Market Reforms, the Business Cycle, and Macro Policy

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Introduction

- Labor and product market reforms are at the heart of the structural reform agenda advocated by many to boost performance of several advanced economies, notably in Europe and Japan.
- The theoretical case has been laid out by extensive literature that highlights long-term gains.
- No consensus on short- to medium-term impact, and even less on whether these effects depend on state of business cycle, other initial conditions (such as stringency of external borrowing constraints), and the conduct of macroeconomic policy.

Introduction, Continued

- The fallout from recent/ongoing crises has given fresh importance to such transitional dynamics issues:
  - For given long-term impact of re-designing unemployment benefits and employment protection, do such reforms entail larger short-run costs if implemented during a recession? Or, in contrast, do they speed up recovery?
  - Does the removal of barriers to entry in product markets trigger more or less entry by new firms in a depressed economy, and what are the consequences for transition dynamics?
  - Are the effects of reforms stronger or weaker when countries have no access to international financial markets—as was the case to different degrees in euro area periphery countries throughout the recent eurozone crisis?
  - Does it matter whether monetary policy is constrained by the zero lower bound (ZLB) on interest rates?
  - What is the optimal monetary policy response to market reforms?
- I will address these questions by presenting results from a research agenda I have been developing with Matteo Cacciatore, Romain Duval, and Giuseppe Fiori.
  - Specifically: CDFG *JEDC* (2016), CDFG WP (2016), and CFG *JIE* (2016).

Market Reforms in the Time of Imbalance, CDFG *JEDC* (2016)

1. We add to fast-growing literature on short-run effects of labor and product market reforms by addressing the issue in a model that captures key empirical features of product and labor market regulation and reform as well as the narrative of policymakers.

2. First to use such a theoretical framework to assess how short-term effects of reforms vary according to the economy's cyclical position—and how the stringency of its external borrowing constraint further shapes effects.

- Our model and results provided the theoretical background for the analysis of structural reforms in the April 2016 issue of the IMF's *World Economic Outlook* (*WEO*).

Strategy

- Two-country, multi-sector model with endogenous producer entry and search and matching market frictions in the labor market.
  - Bilbiie, Ghironi, and Melitz (2012) and Ghironi and Melitz (2005).
  - Mortensen and Pissarides (1994) and den Haan, Ramey, and Watson (2000).
- We calibrate the model with parameter values from literature and to match features of macro data for euro area.
- Then study dynamic response to:

1. product market reform: reduction in regulatory costs of entry in non-tradable sector.
   - Focus on non-tradable sector to explore idea that deregulation of profession/service sectors should propagate as cost-reduction throughout economy.
   - Different from CDFG *JIMF* (2015), Cacciatore and Fiori *RED* (2016), and CFG *JIE* (2016) and *RiE* (2015).
2. labor market reform: decline in firing costs or decline in generosity of unemployment benefits.

Strategy, Continued

- Two alternative scenarios: Reforms are either implemented in normal times, assuming that the economy is at the steady state, or in the aftermath of a large adverse productivity shock that temporarily depresses the economy.
- To assess the role of external borrowing constraints, also consider financial autarky case.
- Finally, we discuss the implications of credible commitment to future reforms as opposed to implementing unanticipated reforms.

Results: Reforms in Normal Times

- Reforms increase output and employment in the long run.
- When implemented in normal times, short-term effects can be negative in some cases:
  - Product market deregulation involves gradual and costly reallocation of resources to new entrants;
    - along the way, sunk entry costs need to be financed by (partly) reducing consumption and physical capital accumulation.
  - Removal of firing restrictions triggers lay-off of less productive workers, while re-employment takes time, the more so as such reform does not cause much entry of new firms.
  - Reduction in unemployment benefits entails no significant short-term costs because the reduction in the workers' outside option leads to wage moderation, which boosts job creation without triggering significant increase in job destruction.
- Deregulating economy always experiences current account deficit, as reforms stimulate (at least one form of) domestic investment.

Results: Reforms in the Time of Imbalance

- Business cycle conditions at the time of reform matter.

Firing Costs

- Reduction of firing costs entails larger and more persistent adverse short-run effects on employment and output when implemented in recession.
- For given aggregate productivity, positive firing costs imply that relatively unprofitable jobs survive job destruction.
- When aggregate productivity is below trend, share of unprofitable matches is greater than in steady state.
- Removal of firing costs leads to much larger job destruction, which further depresses aggregate demand and output.

Results: Reforms in the Time of Imbalance, Continued

Unemployment Benefits

- By contrast, reduction in unemployment benefits boosts employment and output by more in a recession than in normal times.
- Additional positive effect is due to the fact that, at times of high unemployment, larger pool of workers is searching for jobs.
- As a result, probability of filling a vacancy is higher, and thus expected cost of job creation is lower, in recession.
- Furthermore, since real wages are already low relative to steady state, the same reduction in unemployment benefits generates more job creation.
  - Positive effects on job creation prevail even when we allow the unemployment benefits reform to reduce directly aggregate income and demand.
- Caveat: Unemployment benefits do not play insurance role in our model, as we assume income pooling within the household.
  - This allows us to focus most transparently on the job creation effect of reducing the outside option of workers.

Results: Reforms in the Time of Imbalance, Continued

Product Market Reform

- Impact of product market reforms less sensitive to business cycle.
- Recession has offsetting effects on the present discounted value of product creation:
  - On one side, lower aggregate demand reduces expected stream of profits.
  - On the other side, when productivity is below trend, markups are higher, which encourages product creation.
  - These two opposite effects largely cancel out, unless recession is very persistent—in the latter case, the reduction in aggregate demand prevails, and product market deregulation becomes more costly relative to the steady state in the short term.

Commitment to Reform

- Credible announcements of future deregulation induce sizable short-run dynamics, regardless of whether the announcement takes place in normal times or during downturn.
- Whether immediate effect of committing to future deregulation is expansionary or contractionary varies across reforms:
  - Announcement of future product market deregulation has contractionary effects in the short run, while the opposite is true for an unemployment benefits reform.
- Effects of reform announcements do not significantly depend on the state of the cycle.
- However, credible commitment to lower firing costs can significantly reduce adverse short-run effects of this reform during recession.
  - Since announcement stimulates job creation without triggering immediate job destruction, a smaller number of workers are displaced when reform is actually implemented.

Constraint on External Borrowing

- Existence of binding constraint on external borrowing can amplify the costs of adjustment to market reform.
- This is the case for product market deregulation:
  - With a closed current account, domestic households must reduce consumption and investment in physical capital by more to finance product creation, leading to lower aggregate demand in the short run.

A Policy Bottom Line

- The state of the economy matters for the short- to medium-run effects of market reforms.
- Policymakers should design reform packages appropriately to avoid the risk that short-term costs will derail support for reforms that would generate significant benefits over the longer horizon.
- This advice was incorporated in IMF *WEO* (April 2016) and many subsequent IMF documents.

Related Literature

- Long-run or two-period: Blanchard and Giavazzi (2003) and references in Cacciatore and Fiori (2016).
- Dynamics: Asturias, Hur, Kehoe, and Ruhl (2015), Cacciatore, Duval, Fiori, and Ghironi (2015), Cacciatore and Fiori (2016), Cacciatore, Fiori, and Ghironi (2015, 2016), Ghironi and Melitz (2005).
- Dynamics and state of the economy: Andres, Arce, and Thomas (2014), Eggertsson, Ferrero, and Raffo (2014, EFR), Fernández-Villaverde, Guerrón-Quintana, and Rubio-Ramírez (2011), Gerali, Notarpietro, and Pisani (2015), Vogel (2014).
  - Reduced-form structural reforms, no market dynamics. Very different implications for deflationary effects, terms of trade, and external balance.
  - Everaert and Schule (2008), Gomes (2014), and Varga and in't Veld (2011): EFR-style reforms in normal times in large-scale DSGE models.
- Unemployment benefits literature: Jung and Kuester (2015), Kroft and Notowidigdo (2011), Landais, Michaillat, and Saez (2010). More emphasis on firm hiring channel, as in Mitman and Rabinovich (2015), but full insurance within household and constant job search effort imply we do not incorporate insurance vs. moral hazard tradeoff.
- Positive effects of reducing unemployment benefits during recession consistent with evidence in Hagedorn, Karahan, Manovskii, and Mitman (2013) and Hagedorn, Manovskii, and Mitman (2015).

The Model: Household Preferences

- Two countries, Home and Foreign.
- Representative home household maximizes:

$$E_t \left[\sum_{s=t}^{\infty} \beta^{s-t} \frac{\left(C_s^H - h C_{s-1}^H \right)^{1-\gamma}}{1-\gamma} \right],$$

  where $\beta \equiv$ discount factor and $h \equiv$ habit, both between 0 and 1; $\gamma > 0$.

- $C_t^H \equiv$ household consumption:

$$C_t^H \equiv C_t + h_p(1 - L_t).$$

  - $L_t \equiv$ mass of employed workers,
  - $h_p \equiv$ home production,
  - $C_t \equiv$ basket of domestic and imported consumption sub-bundles.

- Habits included for quantitative purposes related to IMF *WEO* analysis. Removing habits would not alter our key qualitative results.

The Model: Household Preferences, Continued

- The consumption basket C_t aggregates a bundle of domestic and imported traded goods, C_t^T, and a bundle of non-tradable goods, C_t^N:

$$C_t = \left[(1-\alpha_N)^{\frac{1}{\phi_N}} \left(C_t^T\right)^{\frac{\phi_N - 1}{\phi_N}} + \alpha_N^{\frac{1}{\phi_N}} \left(C_t^N\right)^{\frac{\phi_N - 1}{\phi_N}} \right]^{\frac{\phi_N}{\phi_N - 1}}.$$

- Tradable consumption:

$$C_t^T = \left[(1-\alpha_X)^{\frac{1}{\phi_T}} \left(C_{D,t}^T\right)^{\frac{\phi_T - 1}{\phi_T}} + \alpha_X^{\frac{1}{\phi_T}} \left(C_{X,t}^{T^*}\right)^{\frac{\phi_T - 1}{\phi_T}} \right]^{\frac{\phi_T}{\phi_T - 1}}.$$

- Home bias in tradable preferences.

The Model: Household Preferences, Continued

- Endogenous number of non-tradable product varieties available to consumers $c_t^N(\omega)$: $\Omega_t \in \Omega$.
- Aggregator C_t^N takes a translog form (Feenstra, 2003).
- Unit expenditure function on basket C_t^N given by:

$$\ln P_t^N = \frac{1}{2\sigma}\left(\frac{1}{N_t} - \frac{1}{\tilde{N}}\right) + \frac{1}{N_t}\int_{\omega\in\Omega_t} \ln p_t^N(\omega)\, d\omega + \frac{\sigma}{2N_t}\int_{\omega\in\Omega_t}\int_{\omega'\in\Omega_t} \ln p_t^N(\omega)\left(\ln p_t^N(\omega) - \ln p_t^N(\omega')\right) d\omega d\omega',$$

  where $\sigma > 0 \equiv$ price elasticity of spending share on individual good, $N_t \equiv$ total number of products available at time t, $\tilde{N} \equiv$ mass of Ω, and $p_t^N(\omega) \equiv$ nominal price of good $\omega \in \Omega_t$.

- Property of translog preferences (in the symmetric equilibrium):

$$\theta_t^N \equiv -\frac{\partial \ln c_t^N}{\partial \ln\left(p_{\omega,t}^N / P_t\right)} = 1 + \sigma N_t.$$

The Model: Production

- Vertically integrated production sectors.
- Upstream sector: perfectly competitive firms use capital and labor to produce a non-tradable intermediate input Y_t^I.
  - Search and matching frictions in labor market.
- Downstream sectors:
  - Monopolistically competitive firms use Y_t^I to produce differentiated non-tradable varieties.
  - Perfectly competitive firms combine Y_t^I and differentiated non-tradable products to produce homogeneous tradable good.
  - Production structure consistent with Boeri at al. (2005):
    - Service industries key supplier of the manufacturing sector.

The Model: Intermediate Input Producers

- Firms post vacancies, V_t, to hire new workers, incurring real cost κ.
- Unemployed workers, U_t, search for jobs.
- Aggregate matching technology: $M_t = \chi U_t^{\varepsilon} V_t^{1-\varepsilon}$.
- Probability of filling a vacancy: $q_t \equiv M_t/V_t$; probability of becoming employed: $s_t \equiv M_t/U_t$.

The Model: Intermediate Input Producers, Continued

- Job i produces $Z_t z_t^i \left(k_t^i\right)^a$ units of output:
  - $Z_t \equiv$ aggregate productivity,
  - $k_t^i \equiv$ stock of capital allocated to the job,
  - $z_t^i \equiv$ idiosyncratic job-productivity shock with c.d.f. $G(z)$.

- The representative firm in this sector produces output

$$Y_t^I = Z_t L_t \frac{1}{1 - G(z_t^c)} \int_{z_t^c}^{\infty} z k_t^{\alpha}(z)\, g(z) dz,$$

  where $L_t \equiv$ measure of jobs within the firm, $k_t(z) \equiv$ capital allocated to job with productivity z, and $z_t^c \equiv$ threshold below which jobs that draw $z_t^i < z_t^c$ are not profitable and are destroyed.

- Firm incurs a real firing cost F_t (pure loss, not a transfer to the worker).

The Model: Intermediate Input Producers, Continued

- Perfect mobility of capital rented in competitive market implies that production can be rewritten as:

$$Y_t^I = Z_t \tilde{z}_t K_t^{\alpha} L_t^{1-\alpha},$$

  where:

  - $\tilde{z}_t \equiv \left[\frac{1}{1-G(z_t^c)} \int_{z_t^c}^{\infty} z^{1/(1-\alpha)} g(z) dz \right]^{1-\alpha}$ (weighted) average job productivity,
  - $K_t = L_t \tilde{k}_t$, where $\tilde{k}_t \equiv \int_{z_t^c}^{\infty} k_t(z)\, g(z) dz / \left[1 - G\left(z_t^c\right)\right]$.
  - See Cacciatore and Fiori *RED* (2016) for more details.

The Model: Intermediate Input Producers, Continued

- Producers chooses (K_t, L_t, V_t, z_t^c) to maximize PDV of profits.
- Period t profits, d_t^I:

$$d_t^I \equiv \varphi_t Z_t \tilde{z}_t K_t^{\alpha} L_t^{1-\alpha} - \tilde{w}_t L_t - r_t^K K_t - \kappa V_t - G(z_t^c)\,(1-\lambda)\,(L_{t-1} + q_{t-1} V_{t-1})\,F_t,$$

  where:

  - $\varphi_t \equiv$ price in units of consumption,
  - $\tilde{w}_t \equiv \int_{z_t^c}^{\infty} w_t(z) g(z) dz / \left[1 - G\left(z_t^c\right)\right]$ (weighted) average wage,
  - $r_t^K \equiv$ rental rate of capital,
  - $\lambda \equiv$ probability of exogenous job separation.

- Constraint: The law of motion of employment:

$$L_t = (1-\lambda)\left(1 - G\left(z_t^c\right)\right)\left(L_{t-1} + q_{t-1} V_{t-1}\right).$$

The Model: Intermediate Input Producers, Continued

Job Creation

- $$\frac{\kappa}{q_t} = (1-\lambda) E_t \left\{ \beta_{t,t+1} \left[(1 - G(z^c_{t+1})) \left((1-\alpha) \varphi_{t+1} \frac{Y^I_{t+1}}{L_{t+1}} - \tilde{w}_{t+1} + \frac{\kappa}{q_{t+1}} \right) - G(z^c_{t+1}) F_{t+1} \right] \right\}.$$

  - $\beta_{s,t} \equiv \beta^{s-t} u_{C^H,s} / u_{C^H,t} \equiv$ stochastic discount factor of Home households, who are assumed to own firms, where:

$$u_{C^H,t} \equiv \left(C^H_t - h_C C^H_{t-1} \right)^{-\gamma} - h_C \beta E_t \left[\left(C^H_{t+1} - h_C C^H_t \right)^{-\gamma} \right].$$

- Marginal cost of posting vacancy $=$ marginal benefit:
  - With probability q_t, vacancy is filled; two events possible:
  - Either the new recruit fired in period $t+1$, and firm will pay firing cost, or match will survive job destruction, generating value for firm.
  - Marginal benefit of filled vacancy includes expected discounted savings on future vacancy posting, plus average profits generated by match.

The Model: Intermediate Input Producers, Continued

Job Destruction

$$(1-\alpha)\,\varphi_t \frac{Y_t^I}{L_t}\left(\frac{z_t^c}{\tilde{z}_t}\right)^{\frac{1}{1-\alpha}} - w\left(z_t^c\right) + \frac{\kappa}{q_t} = -F_t.$$

- Value to firm of job with productivity z_t^c must be equal to zero:
  - Contribution of match to current and expected future profits $=$ firm outside option—firing the worker, paying F_t.
  - When unprofitable jobs are terminated, firm loses current and expected profits it would have earned had it kept the laid-off workers.
  - But firm benefits from job destruction in the form of improved distribution of job productivities.

Capital

$$\alpha\varphi_t \frac{Y_t^I}{K_t} = r_t^K.$$

The Model: Intermediate Input Producers, Continued

Wage Bargaining

- Individual Nash bargaining: worker's exogenous bargaining weight η.
- Firm's outside option: firing the worker and posting a new vacancy.
- Worker's outside option: unemployment benefit from the government, b_t, and home production, h_p.
- In equilibrium:

$$\begin{aligned} w_t(z) \;=\; & \eta \left[(1-\alpha)\,\varphi_t \frac{Y_t^I}{L_t} \left(\frac{z}{\tilde{z}_t} \right)^{\frac{1}{1-\alpha}} + \kappa \frac{V_t}{U_t} + F_t - (1-\lambda)\,(1-s_t)\,E_t \beta_{t,t+1} F_{t+1} \right] \\ & + (1-\eta)\,(h_p + b_t)\,. \end{aligned}$$

The Model: Non-Tradable Output Producers

- Continuum of symmetric monopolistically competitive producers.
  - Endogenous number of producers: N_t.
- Producer ω faces demand:

$$y_t^N(\omega) = \sigma \ln\left(\frac{\bar{p}_t^N}{p_t^N(\omega)}\right)\frac{P_t^N Y_t^N}{p_t^N(\omega)},$$

  where

$$\ln \bar{p}_t^N \equiv (1/\sigma N_t) + (1/N_t)\int_{\omega\in\Omega_t} \ln p_t^N(\omega)\, d\omega$$

  is maximum price that producer can charge while still having a positive market share.

- Optimal price setting:

$$\frac{p_t^N}{P_t} = \frac{\theta_t}{(\theta_t - 1)}\varphi_t.$$

- Pro-competitive effect of entry: $\theta_t \equiv 1 + \sigma N_t$.

The Model: Non-Tradable Output Producers, Continued

Entry

- Sunk entry cost: $f_{E,t} \equiv f_{R,t} + f_{T,t}$ in units of final consumption.
  - $f_{R,t} \equiv$ red tape,
  - $f_{T,t} \equiv$ technological entry cost.
- Exogenous exit shock with probability δ at the end of each period.

The Model: Non-Tradable Output Producers, Continued

- Entry decision:

$$e_t^N = f_{E,t},$$

where

$$e_t^N = E_t \left[\sum_{s=t+1}^{\infty} \beta_{t,s} \left(1-\delta\right)^{s-t} d_s^N \right],$$

and $d_t^N \equiv \left(p_t^N / P_t - \varphi_t\right) y_t^N =$ period firm profit (symmetric equilibrium).

- Number of producers (time to build):

$$N_t = (1-\delta)(N_{t-1} + N_{E,t-1}),$$

where $N_{E,t} \equiv$ number of entrants.

The Model: Tradable Output Producers

- Production function:

$$Y_t^T = \left(Y_{T,t}^I\right)^{\xi} \left(Y_{T,t}^N\right)^{1-\xi},$$

  where:

  - $Y_{T,t}^I \equiv$ intermediate input,
  - $Y_{T,t}^N \equiv$ non-tradable goods used in tradable good production.

The Model: Tradable Output Producers, Continued

- Perfect competition $\Longrightarrow$ price of output as given, both in domestic and export market.
- No arbitrage $\Longrightarrow$ price of export (in the common currency) is $P_{X,t}^T = \tau_t P_{D,t}^T$, where τ_t is an iceberg trade cost
- F.o.c.'s for $Y_{T,t}^I$ and $Y_{T,t}^N$ imply, respectively:

$$\xi \rho_{D,t}^T \left(C_{D,t}^T + \tau_t C_{X,t}^T \right) = \varphi_t Y_{T,t}^I,$$

$$(1-\xi) \rho_{D,t}^T \left(C_{D,t}^T + \tau_t C_{X,t}^T \right) = \rho_t^N Y_{T,t}^N,$$

  where ρ's are relative prices (in units of consumption).

Household's Intertemporal Choices

- Owns capital stock, rented competitively to intermediate input producers, and invests in two financial assets:
  - shares in mutual fund of non–tradable-output firms,
  - non-contingent, internationally traded bonds denominated in units of currency.
- Stock market investment is the mechanism through which household savings are made available to prospective entrants to cover entry costs.
- Euler equation for share holdings:

$$e_t^N = (1-\delta)\, E_t \left[\beta_{t,t+1} \left(d_{t+1}^N + e_{t+1}^N\right)\right],$$

  - $e_t^N \equiv$ real price of a share (claim to future profits).
- Forward iteration yields the expression for e_t^N in the entry condition: general equilibrium link between household saving and producer investment in business creation.

Household's Intertemporal Choices, Continued

- Capital accumulation is subject to convex investment adjustment costs and variable capital utilization (set by household).

- Optimization leads to standard f.o.c.'s (see paper for details).
  - Physical capital, investment adjustment costs, and variable utilization are other ingredients introduced for quantitative purposes related to IMF *WEO*.
  - Removing them and focusing on a model where labor is the only input in upstream, intermediate input production would not alter key qualitative results.

- Bond holdings are subject to adjustment costs to pin down steady state and ensure stationary responses to temporary shocks.

- This results in a standard Euler equation, adjusted for a term that depends on bond holdings.

- See the paper for details and aggregate equilibrium relations.

Calibration

- Parameter values from the literature and to match features of euro area macro data (1995:Q1-2013:Q1).
- Symmetric calibration across countries.
  - Level of market regulation in the euro area:

	Core	Periphery
Product Market Regulation, Retail Industry Regulation Index, 2013	2.58	2.94
Unemployment Benefits, Gross Replacement Rate, 2013	24.49	34.9
Employment Protection Legislation, OECD Index, 2013	2.59	2.34

Market Reforms

- Permanent change in product and labor market policy parameters.
- Product market reform: reduction of red tape entry costs, f_R.
- Labor market reform:
  - reduction of firing costs, F,
  - reduction of unemployment benefit replacement rate, $b/\tilde{w}$ (the replacement rate).
- Reform size: from average levels in the euro area to corresponding U.S. level.
- We contrast deregulation in normal times vs. recession,
  - with external borrowing or under financial autarky,
  - unanticipated reform or commitment to future reform.
    - Government credibly announces that reform will be implemented within a year (after 3 quarters). The reform is then effectively implemented.
    - When economy is in recession, announcement takes place at time $1,$ and it is unexpected at time 0 (when negative productivity shocks in Home and Foreign are realized).

Market Reforms in Times of Imbalance

Benchmark Exercise

- Assume that at time 0 both Home and Foreign are hit by symmetric, negative productivity shock
- Calibrate shock so that we reproduce peak-to-trough decline of euro-area output of about 4 percent following the collapse of Lehman Brothers in September 2008 (set persistence of shock such that it takes about 4 years to return to initial steady state in absence of market reforms).
- Next, assume that at time 1 there is a permanent change in regulation (treated as unanticipated).
- Construct net effect of reforming in recession as difference between impulse responses to reform and impulse responses to negative productivity shock in absence of market reform.

Alternative Exercise

- Commitment to future reform as described above.

- I will focus on some examples of our results.

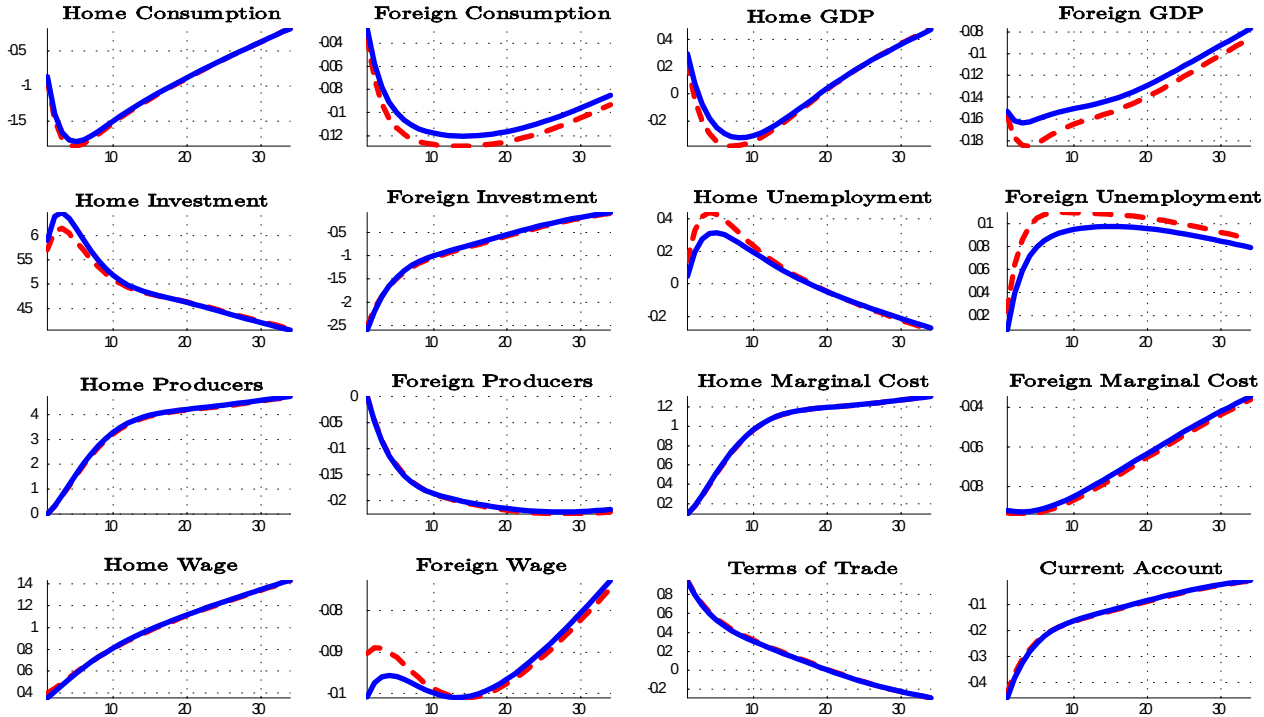

Figure 1. Home product market reform, steady-state (continuous lines) versus recession (dashed lines). Responses show percentage deviations from the steady state. Unemployment is in deviations from the steady state.

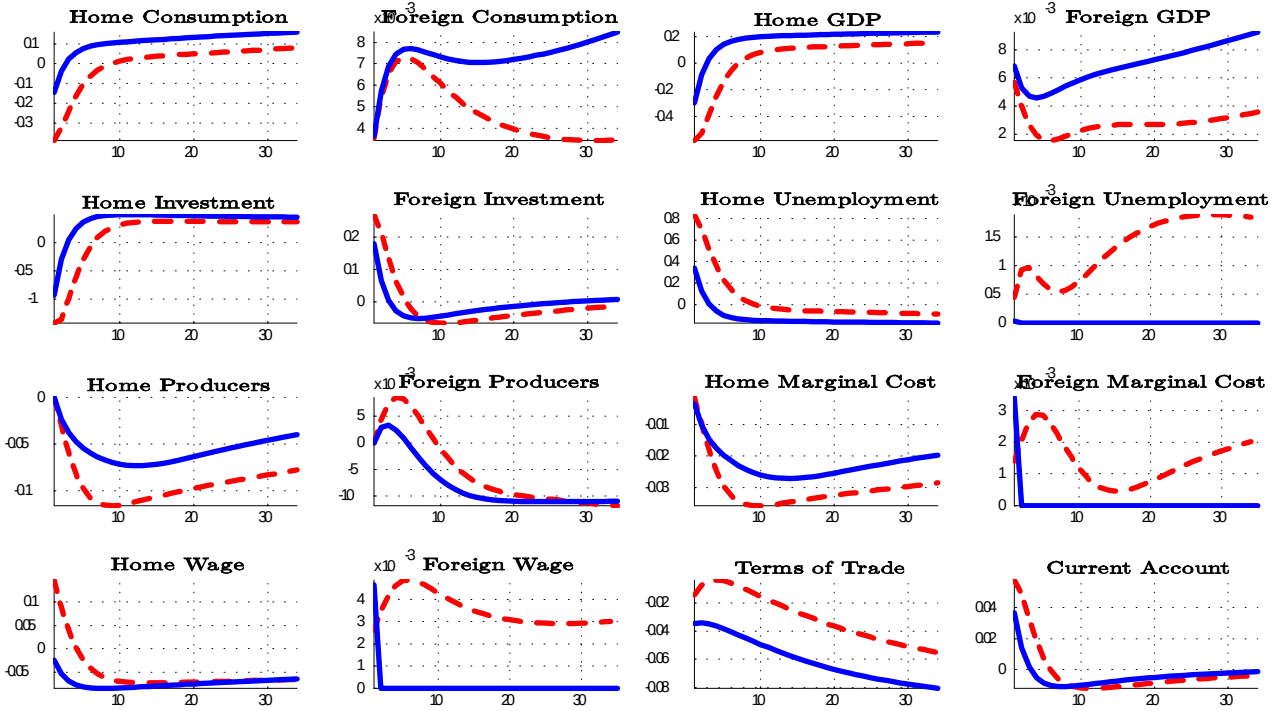

Figure 2. Home firing costs reform, steady-state (continuous lines) versus recession (dashed lines). Responses show percentage deviations from the steady state. Unemployment is in deviations from the steady state.

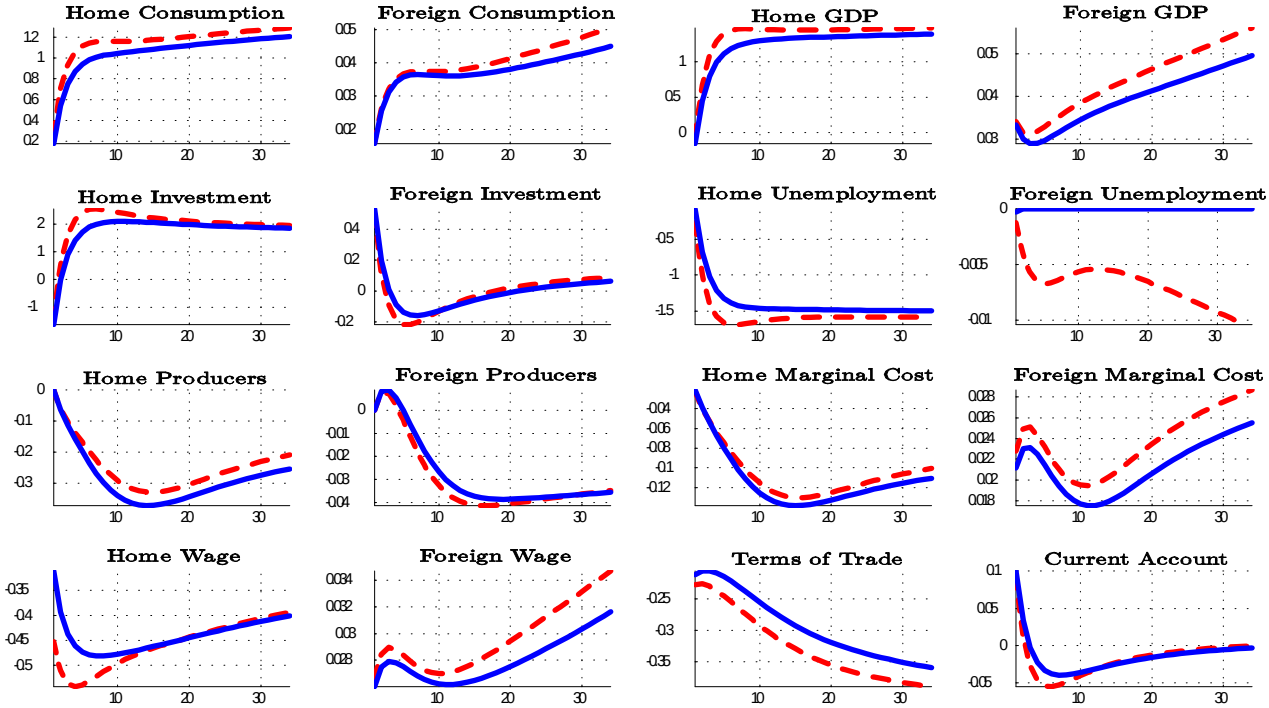

Figure 3. Home unemployment benefit reform, steady-state (continuous lines) versus recession (dashed lines). Responses show percentage deviations from the steady state. Unemployment is in deviations from the steady state.

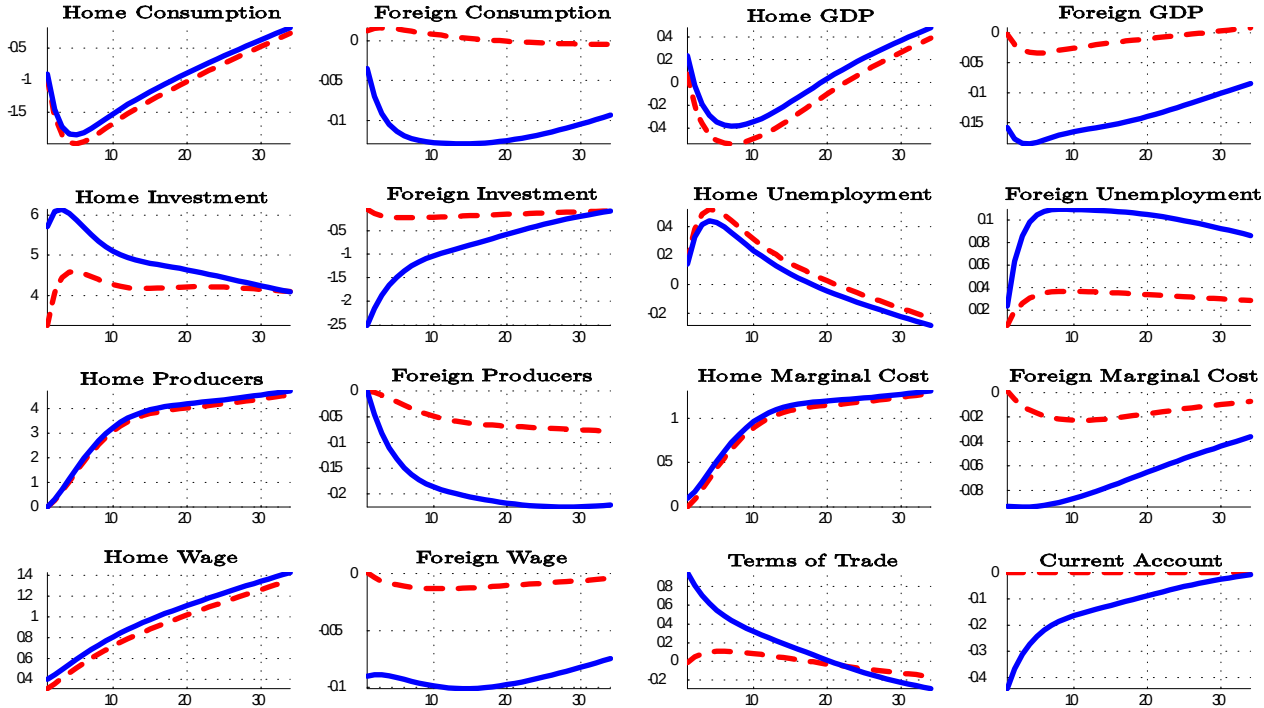

Figure 10. Home product market reform in a recession, open current account (continuous lines) versus financial autarky (dashed lines). Responses show percentage deviations from the steady state. Unemployment is in deviations from the steady state.

Market Reforms at the Zero Lower Bound, CDFG WP (2016)

- A central issue in the current economic environment involves the consequences of structural reforms when central banks face binding constraints on monetary policy easing, such as the so-called zero lower bound (ZLB) on nominal interest rates.
- At the heart of the debate lies the question whether reforms have important deflationary effects.
- As argued by Eggertsson (2010), in a liquidity trap, expectation of deflation increases real interest rates, thus depressing current demand further.
- Building on this insight, EFR argue that structural reforms can have costly contractionary effects when monetary policy is constrained by the ZLB, since reforms fuel expectations of prolonged deflation.

Reduced-Form Reforms vs. Micro-Level Modeling

- Importantly, the analysis in EFR—and in several other papers that followed their approach—models market reforms as exogenous reductions in price and wage markups.
- This implies that reforms are automatically deflationary (and also that they depreciate the terms of trade and improve the external balance).
- However, from an empirical perspective, market regulation affects the incentives to create and destroy product and jobs by acting on barriers to entry and labor market legislation.
- Price and wage markup dynamics are endogenous outcomes of market reforms.
- The goal of this paper is to address the consequences of primitive changes in market regulation (rather than exogenous markup cuts) when the economy is in a deep recession that has triggered the ZLB on nominal interest rates.

Strategy

- Same model, plus sticky prices in non-traded sector, common monetary policy for the two countries: interest rate setting subject to ZLB constraint.
- As in our *JEDC* paper, we calibrate the model with parameter values from literature and to match features of macro data for euro area.

Strategy, Continued

- Then study dynamic response to:

1. product market reform: reduction in regulatory costs of entry in non-tradable sector;
   - As in *JEDC* paper. focus on non-tradable sector to explore idea that deregulation of profession/service sectors.
2. labor market reform: decline in firing costs or decline in generosity of unemployment benefits.

- Two alternative scenarios: Reforms are either implemented in normal times, assuming that the economy is at the steady state, or in the aftermath of a large adverse shock that depresses the economy and pushes monetary policy to the ZLB.
  - To push the economy to the ZLB, we follow the literature and append a shock to the Euler equation for bond holdings.
  - The shock causes the demand for bonds to increase and the economy to contract by depressing consumption and investment.
  - The central bank would respond by pushing the interest rate below zero if it were allowed to do so.

Results

- Our main conclusion is that while business cycle conditions at the time of deregulation matter for the adjustment, the presence of the ZLB does not per-se induce recessionary effects of market reforms.
- In fact, reforms can be more beneficial when the ZLB is binding, as observed for product market reform and joint deregulation of product and labor markets.
- This result stems from the fact that reforms do not have deflationary effects in the first place, and some are indeed inflationary, at least in the first phase of the transition.
- As for the JEDC paper, model and results provided theoretical background for arguments in the April 2016 IMF *WEO*.

Results, Continued

Intuition

- Consider first a reduction in barriers to producer entry.
- While such reform reduces price markups over time as a larger number of products results in higher substitutability, the downward pressure on prices is initially more than offset by two inflationary forces.

1. Lower entry barriers trigger entry of new producers, which increases demand for factors of production and thereby marginal costs.
2. Incumbent producers lay off less productive workers in response to increased competition.
   - Since remaining workers have higher wages on average, marginal labor costs rise (even if remaining employed workers are more productive).

- The latter effect also explains why lower firing costs—which induce firms to lay off less productive workers—are not deflationary either, even though layoffs reduce aggregate demand all else equal.
- Finally, while unemployment benefit cuts have a negative impact on wages and aggregate demand by weakening workers' outside option in the wage bargaining process, this deflationary effect is offset by the positive general equilibrium impact of the reform on labor demand, which increases wages other things equal.

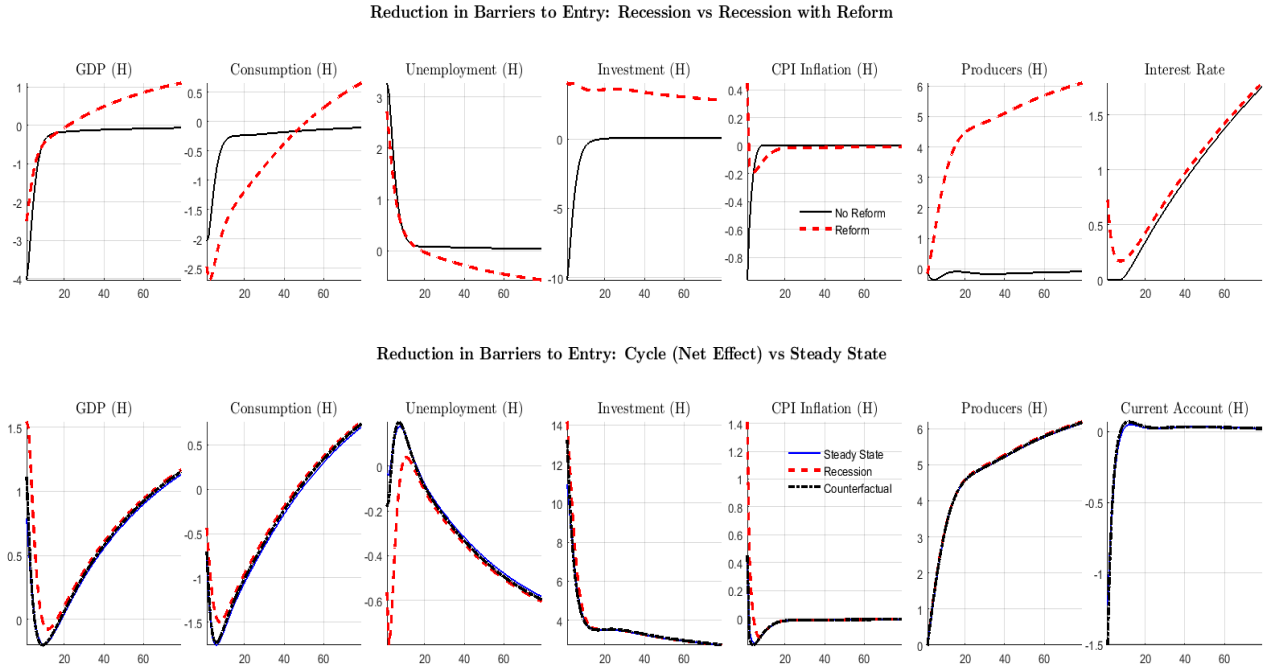

Figure 1. *Top panel*: recession (continuos lines) versus recession followed by product market reform (dashed lines); *Bottom panel*: net effect of product market reform in normal times (continuos lines), in a recession with binding ZLB (dashed lines), and in a recession where the interest rate is allowed to violate the ZLB (dotted lines). Responses show percentage deviations from the initial steady state. Unemployment is in deviations from the initial steady state.

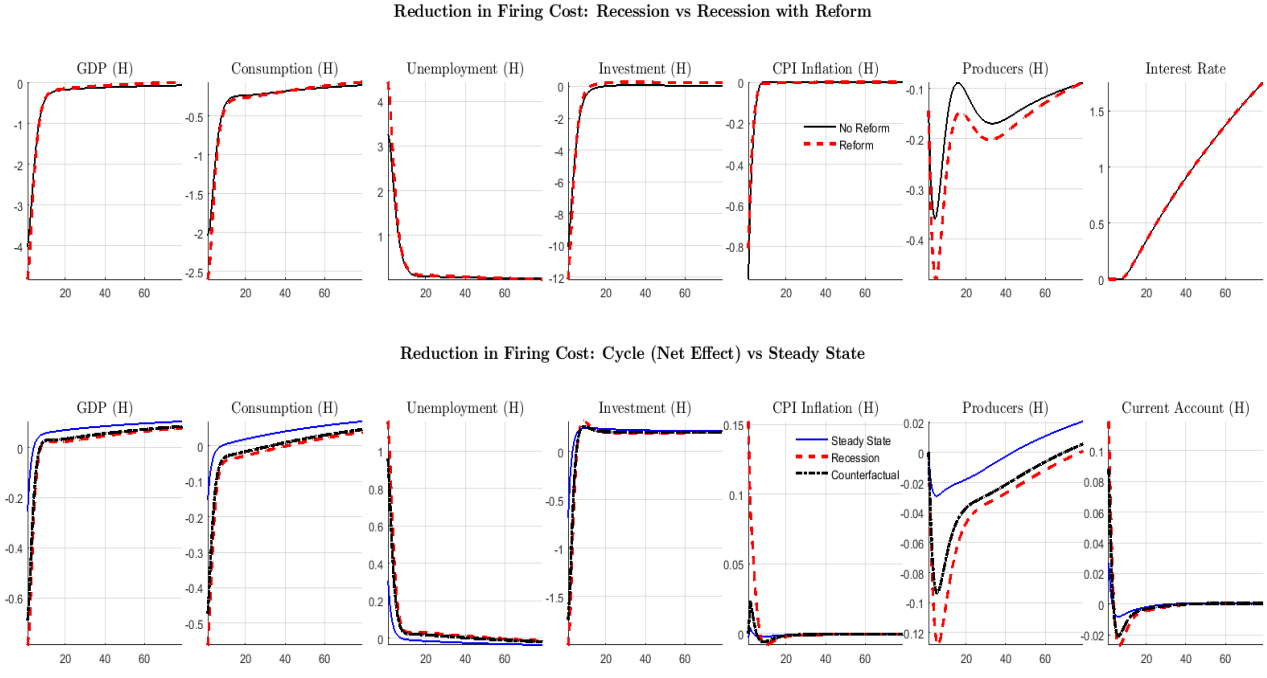

Figure 2. *Top panel*: recession (continuos lines) versus recession followed by firing cost reform (dashed lines); *Bottom panel*: net effect of firing cost reform in normal times (continuos lines), in a recession with binding ZLB (dashed lines), and in a recession where the interest rate is allowed to violate the ZLB (dotted lines). Responses show percentage deviations from the initial steady state. Unemployment is in deviations from the initial steady state.

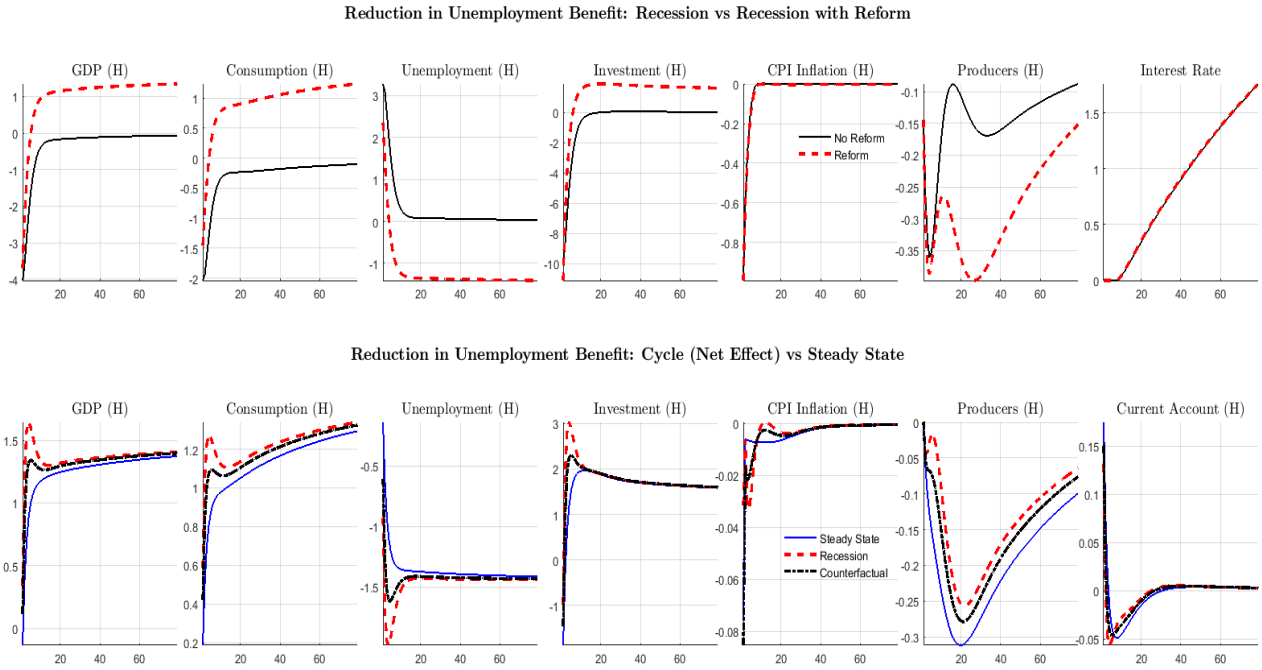

Figure 3. *Top panel*: recession (continuos lines) versus recession followed by unemployment benefit reform (dashed lines); *Bottom panel*: net effect of unemployment benefit reform in normal times (continuos lines), in a recession with binding ZLB (dashed lines), and in a recession where the interest rate is allowed to violate the ZLB (dotted lines). Responses show percentage deviations from the initial steady state. Unemployment is in deviations from the initial steady state.

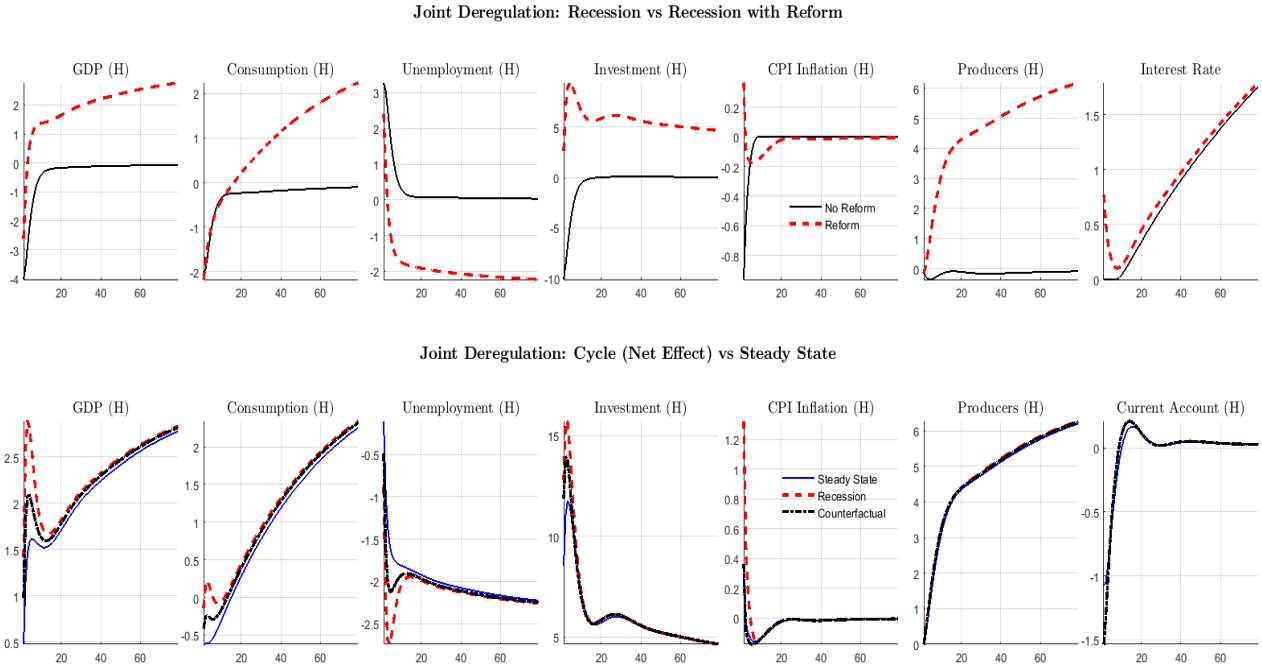

Figure 4. *Top panel*: recession (continuos lines) versus recession followed by joint product and labor market reform (dashed lines); *Bottom panel*: net effect of joint product and labor market reform in normal times (continuos lines), in a recession with binding ZLB (dashed lines), and in a recession where the interest rate is allowed to violate the ZLB (dotted lines). Responses show percentage deviations from the initial steady state. Unemployment is in deviations from the initial steady state.

Market Deregulation and Optimal Monetary Policy in a Monetary Union, CFG *JIE* (2016)

- Two-country monetary union model, product market dynamics in final, traded production; labor market reforms: worker bargaining power and unemployment benefits; product market reform: entry costs.
- It is optimal to combine reforms with monetary expansion (more than historical ECB behavior).
- This makes it possible to smooth transition costs and front-load the benefits of reforms.
- Results support the argument made by Draghi in his 2015 Sintra speech: Implementing reforms in environment of exceptional monetary expansion brings long-term benefits closer to the present.

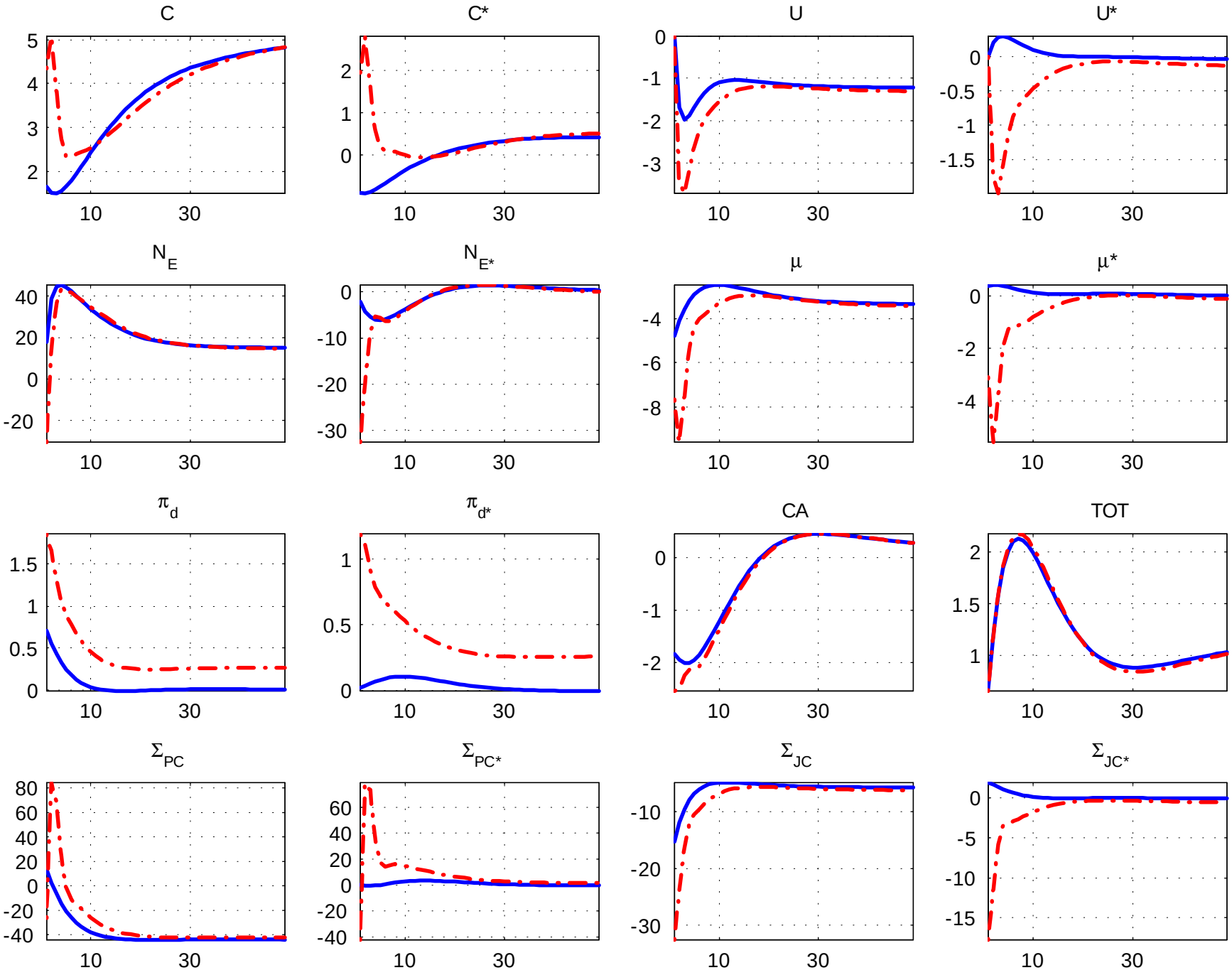

Figure 2: Home Product Market Deregulation, Historical Policy (Solid) versus Optimal Policy (Dashed).

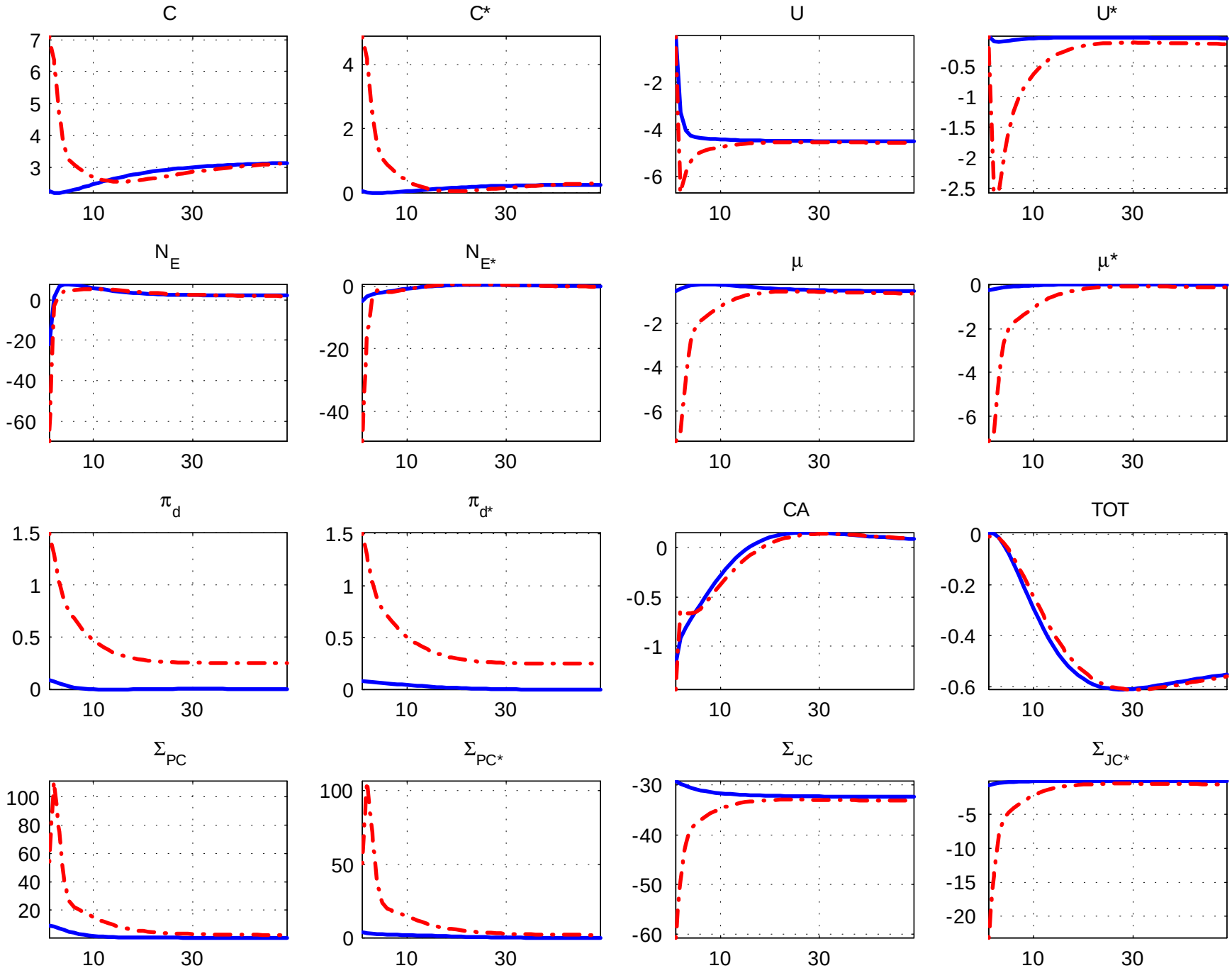

Figure 3: Home Labor Market Deregulation, Historical Policy (Solid) versus Optimal Policy (Dashed).

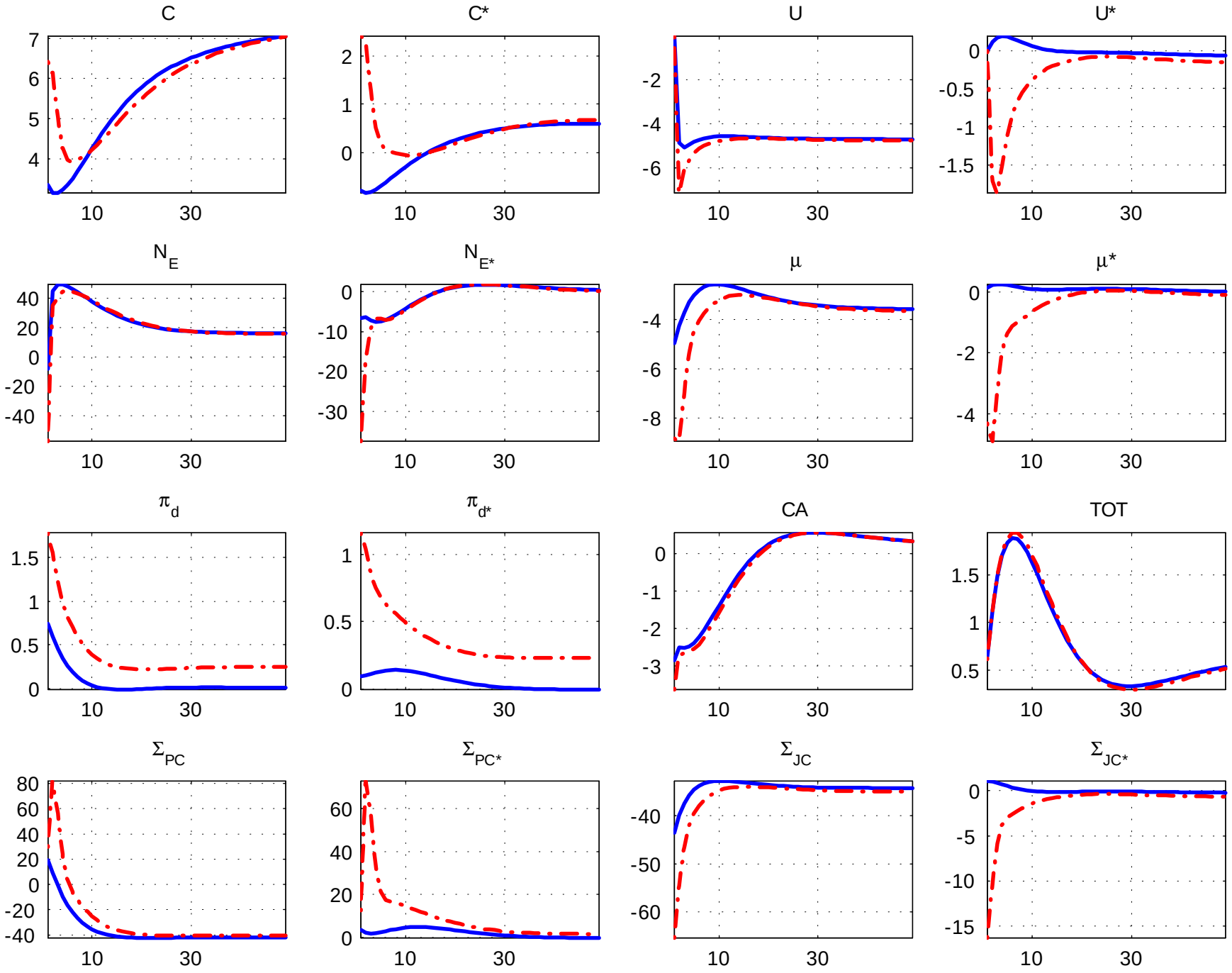

Figure 4: Home Product and Labor Market Deregulation, Historical Policy (Solid) versus Optimal Policy (Dashed).

Conclusions

- Modeling micro-level market dynamics is important for analysis of structural reforms, how their effects depend on the conditions of the economy, and how they interact with macro policy.
- The results of this research agenda have provided theoretical background and confirmation for advice and intuitions by policymakers at various institutions.
- Ongoing agenda: Much remains to be done!