The effect of staying on moving: Evidence for dynamic amenities from Danish refugees

Farid Farrokhi and David Jinkins

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People are persistent

- 86% of Danes 35-44 lived in the same city in 2006 as they did ten years earlier
- 93% of Danes 45-54 lived in the same city in 2006 as they did ten years earlier

What are moving costs?

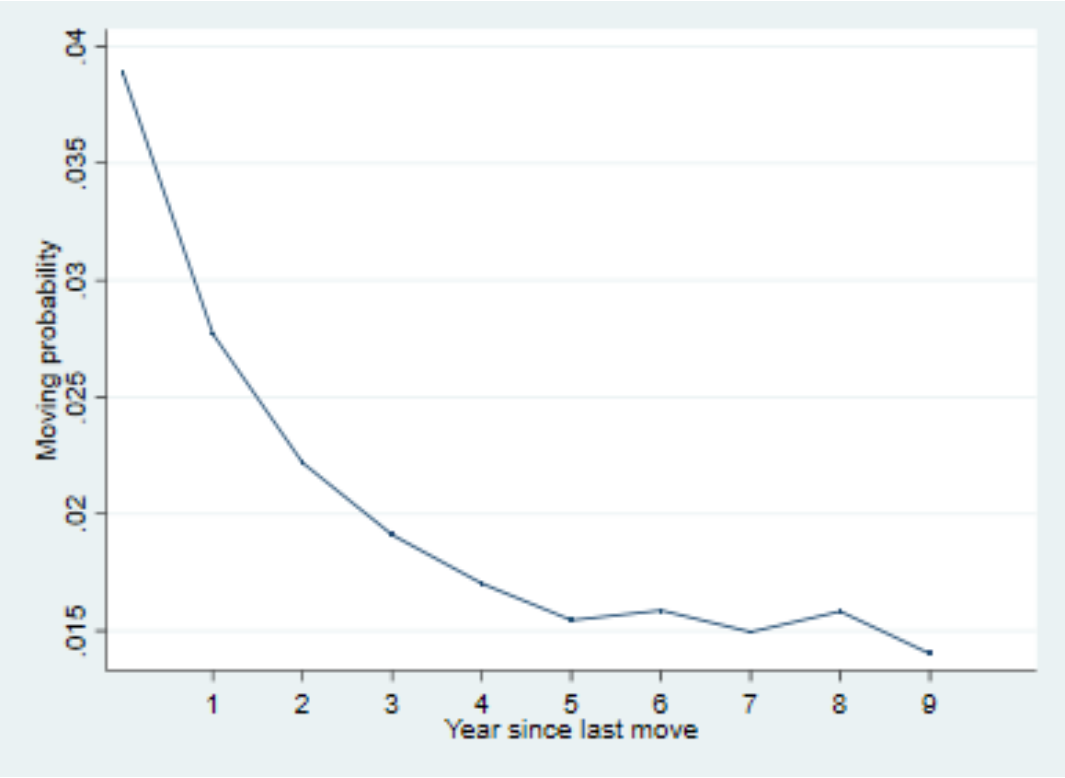
- Structural literature has estimated that moving costs are rather large
  - 312,000 USD on average in Kenan and Walker (Ecma 2011)
  - By KW calculations, 42-90% of lifetime income
  - Tombe and Zhu moving reduces l.u. by factor 2.4-5.3.
- Understanding these costs is important:
  - Why do people stay in a "bad" location?
  - The physical, direct costs of moving cannot be **that** high.
  - Policy might be possible
  - Must understand the nature of the friction

Unpacking moving costs

- This paper: Focus on one aspect of moving cost, dynamic amenities.
- Economic geography:
  - Amenities are the reason some locations are "better" than others (weather)
  - Everyone enjoys them to the same degree
  - In practice, often a structural residual
- Our idea: Individual location-specific assets:
  - Social network
  - Learning about parks, schools, neighborhoods
  - Securing a desirable job
  - Learning about city specific institutions
- The longer one is in a city, the greater the return to remaining there.

Initial evidence

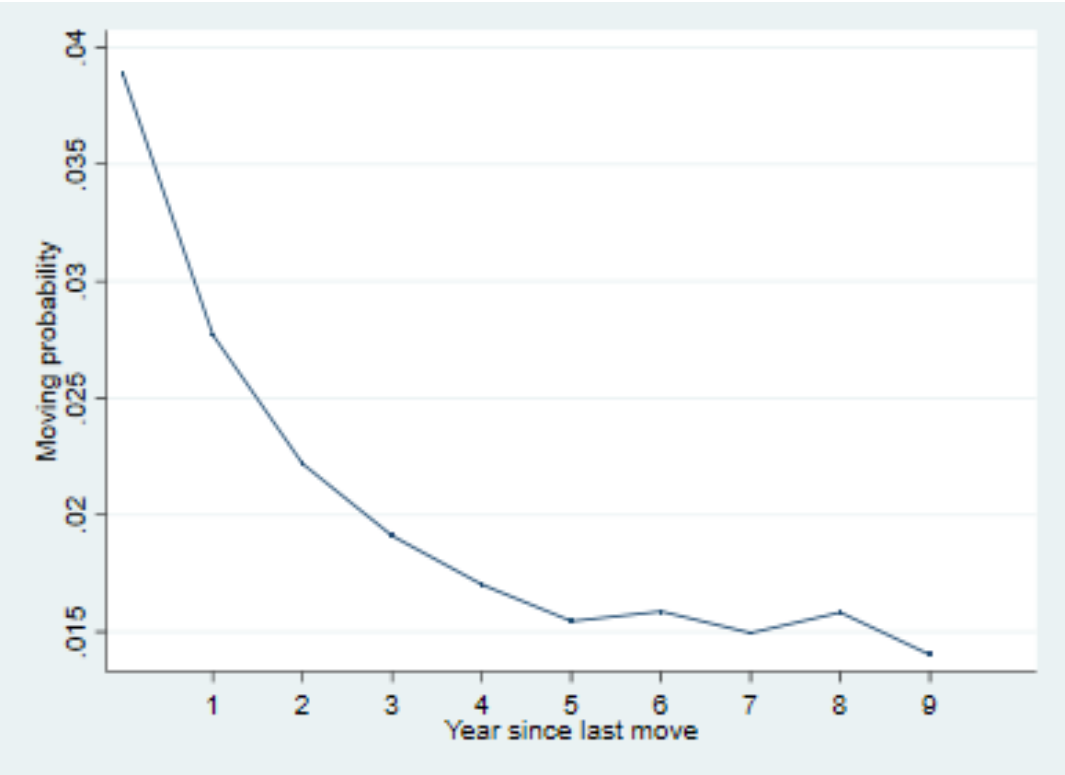
- Danish moving probabilities (between cities) conditional on being 35 years old



- Moving probabilities are low and fall with tenure
- Robust relationship
- Dynamic amenities?

Selection issue

- Danish moving probabilities (between cities) conditional on being 35 years old



- Unfortunately, selection:
  - People in year 1 different than people in year 8
  - People in year 8 might simply love the city from the get-go

Selection issue

- Econometrician can't observe individual preferences over cities
- Experiment we would like to do:
  - Randomly allocate people to cities
  - Randomly force some people to stay for a period of time
    1. Once people can move, do movement patterns depend on length of forced stay?
    2. Years later, are the forced stayers more likely to still be there?
  - If so, evidence for dynamic amenities
- Danish refugee resettlement approximates this experiment.

Related Literature

- Related models of migration (Kennan and Walker, 2011; Tombe and Zhu, 2019; Caliendo et al., 2019)
- Estimation of costs as residual (Lee and Wolpin, 2006; Artuç et al., 2010; Hummels and Schaur, 2013)
- Danish refugees (Damm, 2009; Damm and Dustmann, 2014; Dustmann et al., 2016)

Road map for talk

- What we do:
  - Develop a simple two-period model to measure dynamic amenities
  - Use refugee placements in Denmark to identify model
  - Speculate on mechanisms that cause dynamic amenities
- Road map for the talk:
  - Theory and explain identification
  - Present data and descriptives
  - Estimate empirical version of model
  - Explore data for evidence of mechanisms

Theory

- Two-period model
- Initial locations j, person i
- τ is tenure in a location
- Choice: Move from j to k?
- Log utility:

$$y_{kt}^{i}(j,\tau) = \begin{cases} \mu_k + \eta_k^i - C + \varepsilon_{kt}^i & k \neq j \\ \mu_k + \eta_k^i + \phi\tau + \varepsilon_{kt}^i & k = j \end{cases}$$

- μ_k is common city-specific amenities
- η_k^i individual amenities in location k
- C is disutility or costs of moving
- ε_{kt}^i is independent idiosyncratic shock with $e^{\varepsilon_{kt}^i}$ Frechet

Theory: moving probability

- Probability that person i moves to k relative to staying in j is:

$$\frac{\pi_k^i(j,\tau)}{\pi_j^i(j,\tau)} = \left[\frac{\exp(\mu_k + \eta_k^i - C)}{\exp(\mu_j + \eta_j^i + \phi\tau)}\right]^\theta$$

- In logs:

$$\ln \pi_k^i(j,\tau) - \ln \pi_j^i(j,\tau) = (\tilde{\mu}_k - \tilde{\mu}_j) + (\tilde{\eta}_k^i - \tilde{\eta}_j^i) - \tilde{C} - \tilde{\phi}\tau \quad (1)$$

- Tilde coefficients are multiplied by the Frechet scale parameter θ.

Identification

$$\mathbb{E}\left[\ln \pi_k^i(j,\tau) - \ln \pi_j^i(j,\tau)|j,\tau\right] = (\tilde{\mu}_k - \tilde{\mu}_j) + \mathbb{E}\left[(\tilde{\eta}_k^i - \tilde{\eta}_j^i)|j,\tau\right] - \tilde{C} - \tilde{\phi}\tau$$

- Expectation over individuals
- To save space, define $P_j^k(\tau) \equiv \mathbb{E}\left[\ln \pi_k^i(j,\tau) - \ln \pi_j^i(j,\tau)|j,\tau\right]$
- ϕ (and C) are our parameters of interest
- Econometrician observes aggregate flows cond. on j and τ
- Adding $P_j^k(\tau) + P_k^j(\tau)$ eliminates the μ effects.
- Comparing people with different τ's separates C and τ.
- $\mathbb{E}\left[\tilde{\eta}_j^i|j,\tau\right]$ difference term does not disappear.

Identification (cont)

$$P_j^k(\tau) = (\tilde{\mu}_k - \tilde{\mu}_j) + \mathbb{E}\left[(\tilde{\eta}_k^i - \tilde{\eta}_j^i)|j, \tau\right] - \tilde{C} - \tilde{\phi}\tau$$

- $\mathbb{E}\left[\tilde{\eta}_j^i|j, \tau\right]$ is unobservable
- $\mathbb{E}\left[\tilde{\eta}_j^i|j, \tau\right]$ and τ are positively correlated
- In richer dynamic model, caused by selection
- Naive estimation might pick it up as moving cost!

Identification (cont)

$$P_j^k(\tau) = (\tilde{\mu}_k - \tilde{\mu}_j) + \mathbb{E}\left[(\tilde{\eta}_k^i - \tilde{\eta}_j^i)|j, \tau\right] - \tilde{C} - \tilde{\phi}\tau \qquad (2)$$

- Refugee assignment to eliminate the η_k^i term
- Since 1986, refugees placed pseudo randomly across locations
- Forced to stay in location of placement for several years
- For refugees, η random and uncorrelated with τ
- Idea is to estimate the above equation using flows of refugees

Refugees

- 1986-1999, Danish Refugee Council offered refugees low-cost housing (90% accepted).
- Allocated across municipalities in proportion to population (some caveats).
- Danish Refugee Council adopted policy of conditional random allocation:
  - Conditional on country of origin, family status (married, children), health issues, special educational needs, close family already in Denmark, year of immigration (Damm 2005).
  - Year of immigration, as constraints became more binding as time passed.
  - Those that chose usually chose major cities, esp. Copenhagen.
- Refugees were provided with Danish courses and social assistance for 1.5 years.
  - Refugees were encouraged by social workers to stay for this period.
  - Even so, no restriction on leaving.

Policy change in 1999

- Reaction to large Bosnian influx in early 1990's (mostly exclude Bosnians from analysis)
- Refugee resettlement formalized and moved from DRC to the Danish Immigration Service
- Each Danish municipality assigned an annual quota for refugees
- Danish courses and social assistance extended to 3 years after 1999
  - Became much more mandatory to stay for full three years
  - Could only leave with job contract (some caveats)
  - Change again in 2014 to "maximum 3 years", and current law "at least one, and maximum 5 years"

Policy change in 1999

- Less research on this period
- Potentially less random
  - Refugees interviewed about preferences
- Azlor, Damm, and Schultz-Nielsen (2018) method:
  - Quotas in desirable locations fill up fast
  - Refugee applications take months or years
  - Thus placements in later calendar months random
- In most of our empirical section:
  - Drop first placement in Copenhagen
  - Keep only refugees registered in final quarter of year after 1999
  - Comparison group of non-refugee immigrants from same countries

Are final quarter refugee placements different?

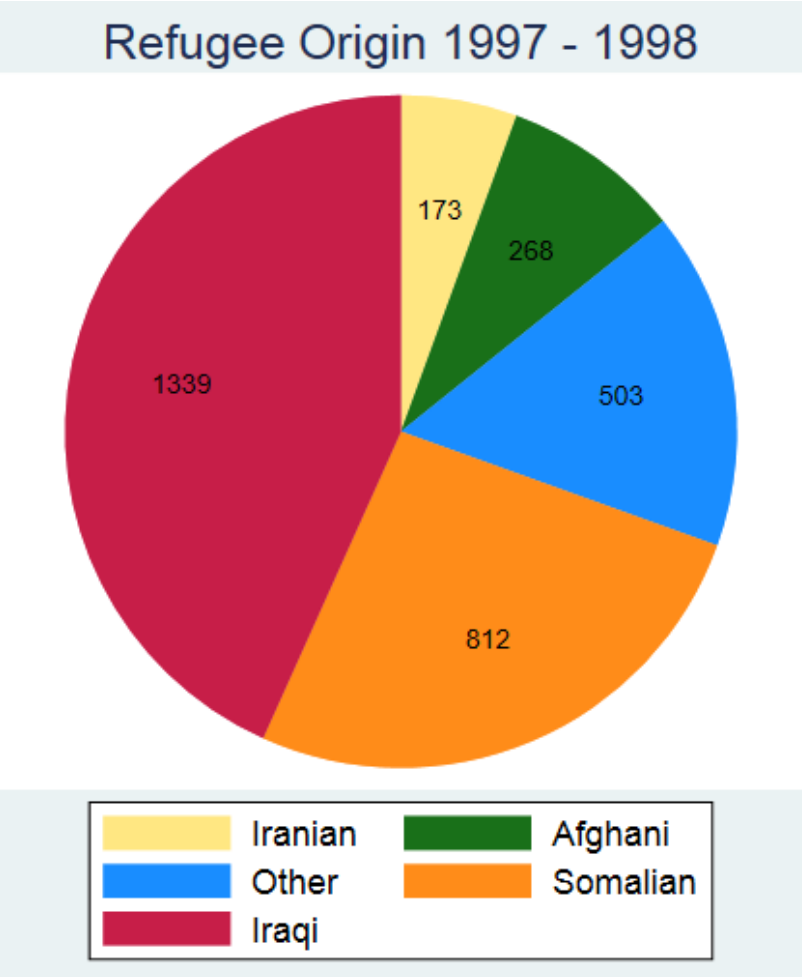
Data sources

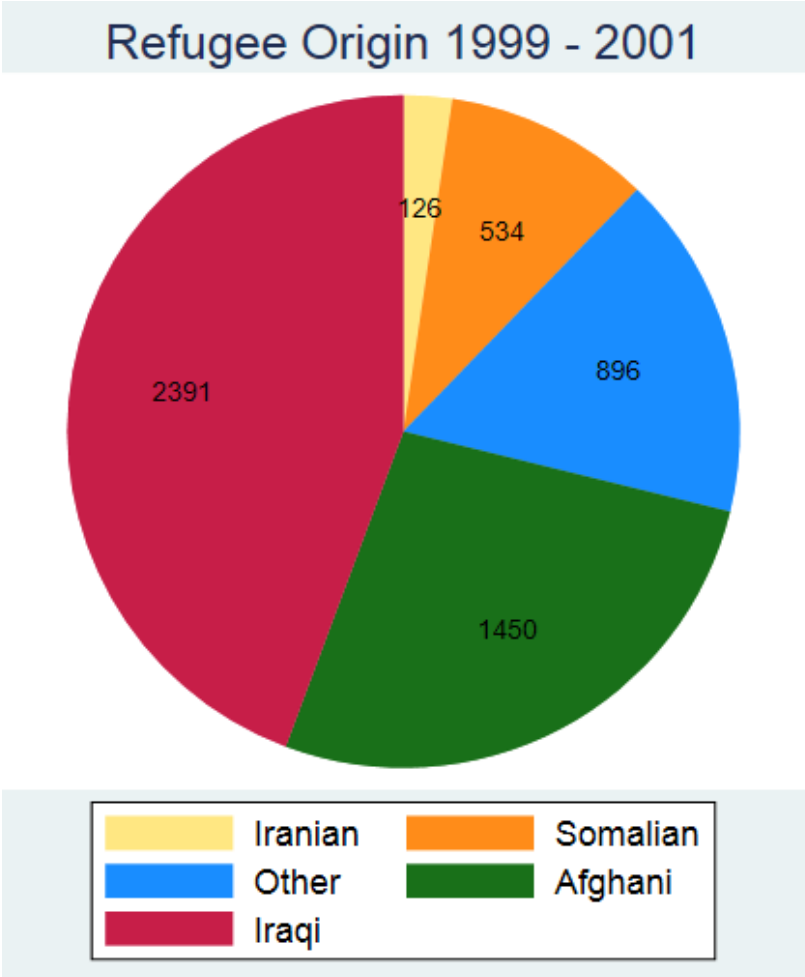
- All Danish administrative data
- Census register (1986-)
  - Demographics
  - Municipality of residence at year end
  - Country of origin
- Visa register (1997-)
  - Identify refugees (first visa asylum)
  - Previous research identifies refugees from 1986 using demographics Previous studies: how well did they identify refugees?
- Unit of geography
  - We call it city, based on Denmark Statistics *landsdele*
  - Something like a commuting zone, county for rural areas
  - Eight of them in Denmark

Descriptive Statistics on Arrival 1997-2001

	Refugee		Non-ref	
	mean	sd	mean	sd
Age	34.5	10.9	29.9	10.0
Female	0.34	0.47	0.54	0.49
Married	0.35	0.48	0.51	0.50
Total	9,299		49,652	

Descriptive Statistics

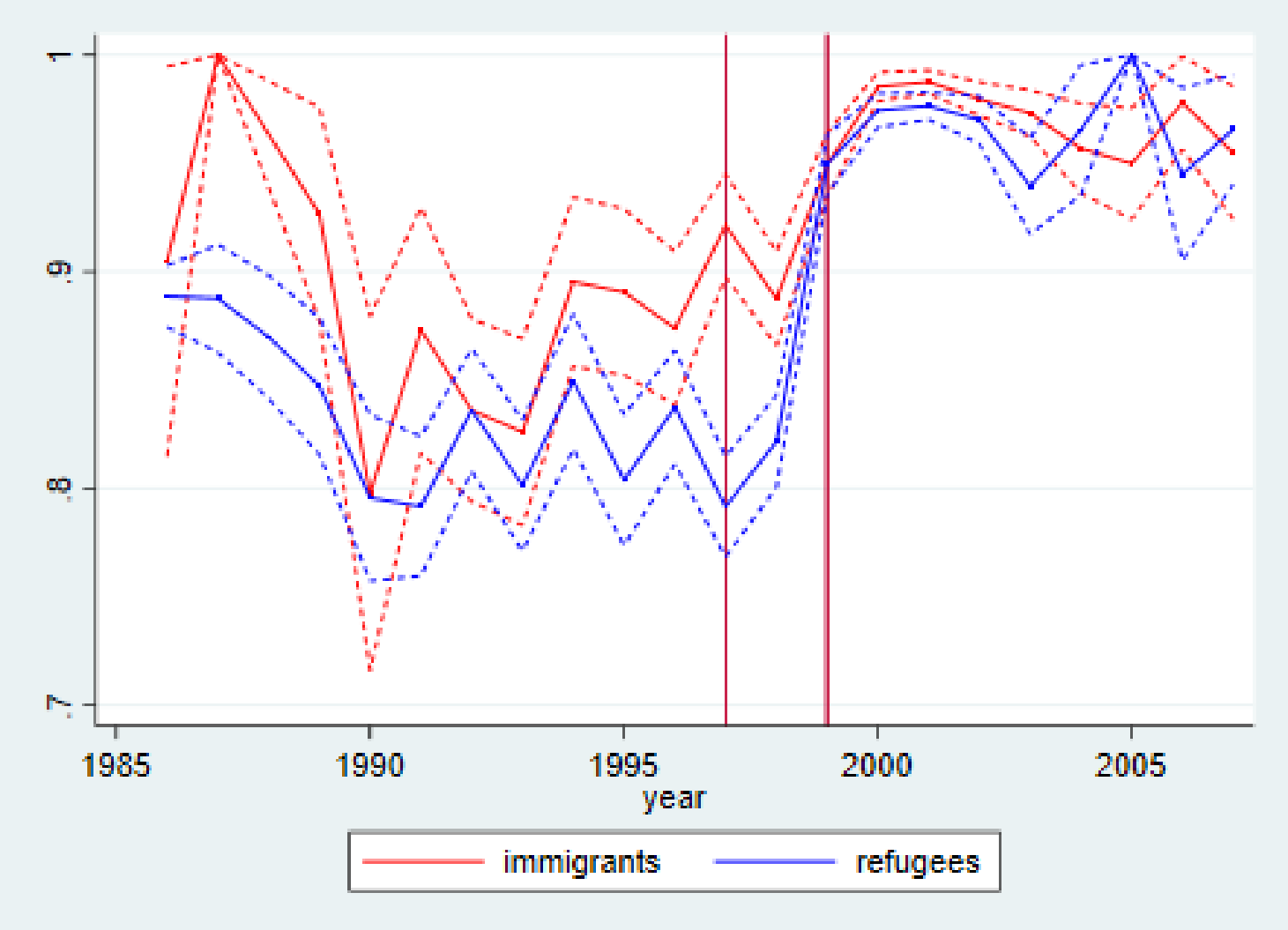




Was the dispersion policy effective?

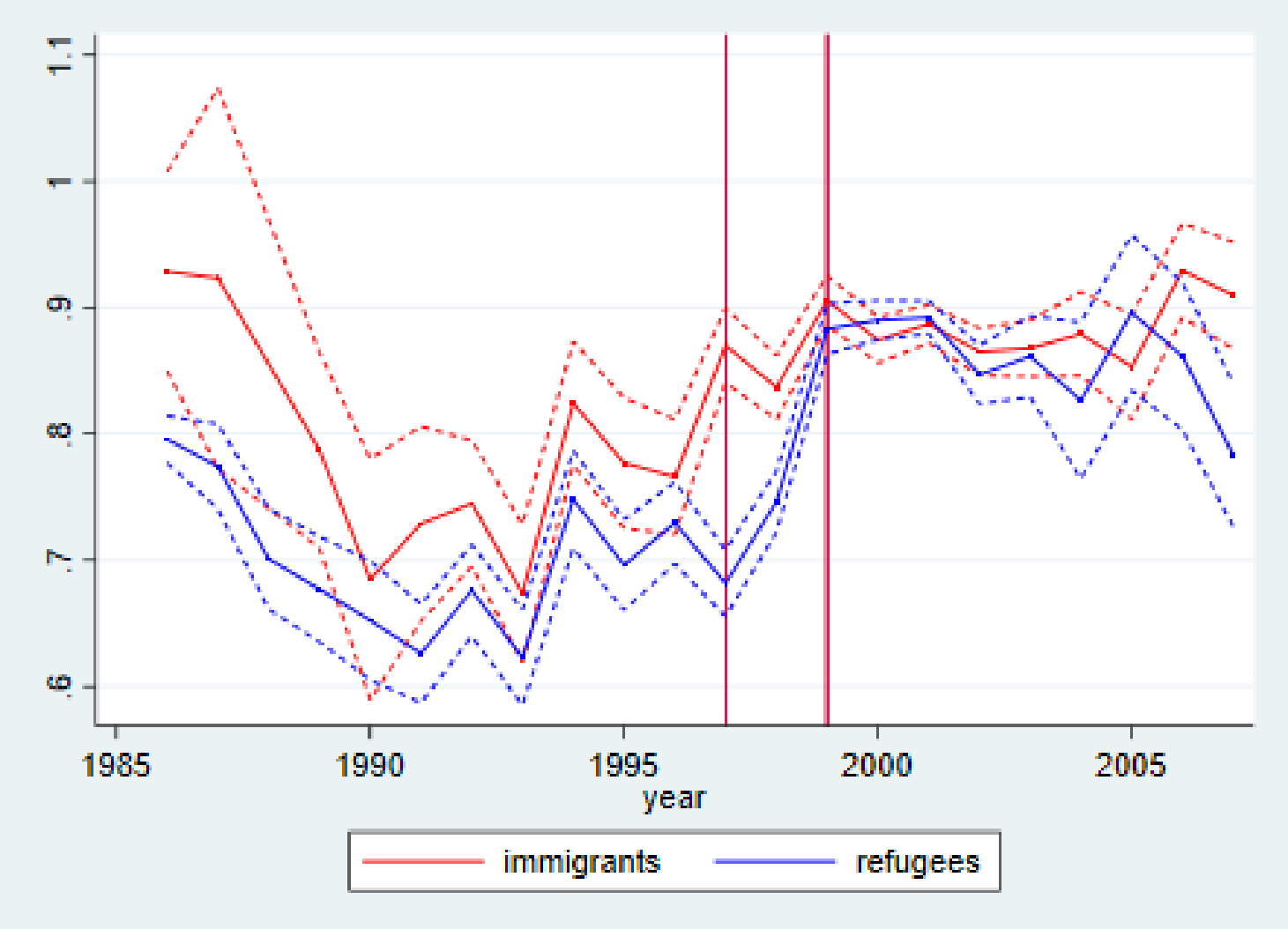
Initial location, 1999 arrivals		
	Non-Refugee	Refugee
Copenhagen	41.33	6.96
North Zealnd	5.72	3.75
East Zealand	3.14	3.59
West/Sou Zea	5.81	15.93
Fyn	6.01	14.27
Aarhus/E Jut	21.84	30.63
West Jutland	5.41	13.27
North Jutlnd	6.10	11.57

Did the policy change in 1999 have an effect?



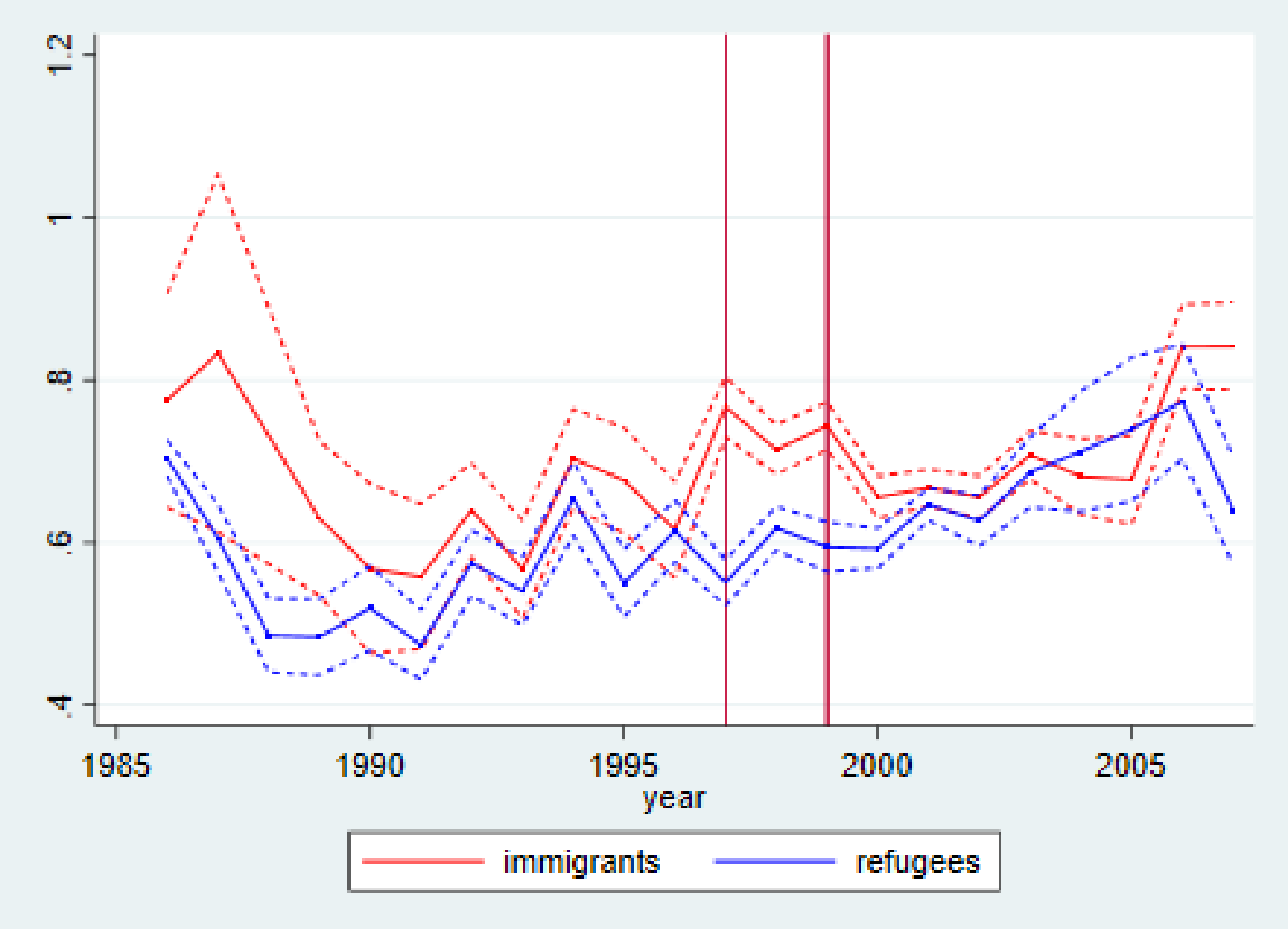
Fraction still in arrival city in second year

Did the policy change in 1999 have an effect?



Fraction still in arrival city in fourth year

Did the policy change in 1999 have an effect?



Fraction still in arrival city in tenth year

In a regression: Diff-in-diff

- Compare refugees to non-refugees
- Only keep non-refugee immigrants from the top 10 refugee sending countries
- Regress "Still in placement 10 years later" on refugee dummy, post 1999 dummy, and their interaction
- Expect:
  1. Coefficient on "refugee" negative (immigrants select into preferred location)
  2. Coefficient on interaction of "refugee" and "post-1999" positive (dynamic amenities)

Still in placement 10 years later

	Still there	Still there	Still there	Still there
refugee	-0.152***	-0.176***	-0.148***	-0.139***
	(0.0137)	(0.0232)	(0.0236)	(0.0247)
post 1999	-0.0619***	-0.0579**	-0.0359	-0.0406*
	(0.0125)	(0.0225)	(0.0226)	(0.0225)
ref × post 1999	0.0506**	0.107***	0.0930***	0.104***
	(0.0205)	(0.0316)	(0.0315)	(0.0315)
Constant	0.807***	0.663***	0.640***	0.501***
	(0.0100)	(0.0189)	(0.0193)	(0.0957)
Observations	8,836	4,422	4,422	4,422
R-squared	0.018	0.016	0.047	0.059
Omit Copenhagen	NO	YES	YES	YES
Country of origin FE	NO	NO	YES	YES
Family type FE	NO	NO	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Measuring dynamic amenities

$$P^k_{j,t}(\tau) = (\tilde{\mu}_{kt} - \tilde{\mu}_{jt}) + \mathbb{E}\left[\tilde{\eta}^i_k(\tau) - \tilde{\eta}^i_j(\tau)|j,\tau\right] - \tilde{C} - \tilde{\phi}\tau$$

- Same as in identification section, but allow time changing μ.
- Assume $\mathbb{E}\left[\tilde{\eta}^i_j\right] = 0$
- For refugees:
  - Before 1999 $\mathbb{E}\left[\tilde{\eta}^i_j|j,1\right] = 0$
  - After 1999 $\mathbb{E}\left[\tilde{\eta}^i_j|j,\tau\right] = 0$ for $\tau = 1,2,3$
- For non-refugees:
  - Expect $B^k_j(\tau) = \mathbb{E}\left[(\tilde{\eta}^i_k(\tau) - \tilde{\eta}^i_j(\tau)|j,\tau\right] < 0$
  - Assume unrelated to t
- Diff-in-diff:

$$P^{k,R}_{j,t_2}(3) - P^{k,N}_{j,t_2}(1) - \left(P^{k,R}_{j,t_1}(1) - P^{k,N}_{j,t_1}(1)\right) = -2\tilde{\phi}$$

Estimation: some issues

$$P^{k,R}_{j,t_2}(3) - P^{k,N}_{j,t_2}(1) - \left(P^{k,R}_{j,t_1}(1) - P^{k,N}_{j,t_1}(1)\right) = -2\tilde{\phi}$$

- Issue 1: observe noisy version of expected flows
  - $P^k_{j,t}$ is expectation of log flows
  - Solution: Use Taylor expansion
- Issue 2: Data contains many zeros
  - Data small to begin with
  - For now, add one to all flow frequencies

Expectation of log flows

- We need $\mathbb{E}\left[\ln \pi^i_{kt}(j,\tau)\right]$
- Observe noisy version of $a \equiv \mathbb{E}\left[\pi^i_{kt}(j,\tau)\right]$
- Approximate with 2nd-order Taylor expansion around a:

$$\ln X \approx \ln(a) + \frac{1}{a}(X-a) - \frac{1}{2a^2}(X-a)^2$$

- Taking the expectation:

$$\hat{P}^k_{j,t}(\tau) \equiv \ln(\mathbb{E}\left[\pi^i_{kt}(j,\tau)\right]) - \frac{1}{2\mathbb{E}\left[\pi^i_{kt}(j,\tau)\right]^2}\mathbb{V}\left[\ln \pi^i_{kt}(j,\tau)\right]$$

- Now have differenced approximation/measurement errors ξ_{jkt}:

$$\hat{P}^{k,R}_{j,t_2}(3) - \hat{P}^{k,N}_{j,t_2}(1) - \left(\hat{P}^{k,R}_{j,t_1}(1) - \hat{P}^{k,N}_{j,t_1}(1)\right) = 2\tilde{\phi} + \xi_{jkt}$$

Data sparcity

$$\hat{P}^{k,R}_{j,t_2}(3) - \hat{P}^{k,N}_{j,t_2}(1) - \left(\hat{P}^{k,R}_{j,t_1}(1) - \hat{P}^{k,N}_{j,t_1}(1)\right) = -2\tilde{\phi} + \xi_{jkt}$$

- We have 4645 refugees in 1997-1998, and 1548 random refugees in 1999-2001
- But distribution across locations is skewed
- Flows even moreso
  - Plenty of flows to and from big and medium cities (Aarhus, Odense)
  - Far fewer flows to small locations
  - Particularly little flow between small locations
- To estimate flows j to k, need non-zero refugee flows two periods, and non-refugee flows in two periods
- In practice, eliminates many pairs
- For now, we simply add one migrant to all location pairs
  - More complicated corrections with nicer properties possible
  - Weight regressions by initial placements in origin

More estimation details

$$\hat{P}^{k,R}_{j,t_2}(3) - \hat{P}^{k,N}_{j,t_2}(1) - \left(\hat{P}^{k,R}_{j,t_1}(1) - \hat{P}^{k,N}_{j,t_1}(1)\right) = -2\tilde{\phi} + \xi_{jkt}$$

- **Preliminary**
- All countries of origin pooled
- Report in two ways:
  1. Lump flows into a pre-period (1997-1998) and a post period (1999-2001)
  2. All year permutations (ex. 1997 and 1999, 1997 and 2000, 1997 and 2001, etc)
- First method gives us more accuracy, but only 56 observations
- Second method has more measurement error, but 336 observations (and independence issue?)

OLS Results

$$\hat{P}^{k,R}_{j,t_2}(3) - \hat{P}^{k,N}_{j,t_2}(1) - \left(\hat{P}^{k,R}_{j,t_1}(1) - \hat{P}^{k,N}_{j,t_1}(1)\right) = -2\tilde{\phi} + \xi_{jkt}$$

	DID (b/a)	DID (b/a)	DID (per.)	DID (per.)
$\tilde{\phi}$	25.96	42.79	2.75	8.87
	(12.57)	(16.12)	(3.46)	(4.06)
Weights	No	Yes	No	Yes

- Interpretation: inv. elasticity of moving w.r.t. tenure
- Before/After a bit high, prefer weighted permutation $\tilde{\phi} = 8.87$
- Preference parameter ϕ also interesting
- In other work, we estimate $\theta = 13.8$ in US data (Allen and Donaldson (2018) estimate 11.7)
- If so, $\phi = 0.64$

Separating static costs and dynamic amenities

- Possible to estimate total moving cost:

$$P_{j,t}^{k,R}(\tau) + P_{k,t}^{j,R}(\tau) = (\mu_{kt} - \mu_{jt}) + (\mu_{jt} - \mu_{kt}) + 2\tilde{C} + 2\tilde{\phi}\tau$$
$$= 2\tilde{C} + 2\tilde{\phi}\tau$$

- Also a method of estimating $\tilde{\phi}$, similar results
- Using $\tilde{\phi} = 8.87$, estimate $\tilde{C} = 54.8$
- If $\theta = 13.8$, $C = 3.23$, in line with literature
- Implies $\frac{\phi}{\phi + C} = 0.14$ of moving cost dynamic in first yr
- Dynamic amenities similar to static costs after five years

Speculation on mechanisms

- What causes dynamic amenities?
  - Growing social network?
  - Finding a good job?
  - Becoming attached to a local?
  - Something else?
- In order to explore, compare Pre and Post policy refugees
- Only compare first year outcomes

Speculation on mechanisms

	1997-1998	1999-2001
Number	1607	2301
Age	26.9	28.5
Female	.41	.34
Married	0.39	0.48
Get Married	0.32	0.41
Get Divorced	0.05	0.05
Worked	0.03	0.07
Find job next yr.	0.05	0.11
Sending country 1	Somalia	Iraq
Sending country 2	Iraq	Afghan.

Conclusion

- What we have done:
  - We find evidence for dynamic amenities
  - We measure these effects in two-period model
  - Exploit random refugee placements to deal with selection on unobservables
- Where we are going
  - Look more into mechanisms
  - Possibly estimate dynamic model ala Artuc et al Some thoughts
  - Simple policy experiments

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Kennan, J. and Walker, J. R. (2011). The effect of expected income on individual migration decisions. *Econometrica*, 79(1):211–251.

Lee, D. and Wolpin, K. I. (2006). Intersectoral labor mobility and the growth of the service sector. *Econometrica*, 74(1):1–46.

Tombe, T. and Zhu, X. (2019). Trade, migration, and productivity: A quantitative analysis of china. *American Economic Review*, 109(5):1843–72.

Initial location in 2000		
	Mnth. 1-8 Refugee	Mnth. 9-12 Refugee
Copenhagen	15.25	6.55
North Zeal d	6.68	4.27
East Zealand	4.32	3.52
West and S d	14.76	15.01
Fyn	8.97	15.43
East Jutla s	29.30	29.71
West Jutland	8.82	13.44
North Jutl d	11.90	12.07

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Identifying refugees 1980-1998

- Large literature using the randomness of refugee placements 1980-1999
- No flag for refugee in this data
- In practice, look for immigrants from countries sending refugees by year
- Focus on large sending countries
- Cut those who have spouses in Denmark, only use working age men
- We have data on actual visas in 1997 and 1998
- How well does this method work?

Identifying refugees 1980-1998

- Not too badly – by our calculation, only 16% of identified refugees in 1997-1998 were not refugees.
- Of those that were misclassified, most were family reunification (57%).
- Still, much better to use visa information now that it is available
- Family reunified immigrants in particular are not randomly assigned

back

Fully dynamic model ala Artuc et al

$$\begin{aligned} \ln \pi^h_{jt}(i,\tau) - \ln \pi^h_{it}(i,\tau) &= \beta\theta V^h_t(j,1) - \beta\theta V^h_t(i,\tau+1) - c_{ij} \\ &= \beta\theta(\mu_j - \mu_i) + \beta\theta(\eta^h_j - \eta^h_i) - \beta\theta\phi\tau - \beta\theta c_{ij} + \beta\Delta^h_{ji,t}(i,\tau) \end{aligned} \tag{3}$$

$$\begin{aligned} \Delta^h_{ji,t}(i,\tau) = & \log\left[\exp\left(\beta V^h_t(j,2)\right)^\theta + \sum_{j'\in J, j'\neq j} \exp\left(\beta V^h_t(j',1) - c_{jj'}\right)^\theta\right] \\ - & \log\left[\exp\left(\beta V^h_t(i,\tau+1)\right)^\theta + \sum_{j'\in J, j'\neq i} \exp\left(\beta V^h_t(j',1) - c_{ij'}\right)^\theta\right] \end{aligned} \tag{4}$$

- Similar to our two-period model, except the option value (last term)
- How might we identify Δ which involves values iterated forward?

Fully dynamic model

$$\ln \pi_i^h(i,\tau) - \ln \pi_i^h(i,\tau-1) \quad = \quad \beta\theta V^h(i,\tau+1) - \beta\theta V^h(i,\tau) \tag{5}$$

- Suppose we are in steady state, drop t
- Only possible because outside options stay the same
- Change in migration flows reflects change in value
- Deal with unobservable heterogeneity with refugees

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