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The Effects of Labour Market Reforms upon Unemployment and Income Inequalities: an Agent Based Model

G. Dosi[1] M. C. Pereira[1,2] A. Roventini[1] M. E. Virgillito[3,1]

[1] *Scuola Superiore Sant'Anna*, [2] *University of Campinas*, [3] *Universita' Cattolica del Sacro Cuore*

Inequality and Structural Reforms: Methodological concerns
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Motivation of the work

The call for labour market structural reforms

During the years of the recent European crisis (and also before), the economic policy debate has been marked by the emphasis on the *need* of labour market structural reforms. This rhetoric has addressed particularly the Mediterranean countries, praising all "recipes" aimed at labour market flexibilization as key to increase productivity and GDP growth, ultimately leading to measures such as the *Jobs Act* in Italy and the reform of the *Code du Travail* in France.

"Unified Theory" or "Transatlantic Consensus" or "OECD-IMF orthodoxy"

Labour market institutions such as collective bargaining, legal minimum wages, employment protection laws and unemployment benefits foster rigidities that make job creation less attractive for employers and joblessness more attractive for workers. Why?

- Institutions may increase unemployment preventing downward wage flexibility (the *wage compression* variant).
- Institutions may alter the competitive nexus between earning and skills distributions, artificially increasing wages for the lower tail of the workers' skills distribution (the *skill dispersion* variant).

But a large ensemble of empirical evidence contradicts both theories

Institutions

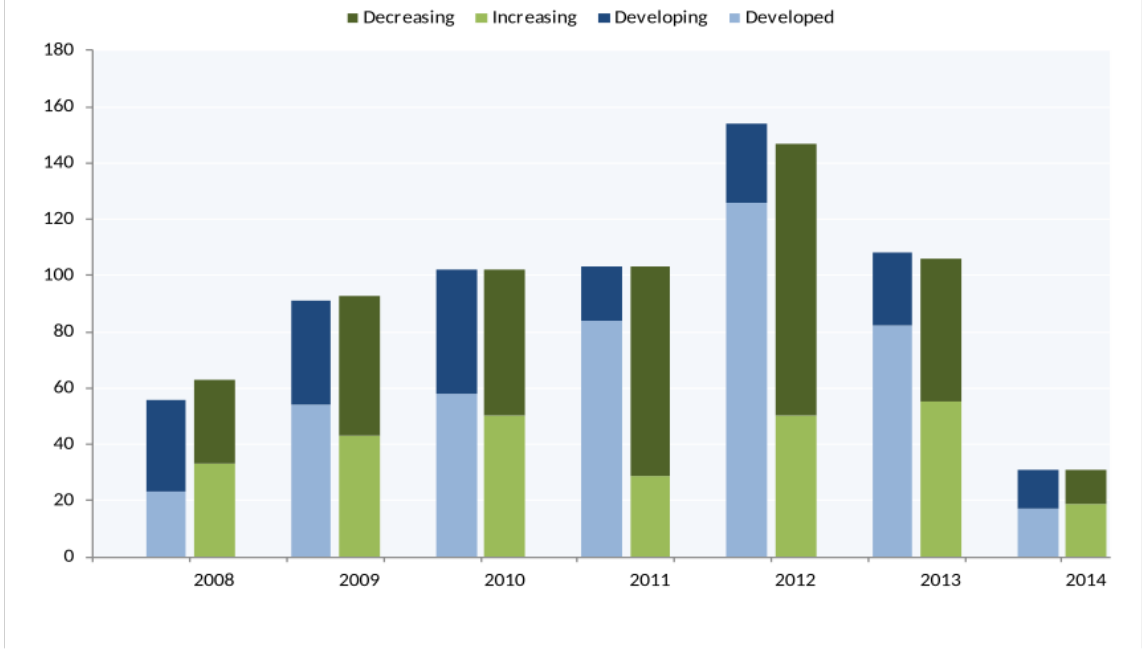
- Are quite important for equity considerations, particularly for the process of *wage formation*, mitigating inequality,
- Are not responsible for the lack of employment (the efficiency outcomes).

The introduction of labour market structural reforms – aimed at altering the wage formation mechanisms and lowering unionization, unemployment benefits and minimum wages – are likely to yield both higher inequality and structural unemployment *without* fostering productivity or GDP growth.

Implementation of labour market structural reforms

Adascalitei et. al 2015 document an increasing trend in implementing labour market structural reforms aimed at make labour market more flexible

Figure 4: Number of changes in labour market regulation by year of implementation

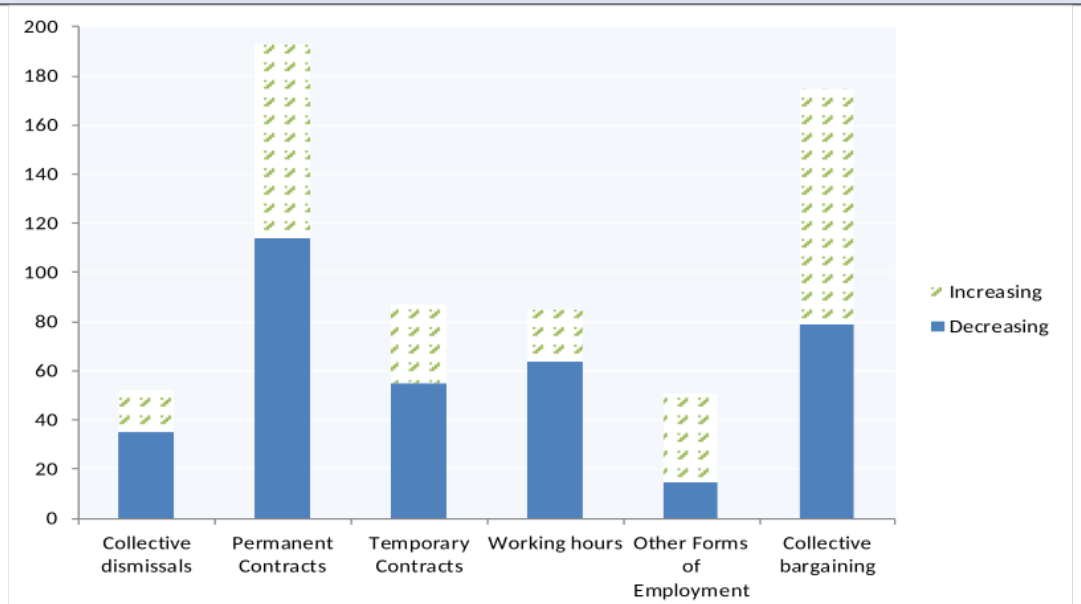


Note: Data for 2014 is preliminary.
Source: Authors' calculations based on Natlex, EPLex, Eurofound, LABREF and ILO (2012a).

Implementation of labour market structural reforms

Especially in developed countries.

Figure 5: Number of changes in labour market regulation by policy area, 2008-2014



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Source: Authors' calculations based on Natlex, EPLex, Eurofound, LABREF and ILO (2012a).

Implementation of labour market structural reforms

Adascalitei et al. 2015 p. 15

In advanced economies and the EU a total of 444 changes to labour market regulation have been registered between 2008 and 2014 – equal to 69 per cent of the registered changes.

These changes have mostly concerned the regulation of permanent employment contracts (135 changes), collective bargaining legislation (83 changes) and working hours (77 changes).

Overall, 68 per cent of these changes have decreased existing levels of protection in an effort to facilitate the capacity of firms to adjust over the business cycle.

Aim of the work

An agent-based model that investigates the effects of a policy regime change characterized by a set of structural reforms on the labour market, keeping constant the structure of the capital- and consumption-good markets

Confirming a recent IMF report (Jamoutte and Buitron 2015), the model shows how labour market structural reforms reducing workers' bargaining power and compressing wages tend to increase:

1. unemployment
2. functional income inequality
3. personal income inequality

The increasing interest for Agent-Based Models

The atomistic, optimising agents underlying existing models do not capture behaviour during a crisis period. We need to deal better with heterogeneity across agents and the interaction among those heterogeneous agents. Agent-based modelling dispenses with the optimisation assumption and allows for more complex interactions between agents. [Trichet (18/11/2010]

Why Agent-Based Models?

- ABMs consider economies as complex dynamical systems of heterogeneous and boundedly rational agents, interacting out of equilibrium

- ABMs as possible alternative to DSGE and CGE models to provide microfounded macroeconomic models accounting for endogenous growth, mild and deep downturns to be employed as laboratory to design and test different policy ensembles
- The use of ABMs has become the standard practice in many disciplines dealing with complex phenomena, wherein the micro and the macro levels are not isomorphic.
- ABMs are particularly suited to the analysis of economic phenomena characterised by (i) disequilibrium processes and (ii) persistent heterogeneity.

The ancestors of the model

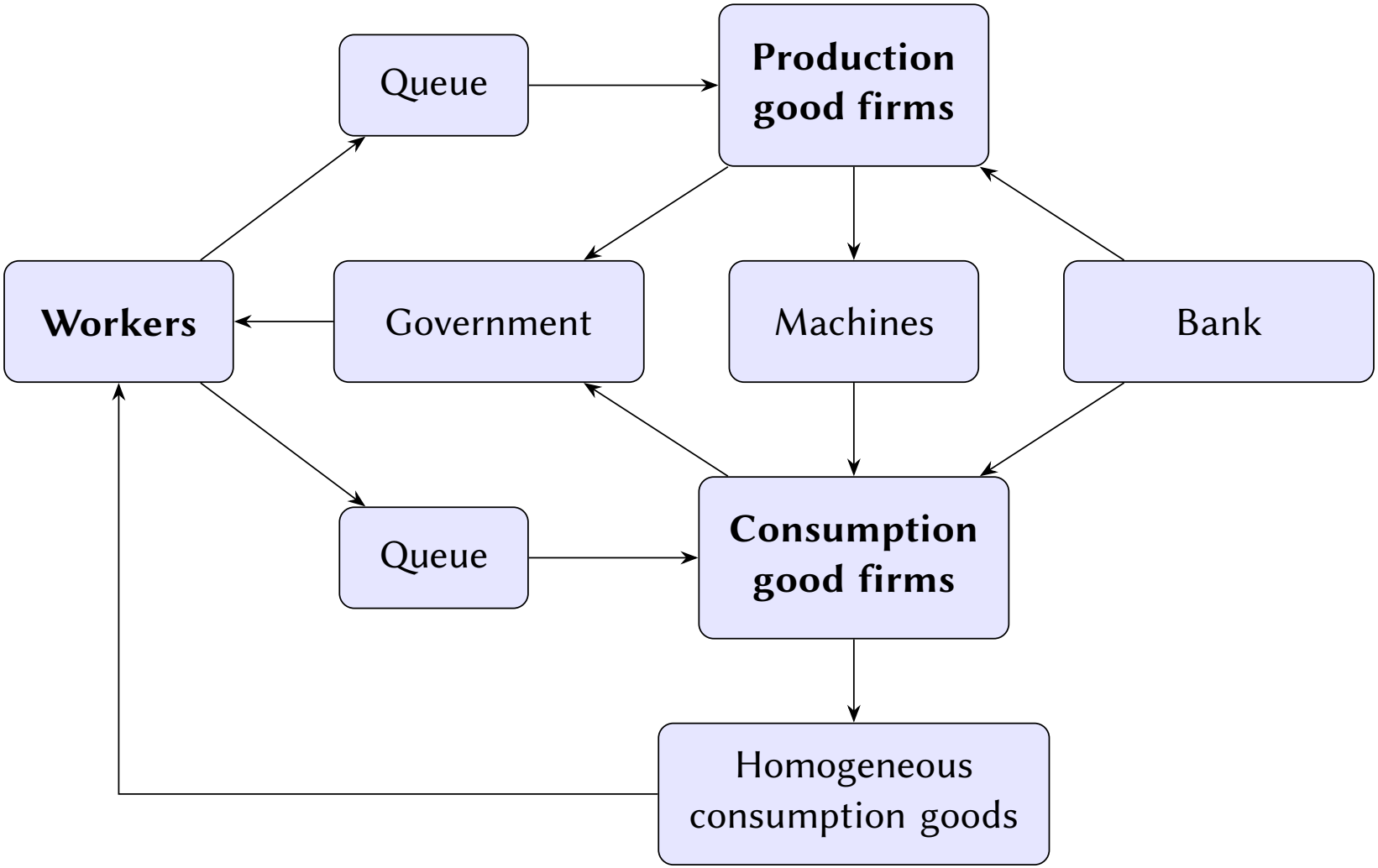
An ABM mainly composed of two dynamically coupled domains

- an endogenous growth process driven by innovation and their adoption and diffusion (the Schumpeterian engine)
- an aggregate demand process driven by investments and workers' consumption (the Keynesian engine)

The 'Schumpeter meeting Keynes' family

- Dosi, Fagiolo, Roventini (JEDC, 2010)
- Dosi, Fagiolo, Napoletano, Roventini (JEDC, 2013)
- Dosi, Fagiolo, Napoletano, Roventini, Trebich (JEDC, 2015)
- Dosi, Pereira, Roventini, Virgillito, (JEDC 2017)

Model description



Technical Change I

- **Capital-good firms search for better machines and for more efficient production techniques**
  - $A_i(t)$: productivity of machine manufactured by firm i
  - $B_i(t)$: productivity of production technique of firm i
  - $A_i(t)$ and $B_i(t)$: determine the technology of firm i at time t

- **R&D**
  - R&D investment (RD) is a fraction of firm sales (S):

$$RD_i(t) = \upsilon S_i(t-1) \qquad \upsilon > 0$$

  - capital-good firms allocate R&D funds between innovation (IN) and imitation (IM):

$$IN_i(t) = \xi RD_i(t) \qquad IM_i(t) = (1-\xi) RD_i(t) \qquad \xi \in [0,1]$$

Technical Change II

- **Innovation and imitation: two steps procedure**
  - **innovation**
    1) firm successfully innovates or not through a draw from a Bernoulli($\theta_1(t)$), where $\theta_1(t)$ depends on $IN_i(t)$

$$\theta_1(t) = 1 - e^{-o_1 IN_i(t)} \qquad o_1 > 0$$

    2) search space: the new technology is obtained multiplying the current technology by $(1 + x_i(t))$, where
    $x_i(t) \sim$ Beta over the support (x_0, x_1) with $x_0 < 0, x_1 > 0$
  - **imitation**
    1) firm successfully imitates or not through a draw from a Bernoulli($\theta_2(t)$), where $\theta_2(t)$ depends on $IM_i(t)$

$$\theta_2(t) = 1 - e^{-o_2 IM_i(t)} \qquad o_2 > 0$$

    2) firms are more likely to imitate competitors with similar technologies (Euclidean distance)

Capital-Good Market

- **Capital-good firms**
  - if they successfully innovate and/or imitate, they choose to manufacture the machine with the lowest $p_i + c_i^1 b$
    - p_i : machine price
    - c_i^1 : unit labour cost of production entailed by machine in consumption-good sector
    - b : payback period parameter
  - fix prices applying a mark-up on unit cost of production
  - send a 'brochure' with the price and the productivity of their machines to both their historical and some potential new customers
- **Consumption-good firms**
  - choose as supplier the capital-good firm producing the machine with the lowest $p_i + c_i^1 b$ according to the information contained in the 'brochures'
  - send their orders to their supplier according to their investment decisions

Investment

- **Expansion investment**
  - demand expectations (D^e) determine the desired level of production (Q^d) and the desired capital stock (K^d)
  - firm invests (EI) if the desired capital stock is higher than the current capital stock (K):

$$EI = K^d - K$$

- **Replacement investment**
  - payback period routine
    - an incumbent machine is scrapped if

$$\frac{p^*}{c(\tau) - c^*} \leqslant b, \qquad b > 0$$

    - $c(\tau)$ unit labor cost of an incumbent machine;
    - p^*, c^* price and unit labor cost of new machines
  - also machine older than Λ periods are replaced

Consumption-Good Markets

- **Supply**
  - imperfect competition: prices (p_j) $\Longrightarrow$ variable mark-up (mi_j) on unit cost of production (c_j)

$$p_j(t) = (1 + mi_j(t))\, c_j(t)$$

$$mi_j(t) = mi_j(t-1)\left(1 + \nu \frac{f_j(t-1) - f_j(t-2)}{f_j(t-2)}\right)$$

$$\nu > 0, \qquad f_j \text{ market share of firm } j$$

  - firms first produce and then try to sell their production (inventories)

Consumption-Good Markets

- **Market dynamics**
  - market shares evolve according to a 'quasi' replicator dynamics:

$$f_j(t) = f_j(t-1)\left(1 + \chi \frac{E_j(t) - \overline{E}(t)}{\overline{E}(t)}\right), \quad \chi \geqslant 0$$

E_j: competitiveness of firm j

$\overline{E}$: avg. competitiveness of consumption-good industry

  - firm competitiveness depends on price and unfilled demand (l_j)

$$E_j(t) = -\omega_1 p_j(t) - \omega_2 l_j(t), \quad \omega_{1,2} > 0$$

Labour Demand and Production

The labour demand is defined as

$$L^d_{j,t} = \frac{Q^d_{j,t}}{A_{j,t}} \tag{1}$$

Desired production is determined by expected demand, computed via a simple adaptive rule

$$D^e_{j,t} = f(D_{j,t-1}, D_{j,t-2}, D_{j,h-1}) \tag{2}$$

where $D_{j,t-1}$ is the demand actually faced by firm j at time $t-1$ (h positive integer)

Labour Demand and Production

The desired level of production Q_j^d depends on the expected demand as well as on the desired inventories N_j^d and the actual stock of inventories N_j

$$Q_{j,t}^d = D_{j,t}^e + N_{j,t}^d - N_{j,t-1} \tag{3}$$

Each firm j will have, in average, a fraction of the number of applicant workers ωL in its job queue, proportional to firm size f

$$L_{j,t}^s = \omega L f_{j,t-1} \tag{4}$$

where ω is a parameter and $f_{j,t-1}$ is the market share of firm j at time $t-1$

Hiring

In case of an increase in production, workers are hired

$$\text{if} \quad \Delta Q^d_{j,t} = Q^d_{j,t} - Q_{j,t-1} > 0 \quad \text{then} \quad \text{hire} \quad \Delta L^d_{j,t} = L^d_{j,t} - L_{j,t-1} \quad \text{workers} \tag{5}$$

The archetypes

	Fordist	Competitive
Wage sensitivity to unemployment	rigid	flexible
Search intensity	unemployed only	unemployed and employed
Firing rule	under losses only	shrinkage on production
		only temporary contracts
		increasing protection contracts
Unemployment benefits / tax on profits	yes	no or reduced
Minimum wage productivity indexation	full	partial

Table: The two archetypal labour regimes main characteristics configured in the model.

The archetypes

Fordist Regime: wage determination

firms set salary according to

$$w^o_{j,t} = w^o_{j,t-1}(1 + WP) \tag{6}$$

$$WP = \psi_1 \frac{\Delta A_t}{A_{t-1}} + \psi_2 \frac{\Delta A_{j,t}}{A_{j,t-1}} \tag{7}$$

$$\psi_1 + \psi_2 \leq 1 \tag{8}$$

Each firm can afford to pay a salary not bigger than a *break even salary*

$$w^{MAX}_{j,t} = p_{j,t-1} A_{j,t-1} \tag{9}$$

Competitive Regime: wage determination

workers have a reservation wage equal to the unemployment benefit w_t^u they would receive in case of unemployment. Each worker has a satisfying wage

$$w_{\ell,t}^s = \frac{1}{T_s}\sum_{h=1}^{T_s} w_{\ell,t-h}, \qquad T_s > 0 \tag{10}$$

Given her employment status, the applicant worker wage request is

$$w_{\ell,t}^r = \begin{cases} \max(w_t^u, w_{\ell,t}^s) & \text{if } \ell \text{ is unemployed in } t-1 \\ w_{\ell,t-1}(1+\epsilon) & \text{if } \ell \text{ is employed in } t-1 \end{cases} \tag{11}$$

Competitive Regime: wage determination

In each period workers search for better paid jobs. Hence he can decide if quitting or not from firm j, according to the rule

$$w^o_{n\neq j,t} > w^r_{\ell,t} \quad \Longrightarrow \quad \text{quit } j \tag{12}$$

that is if he receives an offered wage $w^o_{n,t}$ from at least one firm among the firms to which he applied that is strictly higher than is own required wage. Given the wages required by workers in the job queue and the number of workers needed for production $\#\{l^d_{j,t}\} = \Delta L^d_{j,t}$ firms set their wage offer

$$w^o_{j,t} = \max w^r_{\ell,t}, \quad \ell \in \{\ell^d_{j,t}\} \tag{13}$$

therefore it is the max wage among the smallest set of the cheapest workers in the queue that is large enough to provide the required number of workers

Firing rules in the Competitive regimes

Firing occurs according to alternative rules that characterize three Competitive regime scenarios:

1. Competitive 1: Firms fire whenever temporary work contracts end.
2. Competitive 2: Firms fire whenever production shrinks.
3. Competitive 3: Firms adopt increasing-protection work contracts.

Government Sector and Closure of the model

Unemployed workers receive a subsidy (w_t^u) which is a fraction of the current average wage, i.e. $w_t^u = \psi \frac{1}{L^S} \sum_{\ell=1}^{L^S} w_{\ell,t-1}, \quad \psi\ [0,1]$

$$G_t = w_t^u (L^S - L_t^D) \tag{14}$$

Desired aggregate consumption C_t^d depends on the income of both employed and unemployed workers plus possibly the desired unsatisfied consumption from the previous period (the forced savings $C_{t-1}^d - C_{t-1}$ term)

$$C_t^d = \sum_{\ell=1}^{L^S} w_{\ell,t-1} + G_t + (C_{t-1}^d - C_{t-1}) \tag{15}$$

$$C_t = \min(C_{t-1}^d, Q_t^2), \quad Q_t^2 = \sum_{j=1}^{F_2} Q_{j,t} \tag{16}$$

Government Sector and Closure of the model

Taxes paid by firms on their profits are gathered by the Government at the fixed tax rate *tr*
Finally, the Government (except in the most extreme competitive set-up) establishes an institutional minimum wage which imposes a lower bound to firm specific wage setting behaviour

$$w_t^{minPolicy} = w_{t-1}^{minPolicy}\left(1+\psi_1\frac{\Delta A_t}{A_{t-1}}\right) \tag{17}$$

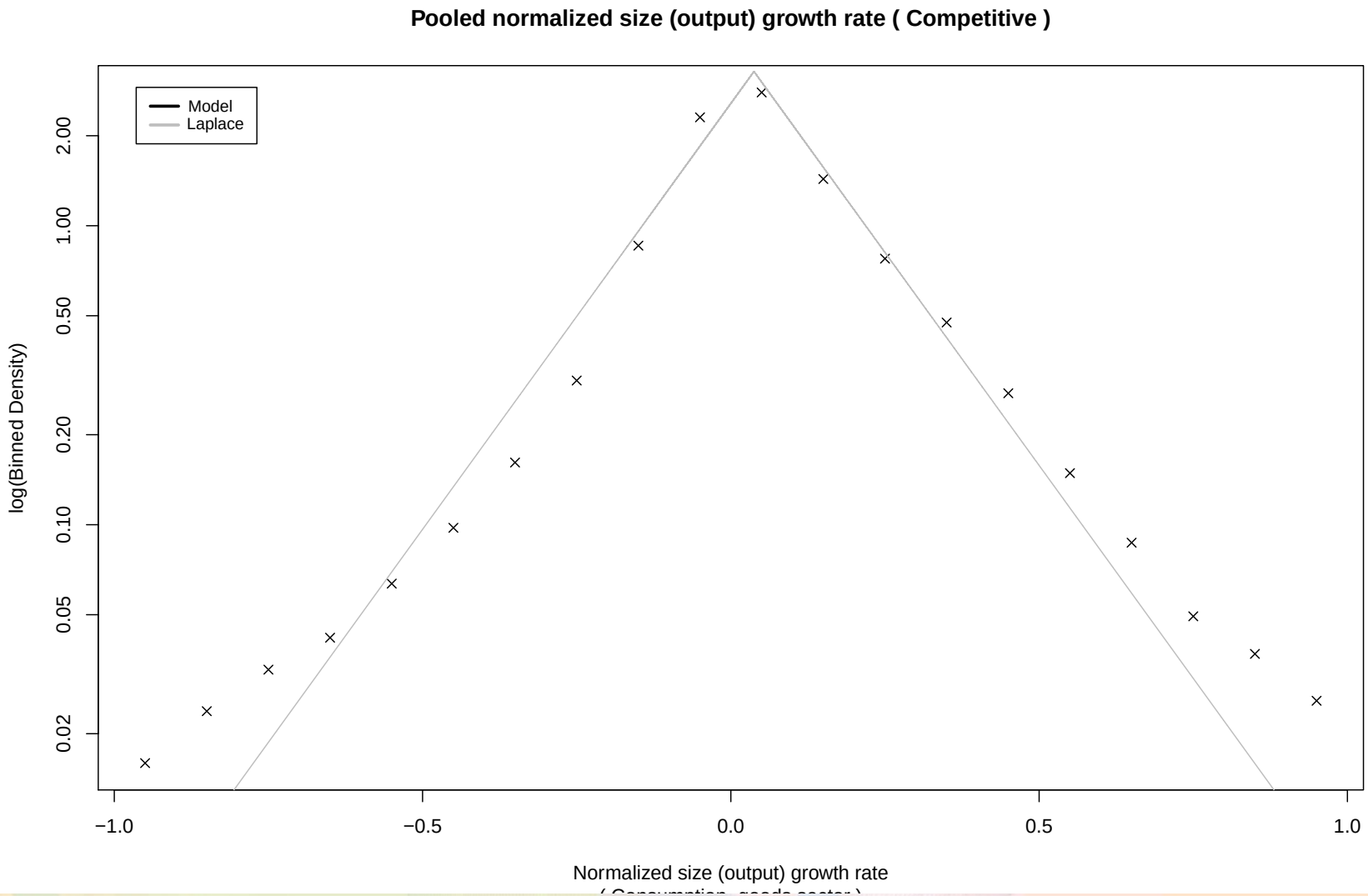
Total production in turn coincides with the sum of aggregate consumption (C_t), investment (I_t) and change in inventories (ΔN_t)

$$\sum_{i=1}^{F_1} Q_{i,t} + \sum_{j=1}^{F_2} Q_{j,t} = Q_t^1 + Q_t^2 = Y_t = C_t + I_t + \Delta N_t, \quad Q_t^1 = \sum_{i=1}^{F_1} Q_{i,t} \tag{18}$$

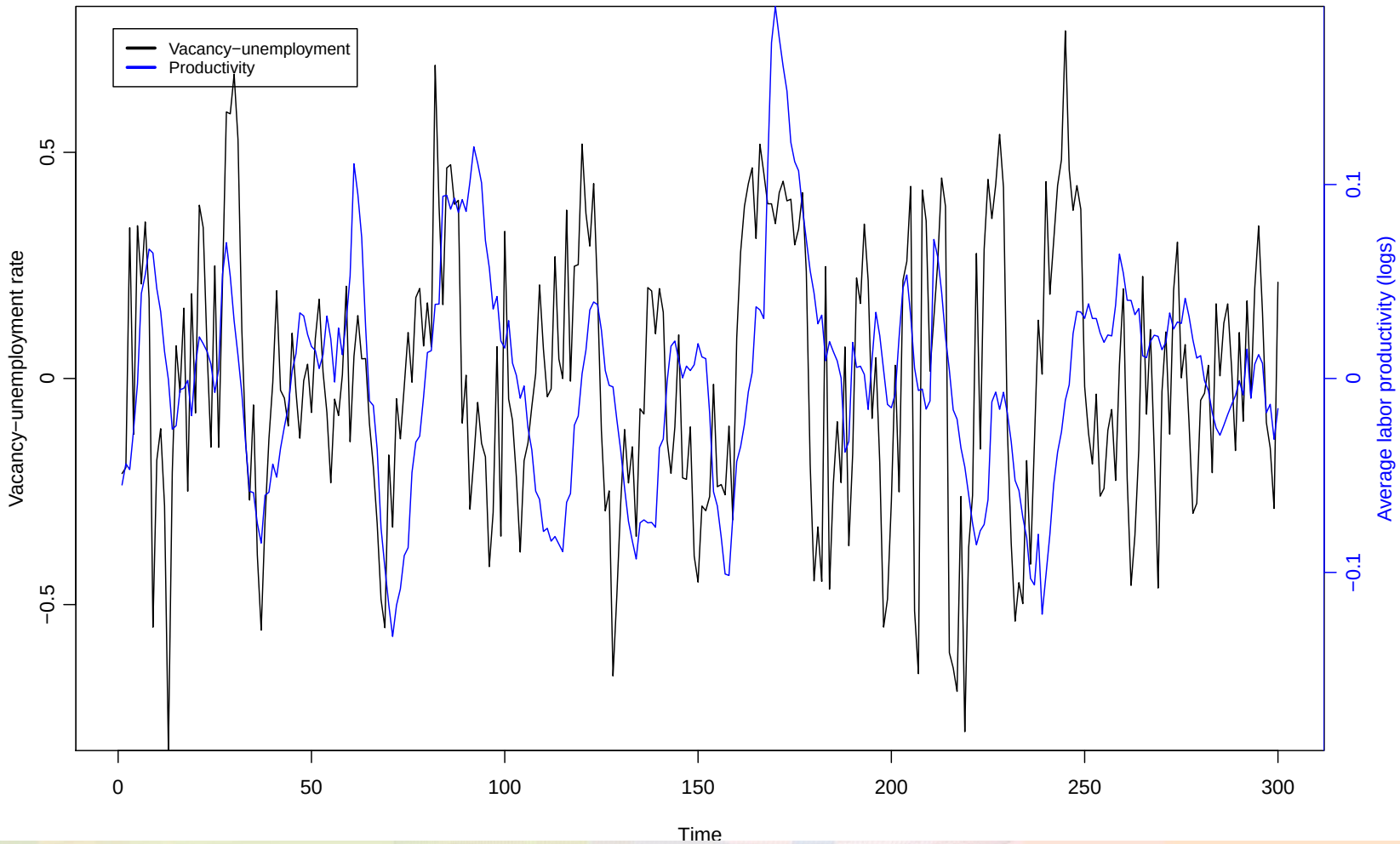
Stylised Facts

Firm level SF	Aggregate level SF
Skewed firm size distribution	Endogenous self-sustained growth with persistent fluctuations
Fat-tailed firm growth rate distribution	Fat-tailed GDP growth rate distribution
Productivity heterogeneity across firms	Relative volatility of GDP, C, I
Persistent productivity differentials among firms	Cross-correlation of macro variables
Lumpy investment rates at firm-level	Pro-cyclical aggregate R&D investment
	Persistent unemployment
	Wage curve
	Beveridge curve
	Okun curve
	Separation and hiring rates volatility
	Matching function
	Productivity, unemployment and vacancy rates volatility
	Unemployment and inequality correlation

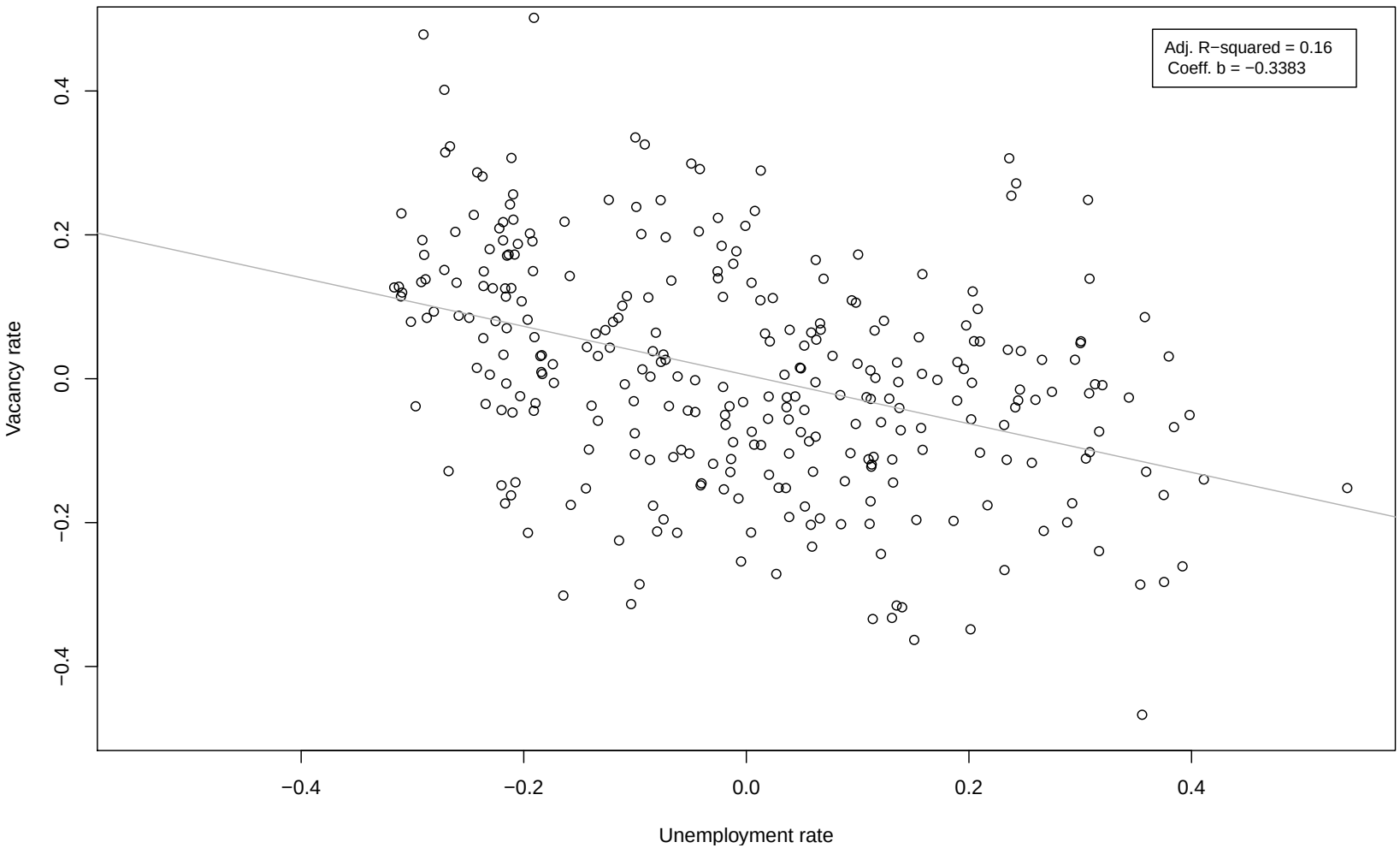
Fat-tailed GDP growth rate distribution



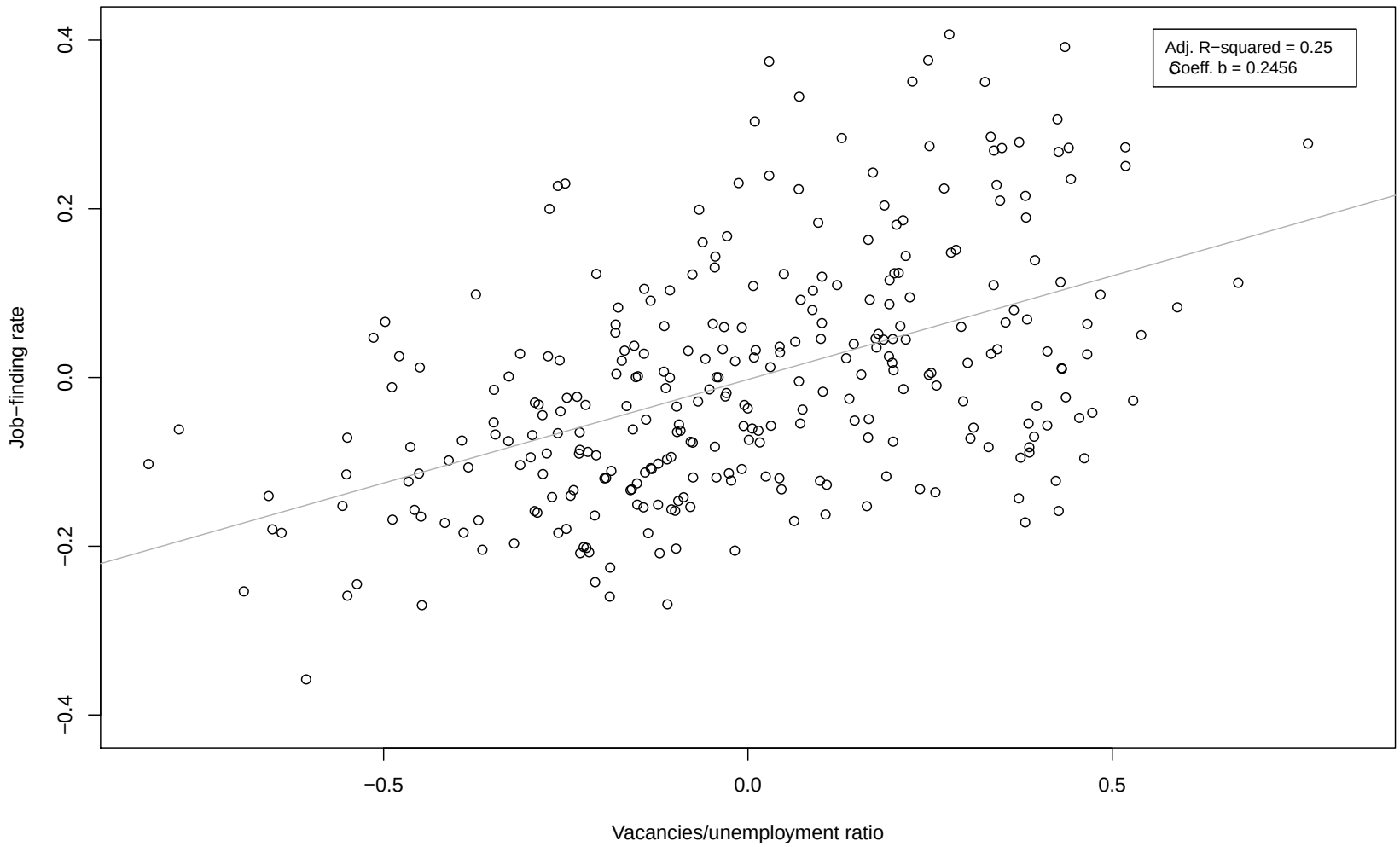
Vacancy-unemployment vs productivity standard deviations



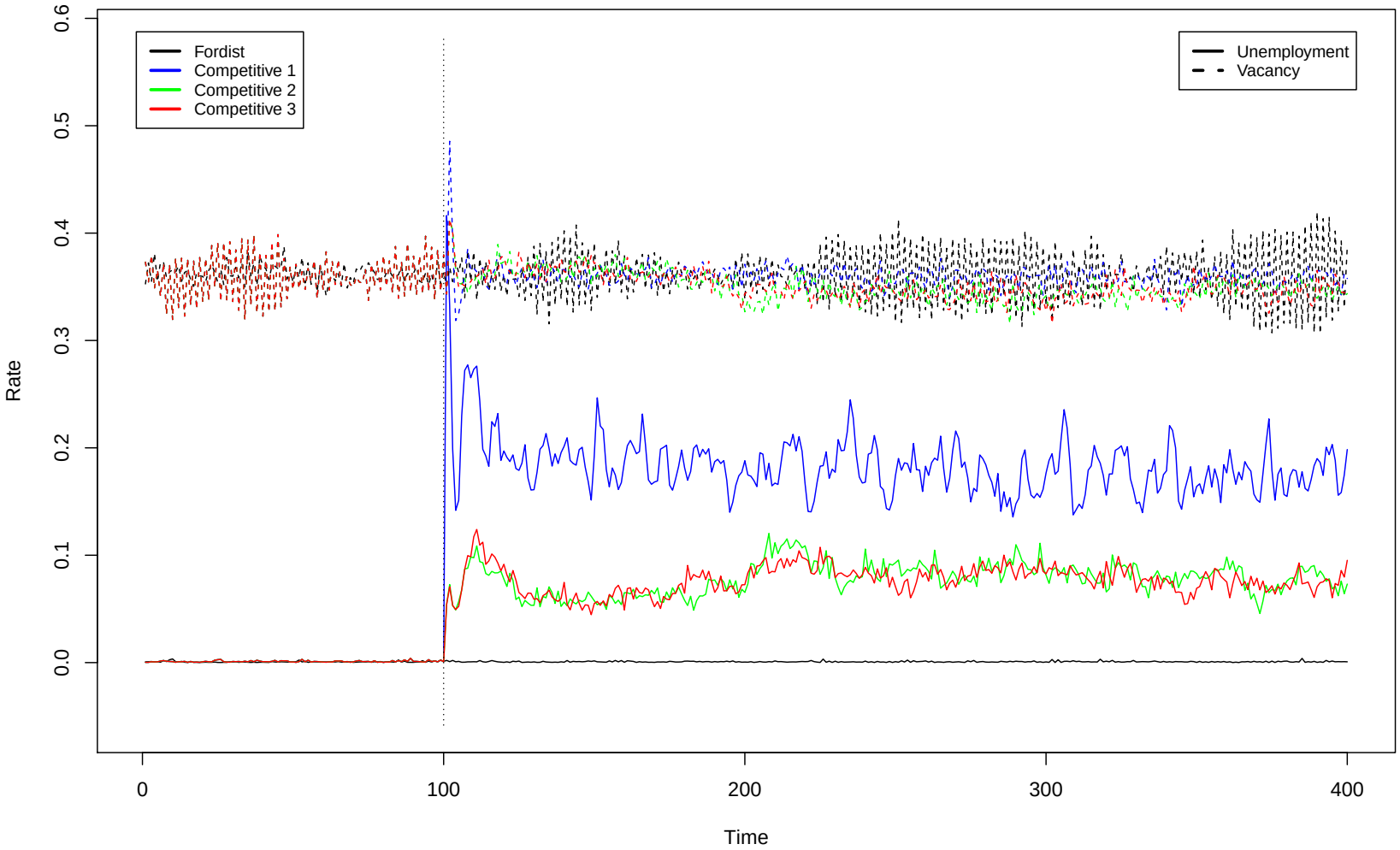
Beveridge Curve



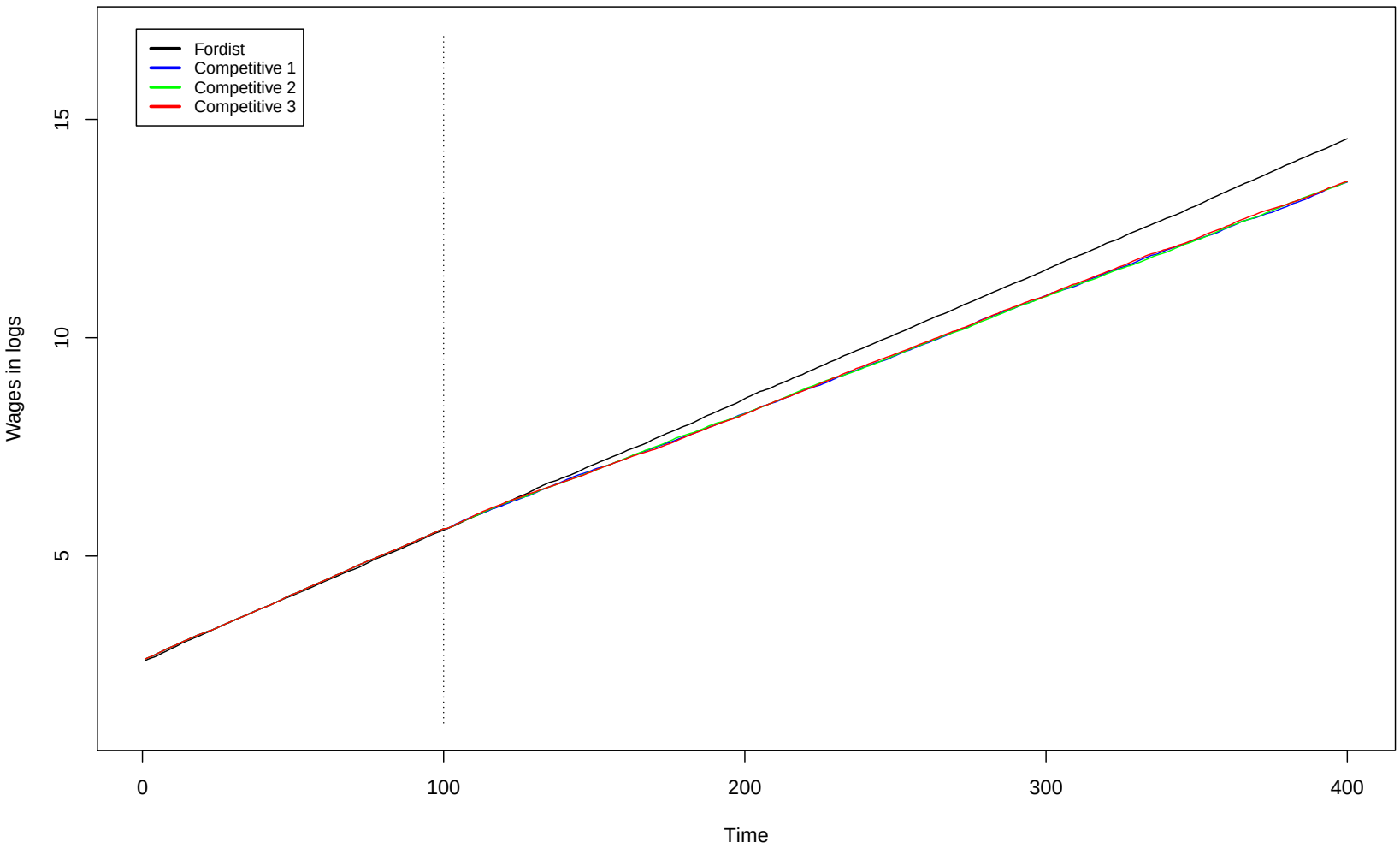
Matching Function



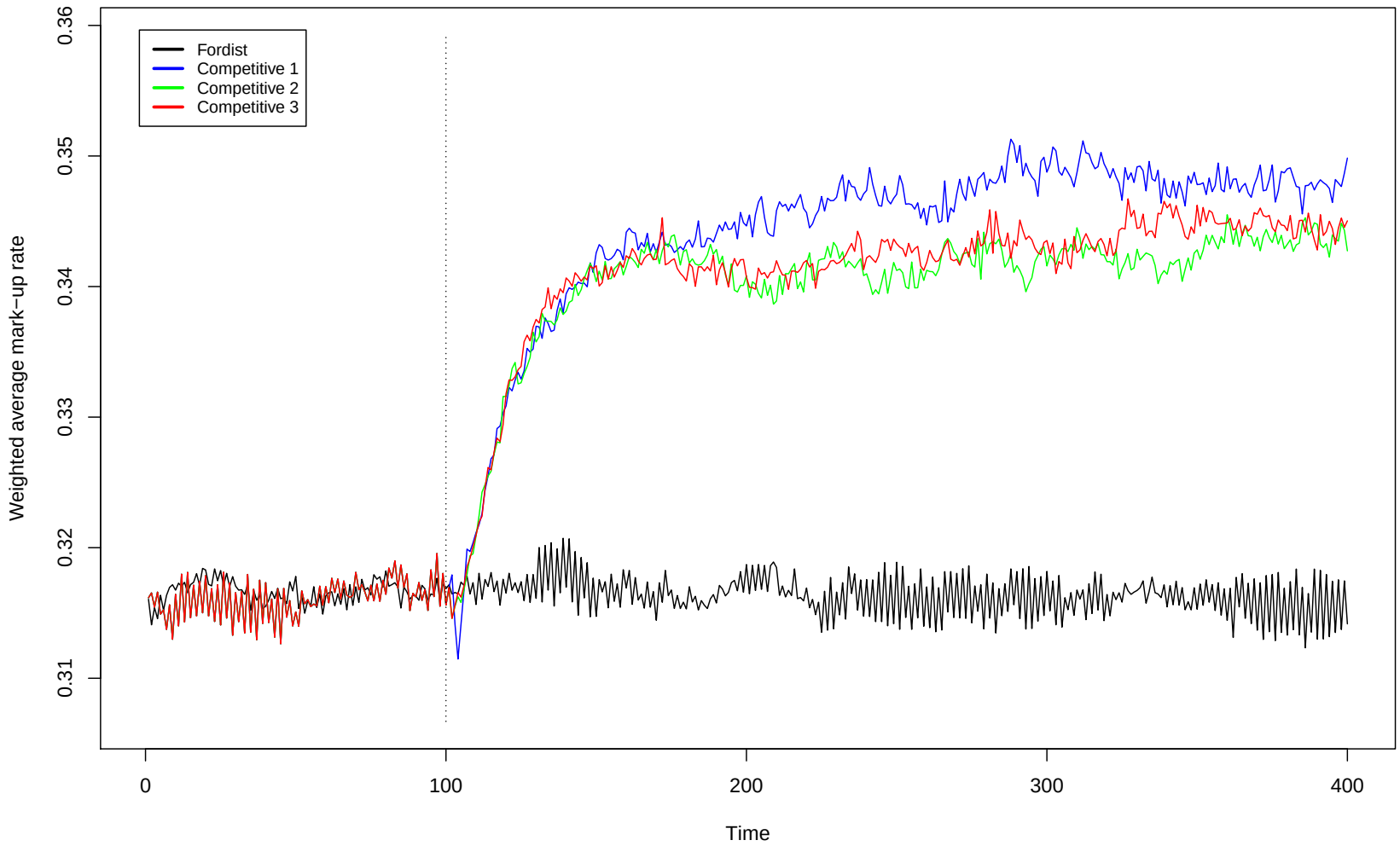
Unemployment



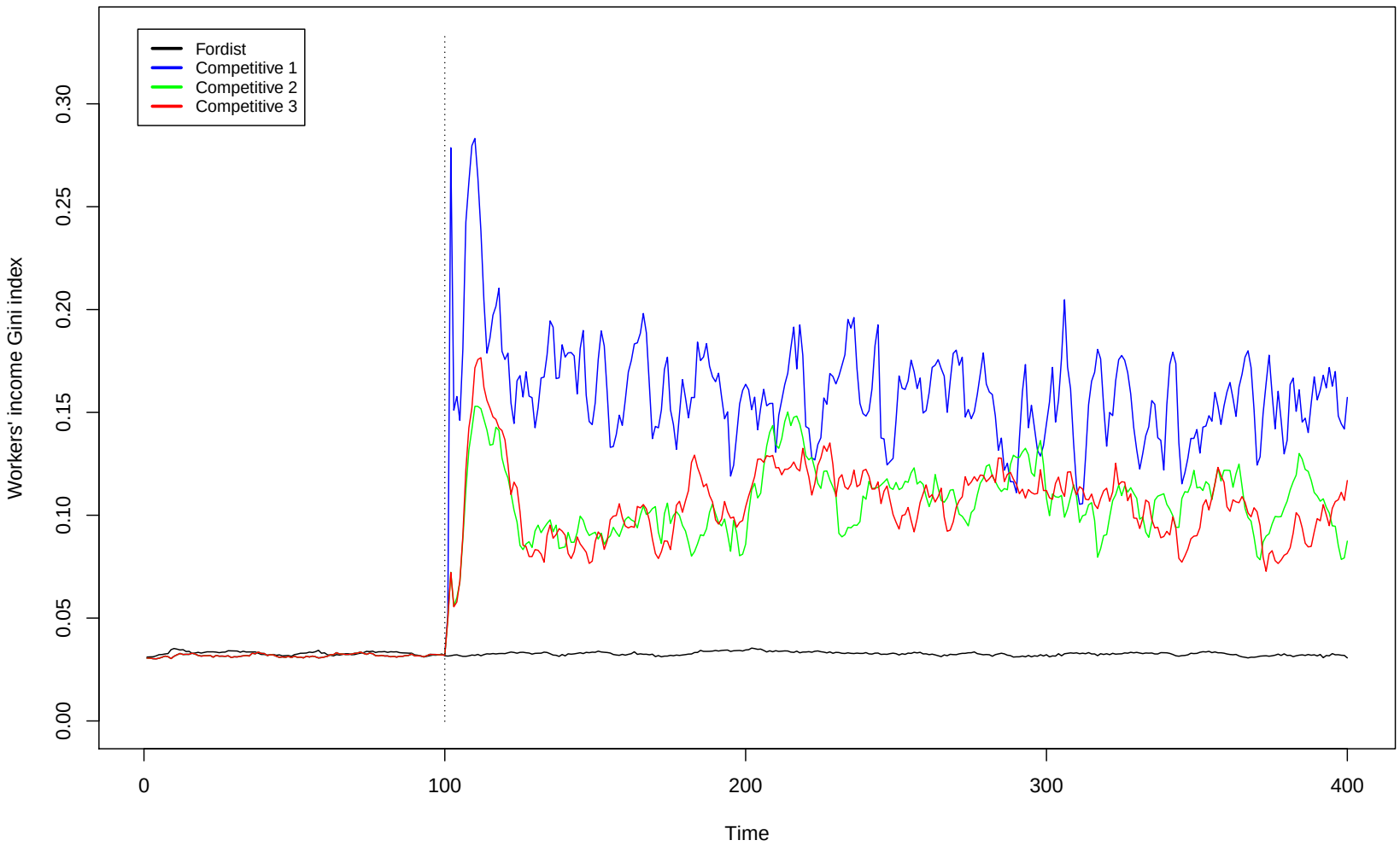
Real Wages


Fordist
Competitive 1
Competitive 2
Competitive 3
Wages in logs
5
10
15
0
100
200
300
400
Time

Functional income distribution



Personal income distribution



Summary of the results

	Fordist	Competitive 1		Competitive 2		Competitive 3	
	Baseline	*Ratio*	*p-value*	*Ratio*	*p-value*	*Ratio*	*p-value*
GDP growth rate	0.030	0.866	0.000	0.880	0.000	0.876	0.000
σ of GDP growth rate	0.103	0.987	0.450	0.780	0.000	0.790	0.000
Productivity growth rate	0.030	0.869	0.000	0.877	0.000	0.880	0.000
Unemployment rate	0.001	215.8	0.000	102.3	0.000	98.06	0.000
Frequency of full employment	0.557	0.137	0.000	0.311	0.000	0.338	0.000
Wages dispersion	0.057	0.552	0.000	1.508	0.000	1.486	0.000
Gini coefficient	0.032	4.730	0.000	3.409	0.000	3.310	0.000
Average mark-up	0.316	1.099	0.000	1.082	0.000	1.086	0.000

Table: Scenario/baseline ratio and p-value for a two means test with H_0: no difference with baseline. Average values across 50 Monte Carlo runs.

Elementary Effects Screening Procedure

Out of the 35 parameters of the model we reduce the relevant parametric dimensionality to 16.

Symbol	Description	Value
Policy		
ψ^{chg}	Unemployment subsidy rate on average wage	0
$aliq^{chg}$	Tax rate	0
Labour market		
ϵ	Minimum desired wage increase rate	0.02
ωL_a^{chg}	Number of firms to send applications	5
T_s^{chg}	Number of wage memory periods	4
Industrial dynamics		
μ_2	Initial mark-up in consumption-good sector	0.30
χ	Replicator dynamics (intensity) coefficient	1
$exit_2$	Exit (minimum) share in consumption-good sector	0.00001
Technology		
dim_{mach}	Machine-tool unit production capacity	40
(b_{a_1}, b_{b_1})	Beta distribution parameters (innovation process)	$(3, 3)$
$[uu_5, uu_6]$	Beta distribution support (innovation process)	$[-0.15, 0.15]$
Initial conditions		
L_0^S	Number of workers	250000
N_1	Number of firms in capital-good sector	50
N_2	Number of firms in consumer-good sector	200

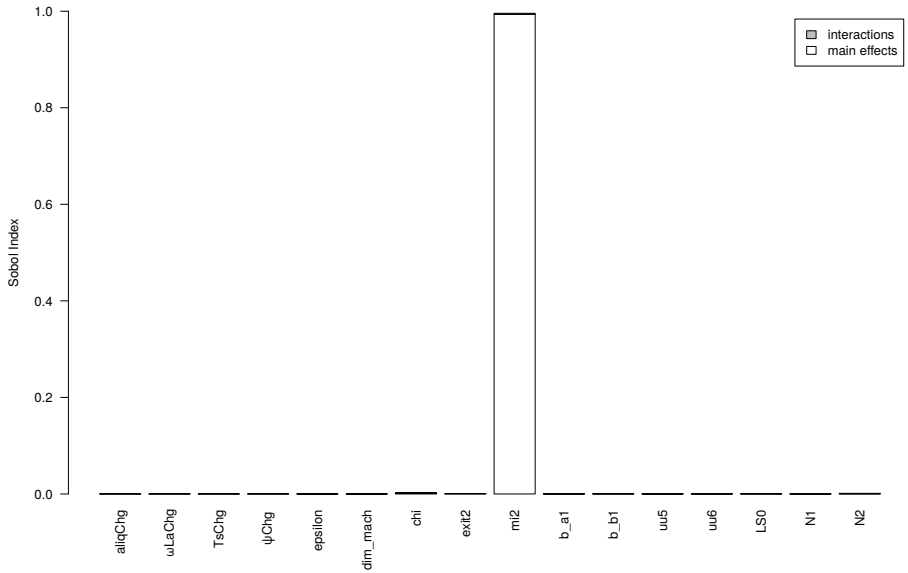
Table: The "chg" superscript indicates parameters changed during regime transition at $t = 100$

Parametrization

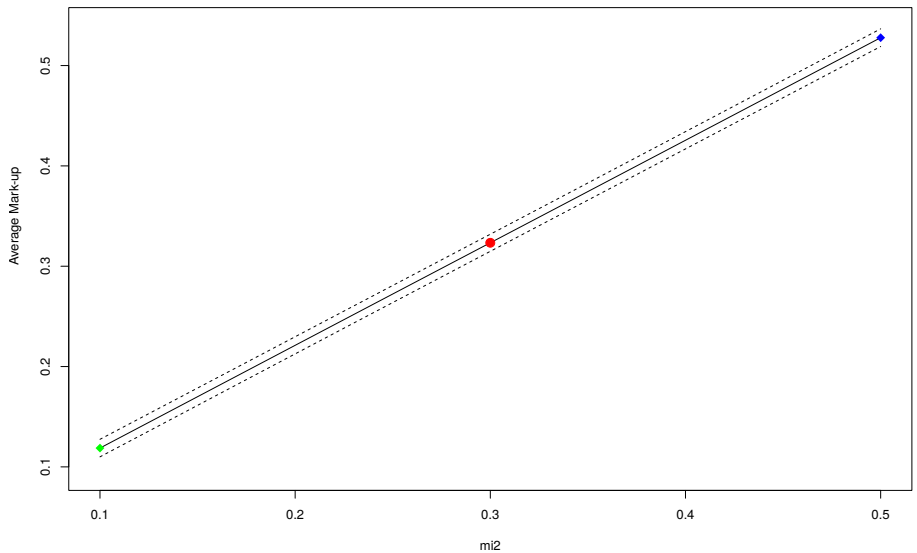
	Fordist	Competitive
ωL_a	0	5
ψ	0.40	0
$aliq$	0.10	0
T_s	0	4

Table: Regime-specific parameter values. Competitive values apply for all scenarios.

Global Sensitivity Analysis - Functional income distribution

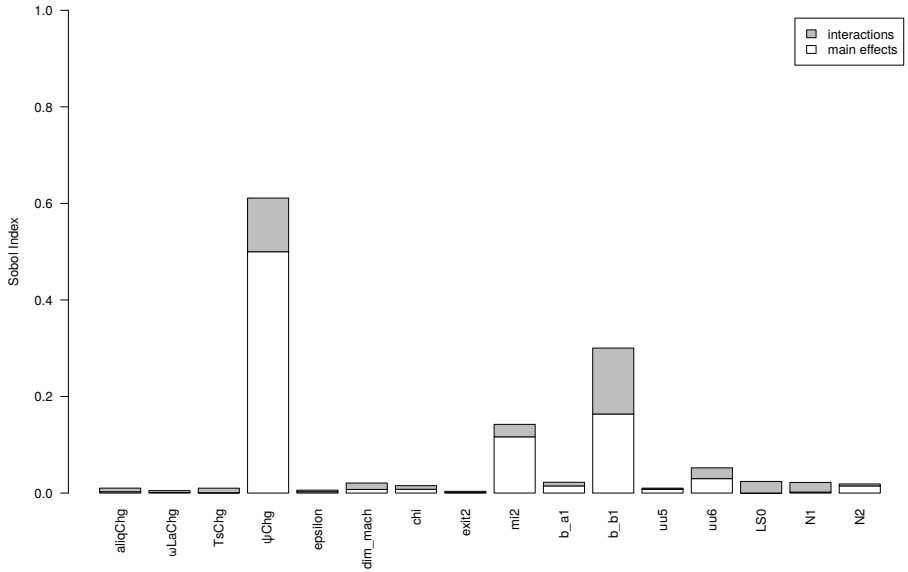


(a) Sobol decomposition: average mark-up.

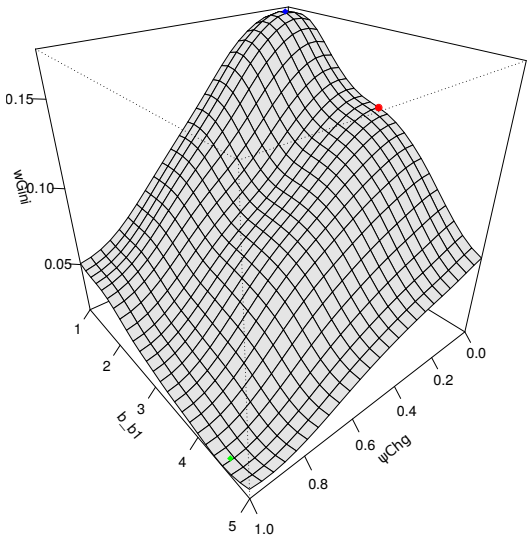


(b) Average mark-up (y) vs. initial mark-up μ_2 (x) (dotted lines at 95% confidence interval, red dot at calibration and markers at max./min.).

Global Sensitivity Analysis - Personal income distribution

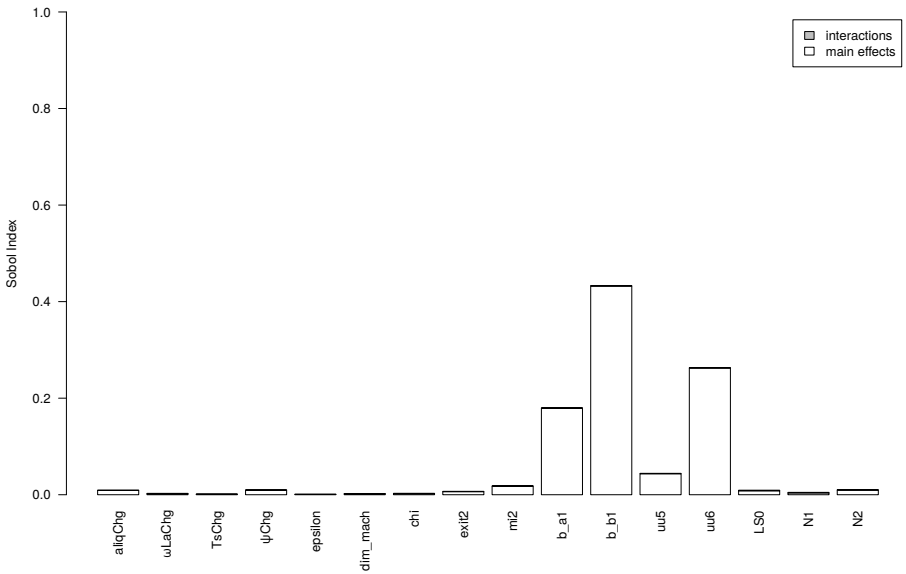


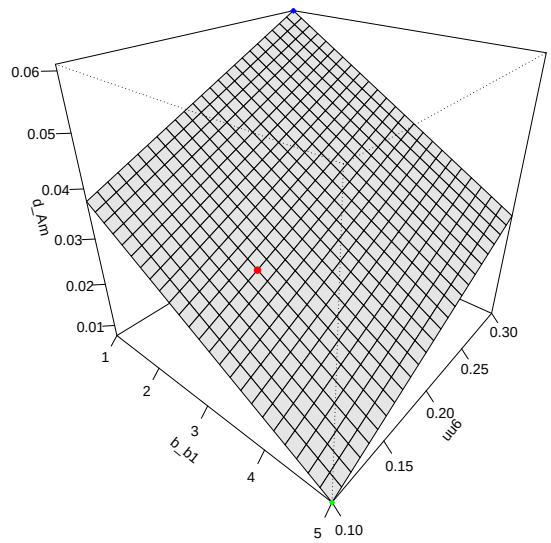
(c) Sobol decomposition: Gini coefficient.



(d) Gini coefficient (z) vs. upper Beta distribution parameter b_{b_1} (x) and fraction of unemployment benefits ψ^{chg} (y) (red dot at calibration and markers at max./min.).

Global Sensitivity Analysis- Productivity growth rate

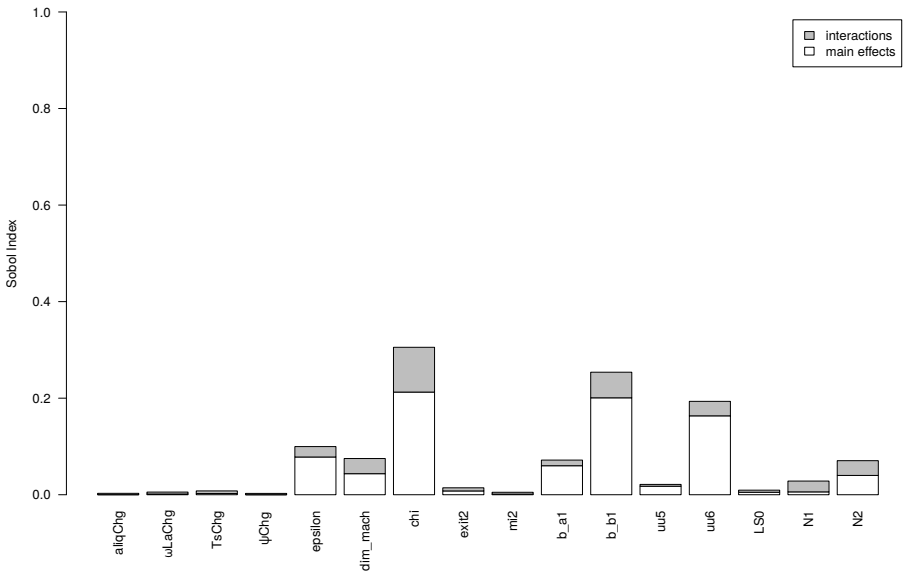




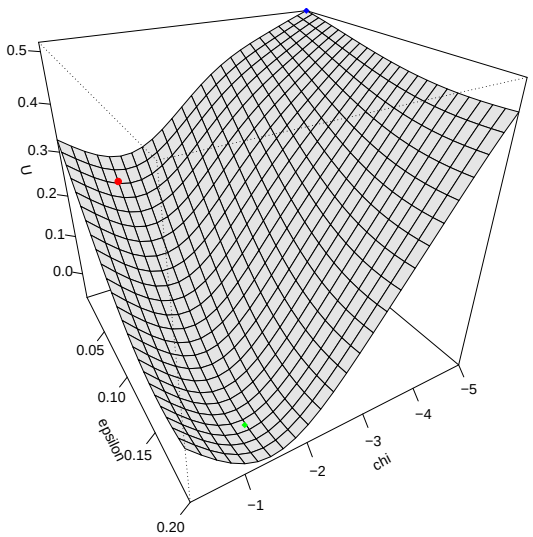
(e) Sobol decomposition: productivity growth rate.

(f) Productivity growth rate (z) vs. Beta shape parameter b_{b_1} (x) and Beta distribution upper support uu_6 (y) (red dot at calibration and marker at max./min.).

Global Sensitivity Analysis - Unemployment



(g) Sobol decomposition: unemployment rate.



(h) Unemployment rate (z) vs. desired wage increase ϵ (x) and replicator dynamics intensity $-\chi$ (y) (red dot at calibration and markers at max./min.).

Does the impact of structural reforms introduce hysteresis?

Hysteresis in Standard Macroeconomics

The notion of hysteresis has experienced a changing fortune in Macroeconomics: firstly introduced by Blanchard and Summers (1987), it was abandoned for long time

> *The recent European experience has led to the development of alternative theories of unemployment embodying the idea that the equilibrium unemployment rate depends on the history of the actual unemployment rate. Such theories may be labelled hysteresis theories after the term in the physical sciences referring to situations where equilibrium is path-dependent.* *[Blanchard et 1987, pag. 1]*

A supply side explanation

Two alternative supply-side hypotheses were proposed by the authors in order to explain the emergence of hysteresis

- the *membership* channel: only insider workers are able to exert pressure in the wage setting process
- the *duration* channel: long-term unemployed are less relevant in the wage determination process. Unemployment duration can (a) induce a process of worker skills deterioration; (b) trigger search discouragement in unemployed people, less re-employable, and so less prone to search in the labour market.

Hysteresis and the crisis

In the current economic crisis, the notion of hysteresis has been extended from unemployment to permanent output loss

> *[...] in most countries the loss of potential output is almost as large as the shortfall of actual output from its pre-crisis trend. This finding implies that hysteresis effects have been very strong during the Great Recession. Second, in the countries hit hardest by the recession, the growth rate of potential output is significantly lower today than it was before 2008. This growth slowdown means that the level of potential output is likely to fall even farther below its pre-crisis trend in the years to come.* *[Ball 2014, p. 2]*

Three notions of hysteresis in the literature

- Persistence in the deviations from some equilibrium path
- A random-walk dynamics in equilibrium itself
- Heterogeneous and non-linear responses of a system characterised by multiple equilibria or path-dependent trajectories.

Alternative origins of hysteresis in socio-economic domains

- Feedback mechanisms related to *coordination externalities*
- Amplification processes stemming from some form of *increasing returns*:

  [During recessionary phases], typically firms also reduce their expenditures in R&D and productivity-enhancing expenditures. The reduction in output reduces opportunities to "learn by doing". Thus, the attempt to pare all unnecessary expenditures may have a concomitant effect on long-run productivity growth. In this view, the loss from a recession may be more than just the large, but temporary, costs of idle and wasted resources: the growth path of the economy may be permanently lowered. *[Stiglitz,1994, p. 122]*

Alternative origins of hysteresis in socio-economic domains

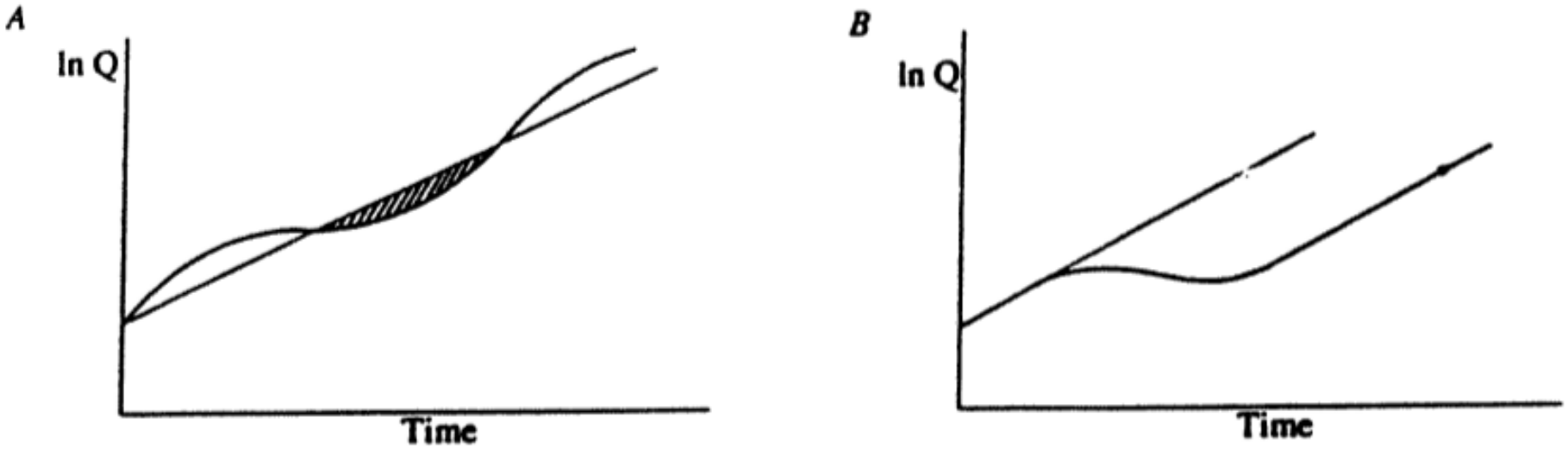


Figure: Positive feedbacks between output and innovative search (in levels): short-run (A) and long-run (B) effects of recessions. Source: Stiglitz, 1994, p. 123.

Alternative origins of hysteresis in socio-economic domains: Dosi et al. 2016, 2017

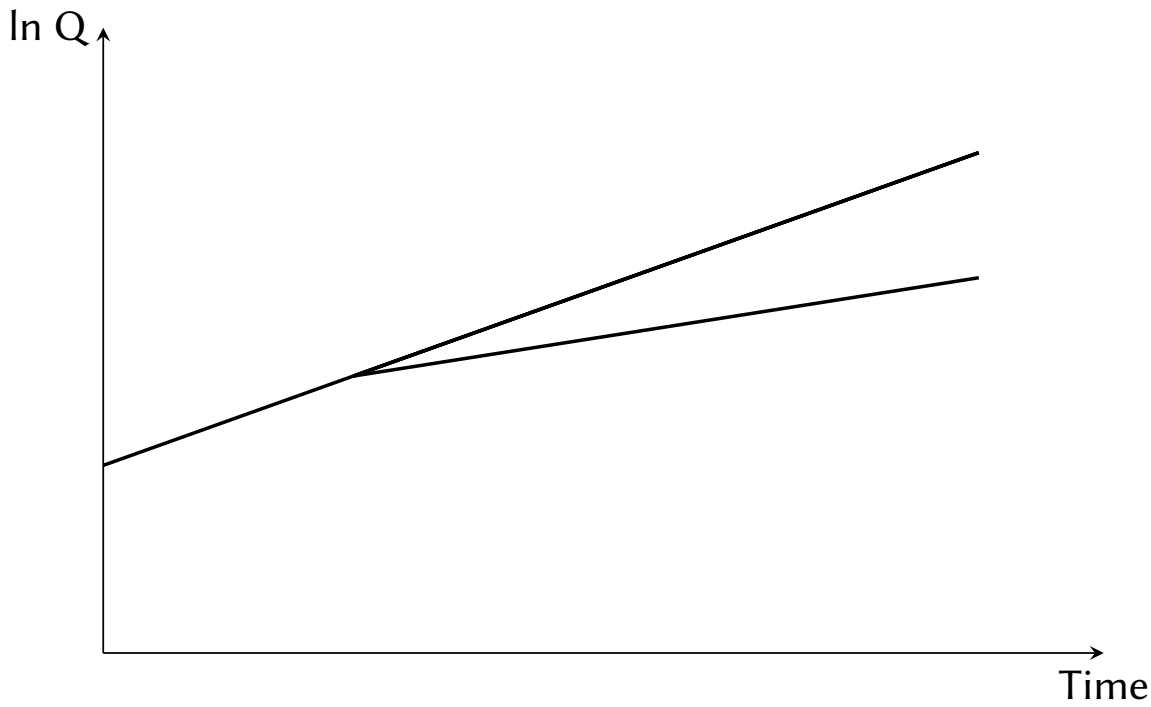


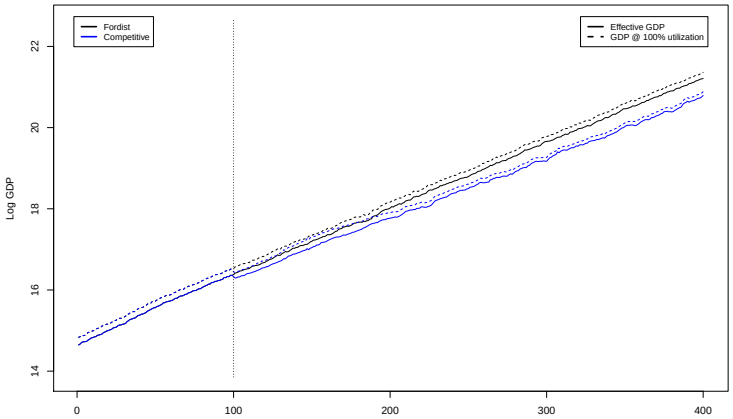
Figure: Divergent growth trajectories and permanent losses in output growth rates.

Regime change: asymptotic hysteresis

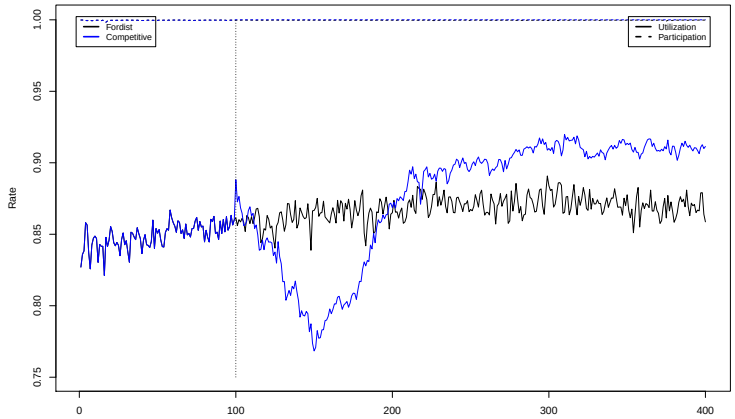
When affected by an institutional shock, namely the introduction of "structural reforms" aimed at increasing the flexibility of the labour market, the model does exhbit "asymptotic hysteresis"

The transition from a Fordist toward a Competitive type of labour relations well captures such structural reforms, aimed at achieving both numerical (easier firing) and wage flexibility (wages more respondent to unemployment).

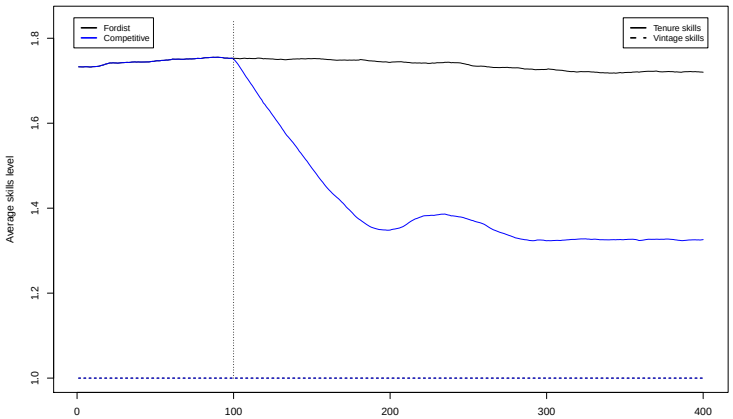
Regime change: asymptotic hysteresis



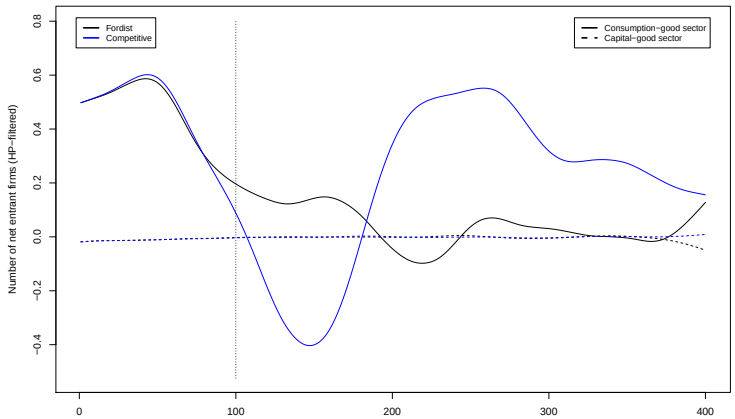
(a) Actual and full capacity GDP



(b) Capacity utilization

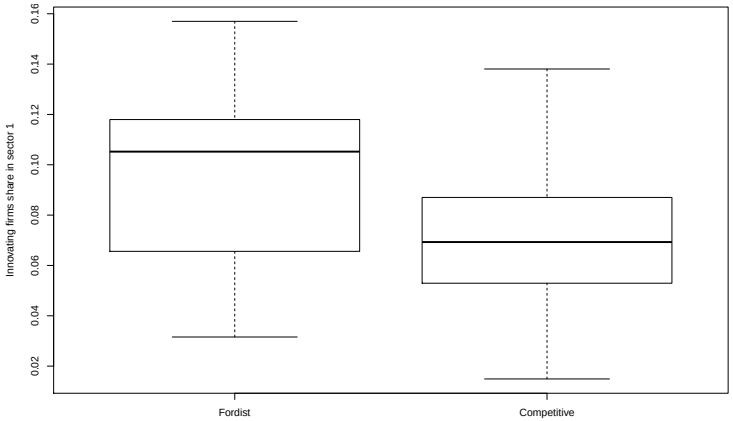


(c) Average worker skills

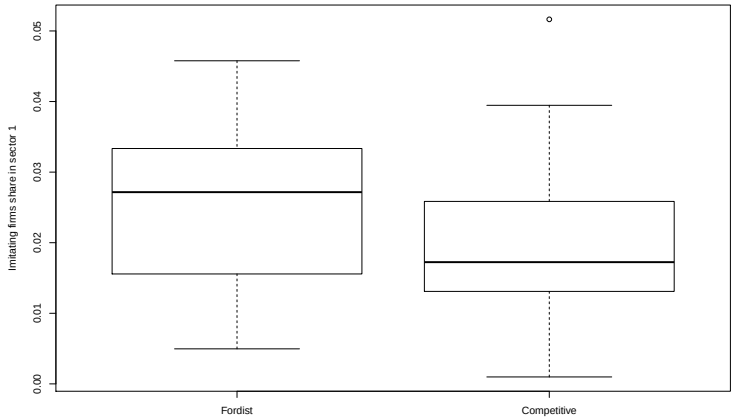


(d) Net entry of firms

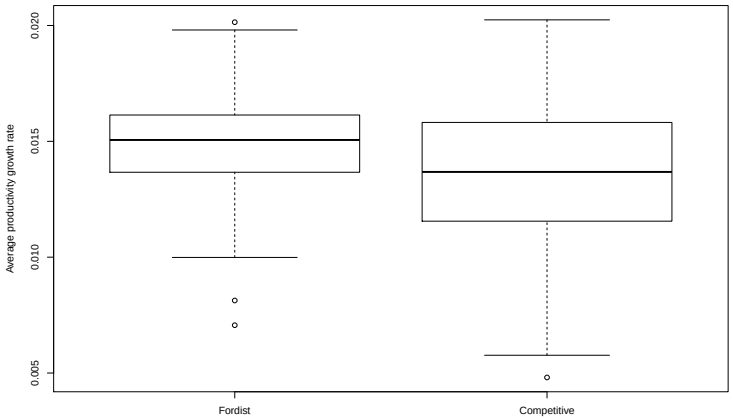
Regime change: asymptotic hysteresis



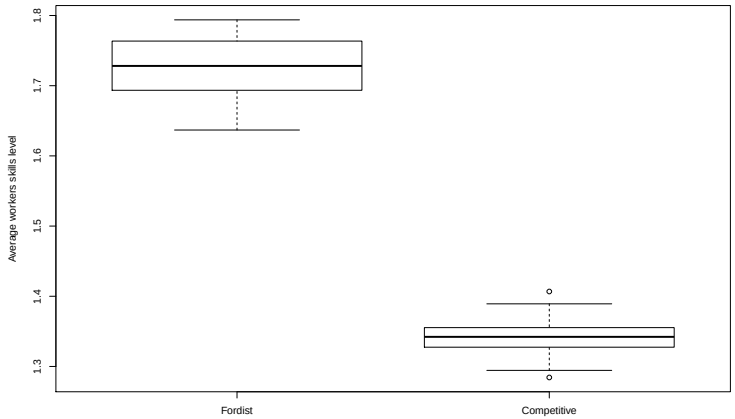
(e) Innovation rate



(f) Imitation rate

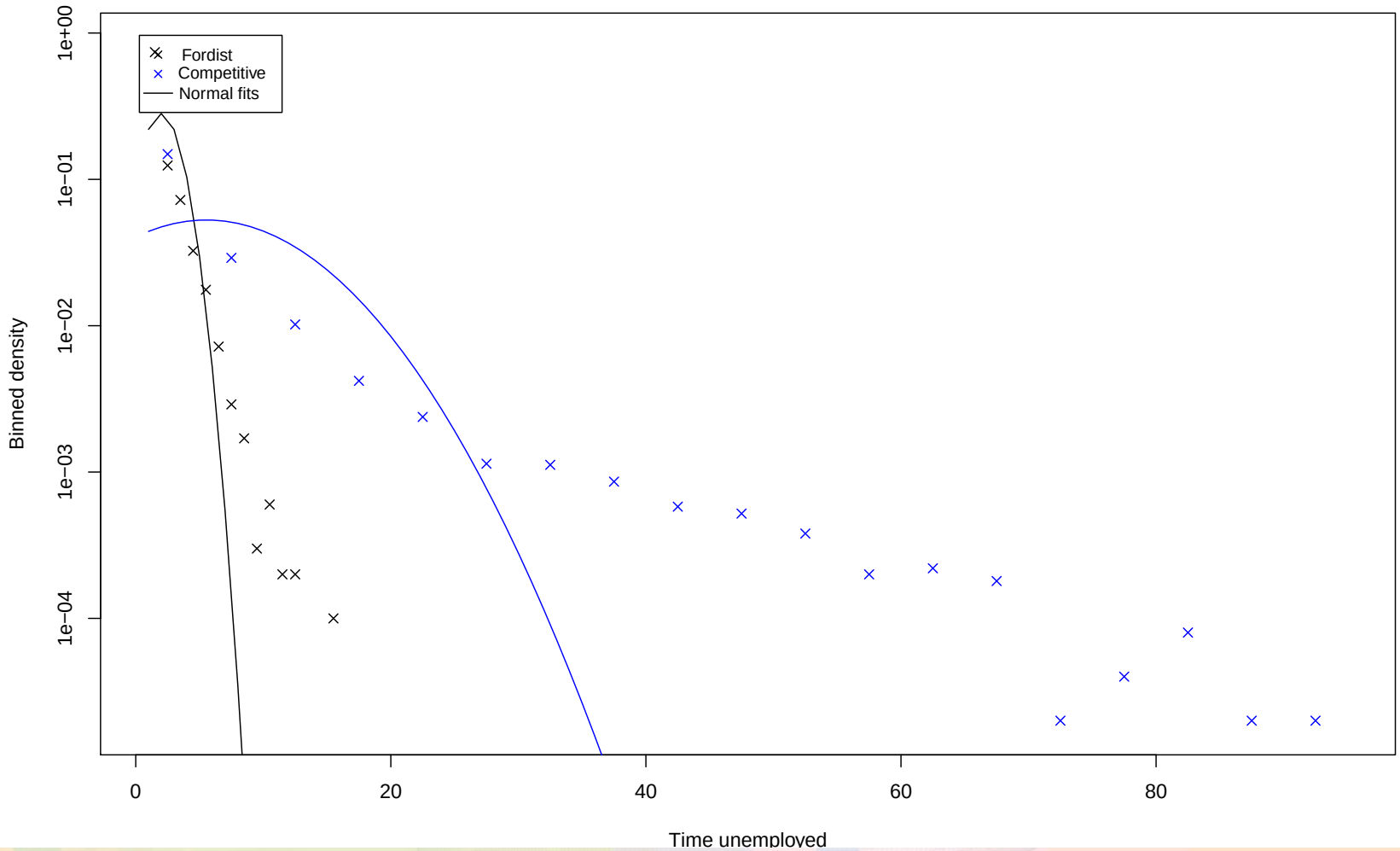


(g) Productivity growth rate



(h) Worker skills

Unemployment time distributions in the two institutional set-up



Detecting intra regimes hysteresis

Assessing the emergence of intra-regime hysteresis is not a trivial task as there is no unifying test or even widely accepted criteria for this.

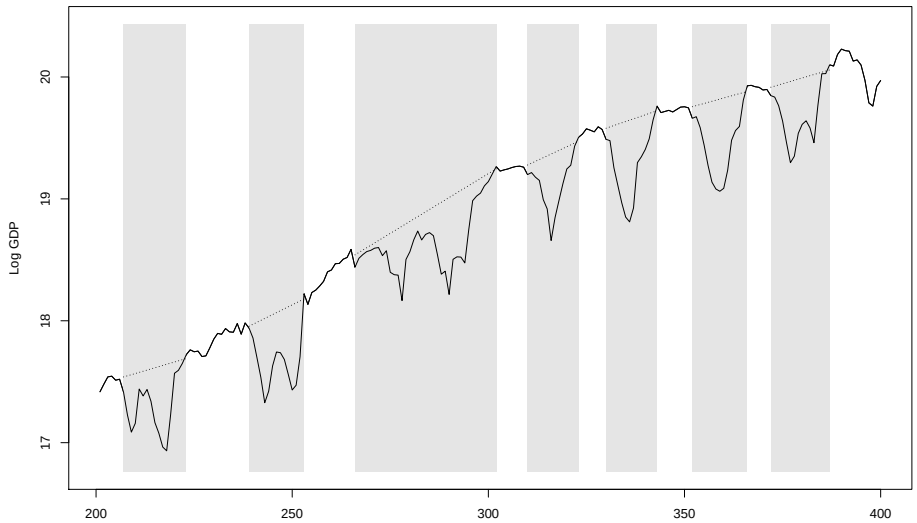
Property	Test	Reference
Remanence	Duration of recovery of employment and GDP after crises	Jaimovich et al 2012
Super-hysteresis	Different GDP growth trend (slope) after crises	Blanchard et al. 2015
Persistency	Unit-root tests for stationarity	Blanchard et al. 1986
Nonlinearity	Brock-Dechert-Scheinkman test	Brock et al. 1996
Path dependence	Ergodicity tests	Wald 1940

Table: Selected tests to evaluate hysteretic properties in times series.

GDP recovery after crises

Figure: Dashed line: pre-crisis trends | Gray boxes: recovery periods

(a) Fordist



(b) Competitive

Detecting intra regimes hysteresis

	Fordist	Competitive
Number of crises	6.15	5.77
	(0.44)	(0.28)
Crises peak	0.23	0.51
	(0.01)	(0.02)
Crises losses	2.38	4.18
	(0.33)	(0.42)
Recovery duration		
- GDP	15.64	16.97
	(1.43)	(1.04)
- Unemployment time	6.83	31.22
	(0.55)	(9.04)

Table: Comparison between policy regimes: GDP and unemployment time recovery.

Conclusions

Along each history of our agent-based model we introduce regime changes capturing a series of alternative policy interventions aimed at making labour markets more flexible.

Such policy interventions effectively *cause* the increase of both functional and personal income inequality, on the one hand, and of the unemployment rate, on the other.

Conversely, the model fails to provide any evidence of the existence of an equity-efficiency trade-off.

Conclusions

It happens that the nearer the system gets to competitive conditions in the labour market, the *harder* it is for the Schumpeterian engine of innovation and growth to operate. More unequal income distribution and higher unemployment spells induce, via Keynesian dynamics, a stagnationist bias in the aggregate dynamics.

Conclusions

- The model is able to generically exhibits path dependence, nonlinearity and non-ergodicity in its main macroeconomic variables, presenting both *inter-regime* and *intra-regime* hysteresis as a bottom-up emergent property.
- The model fails in providing support to the insider-outsider hypothesis, according to which more flexible labour relations might reduce hysteresis.
- The model suggests that both numerically and wage flexibility are quite prone to increase the hysteretic properties of the macroeconomic system.