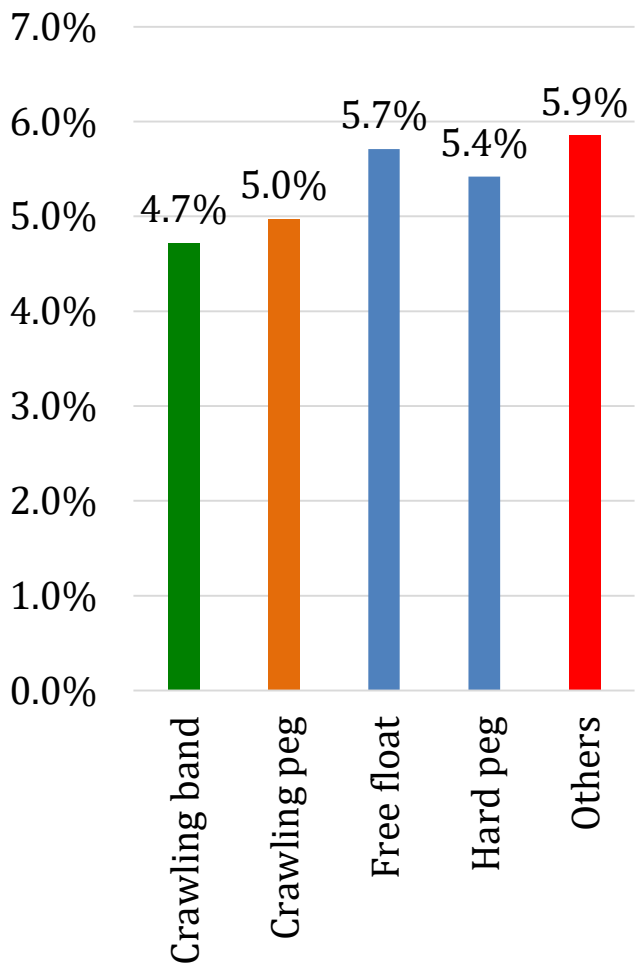
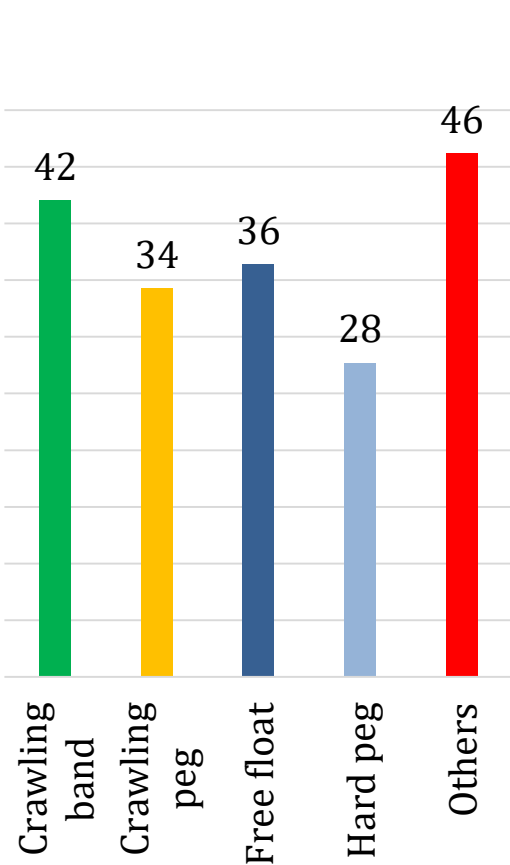**High Income Countries**

Middle Income Countries

Policy implication: greater exchange rate flexibility (crawling band) is good for low growth uncertainty and industrialization
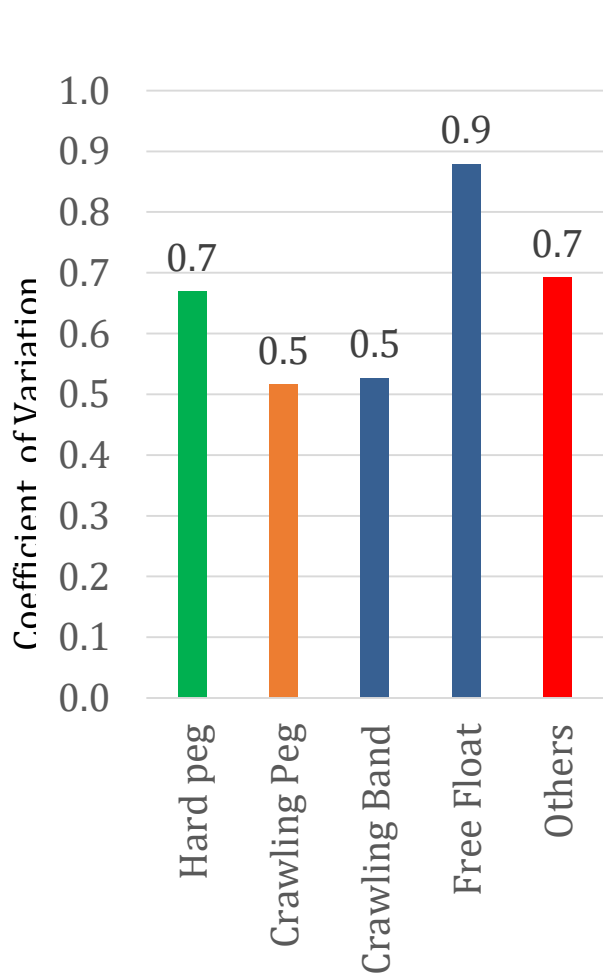
Growth Volatility

- Crawling band: 4.7%
- Crawling peg: 5.0%
- Free float: 5.7%
- Hard peg: 5.4%
- Others: 5.9%

Share of industry in GDP

- Crawling band: 42
- Crawling peg: 34
- Free float: 36
- Hard peg: 28
- Others: 46

Inflation Volatility Across Exchange Rate Regimes

Coefficient of Variation

- Hard peg: 0.7
- Crawling Peg: 0.5
- Crawling Band: 0.5
- Free Float: 0.9
- Others: 0.7

Policy implication: Greater ER Flexibility (Crawling peg, Crawling Bands) are better

VARIABLES	Impact of Exchange Rate Regime on Growth –Whole Sample	
	Whole Sample	Middle Income
Initial income	-0.00189*	-0.00932***
	(0.00114)	(0.00266)
Crawling peg	0.0119***	**0.00887***
	(0.00363)	(0.00499)
Crawling band	-0.00165	-0.00975
	(0.00394)	(0.00601)
Free Float	-0.0102	-0.182***
	(0.00900)	(0.0416)
Constant	0.0400***	0.111***
	(0.0102)	(0.0225)
Observations	1,286	649
R-squared	0.052	0.122

VARIABLES	Impact of Exchange Rate Regime On Industrial Share in GDP (Middle Income)	
	(1)	(2)
Initial income	3.136***	2.305***
	(0.720)	(0.770)
Crawling peg	2.584*	**4.063***
	(1.350)	(1.462)
Crawling band	5.613***	**5.569***
	(1.611)	(1.666)
Free Float	-2.224	-2.226
	(9.416)	(9.278)
Govt. Consumption		7.047***
		(1.466)
Constant	1.065	-10.55
	(6.037)	(7.035)
Observations	450	408
R-squared	0.091	0.119

Conclusion

❖ In the medium term, keeping the exchange rate away from its fundamentals in either direction does not help promote growth

❖ Allow greater flexibility in exchange rates

❖ However, being exposed to shocks such as reversal of capital inflows and fluctuation in global commodity prices, developing countries should still mange excessive volatility in exchange rate.

❖ Following either crawling peg or crawling band regimes seems better option to address unwarranted volatility in exchange rate and gradually move their currencies toward equilibrium in the medium term

Thank You For Your Patience

Rodrik: undervaluation boosts growth through Trade Channel

❖ In the developing countries, **Institutional weaknesses** and **product market failures** disproportionately affect the tradable sector.

❖ Sustained real exchange rate depreciation increases the relative profitability of investing in tradable, and act as subsidy (in the second best fashion) to alleviate the economic costs of these distortions

❖ Encouraging impact of depreciated exchange rate on exports sector **stimulates growth through positive externalities such as learning by doing effects and technology spillovers**

❖ Gluzmann et al (2012) argue that depreciated real exchange rate passes-through to domestic prices that **reduce the real wages of households**. This **redistributes the income** from low income households to high income households. Higher propensity to save of the latter increases the domestic savings that stimulate growth by increasing the supply of loanable funds for financially constrainted firms. This channel is likely to be **more effective for the saving constrained economies.**

Hofmann: depreciated (undervalued) exchange rate hurts growth through financial risk channel

❖ In case of currency mismatch for the borrowers, **exchange rate depreciations weaken the balance sheet of borrowers whose liabilities increase relative to assets.** This **reduces the net worth** of these firms and raises the costs of external funding. **Increase in risk premium** tightens supply of credit to financially constrain borrowers that, in turn, dampens economic growth

❖ Adverse shock like exchange rate depreciation to net worth of the financially constrained firm **worsens the asymmetric information problem** and these firms have to pay **extra premium for getting credit**. This adversely impact business spending leading to contractionary impact on growth

❖ In emerging economies, exchange rate depreciation has **greater pass-through on domestic prices due to high inflation environment and relatively less independent monetary authorities. High inflation may add to risk premium** having adverse impact on economic growth

❖ Expectations of sustained exchange rate depreciations reverses capital flows that has contractionary impact on growth