FIRM TURNOVER AND INFLATION DYNAMICS

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INTRODUCTION

Price and wage markup shocks explain inflation in an estimated DSGE model such as Smets and Wouters (2007). Chari, Kehoe and McGrattan (2009) question the true nature of these shocks.

Structural reforms are deflationary and can have adverse effects in low interest rate environment: Eggertsson, Ferrero and Raffo (2014).

This paper examines the role of firm turnover in inflation dynamics as the number of firms directly shapes inflation the New Keynesian Philips Curve and can therefore help to improve the fit of the curve and explain inflation.

CONTRIBUTIONS

1. Firm entry cost shocks can explain inflation in the short run.

2. Policies promoting firm creation can be inflationary in the short run even if in the long run an increase in the number of firms may result in lower price level, Eggertsson, Ferrero and Raffo (2014) problems can be mitigated.

MODEL

Main components: Standard utility with consumption and leisure, a budget and a cash-in-advance constraint, linear production technology in labour, Rotemberg pricing, staggered wages, Taylor rule. Close to Uhlig (2009) and Bilbiie et al. (2012).

Aggregation:

$$y_t = \int_0^{F_t} y_{t,j} dj$$

y_t - aggregate output, $y_{t,j}$ - firm j output, F_t - number of intermediate firms.

Law of motion for the number of firms:

$$F_t = (1-\delta)e^{u_t^{surv}}(F_{t-1} + F_{t-1}^E)$$

F_{t-1}^E - number of new firms, δ - exit rate, u_t^{surv} - exog. survival shock.

Net present value (npv) and entry costs:

$$npv_{t,j} = \frac{1}{\Psi}\xi^{ent}e^{u_t^{ent}}\frac{w_t}{e^{\gamma_t}}(1+\xi i_t)$$

$$= (1-\delta)E_t\left[e^{u_{t+1}^{surv}}\frac{\lambda_{t+1}}{\lambda_t}(v_{t+1,j}+npv_{t+1,j})\right]$$
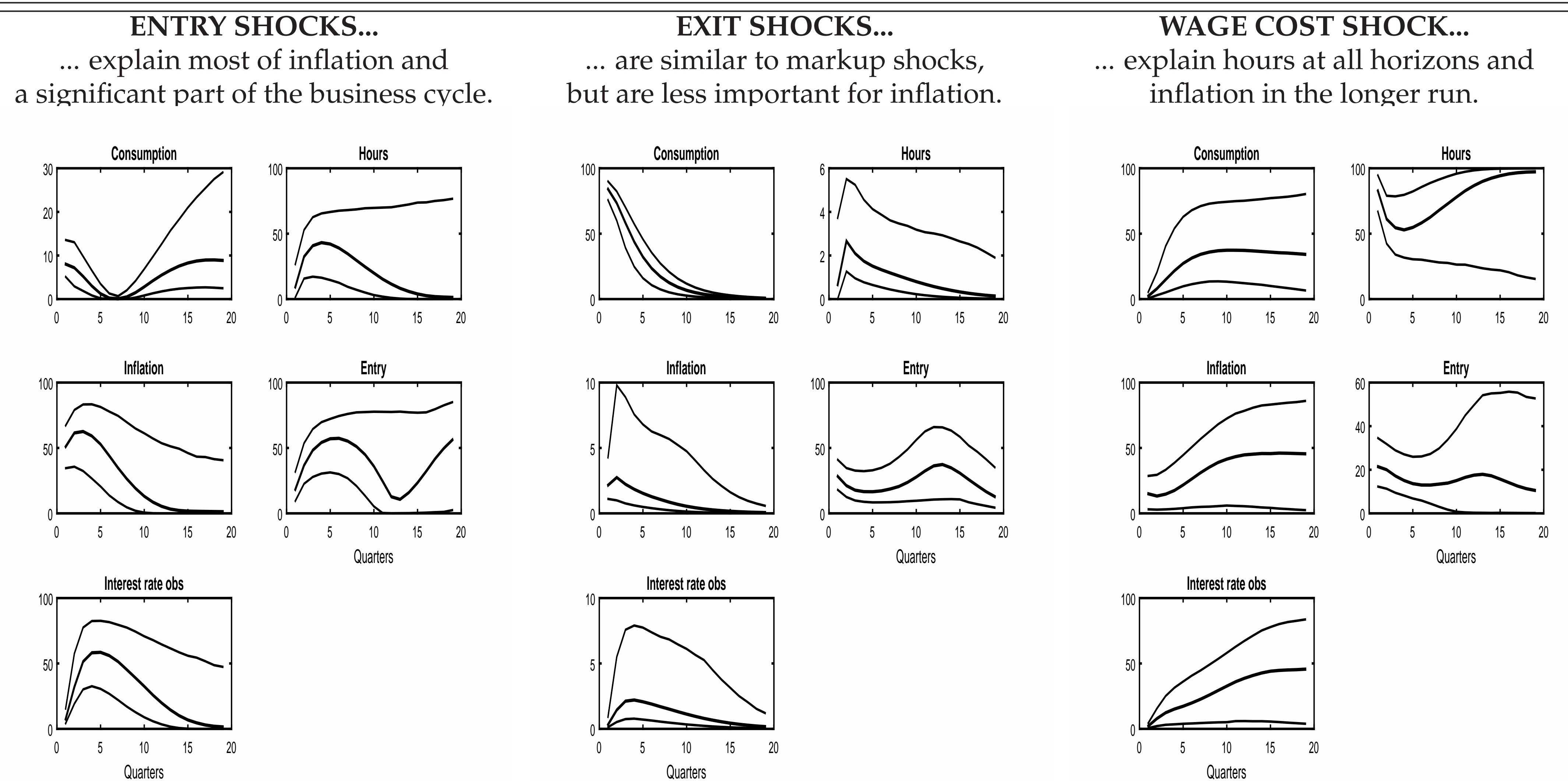
Ψ - share of npv in entry costs, ξ^{ent} - entry cost in labour units, u_t^{ent} - entry cost shock, $\frac{w_t}{e^{\gamma_t}}$ - marginal costs w/o CIA, ξ - CIA for firms, i_t - the interest rate, $\frac{\lambda_{t+1}}{\lambda_t}$ - stoch. disc. factor, v_t - profits.

REFERENCES

1. Bilbiie, F. O., Ghironi, F., Melitz, M. J. (2012). Endogenous entry, product variety, and business cycles. *JPE*

2. Chari, V.V., Kehoe, P.J., McGrattan, E.R. (2009). New Keynesian Models: Not Yet Useful for Policy Analysis. *AEJ:Macro*

3. Eggertsson, G.B., Ferrero, A., Raffo, A. (2014). Can structural reforms help Europe? *JME*

4. Smets, F., Wouters, R. (2007). Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach. *AER*

5. Uhlig, H. (2009). Monetary policy in Europe vs. the US: What explains the difference? In Gali, J., Gertler, M.J., Eds., International Dimensions of Monetary Policy

RESULTS

FORECAST ERROR VARIANCE DECOMPOSITIONS (in percents)

ENTRY SHOCKS...
... explain most of inflation and a significant part of the business cycle.

EXIT SHOCKS...
... are similar to markup shocks, but are less important for inflation.

WAGE COST SHOCK...
... explain hours at all horizons and inflation in the longer run.

IMPULSE RESPONSES AND IN SAMPLE VARIANCE DECOMPOSITIONS (in percents)

ENTRY COST SHOCK IRFs...
... show that low entry cost leads to more entry and a higher inflation rate.

IN SAMPLE DECOMPOSITIONS...
The shocks to the cost of firm creation explain more than half of the variance in inflation at the business cycle frequency.
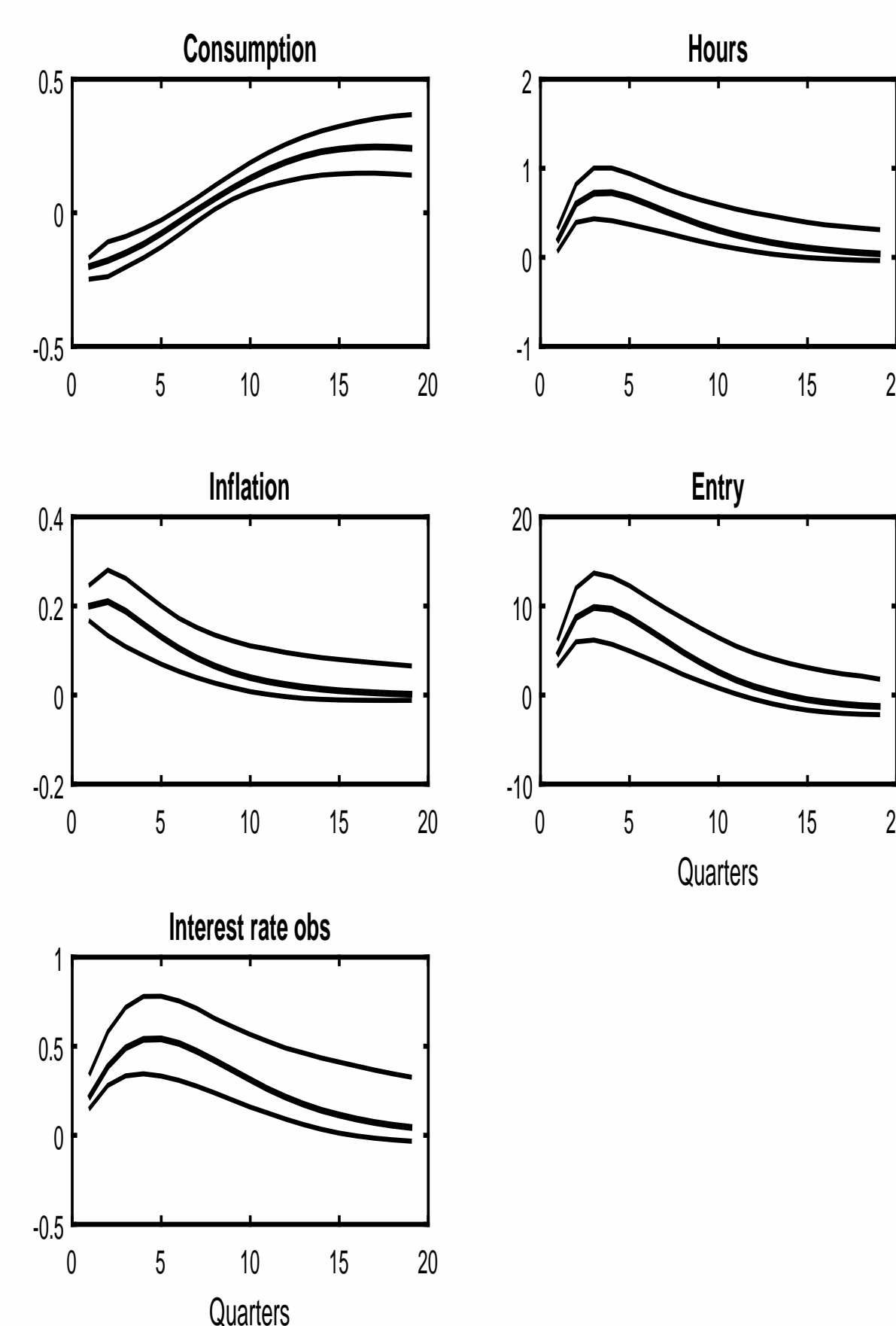
Shock ... Variable	Benchmark	No entry, exit shocks	Wage data instead	No entry shock nor data
Entry				
Consumption	12.49		0.92	
Hours	47.88		8.97	
Inflation	54.96		5.02	
Entry	46.06		1.18*	
Interest rate	43.98		21.95	
Survival				
Consumption	55.76	59.26**	80.41	59.47
Hours	3.27	39.53**	12.85	1.16
Inflation	3.24	22.32**	2.37	0.18
Entry	23.12		20.64*	
Interest rate	2.83	24.75**	1.54	0.08
Wage cost				
Consumption	11.91	13.32	1.91	24.14
Hours	46.92	3.49	24.98	94.00
Inflation	16.88	35.91	19.78	0.76
Entry	12.76		4.02*	
Interest rate	13.04	31.54	1.92	0.62
Technology				
Consumption	19.57	20.11	16.70	12.07
Hours	1.74	19.29	53.15	3.99
Inflation	19.27	36.59	72.41	95.27
Entry	18.02		73.74*	
Interest rate	14.42	27.72	53.54	70.43
Monetary				
Consumption	0.27	7.31	0.07	4.32
Hours	0.19	37.69	0.05	0.85
Inflation	5.65	5.19	0.42	3.80
Entry	0.04		0.42*	
Interest rate	25.72	15.99	21.05	28.86

* - wage data instead of the number of new firms
** - reduced form markup shock

MECHANISM

1. **Entry data matters.**

2. **A drop in the cost of entry** leads to more new firms and results in an increase in the demand for labour, **pushing up marginal costs and inflation**.

3. **When the number of firms peaks**, entry rate starts to drop, labour demand falls and **inflation declines**.

4. **Low estimate of the wage stickiness**: real wages are flexible of new hires.

CALIBRATION

Name	Value	Notes
β	0.99	Discount factor, yearly interest rate of 4%
π	1.005	Steady state inflation, yearly 2%
δ	0.025	Share of firms closed each period, 10% per year
F	1	Number of firms, normalization
A		Matching $\bar{n} = \frac{1}{3}$
Ψ	0.5	Entry cost share in the net present value
ξ^{ent}		Implied by the model, given F=1
μ	0.36	Markup
χ	0.7	Consumption habit
κ	1	Frisch elast. of labor supply
Υ	1.1	Wage markup
ν	0.5	Share of money left in the economy
η	0.5	Share of cash at hand goods

ESTIMATION

Bayesian full likelihood estimation for the US economy 1983Q1-1998Q3 with consumption, hours, the GDP deflator inflation rate, the Federal Funds Rate, the number of new firms.

Parameters		Prior	Posterior moments			
		Mean	Mean	Med.	5%	95%
Price stickiness	ϕ	14	9.09	8.95	2.91	15.53
Int. temp. sub.	σ	1	0.67	0.68	0.60	0.73
CIA for firms	ξ	0.5	0.00	0.00	0.00	0.01
Wage stag.	ω	0.5	0.98	0.98	0.93	1.00
Taylor on output	ζ_y	0.5	0.00	0.00	0.00	0.00
Taylor on infl.	$\zeta_\pi - 1$	0.5	0.06	0.05	0.02	0.13
Int. smooth	ρ_{iL}	0.5	0.73	0.74	0.65	0.79
AR wage	ρ_w^{ar}	0.5	0.96	0.97	0.89	1.00
	ρ_w^{ar}	0.5	0.25	0.23	0.12	0.42
AR entry	ρ_{ent}^{ar}	0.5	0.80	0.88	0.46	0.97
	ρ_{ent}^{ar}	0.5	0.61	0.58	0.29	0.92
AR tech.	$\rho_{\gamma L}$	0.5	0.98	0.99	0.93	1.00
	$\rho_{\gamma u}$	0.5	0.14	0.15	0.04	0.24
AR surv.	ρ_{surv}	0.5	0.09	0.09	0.02	0.17
Mon. shock	σ_i	0.5	0.84	0.84	0.71	1.00
Entry shock	σ_{ent}	0.1	0.99	0.95	0.63	1.46
Surv. shock	σ_{surv}	0.1	1.68	1.67	1.38	2.02
Wage shock	σ_w	0.1	1.07	1.03	0.74	1.53
Tech. shock	σ_γ	0.1	0.62	0.62	0.53	0.72

CONCLUSIONS

Structural shocks that reduce entry costs and increase firm entry are inflationary.

Inflation is persistent because of entry costs.