

# Location as an Asset

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# 1 Introduction

- ▶ Location determines job opportunities, living amenities and housing costs.
- ▶ Location choice as a decision to invest in a ‘location asset’.
- ▶ Location Asset cost is equal to the location’s rent, and a payoff through better job opportunities and, potentially, more human capital.
- ▶ Savers: transfer resources into the future by going to expensive locations with good future opportunities
- ▶ Borrowers: transfer resources to the present by going to cheap locations that offer few other advantages
- ▶ Not subject to borrowing constraints



- ▶ Limitations by housing needs, labor supply, fertility decisions and other choices that determine the current cost and the future benefits of living in a particular location.
- ▶ Heterogenous returns depending on the holder of the asset.
- ▶ Low rates of return in financial market (e.g. low interest rates) result in low rates of return of the Location Asset and therefore larger price differentials across locations.
- ▶ Place-based policies may hurt the currently poor as they reduce the supply of cheap locations where those individuals may prefer to locate.
- ▶ The model can rationalize why low wealth individuals locate in low income regions with low opportunities even in the absence of mobility costs.
- ▶ Negative (positive) front-loaded shocks should make constrained individuals downgrade (upgrade) location, while unconstrained agents should not change their location.



## 2 A Simple Model

# Key model assumptions

- ▶ Individuals differ in their **skills** and in their **income** in periods 0 and 1

$$s \in [\underline{s}, \bar{s}] \quad \{y_t\}_{t=0}^1 \in [\underline{y}_t, \bar{y}_t]$$

- ▶ The income of an individual depends on  $(y_0, y_1, s)$
- ▶ Joint probability density over the outcomes  $f$  and the cumulative distribution  $F$

- ▶ Continuum of locations or ‘cities’ which are classified according to the complementarity of the returns from living in them the skills of individuals.
- ▶ Location of cities  $z \in [\underline{z}, \bar{z}]$
- ▶ Density of cities  $h$  and cumulative density  $H$
- ▶ Returns for an individual of skills  $s$  to live in city  $z$   $z s$
- ▶ Agents can move freely

- ▶ Population density of individuals living in cities type  $z$   $L(z)$
- ▶ Land rents  $q(z)$
- ▶ Cost of supplying housing increases with population density (due to decreasing returns)

$$q(z) = Q(L(z)) \text{ for } z \in [\underline{z}, \bar{z}]$$

- ▶ Individuals have access to a risk free bond with gross interest (exogenous and determined in world markets)
- ▶ Agents are subject to standard borrowing constraint that limits their asset holdings between period 0 and 1
- ▶ No uncertainty in income. This is important because the location asset is used to transfer consumption across time and not for precautionary purposes.

# Asset and Location Choices

- ▶ Households maximize lifetime utility with a discount factor  $\beta \leq 1$
- ▶ Problem of a household: choose *consumption in each period, purchase of the risk free bond and location in period 1.*

$$V(y_0, y_1, s) = \max_{c_0, c_1, a, z} \log c_0 + \beta \log c_1$$

s.t.

$$c_0 + a + q(z) = y_0,$$
$$c_1 = zs + y_1 + Ra,$$
$$a \geq \underline{a}.$$

# First Order Conditions

$$\frac{c_1^*(y_0, y_1, s)}{\beta c_0^*(y_0, y_1, s)} \geq R \text{ for all } (y_0, y_1, s) \quad (1)$$

*(Financial Euler equation)*

- ▶ with equality if and only if the borrowing constraint is not binding

$$a^*(y_0, y_1, s) > \underline{a}$$

- ▶ *Absent borrowing constraints, the desired asset holding of an individual is:*

$$\tilde{a}(y_0, y_1, s) = y_0 - q(z^*(y_0, y_1, s)) - \frac{y_0 + \frac{y_1 + z^*(y_0, y_1, s)s}{R} - q(z^*(y_0, y_1, s))}{1 + \beta}$$

- ▶ Savings in the financial asset

$$a^*(y_0, y_1, s) = \max \{ \tilde{a}(y_0, y_1, s), \underline{a} \}$$

- ▶ Free mobility implies that individuals are never constrained in the ‘location asset’

$$\frac{c_1^*(y_0, y_1, s)}{\beta c_0^*(y_0, y_1, s)} = \frac{s}{q'(z^*(y_0, y_1, s))} \quad \text{for all } (y_0, y_1, s) \quad (2)$$

*(Mobility Euler equation)*

- ▶ Agents can optimize their intertemporal consumption path by choosing their holding of financial assets and ‘location assets’
- ▶ The condition of land rents guarantees that the number of people in locations worse than  $z$  is equal to the number of people that choose to live in those locations



# Equilibrium Allocation and House Rents

- ▶ Since  $a^*(y_0, y_1, s) > \underline{a}$ , therefore:

$$R = \frac{s}{q'(z^*(y_0, y_1, s))}$$

Unconstrained individuals sort into cities on the basis of their skill component

- ▶ If  $q(\cdot)$  is a strictly increasing function and is convex, there exist an strictly increasing matching function  $Z^U(s) = z^*(y_0, y_1, s)$  for unconstrained individuals, such that

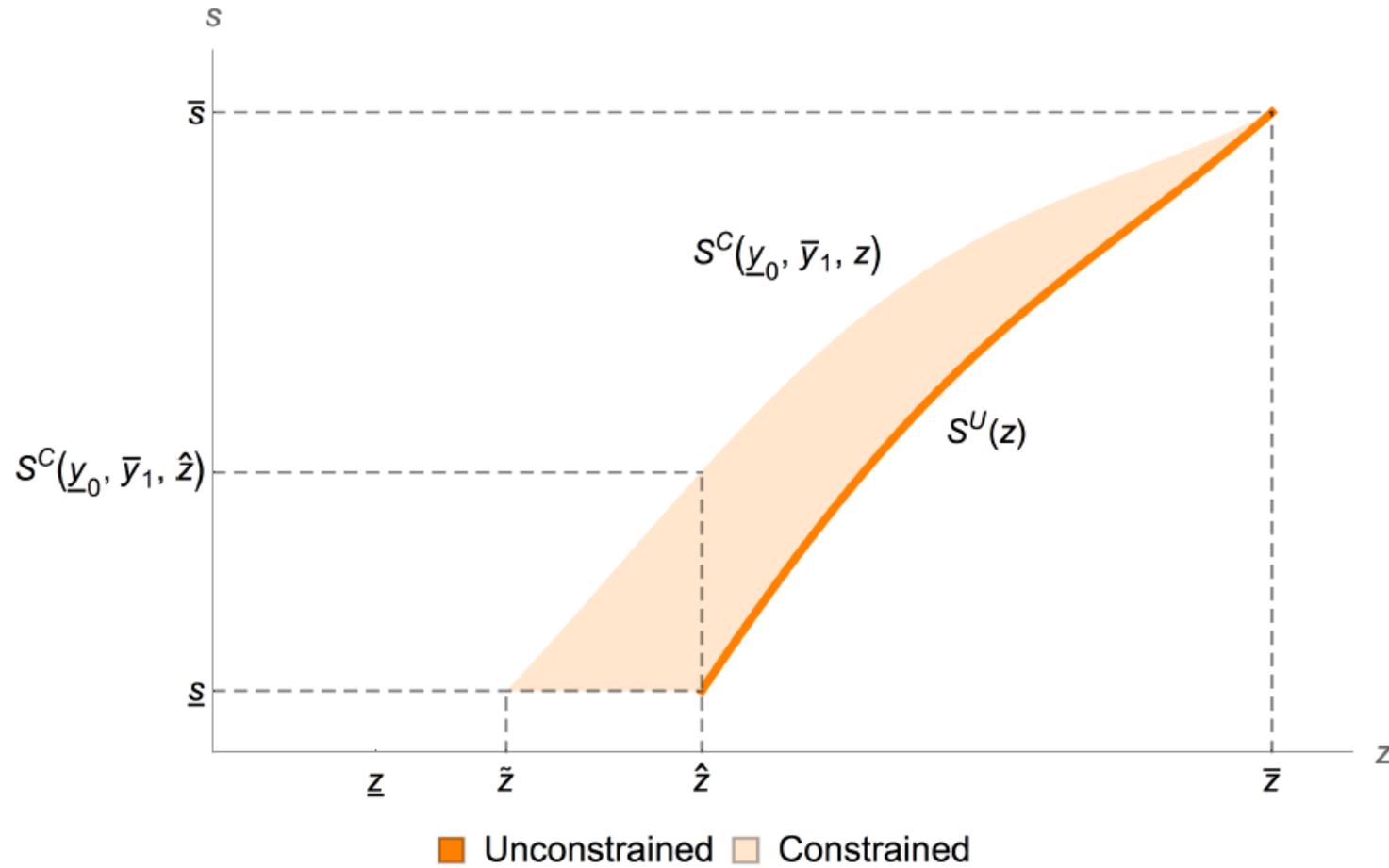
$$R = \frac{s}{q'(Z^U(s))}$$

- ▶ *Constrained individuals locate in cities with lower land rents and lower returns to skill than unconstrained individuals with the same skills.*
- ▶ *They use the location asset rather than the financial asset to adjust their intertemporal consumption path and borrow using the location asset to transfer resources to the present, something financial markets do not allow them to do.*
- ▶ *More skilled individuals locate in better cities, whether constrained or unconstrained, due to the skill complementary we introduce in individual earnings.*

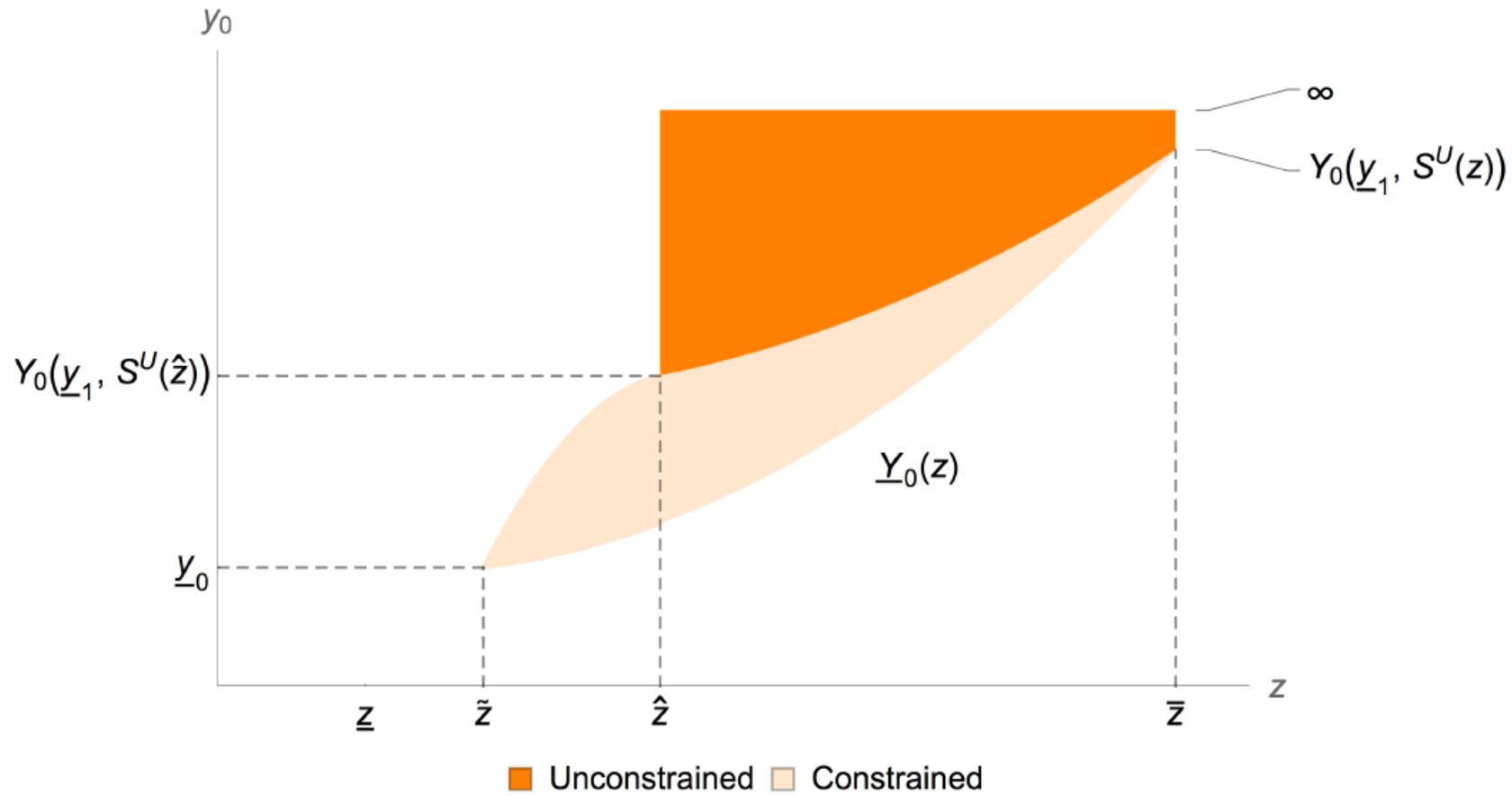
- ▶ *If agents had identical skills, they would be indifferent about where to locate when unconstrained, but their use of the location asset to transfer consumption to the present would still determine their location choice when constrained.*
- ▶ *More future income makes unconstrained individuals want to consume more in the present and therefore makes the constraint on borrowing more binding.*
- ▶ *Similarly, more skilled individuals will earn more in the future and will live in more expensive cities, making the constraint more binding.*
- ▶ *In equilibrium, unconstrained individuals always locate in better cities than constrained ones, hence there exists a threshold  $\hat{z}$  such that for  $z < \hat{z}$  all individuals in the city are constrained and above that we have a mixed of constrained and unconstrained individuals.*
- ▶ *The best city  $\bar{z}$  is an exception and has no constrained agents.*



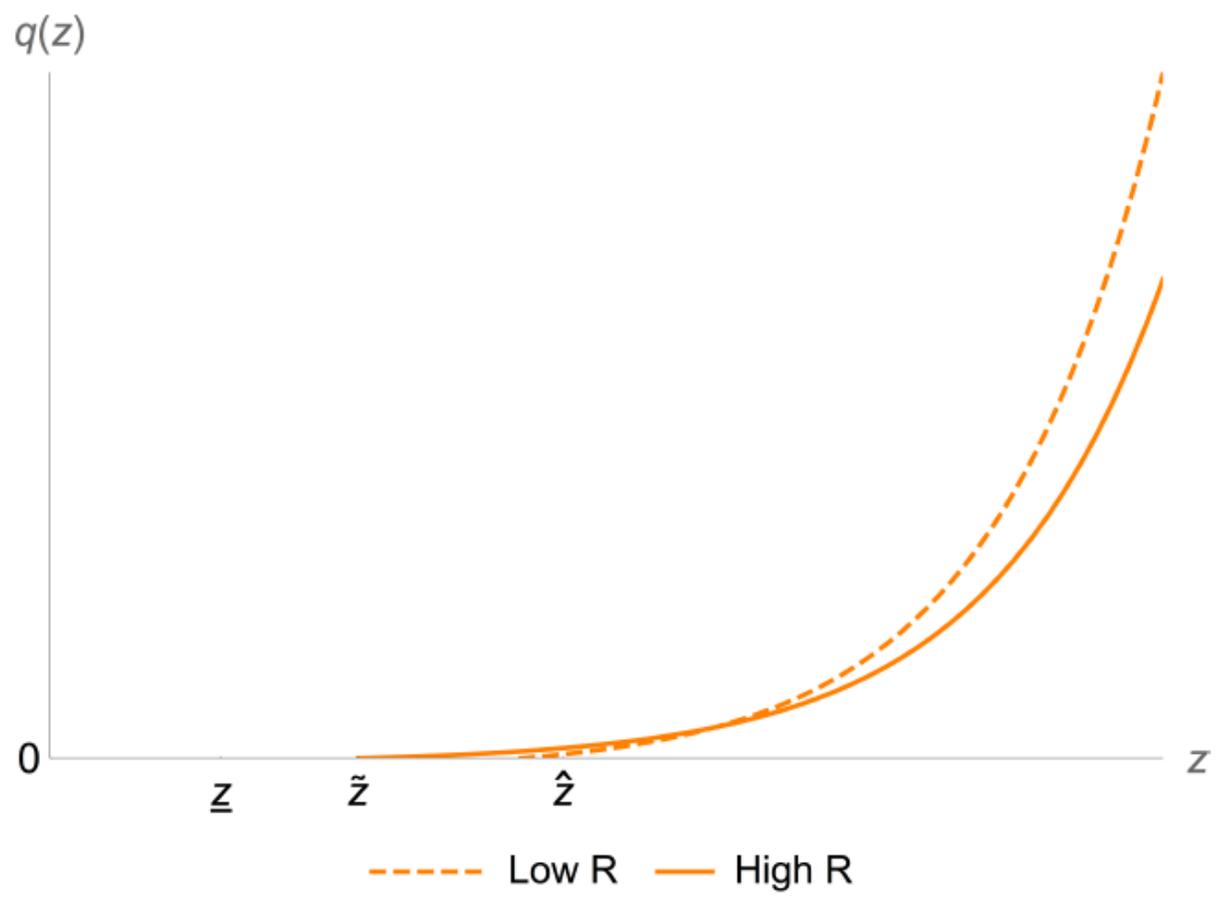
# Allocation of skills to cities



# Allocation of income groups to cities



# House rents across cities



# Optimal Allocation

- ▶ Two steps to obtain it:
  - ▶ Problem of allocating individuals across locations to maximize discounted second period output net of housing costs.
  - ▶ Allocation of consumption in both periods across individuals of different types.
- ▶ Given the assumed supermodularity between  $s$  and  $z$ , the planner allocation necessarily involves a one-to-one increasing matching function.
- ▶ The solution exhibits positive assortative matching. Hence, in contrast to the equilibrium allocation, only one type of agent locates in a given city.



# Place-Based Policies

- ▶ Aim to improve the characteristics of some of the worse locations in the economy. This is costly and implies taxing other locations.
- ▶ Positive sorting between skills and city types imply targeted city type is better than the average.
- ▶ In the equilibrium with place-based policies rents are positive and identical in all cities, but for the lowest skilled individuals the benefits of locating in the improved cities are still zero.



# The Location Effect of Front and Back-Loaded Shocks

- ▶ Income shocks that affect the relative slope of an individual's income path. These shocks will induce agents to adjust their savings using the financial and location assets.
- ▶ **Negative Front-Loaded Shocks (Positive Back-Loaded Shocks, similarly):**
  - ▶ Agents that are constrained or that become constrained due to the shock, will use the location asset more and will downgrade their location.
  - ▶ Unconstrained individuals that remain unconstrained stay where they are.

Constrained individuals, or those that become constrained, borrow more using the location asset, while unconstrained individuals use the financial asset to transfer consumption to the present.



► **Positive Front-Loaded Shocks (Negative Back-Loaded Shocks, similarly):**

Constrained individuals, or individuals that become unconstrained, save with the location asset and upgrade location. Individuals that were, and remain, unconstrained use the financial market to save and do not change their use of the location asset.

► **Permanent adverse (or positive) shocks can imply a change in the slope of the income profile.**

► **Increase of skill  $s$**

An increase in  $s$  increases the return of the location asset relative to the financial asset which implies that agents want to save more using the location asset. Hence, they want to upgrade their city.



# 3 Location and Moving Choices in France

# Objective and type of data used

- ▶ Objective: contrast predictions with empirical evidence
- ▶ Type of data used:
  - ▶ Employer tax return data from a 4% longitudinal panel representative of all workers in the French economy from 1994 to 2007
  - ▶ Worker identifier: Wage (the start and end dates of all her employment spells, residence and workplace municipality)
  - ▶ Other worker characteristics: age, gender, occupation and birthplace.



# Principal Findings

## ▶ The Impact of Location on Wages

- ▶ Real wages are increasing in  $z$
- ▶ Moving to the best location in France conditional on the established controls leads to higher wages (12%; See Graph) than moving to the worst location.
- ▶ Incremental gains from mobility accrue partly over time
- ▶ Location in fact has a payment structure that resembles an intertemporal asset

## ▶ Location Decisions after Non-Employment Shocks

- ▶ The theory predicts that agents that are lower in the income rank of their origin municipality should downgrade relative to others as a result of the unemployment spell. The empirical evidence support this view.
- ▶ A job termination implies that agents in the bottom of percentile of their location's income distribution downgrade to a worse location than the the highest-income agents in their original location. This is a large effect that indicates very different mobility patterns across individuals.

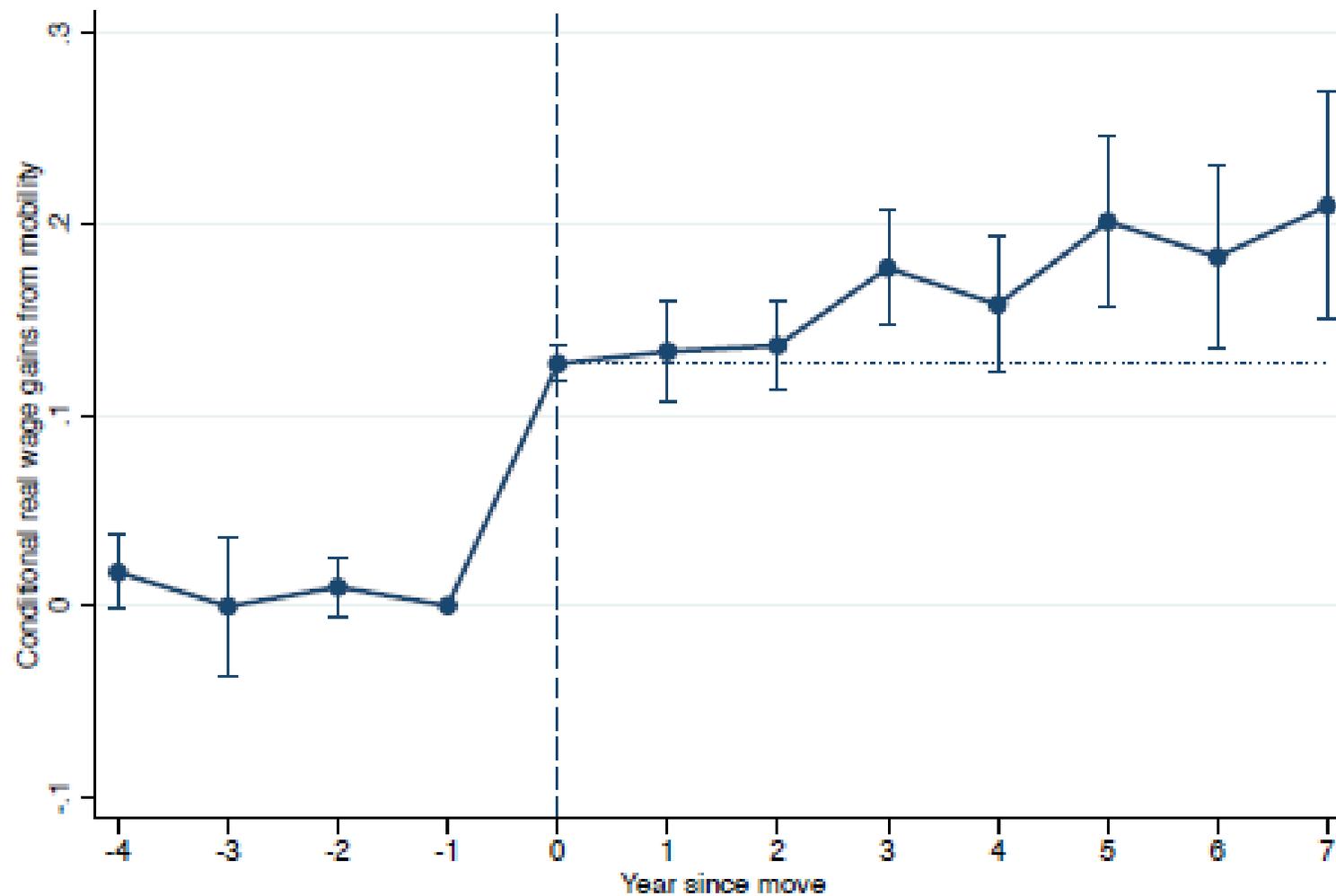


Figure 6: Plot of the  $\beta_t - \beta_{-1}$  coefficients, for  $t = -4..7$ , and observed daily real wages.  $t = 0$  is the first move of a worker and is the instantaneous effect of location. Standard errors clustered at the origin municipality level. Using the 4<sup>th</sup> long panel. The dots show the point estimate, and vertical bars are the 90% confidence intervals.

- ▶ Industry and occupation fixed effects increase the magnitude of the coefficients significantly.
- ▶ Individuals in the same occupation and industry with very different incomes tend to move to the same location due to the spatial concentration of labor demand in specific industries and occupations.
- ▶ For agents with different unemployment spell lengths:
  - ▶ The main effects of unemployment on location are larger as time spent non-employed increases
- ▶ Differences in amenities consumption or commuting do not challenge the location as an asset hypothesis
- ▶ Post-unemployment wages and amenities are positively associated with location rank
- ▶ Individuals in the best locations do not use the location asset at all because none of them are constrained, while individuals in the worst locations use it much more.

Table 1: Unemployment spells and location decisions

Movers only. Fixed city ranks.

Origin Wage Perc. (OWP)	0.100*** (0.005)	0.100*** (0.005)	0.119*** (0.004)	0.148*** (0.006)	0.354*** (0.018)	0.345*** (0.018)	0.343*** (0.018)	0.341*** (0.018)	0.730*** (0.051)
<i>Controls</i>									
Pre-Move Log Wage					-0.084*** (0.004)	-0.087*** (0.004)	-0.087*** (0.004)	-0.088*** (0.004)	-0.083*** (0.004)
Post-Move Log Wage						0.023*** (0.002)	0.022*** (0.002)	0.020*** (0.002)	0.024*** (0.002)
Post-Move Log Comm. Dist.							0.010*** (0.001)	0.001 (0.001)	0.001 (0.001)
Post-Move Amenities Perc. (First PC, other 4 unrep.)								0.290*** (0.013)	0.289*** (0.013)
OWP * W0									-0.094*** (0.010)
Constant	-0.044*** (0.009)								
<i>Fixed effects</i>									
Origin Département & Year		✓	✓	✓	✓	✓	✓	✓	✓
Age, Birthplace & Gender			✓	✓	✓	✓	✓	✓	✓
2-Digit Origin Occ. & Ind.				✓	✓	✓	✓	✓	✓
Obs.	292489	292489	292431	292428	292428	292428	270351	269914	269914
R <sup>2</sup>	0.008	0.060	0.072	0.075	0.088	0.090	0.093	0.154	0.157
W.-R <sup>2</sup>		0.008	0.009	0.010	0.024	0.026	0.029	0.095	0.098

22,180 Origin Municipalities; 2002-2007. Standard errors in parenthesis.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . SEs clustered at the department level.

Effect of OWP at median W0 in last column =  $0.730 - 0.094 * 3.512 = 0.400$ . At P10 = 0.496. At P90 = 0.334

# 4 Conclusions

- ▶ Location decisions can be understood as an investment that allows individuals to transfer resources across periods even when they are constrained in financial markets.
- ▶ Individuals that are constrained to borrow in the financial markets use the location asset to borrow and live in locations that offer relatively bad work and educational opportunities but are cheap in terms of housing costs and other local expenses.
- ▶ Location choices underscores the importance of the incentives to smooth consumption and the extent to which individuals face financial constraints as essential to understand where they live.
- ▶ The fact that many individuals choose to live in such locations, rather than in areas that offer more opportunities, might seem puzzling from a static perspective, but is a perfectly reasonable choice through the lens of our dynamic theory.
- ▶ Using place-based policies to improve some of the worse locations can harm some of the less skilled agents in the economy.

# 5 Advantages and limitations

## ► Advantages

- The inclusion of a Location Asset concept
- In contrast to other literature that relies on unobserved, and implausibly large, migration costs to explain location choices, this model rationalizes this behavior even when migration is perfectly free.
- Interesting insights for policy development

## ► Limitations

- There are data limitations which authors solve with the theoretical model.
- The location as an asset view is more general than the particular model the authors put forward in this paper and can be contrasted more fully with the data.
- The empirical evidence is from France. Thus, the results may not be the same for other regions or countries.

