Economic Growth in Greece: barriers and prospects

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Associate Professor of Political Economy, LSE

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Hellenic Observatory, LSE

George Economides and Apostolis Philippopoulos

Athens University of Economics and Business, and CESifo

February 25, 2020

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- But, before we search for engines of growth, we need to identify the barriers to growth.

What we do in this paper

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- Second, building upon the first task, we study counter-factuals (engines of growth).

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- Step C: We study counter-factuals since 2009.

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- In sum, typical international crisis (Gourinchas and Obstfeld, 2012, Lorenzoni, 2014)

About financial assistance: official fiscal bailouts

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- As a result change in sovereign debt ownership.

About financial assistance: official fiscal bailouts

Public debt to GDP and its holders. Source: Public Debt Management Agency and Greek Ministry of Finance.

Year	**Total Public Debt** (% of GDP)	λ^{eu} (% of totalpublic debt)	λ^{g} (% of total public debt)
2008	109.4	0	75
2009	126.7	0	75
2010	146.2	9.3	46.3
2011	172.1	19.9	24.7
2012	159.6	59.9	20.3
2013	177.4	66.3	18.2
2014	178.9	67.2	16.9
2015	176.8	68.6	16.1
2016	180.8	69.8	16.0

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- See below for the effectiveness of such policies

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- Examples: Sinn (2014), Bindseil and Konig (2011) and Whelan (2014, 2017).

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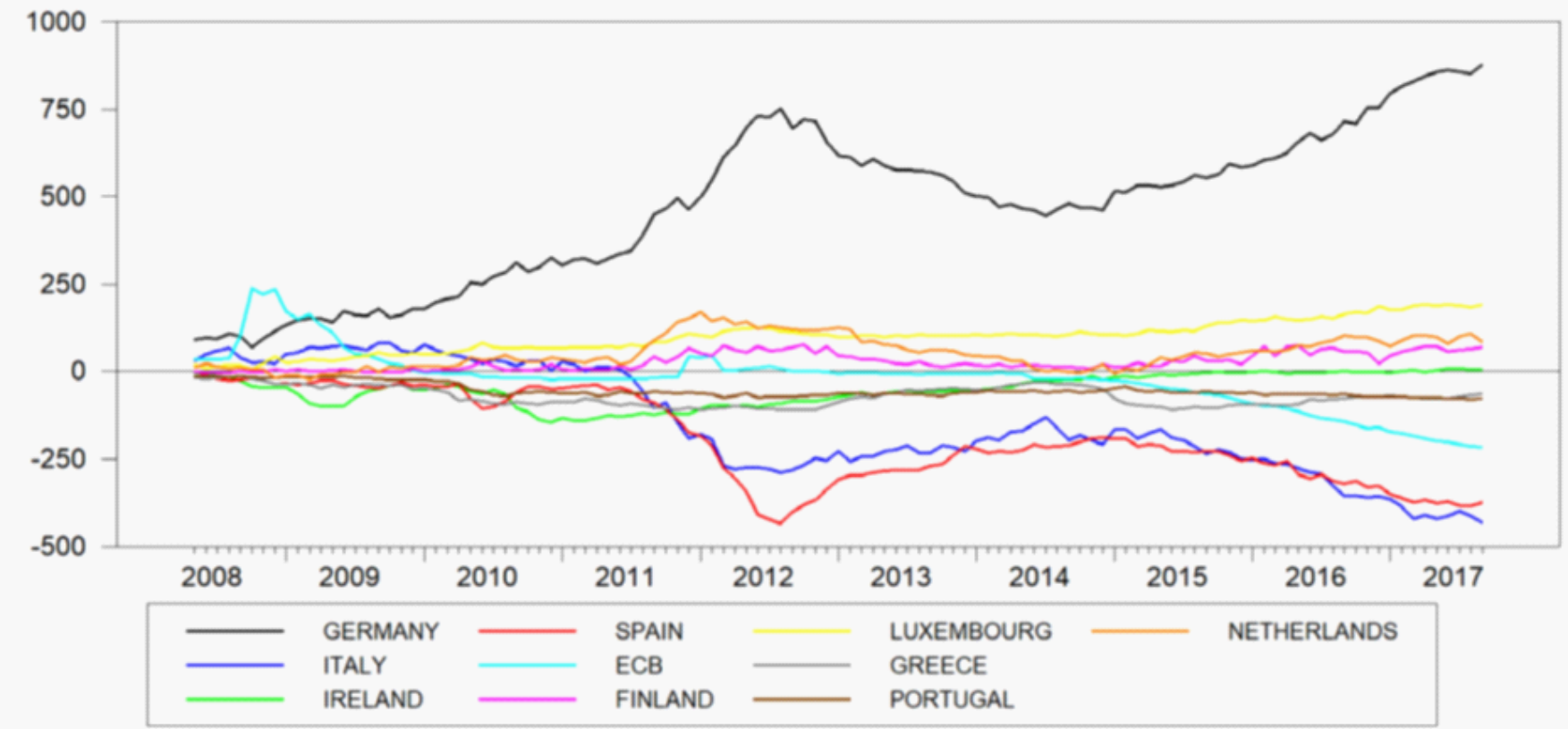
- See below for the role of TARGET2 in our model.

TARGET2 data

TARGET2 balances for the ECB and a selection of countries (billions of Euros)



Source: ECB Statistical Data Warehouse.

Bank of Greece's assets

(billions of euros, end of year, source: Bank of Greece)

Year	Lending to Banks	Securities	Government long-term debt	Total Assets
2007	9	10	8	42
2008	38	14	8	71
2009	50	21	7	86
2010	98	24	7	13
2011	128	21	7	168
2012	121	21	6	160
2013	73	21	6	109
2014	56	31	5	103
2015	107	40	5	163
2016	67	57	6	142
2017	34	74	6	125
2018	11	76	5	109

Bank of Greece's liabilities

(billions of euros, end of year, source: Bank of Greece)

Year	Banknotes	TARGET2	Reserves	Gov deposits	Total liabilities
2007	16	10	7	1	42
2008	18	35	8	1	71
2009	21	49	8	1	86
2010	22	87	10	2	138
2011	23	105	5	5	168
2012	23	98	2	7	160
2013	25	51	2	8	109
2014	27	49	3	5	103
2015	29	94	1	5	163
2016	30	72	1	9	142
2017	31	59	2	12	125
2018	33	29	7	25	109

About fiscal austerity

Government revenue and expenditure. (% of GDP, source: European Commission, Report on Public Finances in EMU)

Variable	**2008**	**2010**	**2011**	**2014**	**2016**	**2018**
Revenue	40	41	44	47	49	48
Expenditure	50	53	54	51	49	48

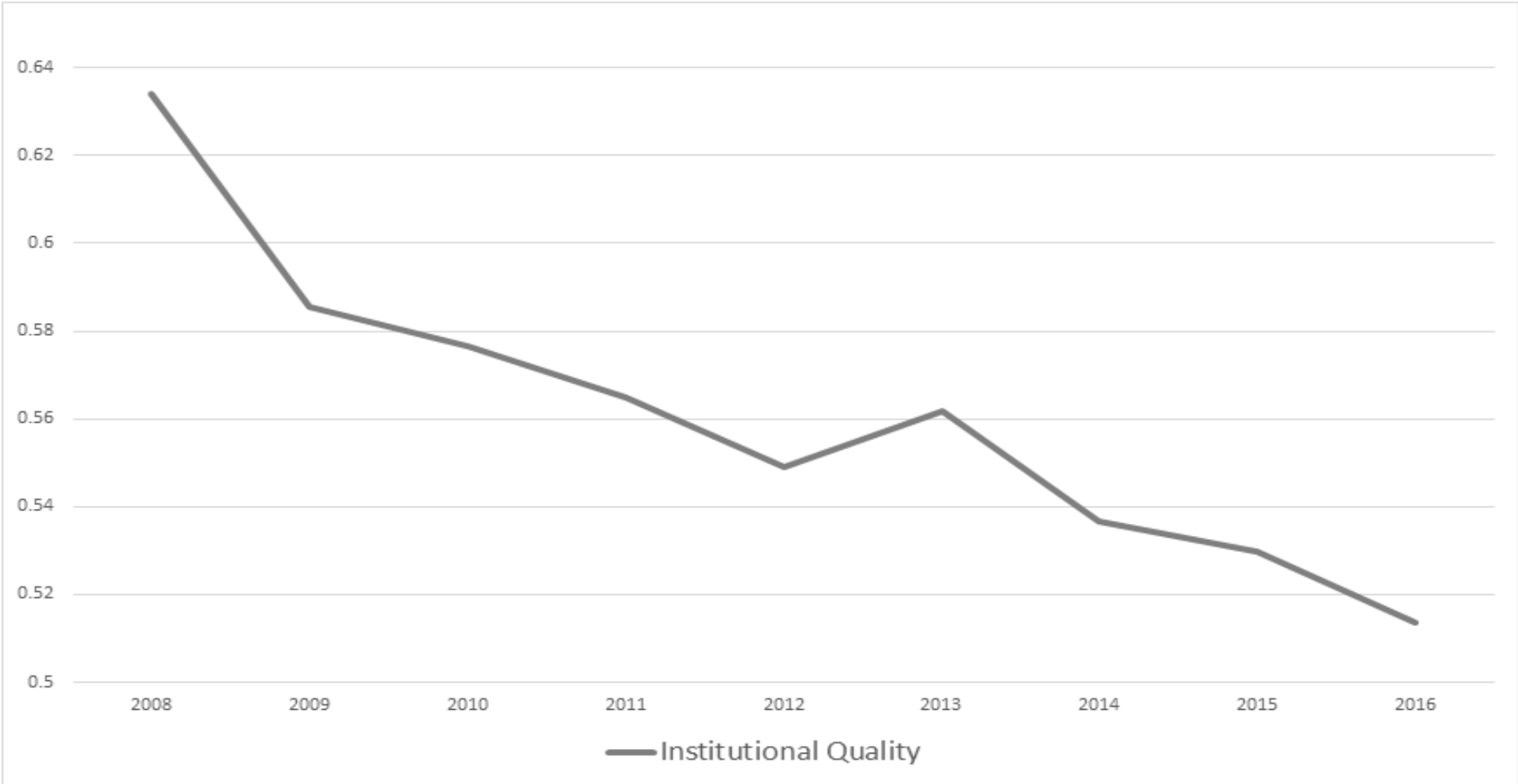
About fiscal austerity

Fiscal (spending-tax) policy mix. (Source: Eurostat)

Var	2008	2009	2010	2012	2013	2014	2015	2016
s^g	9.1	10.2	9.8	9.0	8.2	8.0	8.1	7.9
s^w	11.6	13.0	12.4	12.8	12.2	12.2	12.2	12.3
s^i	5.8	5.7	3.6	2.5	3.4	3.6	3.9	3.5
s^{tr}	18.9	20.5	20.9	23.1	21.4	21.7	22.1	22.2
τ^y	27.3	26.6	26.9	32.5	31.3	32.4	33.6	35.5
τ^c	16.8	15.2	17.7	18.5	18.7	19.1	19.5	21.8
b/y	109.4	126.7	146.2	159.6	177.4	178.9	176.8	180.8

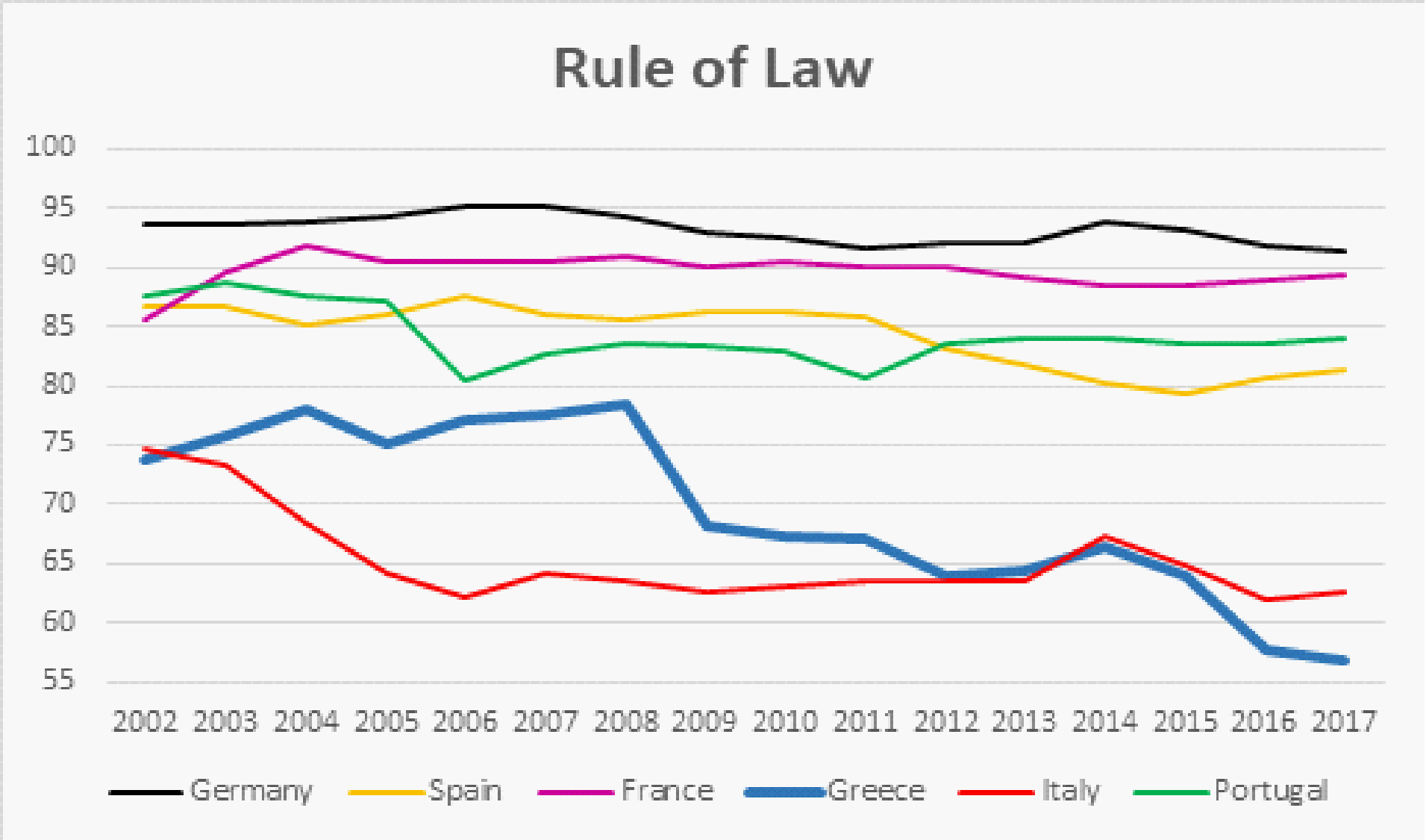
About institutions: property rights in Greece

(PR is constructed as the average of "the rule of law", "regulatory quality" and "political stability and absence of violence/terrorism", rescaled from 0 to 1. Source: World Governance Indicators)



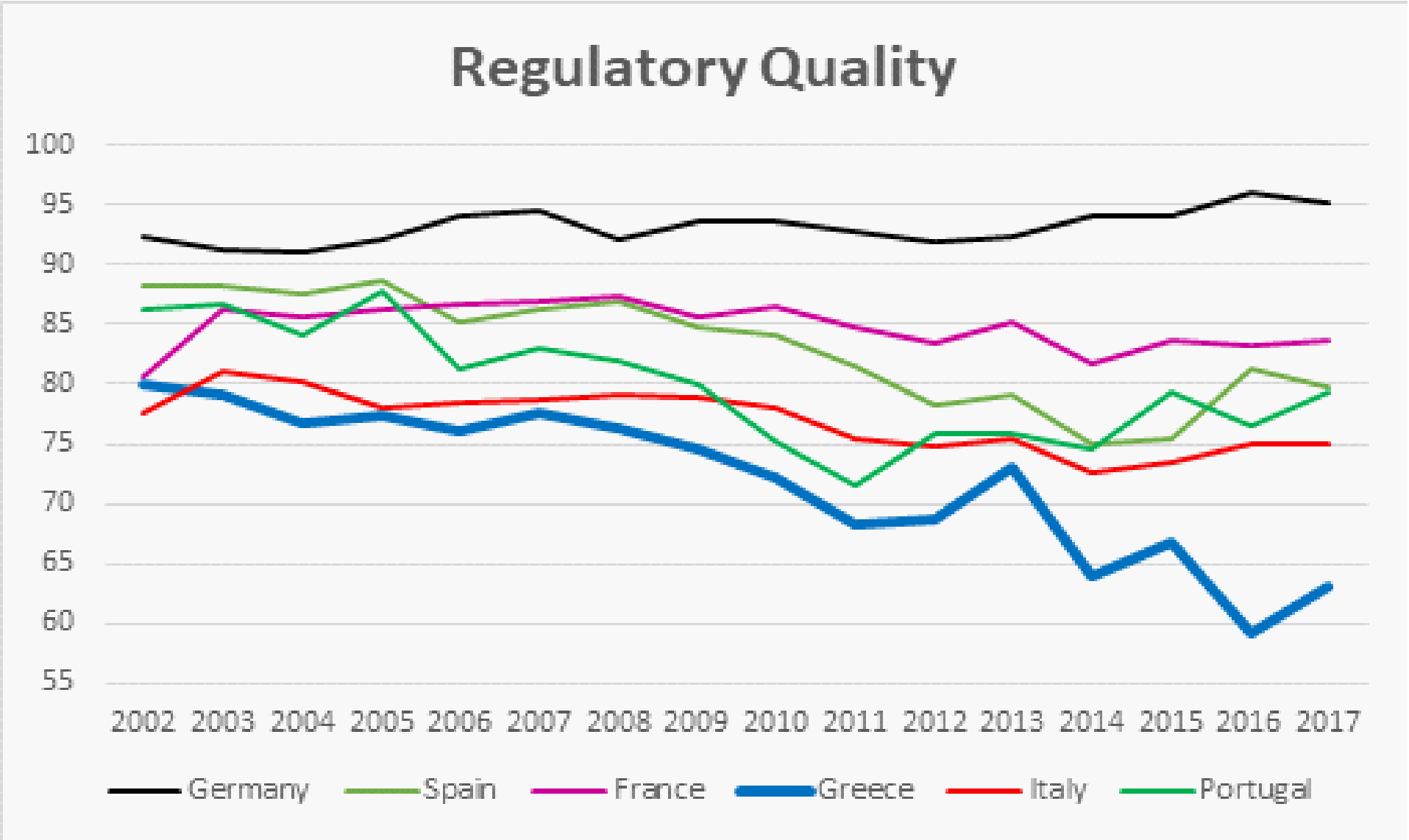
About institutions

Rule of law, comparison to other countries



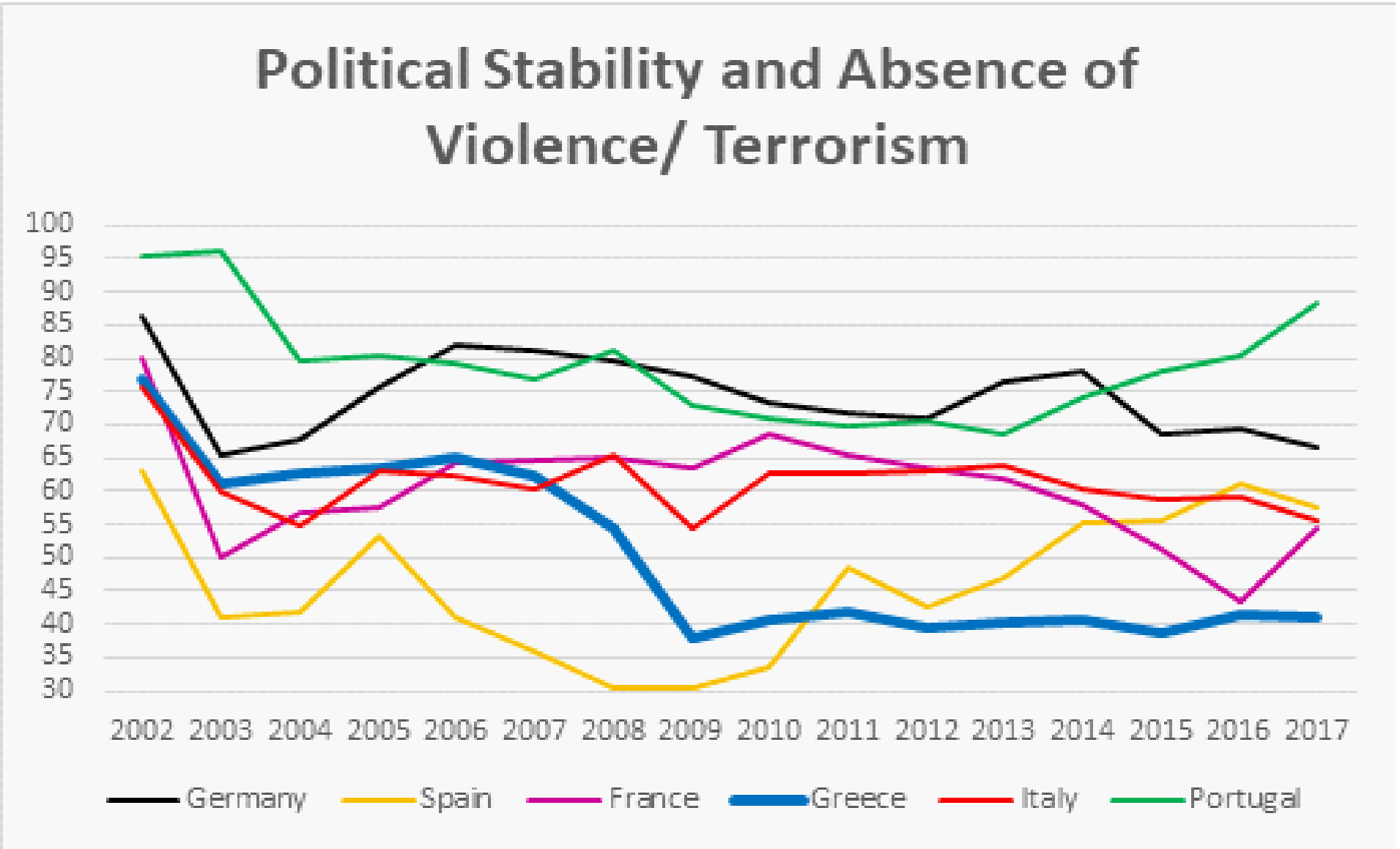
About institutions

Regulatory quality, comparison to other countries



About institutions

Political stability and absence of violence/terrorism, comparison to other countries



Our model

- **Households**

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  - household heterogeneity

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  - final good firms ▸ final good firms

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  - intermediate goods firms: Dixit-Stiglitz, Rotemberg, borrowing constraint, production-price-corporate finance decisions ▸ intermediate good firms

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- **State firms**

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  - use public employees, good purchased from private sector, public capital ▸ public firms

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  - tax, spending, public debt and its decomposition as in the data - fiscal austerity and official bailout

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  - But can balance-sheet (size and mix), or quantitative, monetary policy "alleviate fiscal burdens" and affect national resources?

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  - add frictions (see Walsh, 2017, chapter 11)
  - but, even without frictions, in a CU, balance sheet policies can have redistributive real allocation effects (see Reis, 2013, 2017, and Sinn, 2014)

Our model

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- According to this criterion: bonds purchased by ECB, dividends paid by ECB, and TARGET2 balances can play this role at least in principle (see also Reis, 2013, 2017, and Sinn, 2014).

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    - That is, accommodative monetary policy, or fiscal dominance, at member-country level.

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  - transaction cost associated with participation in international asset market

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  - This distorts incentives as agents expend resources to capture the rents (Acemoglu and Robinson, 2019, etc)
  - **Rent seeking technology:** Tullock-type rent seeking competition (Murphy et al.,1991, Dixit, 2004, Esteban and Ray, 2011, etc) ▸ Tullock-type

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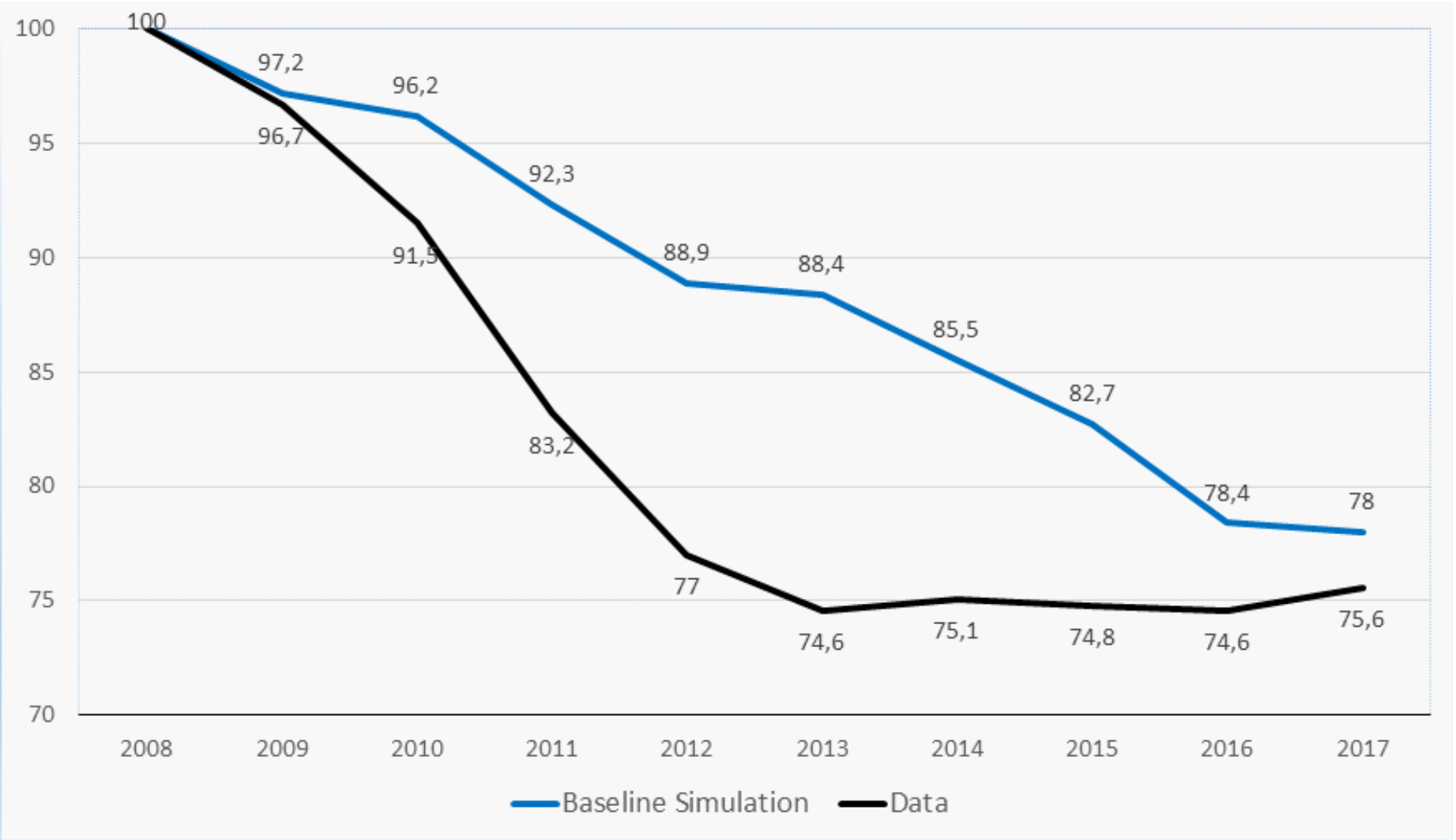
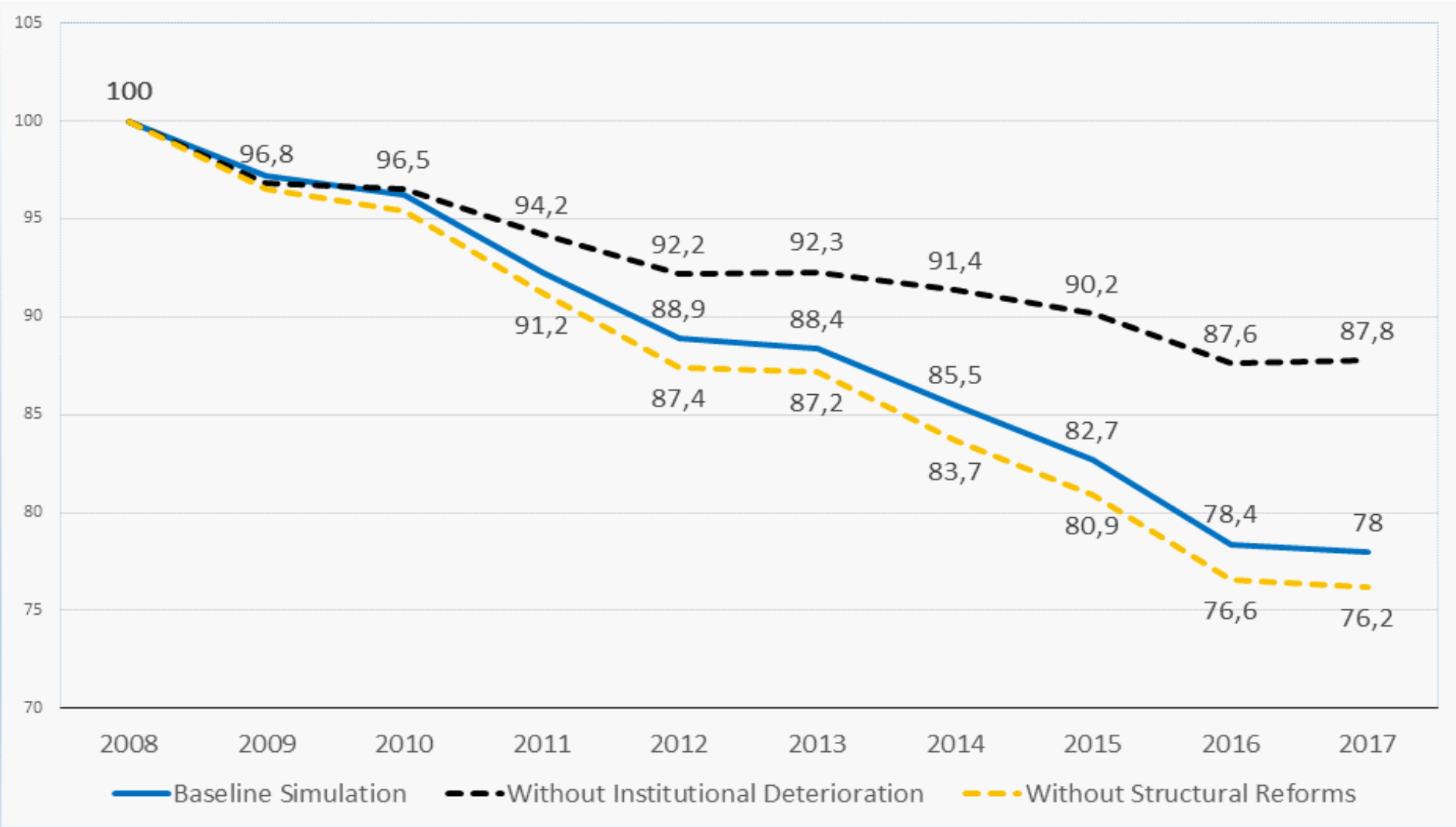
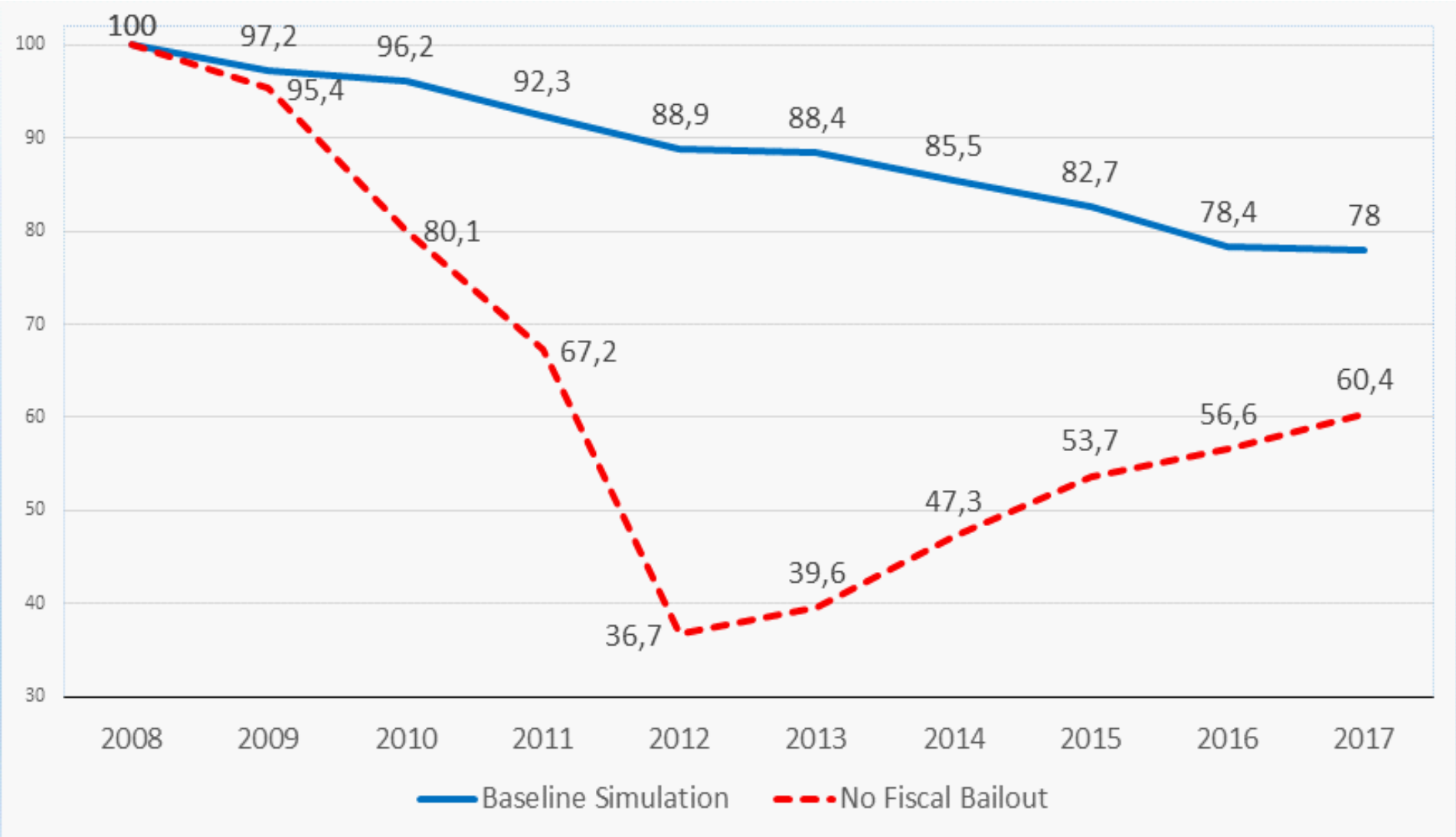
Output loss and data



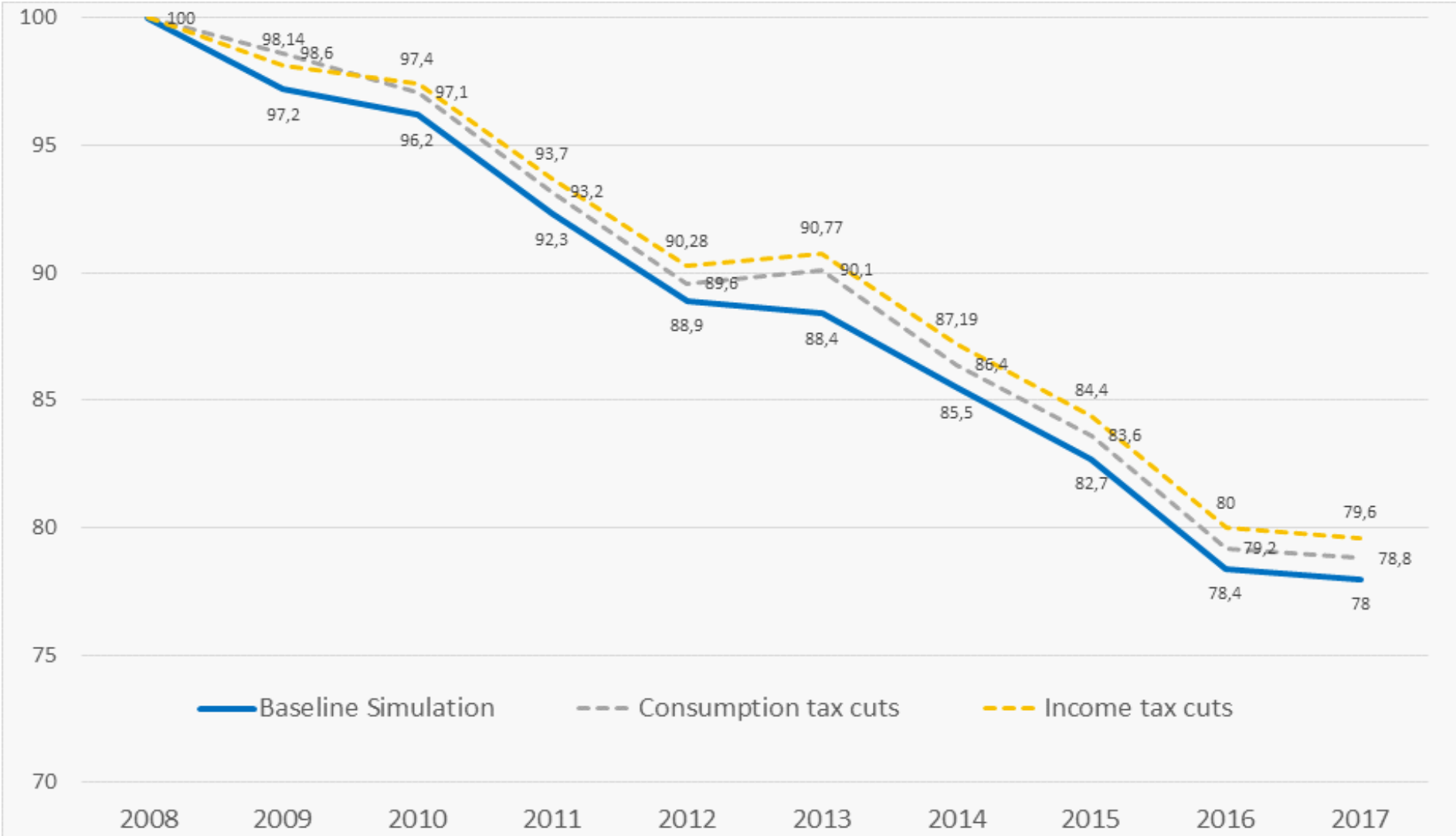
Output loss and its main drivers



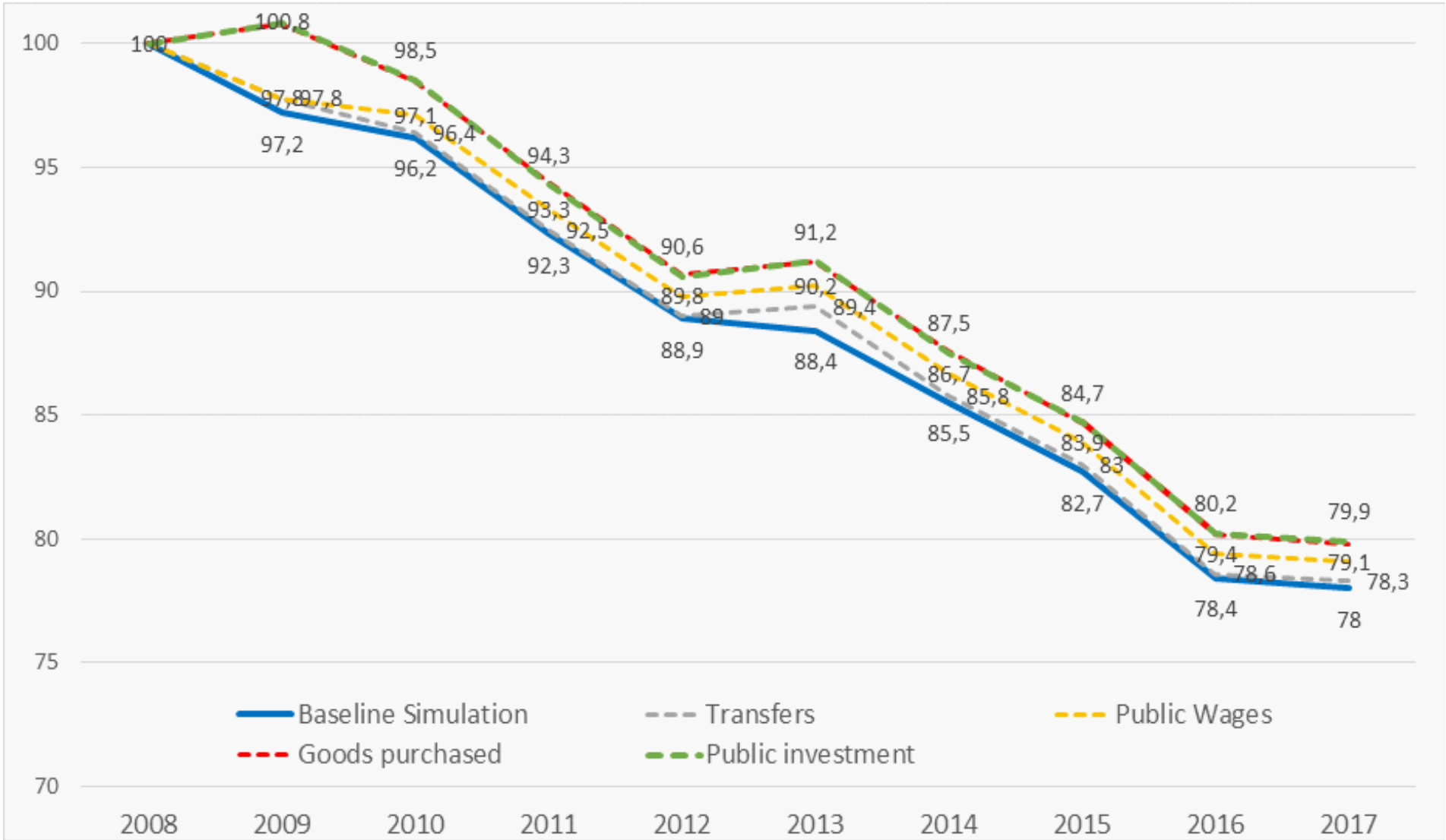
Counterfactual I: No fiscal bailout



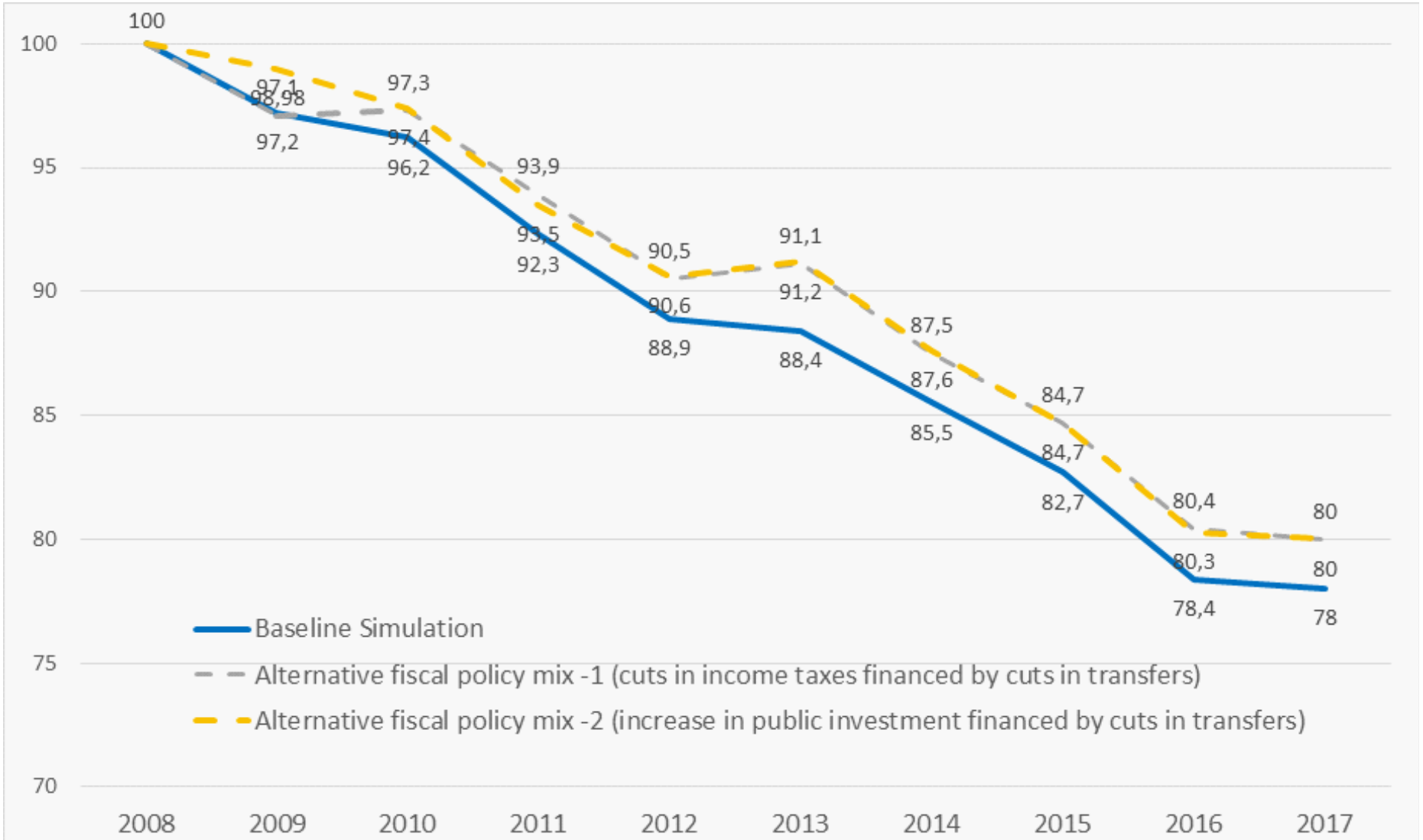
Counterfactual II: Less austerity - tax cuts



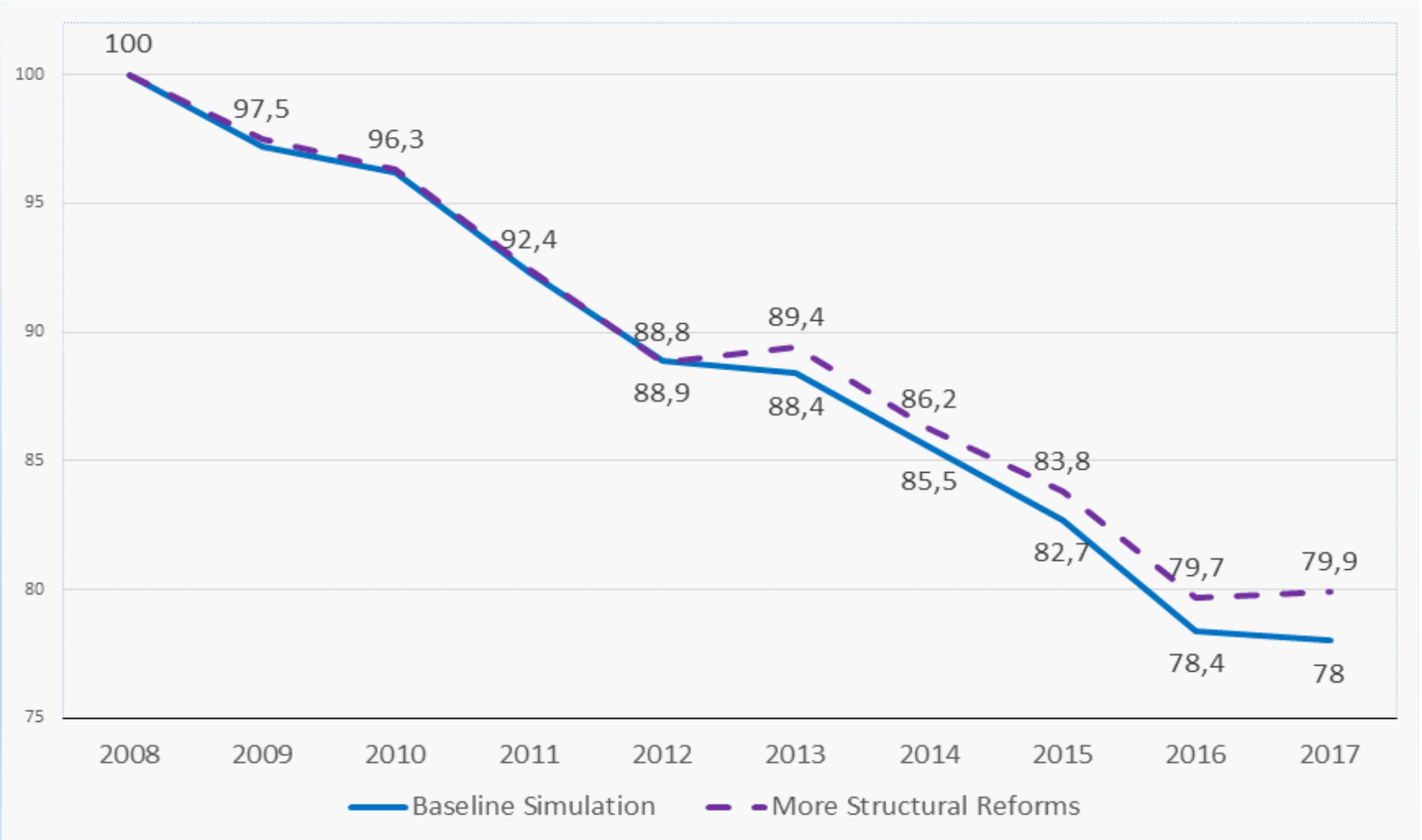
Counterfactual III: Less austerity - gov spending increases



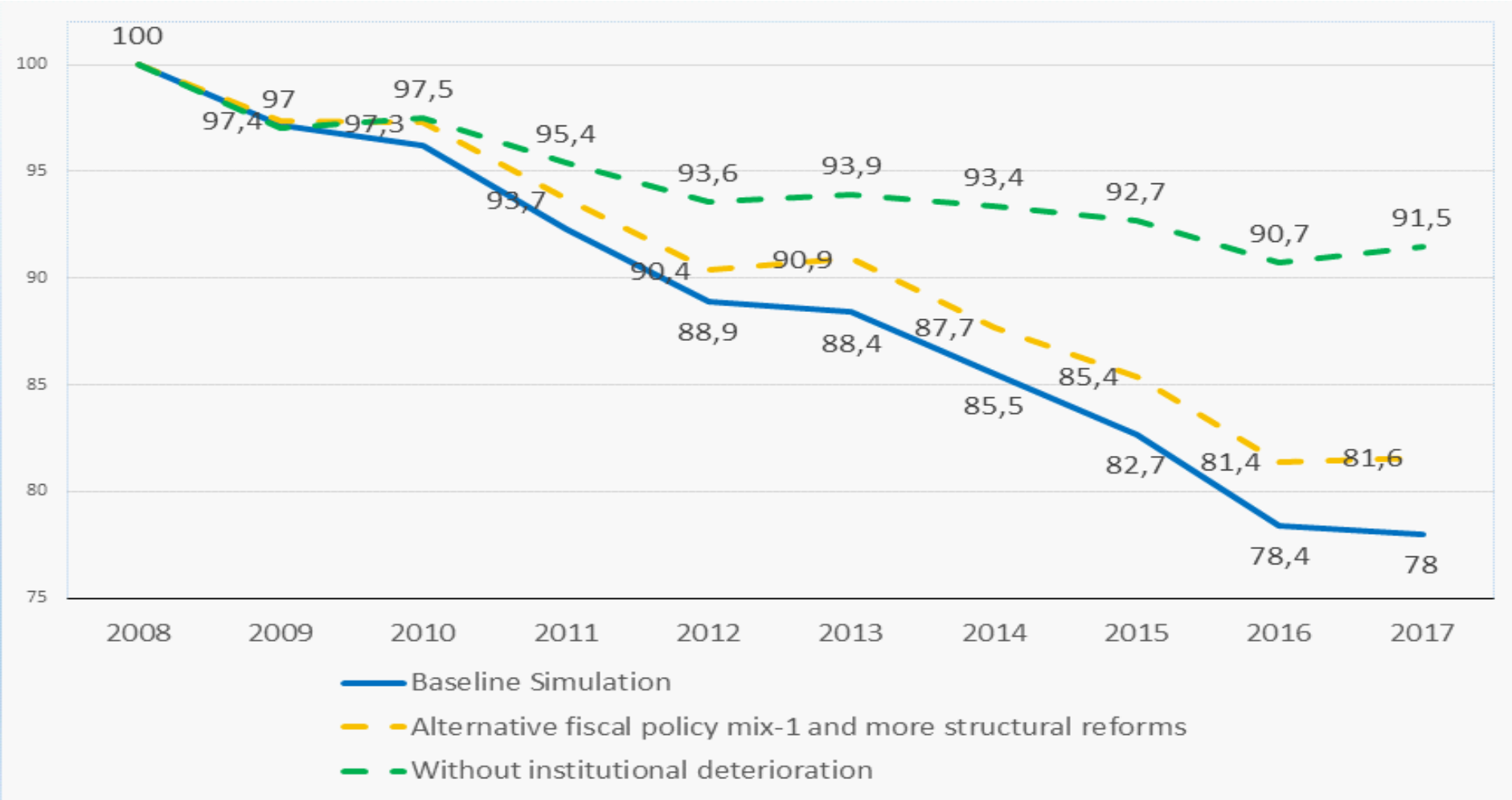
Counterfactual IV: Alternative fiscal policy mixes



Counterfactual V: More structural reforms



Counterfactual VI: Alternative fiscal policy mix, stronger structural reforms and pre-crisis institutions



Possible extensions

- Within the current setup:

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  - Distributive implications

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  - More counterfactuals (e.g. conditional aid, and hypothetical scenaria from now on)

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  - Two-country model (Greece and Germany)

Conclusions

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  - a different budget "neutral" policy mix (e.g. lower income taxes and/or higher public investment in exchange of lower transfers) - see e.g. Economides et al. (2020)

Conclusions

- But, the depression could have been much milder if (no fantasy world):
  - **institutions had not deteriorated since 2008**
  - a different budget "neutral" policy mix (e.g. lower income taxes and/or higher public investment in exchange of lower transfers) - see e.g. Economides et al. (2020)
  - structural reforms (especially, in product market and public sector) had been implemented

Thank you for your attention!

Entrepreneurs

$$(1+\tau_t^c)\left(\frac{p_t^h}{p_t}c_{k,t}^h+\frac{p_t^f}{p_t}c_{k,t}^f\right)+(1+i_t^*)\frac{p_{t-1}^*}{p_t^*}\frac{e_t p_t^*}{p_t}f_{k,t-1}+$$

$$+q_t s_{k,t}+\frac{p_t^h}{p_t}\psi^p(.)+h_{k,t}=$$

$$\equiv(1-\tau_t^y)w_t^k l_{k,t}+(q_t+\pi_{k,t}^i)s_{k,t-1}+\pi_{k,t}^p$$

$$+\frac{e_t p_t^*}{p_t}f_{k,t}+\frac{p_{t-1}}{p_t}h_{k,t-1}+\overline{g}_t^{tr}+$$

$$+\left(\frac{\Gamma^k(s_{k,t})^\gamma}{N^k\Gamma^k(s_{k,t})^\gamma+N^w\Gamma^w(s_{w,t})^\gamma+N^b\Gamma^b(s_{b,t})^\gamma}\right)(1-PR_t)Y_t$$

▸ households

Workers

$$(1+\tau_t^c)\left(\frac{p_t^h}{p_t}c_{w,t}^h+\frac{p_t^f}{p_t}c_{w,t}^f\right)+j_{w,t}+h_{w,t}\equiv$$

$$\equiv(1-\tau_t^y)w_t^w l_{w,t}+(1+i_t^d)\frac{p_{t-1}}{p_t}j_{w,t-1}+\frac{p_{t-1}}{p_t}h_{w,t-1}+\overline{g}_t^{tr}+$$

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Public employees

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$$=(1-\tau_t^y)w_t^g l_{b,t}+(1+i_t^d)\frac{p_{t-1}}{p_t}j_{b,t-1}+\frac{p_{t-1}}{p_t}h_{b,t-1}+\overline{g}_t^{tr}+$$

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Final good firms

Standard Dixit-Stiglitz technology:

$$y_{h,t}^{h} = \left[\sum_{i=1}^{N^i} \frac{1}{N^i} (y_{i,t}^{h})^{\theta} \right]^{\frac{1}{\theta}}$$

Real profits:

$$y_{h,t}^{h} - \sum_{i=1}^{N^i} \frac{1}{N^i} \frac{p_{i,t}^{h}}{p_{t}^{h}} y_{i,t}^{h}$$

▸ private firms

Intermediate good firms

Net profit:

$$\pi_{i,t} \equiv (1-\tau_t^{\pi}) \left[PR_t \frac{p_{i,t}^h}{p_t} y_{i,t}^h - w_t^w l_{i,t}^w - w_t^k l_{i,t}^k - \frac{p_t^f}{p_t} m_{i,t}^f \right] -$$

$$- \frac{p_t^h}{p_t} \left[k_{i,t} - (1-\delta) k_{i,t-1} \right] - \frac{p_t^h}{p_t} \frac{\xi^k}{2} \left(\frac{k_{i,t}}{k_{i,t-1}} - 1 \right)^2 k_{k,t-1} -$$

$$- \frac{p_t^h}{p_t} \frac{\xi^p}{2} \left(\frac{p_{i,t}^h}{p_{i,t-1}^h} - 1 \right)^2 \overline{y}_{i,t}^h + \left(L_{i,t} - (1+i_t^l) \frac{p_{t-1}}{p_t} L_{i,t-1} \right)$$

Production function:

$$y_{i,t}^h = A^p \left(\frac{N^g y_{g,t}^g}{N^i} \right)^{\sigma} \left[\left(\chi^p (k_{i,t-1})^{op} + (1-\chi^p)(m_{i,t}^f)^{op} \right)^{\frac{\alpha}{op}} \left(A^w l_{i,t}^w + A^k l_{i,t}^k \right)^{1-\alpha} \right]^{1-\sigma}$$

Intermediate good firms

Borrowing constraint:

$$L_{i,t} \leq \rho^{l} \frac{p_t^h}{p_t} k_{i,t-1}$$

Demand for product:

$$p_{i,t}^h = p_t^h \left(\frac{y_{i,t}^h}{y_{h,t}^h} \right)^{\theta-1}$$

▸ private firms

Capital good firms

There are N^c capital good firms indexed by the subscript $c = 1, 2, ..., N^c$. In each period, each c maximizes:

$$\pi_{c,t} \equiv Q_t x_{c,t} - x_{c,t}$$

▸ private firms

Private banks

The **budget constraint** of each bank that connects changes in its assets and liabilities is:

$$L_{p,t}+b_{p,t}+\pi_{p,t}+(1+i_t^d)\frac{p_{t-1}}{p_t}j_{p,t-1}+\frac{p_t^h}{p_t}\Xi(L_{p,t},z_{p,t},b_{p,t})+$$

$$+(1+i_t^z)\frac{p_{t-1}}{p_t}z_{p,t-1}\equiv(1+i_t^l)\frac{p_{t-1}}{p_t}L_{p,t-1}+(1+i_t^*)\frac{p_{t-1}}{p_t}b_{p,t-1}+j_{p,t}+z_{p,t}$$

Borrowing constraint:

$$z_{p,t}\leq\rho^z(L_{p,t}+b_{p,t})$$

▸ private banks

State firms

The cost of each state firm for producing the public good is in real terms:

$$w_t^g l_t^g + \frac{p_t^h}{p_t}(g_{g,t}^g + g_{g,t}^i) + \frac{p_t^f}{p_t} m_{g,t}^g$$

The production function of each state firm is:

$$y_{g,t}^g = A^g \left(\chi^g (k_{g,t-1}^g)^{og} + (1-\chi^g)(m_{g,t}^g)^{og} \right)^{\frac{\theta_1}{og}} (l_{g,t}^g)^{\theta_2} \left(g_{g,t}^g\right)^{1-\theta_1-\theta_2}$$

▸ state firms

The Government budget constraint

The flow budget constraint of the government written in per capita and real terms is:

$$\overline{g}_t^{tr} + n^b \left[w_t^g l_{g,t}^g + \frac{p_t^h}{p_t} \left(g_{g,t}^g + g_{g,t}^i \right) + \frac{p_t^f}{p_t} m_{g,t}^g \right] +$$

$$+ (1 + i_t^*) \frac{p_{t-1}}{p_t} \lambda_{t-1}^d d_{t-1} + (1 + i_t^*) \frac{p_{t-1}}{p_t} \lambda_{t-1}^{ncb} d_{t-1} +$$

$$(1 + i_t^*) \frac{p_{t-1}^*}{p_t^*} \frac{e_t p_t^*}{p_t} \frac{p_{t-1}}{e_{t-1} p_{t-1}^*} \lambda_{t-1}^g d_{t-1} + (1 + i^*) \frac{p_{t-1}^*}{p_t^*} \frac{e_t p_t^*}{p_t} \frac{p_{t-1}}{e_{t-1} p_{t-1}^*} \lambda_{t-1}^{eu} d_{t-1}$$

$$+ \frac{p_t^h}{p_t} \psi^g (.) \equiv d_t + \frac{T_t}{N} + rcb_t^g$$

The Government budget constraint

Total tax revenues in real terms are defined as:

$$T_t \equiv \tau_t^c [N^k (\frac{p_t^h}{p_t} c_{k,t}^h + \frac{p_t^f}{p_t} c_{k,t}^f) + N^w (\frac{p_t^h}{p_t} c_{w,t}^h + \frac{p_t^f}{p_t} c_{w,t}^f) +$$

$$+ N^b (\frac{p_t^h}{p_t} c_{b,t}^h + \frac{p_t^f}{p_t} c_{b,t}^f)] + \tau_t^y N^k [\frac{p_t^h}{p_t} r_t^k k_{k,t-1} + \pi_{k,t} + w_t^k l_{k,t}]$$

$$+ \tau_t^y N^w w_t^w l_{w,t} + \tau_t^y N^b w_t^g l_{b,t}$$

▸ treasury

The National central bank

The budget constraint of the NCB linking changes in assets and liabilities is (written in real and per capita terms):

$$n^k z_{p,t} + \lambda_t^{ncb} d_t + rcb_t^g \equiv$$

$$\equiv \left(h_t^n - \frac{p_{t-1}}{p_t} h_{t-1}^n \right) + \left(TARG_t - \frac{p_{t-1}}{p_t} TARG_{t-1} \right) +$$

$$+ n^k (1 + i_t^z) \frac{p_{t-1}}{p_t} z_{p,t-1} + (1 + i_t^*) \frac{p_{t-1}}{p_t} \lambda_{t-1}^{ncb} d_{t-1}$$

where

$$h_t^n = n^k h_{k,t} + n^w h_{w,t} + n^b h_{b,t}$$

that is, banknotes are equal to currecncy held by the public for liquidity providing services.

▸ national central bank

Consolidated government budget constraint

The consolidated government budget constraint (in real and per capita terms) is:

$$\overline{g}_t^{tr} + (1+i_t^*)\frac{p_{t-1}}{p_t}\lambda_{t-1}^d d_{t-1} + (1+i_t^*)\frac{p_{t-1}^*}{p_t^*}\frac{e_t p_t^*}{p_t}\frac{p_{t-1}}{e_{t-1}p_{t-1}^*}\lambda_{t-1}^g d_{t-1} +$$

$$+(1+i^*)\frac{p_{t-1}^*}{p_t^*}\frac{e_t p_t^*}{p_t}\frac{p_{t-1}}{e_{t-1}p_{t-1}^*}\lambda_{t-1}^{eu} d_{t-1} +$$

$$+n^b\left[w_t^g l_{g,t}^g + \frac{p_t^h}{p_t}\left(g_{g,t}^g + g_{g,t}^i\right) + \frac{p_t^f}{p_t}m_{g,t}^g\right] +$$

$$+\frac{p_t^h}{p_t}\frac{\psi^g}{2}\left[\frac{\frac{e_t p_t^*}{p_t}\left(n^k f_{k,t}+\lambda_t^g d_t\right)}{\frac{p_t^h}{p_t} n^k y_{i,t}^h}-\overline{f}\right]^2 n^k y_{i,t}^h=(\lambda_t^d+\lambda_t^g+\lambda_t^{eu})d_t+\frac{T_t}{N}+$$

$$+n^k h_{k,t}+n^w h_{w,t}+n^b h_{b,t}-\frac{p_{t-1}}{p_t}(n^k h_{k,t-1}+n^w h_{w,t-1}+n^b h_{b,t-1})-$$

$$-n^k\left(z_{p,t}-(1+i_t^z)\frac{p_{t-1}}{p_t}z_{p,t-1}\right)+\left(TARG_t-\frac{p_{t-1}}{p_t}TARG_{t-1}\right)$$

▸ macro policy regime

Balance of payments

If we add up the budget constraints of all agents, we get the country's balance of payments (in real and per capita terms):

$$\frac{p_t^f}{p_t}\left(n^k c_{k,t}^f + n^w c_{w,t}^f + n^b c_{b,t}^f + n^k m_{i,t}^f + n^b m_{g,t}^g\right) -$$

$$-\frac{p_t^h}{p_t} c_t^{f*} + (1+i_t^*)\frac{p_{t-1}^*}{p_t^*}\frac{e_t p_t^*}{p_t} n^k f_{k,t-1} +$$

$$+(1+i_t^*)\frac{p_{t-1}^*}{p_t^*}\frac{e_t p_t^*}{p_t}\frac{p_{t-1}}{e_{t-1}p_{t-1}^*}\lambda_{t-1}^g d_{t-1} +$$

$$+(1+i^*)\frac{p_{t-1}^*}{p_t^*}\frac{e_t p_t^*}{p_t}\frac{p_{t-1}}{e_{t-1}p_{t-1}^*}\lambda_{t-1}^{eu} d_{t-1} +$$

$$+\frac{p_t^h}{p_t}\frac{\psi^p}{2}\left[\frac{\frac{e_t p_t^*}{p_t}\left(n^k f_{k,t}+\lambda_t^g d_t\right)}{\frac{p_t^h}{p_t} n^k y_{i,t}^h}-\overline{f}\right]^2 n^k y_{i,t}^h+$$

$$+\frac{p_t^h}{p_t}\frac{\psi^g}{2}\left[\frac{\frac{e_t p_t^*}{p_t}\left(n^k f_{k,t}+\lambda_t^g d_t\right)}{\frac{p_t^h}{p_t} n^k y_{i,t}^h}-\overline{f}\right]^2 n^k y_{i,t}^h=$$

$$=\frac{e_t p_t^*}{p_t} n^k f_{k,t}+\lambda_t^g d_t+\lambda_t^{eu} d_t+\left(TARG_t-\frac{p_{t-1}}{p_t} TARG_{t-1}\right)$$

▸ macro policy regime

Country's interest rate

Following most of the literature on small open economies we use the functional form:

$$i_t^* = i^* + \psi^* \left(\exp\left(\frac{d_t}{\frac{p_t^h}{p_t} n^k y_{i,t}^h} - \overline{d} \right) - 1 \right)$$

▸ stationarity

Tullock-type rent seeking competition

Given ill-defined property rights, we assume that:
- total real output, Y_t, is a contestable prize,
- $0 < PR_t \leq 1$ is the degree of protection of property rights and

$$\left(\frac{\Gamma^i (s_{i,t})^\gamma}{N^k \Gamma^k (s_{k,t})^\gamma + N^w \Gamma^w (s_{w,t})^\gamma + N^b \Gamma^b (s_{b,t})^\gamma} \right) (1 - PR_t) Y_t$$

is the fraction of the prize extracted by each agent $i = k, w, b$ in a Tullock (1980) type rent-seeking competition.

▸ institutions

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