Slackness Regimes in Frictional Labor and Goods Markets

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Credits

Joint work with:

- **Nicolas Petrosky-Nadeau**, Federal Reserve Board of San Francisco

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- **Nicolas Petrosky-Nadeau**, Federal Reserve Board of San Francisco
- **Etienne Wasmer**, New York University Abu Dhabi and CEPR

Outline

1. Introduction
2. Exogenous price and wage
3. Nash bargaining over price and wage
4. Calibrating to US data
5. Market power and markups (preliminary)
6. Conclusion

1. Introduction

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  - Keynesians: unemployment stems from a shortfall in aggregate demand
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  - Instead, focus on frictions, reservation wage, training.
- However, role of aggregate demand lost in the process.

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- Keep the M-P insights on frictional unemployment but reinject aggregate demand effects into the model by introducing goods market frictions
- Resuscitate the old Benassy/Barro-Grossman disequilibrium literature on slackness regime in labor and goods markets.

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- How does slackness in the labor and goods market interact in the determination of unemployment?
- In which direction do wages and prices need to move to bring the competitive allocation closer to the constrained social optimum?

Literature

- Petrosky-Nadeau, Wasmer and Weil (2018), drawing on Petrosky-Nadeau and Wasmer (2015) and Wasmer-Weil (2004)

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- Hosios (1990), Moen (1997), Julian and Mangin (2018)

2. Exogenous price and wage

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- Free entry of firms and consumers search effort

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- In both markets, tightness means high tension, and slackness means low tension.

Goods market

- Under free entry of consumers, the expected pdv of the flow costs σ of procuring an extra unit of the consumption good must equal the expected pdv of the excess of *constant* marginal utility Φ over the price $\mathcal{P}$ of the good:

$$\boxed{\frac{\sigma}{\psi(\xi)} = \frac{\Phi - \mathcal{P}}{r+s}.} \tag{3}$$

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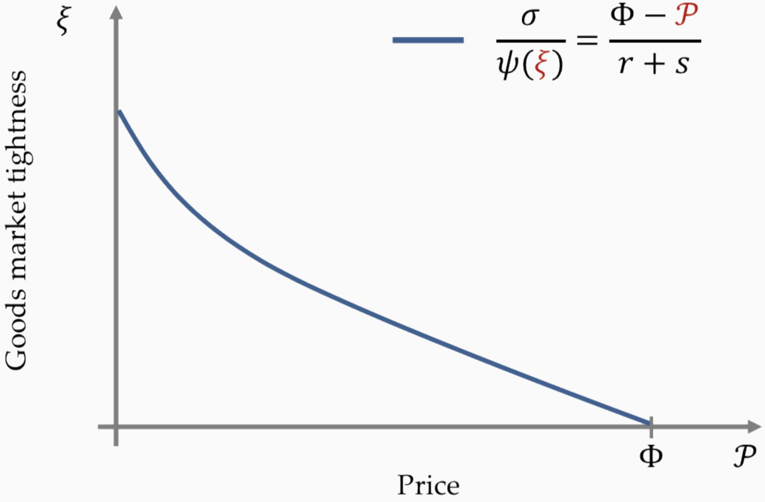
- The probability ψ of finding a seller of the good is assumed to depend negatively on the tension ξ of the good market. Separation occurs at rate s.
- This zero-profit condition implies a *negative* relationship between ξ and $\mathcal{P}$: to maintain zero profit, goods must be cheaper when harder to find.

Consumer free entry condition



Labor market

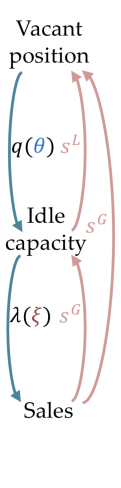


Figure 1: Searching for a worker before securing a buyer

Labor market

- Under free entry of firms, the expected pdv of the search costs γ of finding a worker must equal the expected pdv of revenue π net of wages ω generated after meeting a worker (until exogenous separation):

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- The probability $q(\theta)$ of finding a worker is assumed to depend negatively on the tension θ in the labor market (the ratio of posted vacancies to unemployed workers).

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$$\pi = \mu(\xi)\mathcal{P}, \tag{5}$$

where $\mu(\xi) = \lambda(\xi)/[r + s + \lambda(\xi)] \in (0, 1)$ and with $\lambda(\xi) \equiv \xi\psi(\xi)$ denoting the probability of finding a buyer ($\lambda'(\cdot) > 0$).

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  - $\mu(\infty) = 1$: a buyer is found immediately

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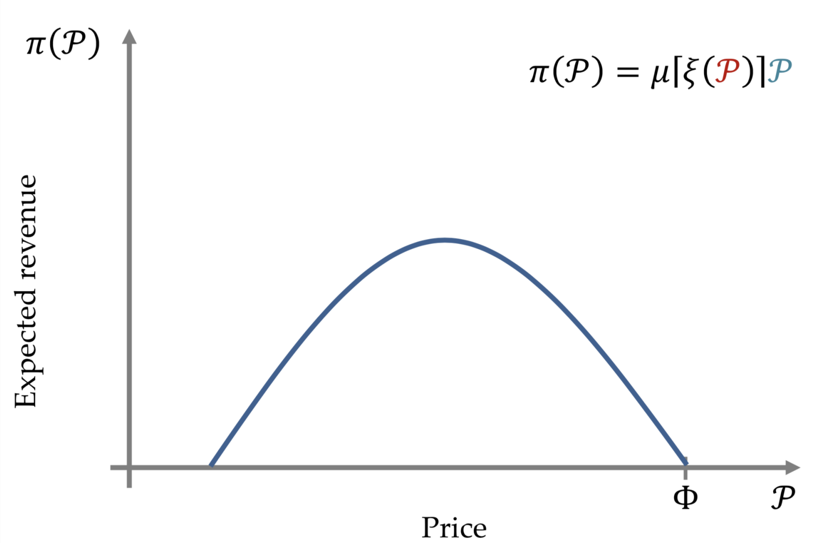
  - ... but it raises revenue per unit sold (positive price effect).
- When the price is zero, there are lots of consumers but revenue is zero. When the price equals ϕ, there are no buyers and revenue is also zero $\Longrightarrow$ **hump-shaped revenue function**!

A Laffer curve for the firm's revenue



Labor market iso-tension loci in $(\mathcal{P}, \omega)$

- We have already combined the consumer's free entry condition in the goods market with the computation of the firm's annuity value of revenues to get

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- Now insert this equation into the firm's free entry condition on the labor market to get

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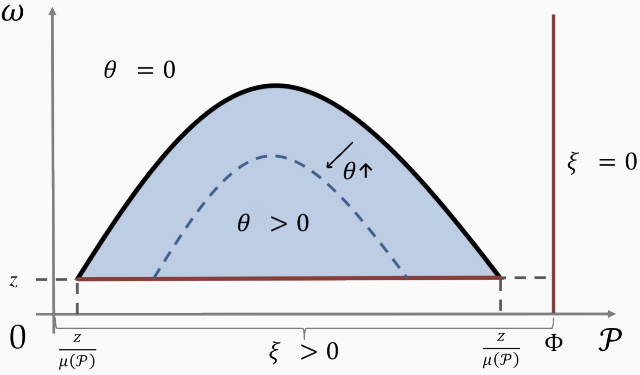
- This defines in $(\mathcal{P}, \omega)$ space, for each θ, **labor market iso-tension loci** which inherit their hump shape from that of the revenue function.

Labor market iso-tension loci in $(\mathcal{P}, \omega)$ space



- For each point in the shaded region, we infer $\xi = \xi(\mathcal{P})$.

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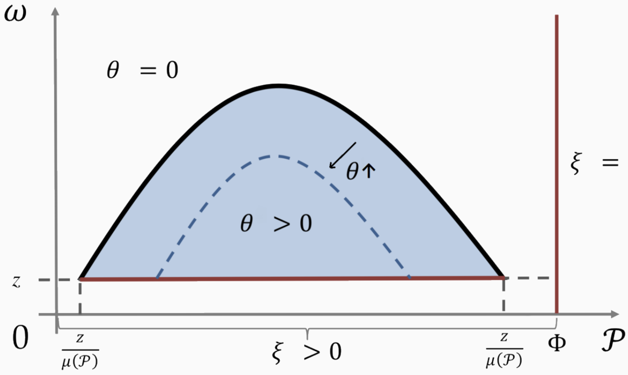

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- For each point in the shaded region, we read θ from the position of iso-tension locus through that point.

Taking stock of results so far

- The zero-profit condition on the goods market provides the **first equation** of the model (negative relationship between ξ and $\mathcal{P}$):

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- That's all there is to it!

Constrained social optimum

- The planner maximizes the expected pdv of output and leisure net of search costs, subject the matching frictions in the labor and goods market.

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- **Two-part social optimum**: maximize the size of the pie (ξ^{opt}) then split it optimally between firms and workers (θ^{opt}).

The constrained optimum and competitive allocations

The set of competitive allocations and the wage and price that decentralize the constrained social optimum can be represented in $(\mathcal{P}, \omega)$ space:

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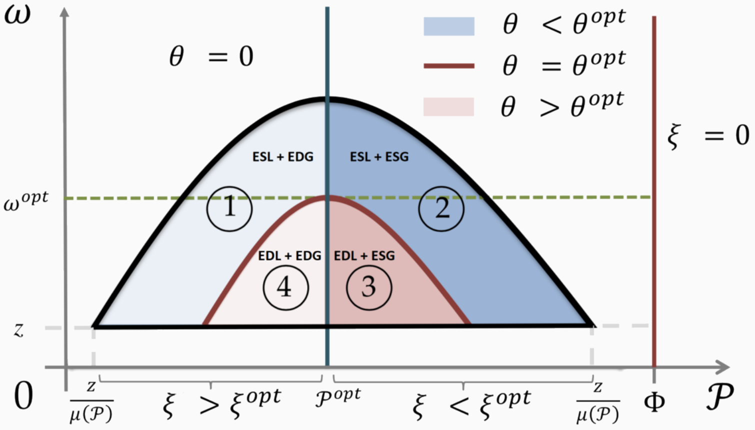
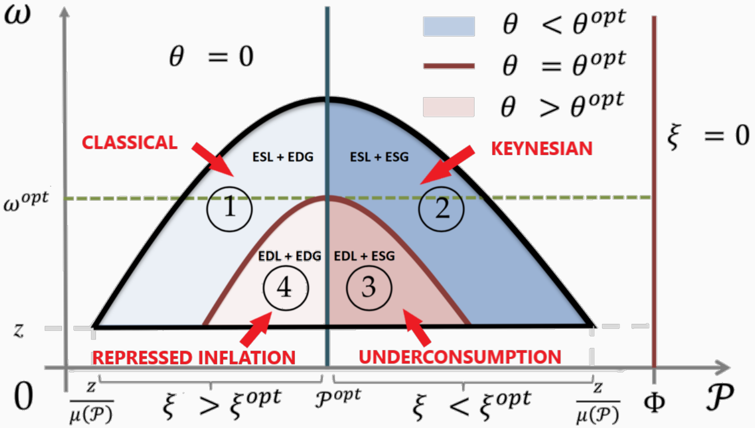
- Labor market tension is optimal when $\theta = \theta^{opt}$, and this occurs along the labor market iso-tension locus corresponding to θ^{opt}:

$$\frac{\gamma}{q(\theta^{opt})} = \frac{\mu[\xi(\mathcal{P})]\mathcal{P} - \omega}{r + s}. \tag{11}$$

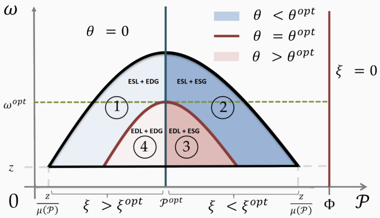
Four slackness regimes



Drèze, Benassy, Malinvaud and Barro-Grossman



Four regimes: how to reach the planner's optimum



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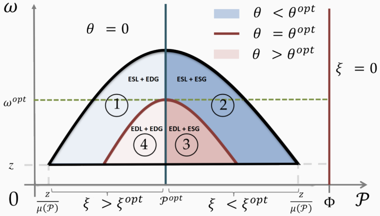

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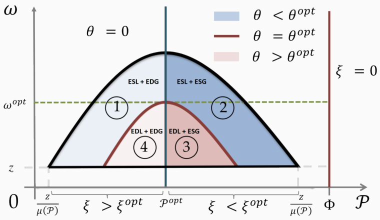
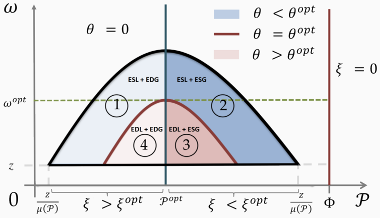


- In all four regimes, moving the price towards its optimal value is required to get closer to the social optimum.
- This always raises the firm's revenue (we are moving in the direction of top of the Laffer curve) and encourages entry of firms in the labor market.
- This always raises, ceteris paribus, the tension in the labor market θ— as any horizontal movement towards $\mathcal{P}^{opt}$ is a shift to a lower iso-tension locus, i.e. a higher θ.

EDL: how to reach the planner's optimum



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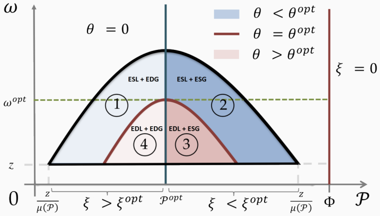

- In regions 3 and 4 (with EDL), convergence of $\mathcal{P}$ towards its optimum **exacerbates already excessive labor market tension**.
- It must therefore be accompanied by an offsetting **increase in the wage** to discourage firms from entering the labor market.

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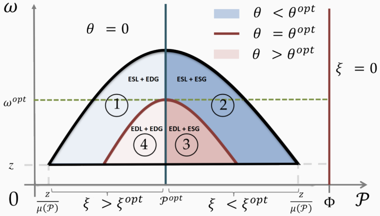

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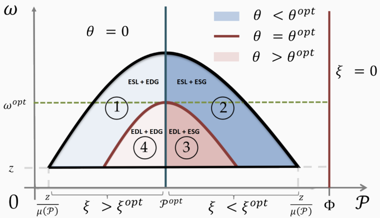

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- In the top part of the regions 1 and 2 (above the $\omega = \omega^{opt}$ line) it helps too little, and it must be accompanied by a **fall** in the wage!

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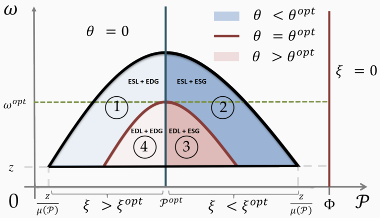

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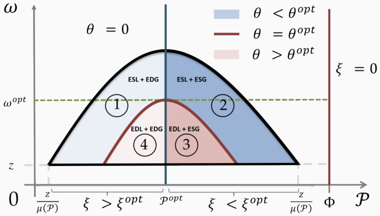
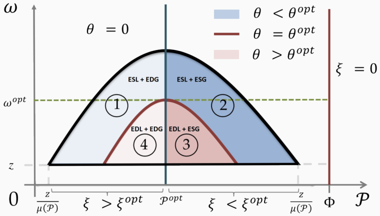
- In the top part of the regions 1 and 2 (above the $\omega = \omega^{opt}$ line) it helps too little, and it must be accompanied by a **fall** in the wage!
- In the bottom part, it helps too much, and it must be accompanied by a **rise** in the wage!

Take home message



- Curing classical or Keynesian unemployment (regions 1 and 2 with excess supply of labor relative to the constrained social planner optimum) sometimes requires **raising** the wage rate.

Take home message



- Curing classical or Keynesian unemployment (regions 1 and 2 with excess supply of labor relative to the constrained social planner optimum) sometimes requires **raising** the wage rate.
- If goods market tension is optimal (and the price is $\mathcal{P}^{opt}$), resorbing ESL requires lowering the wage.

3. Nash bargaining over price and wage

Simplifications

- No strategic sequential bargaining; independent bilateral bargaining

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- Same wage paid by firms searching or matched in the goods market

Bargaining over the price

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  - increasing in the tightness of the goods market ξ and the consumer's search cost σ which strengthen the outside option of the seller relative to the buyer.

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  - increasing in the search cost γ and the labor market tension θ which weaken the outside option of the firm relative to the buyer.

Four slackness regimes in (α_G, α_L) space

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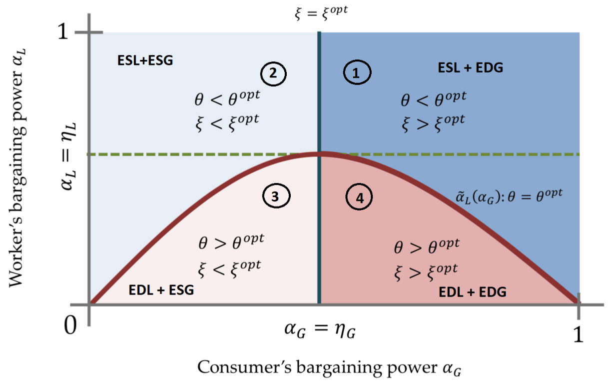
- This procedure is analogue to the one we used when we took $(\mathcal{P}, \omega)$ as fixed.
- Beware: the next graph is flipped horizontally compared to the four regimes in $(\mathcal{P}, \omega)$ space because a high α_G *lowers* the negotiated price $\mathcal{P}$.

Four slackness regimes in (α_G, α_L) space

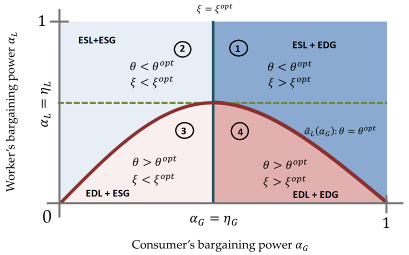


Theorem (Hosios conditions in goods and labor market)

*The decentralized allocation with search and bargaining is constrained efficient if $\alpha_L = \eta_L$ **and** $\alpha_G = \eta_G$, with*

- $\xi = \xi^{opt}$ ***if and only if*** $\alpha_G = \eta_G$
- $\theta = \theta^{opt}$ *if* $\alpha_L = \eta_L$ ***and*** $\alpha_G = \eta_G$.

Four regimes: how to reach the planner's optimum



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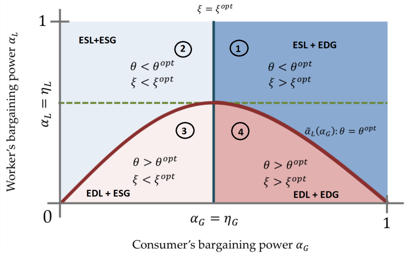

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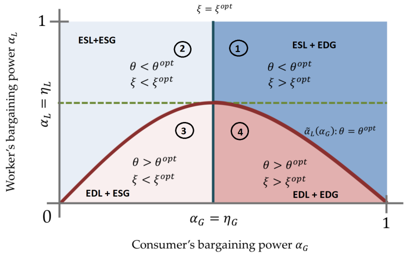

- In all four regimes, moving α_G towards η_G is required to approach to the social optimum.
- This always raises the firm's revenue towards the top of the Laffer curve, leading more firms to enter into the labor market.
- This always raises, ceteris paribus, labor market tension θ as any horizontal movement towards η_G transports to a lower iso-tension locus, i.e. yields a higher θ.

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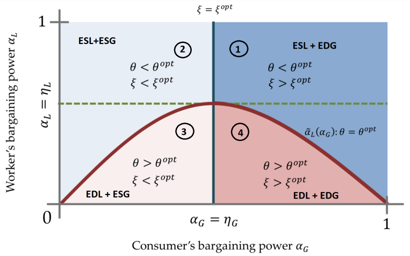

- In regions 3 and 4 (with EDL), convergence of α_G towards its optimum η_G **exacerbates already excessive labor market tension** by raising revenue.

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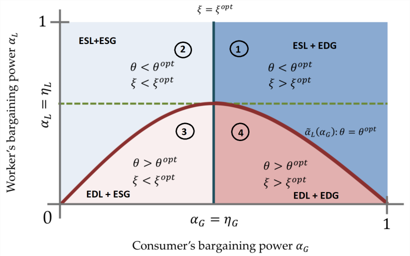

- In regions 3 and 4 (with EDL), convergence of α_G towards its optimum η_G **exacerbates already excessive labor market tension** by raising revenue.
- It must therefore be accompanied by a countervailing **rise in the bargaining power of workers** α_L to discourage firms from entering the labor market.

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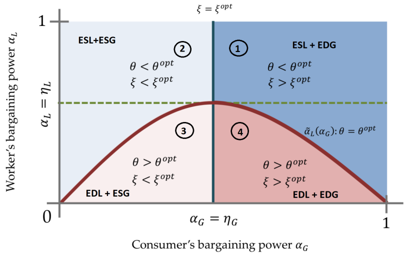

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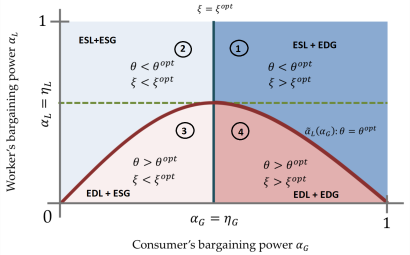

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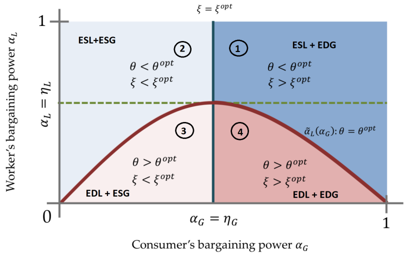

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- In the top part of the regions 1 and 2 (above the $\omega = \omega^{opt}$ line) it helps too little, and it must be accompanied by a **fall** in α_L!
- In the bottom part of regions 1 and 2, it helps too much, and it must be accompanied by a **rise** in α_L!

4. Calibrating to US data

Questions

- Do consumers have too much or too little bargaining power?

Central questions of capitalism!

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- What are the policies requires to approach the constrained optimum?

Central questions of capitalism!

Parameter values and calibration targets (short version)

Labor market

- Matching elasticity η_L: draw from survey of estimates of the labor market matching function in Petrongolo and Pissarides (2005)

Goods market

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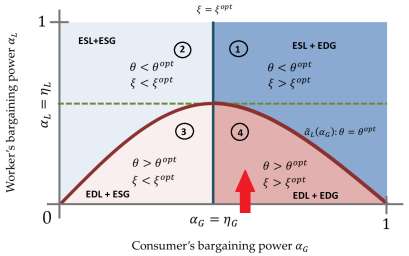
- Market power α_G: target a price markup $\mathcal{P}/w$ equal to 20%

Parameter values and calibration targets (long version)

		Parameter	Target or reference:	
Time discount rate	r	$e^{(2.5/1200)}-1$	3-month Treasury bill	
Labor market:				
Worker bargaining weight	α_L	0.34	Unemployment rate	$\mathscr{U}=0.05$
Elasticity of matching function	η_L	0.50	Petrongolo and Pissarides [2001]	
Level of matching function	χ_L	0.68	Job vacancy rate	$\mathscr{V}=0.04$
Job-separation rate	s^L	0.032	JOLTS	
Vacancy cost	γ	0.87	Product entry rate	$\psi=0.015$
Non-employment value	z	0.37	Mulligan [2012]	$\frac{z}{w}=0.50$
Goods market:				
Consumer bargaining weight	α_G	0.33	Price markup over wage	$\frac{\mathscr{P}}{w}=1.25$
Elasticity of matching function	η_G	0.14	Price elasticity of demand	$\frac{\mathrm{d}\mathscr{D}_M}{\mathrm{d}\mathscr{P}}\frac{\mathscr{P}}{\mathscr{D}_M}=-2$
Level of matching function	χ_G	0.13	Rate of capacity utilization	$\frac{\lambda}{\lambda+s}=0.85$
Goods exit rate	s^G	0.001	Product exit rate	
Cost of search	σ	0.03	American Time Use Survey	$\frac{\sigma D_U}{w\mathscr{N}}=0.05$
Marginal utility of search good	Φ	1	Normalization	

In which regime does the US economy lie?



- $\alpha_G = 0.33 > \eta_G = 0.14$: **consumers have too much bargaining power**
- $\alpha_L = 0.34 < \eta_L = 0.50$: **workers have too little bargaining power**
- Repressed inflation?!

5. Market power and markups (preliminary)

Background

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- At the same time, increasing evidence of flattening of the wage Phillips curve (Katz and Krueger, 1999; Leduc and Wilson (2017); Gali and Gambetti, 2018)
- This setup provides a way to put these two evolutions together

Increased firm power in labor markets

- Decline in unions (Schanbel, 2013)

Increased firm power in labor markets

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- Rise in large employers (Azar et al., 2017, Benmelech et al., 2018), limits to workers' bargaining power such as non-compete clauses or binding arbitration (Krueger and Posner, 2018, Starr et al., 2019).

Increased firm power in goods markets

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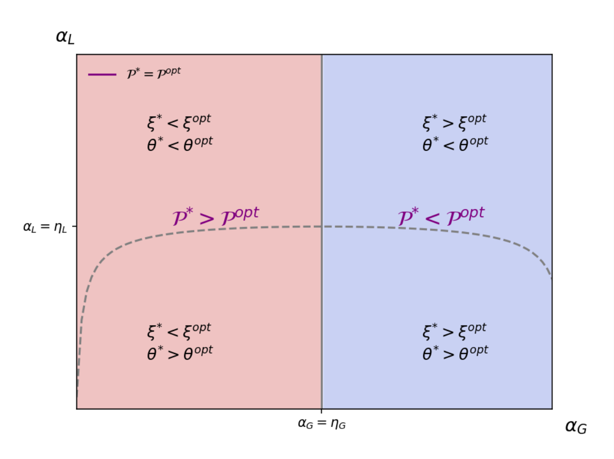
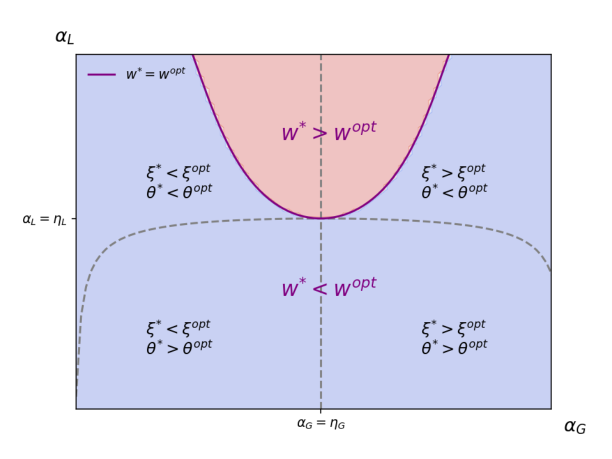
- Strictly speaking, however, markups are reflect firm market power in either the labor or the product market.

Market power and price



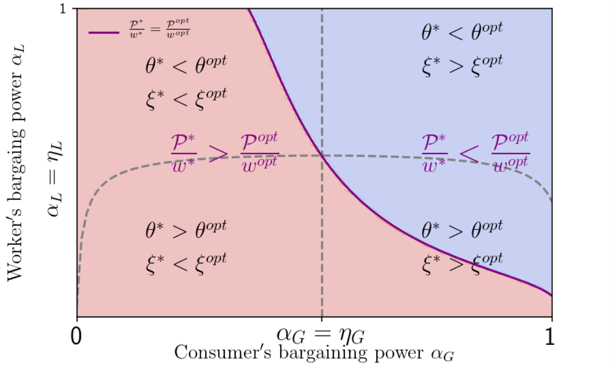
$$\mathcal{P} = (1 - \alpha_G)(\Phi + \xi\sigma)$$

Market power and wage



$$\omega = \alpha_L[\underbrace{\mu(\xi)\mathcal{P}}_{\pi} + \gamma\theta]$$

Market power and markup



$$\frac{\mathcal{P}}{\omega} = \frac{(1 - \alpha_G)(\Phi + \xi\sigma)}{\alpha_L[\mu(\xi)\mathcal{P} + \gamma\theta]}$$

6. Conclusion

Two pleas

- Take goods market frictions seriously, as well as their spillover onto the labor market!

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- Pull Benassy and Barro-Grossman disequilibrium economics out of the mothballs: matching functions are the stochastic rationing mechanism that the disequilibrium economics literature would have needed to avoid death by dint of ad-hoc rationing mechanisms.

Agenda for future research

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- Endogenous sequencing of search

A final word

Thanks!