Fiscal Procyclicality and Over-optimism in Official Forecasts

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Harpel Professor, Harvard University

MAS Term Professor,

National University of Singapore, May 22, 2017

Main papers on which the presentation is based

1) Which countries succeed in running counter-cyclical fiscal policy?

"On Graduation from Fiscal Procyclicality," with Carlos Vegh & Guillermo Vuletin, *Journal of Development Economics*, 2013.

2) A possible source of the problem: Are official forecasts biased ?

"Over-optimism in Forecasts by Official Budget Agencies and Its Implications," *Oxford Review of Economic Policy*, 2011.

3) Is the bias in government forecasts better or worse for countries subject to fiscal rules such as the Stability & Growth Pact?

"Over-optimistic Official Forecasts & Fiscal Rules in the Eurozone," with Jesse Schreger, *Weltwirtschaftliches Archiv*, 2013.

4) Possible solutions: Can private-sector forecasts do better?

"Bias in Official Fiscal Forecasts: Can Private Forecasts Help?" with Jesse Schreger, Harvard Kennedy School, 2016.

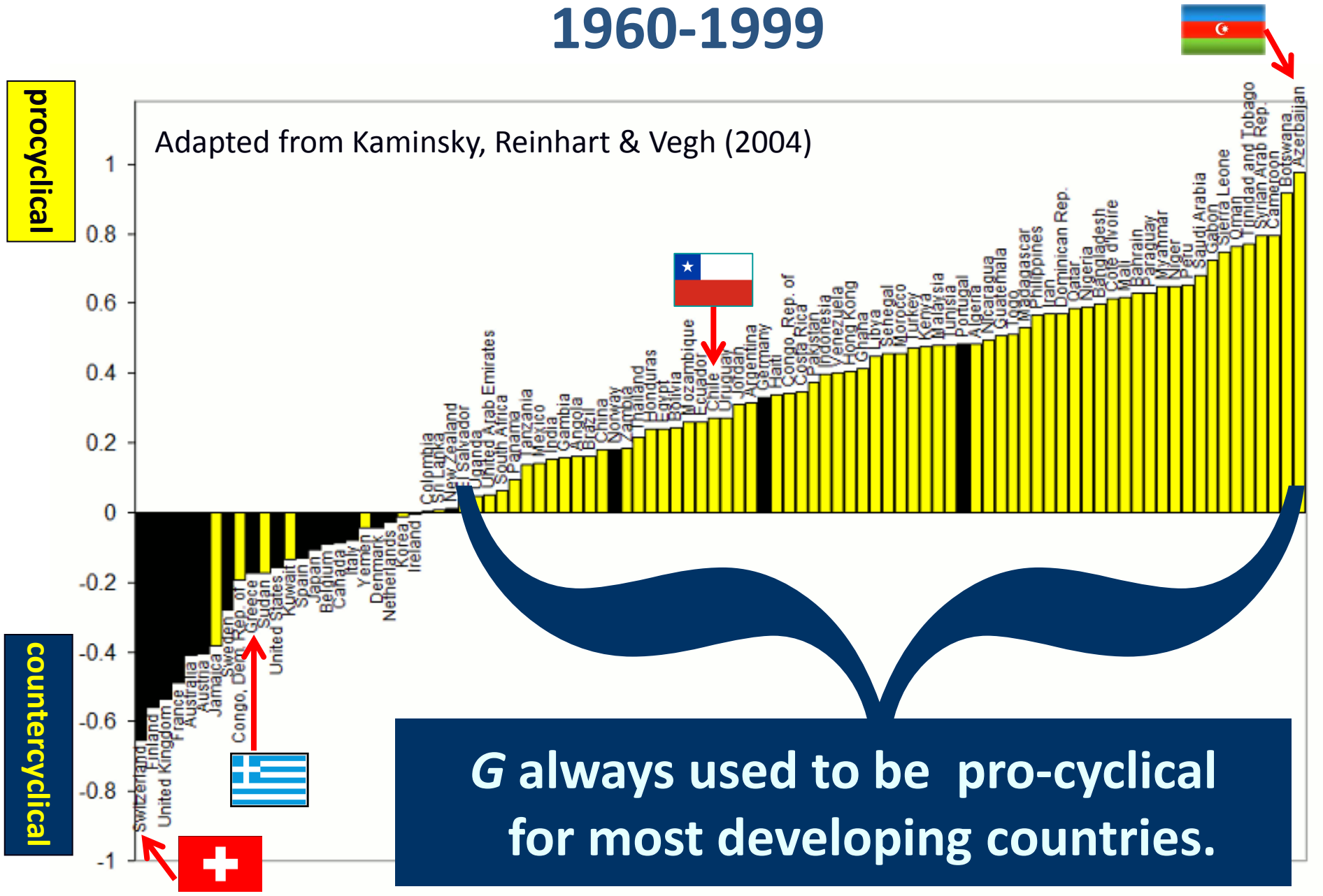
Procyclicality

- Fiscal policy has historically tended to be pro-cyclical in a majority of countries, especially developing countries,

  thereby worsening ups & downs in the economic cycle.

- Correlation of income & spending mostly positive:
  - Cuddington (1989), Gavin & Perotti (1997), Tornell & Lane (1999), Kaminsky, Reinhart & Vegh (2004), Talvi & Végh (2005), Alesina, Mendoza & Oviedo (2006), Campante & Tabellini (2008), Ilzetski & Vegh (2008), Medas & Zakharova (2009), Erbil (2011), Céspedes & Velasco (2014), Avellan & Vuletin (2015).
- Tax policy tends to be procyclical as well:
  - Vegh & Vuletin (*AEJ-EP*, 2015).

Correlations between Gov.t Spending & GDP 1960-1999

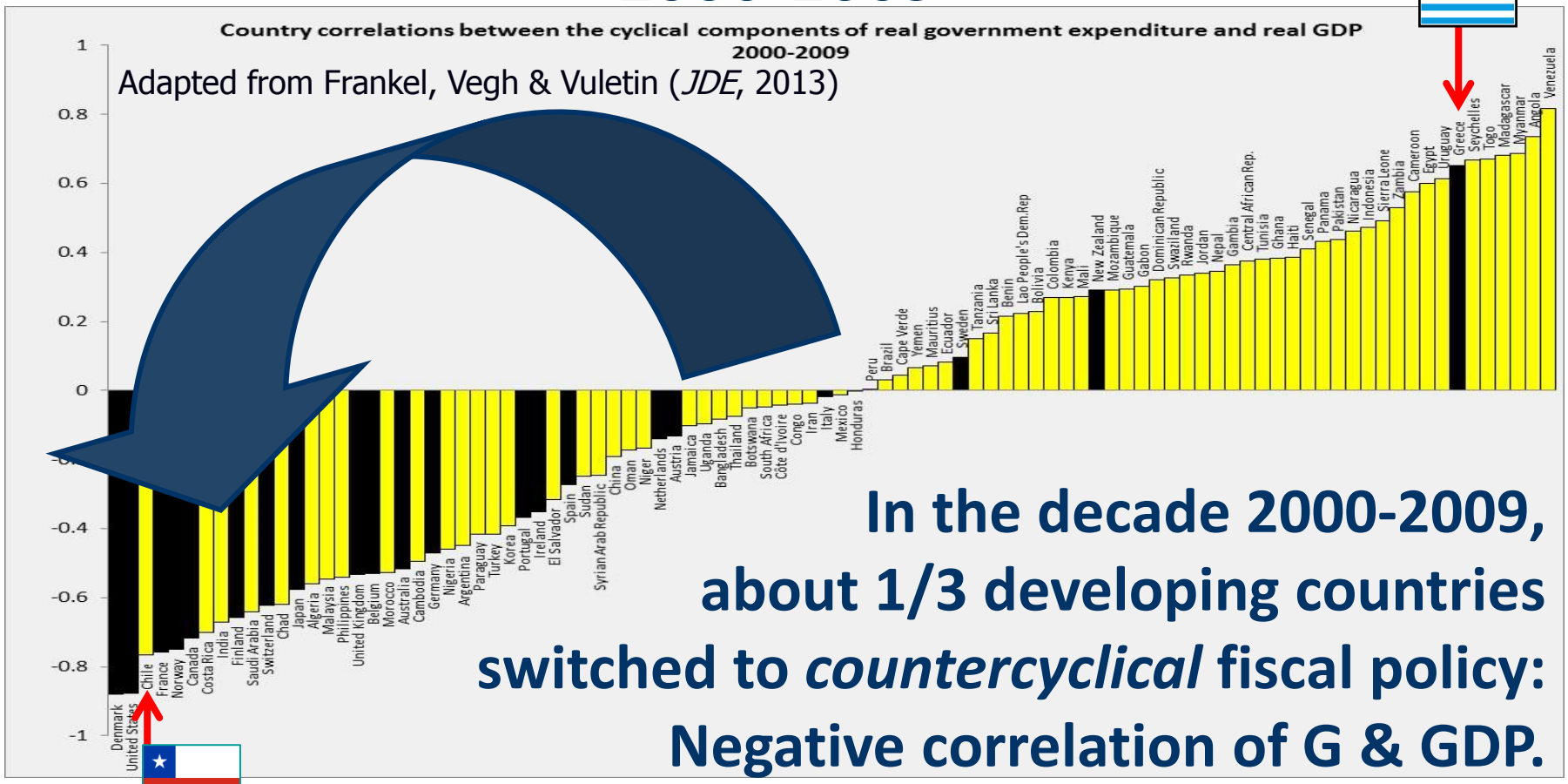


The procyclicality of fiscal policy, cont.

- An important development --
  some developing countries were able to break the historic pattern after 2000:
  - taking advantage of the boom of 2002-2008
    - to run budget surpluses & build reserves,
  - thereby earning the ability to expand fiscally in the 2008-09 crisis.
  - Chile, Botswana, Malaysia, Indonesia, Korea, China…

  - How were they able to achieve counter-cyclicality?

Correlations between Government spending & GDP 2000-2009



In the decade 2000-2009, about 1/3 developing countries switched to *countercyclical* fiscal policy: Negative correlation of G & GDP.

DEVELOPING:

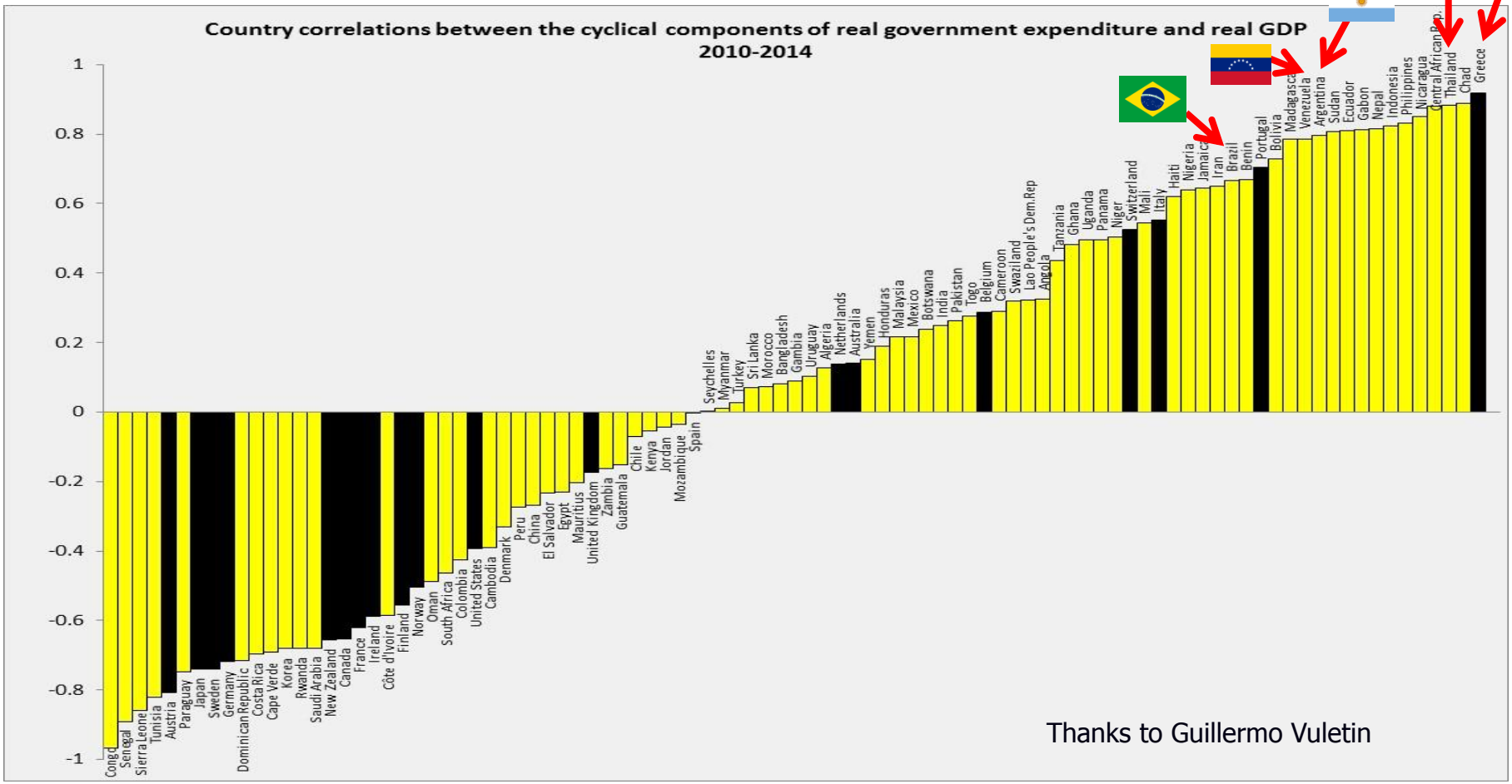
43% (or 32 out of 75) countercyclical. *The figure was 17% (or 13 out of 75) in 1960-1999.*

INDUSTRIAL:

86% (or 18 out of 21) countercyclical. *The figure was 80% (or 16 out of 20) in 1960-1999.*

Update of Correlation (G, GDP): 2010-14

Back-sliding among some countries.



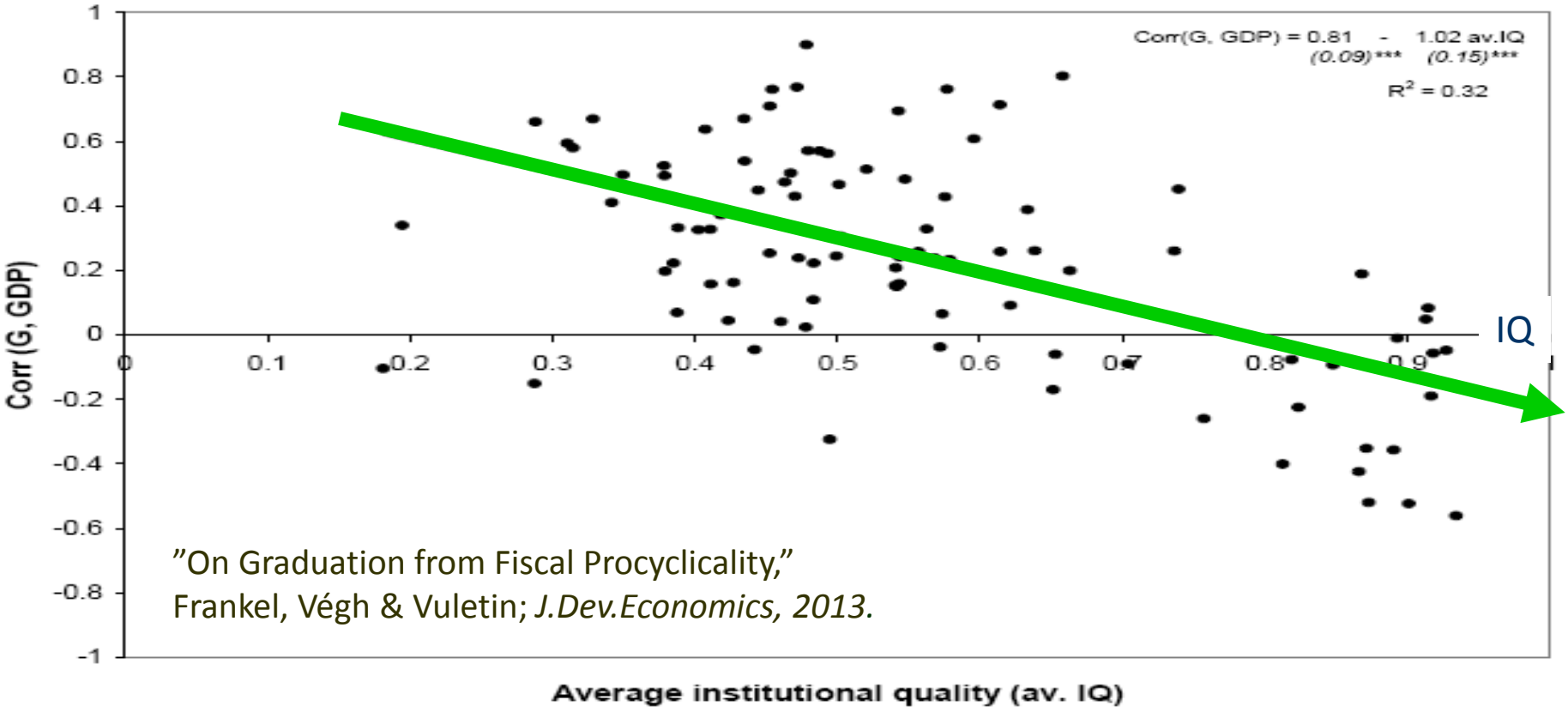
DEVELOPING: 37% (or 29 out of 76) pursue counter-cyclical fiscal policy.

INDUSTRIAL: 63% (or 12 out of 19) pursue counter-cyclical fiscal policy.

Who achieves countercyclical fiscal policy?

Countries with "good institutions"

Figure 5. Country correlations between the cyclical components of the real government expenditure and real GDP (1960-2009) vs. average institutional quality (1984-2008)



"On Graduation from Fiscal Procyclicality,"
Frankel, Végh & Vuletin; *J.Dev.Economics, 2013.*

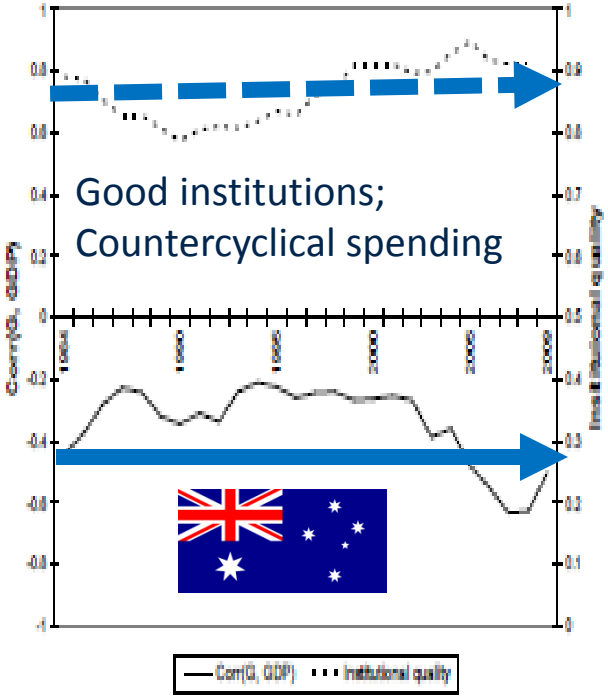
Notes: The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. Country correlations between the cyclical components of the real government expenditure and real GDP (i.e., Corr(G, GDP)) are calculated for the period 1960-2009. Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, bureaucracy quality. Country average institutional quality (i.e., av. IQ) is calculated for each country for the period 1984-2008. See Appendix 2 for correlation value and average institutional quality for each country.
Source: International Country Risk Guide (ICRG), World Economic Outlook and International Financial Statistics (IMF).

The quality of institutions varies, not just across countries, but also across time.

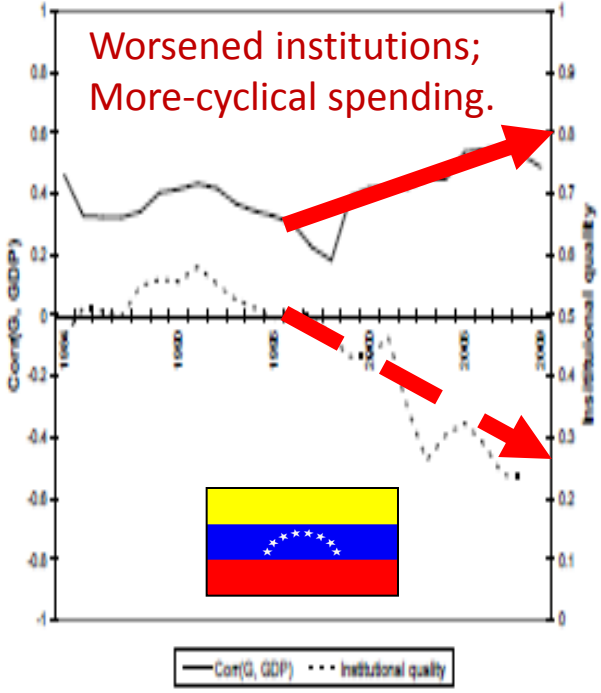
Figure 6. Graduation examples. Country correlations between the cyclical components of real government expenditure and real GDP (20-year rolling windows) vs. institutional quality

1984-2009

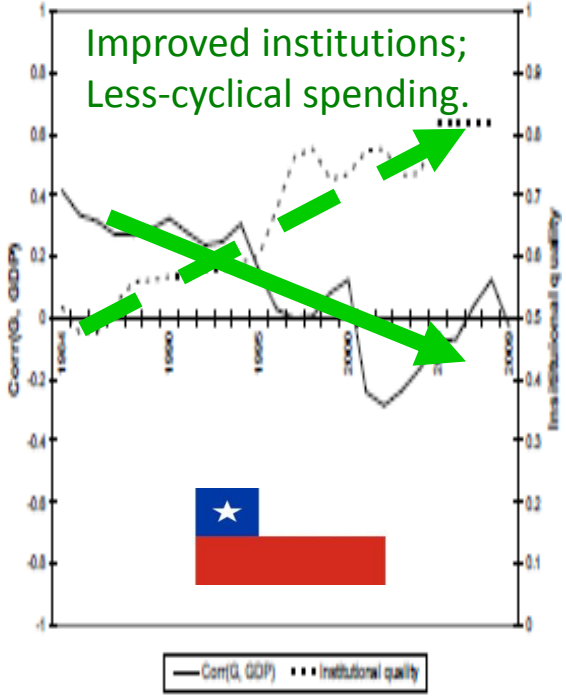
Panel A. Australia (established graduate)



Panel B. Venezuela (still in school)



Panel C. Chile (recent graduate)



Notes: The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. Country correlations between the cyclical components of real government expenditure and real GDP (i.e., Corr(G, GDP)) are calculated as 20-year rolling windows for the period 1960-2009.
Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, and bureaucratic quality. Actual institutional quality (i.e., for each year) is used.
Institutional quality is shown on the right axis and the correlation between the cyclical components of real government expenditure and real GDP is shown on the left.
Source: International Country Risk Guide (ICRG), World Economic Outlook and International Financial Statistics (IMF).

Frankel, Végh & Vuletin, *2013.*

Table 1. Institutional quality statistics by graduating class

Dependent variable is:	IQ	$IQ^{initial}$	ΔIQ
	(1)	(2)	(3)
Group means			
Established graduate (EG)	0.82	0.84	-0.02
Still in school (SS)	0.48	0.43	0.05
Recent graduate (RG)	0.55	0.47	0.07
Back to School (BS)	0.60	0.56	0.04
Mean tests (p-value)			
EG vs. SS	1.9×10^{-251}	1.8×10^{-12}	2.3×10^{-25}
EG vs. RG	2.1×10^{-120}	1.5×10^{-6}	7.7×10^{-33}
EG vs. BS	1.6×10^{-35}	0.009	5.9×10^{-20}
SS vs. RG	3.1×10^{-19}	0.346	1×10^{-4}
SS vs. BS	5×10^{-22}	0.081	0.599
RG vs. BS	4.5×10^{-4}	0.399	0.006

Notes: Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, and bureaucratic quality. IQ refers to the current institutional quality value. $IQ^{initial}$ refers to earliest IQ value available for each country; in most cases it corresponds to the 1984 value. The only exceptions are Rep. of Congo (1985), Gambia (1985), Niger (1985), Sierra Leone (1985), Yemen (1990), and Azerbaijan (1998). $\Delta IQ \equiv IQ - IQ^{initial}$. The mean test is a t-test on the equality of means for two groups; the null hypothesis is that both groups have the same mean.
Source: International Country Risk Guide (ICRG).

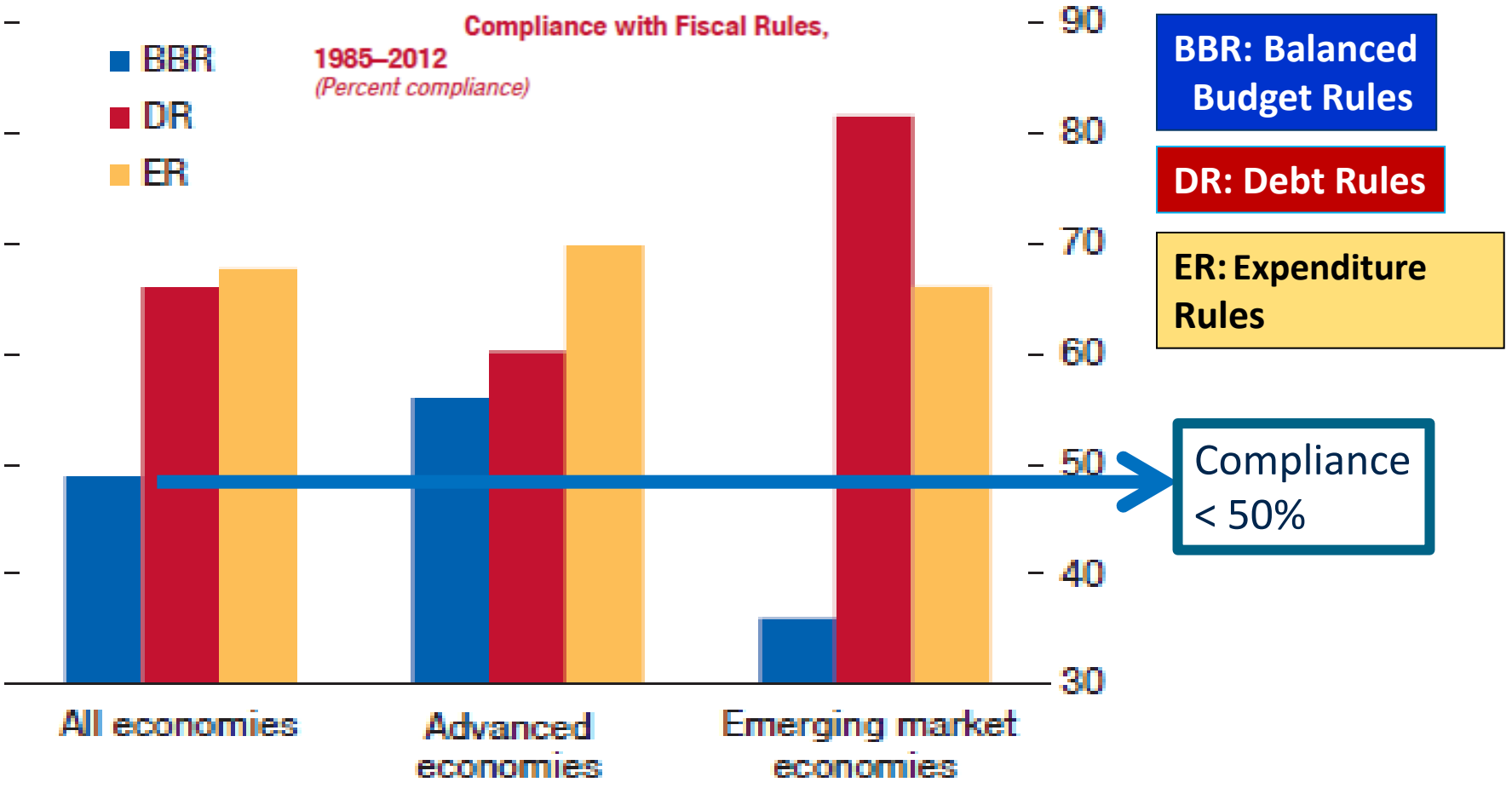
The countries that graduated to countercyclical fiscal policy after 2000, statistically, are those where institutional quality improved.

"On Graduation from Fiscal Procyclicality," Frankel, Végh & Vuletin; *J. Dev. Econ.*, 2013.

How can countries avoid pro-cyclical fiscal policy?

- What *are* "good institutions," exactly?
- Rules?
  - Budget deficit ceilings (SGP) or debt brakes?
    - Have been tried by many countries:
      - 97 IMF members, by 2013.
      - Usually fail.
  - Rules for *cyclically adjusted* budgets?
    - Countries can more likely stick with them. But…
- Rules don't address a major problem:
  - Over-optimism in official forecasts
    - of GDP growth rates, tax receipts & budgets.

Countries with Balanced Budget Rules frequently violate them.



FISCAL MONITOR
April 2014

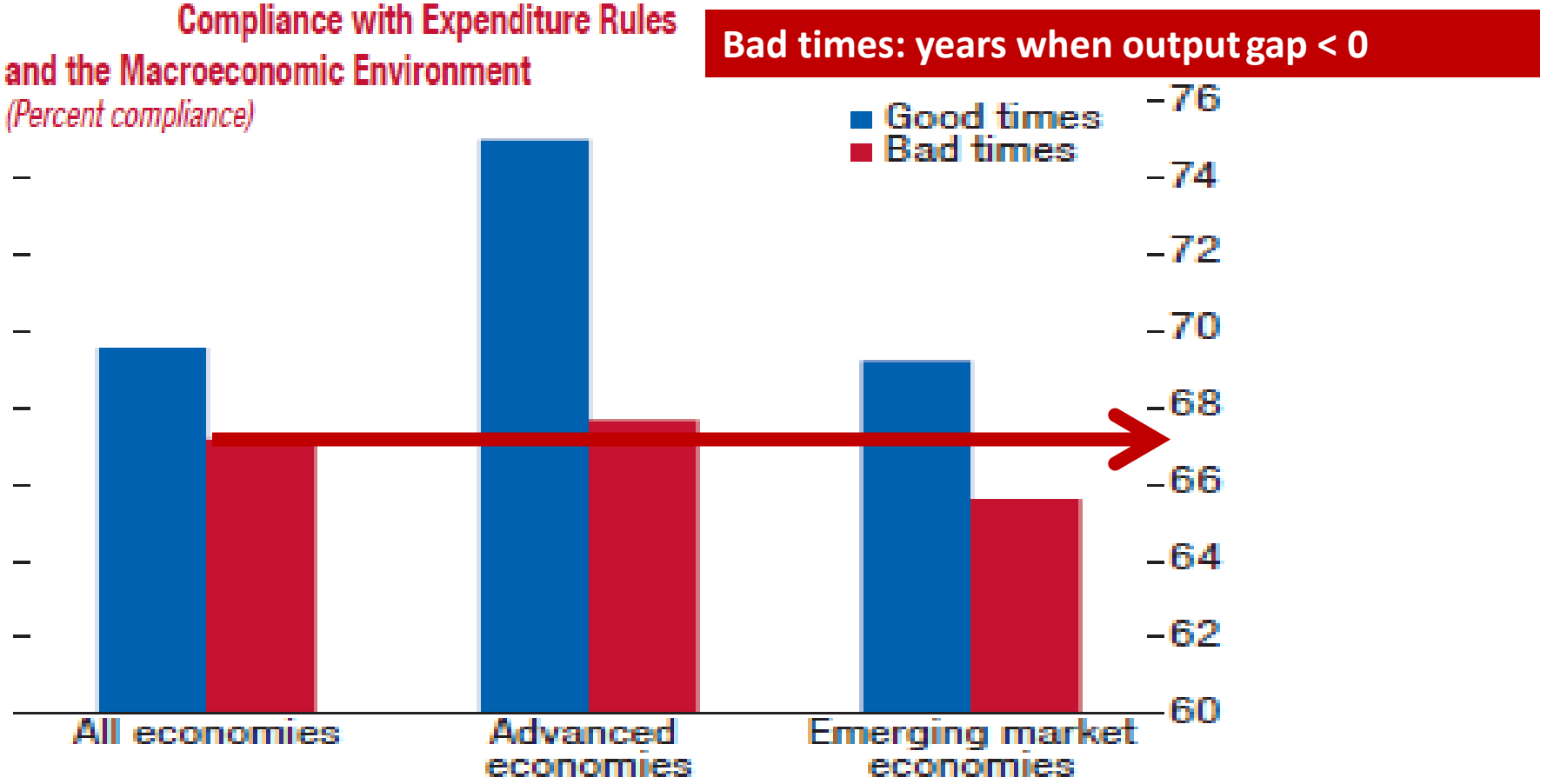
Public Expenditure Reform
Making Difficult Choices

International Monetary Fund, 2014

Sources: IMF, Fiscal Rules Database; and IMF staff estimates.
Note: The y axis measures the average compliance rate with Balance Budget Rules (BBR), Expenditure Rules (ER), and Debt Rules (DR) in all years in which an assessment could be made. BBRs and DRs include both national and supranational rules.

To expect countries to comply with the rules during recessions is particularly unrealistic

(and not even necessarily desirable).



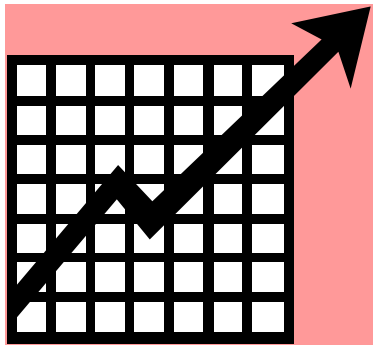
International Monetary Fund, 2014

Over-optimism in official forecasts

- Statistically significant findings among 33 countries
  - Frankel (2011, 2012).
- Official forecasts on average are overly optimistic, for:
  - (1) budgets &
  - (2) GDP .
- The bias toward optimism is:
  - (3) stronger the longer the forecast horizon;
  - (4) greater in booms.

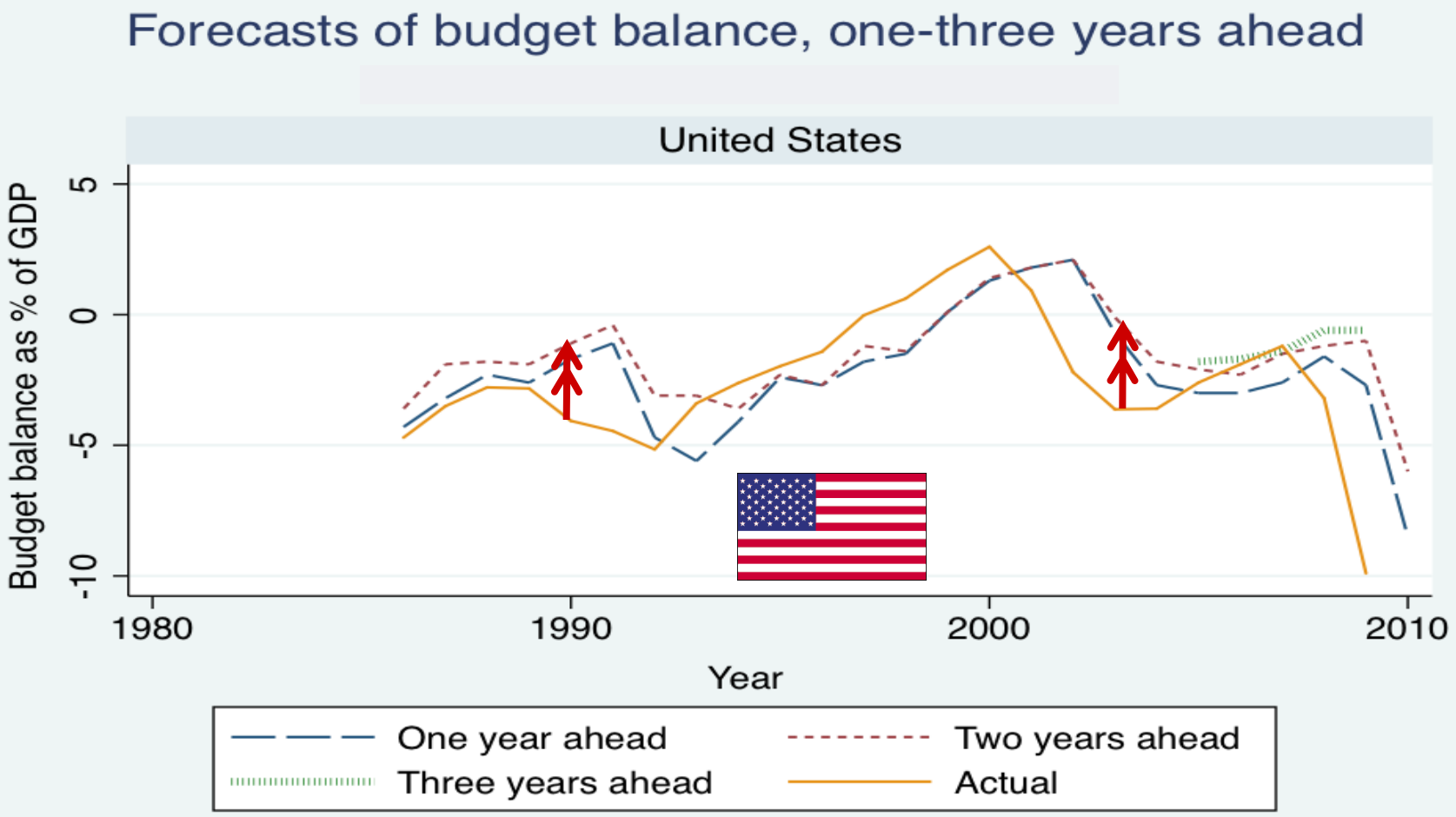
Implication of forecast bias for actual budgets

- Can lead to pro-cyclical fiscal policy:
  - If the boom is forecast to last indefinitely, there is no apparent need to retrench.

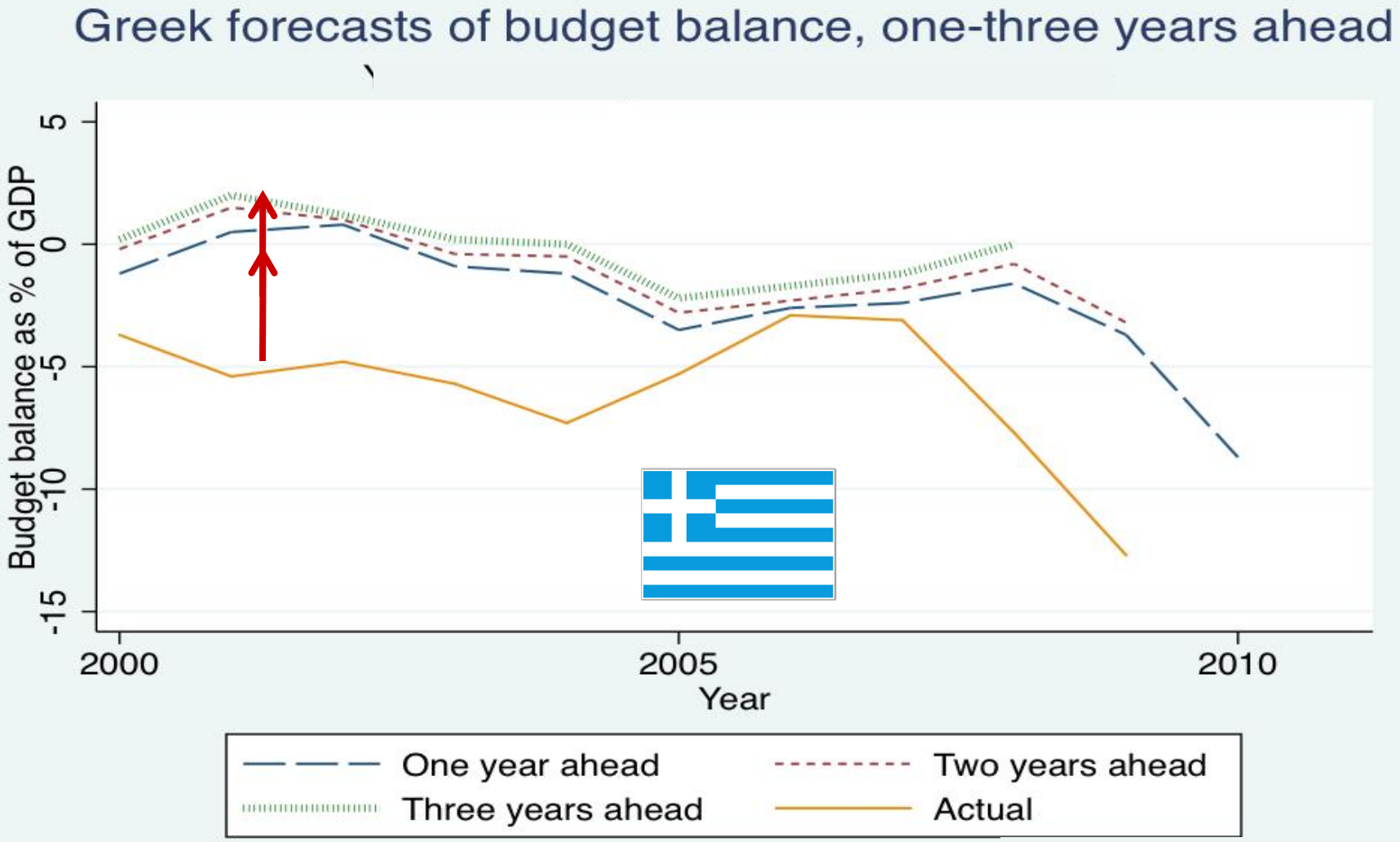


- BD rules don't help.
  - The SGP *worsens* forecast bias for euro countries.
    - Frankel & Schreger (2013)

US official projections were over-optimistic on average.



Greek official forecasts were *always* over-optimistic.



Data from Greece's Stability and Convergence Programs.

German forecasts were also usually too optimistic.

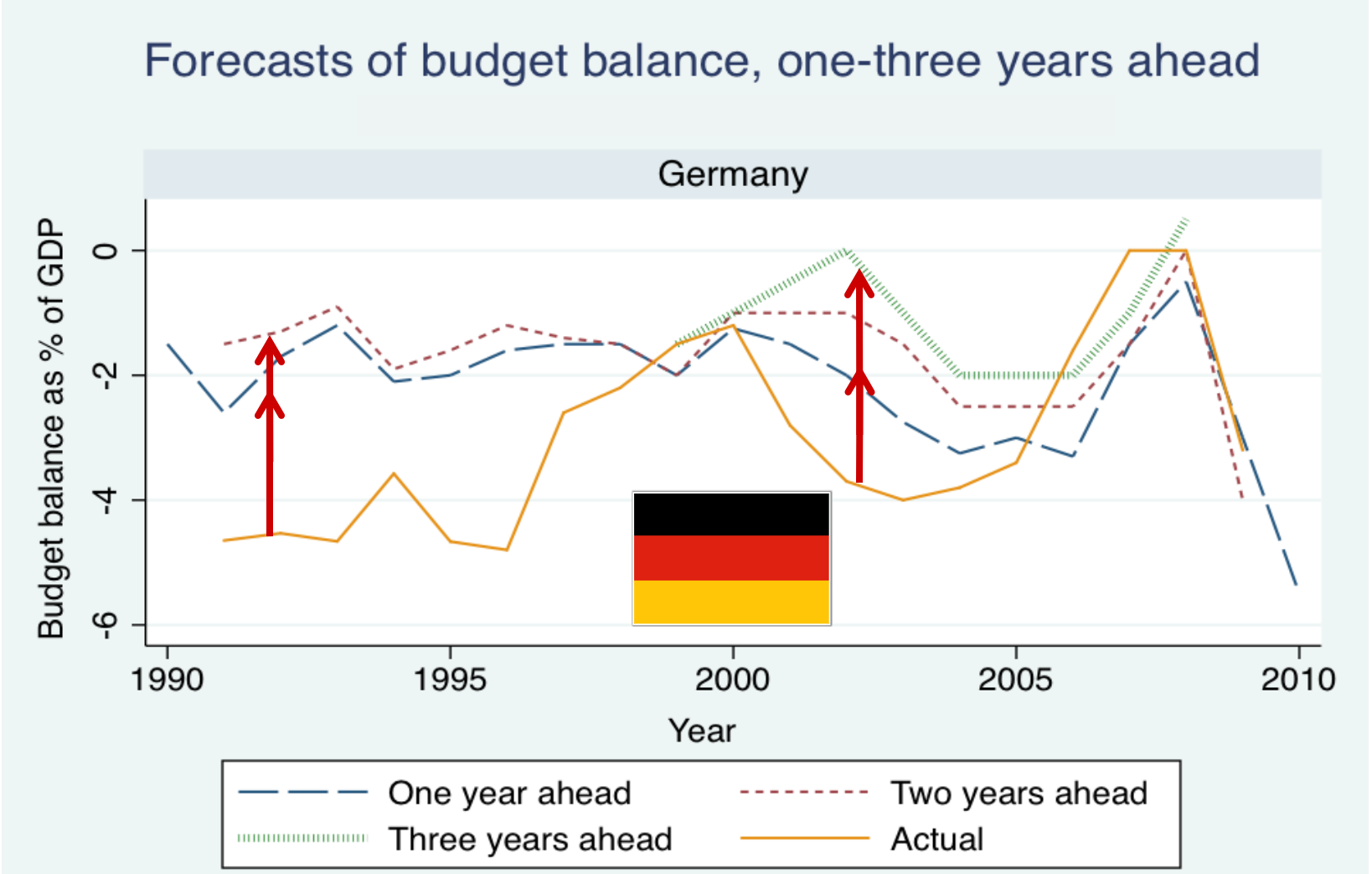


Table 2: Frankel (2011)

Budget balance forecast error as % of GDP, full dataset

Variables	1 year ahead	2 years ahead	3 years ahead
GDP gap	0.093***	0.258***	0.289***
	(0.019)	(0.040)	(0.063)
Constant	0.201	0.649***	1.364***
	(0.197)	(0.231)	(0.348)
Observations	398	300	179
R^2	0.033	0.113	0.092
RMSE	2.25	2.73	3.10

*** p<0.01, ** p<0.05, * p<0.1.
(Robust standard errors in parentheses, clustered by country.)
Note: GDP gap is lagged so that it lines up with the year in which the forecast was made, not the year being forecast.

Econometric findings regarding bias among EU countries in particular.

- Euro countries, subject to the SGP,
  - show even more optimism bias than others
    - in growth forecasts, significant at 1 and 2-year horizons
  - particularly when GDP is currently high.
  - Forecasts of budget balance among euro countries also show extra bias when GDP is currently high.

GDP growth rate forecast error,

full dataset. Frankel (2011), Table 5 (c)

Variables	1 year ahead	2 years ahead	3 years ahead	1 year ahead	2 years ahead	3 years ahead
SGP dummy	0.379*	0.780**	–0.555	0.192	0.221	–1.067*
	(0.199)	(0.352)	(0.529)	(0.215)	(0.410)	(0.549)
SGP*GDPgap				0.148**	0.516***	0.522***
				(0.068)	(0.141)	(0.161)
Constant	0.239	0.914***	2.436***	0.252	0.887***	2.444***
	(0.168)	(0.318)	(0.643)	(0.168)	(0.330)	(0.642)
Observations	369	282	175	368	282	175
Countries	33	31	28	33	31	28
R^2	0.006	0.006	0.007	0.011	0.042	0.040
RMSE	2.40	3.44	3.81	2.38	3.36	3.73

***p<0.01, **p<0.05, *p<0.1. (Robust standard errors in parentheses.) Random effects.

SGP ≡ dummy for countries subject to the SGP.

GDP gap ≡ GDP as deviation from trend.

All variables are lagged so that they line up with the year in which the forecast was made.

Budget balance forecast error,

full dataset. Frankel (2011), Table 3(c).

Variables	1 year ahead	2 years ahead	3 years ahead	1 year ahead	2 years ahead	3 years ahead
SGP dummy	0.368	0.922***	0.625	0.182	0.331	0.066
	(0.342)	(0.329)	(0.415)	(0.335)	(0.355)	(0.449)
SGP * GDPgap				0.161**	0.509***	0.544***
				(0.065)	(0.147)	(0.148)
Constant	0.245	0.530**	1.235***	0.219	0.501*	1.240***
	(0.198)	(0.268)	(0.408)	(0.193)	(0.268)	(0.404)
Observations	399	300	179	398	300	179
Countries	33	31	29	33	31	29
R^2	0.018	0.023	0.008	0.029	0.080	0.076
RMSE	2.113	2.701	3.130	2.122	2.614	3.011

***p<0.01, **p<0.05, *p<0.1. (Robust standard errors in parentheses.) Random effects.

SGP ≡ dummy for countries subject to the SGP.

GDP gap ≡ GDP as deviation from trend.

All variables are lagged so that they line up with the year in which the forecast was made.

What institutions might help address the problem of bias in fiscal forecasts?

- The evidence from the euro-zone and other countries suggests that fiscal rules are not the solution to the problem.

- Two papers offer suggestions of possible answers:
  - The use of private sector forecasts.
  - The case of Chile's fiscal institutions.

New research brings in private sector forecasts, from *Consensus Economics*

Frankel & Schreger (2016)

The extension of the analysis helps answer two important questions.

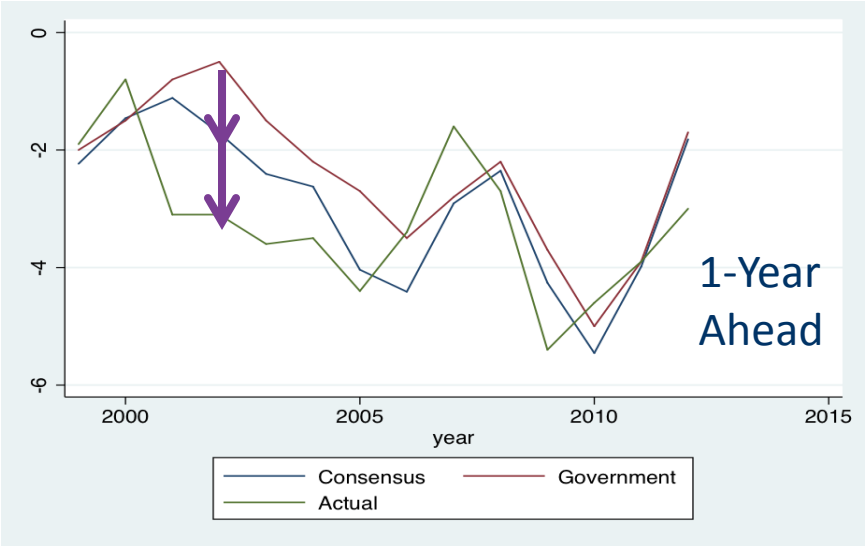
i. When the time sample is short, results based on ex post realizations can be too sensitive to particular historical outcomes:
Might earlier findings of over-optimism be explained by one historical event, the severe 2008-09 crisis that everyone underestimated?

Private forecasts offer an alternative standard by which to judge performance of official forecasts, less sensitive to historically volatile ex post outcomes.

ii. If the reform proposal is that budget-makers should use independent projections such as those by private forecasters,
it may be instructive to test whether private forecasters suffer from optimism bias as badly as government forecasters.

Italy is typical: Private forecasts more realistic than official forecasts

Fig.2: Budget Balance Forecasts



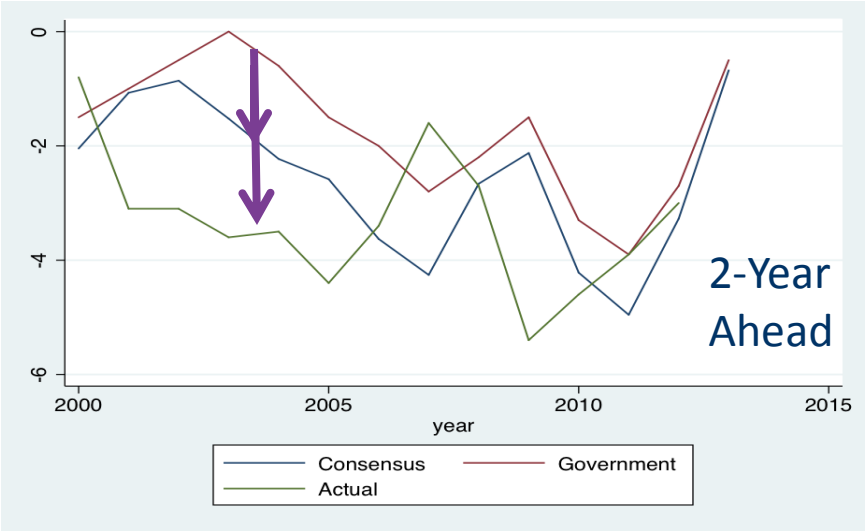
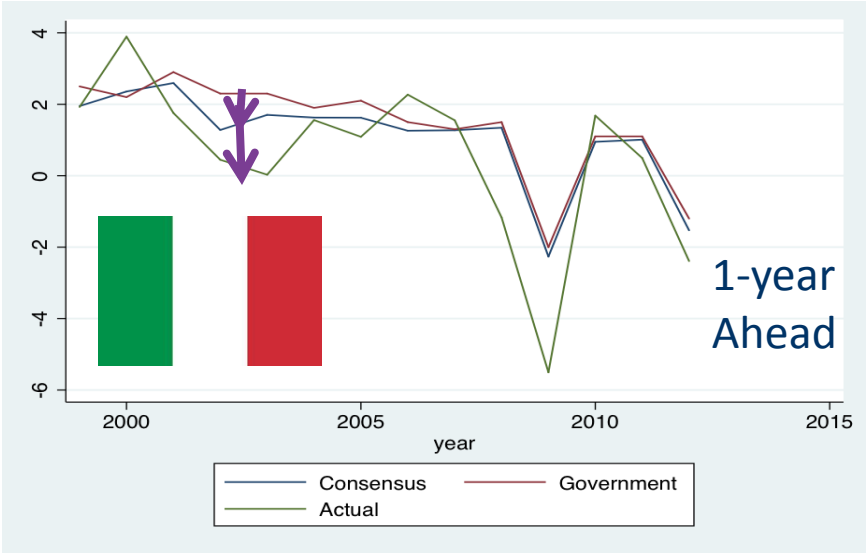
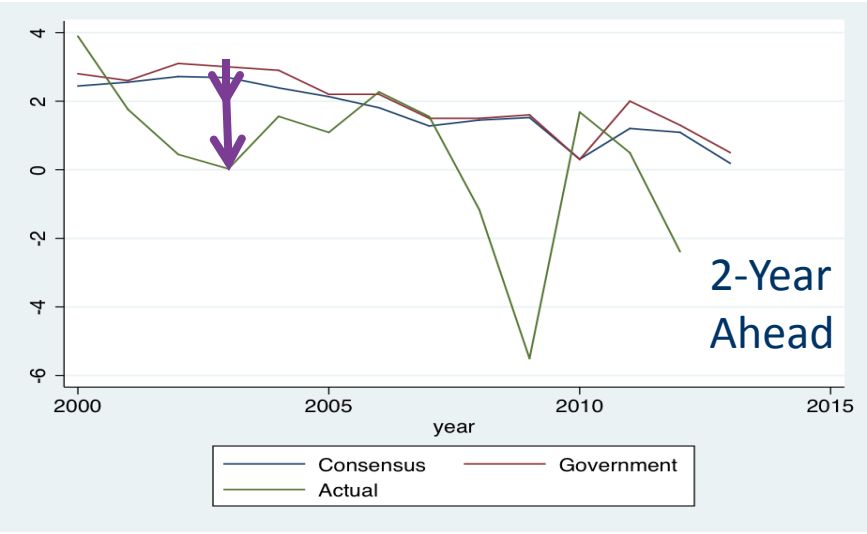


Fig.3: Real GDP Growth Forecasts





Notes: Forecast year is year being forecast. Frankel & Schreger (June 2013)

We have three main new results,

for a sample of 26 countries (sample period up to 2013.)

1. Official forecasters are more over-optimistic than private forecasters on average, at the 1- & 2-year horizon for budget balances and at the 1- & 2-year horizon for real GDP forecasts.

2. While euro area governments were very reluctant to forecast violations of the 3% deficit/GDP cap in the SGP; private sector forecasters were not.

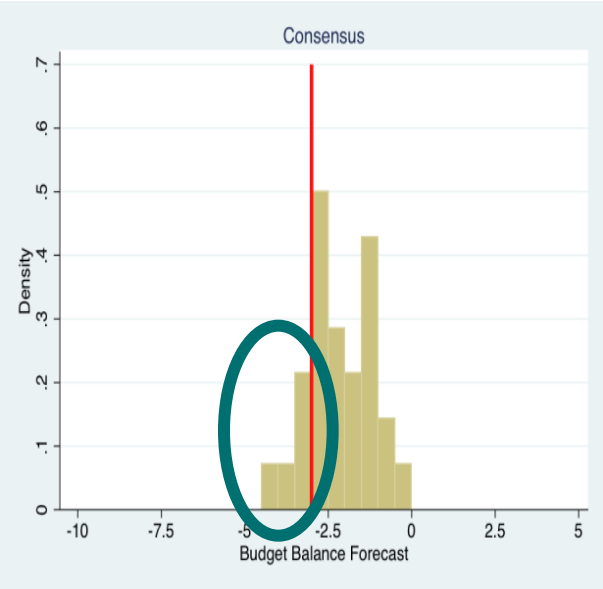
3.The difference between official forecast & private forecast is positively correlated with the difference between official forecast and ex post realization.

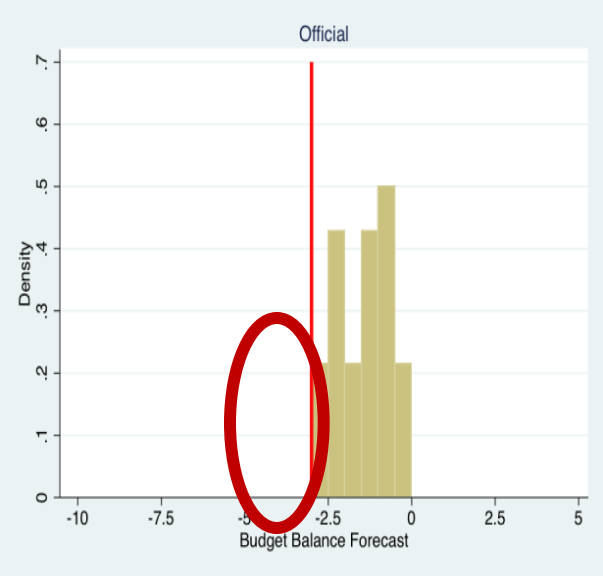
• These results suggest that incorporating private sector forecasts into the budget process could help countries stick to fiscal rules, by identifying over-optimism ex ante rather than just ex post.

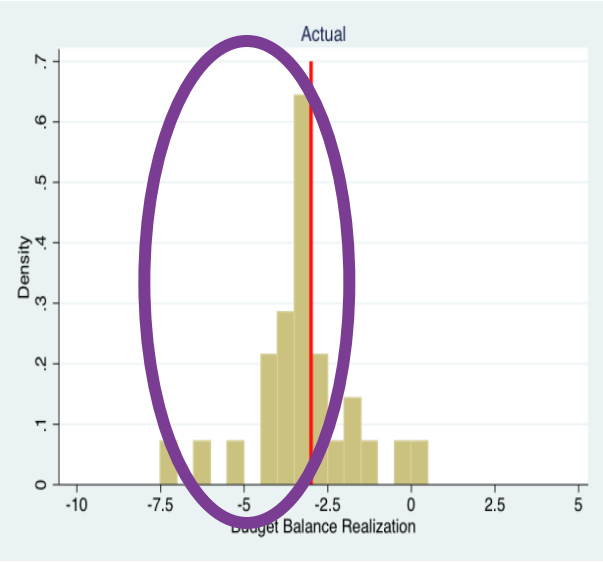
Budget forecasts & realizations in the euro area

2-years ahead, thru 2009

Frankel & Schreger (2016), Figure 5







In the euro countries, which are subject to SGP rules, the optimism bias took the form of never forecasting next year's budget deficit > 3% of GDP.

Private-sector forecasts surveyed by *Consensus Forecasts* are free to forecast budget deficits > 3% of GDP.

Frankel & Schreger (2016) Table III

Summary Statistics for Budget Balance Forecasts (% of GDP)

Two-year ahead forecasts (95 observations, 10 countries)

	Mean	Standard Error
Official Minus Consensus	0.478***	(0.086)
Official Forecast Error	1.060*	(0.541)
Consensus Forecast Error	0.582	(0.548)

Driscoll-Kraay Standard Errors with 2 year lag. Only includes countries with at least 6 years of data.

- The official budget forecasts are over-optimistic on average.
- The private forecasts from Consensus Economics are significantly less over-optimistic than the official forecasts.

Frankel & Schreger (2016) Table IV

Summary Statistics for GDP Growth Forecasts

Two-year ahead forecasts (278 observations, 23 countries)

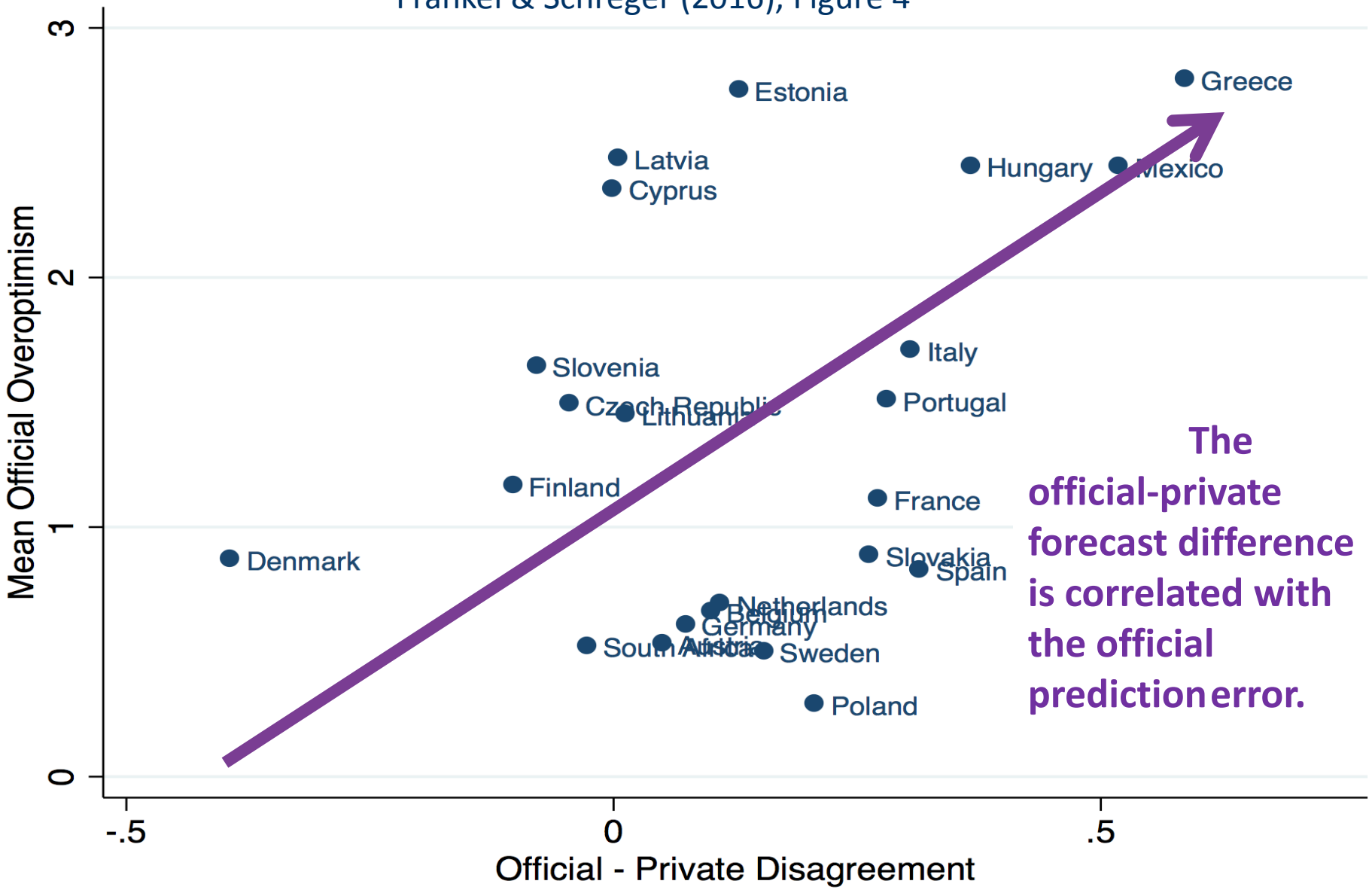
	Mean	Standard Error
Official Minus Consensus	0.135**	(0.048)
Official Forecast Error	1.244	(0.738)
Consensus Forecast Error	1.110	(0.736)

Driscoll-Kraay Standard Errors with 2 year lag. Only includes countries with at least 6 years of data.

- **As with the forecasts of budget balance, the private forecasts of GDP growth are significantly less over-optimistic than the official forecasts.**

GDP Growth Forecasts, 2-Year Ahead)

Frankel & Schreger (2016), Figure 4



Official GDP Growth Forecast Errors and Government-Private Disagreement

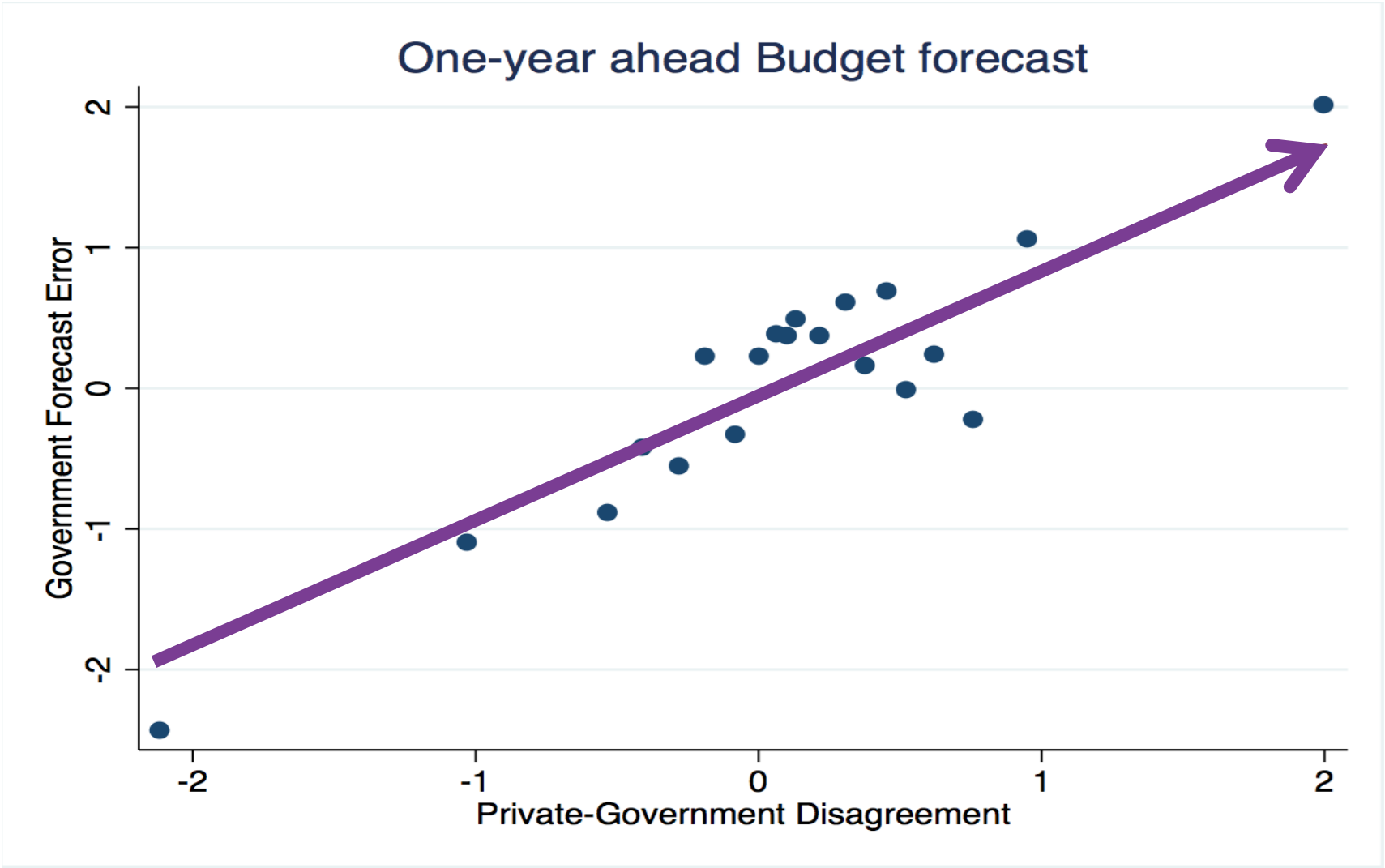
excluding 2008-09, to make sure the great recession isn't driving the results

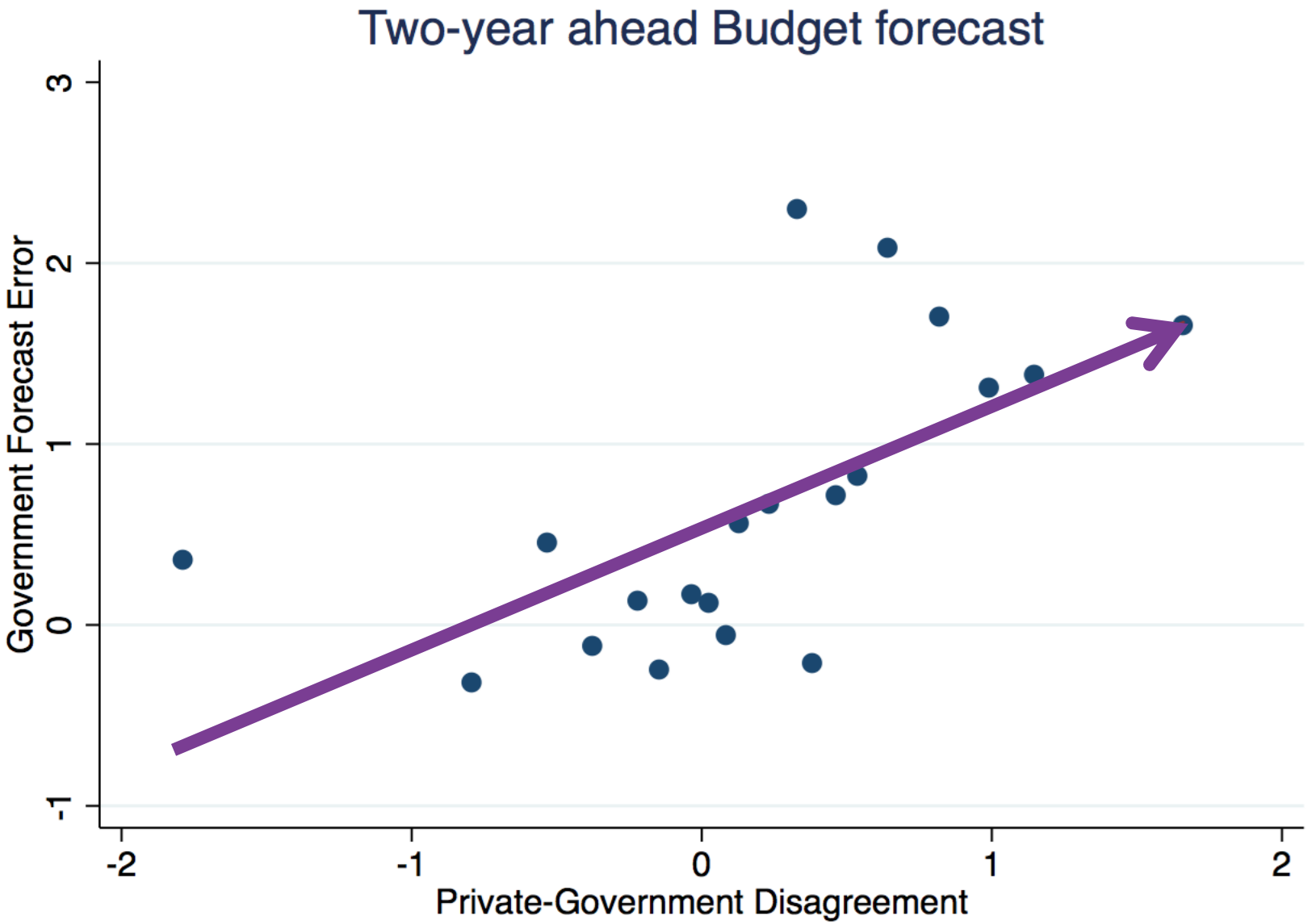
	(1) Off. Error t+1	(2) Off. Error t+1	(3) Off. Error t+2	(4) Off. Error t+2
Official-Consensus	0.856***	0.845***	0.471**	0.284*
	(0.161)	(0.181)	(0.203)	(0.135)
Constant	-4.669***	-1.855**	1.595***	1.141
	(0.124)	(0.764)	(0.020)	(0.702)
Observations	272	272	232	232
R-squared	0.416	0.594	0.424	0.593
Countries	26	26	23	23
Year FE	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	Yes

The official-private difference in ex ante forecasts is significantly correlated with the ex post official prediction error.

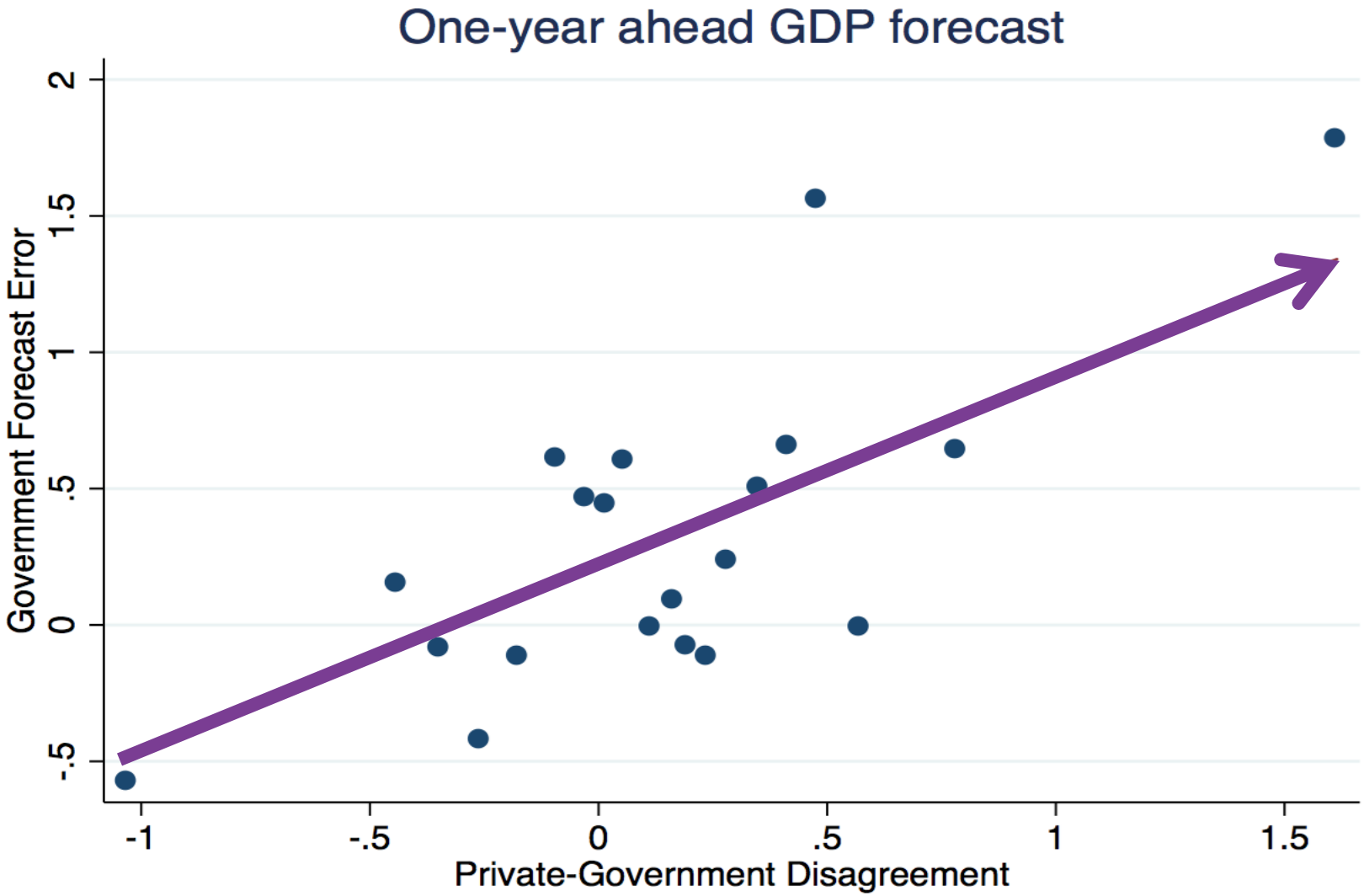
Frankel & Schreger (2016), Table VII

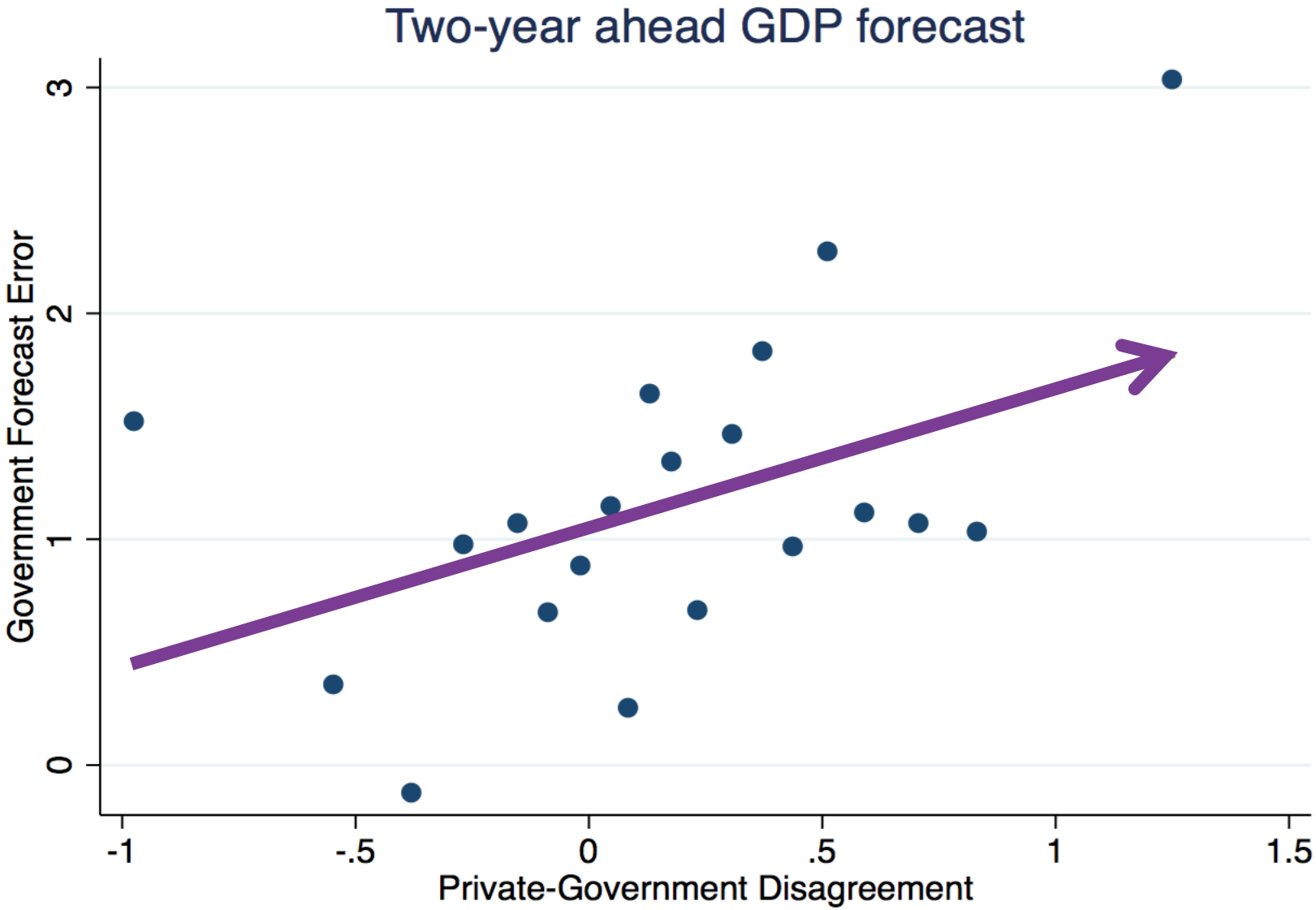
When official forecasts of budget balance are more optimistic than private forecasts, they are too optimistic.




Two-year ahead Budget forecast
Government Forecast Error
3
2
1
0
-1
-2
-1
0
1
2
Private-Government Disagreement

When official forecasts of GDP are more optimistic than private forecasts, they are too optimistic.




Two-year ahead GDP forecast
Government Forecast Error
0
1
2
3
-1
-.5
0
.5
1
1.5
Private-Government Disagreement

Conclusions regarding private forecasts

Incorporating private sector forecasts into the budget process could help countries stick to fiscal rules:

1. Official forecasters are more over-optimistic than private forecasters judged by outcomes for budget balances & real GDP.

2. While euro area governments were very reluctant to forecast violations of the 3% deficit/GDP cap in the SGP during the period 1999-2009, private sector forecasters were not.

3.The difference between official forecast & private forecast is positively correlated with the difference between official forecast and ex post realization, i.e., the prediction error.

A possible solution: The case of Chile's institutions

- 1st rule – Governments must set a budget target,

- 2nd rule – The target is structural:
  Deficits allowed only to the extent that
  - (1) output falls short of trend, in a recession,
  - (2) or the price of copper is below its trend.

- 3rd rule – The trends are projected by 2 panels of independent experts, outside the political process.
  - Result: Chile avoided the pattern of 32 other governments,
    - where forecasts in booms were biased toward optimism.

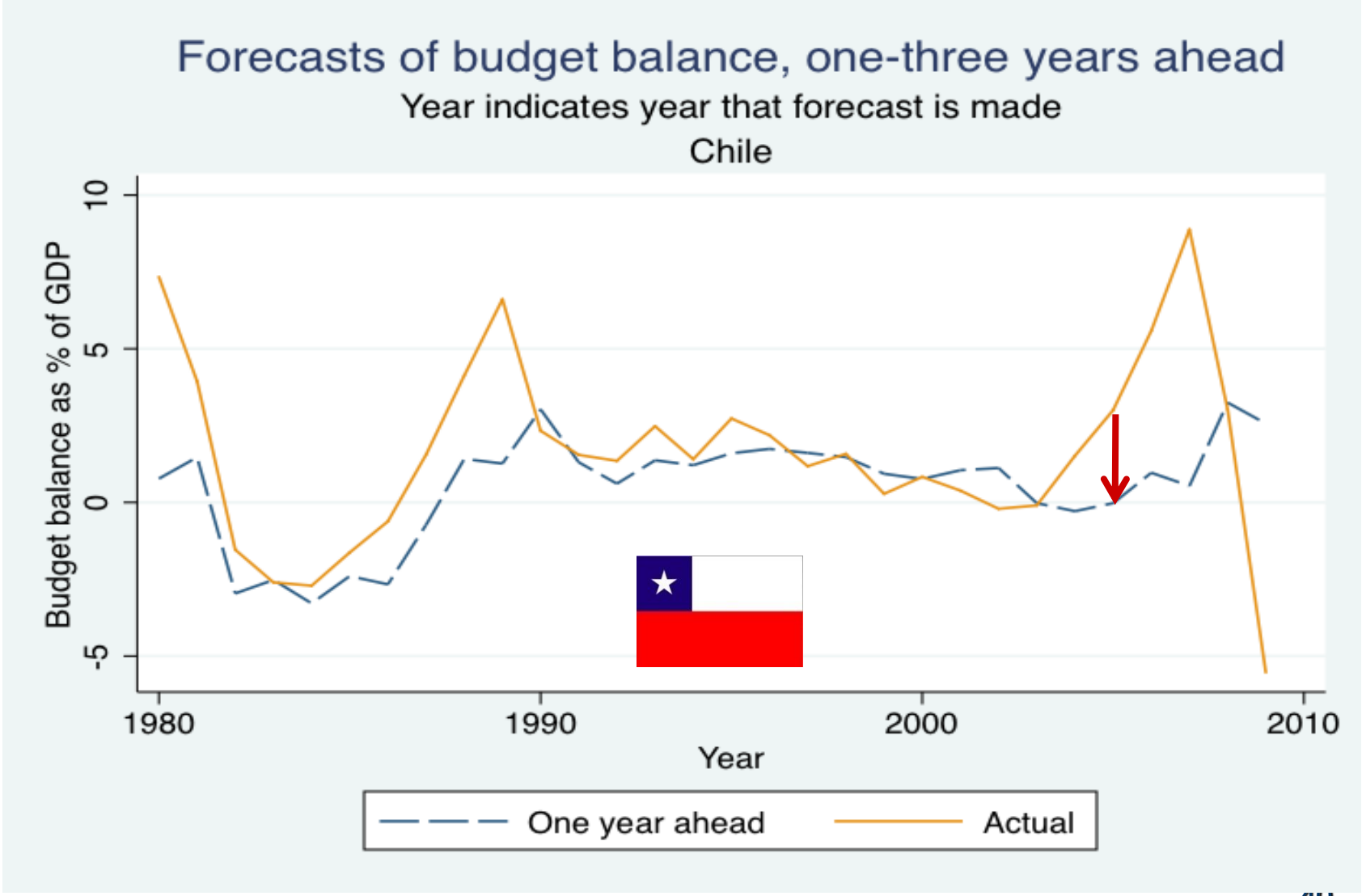
Chilean fiscal institutions

- In 2000 Chile instituted its structural budget rule.
- The institution was formalized in law in 2006.
- The structural budget surplus must be…
  - 0 as of 2008 (was 1%, then ½ %, before; negative after),
  - where structural is defined by output & copper price equal to their long-run trend values.
- I.e., in a boom the government can only spend increased revenues that are deemed permanent; any temporary copper bonanzas must be saved.

The Pay-off

- Chile's fiscal position strengthened immediately:
  - Public saving rose from 2.5 % of GDP in 2000 to 7.9 % in 2005
  - allowing national saving to rise from 21 % to 24 %.
- Government debt fell sharply as a share of GDP and the sovereign spread gradually declined.
- By 2006, Chile achieved a sovereign debt rating of A,
  - several notches ahead of Latin American peers.
- By 2007 it had become a net creditor.
- By 2010, Chile's sovereign rating had climbed to A+,
  - ahead of some advanced countries. Now AA-.
- => It was able to respond to the 2008-09 recession
  - via fiscal expansion.

Chile's official forecasts have *not* been over-optimistic.



In sum, Chile's fiscal institutions appear to have overcome the problem of over-optimism:

- Chile is not subject to the same bias toward over-optimism in forecasts of the budget, growth, or the all-important copper price.

- The key innovation that has allowed Chile to achieve countercyclical fiscal policy:
  - not just a structural budget rule in itself,
  - but rather the regime that entrusts to two panels of independent experts estimation of the long-run trends of copper prices & GDP.

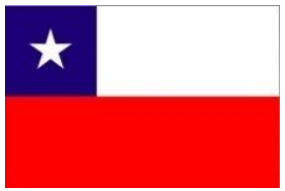
Appendices

- Appendix I: Pro-cyclical politicians in the US.

- Appendix II: Mexican case

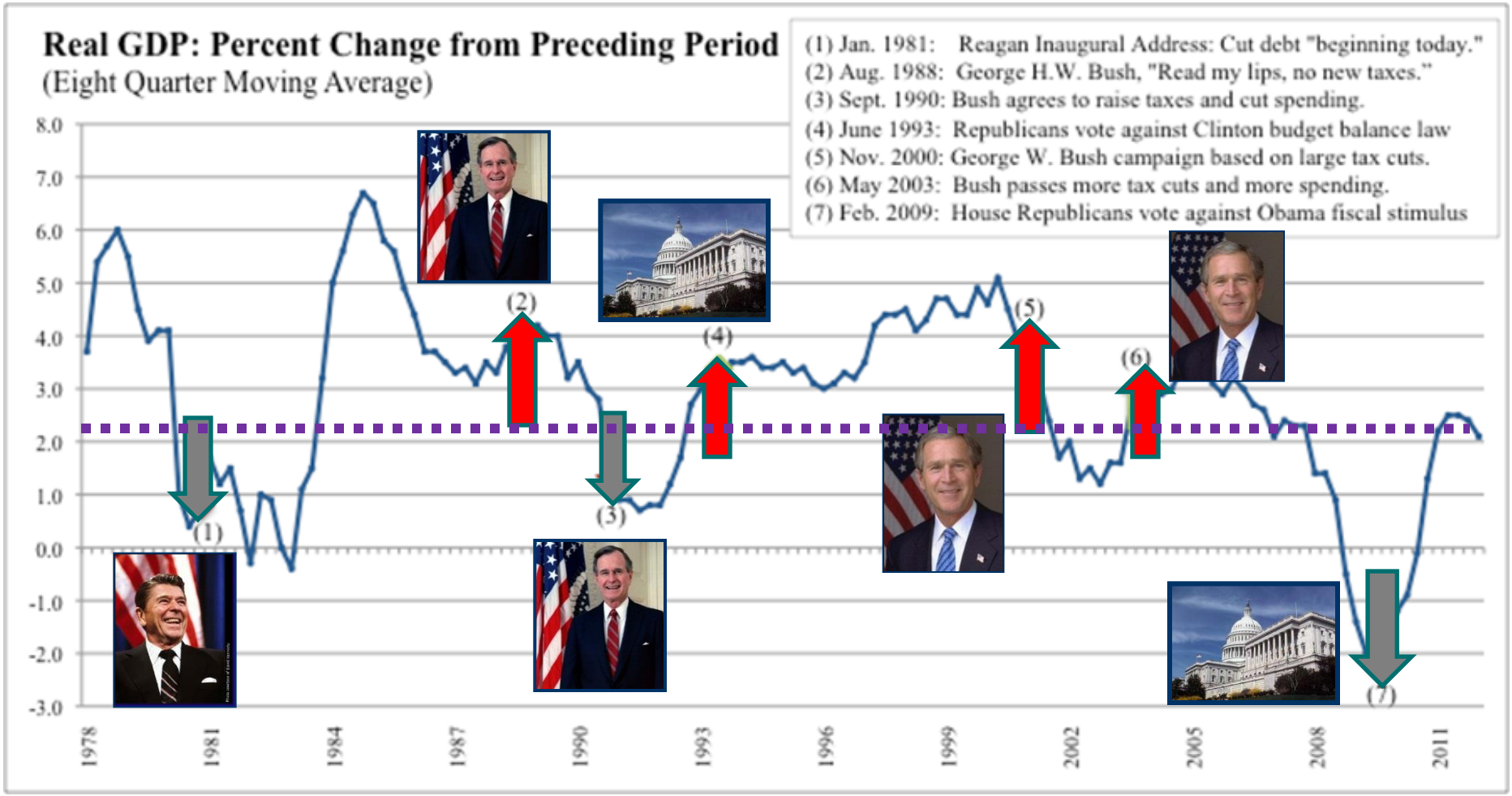
- Appendix III: More on the European case

- Appendix IV: More on the Chilean case.



Appendix I: Pro-cyclical politicians in the US

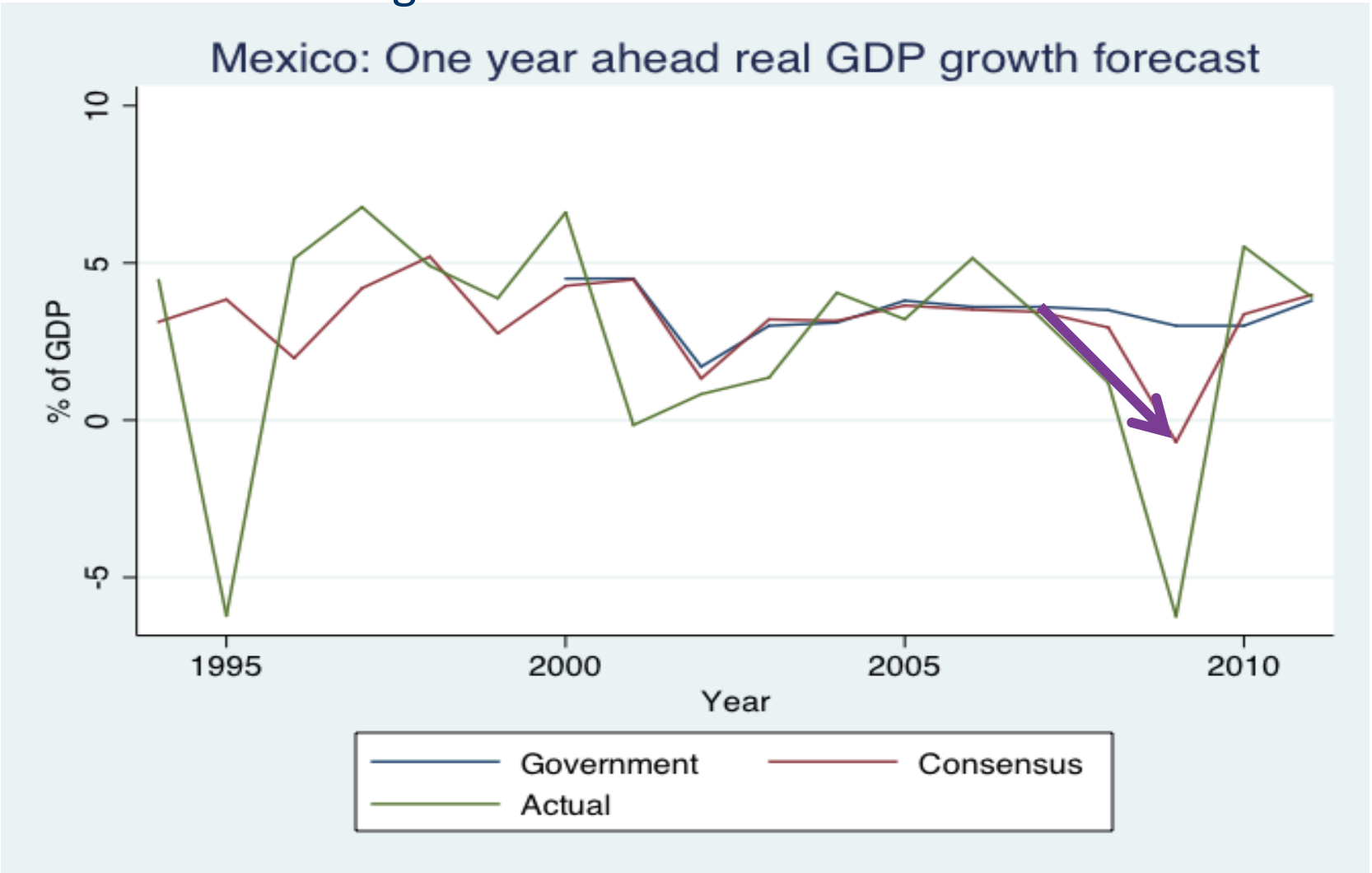
Through 3 cycles, some pursued austerity during recessions, followed by fiscal expansion when the economy was already expanding.



Appendix II:

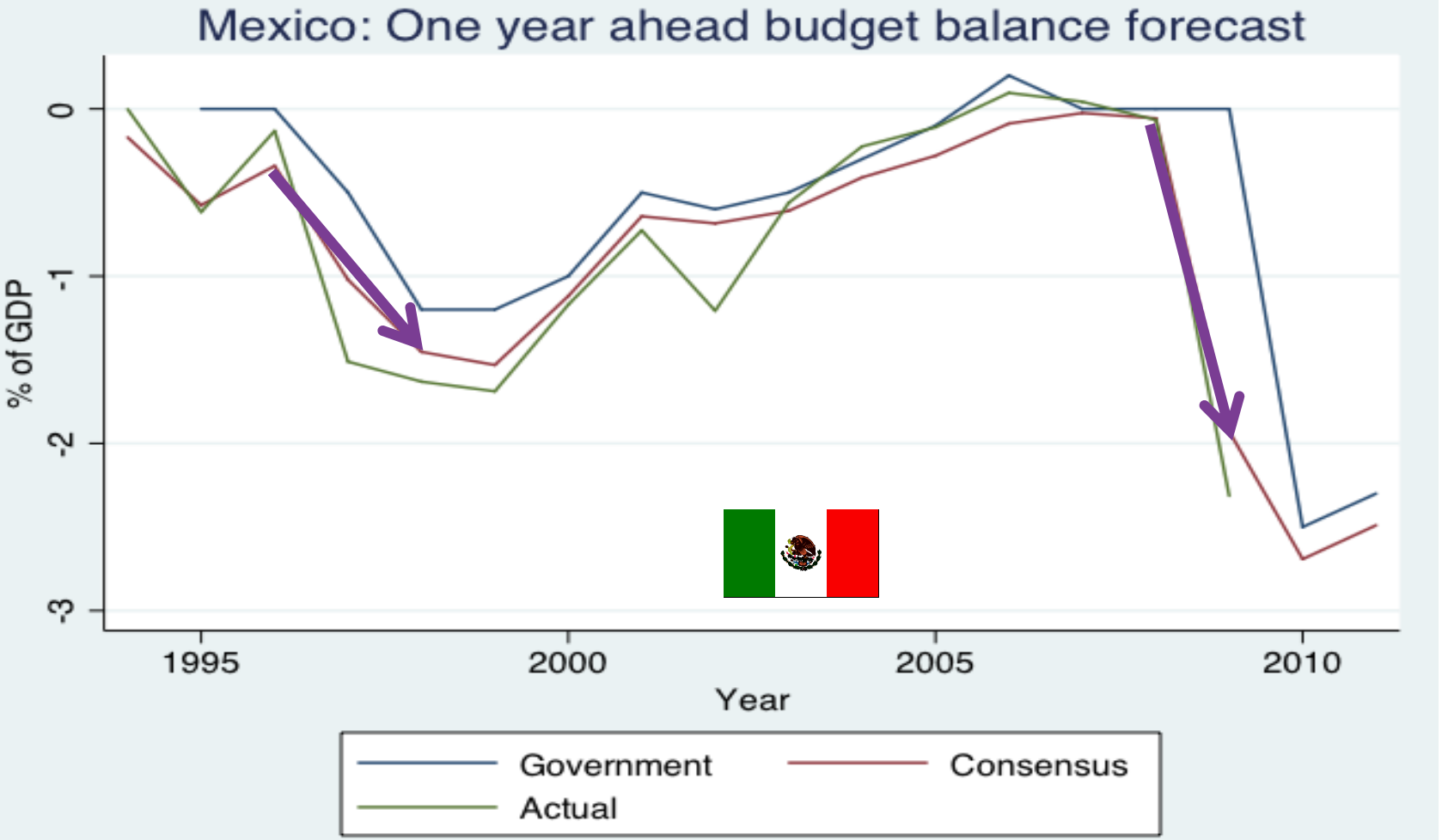
The private sector downgraded forecasts for Mexico

in response to the 2008-09 global crisis,
while government forecasters did not.



The private sector has also been less optimistic than government forecasters about Mexican budget prospects

especially in the 2009 global crisis.



Appendix III: More on the Europe case

Figure 2 (F&S, 2013):

Mean Budget Forecast Errors, Europe, 1995-2011

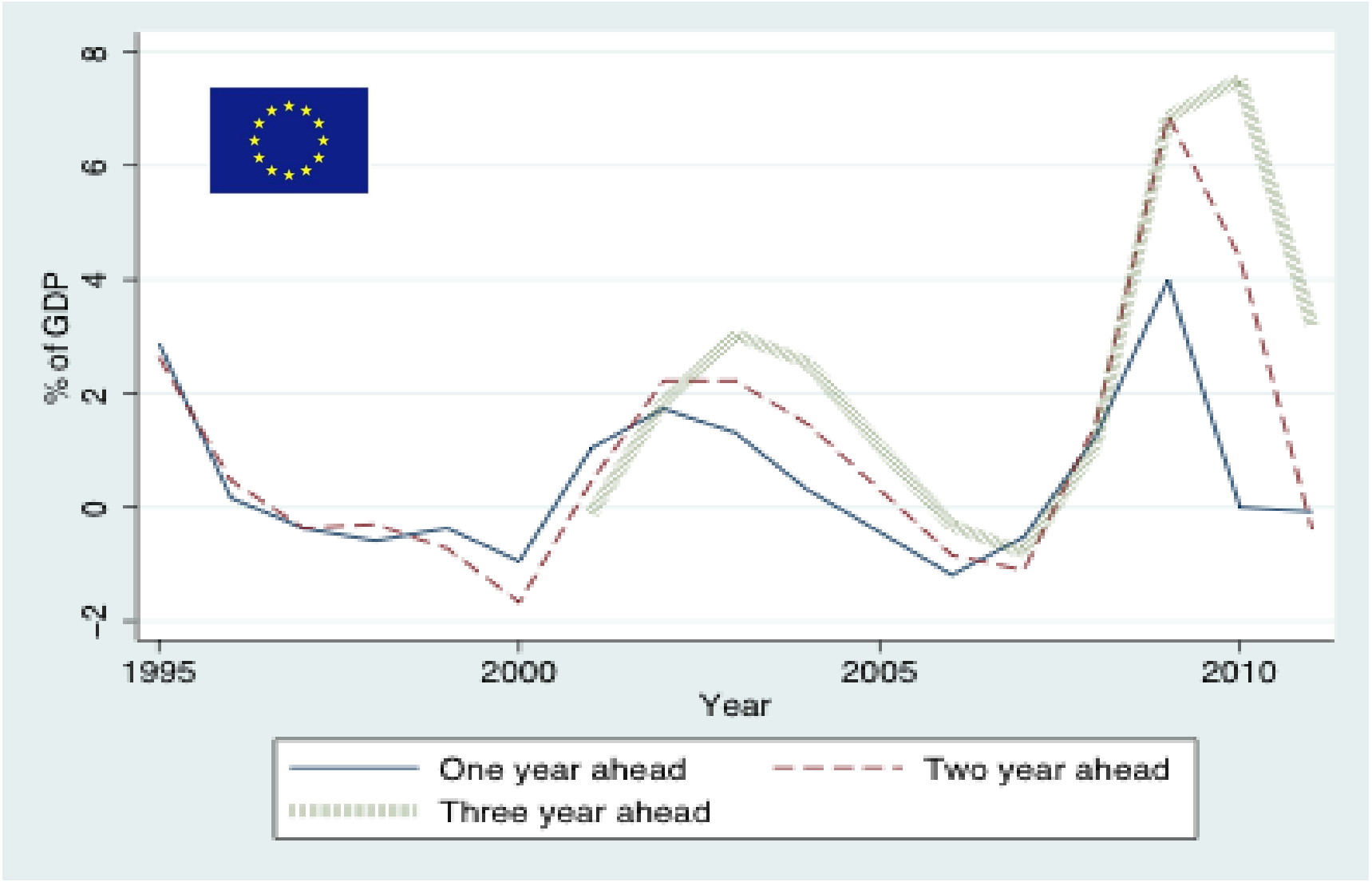
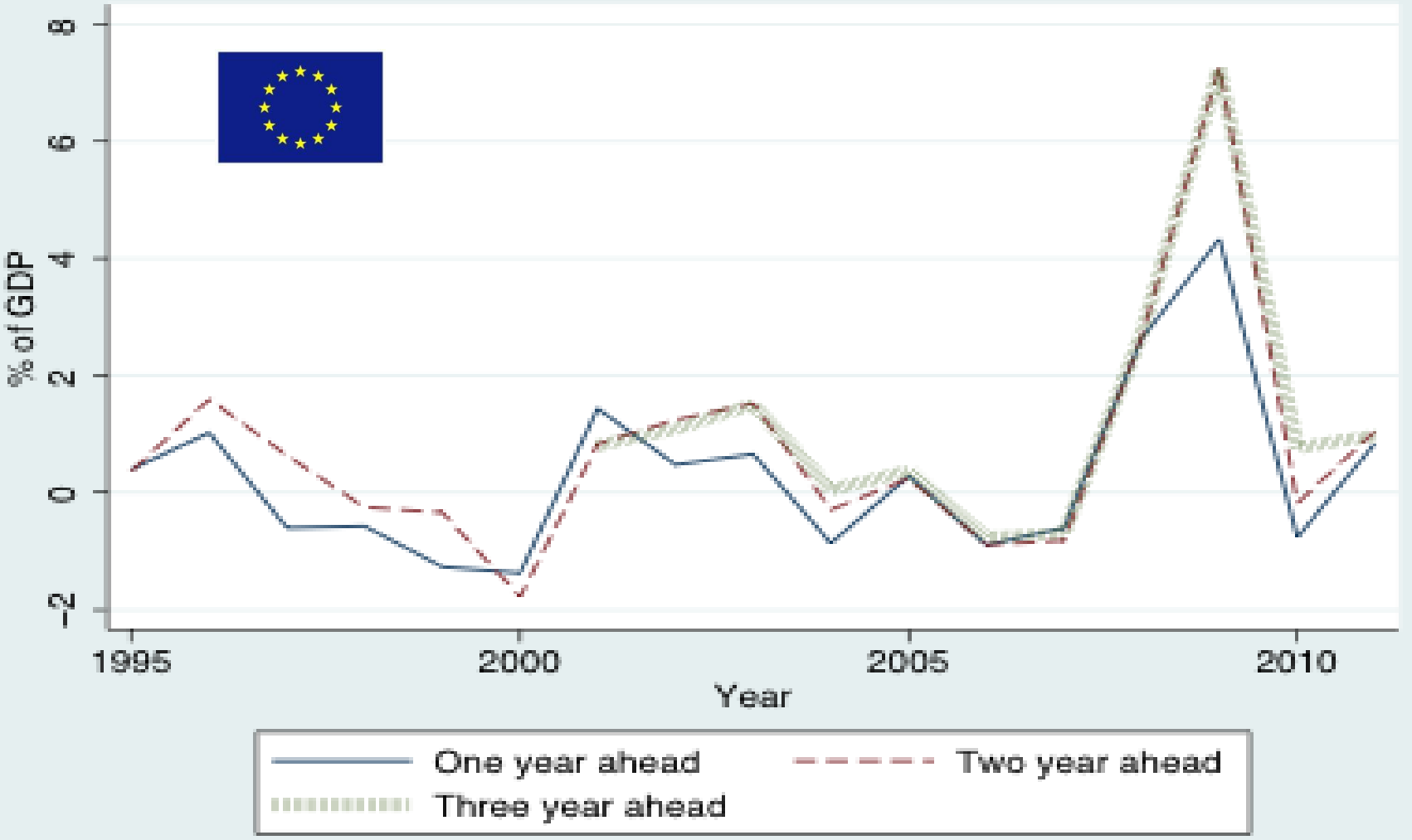


Figure 3 (F&S, 2013):

Mean GDP Growth Forecast Errors, Europe, 1995-2011



Most European official forecasts have been over-optimistic.

Figure 1 (F&S, 2013):

Mean 1-year ahead budget forecast errors, European Countries,

Full Sample Period

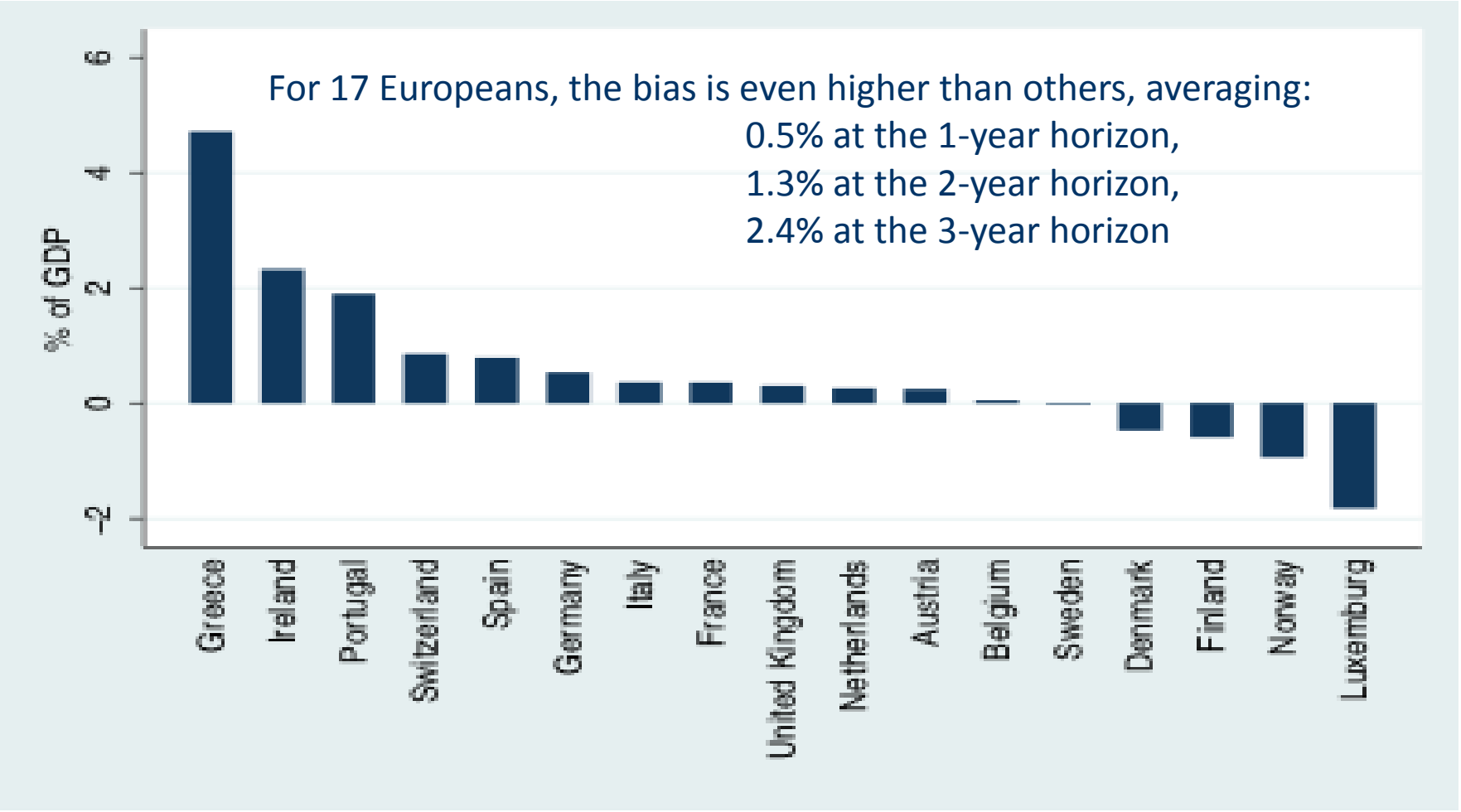
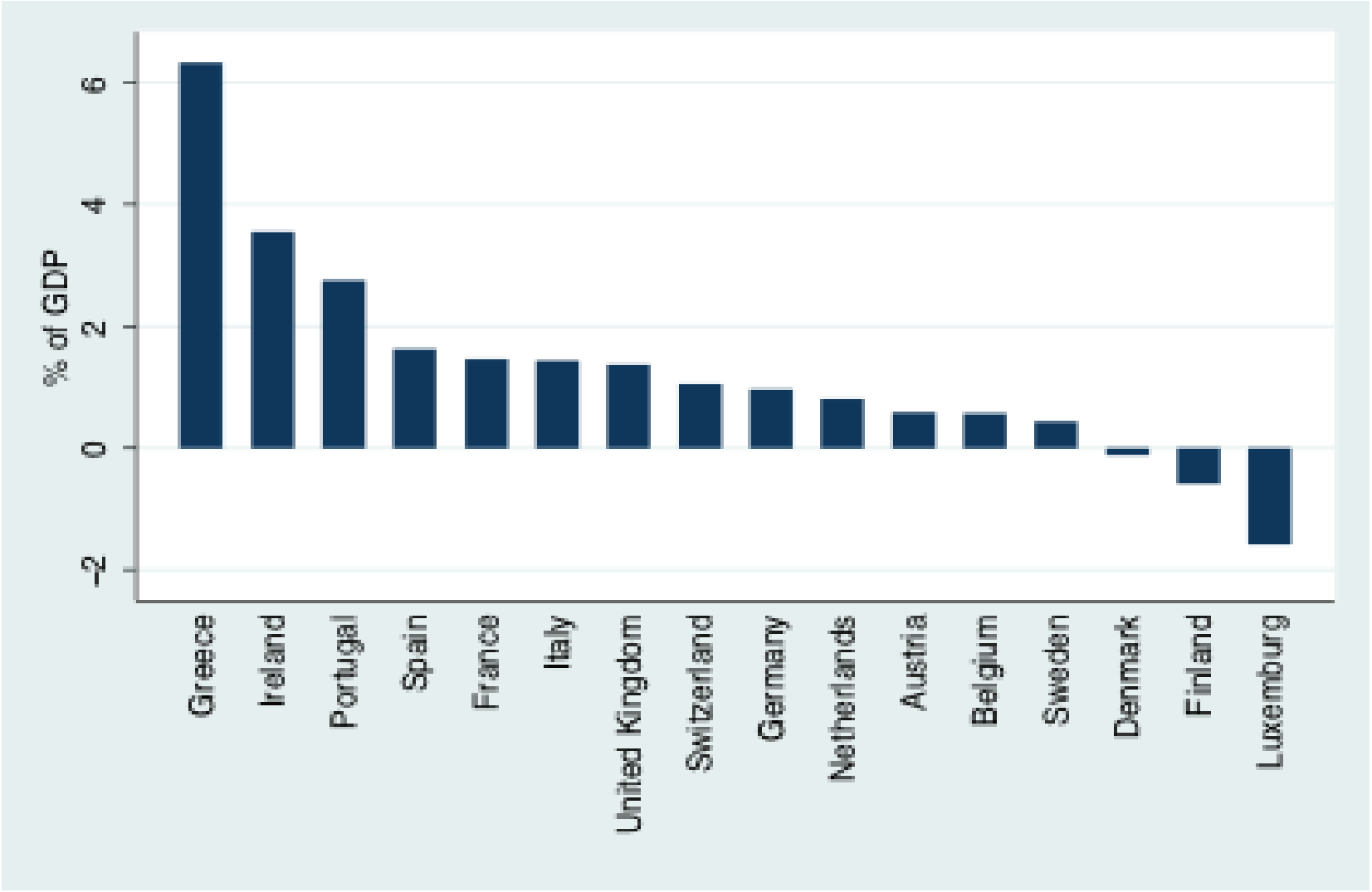


Figure 2 (F&S, 2013):

Mean 2-year ahead budget forecast errors, European Countries,

Full Sample Period



More findings regarding systematic forecast errors in Europe

(Frankel & Schreger, 2013a).

Besides cyclicality (output gap), another determinant of government bias: they over-forecast speed of disappearance of budget deficits.

VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+2}	(3) BBE_{t+3}
$Surplus_t$*$BudgetBalance_t$	-0.080	-0.295**	-0.175
	(0.057)	(0.108)	(0.171)
$Deficit$*$BudgetBalance_t$	-0.293***	-0.363**	-0.558***
	(0.064)	(0.134)	(0.180)
$Output\ Gap_t$	0.651***	1.409***	1.812***
	(0.113)	(0.281)	(0.452)
Constant	-0.150	0.459	0.932**
	(0.169)	(0.274)	(0.404)
Observations	243	210	164
R-2	0.213	0.344	0.374
Countries	17	16	15
Year FE	No	No	No

(Robust s.e.is n parentheses, clustered at the country level.) ***, **, &* : significance at the level of 1, 5, and 10%, respectively.

Appendix IV: More on the Chilean case

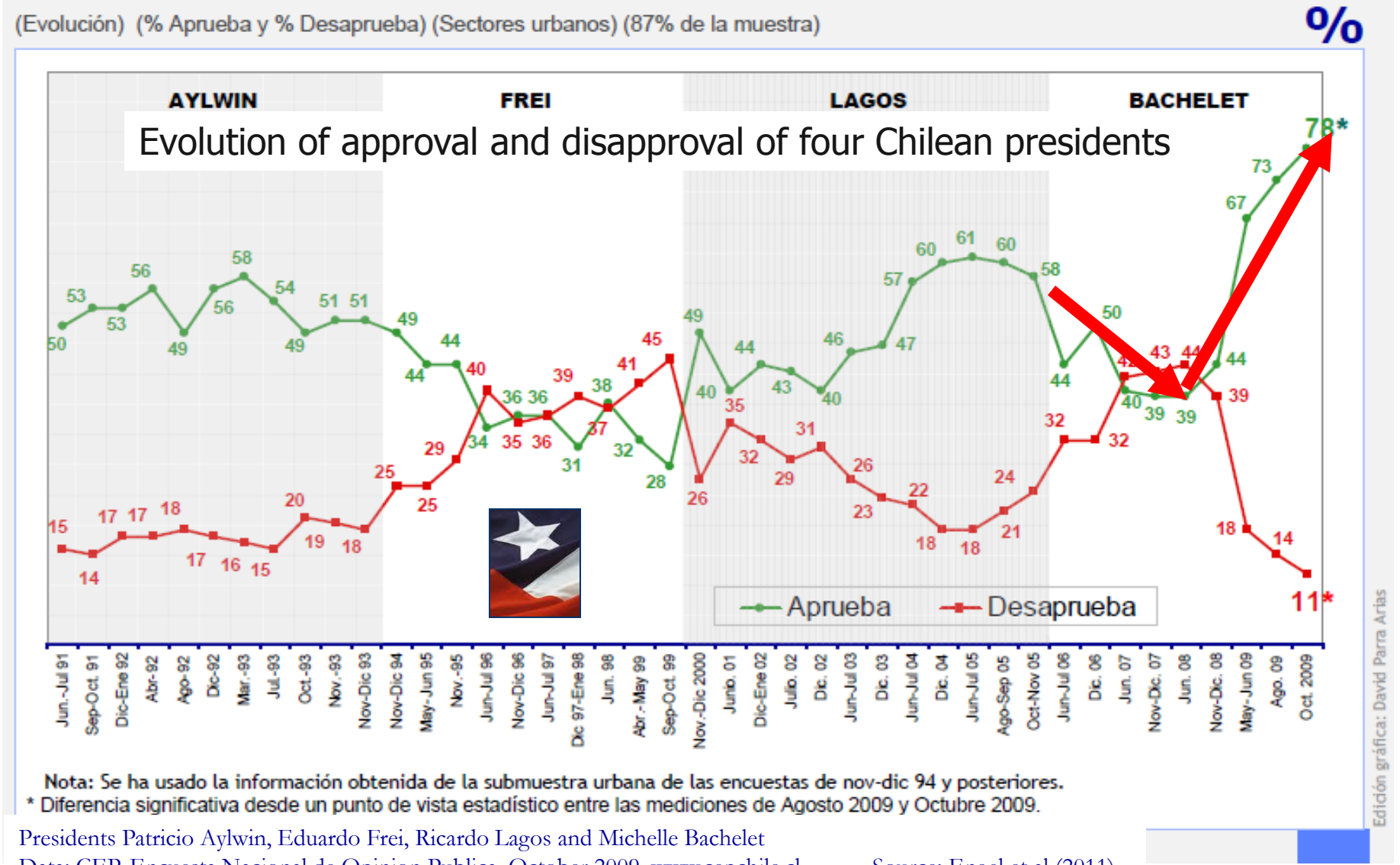
5 econometric findings regarding official forecasts in Chile.

- (1) The key macroeconomic input for budget forecasting in most countries: GDP. In Chile: the copper price.
- (2) Real copper prices revert to trend in the long run.

- But this is not always readily perceived:
  - (3) 30 years of data are not enough to reject a random walk statistically; 200 years of data are needed.
  - (4) Uncertainty (option-implied volatility) is higher when copper prices are toward the top of the cycle.
- (5) Chile's official forecasts are not overly optimistic.

It has apparently avoided the problem of forecasts that unrealistically extrapolate in boom times.

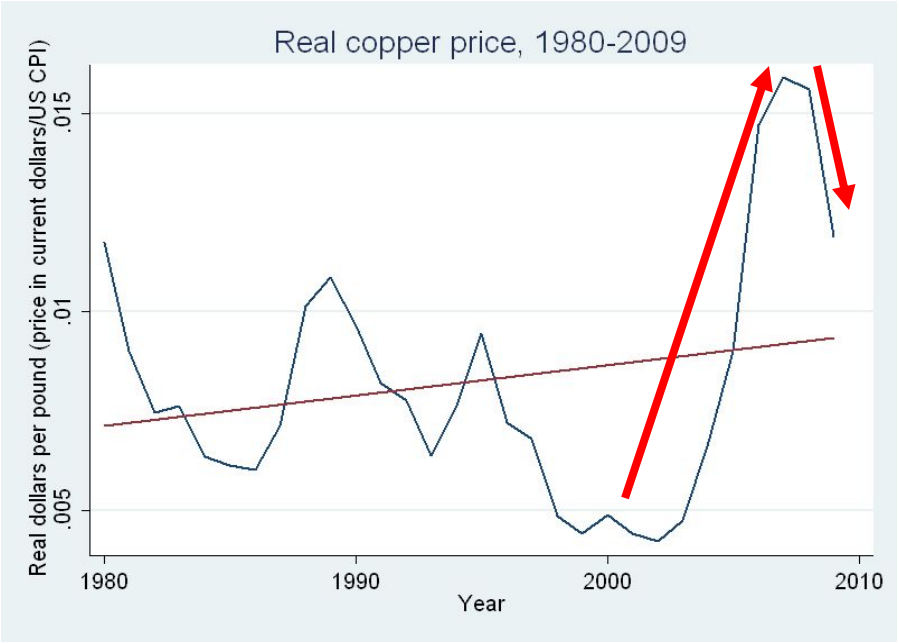
In 2008, the government of Chilean President Bachelet & her Fin.Min. Velasco ranked very low in public opinion polls. By late 2009, they were the most popular in 20 years. Why?



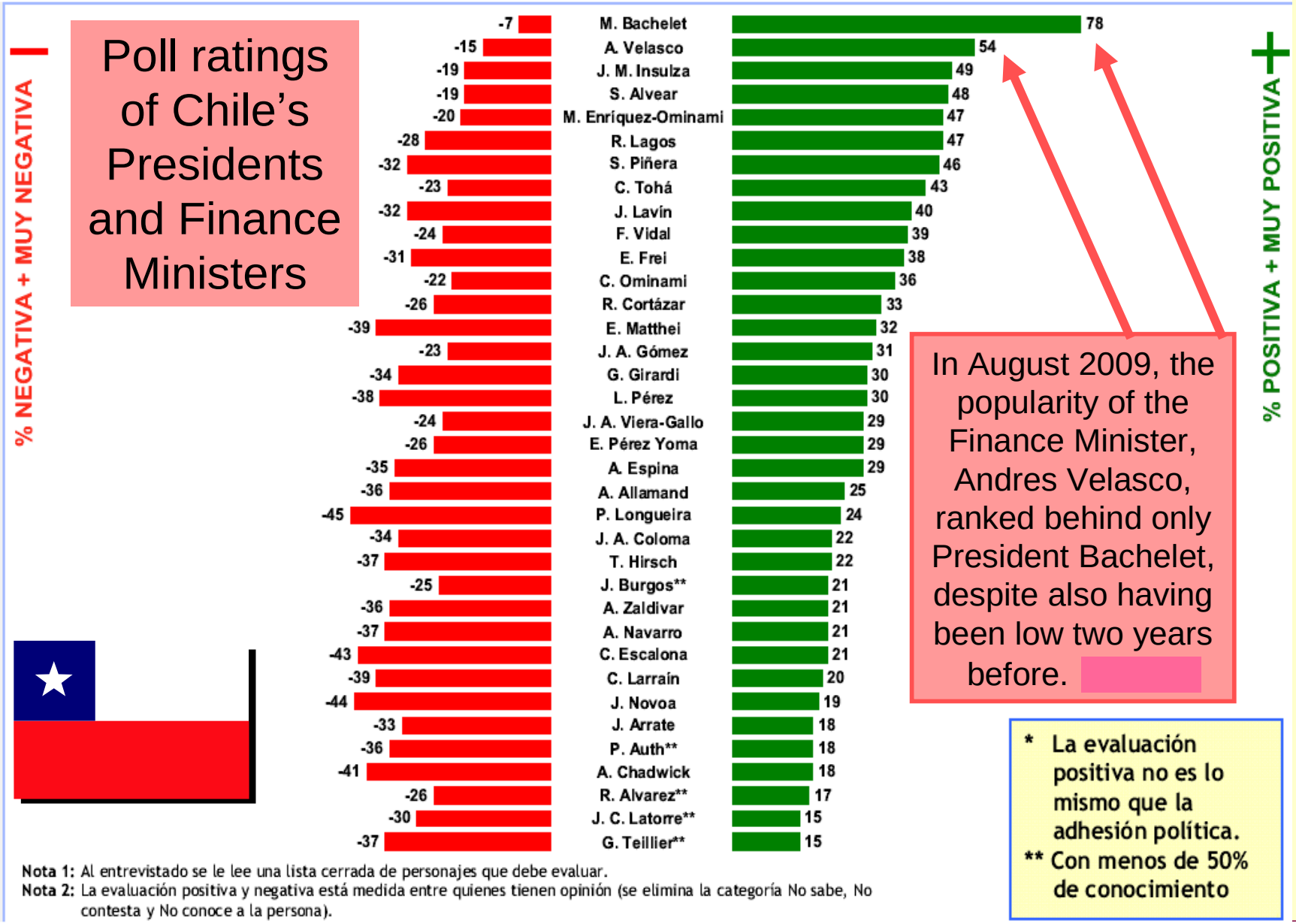
Presidents Patricio Aylwin, Eduardo Frei, Ricardo Lagos and Michelle Bachelet

Data: CEP, Encuesta Nacional de Opinion Publica, October 2009, www.cepchile.cl. Source: Engel et al (2011).

- In 2008, with copper prices spiking up, the government of President Bachelet had been under intense pressure to spend the revenue.
  - She & Fin.Min.Velasco held to the rule, saving most of it.
  - Their popularity fell sharply.
- When the recession hit and the copper price came back down, the government increased spending, mitigating the downturn.
  - Bachelet & Velasco's popularity reached historic *highs* by the time they left office



Poll ratings of Chile's Presidents and Finance Ministers



In August 2009, the popularity of the Finance Minister, Andres Velasco, ranked behind only President Bachelet, despite also having been low two years before.

* La evaluación positiva no es lo mismo que la adhesión política.
** Con menos de 50% de conocimiento

Nota 1: Al entrevistado se le lee una lista cerrada de personajes que debe evaluar.
Nota 2: La evaluación positiva y negativa está medida entre quienes tienen opinión (se elimina la categoría No sabe, No contesta y No conoce a la persona).

Chart source: Eduardo Engel, Christopher Neilson & Rodrigo Valdés, "Fiscal Rules as Social Policy," Commodities Workshop, World Bank, Sept. 17, 2009

Application of the innovation to other countries

- Any country could adopt the Chilean mechanism.
- Suggestion: give the panels more institutional independence
  - as is familiar from central banking:
    - laws protecting them from being fired.
- Open questions:
  - How much of the structural budget calculations are to be delegated to the independent panels of experts?
    - Minimalist approach: they compute only 10-year moving averages.
  - Can one guard against subversion of the institutions (CBO) ?

More complete list of relevant references by the author

- "Bias in Official Fiscal Forecasts: Can Private Forecasts Help?" with Jesse Schreger, NBER Working Paper 22349, 2016.
- "Over-optimistic Official Forecasts and Fiscal Rules in the Eurozone," with J. Schreger; *Review of World Economy* (*Weltwirtschaftliches Archiv*) 149, 2, 2013. NBER WP 18283.
- "Over-optimism in Forecasts by Official Budget Agencies and Its Implications," *Oxford Review of Economic Policy* 27, 4, 2011, 536-62. NBER WP 17239; Summary in *NBER Digest*, Nov.2011.
- "On Graduation from Fiscal Pro=cyclicality," with Carlos Vegh & Guillermo Vuletin, *Journal of Development Economics*, 100, 1, 2013; pp. 32-47. NBER WP 17619. Summarized in *VoxEU*, 2011.
- "A Solution to Fiscal Pro-cyclicality: The Structural Budget Institutions Pioneered by Chile," in *Fiscal Policy and Macroeconomic Performance,* Luis Felipe Céspedes & Jordi Galí, eds. (Central Bank of Chile: Santiago), 2013, pp. 323-391.
- "A Lesson From the South for Fiscal Policy in the US and Other Advanced Countries," *Comparative Economic Studies,* 53, no.3, 2011, 407-30.
- "Snake-Oil Tax Cuts," 2008, *EPI Briefing Paper* 221. HKS RWP 08-056.