# Efficiency in the Housing Market with Search Frictions

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- Housing market subject to search frictions
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  $\rightarrow$ "Beveridge curve" is upward sloping
- Search, endogenous entry $\Rightarrow$ 2 externalities
  1. (Usual) congestion/thick market
  2. Participation externality:

     Buyers enter $\Rightarrow$ search more costly

     $\Rightarrow$ don't internalize effect on costs

     $\Rightarrow$ additional externality

# This paper

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  - How far decentralized market from efficient allocation?

# Results

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  - Search is competitive
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- Quantitative exercise
  - Calibrate housing market, US data
  - Vacancy rate $\approx 80\%$ larger than optimal
  - Time-to-sell $\approx 85\%$ larger than optimal
  - Homeownership lower than optimal

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  - Search is competitive
- Intuition: require an additional "tool" to adjust buyer entry
- Quantitative exercise
  - Calibrate housing market, US data
  - Vacancy rate $\approx 80\%$ larger than optimal
  - Time-to-sell $\approx 85\%$ larger than optimal
  - Homeownership lower than optimal
- Show that results similar w/ participation and heterogenous buyers

# Environment

- Continuous time/simplified Gabrovski Ortego-Marti (2019 JET)
- Discount rate $r$
- Agents, risk neutral
  - Households: homeowner, search or idle (entry decision)
  - Sellers: households, construction/new housing
- Houses identical
- Sellers must post vacancy, search for buyers

# Matching, search frictions

- Matching function, Pissarides (2000)
- Buyers $b$, vacancies $v$
  - Matches: $M(b, v)$
- Market tightness $\theta = \frac{b}{v}$
- Finding rates
  - Buyers: $m(\theta) = \frac{M(b,v)}{b}$
  - Sellers: $\theta m(\theta) = \frac{M(b,v)}{v}$
- Exogenous separations, rate $s$
- Depreciation: house destroyed at rate $\delta$

# Equilibrium: key ingredients

Endogenous entry of buyers, sellers

- Free entry of sellers
  - Developers build new homes at cost $k$
- Free entry of buyers, Gabrovski Ortego-Marti (2019 JET)
  - Buyers search cost $= c^B(b)$
- Prices are determined by bargaining

# Equilibrium

- Housing Entry (HE) condition

$$\frac{(r+\delta)k + c^S}{\theta m(\theta)} = p - k$$

- Buyer's Entry (BE) Condition

$$\frac{c^B(b)}{m(\theta)} = (1-\beta)\left(\frac{\varepsilon + sk}{r+\delta+s} - k\right)$$

- Price Equation (PP)

$$p = k + \beta\left[\frac{\varepsilon + sk}{r+\delta+s} - k\right]$$

# Planner's Solution

- Planner's FOCs (sufficient, Arrow theorem)

$$\frac{c^B(b)}{m(\theta)} = \left(\frac{1-\alpha}{1+\gamma}\right)\left(\frac{\varepsilon + sk}{r+s+\delta} - k\right) \qquad (P1)$$

$$(r+\delta)k + c^S = \alpha\theta m(\theta)\left(\frac{\varepsilon + sk}{r+s+\delta} - k\right) \qquad (P2)$$

- Hosios condition not enough, need

$$\beta = \alpha \quad \text{and} \quad 1-\beta = \frac{1-\alpha}{1+\gamma}$$

- Since $\alpha < 1$, decentralized opt iff $\gamma = 0$, i.e. no entry of buyers!

  $\Rightarrow$ usual Hosios-Mortensen-Pissarides cond

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- Same results with directed search $\Rightarrow$ Hosios-Mortensen-Pissarides cond, but not enough ($\gamma = 0$ still needed)

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- Hosios condition not enough, need

$$\beta = \alpha \quad \text{and} \quad 1-\beta = \frac{1-\alpha}{1+\gamma}$$

- Intuition: need to "fix" buyers' entry first (P1), HMP cond then fixes cong/thickness externalities

# Calibration

| Preferences/Technology | Parameter | Value | Source/Target |
|---|---|---|---|
| Discount rate | $r$ | 0.012 | 0.953 annual discount factor |
| Utility flow | $\varepsilon$ | 10.883 | normalization |
| Elasticity of Matching Function | $\alpha$ | 0.16 | Genesove and Han ('12) |
| Destruction rate | $\delta$ | 0.004 | Von Nieuwerburgh and Weill ('10) |
| Separation Rate | $s$ | 0.0126 | Listing Rate = 1.67% |
| Construction cost | $k$ | 451.98 | TTS= 1.76 quarters |
| Efficiency of Matching Function | $\mu$ | 0.5682 | TTB≈ TTS (Genesove and Han, '12) |
| Seller cost | $c^S$ | 14.233 | Avg seller cost= 5.1% of price (Ghent, '12) |
| Bargaining power | $\beta$ | 0.5234 | Avg buyer cost= 8% of price (Ghent, '12) |
| Buyer cost scale | $\bar{c}$ | 22.327 | $b = 1$, normalization |
| Buyer cost elasticity | $\gamma$ | 0.68 | BC slope elasticity |

# Calibration

Include housing taxes in calibrated model

| Taxes | Parameter | Value | Source/Target |
|---|---|---|---|
| Construction | $\tau_k$ | 0 | |
| Property | $\tau_p$ | 0.28% | Tax Foundation Facts and Figures 2018 |
| Profit | $\tau_s$ | 3.65% | Aswath Damodaran Data Set |
| Transfer Rate | $\tau_b$ | 0.16% | NAR Summary of Real Estate Taxes |

# Results

| Moment | Decentralized | Optimal |
|---|---|---|
| Vacancy Rate | 2.83% | 1.55% |
| Listing Rate | 1.67% | 1.66% |
| Time-to-sell | 1.76 | 0.95 |
| Buyers | 1 | 1.72 |
| Vacancies | 1 | 0.83 |
| Homeowners | 34.33 | 52.65 |

# Results

| Taxes | Calibrated Benchmark | Optimal |
|---|---|---|
| $\tau_s$ | 3.65% | 69.8% |
| | ($1.43) | ($44.54) |
| $\tau_k$ | 0% | $-17.31\%$ |
| | ($0) | ($-$78.25) |

# Optimal Market Size

- Instead we investigate optimal homeownership rates in a heterogeneous buyer setting
- Model same as before except
  - $\varepsilon \sim F(\varepsilon)$
  - $c^B(b) = c^B$
- Results

| Moment | Decentralized | Optimal |
|---|---|---|
| Vacancy Rate | 2.83% | 1.64% |
| Listing Rate | 1.67% | 1.66% |
| Time-to-sell | 1.76 | 1.01 |
| Buyers | 1 | 1.14 |
| Home-owners | 34.33 | 35.08 |

# Optimal Market Size

| Taxes | Calibrated Benchmark | Optimal |
|---|---|---|
| $\tau_s$ | 3.65% | 50.34% |
| | ($1.43) | ($21.59) |
| $\tau_k$ | 0% | −4.41% |
| | ($0) | (−$19.91) |
| $\tau_s$ | 3.65% | 50.93% |
| | ($1.43) | ($22.44) |
| $\tilde{\tau}_b$ | 10% | 7.14% |
| | ($49.39) | ($35.43) |

# Conclusion

- Study housing market efficiency in model with
  - Search frictions $\Rightarrow$ (usual) congestion externality
  - Buyer entry $\Rightarrow$ search cost externality
- HMP condition/competitive search does not achieve efficiency
- Numerical results
  - Vacancy rate $\approx 2/3$ higher than optimal
  - Time-to-sell $\approx 2/3$ higher than optimal