

Exchange Rate Implications of Reserve Changes:
How Non-EZ European Countries
Fared during the Great Recession

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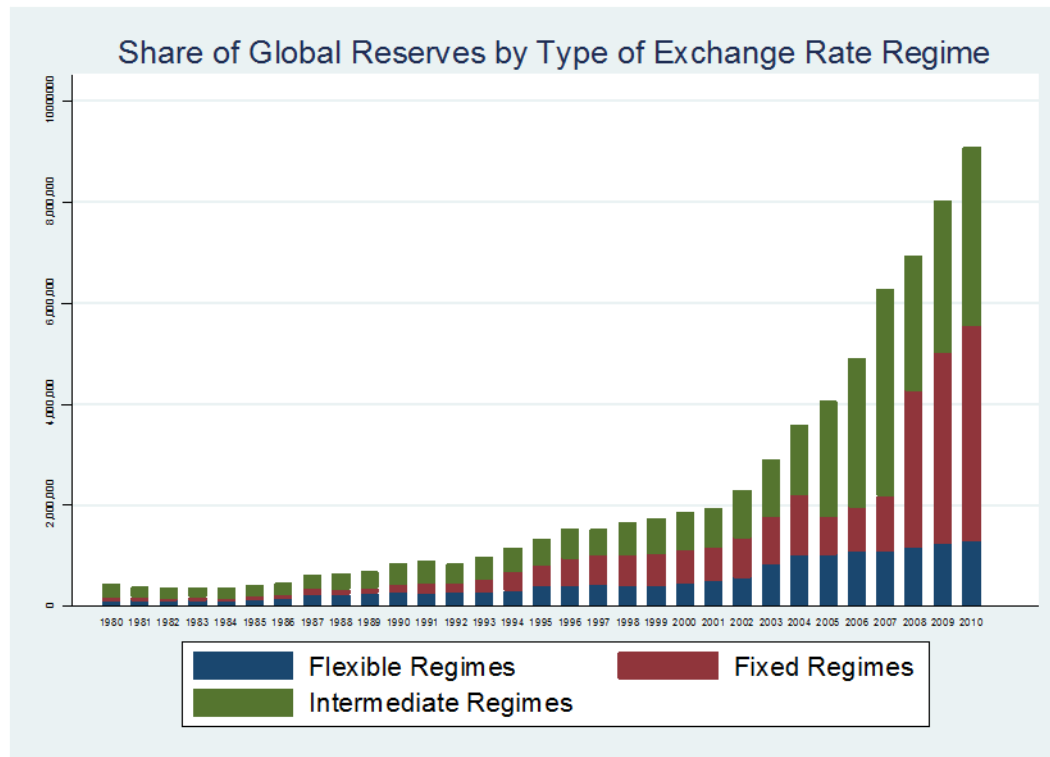
Exchange Rates, Capital Controls and Reserves during the GFC

- This study examines the relationship between exchange rates, capital controls and foreign reserves, focusing on changes in each of these measures in the Non-Eurozone European countries during the global financial crisis and recovery.

Exchange Rate Regimes and Reserves

- Reinhart and Rogoff (2004) provide a *de facto* monthly regime classification system that allows us to group countries into fixed, intermediate, floating and “free falling” regimes.
- Countries with fixed exchange rates require foreign exchange reserves, and sometimes capital controls, to maintain the pegged regime.
- Even countries with intermediate and floating exchange rate regimes hold significant foreign reserve stocks and at times resort to capital controls.

Foreign Reserves, 1980-2010



Exchange Rate Movements

- There were significant exchange rate realignments during the global financial crisis.
- Consequences: the implications of exchange rate regime choice and exchange rate movements for broader macroeconomic stabilization and economic growth remain contentious.
- Not controversial: exchange rate crises have significant negative effects on growth.

Trilemma

- The currency crisis-prevention tool-kit is importantly constrained by the international finance trilemma.
- Policy makers would like to use monetary policy to control interest rates and help stabilize the economy, allow free mobility of capital inflows and outflows, and at the same time maintain a stable exchange rate.
- The crux of the trilemma is that countries can't simultaneously achieve all three of these goals.
- The role of reserves in the trilemma has generally been assumed to be minor.
 - Reserves are essential as part of the mechanics of stabilizing exchange rates, but their potential ability to deter currency market speculation, and in so doing mitigate trilemma trade-offs, has not been emphasized.

European Union and EuroZone Membership



- Eurozone: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain
- EU: Bulgaria, the Czech Republic, Denmark, Hungary, Latvia, Lithuania, Poland, Romania, Sweden, and the United Kingdom
- (Selected) Acceding and Candidate Countries: Croatia, Iceland, Turkey



EU Members and Maastricht Criteria

■	Criterion fulfilled
■	Criterion potentially fulfilled
■	Criterion not fulfilled

Convergence criteria (valid for May 2013)					
Country	HICP inflation rate ^[17] (12-months average of annual rates) ^[nb 6]	Budget deficit to GDP	Debt-to-GDP ratio	ERM II member ^[18]	Long-term interest rate ^[19] (12-months average of 10yr bond yields) ^[nb 6]
Reference values	max. 2.5% ^{[nb 7][nb 8]} (as of 31 Mar 2013)	max. 3.0% (Fiscal year 2012) ^[21]	max. 60%, or declining (Fiscal year 2012) ^[22]	min. 2 years (as of 31 Mar 2013)	max. 4.81% ^{[nb 7][nb 9]} (as of 31 Mar 2013)
EU members (outside the eurozone)					
Bulgaria	2.4%	0.8%	18.5%	No	3.89%
Czech Republic	2.8%	4.4%	45.8%	No	2.30%
Denmark	1.8%	4.0%	45.8%	1 January 1999	1.33%
Hungary	4.6%	1.9%	79.2% (decreasing)	No	6.97%
Latvia	1.3%	1.2%	40.7%	2 May 2005	3.84%
Lithuania	2.7%	3.2%	40.7%	28 June 2004	4.42%
Poland	2.7%	3.9%	55.6%	No	4.44%
Romania	4.1%	2.9%	37.8%	No	6.36%
Sweden	0.8%	0.5%	38.2%	No	1.59%
United Kingdom	2.6% ^[23]	6.3%	90.0% (increasing)	No	1.62%
Candidates for EU membership					
Croatia	4.0%	4.6% ^[24]	53.6% ^[24]	No	4.65% ^[25]
Iceland	5.4%	1.7% ^[24]	96.2% (decreasing) ^[24]	No	6.21% (21.Aug-31.Mar 2013) ^[26]
Macedonia	3.6% ^[27]	3.8% ^[24]	31.0% ^[24]	No	No data
Montenegro	4.1% (2012) ^[24]	4.0% ^[24]	52.0% ^[24]	No ^[nb 10]	No data
Serbia	7.3% (2012) ^[24]	6.4% ^[24]	59.2% ^[24]	No	No data
Turkey	7.7%	1.9% ^[24]	36.3% ^[24]	No	6.02% ^[29]
Potential candidates for EU membership					
Albania	2.0% (2012) ^[30]	3.5% ^[30]	63.8% (increasing) ^[30]	No	No data
Bosnia and Herzegovina	2.2% (2012) ^[30]	2.8% ^[30]	43.7% ^[30]	No	No data
Kosovo ^[nb 11]	0.6% (2012) ^[30]	2.8% ^[30]	17.6% (estimated) ^{[nb 12][31]}	No ^[nb 13]	No data

EU Country *de facto* exchange rate regimes, 2000-2010

	Fixed Regimes			Intermediate Regimes			Flex Regimes			Falling Regimes				
Fixed Regimes	Austria			Hungary	2009	10								
	Belgium			Latvia	2009	7								
	Bulgaria			Lithuania	2007	5								
	Cyprus			Malta	2008	1								
	Denmark			Slovak Rep	2008	1								
	Estonia			Slovenia	2005	12								
	Finland													
	France													
	Germany													
	Greece													
	Ireland													
	Italy													
	Luxembourg													
	Netherlands													
	Portugal													
	Spain													
Intermediate Regimes	Czech Rep	2002	1	Croatia				Turkey	2007	8		Romania	2001	4
	Hungary	2010	3	Iceland										
	Lithuania	2003	11	Poland										
	Lithuania	2009	4	Sweden										
				UK										
Flexible Regimes												Turkey	2003	4
Falling Regimes				Turkey	2001	2								

Exchange Rate Regimes and Reserve Accumulation

Percent of Countries 2008-2011

	High Reserves/GDP	Medium-High Reserves/GDP	Medium-Low Reserves/GDP	Low Reserves/GDP
Exchange Rate Regime				
Fixed Exchange Rate	44	34	48	53
Intermediate Regime	49	46	45	33
Floating Regime	0	2	3	10
Regime change	8	17	5	5
Capital Control Regime				
Long-standing controls	59	44	53	43
New Controls	28	24	28	13
No Controls	13	32	20	45
Large Depreciation GFC	15	15	18	20
Large Reserve Decline GFC	13	20	13	18
# of countries	39	41	40	40

Note: Reserves/GDP ratios are end-of-year 2006. Fixed, Intermediate and Floating Regime classification if country stayed in classification during 2008-2010; otherwise classified as “regime change”. Country is classified as maintaining “long-standing capital controls” if controls are persistently imposed prior to 2007, classified as “new capital controls” if imposed during 2008-2011, classified as “no capital controls” if never imposed controls between 2006 and 2011. Large depreciations and large reserve declines are percentage changes greater than 25%.

Exchange Rate Regimes and Reserve Accumulation

- During the GFC many countries faced sudden capital outflows leading to enormous pressure to depreciate the currency. Monetary authorities have a limited set of policy choices to counter this pressure; they can:
 - allow the exchange rate to depreciate,
 - use foreign reserves to defend the exchange rate,
 - raise the interest rate in the hope that a higher interest rate will discourage capital outflows,
 - impose restrictions on capital outflows
 - use a combination of all of the above.

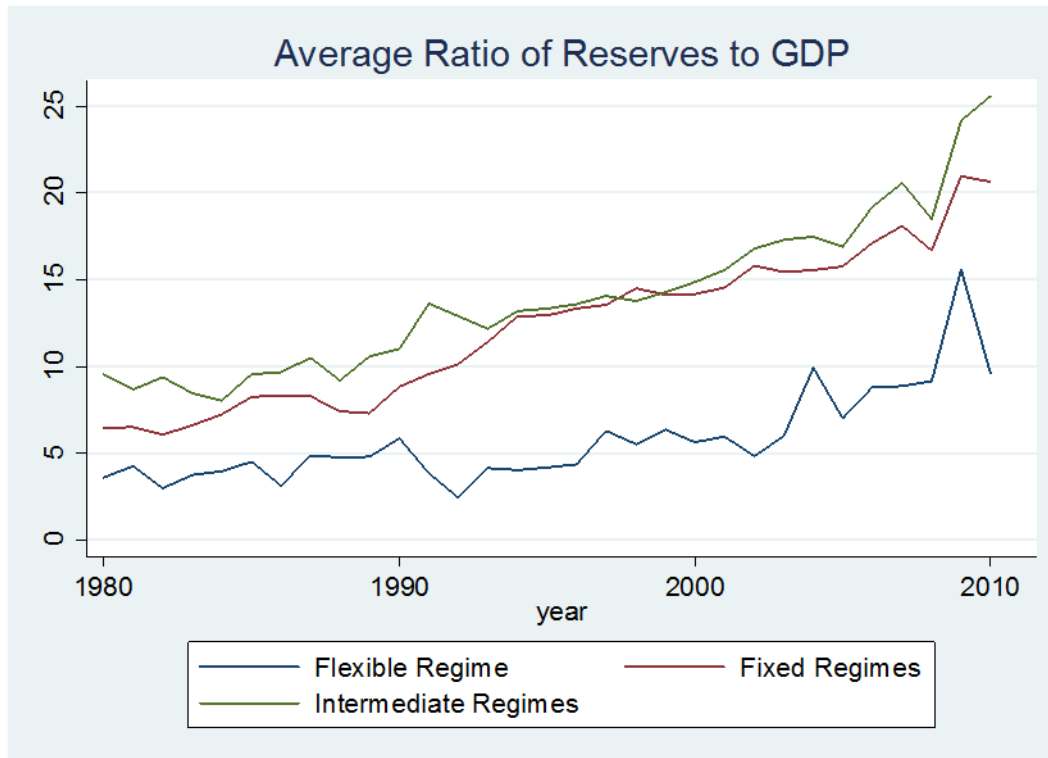
EU Currency Depreciations against USD and Percent Reserve Changes during the GFC

Country	Percent Depreciation	% Reserve Change	Chinn-Ito (2009)
Bulgaria	17	-30	2.44
Croatia	20	-25	1.12
Czech Rep	33	-4	2.44
Denmark	16	25	2.44
Hungary	45	24	2.44
Iceland	36	-19	-1.17
Latvia	16	-10	2.44
Lithuania	16	-19	1.91
Poland	62	-25	0.06
Romania	41	-14	2.44
Sweden	41	-17	2.44
Turkey	44	-11	0.06
UK	29	-10	2.44
Average Intermediate Regimes	19	-9	0.59

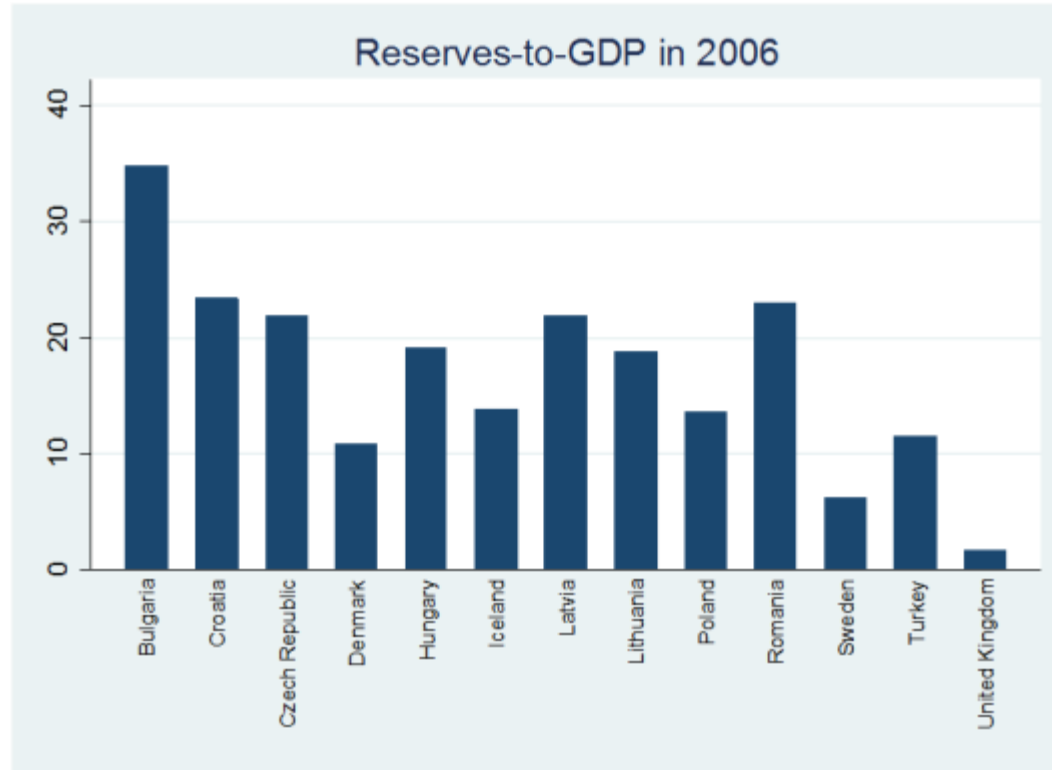
Reserves and the GFC

- Did those countries with large reserve accumulations prior to the GFC reduce their vulnerability to the crisis?
 - If the main rationale for accumulating reserves was to provide precautionary self-insurance, the global financial crisis would seem to be the ultimate vindication for that strategy.

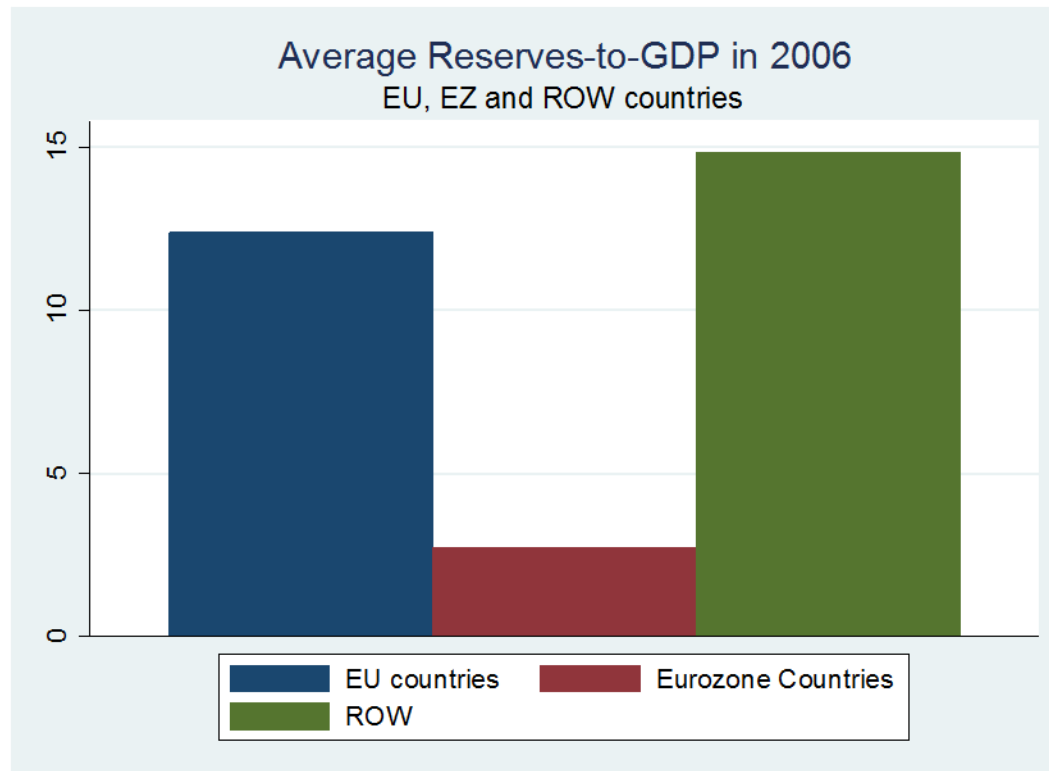
Average Ratio of Reserves-to-GDP by Regime



EU Reserves-to-GDP (pre-GFC)



Reserves-to-GDP comparisons



Reserves-to-GDP Quartiles

Country	Reserves-to-GDP (2006)	Quartile
Bulgaria	34.8	high
Croatia	23.4	high
Czech Republic	21.9	med-high
Denmark	10.9	med-low
Hungary	19.1	med-high
Iceland	13.8	med-low
Latvia	21.9	med-high
Lithuania	18.8	med-high
Poland	13.6	med-low
Romania	23.0	high
Sweden	6.3	low
Turkey	11.5	med-low
United Kingdom	1.7	low
high quartile		>23
med-high		16 to 23
med-low		9 to 15
low quartile		<9

Defining “active” reserve management:

$$IR = Forex + Gold + SDR + IMF + Other$$

$$= (SEC + DEPO) + Gold + SDR + IMF + Other$$

$$dNonCR = dGold + dSDR + dIMF + dOther$$

$$dIR = r^s \times SEC + r^d \times DEPO + d^{ps} SEC + d^{ps} DEPO + d^{val} SEC + d^{val} DEPO + dNonCR$$

Passive management
Active management
Passive management

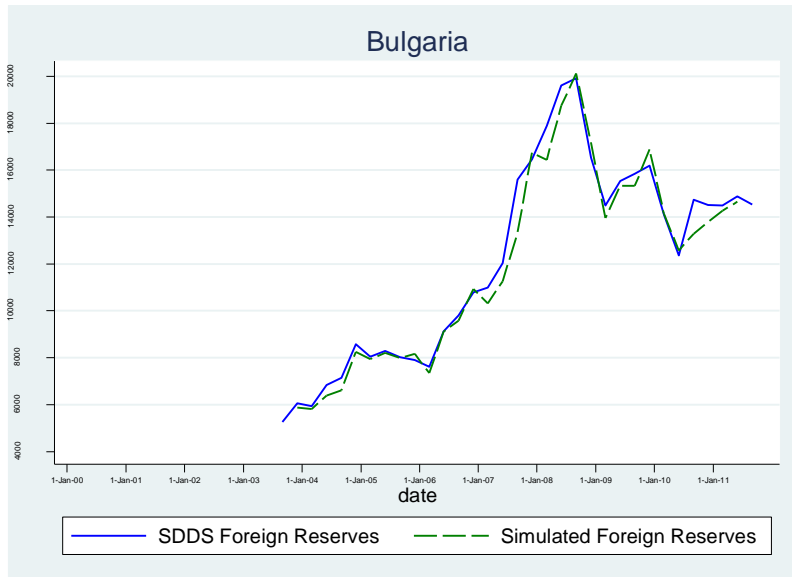
= interest income
≈ intervention
= valuation change

passive management includes valuation changes and interest income on existing assets, interest income is estimated using COFER data, 10-year government bond yields, and 3-month inter-bank rates.

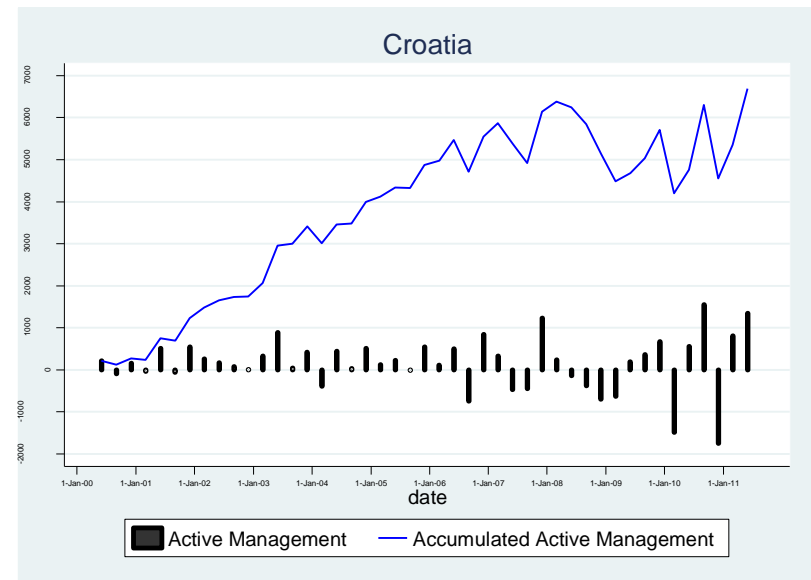
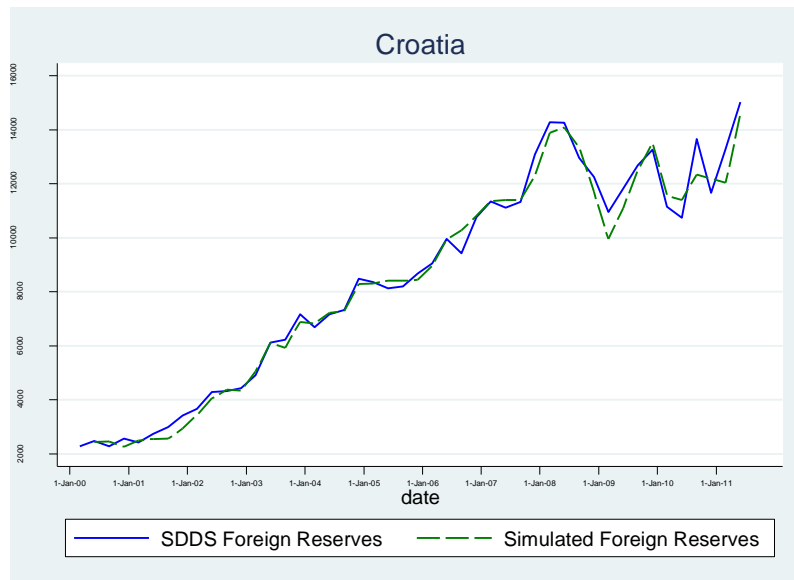
EuroZone Reserves

- It is worth noting that when countries join the Euro-zone we typically see a dramatic fall in foreign reserves, which reflects the fact that Euro-denominated assets are no longer considered foreign reserves for these countries. This pattern is very apparent in the time series for the Slovak Republic and Slovenia.

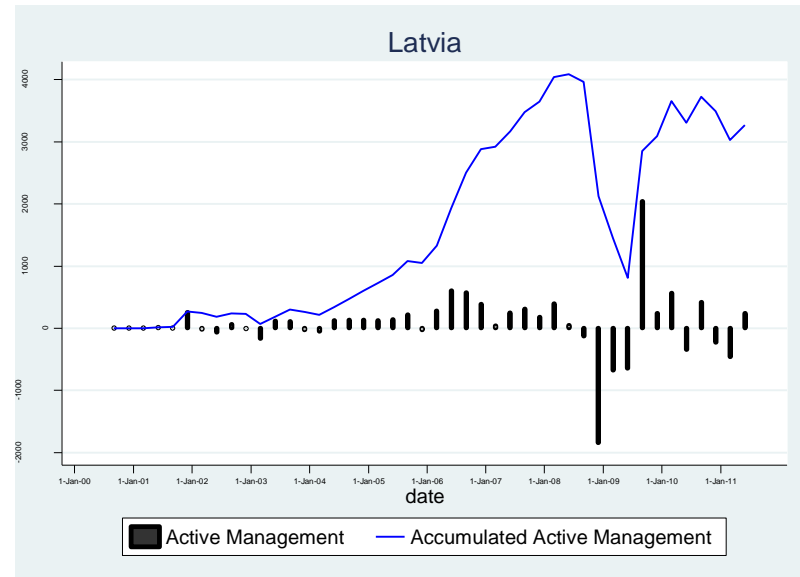
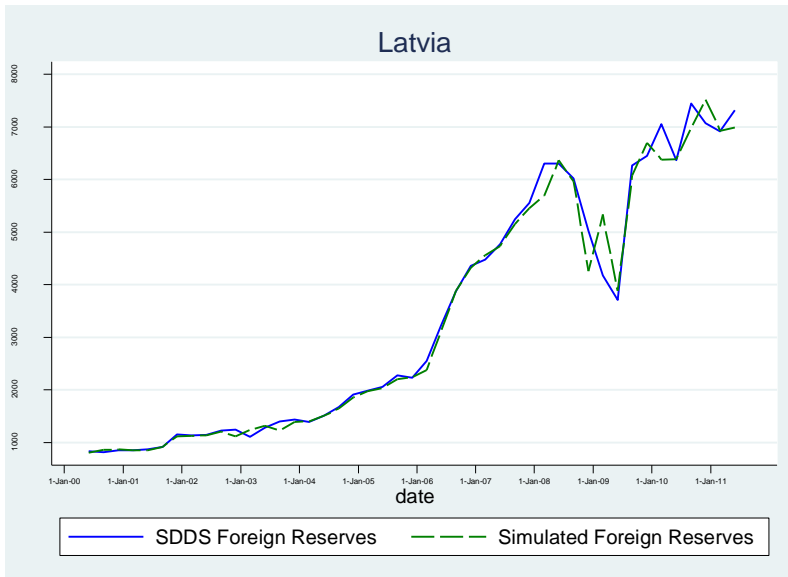
Bulgaria's Reserve Management



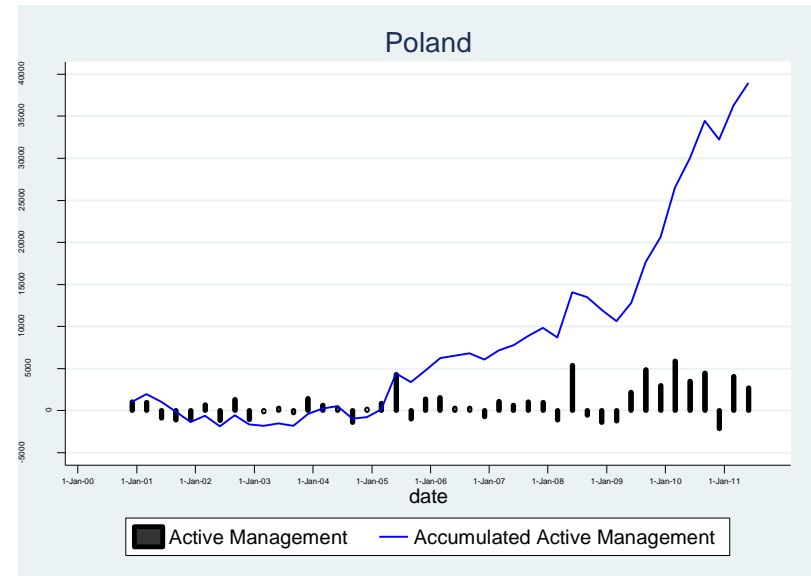
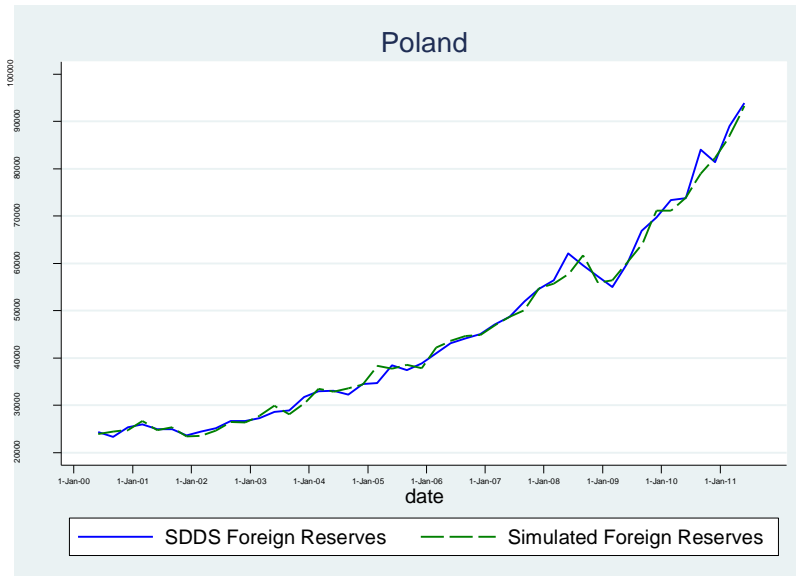
Croatia's Reserve Management



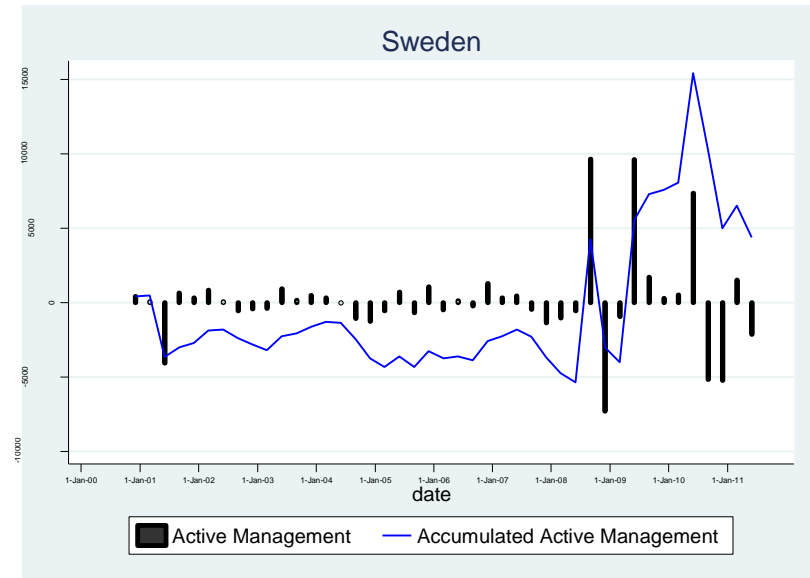
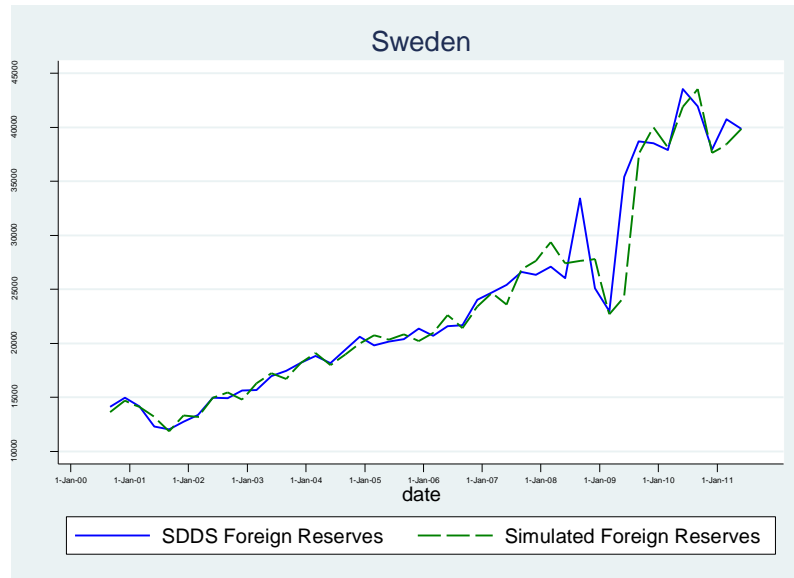
Latvia's Reserve Management



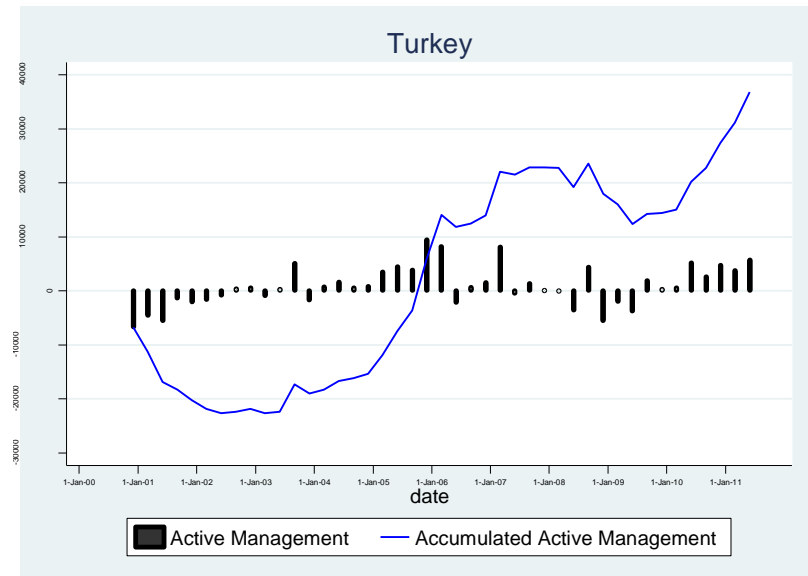
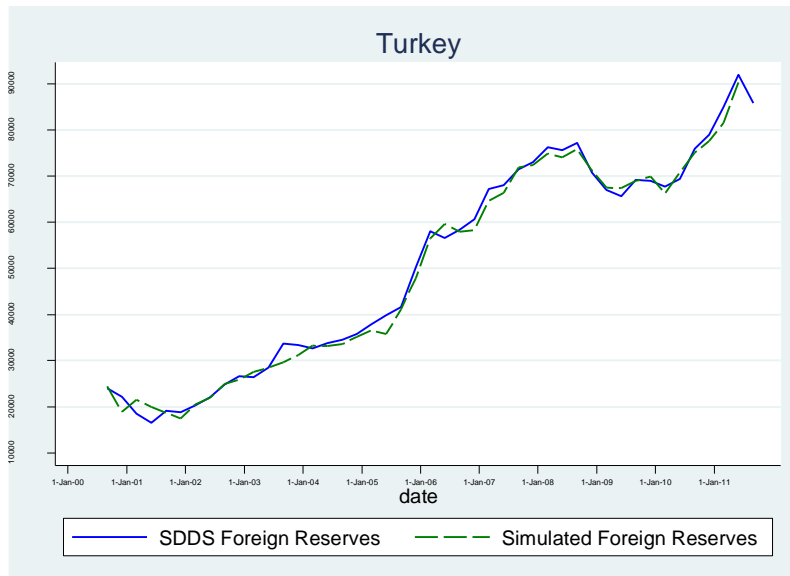
Poland's Reserve Management



Sweden's Reserve Management



Turkey's Reserve Management



Exchange Rate Movements and Reserve Valuation Changes

- A number of countries both experienced large depreciations *and* large reserve depletion during the GFC: Belarus, Congo, Mongolia, Poland, Russia, Serbia, Ukraine, Zambia and Zimbabwe.
- But not all countries that experienced large exchange rate changes also depleted reserves.
 - The most dramatic example of this is Seychelles, which experienced the largest depreciation of its currency (110 percent) while at the same time experiencing a large percentage increase in reserves (102 percent).

Capital Controls

- A number of countries introduced capital controls during the global financial crisis; no countries dismantled controls already in place at the time of the crisis.
- The Chinn-Ito financial openness measure used to create the capital controls indicator variables used in paper is an index that gauges a country's degree of capital account restrictiveness (with higher index scores denoting fewer restrictions).
- The trilemma suggests that capital controls can, at least in theory, act as a substitute for exchange rate adjustments during times of crisis.
- In practice, however, the large exchange rate realignments that occurred during the crisis suggest that capital controls at best complemented exchange rate adjustments

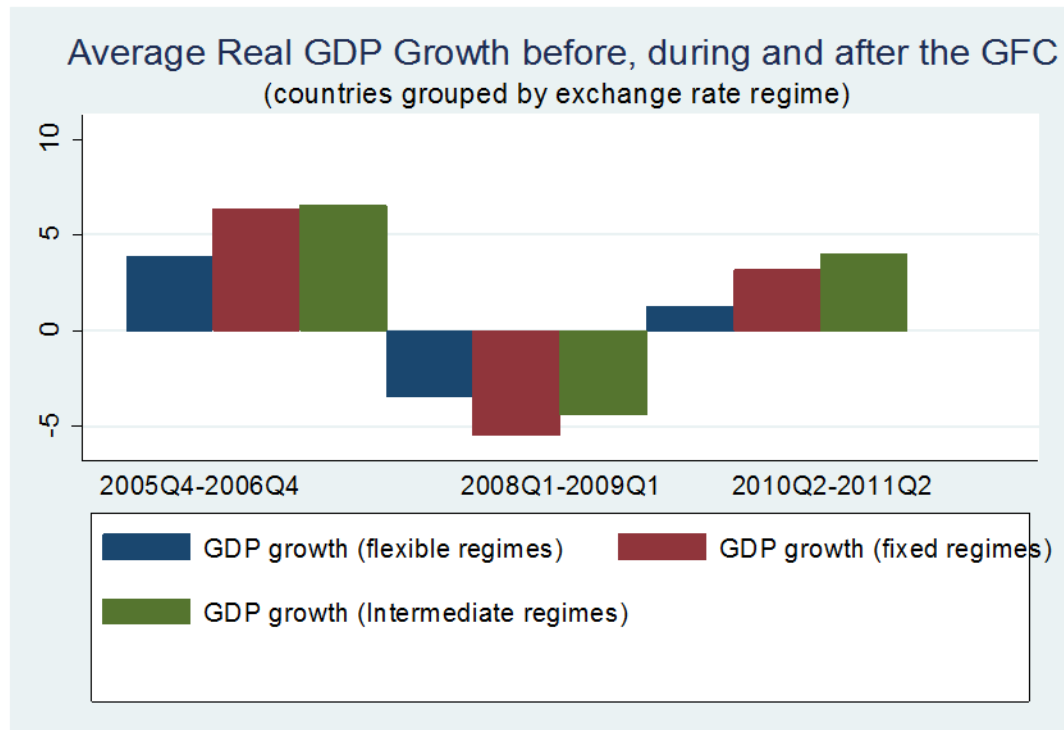
EU Capital Controls

No Controls		New Controls 2008-2011			Long-Standing Controls	
Country		Country	Chinn-Ito	Year	Country	Chinn-Ito
Austria		Iceland	-1.16883	2008	Bulgaria	2.175265
Belgium		Lithuania	2.175265	2008	Croatia	1.120288
Czech Republic		Lithuania	1.911521	2009	Cyprus	1.911521
Denmark		Lithuania	1.647777	2010	Malta	1.911521
Estonia		Lithuania	1.384032	2011	Poland	0.0644257
Finland		Slovenia	2.175265	2008	Romania	2.175265
France		Slovenia	1.911521	2009	Slovakia	0.591914
Germany		Slovenia	1.647777	2010		
Greece		Slovenia	1.384032	2011		
Hungary		Turkey	0.064426	2008		
Ireland						
Italy						
Latvia						
Luxembourg						
Netherlands						
Portugal						
Spain						
Sweden						
United Kingdom						

Exchange Rates and Economic Growth

- The strongest argument in favor of flexible rates is that “floaters” are better able to absorb economic shocks.
- Did those countries that maintained fixed exchange rates during the financial crisis suffer more than countries that allowed their exchange rate to adjust?
- While average real GDP growth fell dramatically for countries across the three different regimes during the crisis, the average decline was largest for fixers, followed by those maintaining intermediate regimes. Floaters fared best.

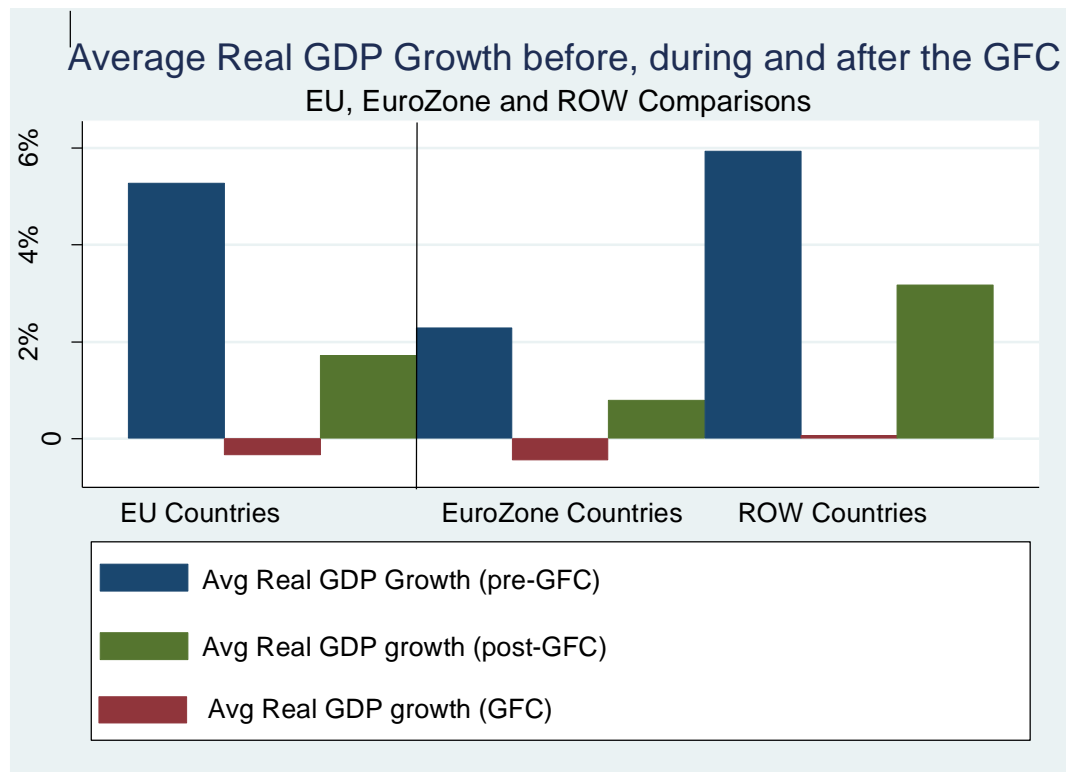
Average Real GDP growth by Exchange Rate Regime



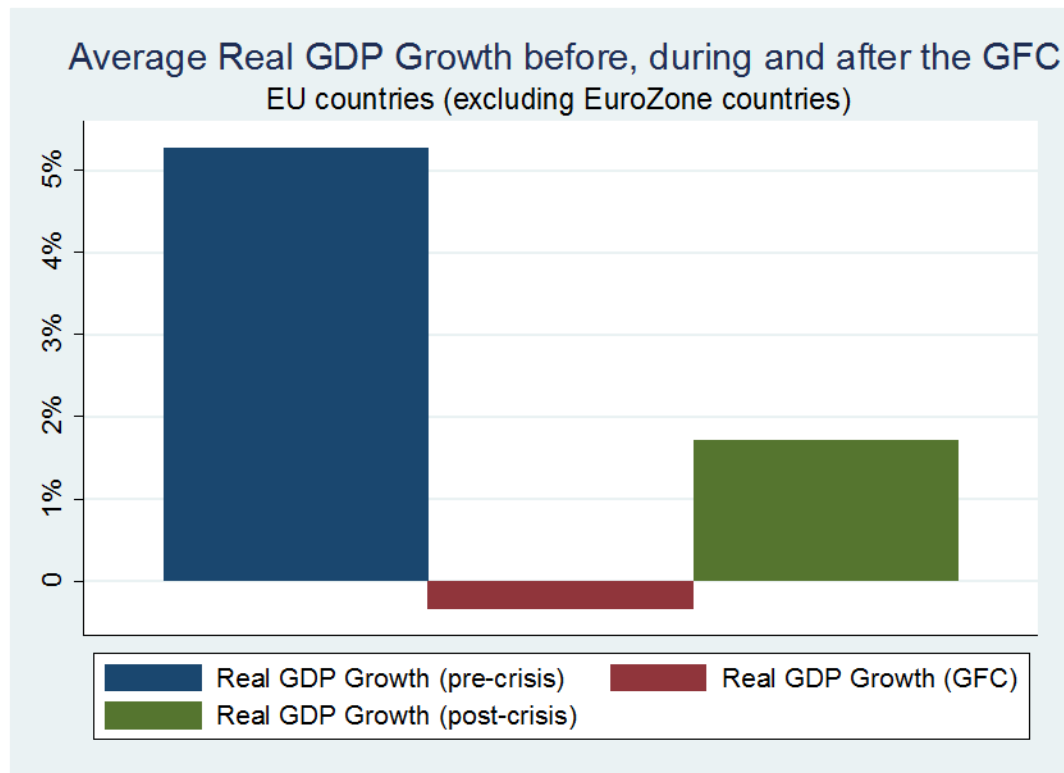
Exchange Rates and Economic Growth after the GFC

- The growth experience for countries grouped by exchange rate regime after the financial crisis is similar, in terms of regime ranking, to the pattern shown in the pre-crisis period.
- The countries with intermediate regimes experienced the highest average real GDP growth, followed by fixers. Floaters fared least well after the crisis, with an average real growth rate of below 2%.
- Message: intermediate regimes (that are neither fully fixed nor fully flexible) are associated with the highest average growth performance in non-crisis periods.
 - Intermediate regimes can be thought of as the Goldilocks of regimes, simultaneously avoiding the worst characteristics of fixed regimes (overvaluation) as well as the drawbacks of floating regimes (volatility).

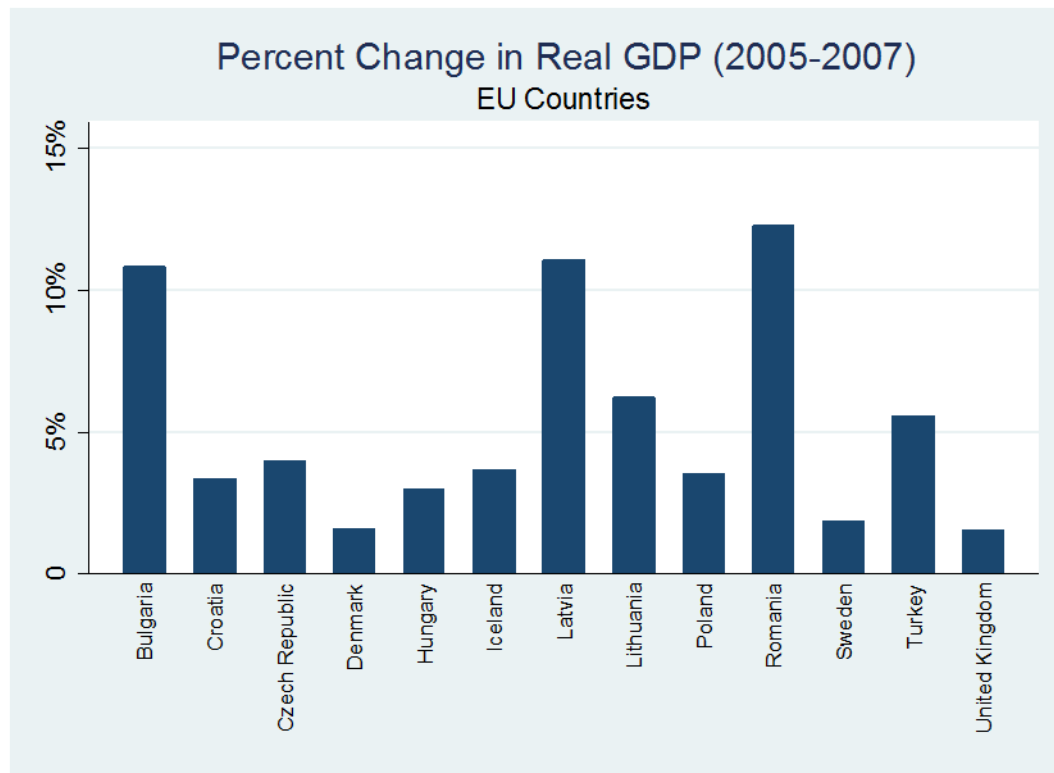
Average Real GDP growth EU, EZ and ROW



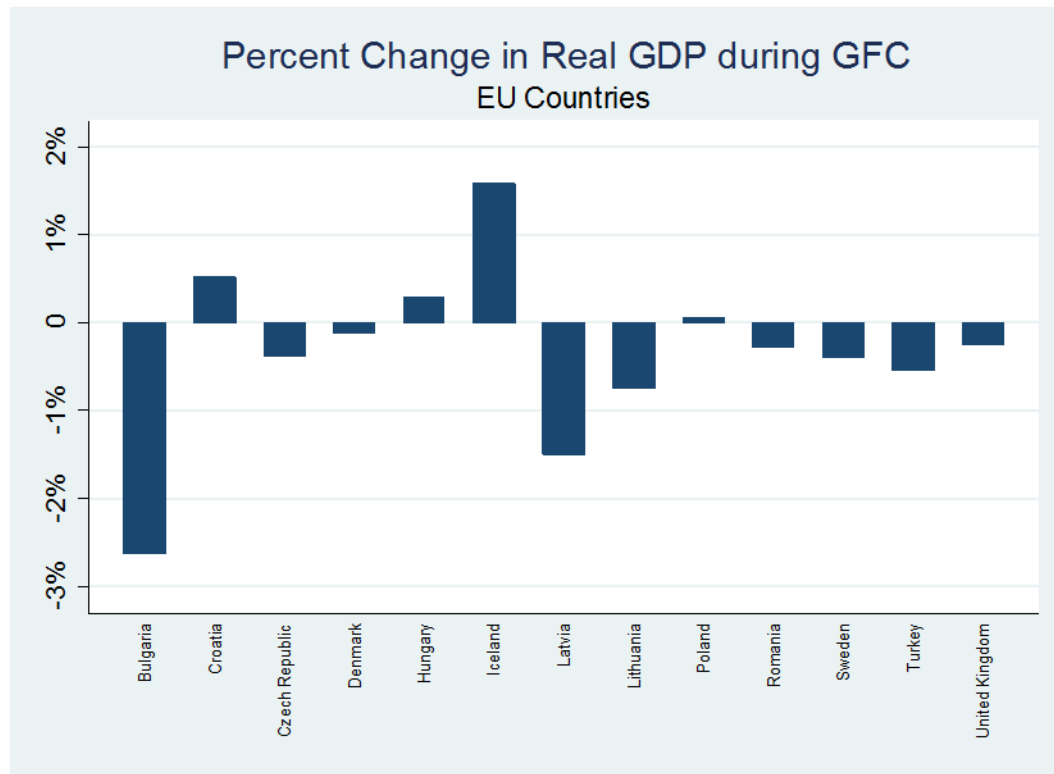
Average EU Real GDP growth during the GFC



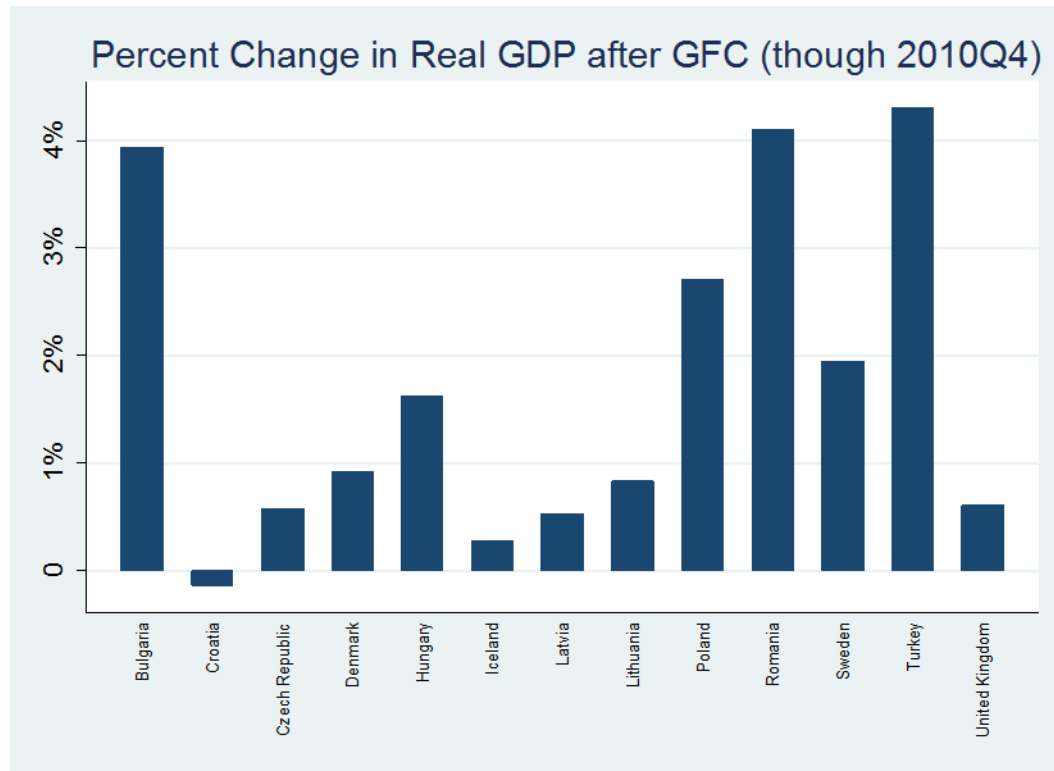
Percent Change in Real GDP before the GFC



Percent Change in Real GDP during the GFC



Percent Change in Real GDP after the GFC



Conclusions

- The data suggest that most countries, regardless of exchange rate regime, hold significant reserve stocks and at the same time maintain some degree of capital account restrictiveness.
- Put another way: a country's choice of exchange rate regime seems to have only minor implications for reserve and capital account management.

Conclusions

- Exchange rates fluctuated much more in the crisis period than they did either before or after the crisis.
- This suggests that policy actions involving reserve management and the use of capital controls during the financial crisis were consistent with allowing larger swings in the exchange rate in most countries relative to pre-crisis norms and controlling for exchange rate regime.

Conclusions

- The relationships between exchange rates, capital controls and foreign reserves during the financial crisis suggest that reserve management plays a much more central role than has typically been emphasized in international finance models.
- Reserves seem to be important not only for stabilizing fixed regimes, but also to deter currency market pressure in some intermediate and floating regimes, and in so doing help to mitigate trilemma trade-offs.