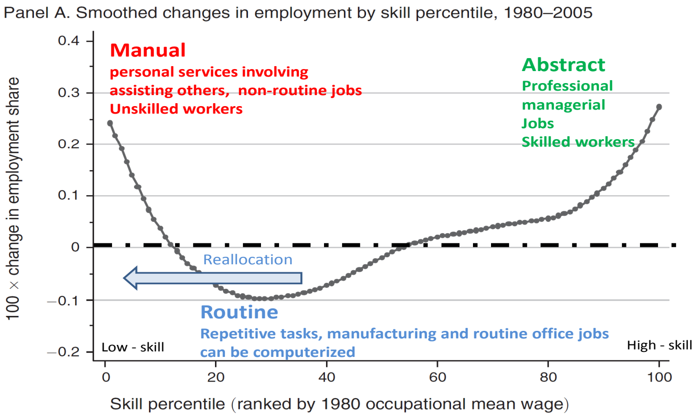
A Tale of Two Countries: A Story of the French and US Polarization

Julien Albertini
Université de Lyon 2
Jean-Olivier Hairault
Université de Paris I (CES) & PSE
François Langot
Université du Mans (GAINS-TEPP, IRA) & PSE
Thepthida Sopraseuth
Université de Cergy-Pontoise (Thema)

December 2017, IBS, Warsaw

Job polarization : Autor and Dorn (2013)'s measure

The disappearance of routine jobs relative to those at the bottom and top of the job quality distribution.

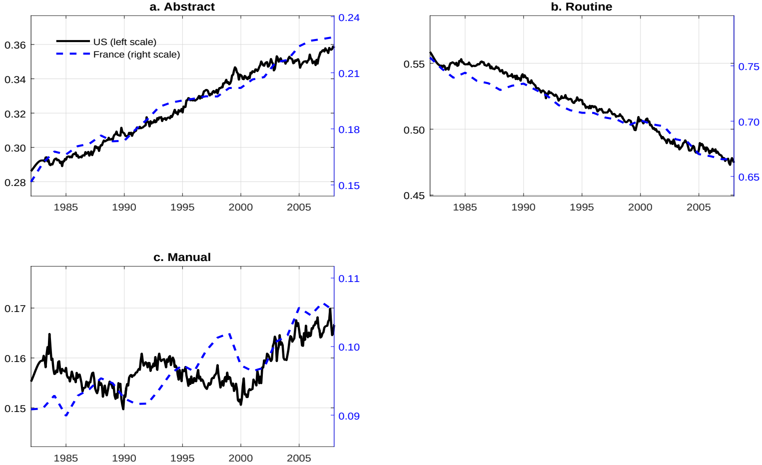


Source : Autor and Dorn (2013)

In this presentation, "manual" or "service" jobs

Job polarization using US and French data

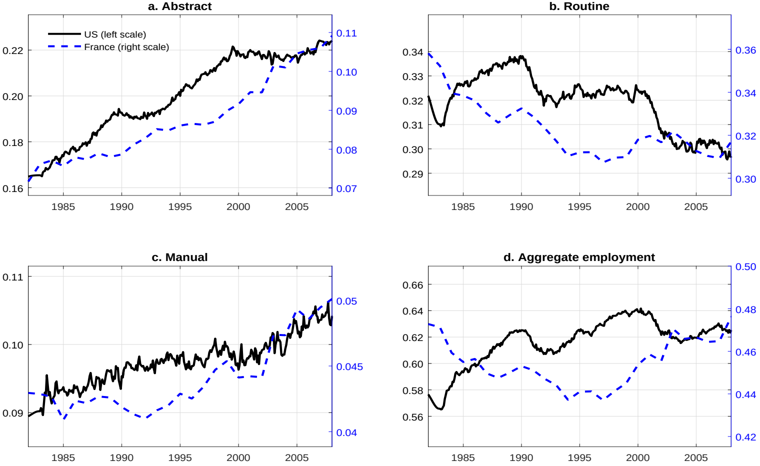
Job polarization captured by trends in employment shares



Authors' calculations. Based on BLS and French LFS.

US data French data

Employment per capita in the US and France



OECD Employment outlook. Employment/Population

The paper

- **Data :** job polarization (JP) using US and French data
  - apparently similar, but actually different
- **Model :** Autor and Dorn meet DMP
  multi-sectorial search and matching model with occupational choice and 3 exogenous trends
  - Task-Biased Tech. Change (TBTC) (Autor and Dorn, 2013, Fall in price of capital)
  - Growth in supply of skilled labor
  - Evolution of Labor Market Institutions : LMIs can freeze or accelerate JP, they also affect differently high-skill / low-skill workers
- **Objectives :**
  - Which trend drives job polarization ?
  - Compare France to the US because of contrasting evolutions of LMI
  - Assess welfare implications of job polarization

Contribution to the literature

- **"European employment problem" :** policy-shock interaction
  - Ljungqvist and Sargent (1998), Ljungqvist and Sargent (1998), Blanchard and Wolfers (1999)
  - Our paper : TBTC
- **Effects of TBTC on labor market**
  - Autor and Dorn (2013), Acemoglu and Autor (2011), Autor et al. (2003), Barany and Siegel (2017)
  - Our paper : labor market frictions, unemployment, LMI, educational attainment
- **SaM with technological change**
  - Mortensen and Pissarides (1998) ; Hornstein et al. (2007)
  - Our paper : transitional dynamics that illustrates interaction between technological change, labor market institutions, and occupational choices
- **SaM with occupational choices**
  - Alvarez and Shimer (2011) ; Carrillo-Tudela and Visschers (2014)
  - Our paper : technological change (non-stationary environment)

Model

Impact of TBTC ? The narrative

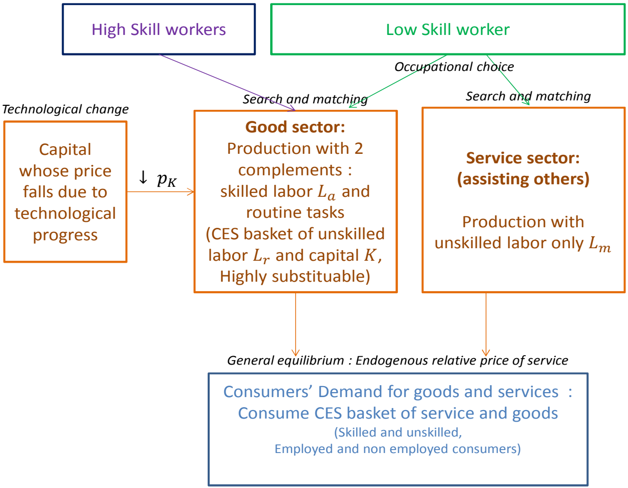
In Autor and Dorn (2013)

- The supply shock : $\downarrow$ price of computer capital.
  - New technologies require more "Abstract tasks" (skilled labor)
  - TBTC reduces the demand for "Routine tasks" (computerized, unskilled labor)
  - Routine workers may move to "Manual tasks" (unskilled labor)
- The feed back : a demand shock
  - Workers (richer and more numerous) consume more.
  - More "services" = $\uparrow$ demand for "Manual tasks" workers.
  - Relative price of service $\uparrow$: signal for occupational switching from routine to manual jobs

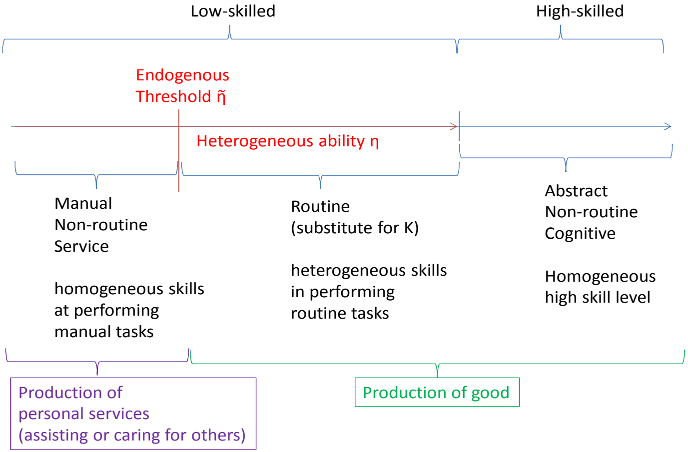
In our model

- TBTC
- Speed and labor reallocations depends on LMI and frictions
- Educational attainment

Building blocks of the model



Heterogeneous workers



TBTC $\Rightarrow \tilde{\eta}$ gradually $\uparrow$.   Exogenous $\uparrow$ supply of skilled labor

Search and Matching Model

- Random matching in separate markets :
  - One sub-market for each occupation ("abstract"/"routine"/"manual") $M_i = \Upsilon_i V_i^{\psi} U_i^{1-\psi}$ for task $i = a, m, m^o$
  - Routine occupations : sub-markets for each ability level η $M_i(\eta) = \Upsilon_i V_i(\eta)^{\psi} U_i(\eta)^{1-\psi}$ for $i = r, m^n$
- Job destruction : exogenous (at rate s) and endogenous (scrapping time)

Occupational choices and LMIs

- Mobility cost = a market for "movers/switcher".
- For those who choose to move from routine to manual occupations,
  - the cost is the acceptance of a bridge job in the service sector (less productive)
  - the long-run gains : an improvement in their employment prospect, after a learning period.
  - Consistent with empirical evidence : human capital is occupation-specific (Kambourov and Manovskii, 2009) ; mobility costs (Cortes, 2015)
- UB determined by workers' past earnings (LS, 1998) $\Rightarrow$ 2 types of switchers :
  - The first are eligible to an UB indexed on their previous routine job wage (new mover/switcher).
  - The second have short employment experience in manual jobs and have lost their eligibility on the routine UB (old mover).
- LMIs can lead to non-existence of these bridge jobs, hence stalling labor reallocation

Wage setting

- Nash bargaining
  - the wage w_{Nash} is highly flexible and follows both productivity and labor market tightness.
  - wage bargaining takes into account occupational switch and changes in taxation over time ▸ More
- A "Minimum wage" mw that can disconnect wage from productivity.

For all jobs, we have the following WS rule : $w = Max(mw, w_{Nash})$ (binding minimum wage)

Employed : for each ability level η

$$W_r = \underbrace{w_r(1-\tau_w)}_{Wage} + \beta\left[(1-s)W_{r,+1} + s\underbrace{\max\{U_{r,+1}, U^n_{m,+1}\}}_{Occupational\ \ choice}\right]$$

$$W^n_m = w^n_m(1-\tau_w) + \lambda[(1-s)\beta W_{m,+1} + s\beta U_{m,+1}]$$
$$+(1-\lambda)[(1-s)\beta W^n_{m,+1} + s\beta U^o_{m,+1}]$$

Unemployed : for each ability level η

$$U_r = z_r + \beta\left[(1-f_r)\max\{U_{r,+1}, U^n_{m,+1}\} + f_r W_{r,+1}\right]$$

$$U^n_m = \underbrace{z_r}_{\substack{Unemployment \\ benefits}} + \beta\left[(1-f^n_m)U^n_{m,+1} + f^n_m W^n_{m,+1}\right]$$

f_i : job finding rate, s : separation rate, λ : learning parameter
Value functions : ▸ Employees ▸ Unemployed workers

General equilibrium setting

- Supply of goods and services :
  - Goods sector with 2 inputs (complements) : skilled labor and repetitive tasks (from unskilled-routine labor or capital, highly substitutable) ▸ More

    $$Y^g = AL_a^\alpha \left[\left((1-\mu)\sum_{\eta^s}^{\overline{\eta}} \eta L_r(\eta)\right)^\sigma + (\mu K)^\sigma\right]^{\frac{1-\alpha}{\sigma}}$$
  - Service sector uses only unskilled labor, not affected by technological change. Heterogeneous workers have homogenous productivity on this occupation. ▸ More

    $$Y^s = A_s\left(L_s + \delta \sum_\eta L_m^n(\eta) + \delta L_m^o\right)$$
- Demand for goods and services from household $i = a, r, m$ in the economy. They are complements in households' preferences $C_i = \left[\nu C_{g,i}^\rho + (1-\nu) C_{s,i}^\rho\right]^{\frac{1}{\rho}}$

$\Rightarrow$ endogenous relative price of good and services ("General Equilibrium (GE) effect")

- No savings, deterministic environment

Occupational choices, LMIs and General Equilibrium effects

In Autor and Dorn (2013) : No labor market frictions, Mobility choice based on wage comparison :

- wage routine $w_r = w_s$ wage service
- ability threshold $\tilde{\eta}$ such that $\eta > \tilde{\eta}$ = routine

$$\left.\begin{array}{rcl} \text{Mobility} : \tilde{\eta} y_r & = & A_s p_s \\ \text{Demand} : p_s & = & MRS(C_g, C_s) \end{array}\right\} \Rightarrow \tilde{\eta} = \phi_w(\sigma, \alpha, \rho)$$

- Good production function : σ, α (technological parameters), $\downarrow p_k \Rightarrow \downarrow$ cost of routine tasks and $\uparrow$ capital $\Rightarrow \uparrow$ supply of goods $\Rightarrow \uparrow$ demand for goods
- ρ (consumer preference, must favor variety) : so that demand for service $\uparrow$

General equilibrium effect through p_s : $\uparrow p_s$ is a signal that routine workers shall switch to manual jobs

Occupational choices, LMIs and GE effects

Our paper : **"search unemployment"**

$$\left.\begin{array}{ll} \text{Mobility :} & U(\theta_r(\tilde{\eta}), LMI) = U(\theta_m, LMI) \\ \text{Demand :} & \left\{\begin{array}{rcl} \theta_r(\eta) & = & \varphi_r(\eta y_r, LMI) \\ \theta_m & = & \varphi_m(A_s {\color{blue}p_s}, LMI) \end{array}\right. \end{array}\right\} \Rightarrow \quad \tilde{\eta} = \phi_{SaM}(\{\sigma, \alpha, \rho\}, LMI)$$

$$\text{where : } LMI = \{\underbrace{rr, h}_{w^r}, \underbrace{\gamma, c}_{w_{Nash}}, \underbrace{MW}_{wage\ \ rigidity}, taxes\}$$

General equilibrium effect through p_s

LMI on both sides of equations but does not go away because of capitalization effect (as long as divergent evolution of productivity across sectors) Example

"Rest unemployment" : $\theta_m = 0$. Reallocations are stalled.

Solution method in a non-stationary, non-linear general-equilibrium model with heterogenous agents

Example : France

Quantitative analysis : Accounting for job polarization in the US and in France

Calibration/Estimation

- Quarterly
- Consider empirical targets before the Great Recession

A difficult task

- large number of parameters :
  - 2 sectors (good, service) in the economy
  - 3 types of jobs (Abstract, Routine, Manual)
  - in 2 countries (US, France)
- calibrate parameters based on external information and estimate unknown parameters
- using which empirical targets ?
  - parameter values must make the model mimic the data *over time*, not historical averages
  - the empirical targets include employment levels by task (N_a, N_r, N_m)
    - at the beginning of the technological transition : $N_{i,j}(0)$ task i, country j
    - at the end of the sample : $N_{i,j}(T)$
    - the average level : $E[N_{i,j}]$

  $=$ 9 empirical targets in 2 countries

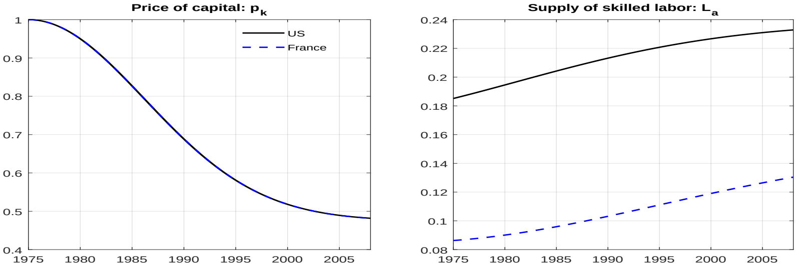
Common/specific parameters

- **Country-specific parameters :**
  - educational attainment, labor market institutions, efficiency of matching for routine and manual workers, exogenous separation rates
- **Same parameters across countries :**
  - consumer preferences, technology parameters and technological shock p_k, distribution of abilities η (assumed to be uniform) within unskilled labor, efficiency of matching for high skill workers, relative productivity across sectors, search costs, elasticity of matching function

Estimated

- Shocks. ‣ What about the data ?
  - TBTC : fall in $\boldsymbol{p_K}$, normalized to 1 in 1975, estimate the speed of TBTC (assuming a quadratic process)
  - Speed of rising educational attainment $\boldsymbol{L_a}$

$$x(t) = \begin{cases} x(0) & \text{if } \; t < t_{x0} \\ x(T) + (x(0) - x(T))\exp(-\vartheta_x (t - t_{x0})^2) & \text{Otherwise,} \end{cases}$$

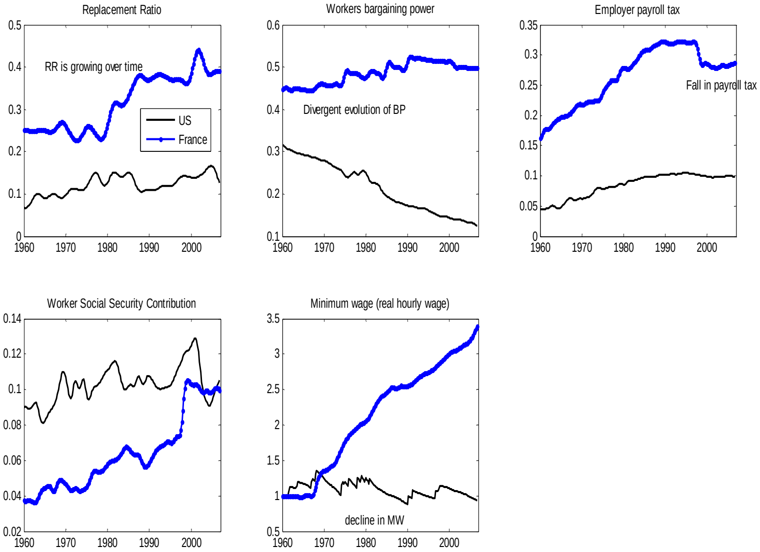


Estimated

- Parameters that affect the extent of polarization :
  - At the steady states : technological parameters (substitution between routine labor and capital in production function α,σ), demand elasticity of substituion (ρ), relative productivity across sectors A, A_s, distribution of abilities η
  - Along the transition : Occupational mobility cost (δ, λ)
- Parameters that help the model fit employment levels :
  - Labor market efficiency by task, country-specific (except for abstract workers, similar across countries)

Calibrated

- c search costs by skill level, s separation rates by task, share of capital in production μ, initial and final level of educational attainment L_a^s consistent with the employment rate in abstract jobs.
- Preferences (discount rate β, share of good in CES ν).
- LMI time series : very different evolutions
  - US : more and more "flexible" (except rising RR)
  - France : more and more "rigid" (except fall in payroll tax)


Replacement Ratio
RR is growing over time
US
France
Workers bargaining power
Divergent evolution of BP
Employer payroll tax
Fall in payroll tax
Worker Social Security Contribution
Minimum wage (real hourly wage)
decline in MW

France : Payroll tax

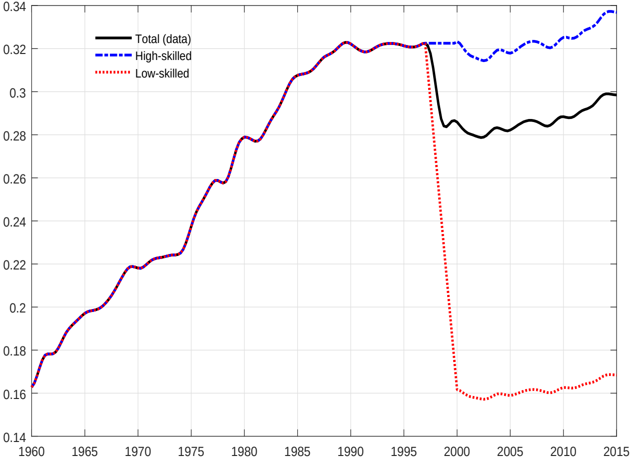


TABLE: Model parameters values based on external information

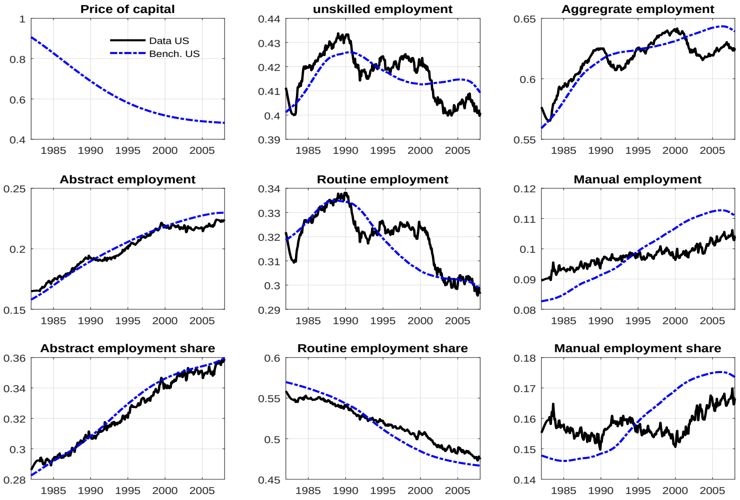
Matching								
c_a	c	ψ	$s_{a,US}$	$s_{r,US}$	$s_{m,US}$	$s_{a,F}$	$s_{r,F}$	$s_{m,F}$
0.5	0.3	0.5	0.05	0.085	0.13	0.04	0.045	0.11
Preferences				Labor supply composition				
β	μ	ν		$L_{a,US}(0)$	$L_{a,F}(0)$	$L_{a,US}(T)$	$L_{a,F}(T)$	
4%	0.5	0.5		0.17	0.085	0.238	0.1513	

TABLE: Parameter values

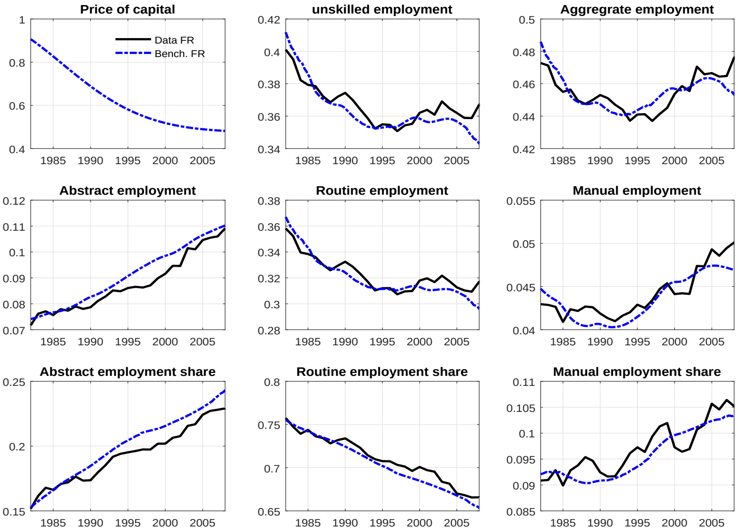
Preferences	ρ					
	0.65					
Learning	δ	λ				
	0.425	0.025				
Technology	A	A_s	σ	α	$\underline{\eta}$	$\overline{\eta}$
	3.5	0.3	0.74	0.3	0.48	1.44
Labor market	Υ_a	$\Upsilon_{r,US}$	$\Upsilon_{r,F}$	$\Upsilon_{m,US}$	$\Upsilon_{m,F}$	
	0.11	0.09	0.129	0.067	0.045	
Structural changes	ϑ_{pk}	$p_k(T)$	$\vartheta_{La,US}$	$\vartheta_{La,F}$		
	0.00025	0.475	0.00007	0.00005		

targets 12 $N_{i,j}(0)$ and $N_{i,j}(T)$ task i and country j
targets 6 $E(N_{i,j})$

US : model versus data



France : model versus data

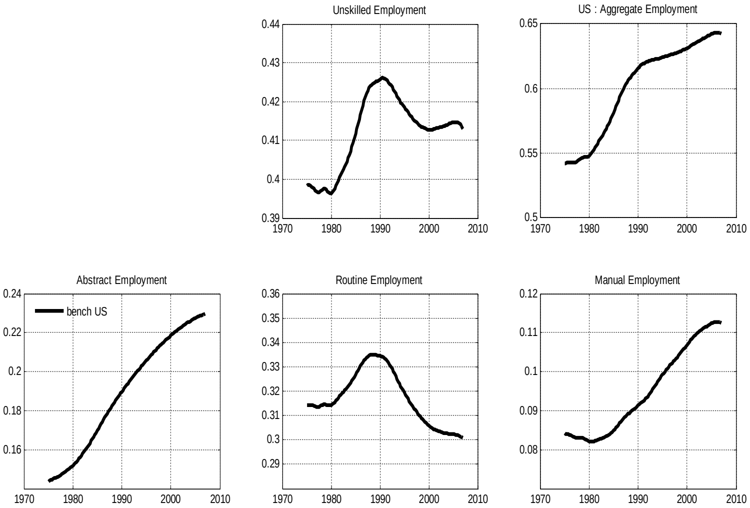


Quantitative Analysis

- **Objective :** Assessing the role of each exogenous trend (TBTC, supply of skilled workers, LMI) in accounting for the job polarization process.
- **Benchmark model :** with TBTC, LMI and educational attainment.
- **Counterfactual experiments :** What would have been the path of employment in the absence of a change in either the TBTC, the supply of skilled worker or the LMI ? $\rightarrow$ shut down the evolution of 1 exogenous trend (set at 1975 and constant).
  - 2 other trends are at work
  - interaction between the exogenous trends

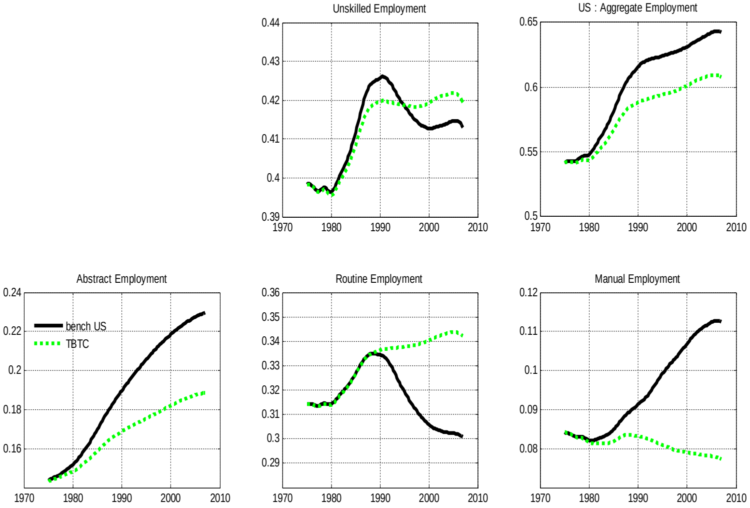
Benchmark - Additional graphs

US



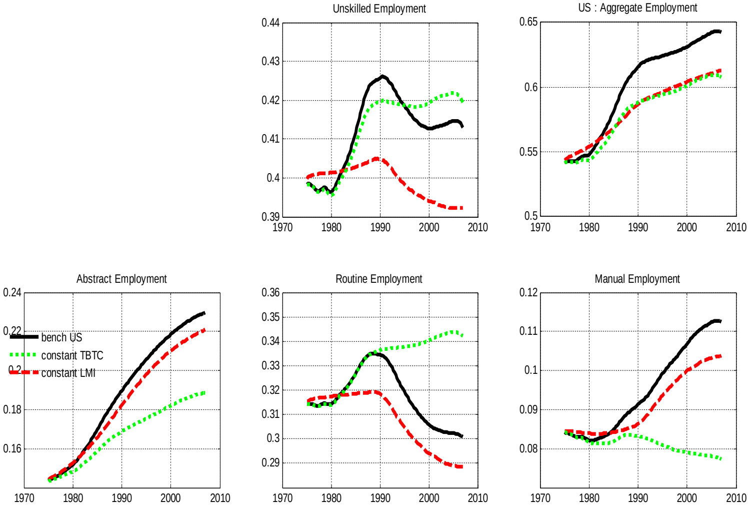
"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts.

US



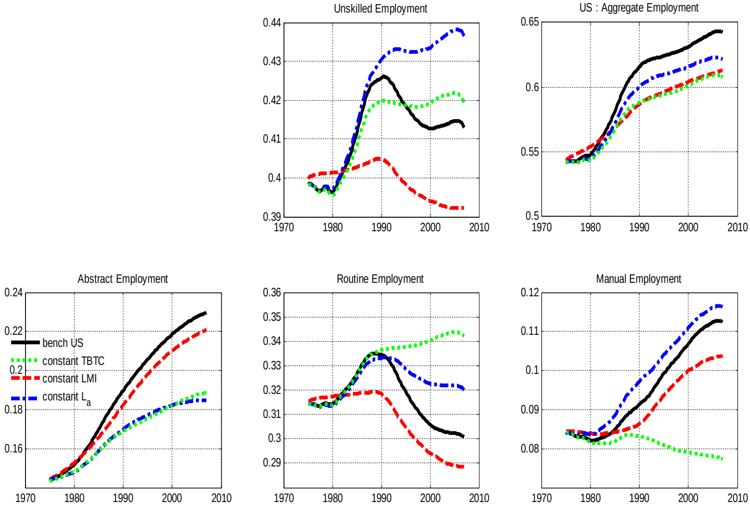
"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant TBTC" constant price of capital, set at 1975 level ; Rising L_a and LMI shifts

US

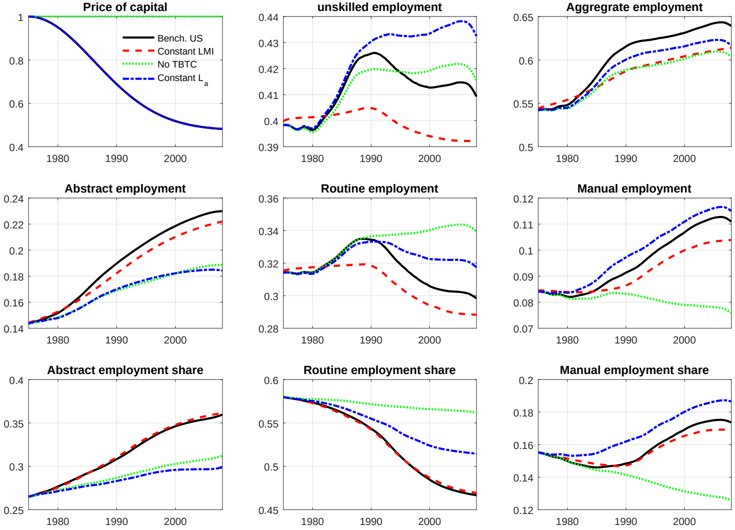


"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant TBTC" constant price of capital, set at 1975 level ; Rising L_a and LMI shifts "Constant LMI" Economy with constant LMI, set at 1975 level ; Rising L_a and TBTC

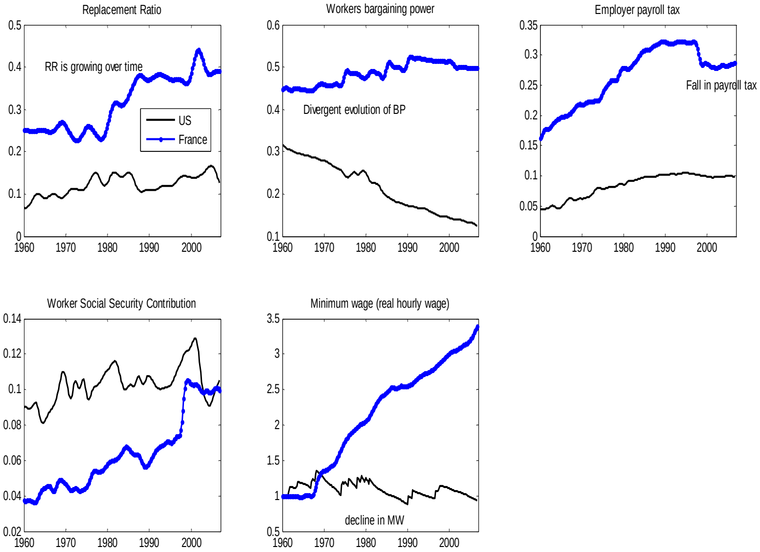
US



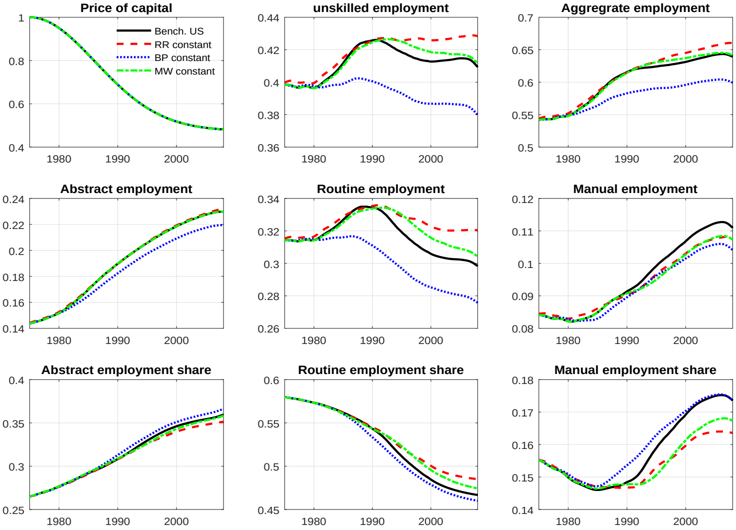
"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant TBTC" constant price of capital, set at 1975 level ; Rising L_a and LMI shifts "Constant LMI" Economy with constant LMI, set at 1975 level ; Rising L_a and TBTC. "Constant L_a" Economy with constant supply of skilled labor, set at 1975 level ; TBTC and LMI shifts



"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant LMI" Economy with constant LMI, set at 1975 level. "Constant TBTC" constant price of capital, set at 1975 level. "Constant L_a" Economy with constant supply of skilled labor, set at 1975 level.

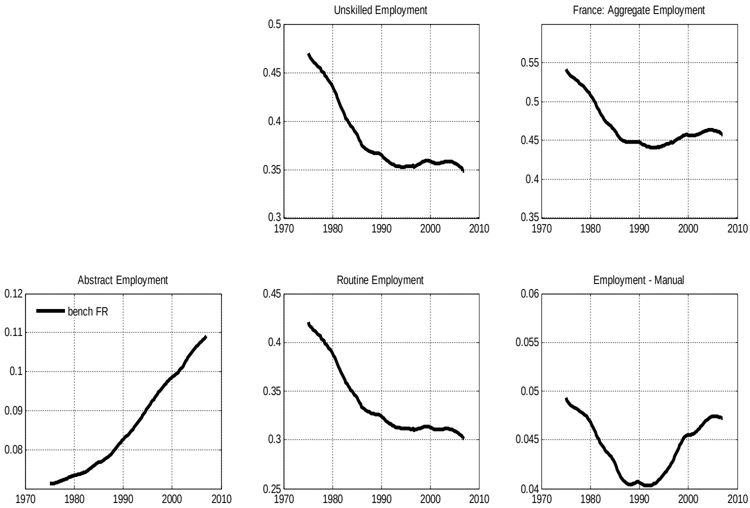


Replacement Ratio
RR is growing over time
US
France
Workers bargaining power
Divergent evolution of BP
Employer payroll tax
Fall in payroll tax
Worker Social Security Contribution
Minimum wage (real hourly wage)
decline in MW
1960
1970
1980
1990
2000



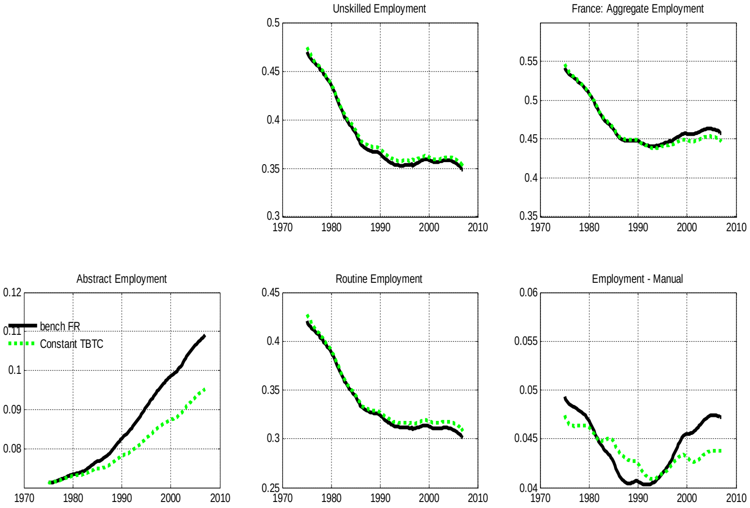
"Bench" Benchmark calibration : TBTC, rising L_a, and LMI shifts ; "RR Constant" Economy with constant replacement ratio, set at 1975 level ; "BP Constant" Economy with constant bargaining power, set at 1975 level ; "MW Constant" Economy with constant supply of minimum wage, set at 1975 level.

France



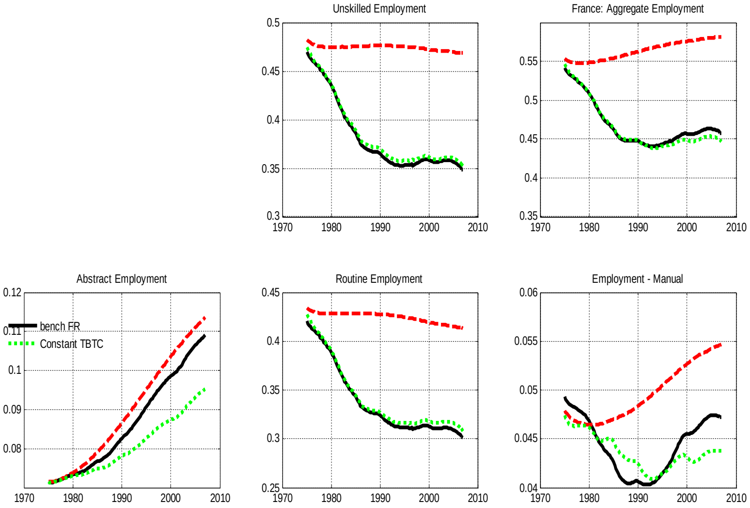
"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts.

France



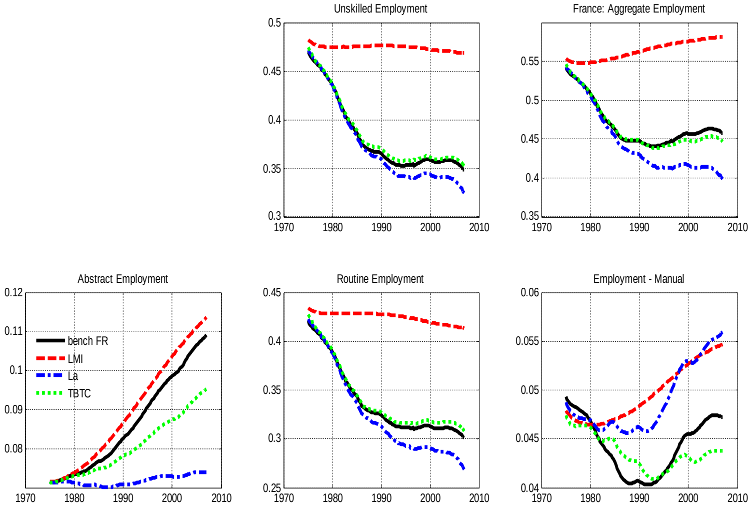
"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant TBTC" constant price of capital, set at 1975 level ; Rising L_a and LMI shifts

France

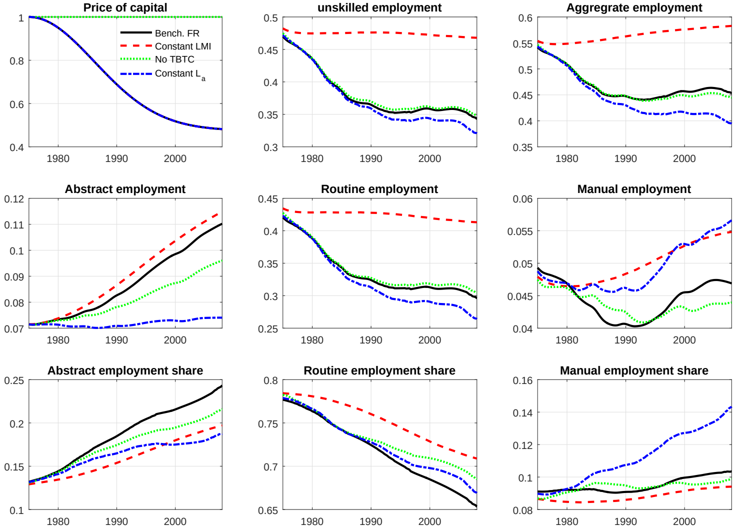


"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant TBTC" constant price of capital, set at 1975 level ; Rising L_a and LMI shifts. "Constant LMI" Economy with constant LMI, set at 1975 level ; Rising L_a and TBTC.

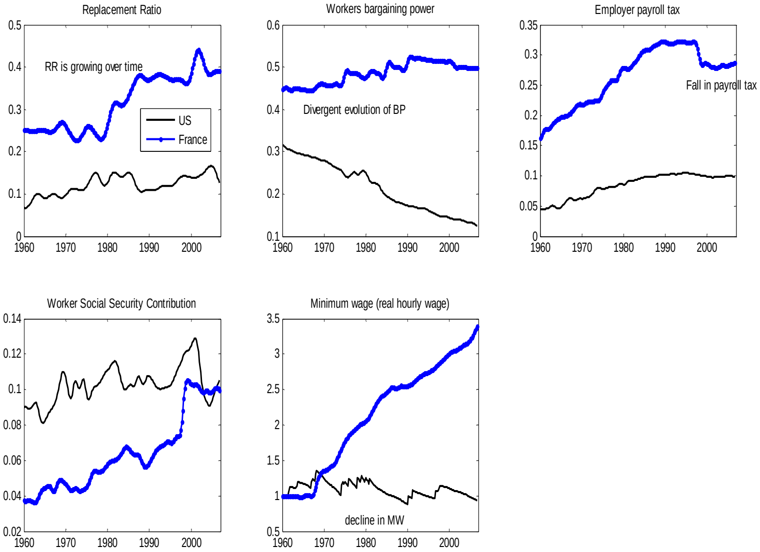
France



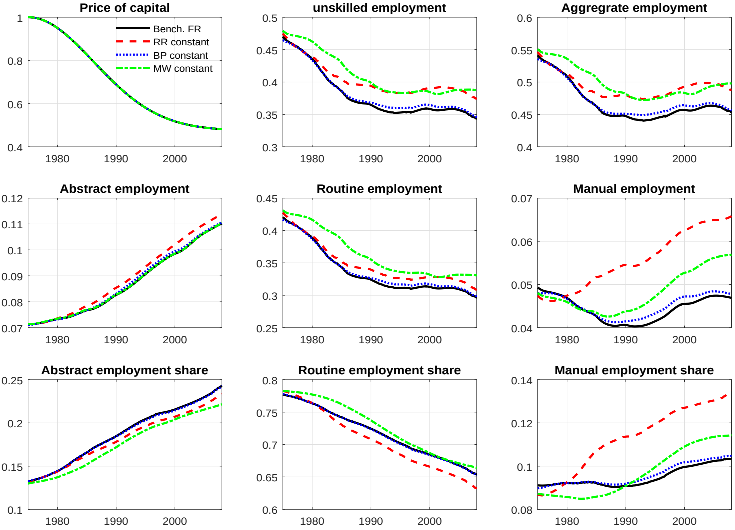
"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant TBTC" constant price of capital, set at 1975 level ; Rising L_a and LMI shifts. "Constant LMI" Economy with constant LMI, set at 1975 level ; Rising L_a and TBTC. "Constant L_a" Economy with constant supply of skilled labor, set at 1975 level ; TBTC and LMI shifts



"Bench" Benchmark calibration : TBTC, rising L_a and LMI shifts. "Constant LMI" Economy with constant LMI, set at 1975 level. "Constant TBTC" Economy with constant price of capital, set at 1975 level. "Constant L_a" Economy with constant supply of skilled labor, set at 1975 level.

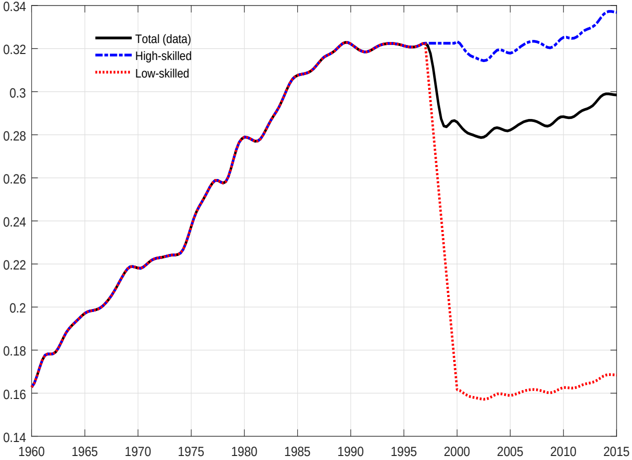


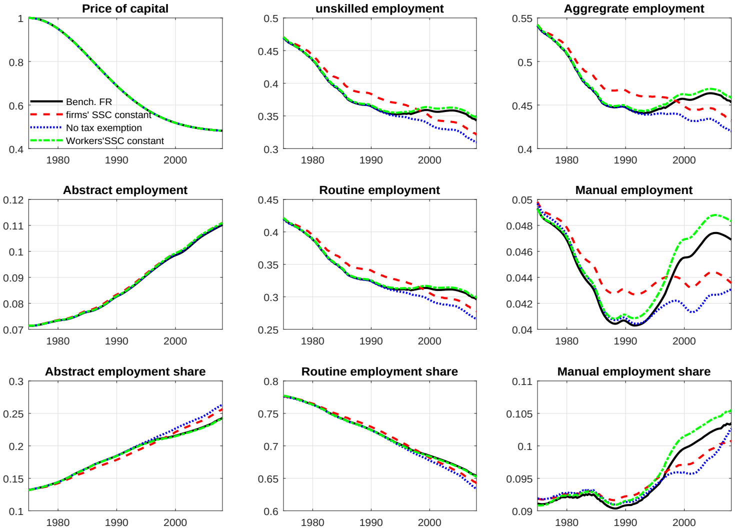
Replacement Ratio
RR is growing over time
US
France
Workers bargaining power
Divergent evolution of BP
Employer payroll tax
Fall in payroll tax
Worker Social Security Contribution
Minimum wage (real hourly wage)
decline in MW



"Bench" Benchmark calibration : TBTC, rising L_a, and LMI shifts ; "RR Constant" Economy with constant replacement ratio, set at 1975 level ; "BP Constant" Economy with constant bargaining power, set at 1975 level ; "MW Constant" Economy with constant supply of minimum wage, set at 1975 level.

France : Payroll tax





"Bench FR" Benchmark calibration : TBTC, rising L_a and LMI shifts ; "firms' SSC Constant" Economy with constant τ^f, set at 1975 level ; "No tax exemption" Economy with a homogenous tax rate τ^f even after 1996 ; "Workers' SSC Constant" Economy with constant τ^w, set at 1975 level.

Shutting down 2 trends $\rightarrow$ only one trend affects the economy.

▸ Shutting down 2 trends

TABLE: Results

	US	France
TBTC	major driving force	limited impact
Rising supply of skilled labor	Important element	particularly important element
LMI	more flexible over time	more rigid over time
		$\uparrow$ MW and RR until the mid-1990s
	de-unionization stimulates US job opportunities created by TBTC policy-shock interaction	payroll tax cuts after 1995

Welfare analysis : Winners and losers of the US and French polarization

B. Obama, The Economist, October 2016.
"What is happening in the American political system ?
How has a country that has benefited - perhaps more than any other - from [...] technological innovation suddenly developed a strain of [...] anti-innovation protectionism ?
Why have some [...] embraced a crude populism ?"

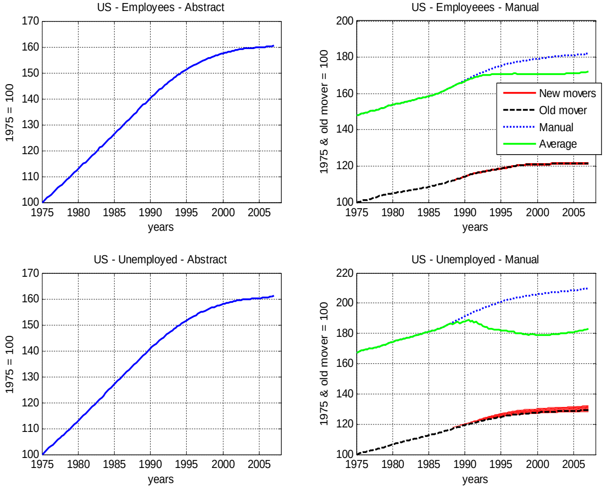
Measuring welfare

- Value functions W, U that include
  - income flow
  - future employment opportunities
- Average measures based of number of workers in each category (employment status, task, ability η)
- divided by consumer price index (which increases due to rise in relative price of services)

TABLE: Winners and losers of the US and French polarization

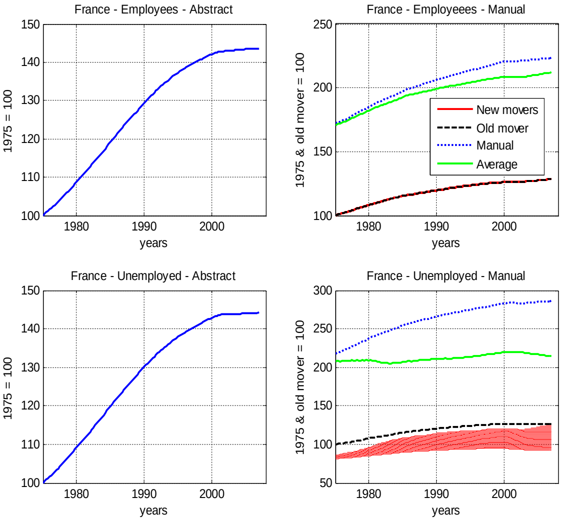
	US	France
Common features :	Average welfare ↑ Manual and abstract workers are the winners of JP	
Difference : The fate of routine workers linked to LMI changes	The US sacrificed "stayers" and favored "movers" to ↑ employment	France favored "stayers" to the detriment of "movers"

Abstract and manual workers are the winners of JP

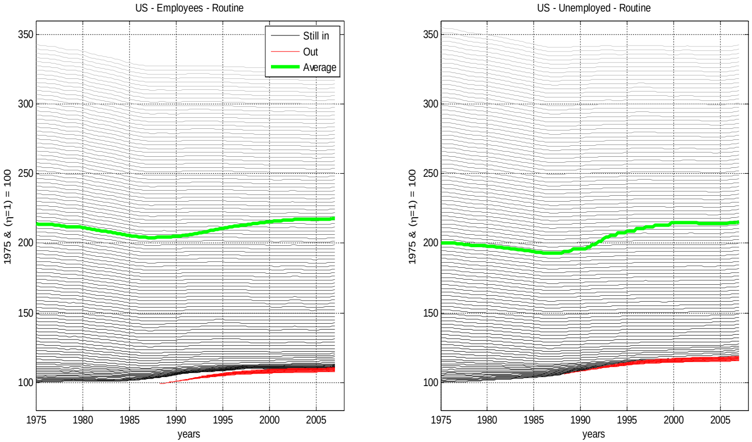


Index base 100 = 1975.

Abstract and manual workers are the winners of JP

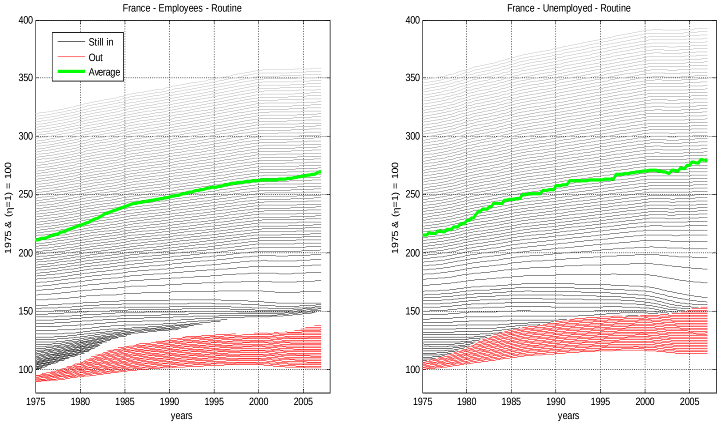


Index base 100 = 1975.



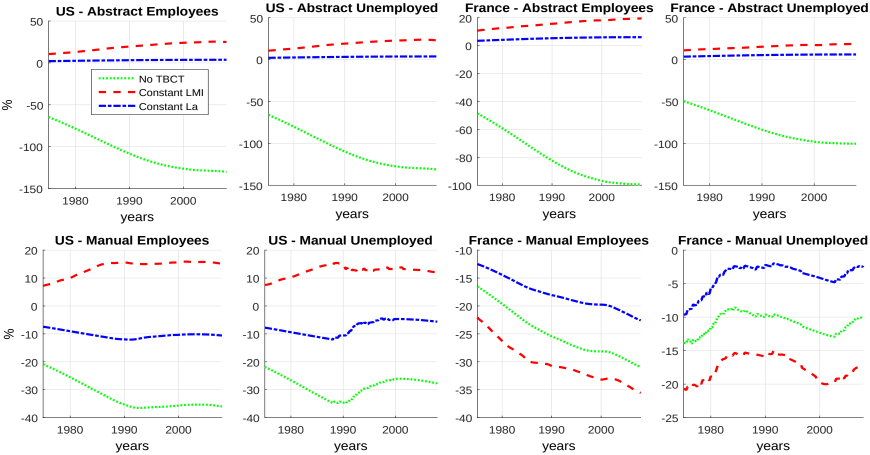
Index base 100 = 1975 for $\widetilde{\eta}$, and Index base 100 $*$ Welfare(η)/Welfare$(\widetilde{\eta})$ = 1975 for $\eta > \widetilde{\eta}$. "Still in" : in routine pool, the highest welfare line is the routine worker with the highest productivity η, "Out" : displaced routine worker (with the lowest productivity η) who switch to manual job.

France



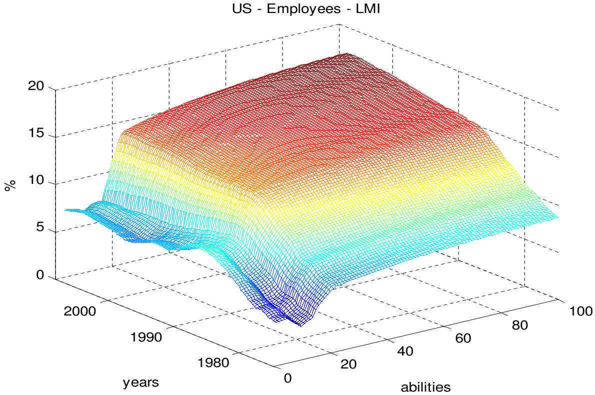
Index base 100 = 1975 for $\widetilde{\eta}$, and Index base 100 $*$ Welfare(η)/Welfare$(\widetilde{\eta})$ = 1975 for $\eta > \widetilde{\eta}$. "Still in" : in routine pool, the highest welfare line is the routine worker with the highest productivity η, "Out" : displaced routine worker (with the lowest productivity η) who switch to manual job.

Abstract and manual welfare : counterfactuals



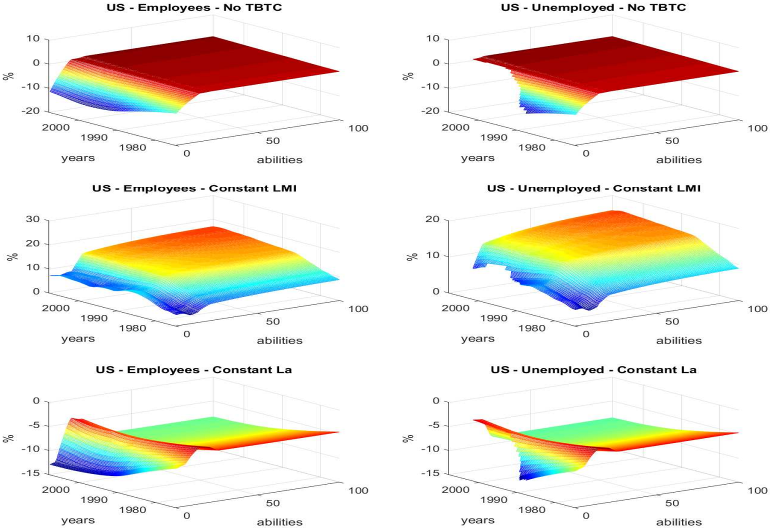
"%" : welfare gap (in percentage) between benchmark simulation and counterfactual experiment. "Constant LMI" : LMI set at 1975 value. "No TBTC" : price of capital p_k is constant. "Constant L_a" : L_a constant, set at 1975 value.

Routine welfare : US counterfactuals

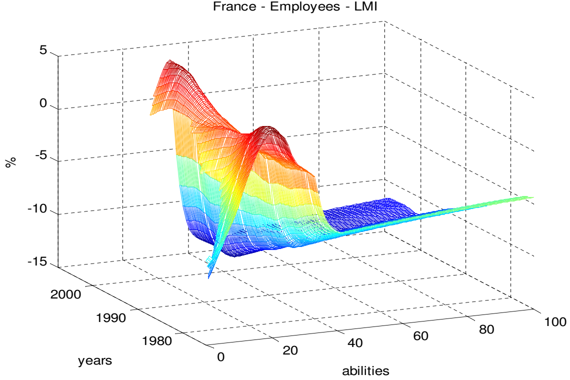


"%" : welfare gap (in percentage) between benchmark simulation and counterfactual experiment. Gap$>$0 : routine workers are happier with conterfactual.

Routine welfare : US counterfactuals

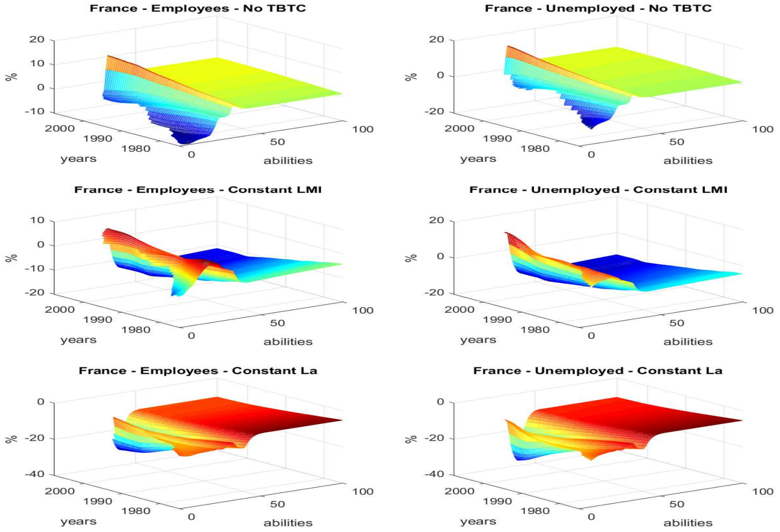


Routine welfare : France counterfactuals



"%" : welfare gap (in percentage) between benchmark simulation and counterfactual experiment. Gap>0 : routine workers are happier with conterfactual.

Routine welfare : French counterfactuals



"%" : welfare gap (in percentage) between benchmark simulation and counterfactual experiment. "Constant LMI" : LMI set at 1975 value. "No TBTC" : price of capital p_k is constant. "Constant L_a" : L_a constant, set at 1975 value.

Conclusion

Job polarization using US and French data.

- Dynamics of employment shares are very similar across countries.
- but major differences in the dynamics of routine employment levels
  - US routine employment level actually increase until the early 1990s, then started falling.
  - The evolution of French routine employment went in opposite directions to that of the US economy.

Conclusion

The impact of task biased technological change, labor market institutions, and rising educational attainment on job polarization

- Major forces at work :
  - US : TBTC fostered by LMI changes and rising supply of skilled labor
  - France : LMI changes and rising educational attainment
- Welfare consequences :
  - Abstract and manual workers are the main winners of job polarization in both countries.
  - Welfare gains and losses contrast more in the routine group
    - US : Unhappy middle class. Sacrifice "stayers" to favor "movers".
    - France : increase in the generosity of LMI made routine stayers "happier", but was detrimental to routine "movers".

Appendix

Authors' calculations : CPS monthly, 1982m01-2017m08

- Abstract $\rightarrow$ Abstract : 96%
- Routine $\leftrightarrow$ Abstract : 1.1-1.4%
- Manual $\rightarrow$ Abstract : 0.09%

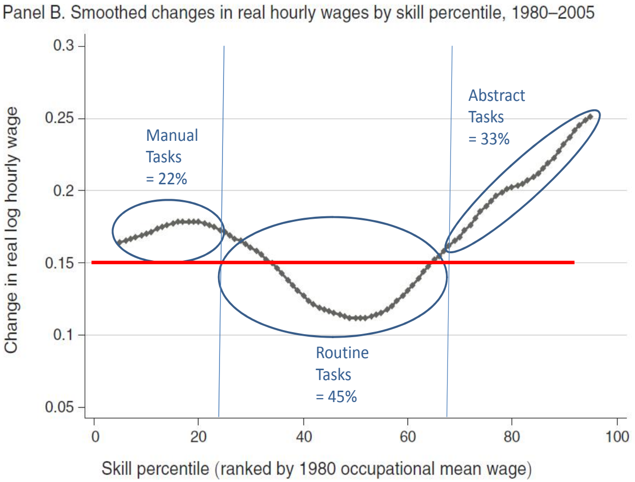
French LFS quarterly, 2003Q1-2016Q4

- Abstract $\rightarrow$ Abstract : 97%
- Routine $\leftrightarrow$ Abstract : 0.02-0.03%
- Manual $\leftrightarrow$ Abstract : 0.005%

Back to slides

Polarization in the US : Autor & Dorn (2013)

▸ Back to slide intro



Related literature

Our contribution : labor reallocation with occupational changes in a non-stationary environment, within unskilled workers (from the middle towards the bottom of the wage distribution), outside steady state

- Job polarization as an outcome of the structural change : Autor and Dorn (2013)
- Search and matching, technological changes : Mortensen and Pissarides (1998,1999), Horstein and al. (2004)
- Occupational choice - search vs rest unemployment : Alvarez and Shimer (2011)
- "European employment problem" and the interaction between structural change and LMI : Ljungqvist and Sargent (1998, 2008), Blanchard and Wolfers (1999)

Links with the "TC-LMI interaction" literature

Ljungqvist and Sargent (1998 & 2008), Mortensen and Pissarides (1999), Hornstein, Krussel & Violante (2007). Originality of our paper w.r.t this literature :

- Perfect mobility versus mobility costs $\rightarrow$ LMI
- Steady-state versus transitional dynamics (the *path* of LMI matters)
- In our paper,
  - Mobility towards less productive jobs (job polarization)
  - A more comprehensive view on labor market dynamics : aggregate employment, employment by task, wage dynamics and inequalities
  - Understanding employment growth by *quantifying* the relative contribution of LMI, TC and Labor supply of skilled labor
  - Reform packages : stress on interaction between LMI

US Data, as in Jaimovich and Siu (2015) Back to slides

- Employment Data by Occupation from BLS
- Abstract : Non-routine cognitive workers. Management, business, and financial operations occupations. Professional and related occupations.
- Routine : sales and related occupations. office and administrative support occupations. production occupations, transportation and material moving occupations, construction and extraction occupations, and installation, maintenance, and repair occupations.
- Manual : service occupations : ... Ushers, Lobby Attendants, and Ticket Takers ; Amusement and Recreation Attendants ; Embalmers ; Funeral Attendants ; Morticians, Undertakers, and Funeral Directors ; Barbers ; Hairdressers, Hairstylists, and Cosmetologists ; Makeup Artists, Theatrical and Performance ; Manicurists and Pedicurists ; Shampooers ; Skincare Specialists ; Baggage Porters and Bellhops ; Concierges ; Travel Guides ; Childcare Workers ; Personal Care Aides ; Fitness Trainers and Aerobics Instructors ; Recreation Workers ; Residential Advisors ; Personal Care and Service Workers, All Other

Back to slides

US Data, as in Jaimovich and Siu (2015)

- Consistent with Autor and Dorn's classification
- Consistent with Routine-Task Intensity index based on DOT

Back to slides

French data :

- Annual French Labor surveys (1983-2014)
- Compute employment by occupation
- Abstract, Routine and Manual workers are identified in the same way as in Jaimovich and Siu (2015)
- classification using wages is not possible in the early 1980s (wage is not a continuous variable in the early 1980s)

▸ Back to slides Goods sector : Complementarity and substitutability

▸ Model : details Goods

$$Y^g \geq A L_a^{\alpha} \left[\left((1-\mu) \sum_{\eta^S}^{\overline{\eta}} \eta L_r(\eta) \right)^{\sigma} + (\mu K)^{\sigma} \right]^{\frac{1-\alpha}{\sigma}}$$

Service sector ▸ Model : details Services

$$Y^s \geq A_s \left(L_s + \delta \sum_{\eta} L_m^n(\eta) + \delta L_m^o \right)$$

Preferences : complementarities ▸ Model : details Households

$$C = \left[\nu C_g^{\rho} + (1-\nu) C_s^{\rho} \right]^{\frac{1}{\rho}}$$

Firms : Goods sector

The representative firm's problem

$$\Pi^g = \max \left\{ \begin{array}{l} Y^g - p_k K - \sum_{\eta^S}^{\overline{\eta}} w_r(\eta)\eta L_r(\eta) - w_a L_a \\ -cV_a - c\sum_{\eta^S}^{\overline{\eta}} V_r(\eta) + \beta \Pi^g_{+1} \end{array} \right\}$$

$$\begin{aligned}
\text{s.t.}\quad Y^g &\geq A L_a^{\alpha} \left[\left((1-\mu) \sum_{\eta^S}^{\overline{\eta}} \eta L_r(\eta) \right)^{\sigma} + (\mu K)^{\sigma} \right]^{\frac{1-\alpha}{\sigma}} \\
L_{r,+1}(\eta) &= (1-s) L_r(\eta) + q_r(\eta) V_r(\eta) \\
L_{a,+1} &= (1-s) L_a + q_a V_a \\
\Pi^g &= \max \left\{ \Pi^g_{(L_r(\eta)>0)}, -FC \times L_r(\eta) + \Pi^g_{(L_r(\eta)=0)} \right\}
\end{aligned}$$

▸ Back to slide model

Firms : Service sector

The representative firm's problem

$$\Pi^s = \max\left\{ \begin{array}{l} p_s Y^s - w_m L_m - \sum_\eta w_m^n(\eta) L_m^n(\eta) - w_m^o L_m^o \\ -cV_m - c\sum_\eta V_m^n(\eta) - cV_m^o + \beta \Pi_{+1}^s \end{array} \right\}$$

$$\begin{aligned}
\text{s.t.} \quad Y^s &\geq A_s \left(L_s + \delta \sum_\eta L_m^n(\eta) + \delta L_m^o \right) \\
L_{m,+1} &= (1-s)L_m + q_m V_m + (1-s)\lambda \sum_\eta L_m^n(\eta) + (1-s)\lambda L_m^o \\
L_{m,+1}^o &= (1-s)(1-\lambda)L_m^o + q_m^o V_m^o \\
L_{m,+1}^n(\eta) &= (1-s)(1-\lambda)L_m^n(\eta) + q_m^n(\eta) V_m^n(\eta)
\end{aligned}$$

with $\delta \in (0,1)$ the loss of efficiency due to the "movers"' learning process.

Back to slide model

Households : Demand

For each worker, the budgetary constraint is

$$PC = I \quad \text{with } I \in \{w_a, w_r(\eta), w_s, w_m, z_a, z_s, z_r\}$$

Given that all workers, we have

$$C \;=\; \left[\nu C_g^{\rho} + (1-\nu) C_s^{\rho}\right]^{\frac{1}{\rho}} \qquad P = \left[\nu^{\frac{1}{1-\rho}} + (1-\nu)^{\frac{1}{1-\rho}} p_s^{\frac{\rho}{\rho-1}}\right]^{\frac{\rho-1}{\rho}}$$

the optimal sharing of the basket good C is given by :

$$p_s = \frac{1-\nu}{\nu}\left(\frac{C_g}{C_s}\right)^{1-\rho}$$

$$\Rightarrow \begin{cases} C_g = \nu^{\frac{1}{1-\rho}} \left(\frac{1}{P}\right)^{\frac{1}{\rho-1}} \frac{I}{P} \\ C_s = (1-\nu)^{\frac{1}{1-\rho}} \left(\frac{p_s}{P}\right)^{\frac{1}{\rho-1}} \frac{I}{P} \end{cases}$$

which are the demand functions.

Back to slide model

Model Assumptions : labor reallocation across sectors

Back to slides

- A mobility cost = a market for "movers/switcher" (s) :
  - Some l-skill workers, unemployed on a "routine" labor market, can choose to move to search for a "manual" job.
  - For them, the cost is the acceptance of a **bad job** in the "manual" sector
- Learning process : the duration of the transformation of a bad job into a good job in the manual sector is stochastic with a Poisson parameter λ.
- There is potentially 2 types of switchers :
  - The first are eligible to an UB indexed on their previous "routine" job wage : new mover/switcher.
  - The second have a longer experience on this segment of the labor market and have lost their eligibility on this UB.

Employees' Opportunities

The worker's value functions are

$$\begin{aligned}
W_a &= w_a(1-\tau^{wa}) + (1-s)\beta W_{a,+1} + s\beta U_{a,+1} \\
W_m &= w_m(1-\tau^{w}) + (1-s)\beta W_{m,+1} + s\beta U_{m,+1} \\
W_r(\eta) &= \eta w_r(\eta) + (1-s)\beta W_{r,+1}(\eta) + s\beta \max\{U_{r,+1}(\eta), U^n_{m,+1}(\eta)\} \\
W^o_m &= w^o_m(1-\tau^{w}) + \lambda[(1-s)\beta W_{m,+1} + s\beta U_{m,+1}] \\
&\quad +(1-\lambda)[(1-s)\beta W^o_{m,+1} + s\beta U^o_{m,+1}] \\
W^n_m(\eta) &= w^n_m(\eta)(1-\tau^{w}) + \lambda[(1-s)\beta W_{m,+1} + s\beta U_{m,+1}] \\
&\quad +(1-\lambda)[(1-s)\beta W^n_{m,+1}(\eta) + s\beta U^o_{m,+1}]
\end{aligned}$$

- "Movers" can obtain a good "manual" job with a $Proba = \lambda$
- For workers previously occupied on a "Routine" task, the reallocation is an option $\Leftrightarrow \max\{U_{r,+1}(\eta), U^n_{m,+1}(\eta)\}$.

Back to slide model

Unemployed workers Opportunities

For the unemployed worker,

$$
\begin{aligned}
U_a &= z_a + (1 - f_a)\beta U_{a,+1} + f_a \beta W_{a,+1} \\
U_m &= z_m + (1 - f_m)\beta U_{m,+1} + f_m \beta W_{m,+1} \\
U_r(\eta) &= z_r(\eta) + (1 - f_r(\eta))\beta \max\{U_{r,+1}(\eta), U^n_{m,+1}(\eta)\} \\
&\quad + f_r(\eta)\beta W_{r,+1}(\eta) \\
U^o_m &= z_m + (1 - \chi f^o_m)\beta U^o_{m,+1} + \chi f^o_m \beta W^o_{m,+1} \\
U^n_m(\eta) &= z_r(\eta) + (1 - \chi f^n_m(\eta))\beta U^n_{m,+1}(\eta) + \chi f^n_m(\eta)\beta W^n_{m,+1}(\eta)
\end{aligned}
$$

with $\chi \in (0; 1)$ the efficiency loss in the matching process when the worker chooses to change occupation. The UB, z_i, are indexed to the wage of the previous job i.

Back to slide model

Back to slide model

Routine :

$$
\begin{aligned}
w^r(\eta) \quad = \quad & \frac{\gamma}{1+\tau^f}\left(y_r(\eta) + \Gamma(\tau^f_{+1}, \tau^w_{+1})\frac{\phi_{+1}}{\phi}\,(c\theta_r(\eta))\right) \\
& + \frac{\gamma}{1+\tau^f}\left(\frac{c}{q_r(\eta)}\right)(1-s_r)\left(1-\Gamma(\tau^f_{+1}, \tau^w_{+1})\frac{\phi_{+1}}{\phi}\right) \\
& + \frac{1-\gamma}{1-\tau^w}\left(z_r(\eta) + (1-s-f_r)\beta\max\{0, U^n_{m,+1}(\eta) - U_{r,+1}(\eta)\}\right)
\end{aligned}
$$

Manual (new movers) :

$$
\begin{aligned}
w^n_m(\eta) \quad = \quad & \frac{\gamma}{1+\tau^f}\left[p_s\delta A_s + \Gamma(\tau^f_{+1}, \tau^w_{+1})\frac{\phi_{+1}}{\phi}\,(c\theta^n_m(\eta))\right] \\
& + \frac{\gamma}{1+\tau^f}\left(\frac{c(1-\lambda)}{q^n_m(\eta)} + \frac{c\lambda}{q_m}\right)(1-s_m)\left[1-\Gamma(\tau^f_{+1}, \tau^w_{+1})\frac{\phi_{+1}}{\phi}\right] \\
& + \frac{1-\gamma}{1-\tau^w}\left[z_r(\eta) + \beta\Big(\lambda(U^n_{m,+1}(\eta) - U_{m,+1}) + s(1-\lambda)(U^n_{m,+1}(\eta) - U^o_{m,+1})\Big)\right]
\end{aligned}
$$

with

$$
\phi \quad = \quad \frac{\gamma}{1-\gamma} \tag{1}
$$

$$
\Gamma(\tau^f_{+1}, \tau^w_{+1}) \quad = \quad \frac{1+\tau^f}{1+\tau^f_{+1}}\,\frac{1-\tau^w_{+1}}{1-\tau^w} \tag{2}
$$

A complex numerical algorithm

Back to slides

- A non-stationary problem : a structural change of the economy
  $\Rightarrow$ standard methods of approximation of the dynamics around a unique steady state are not implementable here.
- There are several regimes
  $\Rightarrow$ Even if we know the initial and the final steady states, the dynamics takes into account the transitional labor reallocations (non-linear problem of occupational choice) and the MW, which can binds or not, depending on the evolution of the economy.
- There are heterogeneous workers, and this heterogeneity matters or not depending on the occupation of the worker. $\Rightarrow$ The size of the model is very large (more than 1500 dynamic equations).
- General equilibrium model : labor re-allocation affects relative production, hence relative price of good, hence feed-back effects on labor re-allocation
- **A time-consuming process to solve this new type of problem**

The expected interest of the analysis at the GE

- Our contribution
  - There is an impact of the growth on aggregate employment

  $\Rightarrow$ An unbalanced growth path leads to capitalization effects for the favored jobs (skilled workers) and to reallocation phenomena (unskilled workers)

  $\Leftrightarrow$ First general equilibrium effect.
  - There are consumers, and thus interaction between worker groups through the utility function.

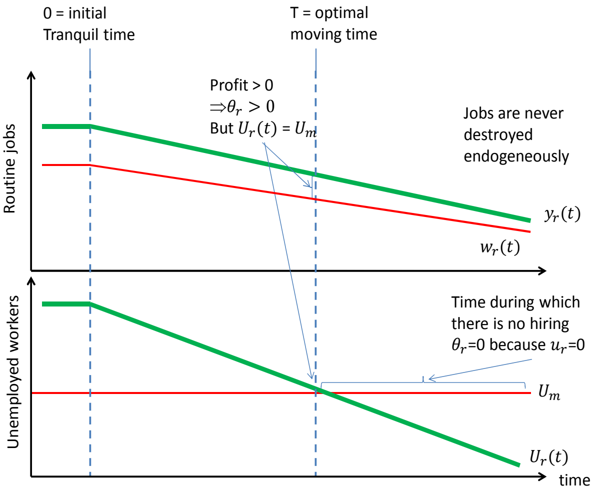
  $\Rightarrow$ The values of the manual jobs dependent from the abstract and routine jobs

  $\Leftrightarrow$ Second general equilibrium effect.
  - There is a combination, specific to each country, of the dynamics of the TBTC and LMI, affecting both the level and the structure of the employment.

  $\Leftrightarrow$ Third general equilibrium effect.

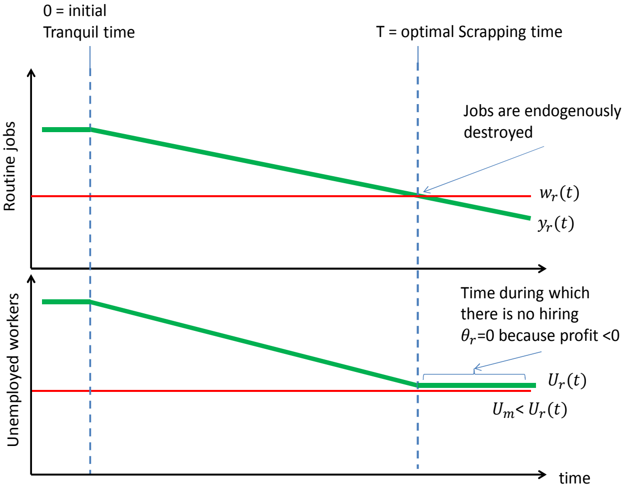
Non-binding scrapping-time with flexible wage

▸ Back



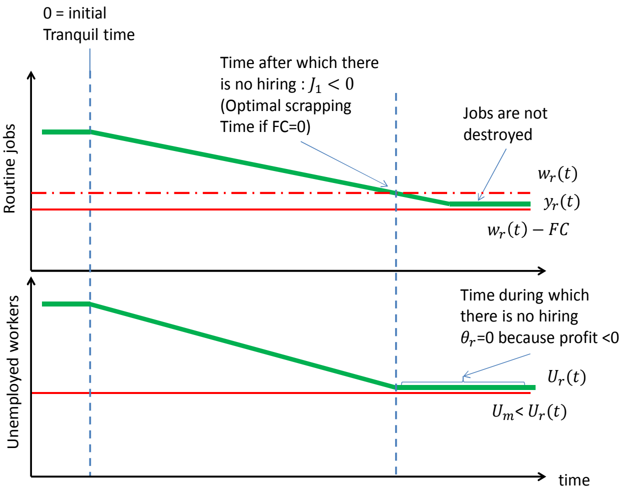
Binding scrapping-time with rigid wage

Back



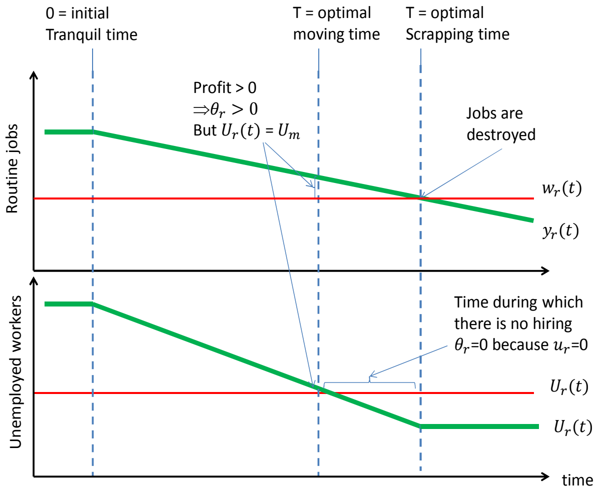
Scrapping-time with rigid wage and firing costs

Back

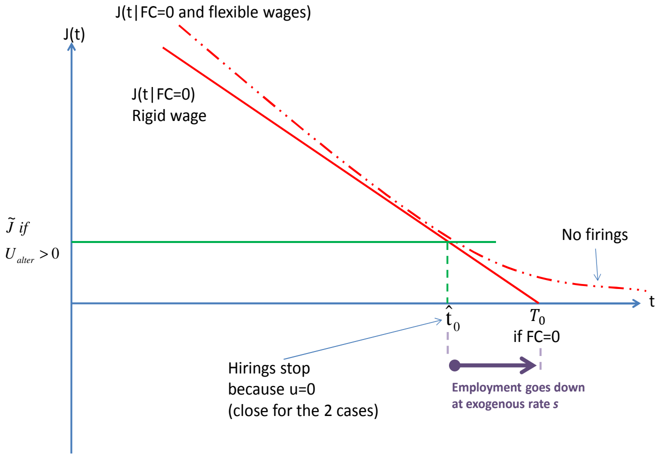


The interaction between moving time and scrapping time

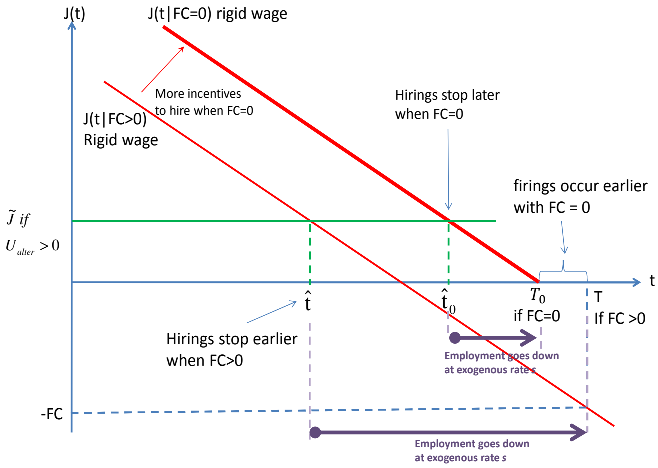
Back



The interaction between moving time and scrapping time

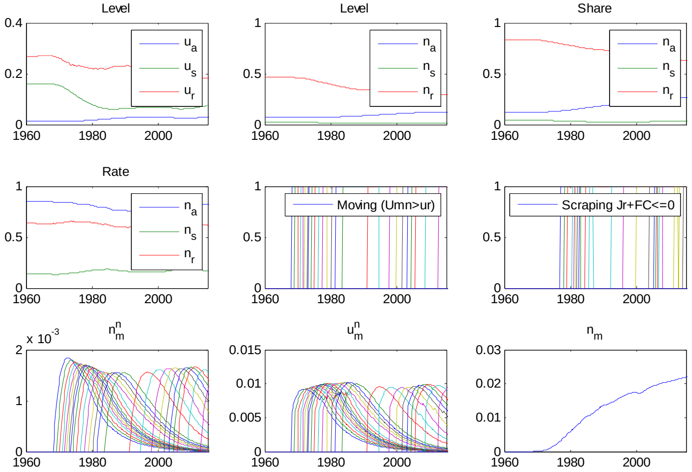


The interaction between moving time and scrapping time, with firing costs

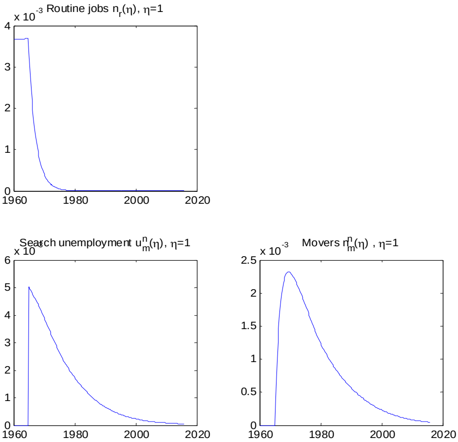


Employment reallocation in France

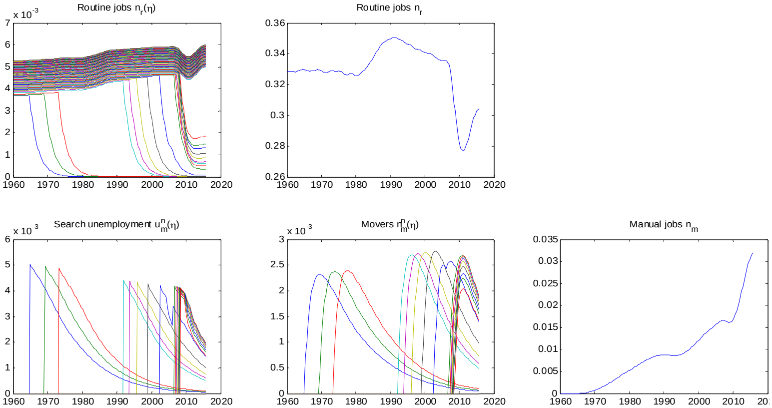
▸ Back to slides



Employment reallocation in the US



Employment reallocation in the US



In a frictionless labor market

Back to slides

In Autor and Dorn (2013), the impact of the Task-Biaised Technological Change (TBTC) is governed by two equations

$$\text{Worker Mobility} : \tilde{\eta} y_r = A_s p_s \quad \text{Demand} : p_s = MRS(C_g, C_s)$$

where MRS is the marginal rate of substitution between goods, and $F(K, L_a, L_r) = AL_a^{\alpha}[((1-\mu)Lr)^{\sigma} + (\mu K)^{\sigma}]^{\frac{\alpha}{\sigma}}$ the production function of goods, leading to $y_r = F'_{L_r}$. The mobility condition determines the ability threshold $\tilde{\eta}$ below which workers choose manual jobs. Thus, if the elasticities of substitutions of $F(\cdot)$ and the $MRS(\cdot)$ depend on $\{\sigma, \alpha\}$ and ρ respectively, then the impact of the TBTC depends only on these 3 parameters. There is no labor supply elasticity because the supply of skilled labor is fixed in all markets.

In a partial equilibrium (p_s is constant and exogenous), we have in a matching model :

$$\text{Mobility :} \quad U(\theta_r(\tilde{\eta}), LMI) = U(\theta_m, LMI)$$

$$\text{where Hirings :} \quad \left\{ \begin{array}{rcl} \theta_r(\eta) & = & \varphi_r(\eta y_r, LMI) \\ \theta_m & = & \varphi_m(A_s p_s, LMI) \end{array} \right.$$

We deduce that the mobility between labor market segments is governed by :

$$\varphi_r(\tilde{\eta} y_r, LMI) = \varphi_m(A_s p_s, LMI)$$

As previously, the impact of the TBTC depends on $\{\sigma, \alpha\}$ (and ρ if p_s is endogenous), but now, combined with $LMI = \{\underbrace{r, h}_{w^r}, \underbrace{\gamma, c}_{w_{Nash}}, \underbrace{MW, \omega, \overline{w}}_{wage\ \ rigidity}\}$ and thus on the labor supply elasticity (extensive margin).

Assume for simplicity that

- the wage is bargained *à la* Hall and Milgrom (2008). In this case, we have $w_r(\eta) = \gamma\eta y_r + (1-\gamma)(h + z_r(\eta))$ and $w_r(\eta) = \gamma p_s A_s + (1-\gamma)(h + z_m)$
- There is no social programs, and the unemployment benefits are proportional to productivity $z_r(\eta) = r\eta y_r$ and $z_m = r p_s A_s$, with r the replacement ratio.

The wage becomes $w_r(\eta) = (\gamma + (1-\gamma)r)\eta y_r$ and $w_m = (\gamma + (1-\gamma)r)p_s A_s$.

Under the assumption that y_r and p_s are constant (equilibrium growth path), mobility across labor market segments is governed by :

$$\eta y_r \left[r + \frac{\beta f_r(\eta)\gamma(1-r)}{1-\beta(1-s-f_r(\eta))} \right] \quad = \quad p_s A_s \left[r + \frac{\beta f_m \gamma(1-r)}{1-\beta(1-s-f_m)} \right]$$

This equation has a trivial solution : $\tilde{\eta} y_r = pA_m$. This comes from the proportionality of all values function to productivity and from the symmetry between routine and manual functional forms $(f_r(\cdot) = f_m(\cdot))$. In this case, the occupational choice is governed by the same equation as in Autor and Dorn (2013).

Thus, assume now that p_s is constant but y_r decreases at the rate g (ie. $y_r(t+1) = (1-g)y_r(t)$). We deduce that the occupational choice is now given by :

$$\eta y_r \left[r + \frac{\beta f_r(\eta)\gamma(1-r)}{1-\beta(1-g)(1-s-f_r(\eta))} \right] \quad = \quad pA_m \left[r + \frac{\beta f_m \gamma(1-r)}{1-\beta(1-s-f_m)} \right.$$

The capitalization effect in the LHS, and absent in the RHS, implies that $\tilde{\eta} y_r = A_m p_s$ is not the equation that determines the ability threshold $\tilde{\eta}$ below which workers allocate to manual jobs.

Back to slides

A simple way to interpret the previous equation is to notice that it defines $\tilde{\eta}$ as follows :

$$\Gamma(\tilde{\eta}, g) = \Upsilon \quad \text{with } \Gamma_1'(\eta, g) > 0 \text{ and } \Gamma_2'(\eta, g) < 0$$

When $g = 0$, the solution is, as previously and as in Autor and Dorn (AD), $\tilde{\eta}_{AD} y_r = p_s A_m$, whereas, when $g > 0$, $\tilde{\eta} < \tilde{\eta}_{AD}$: Search and matching reduces the magnitude of the reallocation process such that less workers reallocate to manual jobs. Due to search and matching, employment is an investment decision : time matters, and thus the capitalization of future profit flows. If profit flows are expected to decline, firms' incentive to open vacancies is reduced. This leads workers to leave earlier the labor market of the routine jobs than in a frictionless market. This results appears even if wage is flexible (Nash bargaining rule) and even if there is no revenues non-indexed on wages, like social program. The gap between $\tilde{\eta}$ and $\tilde{\eta}_{AD}$ depends on the level of LMI, ie. in this example on $\{r, \gamma, c\}$.

- Need accurate data to pin down search costs
- Expected effects ?
- For example, ambiguous effects for predictions on EPL
  - With J2J, lower value of the firm (lower expected duration of the job) then, profit becomes negative sooner, hence larger effect of FC
  - With J2J, more workers leave the firm before profits become negative, hence, there are fewer workers when profit becomes negative, hence smaller effect of FC

Model parameters : values based on external information

Back to main slide

Matching	$c^\star$	$c_a^\star$	$\psi^\star$	$s^\star = s_a^\star$	$\Upsilon^\star$
	0.15	$2c^\star$	0.5	0.0125	0.025
Preferences	$\beta^\star$	$h_s^\star$	ρ	ν	
	4%	0	0.825	0.6	
Technology	A	A_s	σ	α	μ
	4.5	0.95	0.78	0.6	0.5
Learning	$\delta^\star$	$\chi^\star$	$\lambda^\star$		
	0.9	1	0.025		
Wage norms	$\omega_{a,US}$	$\omega_{a,Fr}$	$\omega_{a,Ger} = \omega_{r,Ger}$		
	0.95	0.1	0.55		
Adjustments	g_{p_k}	g_{L_a}	g_{rr}	g_{h_u}	g_{MW}
	0.012	0.005	0.03	0.03	0.02

Blue : "estimated" parameters

Model parameters : calibration $dim(\Phi) = dim(\Psi)$

▸ Back to main slide

The other set of parameters $\Phi = \{\Phi_1, \Phi_{2,US}, \Phi_{2,F}, \Phi_{2,G}, \Phi_3\}$:

$$\begin{aligned}
\Phi_1 &= \left\{ \; \rho, \nu, A, \sigma, \mu, \alpha, A_s, p_k(0), p_k(T), \overline{\eta}, \underline{\eta}, \sigma_\eta \; \right\} \\
\Phi_{2,i} &= \left\{ \; \omega_{a,i}, h_{u,i}(0), h_{u,i}(T) \; \right\}_{i=US,F} \\
\Phi_{2,G} &= \left\{ \; \omega_{a,G}, \omega_{r,G}, h_{u,G}(0) = h_{u,G}(T), h_{u,G}(1995) \; \right\}
\end{aligned}$$

The dynamics of all the exogenous variables are

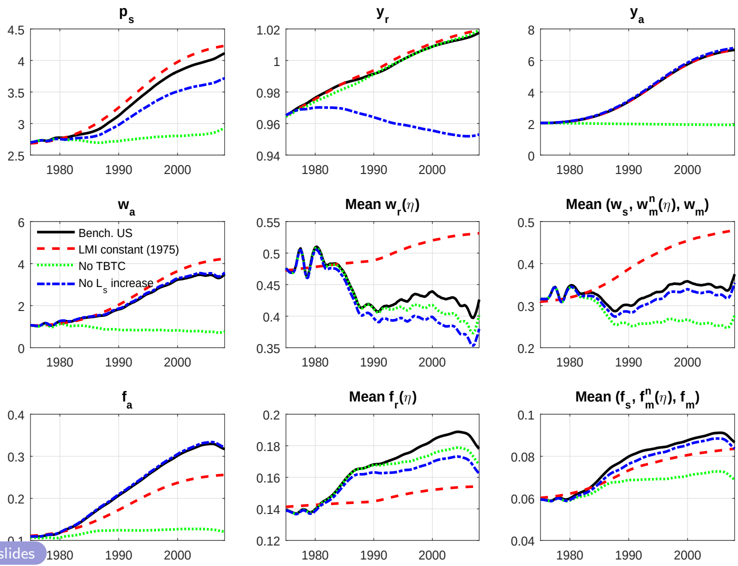
$$x(t) = (x(0) - x(T))e^{-g_x t} + x(T) \quad \text{for } t \in [0, T]$$

This adds $\Phi_3 = \{g_{p_k}, g_{L_a}, g_r, g_{h_u}, g_{MW}\}$ parameters, with $dim(\Phi) = 27$.
The targets of the calibration are :

$$\Psi = \left\{ \begin{array}{l} N_{a,i}(0), N_{r,i}(0), N_{m,i}(0), N_{a,i}(T), N_{r,i}(T), N_{m,i}(T), \\ E_i[N_a], E_i[N_r], E_i[N_m] \end{array} \right\}_{i=US,F,G}$$

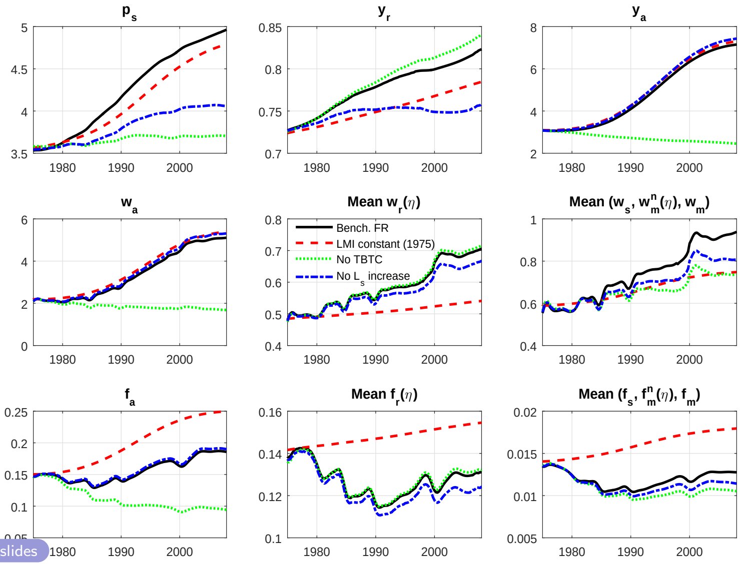
with $dim(\Psi) = 27$.

Benchmark case, additional graphs : US



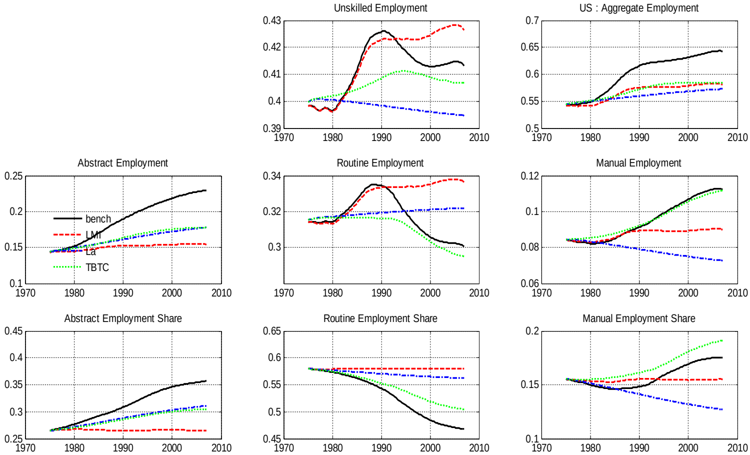
Back to slides

Benchmark case, additional graphs : France



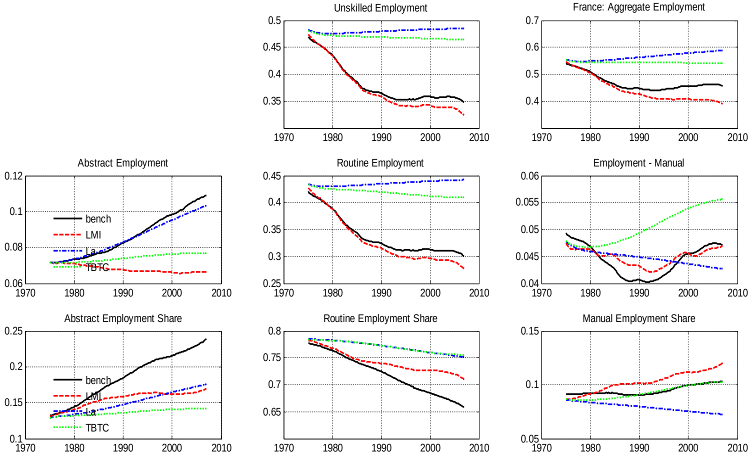
Back to slides

Shutting down 2 trends : US



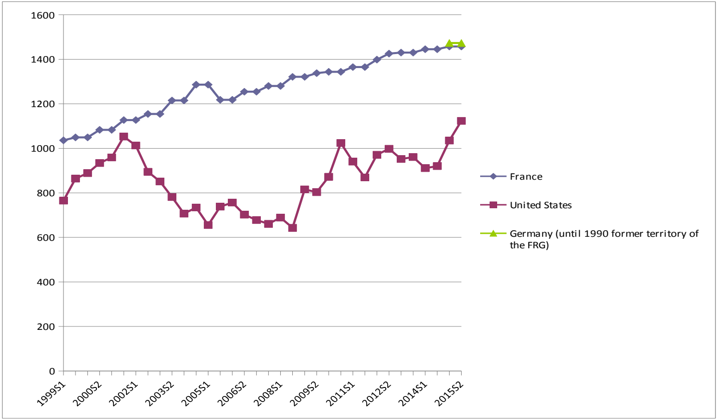
Back to slides

Shutting down 2 trends : France



Back to slides

Minimum wage (monthly, in euros)



Eurostat

Declining price of capital

Back to

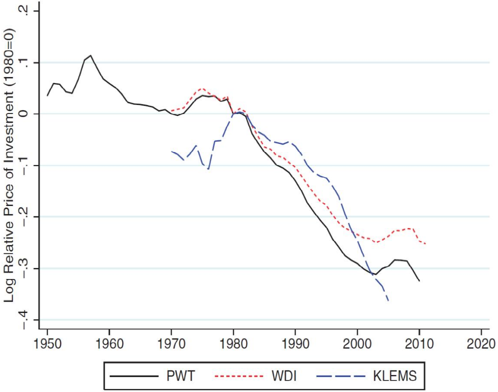


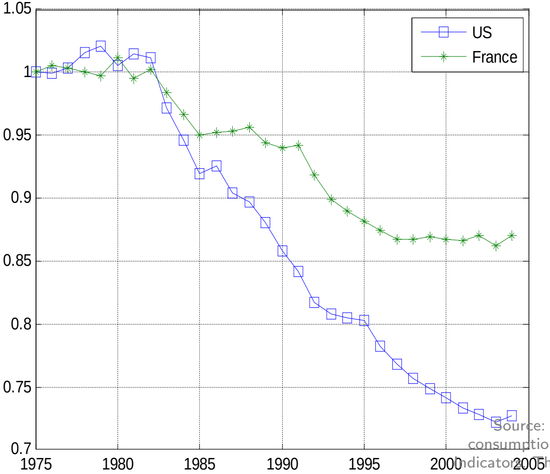
FIGURE VII

Declining Global Price of Investment Goods

Source: Source : Karabarbounis Neiman (QJE 2014).

Declining price of capital

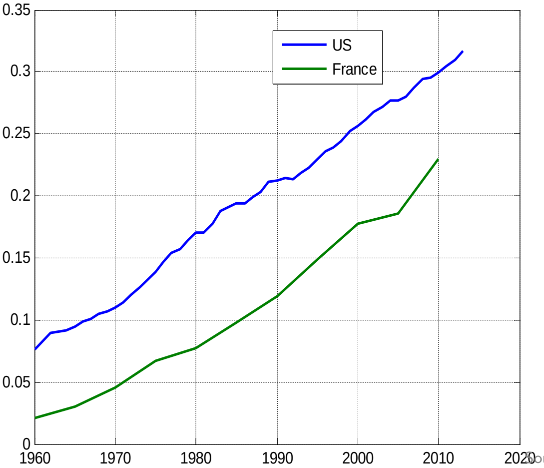
Back to slides



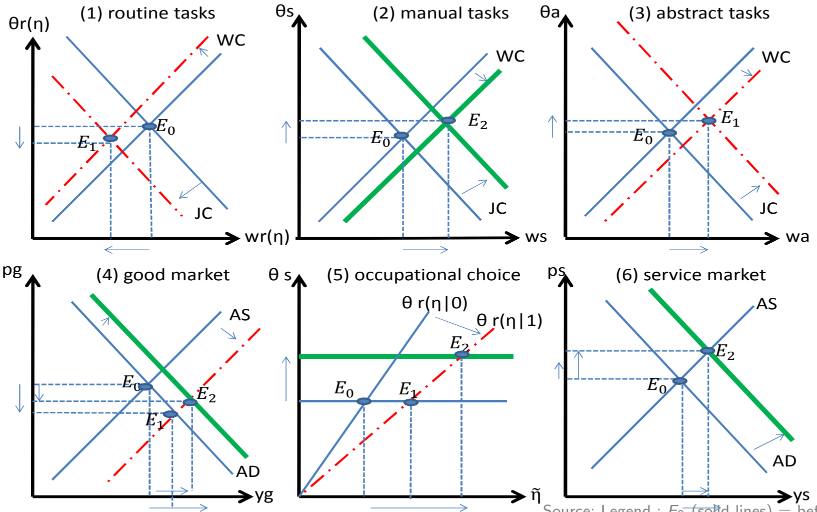
Source: Investment Price (relative to consumption price). World Development Indicators. The relative price is normalized to one in 1980.Source : Data from Karabarbounis Neiman (QJE 2014).

Increase in educational attainment

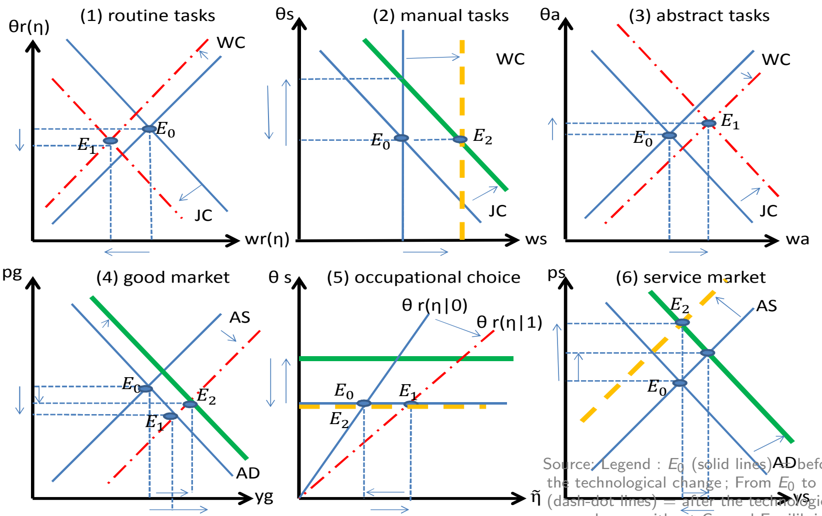
Back to slides



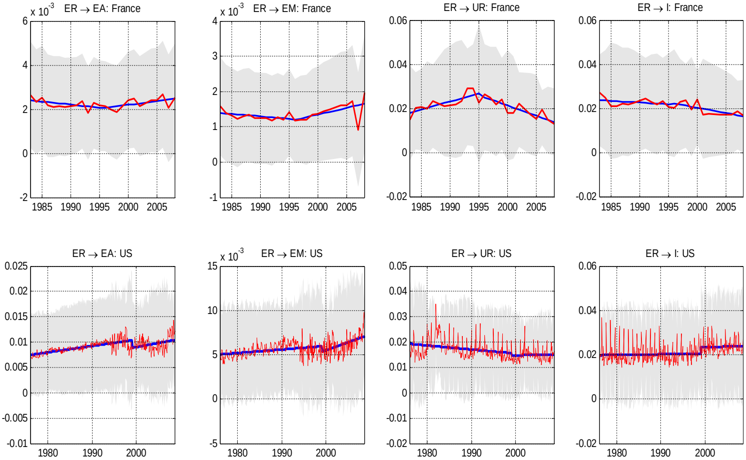
Source: French census. Diplôme universitaire 1er, 2ème ou 3ème cycle, BTS-DUT. US Census (Years of School Completed) College 4 years and more

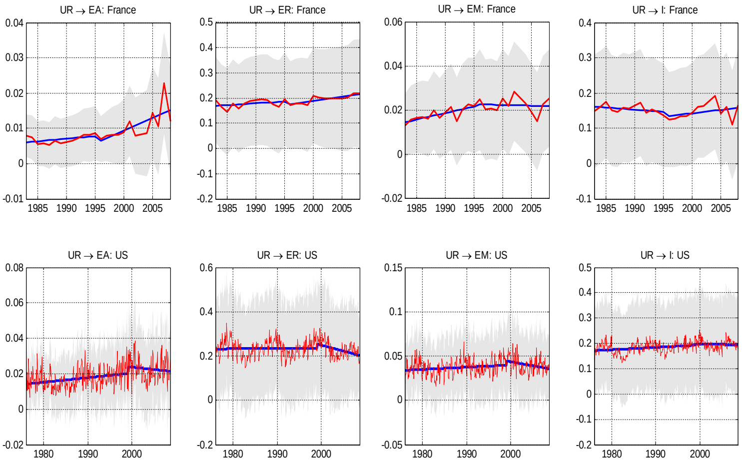


Source: Legend : E_0 (solid lines) = before the technological change ; From E_0 to E_1 (dash-dot lines) = after the technological change without General Equilibrium feedback (no increase in p_s) ; E_2 (bold lines) = after the technological change with General Equilibrium feedback (after increase in p_s).

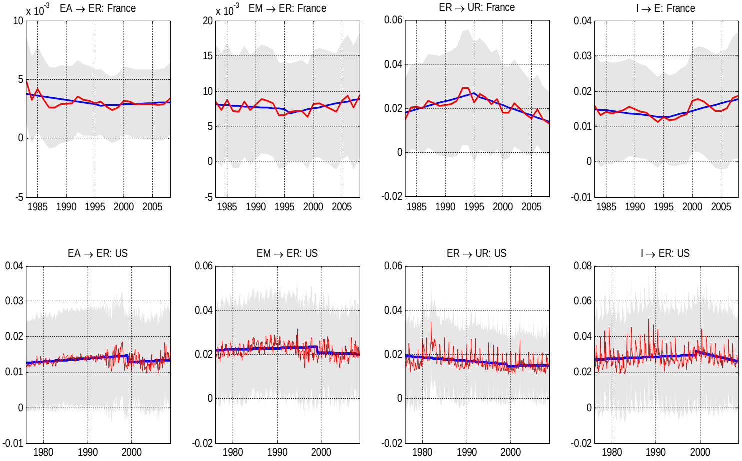


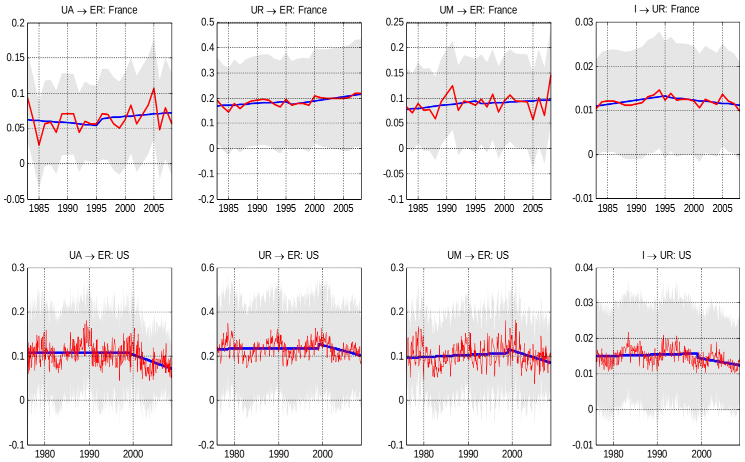
Source: Legend : E_0 (solid lines) = before the technological change ; From E_0 to E_1 (dash-dot lines) = after the technological change without General Equilibrium feedback (no increase in p_s) ; E_2 (bold lines) = after the technological change with General Equilibrium feedback (after increase in p_s) ; bold-dashed lines = rise in minimum wage


x 10^-3 ER → EA: France
ER → EM: France
ER → UR: France
ER → I: France
ER → EA: US
x 10^-3 ER → EM: US
ER → UR: US
ER → I: US


UR → EA: France
UR → ER: France
UR → EM: France
UR → I: France
1985 1990 1995 2000 2005
UR → EA: US
UR → ER: US
UR → EM: US
UR → I: US
1980 1990 2000

Back


EA → ER: France
EM → ER: France
ER → UR: France
I → E: France
EA → ER: US
EM → ER: US
ER → UR: US
I → ER: US


UA → ER: France
UR → ER: France
UM → ER: France
I → UR: France
UA → ER: US
UR → ER: US
UM → ER: US
I → UR: US
1985 1990 1995 2000 2005
1980 1990 2000

Worker flows

The story behind the disappearance of routine jobs

Documenting worker flows in France and in the US

- Survey data : US CPS (monthly, Jan 1976-July 2016) and French LFS (annual, 1983-2014)
- use current or most recent occupation to categorize individuals into task groups : Abstract, Routine, Manual
- Compute each period transition rates between 7 states : Employed (Abstract, Routine, Manual), Unemployed (Abstract, Routine, Manual), Not in Labor Force
- Trends (HP-filter), sample stops before the 2008 crisis

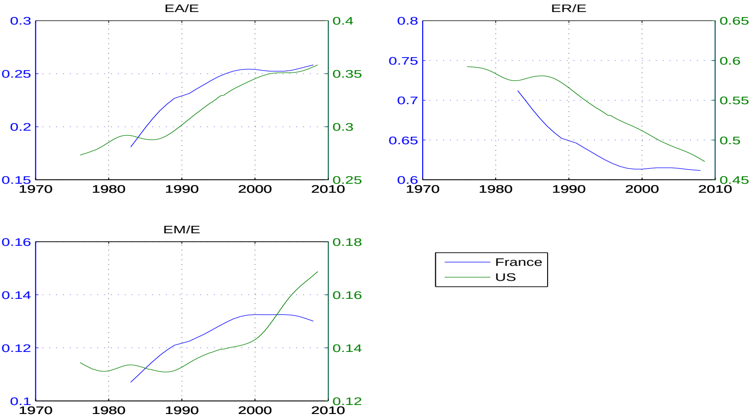
$ER \to EA$,$ER \to EM$, $ER \to UR$, $ER \to I$ Figure
$UR \to EA$,$UR \to ER$, $UR \to EM$, $UR \to I$ Figure
$EA \to ER$,$EM \to ER$, $ER \to UR$, $I \to ER$ Figure
$UA \to ER$,$UR \to ER$, $UM \to ER$, $I \to UR$ Figure

TABLE: Transition matrix(t) : 7×7 matrix of transition rates

	EA(t+1)	ER(t+1)	EM(t+1)	UA(t+1)	UR(t+1)	UM(t+1)	I(t+1)
EA(t)							
ER(t)							
EM(t)							
UA(t)							
UR(t)							
UM(t)							
I(t)							

stocks(t+1)=matrix(t) × stocks(t).
stocks are a vector of size (7,1) each period

The employment shares : a measure of polarization



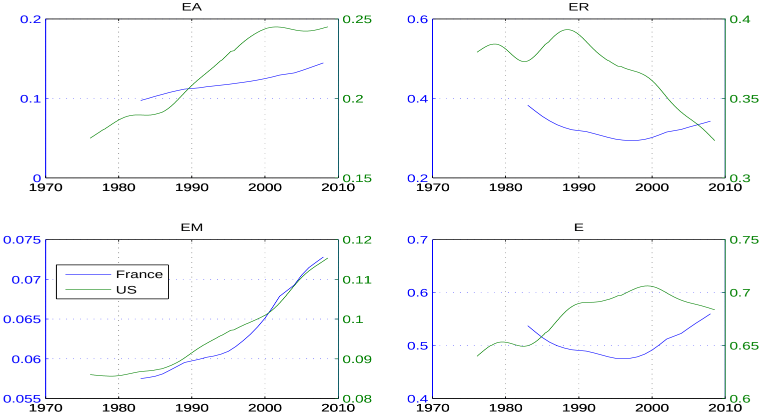
- Shares of abstract and services jobs increased in both countries.
- Routine jobs : a great similarity between France and the United States ⇔ a decrease of about 10 points.

The employment shares : a measure of polarization

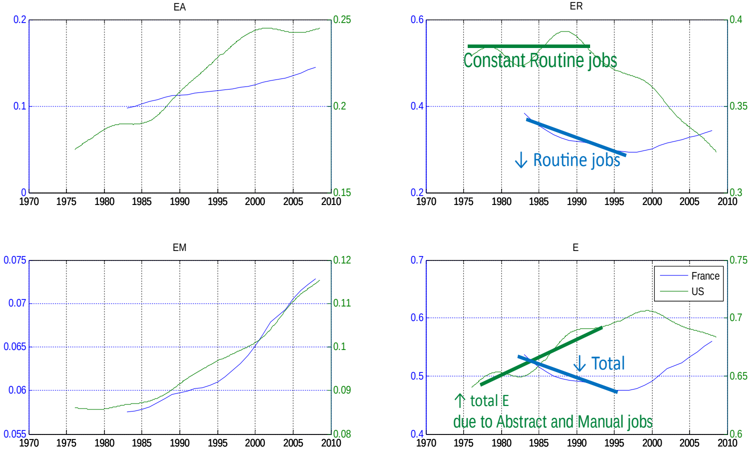
Common decline in the share of routine jobs in total employment but for different reasons

Employment levels :

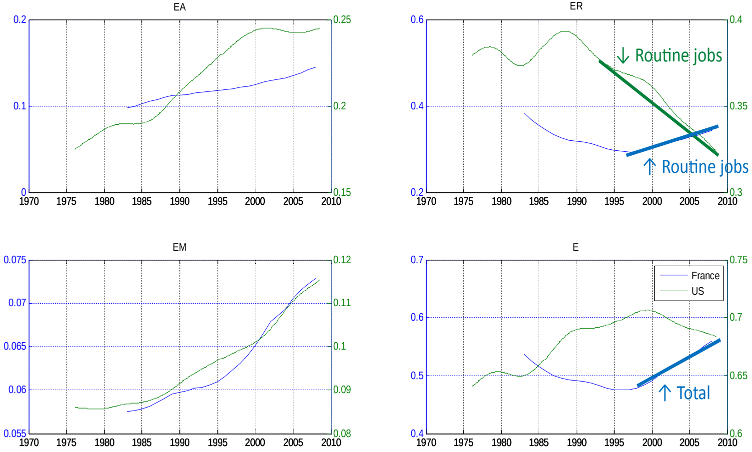
Routine per-capita employment is different across countries.



Employment levels :



Employment levels :



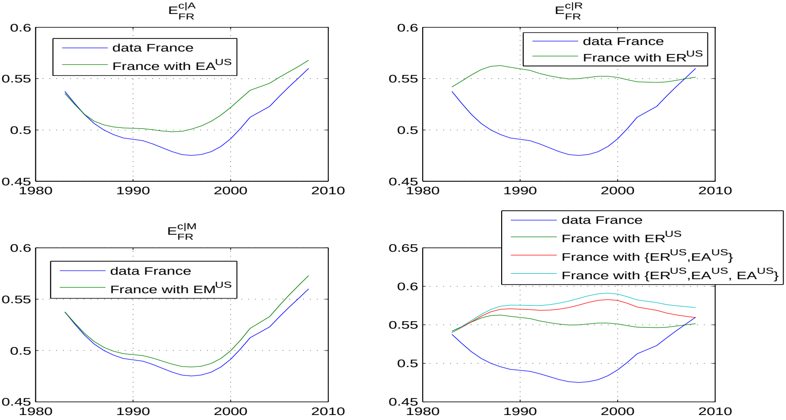
The employment shares : a measure of polarization

Common decline in the share of routine jobs in total employment but for different reasons

Any analysis based on employment *shares* alone provides a partial picture of job polarization

Dynamics of Routine Employment

The decline in routine jobs in France is the main driver of the employment gap with respect to the US



Counterfactuals

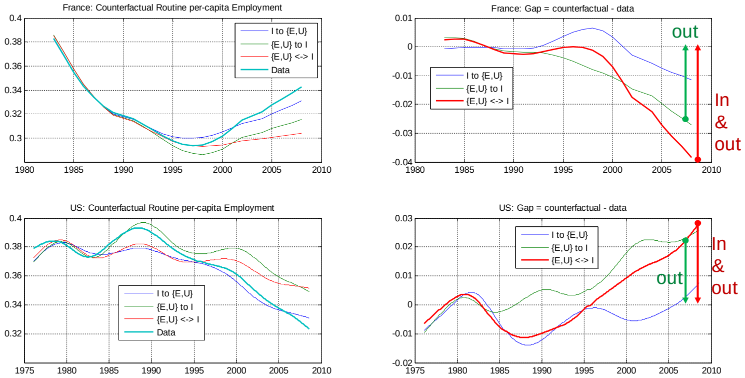
- Which changes in transition rates are key in accounting for the evolution of per capita routine employment ?
- Looking at the evolution of transition rates is not enough as transition rates interact with stocks
- Counterfactual experiments
  - fix some transition rates at their level at the beginning of the sample $\Rightarrow$ get counterfactual transition rates
  - Using the initial stocks, iterate forward using the counterfactual transition rates : stocks(t+1)=matrix(t)$\times$stock(t)
  - predict the counterfactual routine per-capita employment
  - compute the gap between the observed and counterfactual evolutions of routine employment
  - how much of the fall in routine employment would have been prevented if particular transition rates had remained at the levels observed prior to the onset of job polarization ?
  - as in Cortes, Jaimovich, Nekarda and Siu (2015)

Counterfactuals

Ins and Outs of routine employment

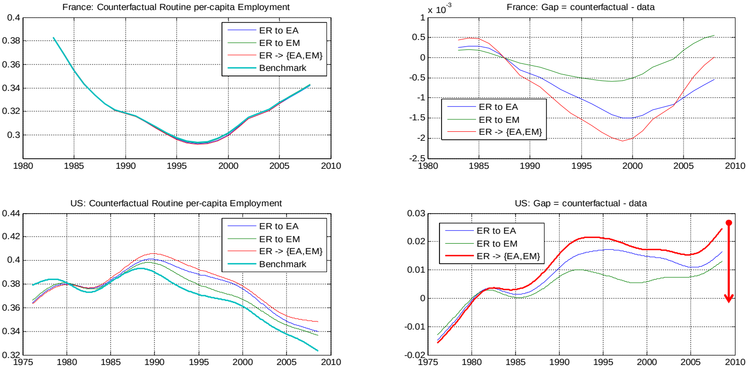
- Inactivity : Labor market participation
- Employment : Job-to-job, occupational mobility
- Unemployment : Job finding, job separation

INs-OUTs of Routine jobs from Inactivity



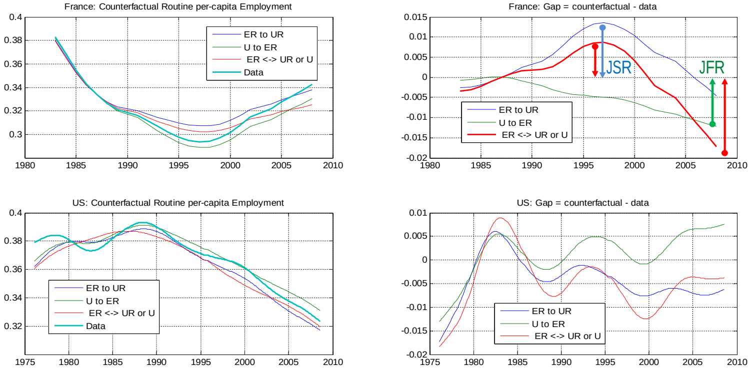
- France : +4pp of ER generated by a decline in the outflows to inactivity (pension reforms ?)
- US : after 1995, -2.5pp in ER due to an increase in the outflows to inactivity, consistent with Cortes et al (2015)

Occupational mobility



- France : ∄ changes in mobility across occupations
- US : -2pp in ER due to a rise in occupational mobility, whether downward or upward

INs-OUTs of Routine jobs from Unemployment



- in France, in the mid-1990s, - 1 pp of *ER* due to high *JSR*. After the mid-1990s, the increase in *ER* is driven by higher JFR.
- The In-Out flows from U does not explain *ER* in the US.

Summary

	France	US
Routine N	Nr down then up after 1995	Nr flat then down after early 1990s
Inactivity	less outflows to inactivity especially after mid-1990s	more outflows to inactivity
Job-to-Job		more outflows to others jobs
Unemployment	high JSR before mid-1990s high JFR after mid-1990s	

Consistent with the view that, in France,

- Lower payroll taxes for low-paid jobs since the late 1990s
- $\rightarrow$ rebound in routine employment = Protection of routine jobs
- Hence, workers are not enticed to look for a job elsewhere (low job-to-job)

Research Agenda

Model with additional features

- Endogenous participation
- Job-2-Job
- Institutional differences :
  - France : payroll tax subsidy on low-wage workers and pension reforms increase retirement age $\Rightarrow$ life-cycle features in the model
  - US : identifying cross-country difference in cost of job-2-job mobility