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Pick Your Poison: The Choices and Consequences of Policy Responses to Crises

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Pick Your Poison: The Choices and Consequences of Policy Responses to Crises

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IMF Annual Research Conference
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11/08/2013

Motivation

- What are the costs and benefits of different policy responses to crises?
 - Stan Fischer’s “Lessons of the Global Crisis” (2011) and Robbins lectures (2001)
 - Several papers today: (Obstfeld; Alvarez & De Gregorio; Vuletin and Vegh; Chari and Henry)
- Long-standing debates
- Econometric issues create challenges for empirical assessment
 - Selection bias
 - Endogeneity

This Paper

- **Key question: What are the effects of different policy responses to crises?**
 - Document determinants and incidence of 4 policy responses:
 - Major reserve sales
 - Large currency depreciations
 - Substantial interest rate increases
 - New controls on capital outflows
 - Assesses impact on 3 outcomes:
 - GDP growth
 - unemployment
 - Inflation
 - **Addresses econometric challenges (selection bias, endogeneity) using propensity-score matching methodology**

This Paper: Key Results

- Major reserve sales and currency depreciations boost GDP growth relative to counterfactual
 - But growth benefits lagged and initial effect is slower GDP growth
 - Generates higher inflation (especially after depreciations)
 - Weaker benefits in EMs (especially for reserve sales)
- Increased interest rates and controls on capital outflows have particularly negative effects
 - Sharp and significant decreases in GDP growth
 - No significant improvement in inflation or unemployment over 6 quarter window
- Countries must “pick their poison”

Comments Today

- Major policy responses during crises
- Propensity-score methodology
- Key Results

Defining “Major” Policy Responses

- Data set: 85 countries , quarterly data for 1997-2001 and 2007-2011
- Focus on policy responses to contraction in global capital flows
 - Nimble policies
 - Large and infrequent actions
 - Define thresholds so occur in 5% of country-quarter observations during crises
- Four policy responses:
 - **Major reserve sales**: 24% ↓ in international reserves (ex. gold) vs. previous yr
 - Reserve/GDP ratio > 10%
 - **Large currency depreciations**: 23% depreciation in US\$ exchange rate over qtr
 - Inflation <20% in previous quarter
 - **Substantial increase in interest rates**: 244 bp ↑ in policy interest rate over past yr
 - Inflation <20% in quarter
 - **New capital controls**: new controls on capital outflows over past year
 - About 3% of country-year observations
 - Based on Klein (2012) and IMF’s AREARs dummy variables

Incidence of Responses

Figure 1a
Number of Countries
Adopting Each Policy, 1997-2001

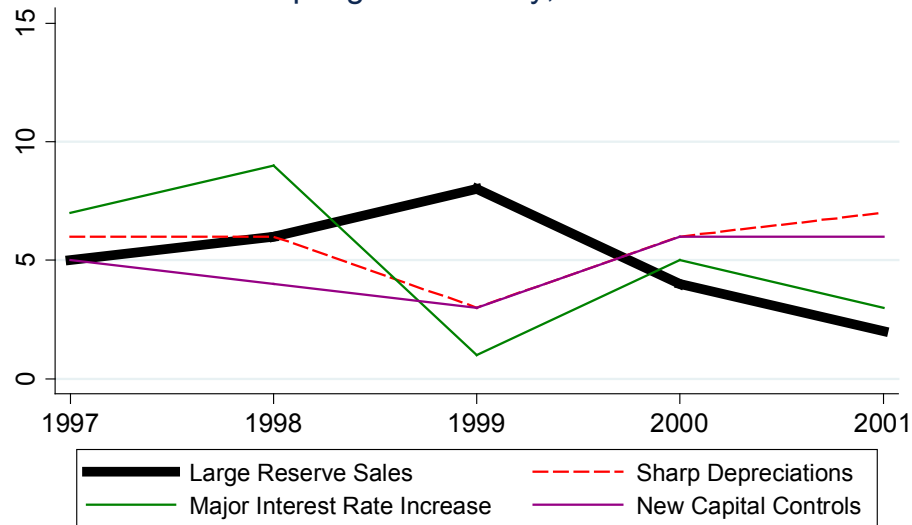
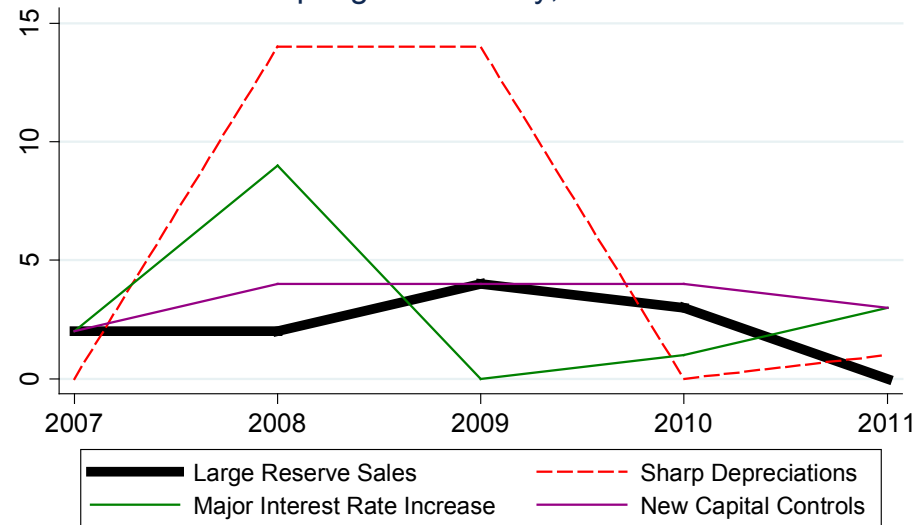


Figure 1b
Number of Countries
Adopting Each Policy, 2008-2011



- Only 1 type of policy usually chosen
 - 80% during 1997-2001 and 88% during 2007-2011

Propensity-Score Methodology (1)

- Common in labor & medical literatures, newer to intl/macro
 - Currency unions & trade: Persson ('01)
 - Capital controls & macroprudential measures: Forbes, Fratzscher & Straub ('13)
 - Monetary policy: Ehrmann & Fratzscher ('06); Angrist & Kuersteiner ('11); Angrist, Jordá & Kuersteiner ('13)
 - Financial liberalization: Glick, Guo & Hutchison ('06); Das & Bergstrom ('12); Levchenko, Rancièrè & Thoenig ('09)
 - Foreign ownership: Chari, Chen & Dominguez ('11); Kalemli-Ozcan, Sorenson & Volosovych ('13)
- Several advantages over OLS:
 - Puts more weight on comparison observations that are more “similar”
 - Focuses on explaining policy choices instead of policy outcomes
 - Avoids specifying joint process governing outcomes, policy choices & covariates
- Potential challenges in macro literature:
 - Requires sufficient “similar” observations across countries and time
 - Sensitivity of results to matching methods & control variables
 - Must pass critical tests (balancing/independence)
 - Some adjustments required for time-series dimension (exclusion window)

Propensity-Score Methodology (2)

- See paper for details on methodology
- Define observations:
 - “Treatments”: country-quarters when adopts major policy response
 - “Controls”: country-quarters with no major policy responses
 - “Exclusion window”: 3 quarters before & after a treatment
- 1st stage: Estimate logit model of probability that each country adopts each of major policy responses each quarter as a function of observables:
 - **Changes in global environment**: risk, Δ U.S. interest rates, commodity prices, 1990s crisis dummy
 - **Domestic vulnerabilities**: Δ real GDP growth, Δ gross capital outflows, Δ gross capital inflows, current account balance/GDP, commodity exporter interaction
 - **Domestic characteristics**: income per capita, institutional quality, capital account openness, reserves/GDP, pegged ER dummy, euro zone dummy
 - **Recent changes in four policy responses**: Δ reserves/GDP, Δ interest rates, $\% \Delta$ exchange rate, new capital controls
- Base case: focus on variables significant at 20% level

1st Stage Logit Results: Predicting Sharp Currency Depreciations

<i>Global Measures</i>	Global risk	0.065***
	US interest rate (ch)	-0.439***
	Commodity price index	2.650**
	1990's crisis dummy	2.481***
<i>Domestic Vulnerabilities</i>	Real GDP growth (ch)	-0.045***
	Current account (% of GDP)	-1.800***
	Comm. index * comm. exporter	0.592**
<i>Other Country Characteristics</i>	Income per capita (log)	-0.063
	Institutions index	-0.109
	Reserves (% of GDP)	-0.111
	Peg dummy	-2.752***
	Openness	-0.212**
<i>Recent Policy Changes</i>	Reserves (% of GDP, ch)	-4.105***
	ER vs. US \$ (%ch)	0.024***

Observations (Pseudo R-squared)

2,523 (0.30)

*** denotes significant at the 1% level; ** at the 5% level and * at the 10% level

Propensity-Score Methodology (3)

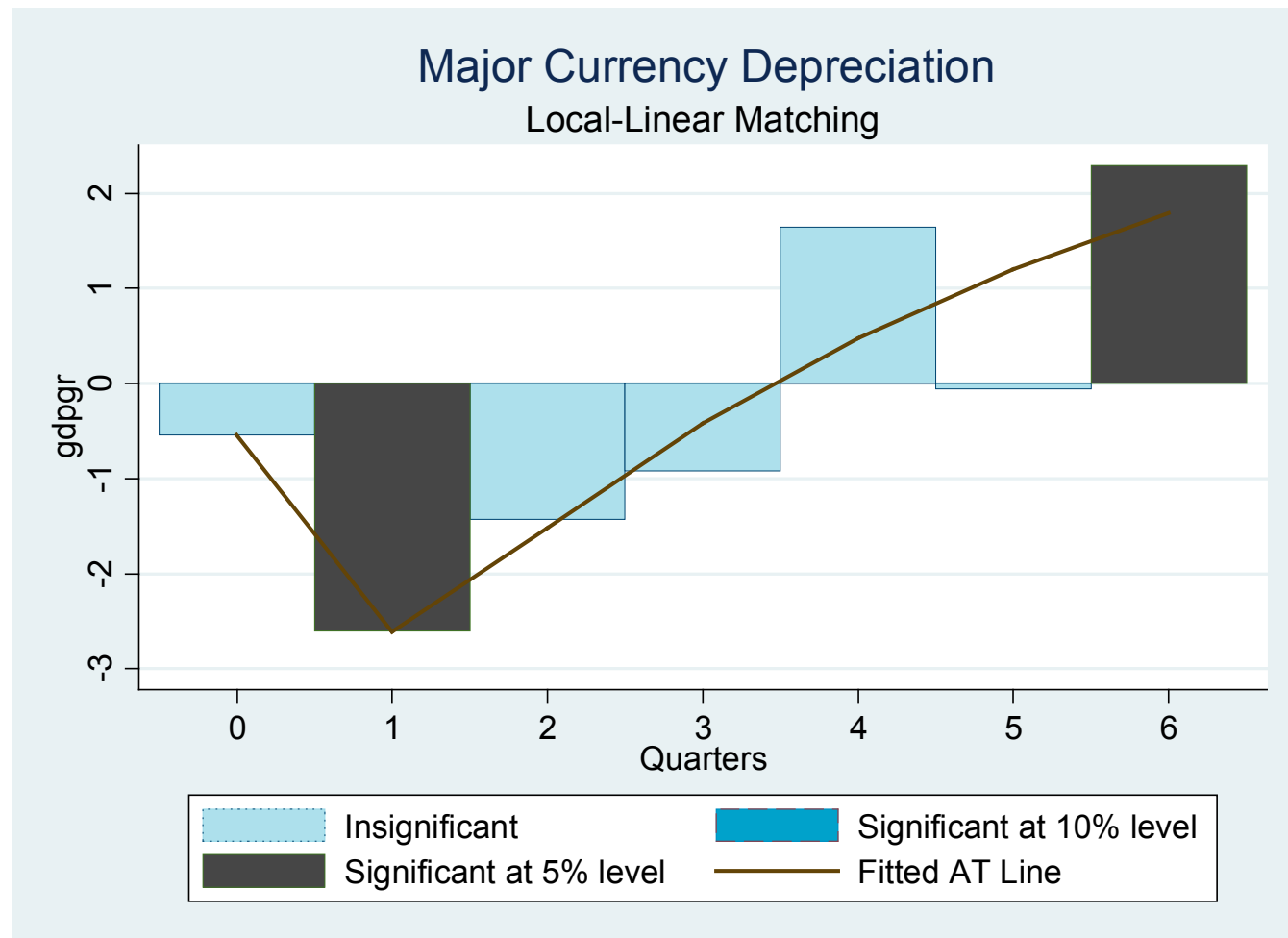
- Use coefficients estimated in logit model to calculate propensity scores
- Use propensity scores to match each treatment with a control group based on 5 matching algorithms:
 1. **Nearest neighbor without replacement**
 2. **5 nearest neighbors**
 3. **Radius** (with caliper = 0.05)
 4. **Kernel**
 5. **Local-linear**: non-parametric estimator using all observations in control group; weighting function assigns higher weight to controls closer to treated observation
- **Tests of methodology**
 - Preferred method (bias/efficiency tradeoff)
 - All treatments meet “common support condition”
 - Meets “independence” assumption/”balancing assumption”

<i>Balancing Tests:</i>	Mean:	Mean:	T-stats	Local-linear	
<i>SHARP CURRENCY DEPRECIATIONS</i>	Treatment Group (μ_T)	Unmatched Control (μ_C)	($H_0: \mu_T = \mu_C$)	Mean: Matched Control	t-stat
Global Risk	31.703	24.786	7.06***	31.726	-0.090
Δ U.S. interest rate	-1.446	-0.455	-6.35***	-1.308	-0.360
Commodity prices	4.654	4.762	-2.34**	4.670	-0.300
1990's crisis dummy	0.533	0.465	1.16	0.541	0.000
Δ Real GDP growth	-5.229	0.073	-5.67***	-6.295	0.930
Current account/GDP	-0.097	0.004	-3.55***	-0.090	-0.280
Commodity interact.	0.413	0.293	2.24**	0.338	0.850
Income per capita	7.646	8.234	-3.85***	7.536	0.580
Institutions index	-0.449	-0.379	-3.20***	-0.420	-0.840
Reserves/GDP	0.459	0.503	-0.54	0.531	-0.850
Peg dummy	0.053	0.477	-7.32***	0.027	0.830
Openness	0.369	1.164	-4.52***	0.529	-0.630
Δ Reserves/GDP	-0.044	0.026	-4.61***	-0.053	0.730
% Δ ER/US\$	15.282	2.545	8.50***	10.816	1.410
Observations	75	2,488		74	

Impact of Policy Responses on Outcomes

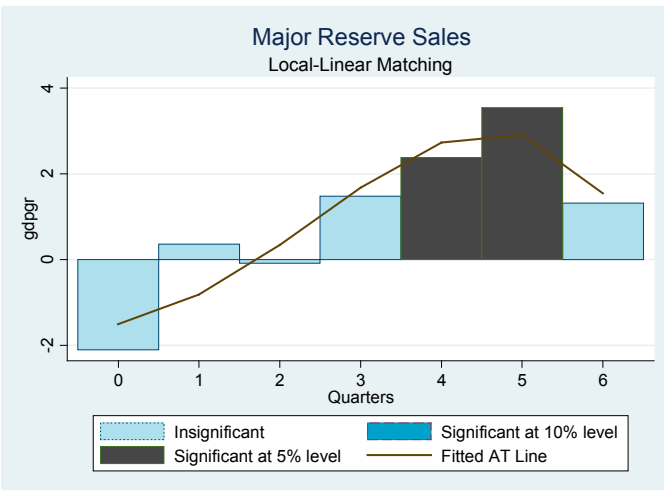
- Calculate **average treatment effect on the treated (ATT)** for each policy response on each outcome variable
 - Compare average values for treated observations with average for matched controls
 - Estimate ATT for each quarter from change through 6 quarters
 - Bootstrapped standard errors
- Test for impact on 3 outcome variables:
 - **Real GDP growth**
 - **CPI inflation**
 - **Unemployment**

Impact on Real GDP Growth (Local-linear matching)

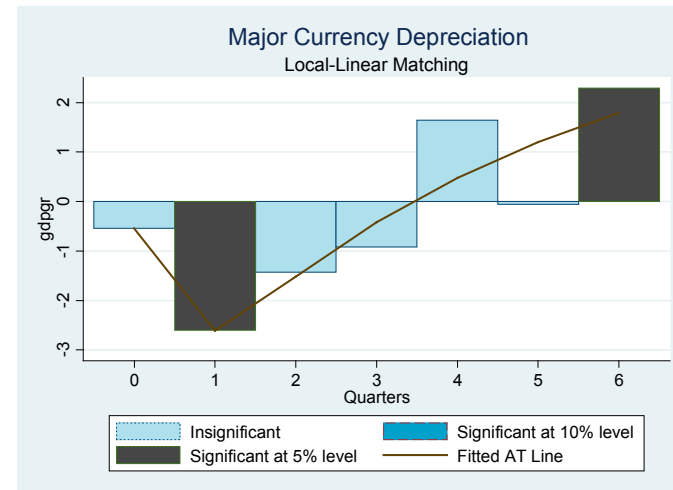


Impact on Real GDP Growth (Local-linear matching)

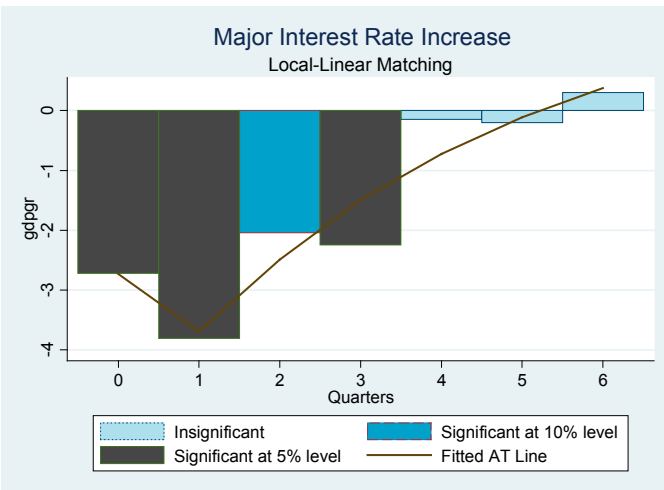
Major Reserve Sales



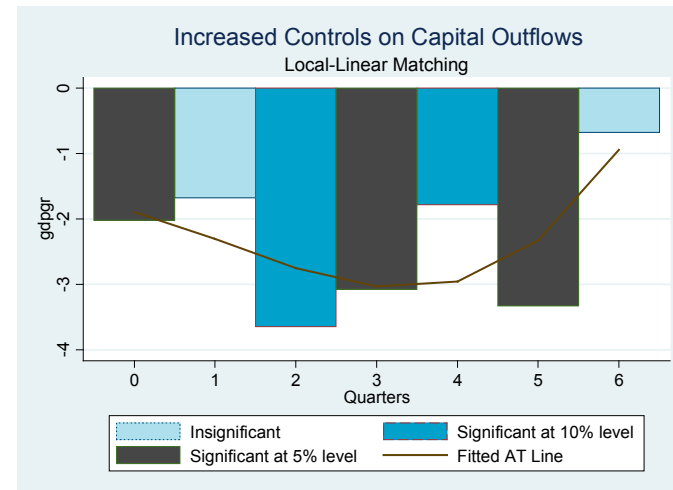
Large Currency Depreciations



Major Interest Rate Hikes

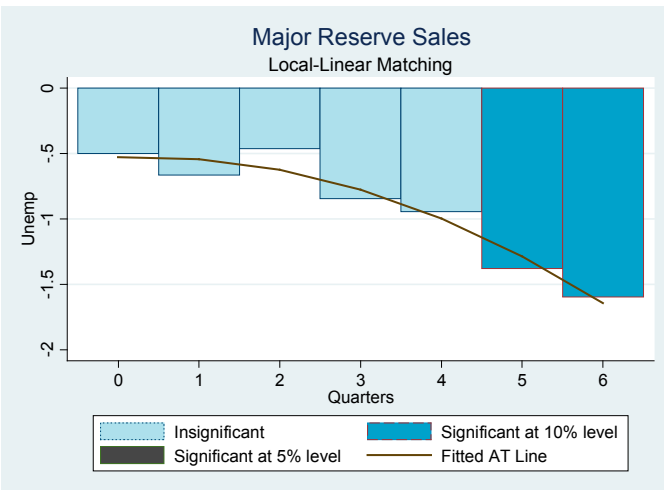


Increased Capital Controls

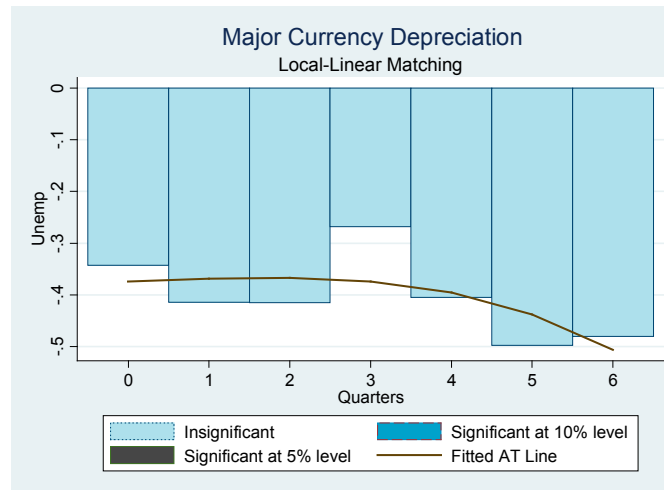


Impact on Unemployment (Local-linear matching)

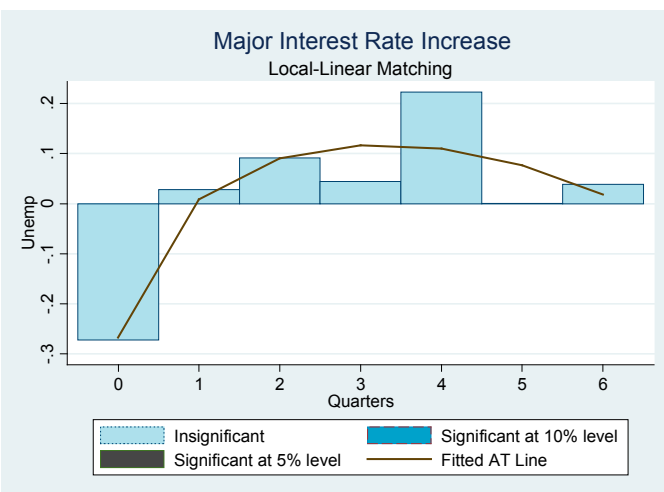
Major Reserve Sales



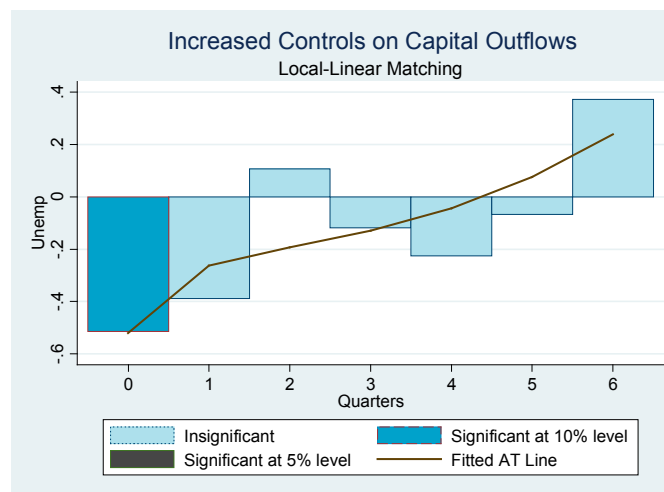
Large Currency Depreciations



Major Interest Rate Hikes

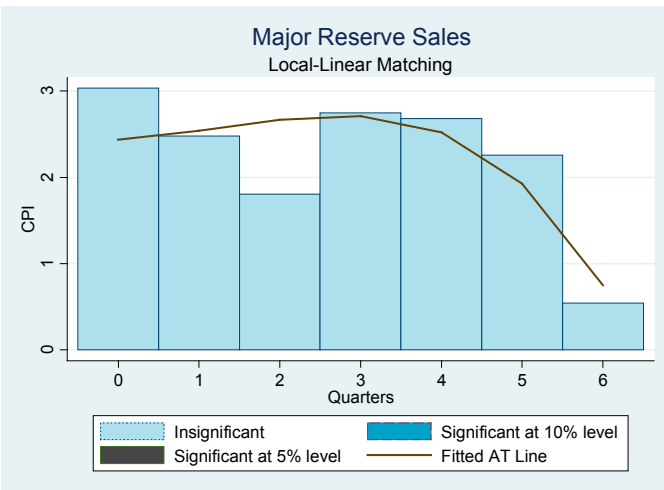


Increased Capital Controls

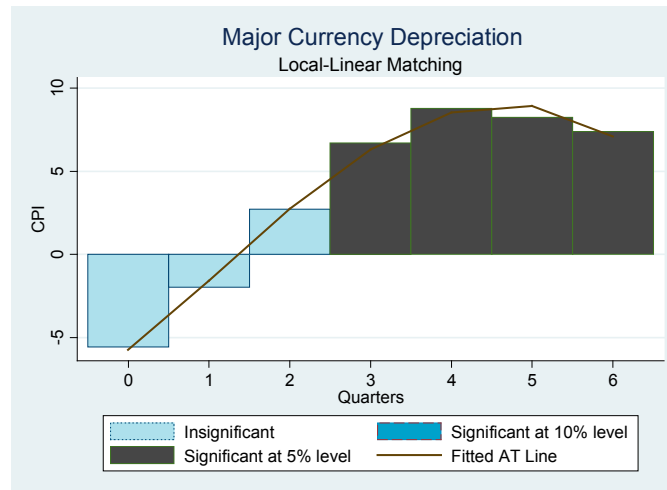


Impact on Inflation (Local-linear matching)

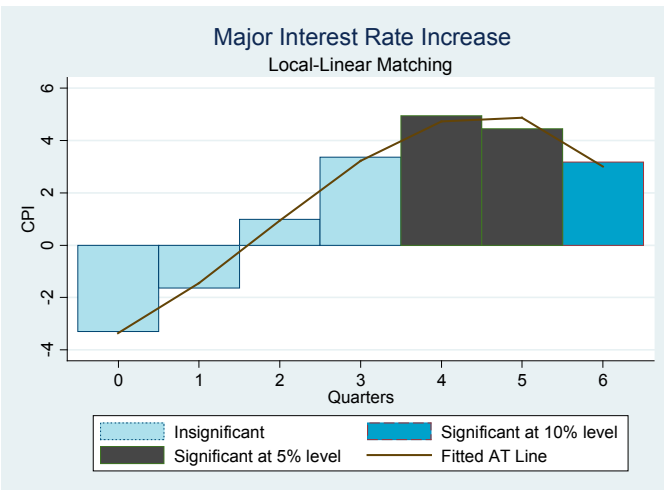
Major Reserve Sales



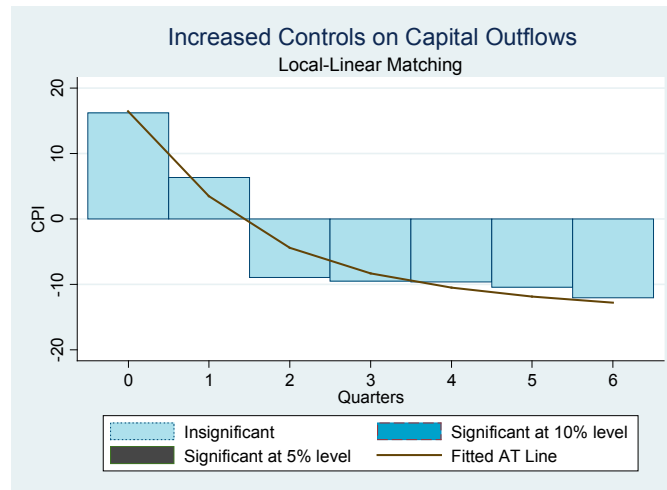
Large Currency Depreciations



Major Interest Rate Hikes



Increased Capital Controls



Sensitivity Tests

- Different sets of covariates
 - Key results unchanged
- Effects for individual crisis periods
 - Sample size too limited
- Only emerging, developing and non-OECD economies
 - Less growth benefit of reserve sales & depreciations
 - Reserve sales may raise unemployment

Pick Your Poison

- How should countries respond to sudden stops in global capital flows?
 - To answer, need to take selection bias & endogeneity seriously
 - No ideal solution that simultaneously improves GDP growth, unemployment and inflation
- Key findings: “Pick Your Poison”
 - Large currency depreciations and reserve sales support GDP growth
 - Benefits lagged and occur after initial contraction
 - May generate increase in inflation (especially depreciations)
 - Weaker benefits in EMs (especially reserve sales)
 - Sharply higher interest rates & new capital controls significantly reduce GDP growth
- Unanswered questions
 - Long-term effects?
 - Other costs and benefits? (financial stability?)