

Differences in resilience between the United States and France : lessons from a DSGE approach

Thomas Le Barbanchon Benoît Ourliac Olivier Simon

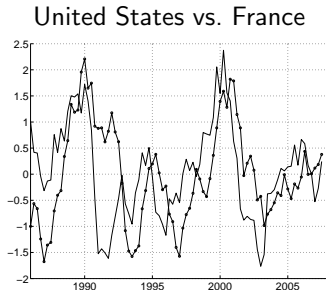
INSEE

23 septembre 2008

Preliminary version : do not quote

Introduction

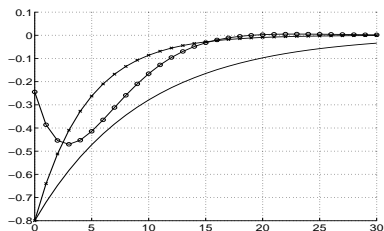
- ▶ Economic resilience : ability to absorb shocks.
- ▶ Over the past three decades, cyclical business cycles have become smaller : Great Moderation.
- ▶ But, in the beginning of the 2000s, the US output-gap decreased more quickly and more strongly than the Eurozone one. Then it returned back to the baseline more quickly too.



Introduction

- ▶ Several recent studies about the difference in resilience between the US and the Euro area :Drew, Kennedy & Sløk (2004), Duval, Elmeskov & Vogel (2007) and DG-EcFin (2007).
- ▶ More flexibility → less adjustment costs → more resilience.
- ▶ If adjustment costs = welfare losses, new argument for policies that make the European economies more flexible.

Which definition for resilience to choose ?



- ▶ Several dimensions : initial impact of shock, persistence of the impulse response function (irf), cumulative output loss...
- ▶ → comparison between irfs

Which method to choose ?

- ▶ The approach of Duval et al. (2007) : to identify a shock that is common to a group of OECD countries, to compare the irfs of these countries to the common shock and to link the resilience of the irfs to indicators of regulation policies in labour and product markets.
- ▶ But this method is not very robust to some changes in methodology.
- ▶ We have chosen a more structural approach, which includes the resilience in a complete description of the business cycle (impulsion, transmission, retroaction) → DSGE models.

DSGE models and comparisons between American and European business cycles

- ▶ Estimated DSGE models on US economy and Eurozone economy :
 - ▶ Smets & Wouters (2004) : demand shocks have greater variance in the US, but are less persistent ; technology shocks more variable in Euro Area ; nominal rigidities on wages stronger in the US.
No significant differences between the two zones both in terms of error variance decomposition and irfs
 - ▶ Grenouilleau, Ratto & Roeger (2007) : model enhanced with important characteristics for the Euro Area, namely public spending and openness.
No difference ; when the Euro Area model is feed with the shocks of the last US cycle, the recent US history is reproduced.
- ▶ → no difference in resilience or wrong quality of the filter
- ▶ And the labour market ?

Frictional unemployment and cyclical fluctuations

- ▶ Recent papers have tried to integrate a good description of the labour market in DSGE models, by using the notion of frictional unemployment developed by Diamond, Mortensen et Pissarides.
- ▶ Importance of wages rigidities to explain shocks propagation :
 - ▶ Blanchard & Galí (2007),
 - ▶ Moyen & Sahuc (2005), Trigari (2004) and Christoffel & Linzert (2005) : *Right-To-Manage* outperforms efficient *Nash Bargaining*

Plan

- ▶ Question : can the differences of frictions on the labour market between the US and France explain the differences in resilience between the two economies ?
- ▶ Plan :
 - ▶ DSGE model with a matching model à la Diamond-Mortensen-Pissarides (close to Christoffel, Kuester & Linzert (2006) but with technical progress)
 - ▶ Calibration on French and American data
 - ▶ Comparison in the irfs of the two models to the same kind of shocks
 - ▶ Business cycle decomposition

The model : description

- ▶ New-Keynesian DSGE model with a search and matching model of the labor market
- ▶ 2 main agents :
 - ▶ the households, who are the active population
 - ▶ the firms : product a good in monopolistic competition

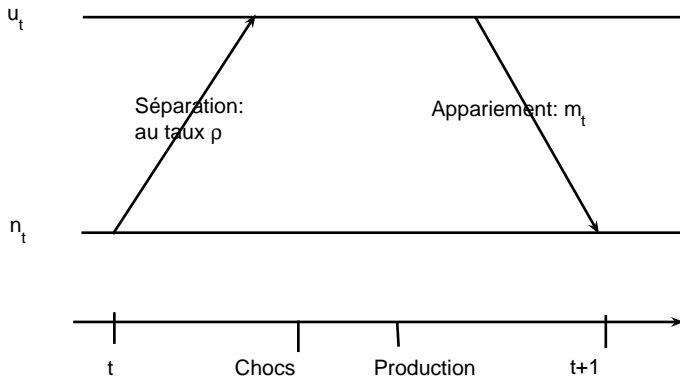
The households

- ▶ Separable utility into consumption and leisure, logarithmic function
- ▶ Habit persistence : $U(C_t, C_{t-1})$
- ▶ → Euler Equation

$$\hat{R}_t - E_t(\hat{\pi}_{t+1}) = \hat{\lambda}_t - E_t(\hat{\lambda}_{t+1}) + E_t(\mu_{t+1}^z)$$

Labour market

Fig.: *Dynamic of the active population*



Matching model : key variables

- ▶ Labor market tightness :

$$\theta_t = \frac{V_t}{U_t}$$

- ▶ Exit rate from unemployment :

$$s_t = \sigma_m \theta_t^{1-\sigma_2}$$

- ▶ Probability that a firm finds a worker :

$$q_t = \sigma_m \theta_t^{-\sigma_2}$$

Free-entry condition

- ▶ For an intermediate firm, searching a worker is costly, but if it finds one, it makes profit at the future periods.
- ▶ Trade-off between searching a worker and not searching one :

$$\begin{array}{l} \textit{Average} \\ \textit{vacancy} \\ \textit{posting cost} \end{array} = \begin{array}{l} \textit{Profitability} \\ \textit{of the} \\ \textit{future job} \end{array}$$

- ▶ Vacancy posting cost :
 - positively depends on the labour market tightness
- ▶ Job profitability :
 - positively depends on the final good price → negatively depends on the job destruction rate

Wage Setting

- ▶ Nash-bargaining between the employer and the employee : :

$$\max_{w_t} (S_t^W)^\eta (S_t^F)^{1-\eta}$$

- ▶ with
 - ▶ S_t^W : surplus of the employee
 - ▶ S_t^F : surplus of the employer
 - ▶ η : bargaining power of the employee
- ▶ *Right-To-Manage* Hypothesis : the number of worked hours is imposed by the employer

$$w_t = x_t mpl_t$$

(mpl_t : marginal productivity of labour)

Rigidities

- ▶ Real rigidities on the wages à la Hall (2005) :

$$w_t = w_{t-1}^{\gamma_p} (w_t^{Nash})^{1-\gamma_p}$$

- ▶ Nominal price rigidities à la Calvo : in each period, a random fraction φ_p of firms cannot reoptimize their price.
→ New-Keynesian Phillips Curve :

Rest of the model

- ▶ Monetary authority with a Taylor rule
- ▶ 7 shocks : productivity shock, preference shock, shock to the disutility of labor, shock to the vacancy posting cost, monetary shock, cost-push shock and a shock to the job separation rate.

Calibration

- ▶ Period from 1986Q1 to 2007Q2 for France, from 1986Q1 to 2007Q3 for the US
 - ▶ Sources :
 - ▶ empirical : data from INSEE, BdF, DARES for France ; OCDE, BLS for the US
 - ▶ literature : Smets & Wouters (2004)...
 - ▶ France vs. United States :
 - ▶ same calibration concerning the degree of rigidities and the monetary policy
 - ▶ calibration of the labour market specific to each economy
- Influence of labour market frictions on the resilience of the economies ?

Labour market

- ▶ At the steady state,

$$\rho = \frac{\bar{u}\bar{s}}{1 - \bar{u} + \bar{u}\bar{s}}$$

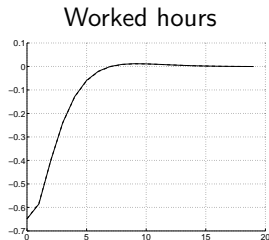
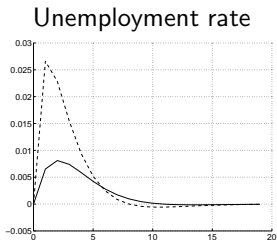
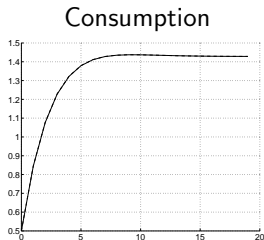
Parameter or variable	Symbol	France	US
Unemployment rate	\bar{u}	0,092	0,055
Exit rate from unemployment	\bar{s}	0,39	0,79
Job destruction rate	ρ	0,038	0,044

- ▶ Calibration of the wage bargaining

Parameter or variable	Symbol	France	US
Replacement rate	η_b	0,6	0,3
Bargaining power	η	0,5	

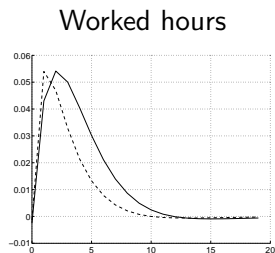
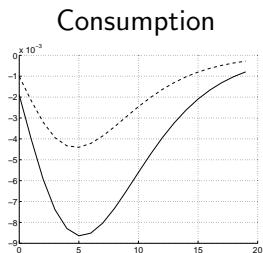
Productivity shock

- ▶ Transitory acceleration of the growth rate of the economy. Shock on the technological level of 1 % at the impact and reaching 1,5 % in the long run.
- ▶ Same irfs of the two economies for the consumption, worked hours, inflation...except for the unemployment rate. In the US, the unemployment rate has a stronger deviation and a lower persistence.
- ▶ However, the deviation of the unemployment rate is very limited in the two economies.



Shock to the vacancy posting cost

- ▶ Negative supply shock : the profitability of future jobs decreases
- ▶ In the US, the amplitude of the irf of the consumption is smaller and its persistence lower. The US are more resilient.



Influence of the labour market frictions on the propagation ?

- ▶ We have compared the irfs of France and the US to the different kinds of shock, when the two economies only differ in the labour market frictions
- ▶ Concerning the consumption, there is no difference between the irfs to every shock, except to the shocks which directly affects the labour market
- ▶ In response to every shock, the unemployment rate in the US is more strongly deviated and has a higher persistence than in France.
- ▶ These conclusions are robust to more realistic calibration of the two economies.

Estimation

- ▶ The model can effectively result in difference in resilience between France and the US? It is the case when the two economies are affected by labour market-specific shock.
- ▶ But which shocks explain the cyclical fluctuations of the output gap on the historical period?
- ▶ → For each economy, estimation of the parameters of the shocks (variance and persistence), by maximum of likelihood, given the calibration of the others parameters of the model.
- ▶ Observed variables : GDP growth rate (in log), hourly earnings growth rate in the private sector, worked hours per worker, unemployment rate, exit rate from unemployment, CPI inflation rate, 3-month money market interest rate.

shock	ρ		μ	
	FR	US	FR	US
<i>mark-up</i>	0.65 (0.17)	0.91 (0.04)	8.10^{-4} (0.0003)	7.10^{-4} (0.0001)
vacancy posting cost	0.98 (0.01)	0.97 (0.02)	0.038 (0.003)	0.029 (0.0023)
disutil. of labour	0.61 (0.08)	0.32 (0.09)	0.025 (0.002)	0.031 (0.003)
monetary	0.14 (0.09)	0.42 (0.08)	0.0022 (0.0002)	0.0016 (0.0001)
preference	0.87 (0.03)	0.73 (0.05)	0.013 (0.002)	0.016 (0.0017)
job destruction rate	0.87 (0.03)	0.89 (0.02)	0.035 (0.0027)	0.033 (0.0026)
productivity	0.55 (0.06)	0.53 (0.07)	0.0042 (0.0003)	0.0048 (0.0004)

Tab.:

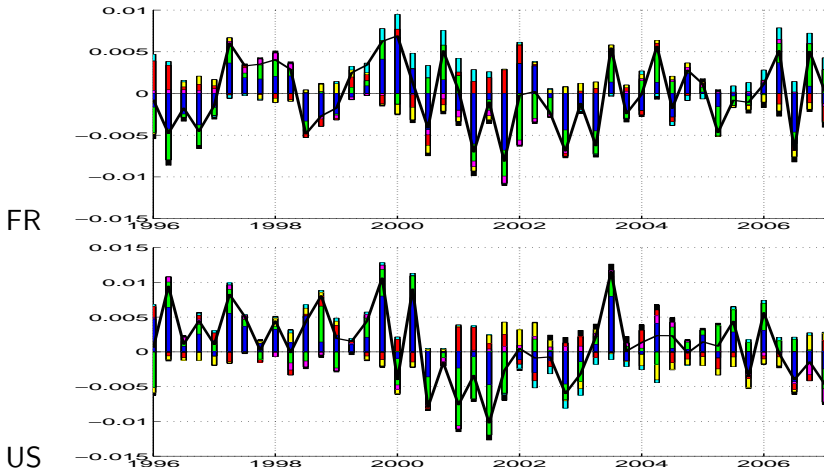
horizon	mark-up	vacancy	disutil. lab.	monetary	demand pref.	destruction	techno.
---------	---------	---------	---------------	----------	--------------	-------------	---------

FR

2	2.3	0.8	0.5	14.5	26.3	0.2	55.4
10	4	1.1	0.8	14.4	23.9	0.3	56
LT	4.2	1.2	0.9	14.2	23.9	0.4	55.3

US







2	3.9	0.2	1.5	5.7	35.7	0.3	52.8
10	4.5	0.2	1.9	6.1	33.6	0.3	53.3
LT	4.8	0.2	2	6.1	33.5	0.4	53







Blue : techno. Green : pref. Red : monetary. Yellow : mark-up. Violet :
 disutil. lab. Cyan : vacancy. Black : destruction

Conclusion

- ▶ Using a DSGE model with a matching model effectively results in differences in the irfs to the shocks which directly affect the labour market.
- ▶ But, on the historical period, these shocks have a small contribution to the variance of the output.
- ▶ In the beginning of the 2000s, the differences in the dynamic of the output gap between France and the United States are rather explained by different combinations of shocks in the two economies..

-  Blanchard, O. & Galí, J. (2007), A new keynesian model with unemployment, CFS Working Paper Series 2007/08, Center for Financial Studies.
-  Christoffel, K. & Linzert, T. (2005), The role of real wage rigidity and labor market frictions for unemployment and inflation dynamics, IZA Discussion Papers 1896, Institute for the Study of Labor (IZA).
-  Christoffel, K. P., Kuester, K. & Linzert, T. (2006), Identifying the role of labor markets for monetary policy in an estimated dsge model, Working Paper Series 635, European Central Bank.
-  DG-EcFin (2007), The resilience of the euro-area economy, Quarterly Report on the Euro Area III, European Commission.
-  Drew, A., Kennedy, M. & Sløk, T. (2004), Differences in resilience between the euro-area and us economies, OECD Economics Department Working Papers 382, OECD Economics Department.
-  Duval, R., Elmeskov, J. & Vogel, L. (2007), Structural policies and economic resilience to shocks, OECD Economics Department Working Papers 567, OECD Economics Department.

-  Genuilleau, Ratto & Roeger (2007), Adjustment to shocks : a comparison between the euro area and the us using estimated dsge models. présenté au workshop de l'OCDE sur la résilience.
-  Moyen, S. & Sahuc, J.-G. (2005), 'Incorporating labour market frictions into an optimising-based monetary policy model', *Economic Modelling* **22**(1), 159–186.
-  Smets, F. & Wouters, R. (2004), Comparing shocks and frictions in us and euro area business cycles : A bayesian dsge approach, CEPR Discussion Papers 4750, C.E.P.R. Discussion Papers.
-  Trigari, A. (2004), The role of search frictions and bargaining for inflation dynamics, Working Papers 304, IGIER (Innocenzo Gasparini Institute for Economic Research), Bocconi University.