Where, When and How does Fiscal Stimulus work?

Giancarlo Corsetti (EUI), André Meier (IMF),
Gernot Müller (University of Bonn)

Banco de Espana, 25-26 Madrid 2010

How large is the government spending multiplier?

- Large fiscal programs to fight the crisis: barely enough/a waste

How large is the government spending multiplier?

- Large fiscal programs to fight the crisis: barely enough/a waste
- Evidence of positive but small multipliers from empirical literature criticized by both sides

How large is the government spending multiplier?

- Large fiscal programs to fight the crisis: barely enough/a waste
- Evidence of positive but small multipliers from empirical literature criticized by both sides
- Theoretically, short answer to question is: "It depends"

Theory: three dimensions

- Trade, financial integration, exchange rate regime

Theory: three dimensions

- Trade, financial integration, exchange rate regime
- State of public finances

Theory: three dimensions

- Trade, financial integration, exchange rate regime
- State of public finances
- State of the economy: financial turnmoil

International dimensions

- Trade alters propensity to consume on domestic imports

International dimensions

- Trade alters propensity to consume on domestic imports
  - Mundell-Fleming and more recent analysis

International dimensions

- Trade alters propensity to consume on domestic imports
  - Mundell-Fleming and more recent analysis
  - Cross-border spillovers—see CMM 2009b

International dimensions

- Trade alters propensity to consume on domestic imports
  - Mundell-Fleming and more recent analysis
  - Cross-border spillovers—see CMM 2009b
- Exchange rate regime (capital mobility)

State of public finances

- Neoclassical model with trigger points (Bertola and Drazen): co-movement of government spending and consumption depends of level of debt

State of public finances

- Neoclassical model with trigger points (Bertola and Drazen): co-movement of government spending and consumption depends of level of debt
- Perotti (1999) allows for demand effects, but also obtains non-linearity. good times (low debt): positive co-movement; bad times (high) debt: negative co-movement

Main results

- Systemic component spending (final goods and services)
  - Confirm other studies: no cyclical pattern

Main results

- Systemic component spending (final goods and services)
  - Confirm other studies: no cyclical pattern
  - Negative feedback from high debt: spending adjusts to increasing debt

Main results

- Systemic component spending (final goods and services)
  - Confirm other studies: no cyclical pattern
  - Negative feedback from high debt: spending adjusts to increasing debt
  - New important result: Spending is systematically cut during crisis crisis periods

Main results

- A spending shock by 1 percent of GDP (on impact)
  - raises GDP by .9 in relatively closed economy with flexible exchange rate, in good fiscal conditions, no financial stress

Main results

- A spending shock by 1 percent of GDP (on impact)
  - raises GDP by .9 in relatively closed economy with flexible exchange rate, in good fiscal conditions, no financial stress
  - add .2 if pegged exchange rates

Main results

- A spending shock by 1 percent of GDP (on impact)
  - raises GDP by .9 in relatively closed economy with flexible exchange rate, in good fiscal conditions, no financial stress
  - add .2 if pegged exchange rates
  - subtract .9 if country is open ($>$ 30 percent of GDP)

Main results

- A spending shock by 1 percent of GDP (on impact)
  - raises GDP by .9 in relatively closed economy with flexible exchange rate, in good fiscal conditions, no financial stress
  - add .2 if pegged exchange rates
  - subtract .9 if country is open ($>$ 30 percent of GDP)
  - subtract .6 if bad fiscal time (high public debt)

Main results

- A spending shock by 1 percent of GDP (on impact)
  - raises GDP by .9 in relatively closed economy with flexible exchange rate, in good fiscal conditions, no financial stress
  - add .2 if pegged exchange rates
  - subtract .9 if country is open ($>$ 30 percent of GDP)
  - subtract .6 if bad fiscal time (high public debt)
  - add 1.9 if financial/banking crisis

Plan

- empirical strategy

Plan

- empirical strategy
- data

Plan

- empirical strategy
- data
- results

Plan

- empirical strategy
- data
- results
- conclusions

Empirical strategy

- Need flexible approach to account for various dimensions simultaneously

Empirical strategy

- Need flexible approach to account for various dimensions simultaneously
- Standard approach to identification not flexible enough

Empirical strategy

- Need flexible approach to account for various dimensions simultaneously
- Standard approach to identification not flexible enough
- Use two step strategy instead

First step

VAR-type fiscal rule

$$\begin{aligned} g_{t,i} &= \phi_i + \eta_i trend_t + \beta_{i,1} g_{t-1,i} + \beta_{i,2} g_{t-2,i} \\ &+ \gamma_{i,1} y_{t-1,i} + \gamma_{i,2} y_{t-2,i} + \theta_i cli_{t,i} \\ &+ \delta_i b_{t-1,i} + \rho ifc_{t,i} + \varepsilon_{t,i} \end{aligned}$$

- g_t: Growth rate of government spending
- $y_{t-1,i}$: Lagged output growth
- cli_{t-1}: lagged value of a composite leading indicator (proxies for the authorities' expectations with respect to current-year growth)
- b_{t-1}: beginning-of-period debt stock, expressed as a share of GDP
- fc_t: dummy variable indicating a financial crisis

Second step

$$
\begin{aligned}
x_{t,i} &= \alpha_i + \mu_i trend_t + \sigma_1 \widehat{\varepsilon}_{t,i} + \sigma_2 \widehat{\varepsilon}_{t-1,i} + \sigma_3 \widehat{\varepsilon}_{t-2,i} + \sigma_4 \widehat{\varepsilon}_{t-3,i} \\
&+ \kappa_1 \left(\widehat{\varepsilon}_{t,i} * d_{t,i} \right) + \kappa_2 \left(\widehat{\varepsilon}_{t-1,i} * d_{t-1,i} \right) + \kappa_3 \left(\widehat{\varepsilon}_{t-2,i} * d_{t-2,i} \right) \\
&+ \kappa_4 \left(\widehat{\varepsilon}_{t-3,i} * d_{t-3,i} \right) + \lambda_1 d_{t,i} + \lambda_2 d_{t-1,i} + \lambda_3 d_{t-2,i} + \lambda_4 d_{t-3,i} + u_{t,i}
\end{aligned}
$$

- x_t: one of our four macroeconomic variables of interest
- $d_{t,i}$: dummy variable indicating a particular feature of the economic environment in a particular year

Table 2. Data Sources and Definitions

Variable	Definition	Data Sources
Government spending growth	Change in real per capita government consumption (in percentage points of lagged GDP)	OECD Economic Outlook Database: volume of final government consumption expenditure (CGV), Value of gross domestic product (GDP), GDP deflator (PGDP); OECD Analytial Database: population size (POP).
GDP growth	Real growth rate of per capita GDP	OECD Economic Outlook Database: value of gross domestic product (GDP), GDP deflator (PGDP); OECD Analytial Database: population size (POP).
CLI	Composite leading indicator	OECD Monthly Economic Indicators database: CLI amplitude-adjusted.
Public debt	General government gross debt (in percent of GDP)	IMF World Economic Outlook: General government gross debt (GGD), nominal GDP (NGDP).
Financial crisis dummy	Takes on value of 1 during financial crises, and 0 otherwise	Reinhart and Rogoff (2008, pp. 65 ff.): the relevant crisis episodes are: Finland 1991-94, Japan 1992-97, Norway 1988-93, Spain 1978-85.
Bad fiscal times dummy	Takes on value of 1 when lagged public debt exceeds 80 percent of GDP, and 0 otherwise	See entry for public debt above.
Peg dummy	Takes on value of 1 when exchange rate regime defined as peg, and 0 otherwise	Ilzetzki, Reinhart, and Rogoff (2008): categories 1-8 of the authors' fine classification scheme are defined as "peg"; category 14 ("freely falling") coded as "not available".
Openness dummy	Takes on value of 1 when lagged imports-to-GDP ratio exceeds 30 percent, and zero otherwise.	IMF World Economic Outlook: imports of goods and services at current prices (NM), nominal GDP (NGDP).
Change in …	Change in …	
Private consumption	Per capita real private consumption (in percentage points of lagged GDP)	OECD Economic Outlook Database: volume of final private consumption expenditure (CPV), value of gross domestic product (GDP); OECD Analytial Database: value of private final consumption expenditure (CP), population size (POP).
Trade balance	Ratio of net exports to GDP	IMF World Economic Outlook: exports of goods and services at current prices (NX), imports of goods and services at current prices (NM), nominal GDP (NGDP).
REER	CPI-based real effective exchange rate (in percent)	OECD Monthly Economic Indicators Database (CCRETT01.IXOB).
Terms of trade	Terms of trade for goods and services (in percent)	OECD Analytical Database: terms of trade for goods and services (TTRADE).

Composition of final sample

Country	Time Period
Austria	1978-2007
Belgium	1984-2007
Canada	1978-2001, 2006-07
Denmark	1978-2007
Finland	1989-91, 1997-2007
France	1984-2007
Ireland	1983-2007
Italy	1982-1991, 1997-2007
Japan	1978-2007
Netherlands	1978-2007
Norway	1978-2007
Portugal	1990-2007
Spain	1984-2007
UK	1983-1989,1996-2007
USA	1982-2007
Total no. of observations:	371

Dummy Characteristics I

Peg	Austria, 1978-2007
	Belgium, 1984-2007
	Canada, 1978-2001
	Denmark, 1978-2007
	Spain, 1984-2007
	Finland, 1989-1991, 1997-2007
	France, 1984-2007
	Ireland, 1983-2007
	Italy, 1983-2007
	Netherlands, 1978-2007
	Portugal, 1990-2007

Openness	Austria, 1978-2007
	Belgium, 1984-2007
	Canada, 1994-2001, 2006-07
	Denmark, 1978-2007
	Spain, 2001-02, 2006-07
	Finland, 1998, 2001-07
	UK, 2007
	Ireland, 1983-2007
	Netherlands, 1978-2007
	Norway, 1978-2000
	Portugal, 1990-2007

Dummy Characteristics II

Bad fiscal times	Belgium, 1984-2007 Canada, 1992-2001 Denmark, 1984-85, 1994 Ireland, 1984-96 Italy, 1988-91, 1997-2007 Japan, 1995-2007	Financial crisis	Spain, 1984-85 Finland, 1991 Japan, 1992-97 Norway, 1988-93

Results for first step: estimated rules

Country	Government spending growth (-1)	Government spending growth (-2)	GDP growth (-1)	GDP growth (-2)	CLI (-1)	Beginning-of-period public debt	Financial crisis dummy
Austria	0,66 ***	0,01	-8,67 ***	-0,75	0,011	-0,002	…
Belgium	-0,04	0,00	2,16	5,76	-0,018	-0,006	…
Canada	0,11	0,12	8,10 **	1,18	-0,036 *	-0,012 **	…
Denmark	0,06	0,20	1,61	0,78	0,039	-0,007 *	…
Finland	0,10	-0,41 **	2,45	5,96	0,000	-0,006	-0,61
France	-0,32 *	-0,47 **	2,39	-1,18	-0,046	-0,050 ***	…
Ireland	0,13	-0,02	4,24	8,42 *	0,112 **	-0,011	…
Italy	0,23	-0,07	3,47	7,58	0,004	-0,013 **	…
Japan	-0,12	-0,09	-9,29 ***	2,30	0,009	-0,006 *	-0,24 *
Netherlands	-0,14	-0,29	-2,24	6,44	0,026	-0,007	…
Norway	0,25	-0,14	0,61	-2,39	0,023	0,000	0,04
Portugal	-0,67 **	-0,63 **	15,15 *	7,23	0,014	-0,013	…
Spain	-0,53 **	-0,13	8,09 *	7,65	0,020	-0,026 ***	-0,63 **
UK	0,46 **	-0,25	5,76	-0,80	-0,059 *	-0,006	…
USA	0,32 *	-0,01	6,07 **	2,94	-0,028 *	-0,012 **	…

Results for first step: diagnostics

	F-test of joint significance (p-value)	R squared	Arellano-Bond test of autocorrelation (p-value)
Austria	0,00	0,59	0,49
Belgium	0,11	0,35	0,08
Canada	0,00	0,54	0,43
Denmark	0,10	0,36	0,71
Finland	0,00	0,81	0,54
France	0,00	0,74	0,53
Ireland	0,01	0,57	0,58
Italy	0,01	0,55	0,85
Japan	0,00	0,60	0,35
Netherlands	0,62	0,18	0,38
Norway	0,22	0,33	0,31
Portugal	0,04	0,63	0,25
Spain	0,01	0,62	0,09
UK	0,11	0,41	0,27
USA	0,00	0,57	0,77

Summary Statistics for Estimated Government Spending Shocks

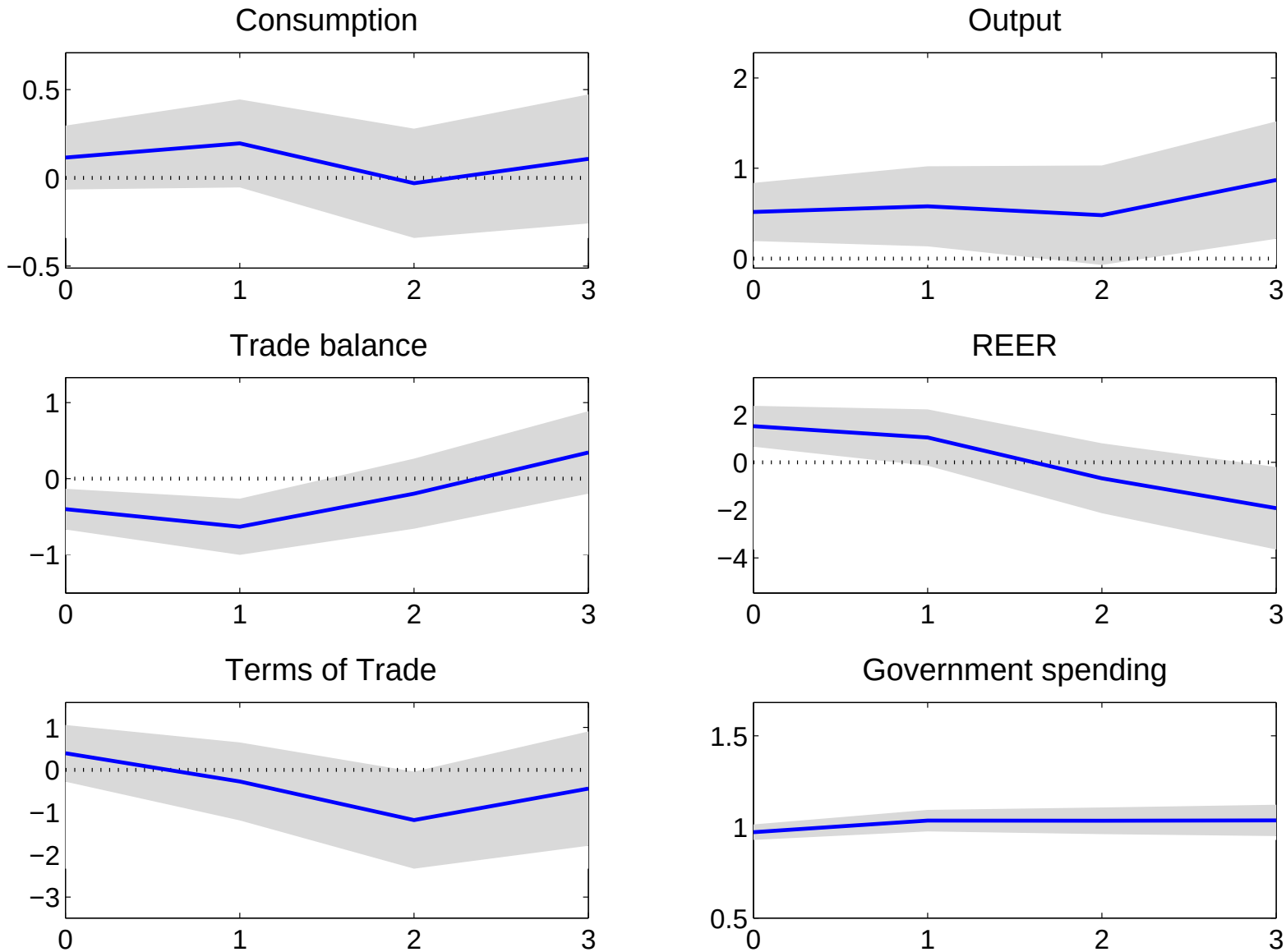
No. of observations	371
Mean	0,00
Median	0,00
Standard deviation	0,28
Minimum	-1,26
Maximum	1,40

Five largest negative and positive	
Ireland, 1987	-1,26
Denmark, 1984	-1,02
Norway, 1988	-0,87
Ireland, 1988	-0,79
Netherlands, 1996	-0,71
Netherlands, 1987	0,84
Denmark, 1993	0,85
Portugal, 1991	0,88
Ireland, 1994	1,11
Netherlands, 2006	1,40

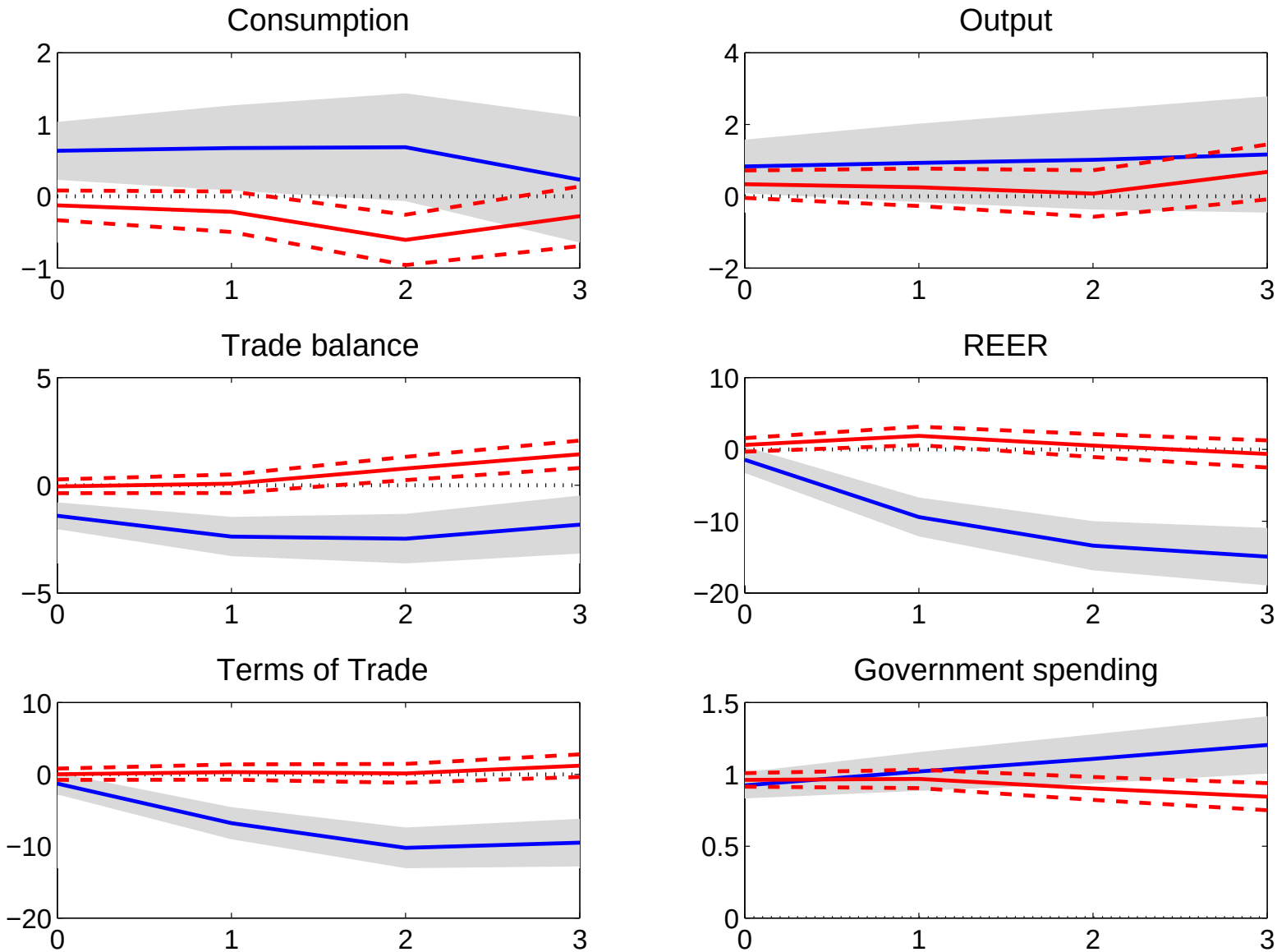
Results for second step: the average effect

Dependent variable: Change in	Units	Shock	Shock (-1)	Shock (-2)	Shock (-3)
Private Consumption	Percentage points of GDP	0,11	0,08	-0,23	0,14
		(0,18)	(0,18)	(0,19)	(0,19)
GDP	Percentage points of GDP	0,52	0,06	-0,10	0,39
		(0,32)	(0,32)	(0,33)	(0,33)
Trade Balance	Percentage points of GDP	-0,40	-0,23	0,44	0,54 **
		(0,27)	(0,27)	(0,28)	(0,27)
REER	Percent	1,51 *	-0,47	-1,70 *	-1,25
		(0,85)	(0,85)	(0,88)	(0,88)
Terms of Trade	Percent	0,39	-0,66	-0,91	0,74
		(0,67)	(0,66)	(0,69)	(0,68)
Govt. spending	Percentage points of GDP	0,97 ***	0,06	0,00	0,00
		(0,04)	(0,04)	(0,04)	(0,04)

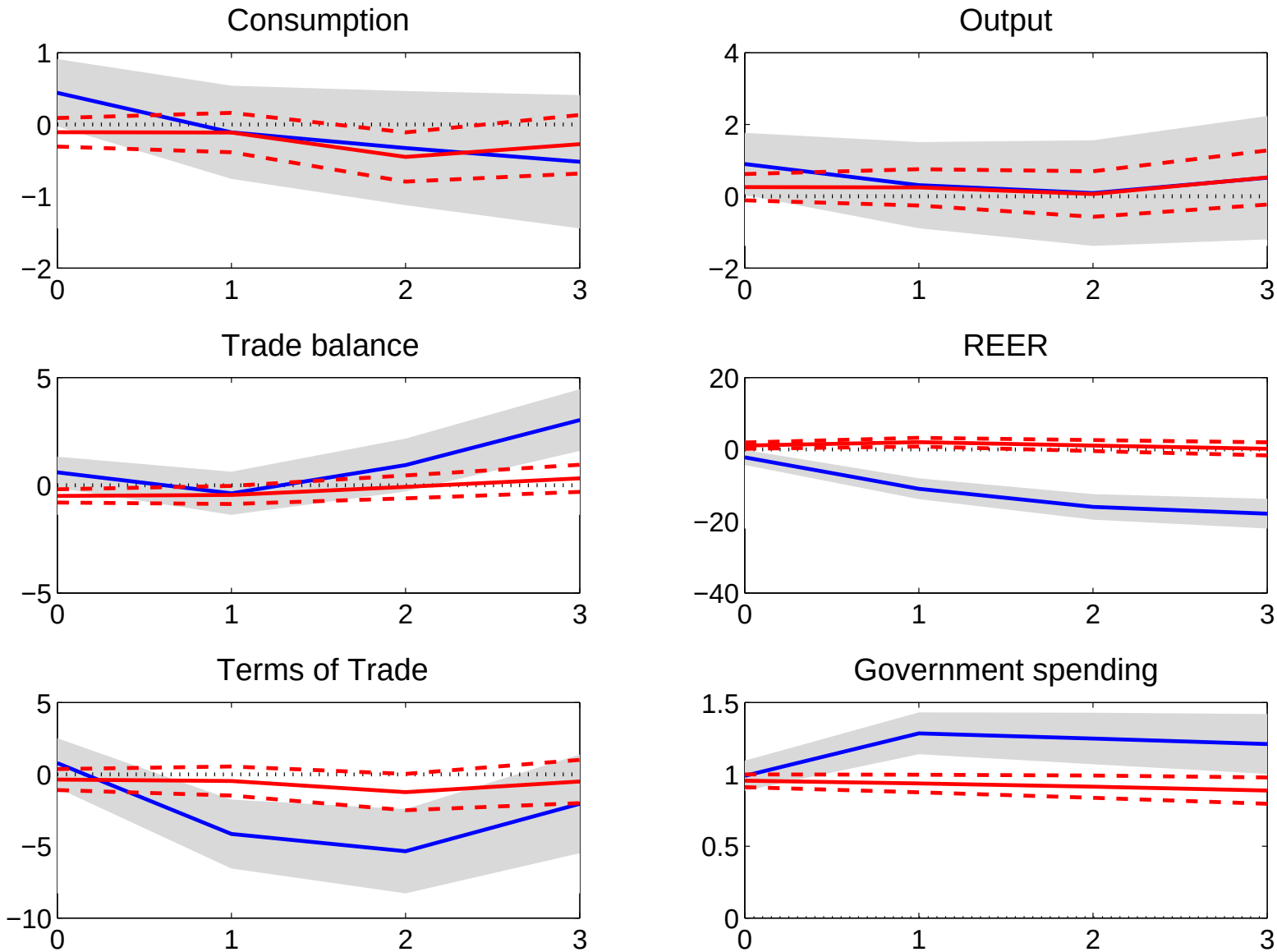
Results for second step: the average effect



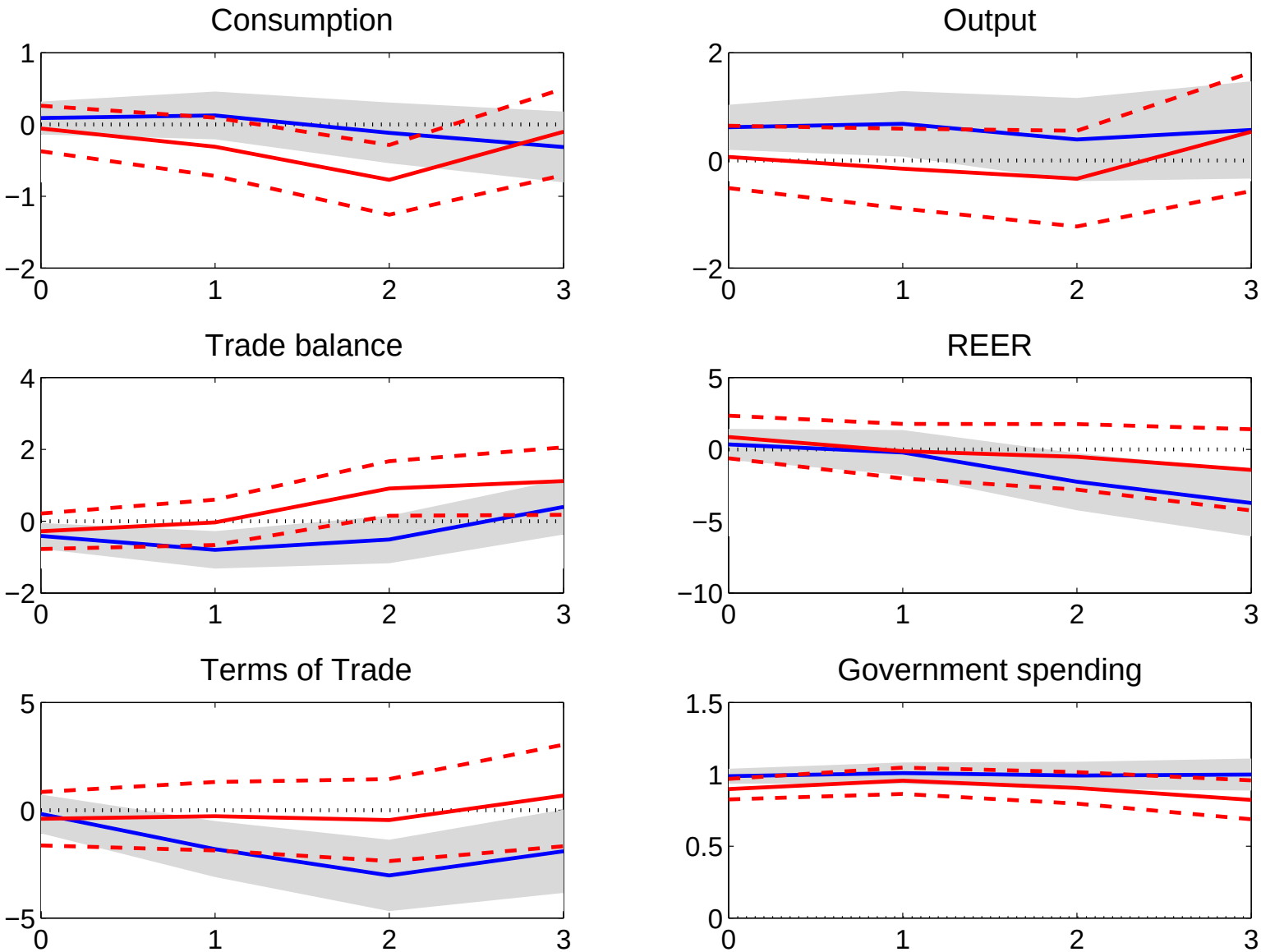
Relatively closed vs relatively open economies



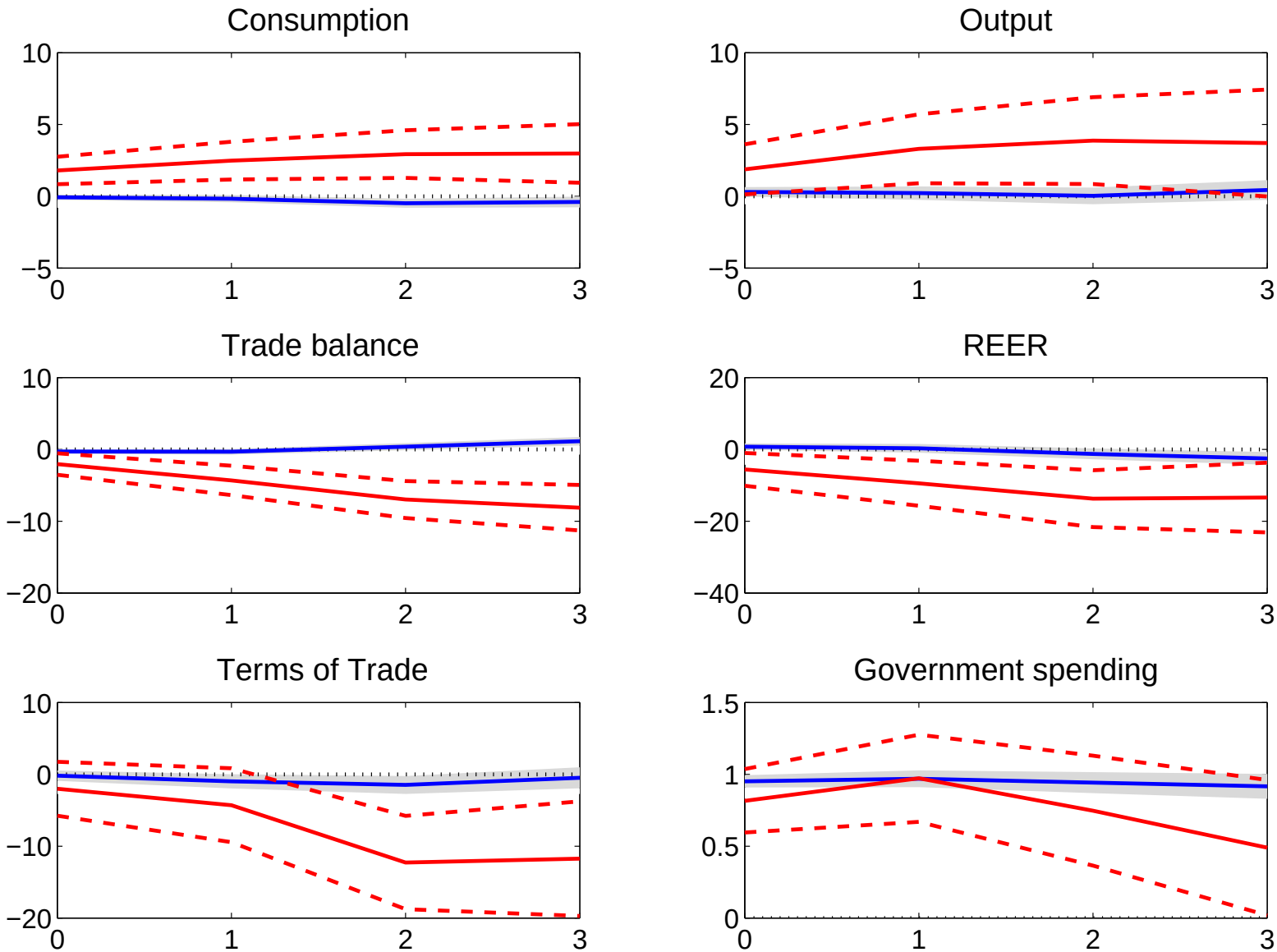
Floating exchange rate regimes vs pegs



Good (low debt) vs bad (high debt) fiscal times



Normal times vs times of crisis



Accounting for all dimensions simultaneously

Dependent variable:	Shock	Shock (-1)	Financial crisis * shock	Financial crisis * shock (-	Bad fiscal times * shock	Bad fiscal times * shock (-1)	Peg * shock	Peg * shock (-1)	Openness * shock	Openness * shock (-1)
Consumption	0,50	0,06	1,98 *	1,30	0,00	-0,46	0,26	0,51	-1,34 **	-0,34
	(0,58)	(0,54)	(1,18)	(1,00)	(0,43)	(0,41)	(0,66)	(0,59)	(0,60)	(0,48)
GDP	0,91	-0,04	1,43	2,09	-0,59	-0,38	0,20	0,68	-0,99	-0,36
	(0,97)	(0,90)	(1,97)	(1,67)	(0,71)	(0,69)	(1,11)	(0,99)	(1,00)	(0,80)
Trade Balance	0,30	-1,33 *	-3,53 **	-1,52	0,01	0,42	-2,48 ***	0,63	2,45 ***	0,55
	(0,84)	(0,78)	(1,71)	(1,45)	(0,62)	(0,60)	(0,96)	(0,85)	(0,87)	(0,69)
REER	0,02	-9,59 ***	-7,99	2,73	0,53	-3,22 *	0,58	7,85 ***	1,55	4,66 **
	(2,44)	(2,26)	(4,97)	(4,21)	(1,79)	(1,73)	(2,79)	(2,48)	(2,53)	(2,01)
Terms of Trade	2,62	-3,98 **	-5,64	-1,50	-0,02	0,33	-3,24	1,25	1,52	2,82 *
	(2,05)	(1,89)	(4,16)	(3,53)	(1,50)	(1,45)	(2,34)	(2,08)	(2,12)	(1,68)
Govt. spending	0,95 ***	0,31 ***	-0,05	0,07	-0,07	0,14 *	0,05	-0,28 **	-0,02	-0,10
	(0,11)	(0,10)	(0,23)	(0,19)	(0,08)	(0,08)	(0,13)	(0,11)	(0,12)	(0,09)

1/ Regressors include the contemporaneous value and three lags of the estimated government spending shock (in percentage points of GDP), the same shocks interacted with each of the dummies considered individually in Tables 8-11; as well as the contemporaneous value and first

Conclusions

- No such thing as *the* multiplier

Conclusions

- No such thing as *the* multiplier
- Multipliers are larger if currency peg (exchange rate regime matters)

Conclusions

- No such thing as *the* multiplier
- Multipliers are larger if currency peg (exchange rate regime matters)
- Multipliers are smaller

Conclusions

- No such thing as *the* multiplier
- Multipliers are larger if currency peg (exchange rate regime matters)
- Multipliers are smaller
  - in relatively open economies (openness matters)

Conclusions

- No such thing as *the* multiplier
- Multipliers are larger if currency peg (exchange rate regime matters)
- Multipliers are smaller
  - in relatively open economies (openness matters)
  - if public finances are bad

Conclusions

- No such thing as *the* multiplier
- Multipliers are larger if currency peg (exchange rate regime matters)
- Multipliers are smaller
  - in relatively open economies (openness matters)
  - if public finances are bad
- Multipliers are larger (2!) at times of financial crisis.