Can Structural Reforms Help Europe?*

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"Growth, Rebalancing, and Macroeconomic Adjustment after Large Shocks"

Budapest—September 20, 2013

Crisis in Europe

- Large output losses during the 2008-9 global financial crisis
 - ► Different speed of recovery (or lack thereof) between core and periphery



Crisis in Europe

• Periphery troubles: Debt crisis but also fundamentals

- Large external imbalances pre-crisis
- Significant inflation differentials (real exchange rate misalignments)



Policy Options for the Periphery

- Traditional policy options limited/unavailable:
 - Exchange rate depreciation not an option due to common currency
 - Fiscal expansion not an option because of debt crisis
 - ► ECB monetary easing limited by zero lower bound (ZLB)

Policy Options for the Periphery

• Structural reforms recommended by various agencies to address competitiveness gap and boost income prospects

"...the biggest problem we have for growth in Europe is the problem of lack of competitiveness that has been accumulated in some of our Member States, and we need to make the reforms for that competitiveness.

...to get out of this situation requires...structural reforms, because there is an underlying problem of lack of competitiveness in some of our Member States."

> José Manuel Durão Barroso President of the European Commission Closing Remarks following the State of the Union 2012 Strasbourg, September 12, 2012

Source of Competitiveness Gap

• Labor/Product market inefficiencies



Source: World Economic Forum (2011)

- In the long run?
- In the short run, when the ZLB binds?



What are the aggregate effects of structural reforms in the periphery?

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- Key intuition: At ZLB, deflationary impact of reforms raises real interest rate and depresses output

Roadmap

- One-sector, closed economy model:
 - Basic intuition and some analytical results
- Two-country, two-sector model of a currency union:
 - Calibration
 - Long-run effects of reforms
 - Short-run effects of reforms in normal times and in a crisis
 - Disentangling the effects of reforms

AD:
$$\hat{Y}_t = \mathbb{E}_t \hat{Y}_{t+1} - \sigma^{-1} (i_t - \mathbb{E}_t \pi_{t+1} - r_t^e)$$

AS:
$$\pi_t = \kappa \hat{Y}_t + \beta \mathbb{E}_t \pi_{t+1} + \kappa \psi \omega_t$$

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Equilibrium output (short-run=S; long-run=L)

$$\hat{Y}_{\mathcal{S}} = -\psi\omega_{\mathcal{S}}$$
 and $\hat{Y}_{L} = -\psi\omega_{L}$

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• Structural reforms: $\omega_t \downarrow \Rightarrow \hat{Y}_S, \hat{Y}_L \uparrow$

Textbook New Keynesian Model at the ZLB

- Dynamics dramatically change at the ZLB
- Consider a negative shock to r_t^e ($r_s^e < 0$) such that:
 - Large enough to force $i_S = 0$ ($\pi_t < 0$):
 - Reverts back to (absorbing) steady state w/ prob. 1μ in each period
- Short-run equilibrium:

AD:
$$\hat{Y}_{S} = \underbrace{\hat{Y}_{L}}_{=-\psi\omega_{L}} + \frac{\sigma^{-1}\mu}{1-\mu}\pi_{S} + \frac{\sigma^{-1}}{1-\mu}r_{S}^{e}$$

AS: $\pi_{S} = \frac{\kappa}{1-\mu\beta}\hat{Y}_{S} + \frac{\kappa\psi}{1-\mu\beta}\omega_{S}$

• Deflationary effect of reforms reduces short-run output via AS



• Expansionary effect of reforms increases demand via AD



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- Income effect of reforms increases short-run demand via AD
 - ▶ Net effect depends on which force dominates (quantitative question)

- Deflationary effect of reforms reduces short-run output via AS
- Income effect of reforms increases short-run demand via AD
 - ▶ Net effect depends on which force dominates (quantitative question)
- \Rightarrow Calibrated two-country (H,F), two-sector (k=T,N) model of currency union
 - Complete financial markets within each country
 - ► Incomplete financial markets (risk-free bond) across countries
 - Sector-specific labor supply
 - Monopolistic competition + Nominal rigidities (prices and wages)
 - Inflation targeting regime

Households (Staggered Wage Setting)

• Utility maximization

$$\max_{C_{t+s}, W_{kt+s}(i), B_{t+s}} \mathbb{E}_t \left\{ \sum_{s=0}^{\infty} \beta^s \underline{\zeta_{t+s}} \left[\frac{C_{t+s}^{1-\sigma}}{1-\sigma} - \frac{L_{kt+s}(i)^{1+\nu}}{1+\nu} \right] \right\}$$

where

$$C_{t} = \left[\gamma^{\frac{1}{\varphi}} C_{Tt}^{\frac{\varphi-1}{\varphi}} + (1-\gamma)^{\frac{1}{\varphi}} C_{Nt}^{\frac{\varphi-1}{\varphi}}\right]^{\frac{\varphi}{\varphi-1}} \qquad C_{Tt} = \left[\omega^{\frac{1}{\varepsilon}} C_{Ht}^{\frac{\varepsilon-1}{\varepsilon}} + (1-\omega)^{\frac{1}{\varepsilon}} C_{Ft}^{\frac{\varepsilon-1}{\varepsilon}}\right]^{\frac{\varepsilon}{\varepsilon-1}}$$

Budget constraint

$$P_{t}C_{t} + \frac{B_{t}}{\psi_{Bt}} = (1 + i_{t-1})B_{t-1} + (1 - \tau_{kt}^{w})W_{kt}(i)L_{kt}(i) + \mathcal{P}_{t} - \mathcal{T}_{t}$$

where

$$\psi_{Bt} \equiv \exp\left[-\psi_B\left(\frac{B_t}{P_t Y_t}\right)\right]$$

Labor demand (labor agencies)

$$L_{kt}(i) = \frac{1}{\gamma_k} \left[\frac{W_{kt}(i)}{W_{kt}} \right]^{-\phi_k} L_{kt}(j)$$

Firms (Staggered Price Setting)

• Profit maximization

$$\max_{\widetilde{P}_{kt}(j)} \mathbb{E}_t \left\{ \sum_{s=0}^{\infty} \xi_p^s Q_{t,t+s} \left[(1 - \tau_{kt+s}^p) \widetilde{P}_{kt}(j) - \frac{W_{kt+s}}{Z_{kt+s}} \right] Y_{kt+s}(j) \right\}$$

Technology

$$Y_{kt}(j) = Z_{kt} L_{kt}(j)$$

• Product demand (retailers)

$$Y_{kt}(j) = \frac{1}{\gamma_k} \left[\frac{P_{kt}(j)}{P_{kt}} \right]^{-\theta_k} Y_{kt}$$

Monetary Policy

• Strict inflation targeting

$$\Pi^{MU}_t = \bar{\Pi}$$

where

$$\Pi_t^{MU} = (\Pi_t)^{0.5} (\Pi_t^*)^{0.5}$$

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• Solve model non-linearly under perfect foresight, taking ZLB into account

 $i_t \ge i^{zlb} \ge 0$

Government Policy

• Periphery steady state markups $(\mu_k^j, j = \{p, w\}, k = \{H, N\})$

$$\mu_k^p = \frac{1}{1 - \tau_k^p} \frac{\theta_k}{\theta_k - 1} \qquad \qquad \mu_k^w = \frac{1}{1 - \tau_k^w} \frac{\phi_k}{\phi_k - 1}$$

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- Periphery product and labor market reforms: Cut τ_k^J
- Subsidies financed through lump-sum taxes

$$\mathcal{T}_{t} = \int_{0}^{1} \tau_{kt}^{p} P_{kt} Y_{kt}(j) dj + \int_{0}^{1} \tau_{kt}^{w} W_{kt} L_{kt}(i) di$$

Calibration of Markups

• Estimates of product market markups (OECD, 2005)

	Markup Estimates		
	Periphery (H)	Core (F)	
Aggregate	1.36	1.25	
Tradable	1.17	1.14	
Non-Tradable	1.48	1.33	

Note: Periphery: Italy and Spain. Core: France and Germany.

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- For labor market markups, combine evidence on
 - Wage premia by sector (Jean and Nicoletti, 2002)
 - Average wage bargaining power in Europe (Everaert and Schule, 2006)
 - Numbers for ϕ_k comparable with product market estimates (Bayoumi, Laxton and Pesenti, 2004; Forni, Gerali and Pisani, 2010)

Other Parameters

Households					
Individual discount factor	β	=	0.99		
Elasticity of intertemporal substitution	σ^{-1}	=	2		
Inverse Frisch elasticity	ν	=	2		
Home bias	ω	=	0.57		
Consumption share of tradable goods	γ	=	0.38		
Elasticity of substitution tradables-nontradables	ϵ	=	0.5		
Elasticity of substitution Home-Foreign tradables	φ	=	1.5		
Price and Wage Setting					
Probability of not being able to adjust prices	ξp	=	0.66		
Probability of not being able to adjust wages	ξw	=	0.66		
Monetary Policy					
Inflation target	Π	=	1		
Effective lower bound on nominal interest rate	i ^{zlb}	=	0.0025		

Structural Reforms in Normal Times

- Experiment: Permanently cut τ_N^p and τ_N^w by 1 p.p. (Periphery \rightarrow Core)
- Long-run effects:
 - ▶ Reduction in markups boosts union-wide output by 0.25%
 - Quantitatively in line with literature
- Periphery reduces competitiveness gap through large decline in relative price of non-traded goods

Structural Reforms in Normal Times

- Experiment: Permanently cut τ_N^p and τ_N^w by 1 p.p. (Periphery \rightarrow Core)
- Short-run effects: Reforms are expansionary



Structural Reforms in a Crisis

- Crisis generated via symmetric shock to discount factor
 - \blacktriangleright Calibrated to match $\approx 4\%$ drop in EMU output during global financial crisis



Structural Reforms in a Crisis

- Crisis generated via symmetric shock to discount factor
 - \blacktriangleright Calibrated to match $\approx 4\%$ drop in EMU output during global financial crisis
- Short-run effects: At the ZLB, reforms are contractionary!

$ au_N^{p} = au_N^{w}$ (in p.p.)	Output	Inflation	Real Rate
0	-4.0	-1.0	1.9
1	-4.1	-1.5	2.2
5	-4.6	-3.6	3.6
10	-5.1	-6.2	5.1

Impact response of aggregate variables

Structural Reforms in a Crisis: Key Mechanism

- Short-run effects of 1 p.p. permanent cut in non-tradable product and labor market markups:
 - In normal times: $\approx +2\%$
 - In a crisis: $\approx -0.1\%$

Structural Reforms in a Crisis: Key Mechanism

- Short-run effects of 1 p.p. permanent cut in non-tradable product and labor market markups:
 - In normal times: $\approx +2\%$
 - In a crisis: $\approx -0.1\%$
- Key mechanism:
 - In a crisis, reforms worsen deflationary pressures
 - ZLB constrains ability to provide monetary stimulus
 - Higher real interest rate further depresses output

Effects of Temporary Reforms in a Crisis

- Adoption of structural reforms in a crisis may lead to political backlash and social unrest
 - ► Example: Debate over labor reforms in recent Italian elections

Effects of Temporary Reforms in a Crisis

- Adoption of structural reforms in a crisis may lead to political backlash and social unrest
 - Example: Debate over labor reforms in recent Italian elections
- Experiment: Temporary reforms
 - Reforms are implemented in a crisis...
 - ...but unwound when ZLB stops being binding
 - ► Agents correctly foresee reforms to be temporary

Effects of Temporary Reforms in a Crisis

$$au_N^{m p} = au_N^w = -1 \; {\sf p.p.}$$



Two Experiments

- Temporary collusion
- ② Credible announcement about future reforms

Two Experiments

• Eggertsson (2012): At ZLB, higher markups can be expansionary

▶ State-contingent design of "New Deal" policy ($\phi_{ au} > 0$)

$$\tau_{Nt}^{p} = \tau_{Nt}^{w} = \tau_{t}^{nd} = -\min\left\{0, \phi_{\tau}\left[\left(1+i\right)\left(\Pi_{t}^{MU}\right)^{\varphi_{\pi}} - \left(1+i^{zlb}\right)\right]\right\}$$

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- Fernandez-Villaverde, Guerron-Quintana and Rubio-Ramirez (2012): Announce reforms implemented when ZLB stops being binding
 - State-contingent design of "Delay" policy

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Two Experiments

$$au_{N}^{p}= au_{N}^{w}=-10$$
 p.p. for "Delay"



EFR (Brown-Oxford-Board)

Conclusions

- Structural reforms boost output over long-run horizon and reduce competitiveness gap between Core and Periphery
 - ▶ 10 p.p. reduction of product and labor market markups
 - $\star~\approx$ 2.5% increase in union-wide output
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 - In normal times, reforms generate output booms
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 - ► In crisis times (ZLB), ambitious reforms can substantially deepen the recession
- Key insight: At ZLB, deflationary impact of reforms raises real interest rate and further depresses output

- Do structural reforms address
 - Competitiveness gap between periphery and core?
 - External imbalances between periphery and core?

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 - Competitiveness gap between periphery and core? Yes, long run RER depreciation of almost 7%
 - External imbalances between periphery and core? No, CA improves by less than 1%
- Competitiveness gap mostly in non-tradable sector
 - Structural reforms reduce relative price of NT but do not affect TOT

• Alternative experiment: Demand shock only hits periphery

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 - Main result goes through

$ au_N^p = au_N^w$ (in p.p.)	Output		Inflation		Real Rate	
	Symm	Asymm	Symm	Asymm	Symm	Asymm
0	-3.95	-3.95	-0.95	-2.10	1.88	2.86
1	-4.07	-3.99	-1.40	-2.54	2.18	3.13
5	-4.51	-4.19	-3.12	-4.28	3.30	4.21
10	-5.03	-4.41	-5.22	-6.40	4.62	5.46

Impact response

- Alternative experiment: Demand shock only hits periphery
 - Large adjustment of terms of trade and current account

$$au_{N}^{p}= au_{N}^{w}=-1$$
 p.p.



But just a function of asymmetric nature of shock

Sensitivity to σ^{-1}

- Results balance
 - Long-run wealth effect: Higher output in new steady state
 - ► Short-run substitution effect: High real interest rated due to ZLB
- Elasticity of intertemporal substitution affects this balance

Experiment:
$$\tau_N^p = \tau_N^w = -10$$
 p.p.

σ^{-1}	2	1	0.5
Y_1^{MU}	-5.03	-3.90	-3.53

Note: Shock such that $Y_1^{MU}=-3.95\%$ with $\tau^{\rho}=\tau^w=\tau$ as σ varies

Sensitivity to φ_π

• Implement strict inflation targeting via Taylor rule

$$1 + i_t = \max\left\{1 + i^{Zlb}, (1+i)\left(\Pi_t^{MU}\right)^{\varphi_{\pi}}\right\}$$

φ_{π}	Y_1^{MU}		ZLB Duration		
	Crisis	Permanent	Crisis	Permanent	
10	-3.95	-4.07	10	10	
20	-3.95	-4.06	11	11	
5	-3.95	-4.04	9	9	
2	-3.95	-3.88	5	6	

• Crisis:
$$\tau_N^p = \tau_N^w = \tau$$

• Permanent:
$$\tau_N^p = \tau_N^w = -1$$
 percentage point