On the Push-Pull Forces of Migrant Border Crossings: The Role of Networks

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Research Questions

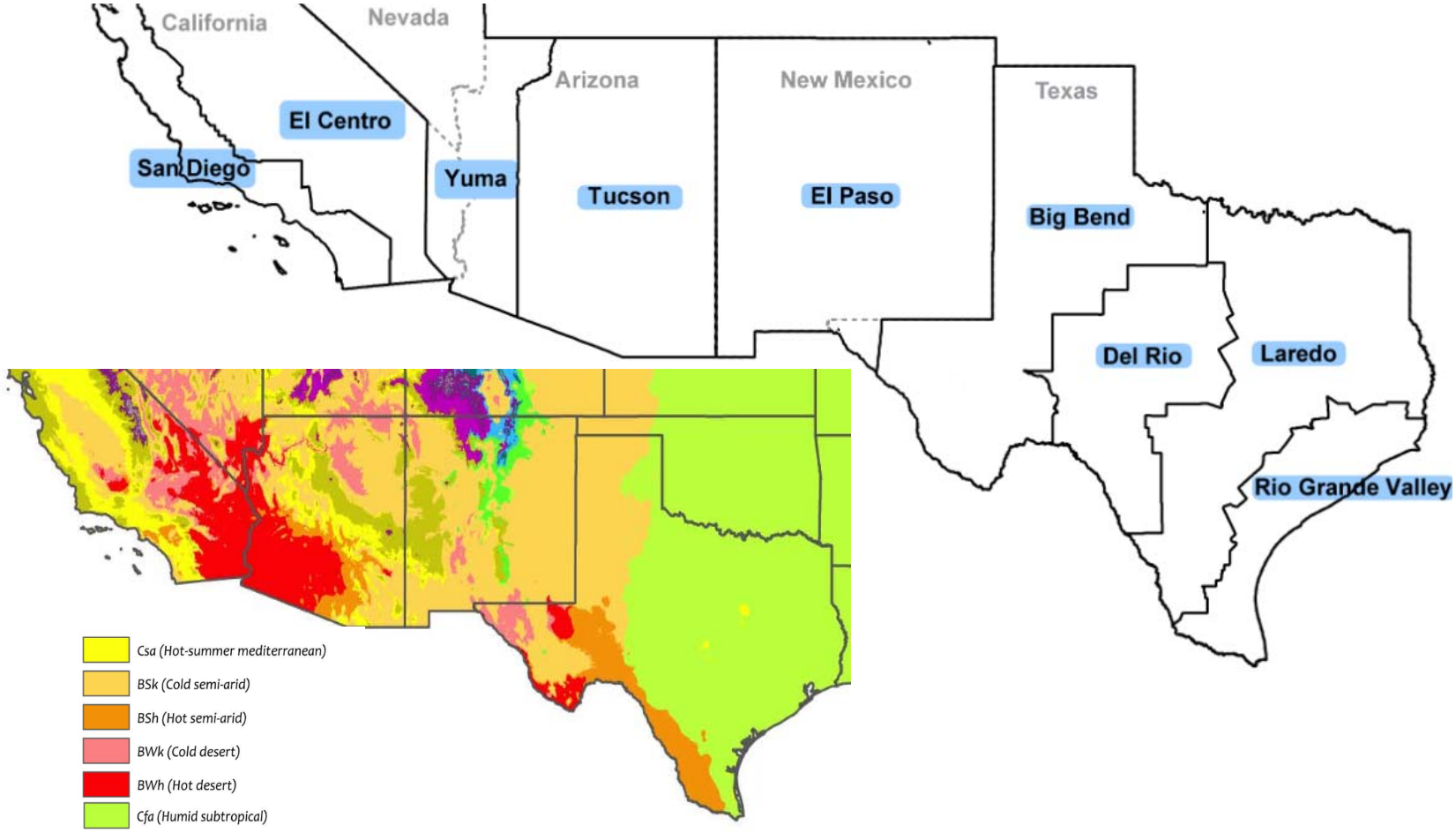
Q1: What drives a migrant's border crossing **location** decision?

Q2: Are there **individual-level** self-selection triggers – how do these compare with the push-pull forces of migration?

Takeaway:
Towards a migrant-centric border enforcement policy
(distributional effects, at-risk population).

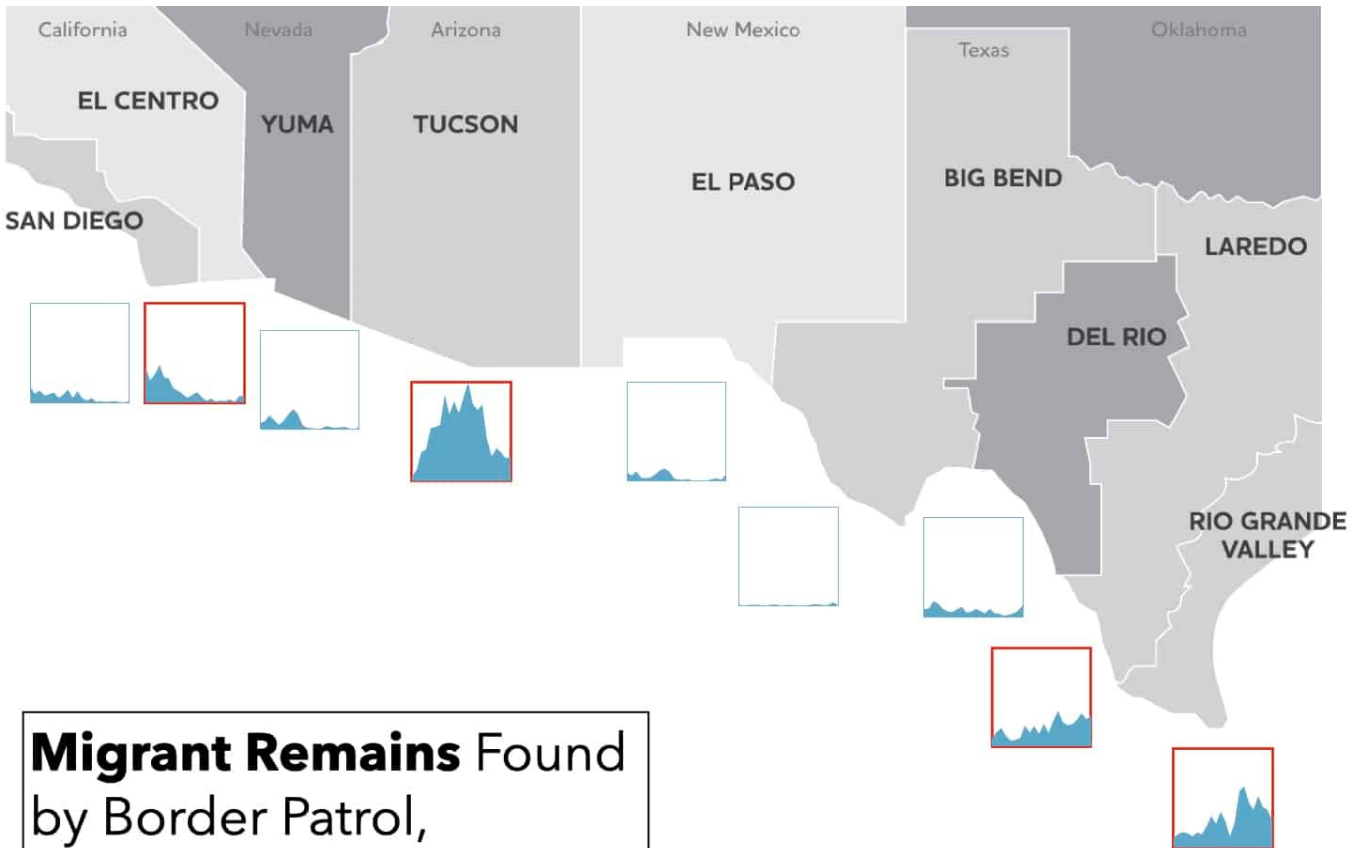
The US-Mexican Border Sectors – a 2000-mile choice set

Source: USGAO (2018)



Crossing Risks: Border Deaths (1998-2019)

Source: WOLA 2021

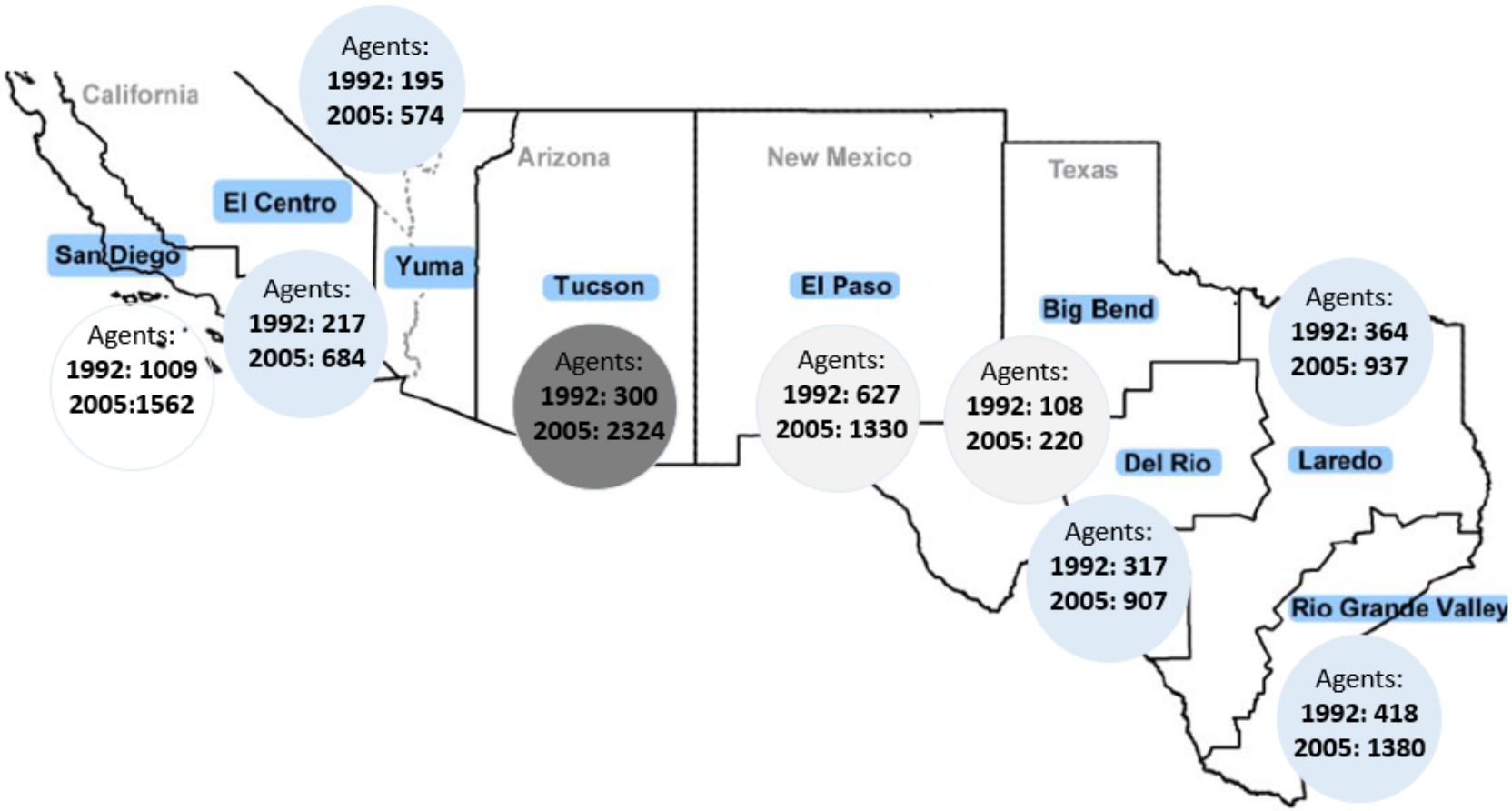


Humanitarian Crisis at the Border

- Worldwide migrant deaths since 1998 reached 75,000, of which over 10,000 occurred along the Mexico-US border (1994-2019, IOM Missing Migrant Project).
- Heterogeneous physiography is a longstanding feature along the Mexico-US border.
- Why the upswings in migrant deaths?

Apprenhension Risks: Border Personnel by Sector: 1992 and 2005

Source: USCBP 2021

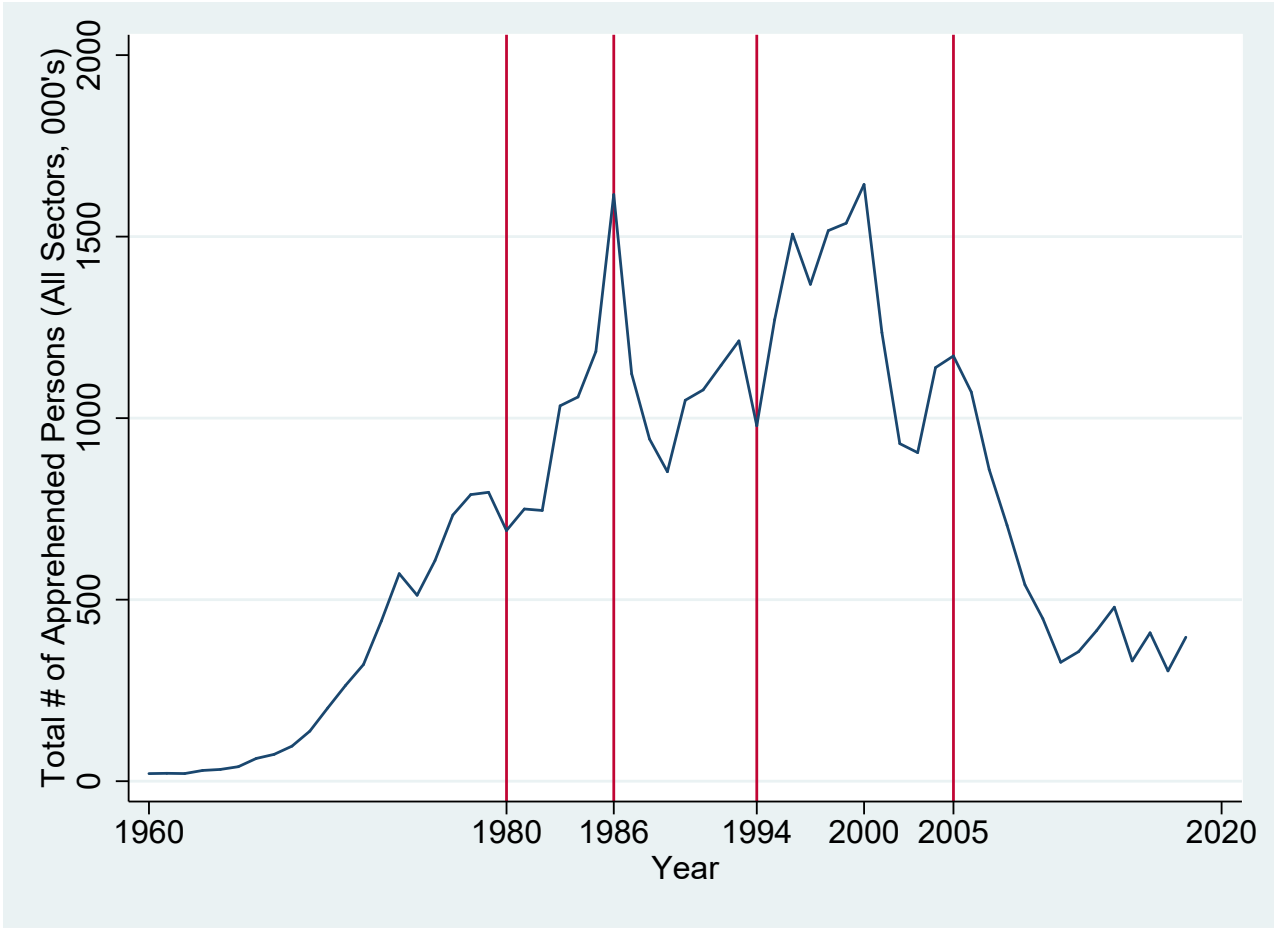


Enforcement Reform Leverages Crossing Risks:

- "Prevention through Deterrence" policy 1994:
- To deter undocumented entry by disrupting traditional crossing traffic and smuggling routes,
- " *with traditional entry and smuggling routes disrupted, illegal traffic will be deterred, or forced over more hostile terrains*," (US Border Patrol Strategic Plan 1994)
- Border operations: Operation Hold the Line (1993) in Texas, Operation Gatekeeper (1994) in California, Operation Safeguard (1994) in Arizona, and Operation Rio Grande (1997) in Texas.
- Border patrol budget: tripled from $500 million to US$1.5 billion (1993-2005) to over US$3.5 billion by 2010. (US$17.5 billion, 65,621 FTE in 2023)

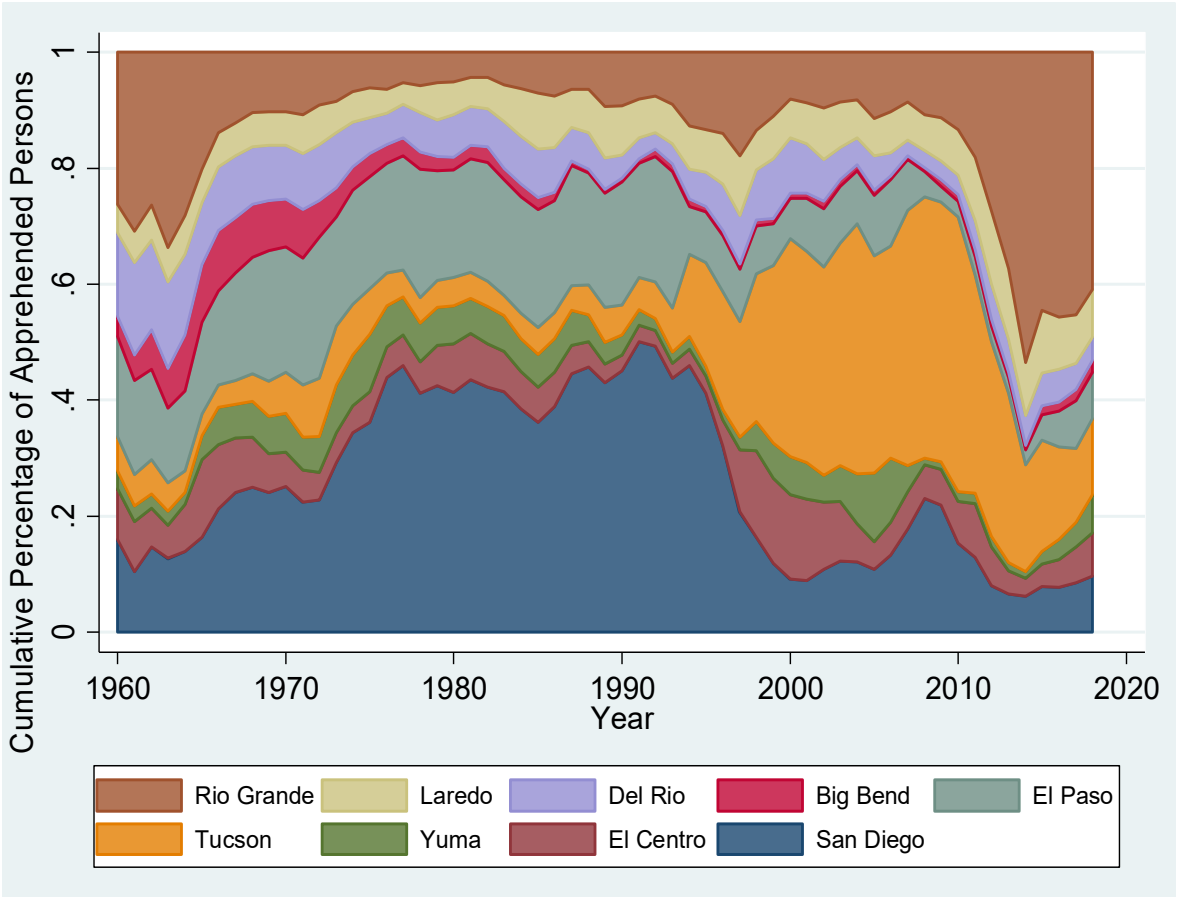
Waves of Apprehension (total no. of apprehensions)

Source: U.S. Customs and Border Protection (USCBP).



Wholesale Migrant Displacement (% of total migrants)

Source: Mexican Migration Project.



Source: Data from Mexican Migration Project.

Literature:

Effectiveness of Border Enforcement

- Border Enforcement Controls:
  - Border patrol person-hours: Hanson and Spilimbergo 1999;
  - Border patrol person-hours & avg. prison term of smugglers: Gathman 2008;
  - Border Fencing: Allen et al. 2019, Feigenberg 2021

- Gathmann (2008) estimates the probability that a repeat migrant will switch crossing location depending on enforcement intensity at the previous crossing.

- Feigenberg (2021) shows that crossing location (border municipality) intentions depends on fencing at and adjacent to a location

- Allen et al. (2019) is a GE setting of trade and migration, shows crossing probabilities response to fence expansion.

This Paper – Crossing Location as a Self-Selection Problem

Theory

- migrants balance sector-specific risk-reward profiles and the cost of crossing and the push-pull factors of migration;
- strong pull forces encourages migrants to seek out loosely enforced crossing location
- strong push forces additionally compels migrants to discount the risk of hazardous crossings

Contemplating Pull and Push Forces:

- Pull forces are often macro-level: e.g. trade shocks / NAFTA, which coincides with enforcement shocks;
- Push forces are well known to conflate with cost of migration through credit constraints: e.g. poverty.

This Paper:

Leverage the social context of migration

- network connection with the destination is a strong pull factor of migration through job search, credit, and social support (e.g. Massey et al. 1994, Munshi 2003),

- network connection with the destination is a strong push factor of migration through stigma and norm formation (e.g. DiMaggio and Garip 2012)

Confounders:

- Individuals with family ties in the US may simply be located closer to a particular border sector with low enforcement, say

Identification strategy:

- Prevention through Deterrence Program that reversed the ranking of enforcement intensity between historically safe and hazardous crossings.

This Paper

Evidence

- Solution to expected utility maximization implies border sector choice probabilities consistent with a McFadden choice model.
- migrants with US family connection and less than high school education:
  - negatively selected in the Tucson (rel. to San Diego) before 1995,
  - positively selected in the Tucson (rel. to San Diego) after 1995,
  - consistent with networks as a push-pull forces of migration driving crossing behaviors.
- alternative network mechanisms: second-degree (via smuggler prices), third degree (via avg. migrant characteristics).
- alternative enforcement effects: changes in migrant characteristics.
- implications on family-based migration policies in conjunction with border enforcement.

The Model

- Each migrant faces K crossing options, $k = 1, ..., K$
- Each assesses expected utility of crossing via k weighing risks and rewards:

Probability	Event	Discounted Lifetime Utility
p_k^s	crossing success	$V_i^d = w^d + \kappa^d n_i$ (pull)
p_k^a	accident en route	$V_i^a = 0$
$1 - p_k^1 - p_k^a$	return to origin	$V_i^o = w^o - \kappa^o n_i$ (push)

- Cost of crossing:

$$c_{ik} = \bar{c}_i + c_k + \tau d_{ik}.$$

- Migrants maximize the expected value of crossing k for migrant i subject to a Type I extreme value distributed idiosyncratic preference shifter

Alternative Specific Conditional Logit

- Log odds of k over 1, and objects we estimate,

$$\log \frac{P_{i,k}}{P_{i,1}} = \underbrace{\left((p_k^s - p_1^s)(\kappa^d + \kappa^o) + (p_k^a - p_1^a)\kappa^o\right)}_{\text{network effects}} n_i$$
$$-\tau \underbrace{(d_{ik} - d_{i1})}_{\text{distance}}$$
$$+\underbrace{(p_k^s - p_1^s)(w^d - w^o) - (p_k^a - p_1^a)w^o - (c_k - c_1)}_{\text{sector-specific time fixed effects}}$$

- (case) individual-specific variables (n_i, same value regardless of border choice), $K-1$ estimates, one for each sector to reveal self-selection rel. to base (San Diego)
- interacted with year-interval dummies to reveal self-selection reversal
- (alternative) border-sector$\times$individual variables $(d_{ik} - d_{i1})$, one τ estimate
- time varying border sector fixed effects.

Data

- Individual migration histories from the Mexican Migration Project (MMP)
- Repeated cross-sectional dataset (27,000 households, 1982-2018)
- Full migration history of household heads, spouses, and family members.

We employ

- Data on first crossing with crossing sector information (1980 - 2005)
- Migrants 18 years of age or older
- 2,478 individual migrants ($2,478 \times 9 = 22,302$ observations (binary decisions))
- from 153 Mexican communities (24 Mexican states) bound for 38 US states.

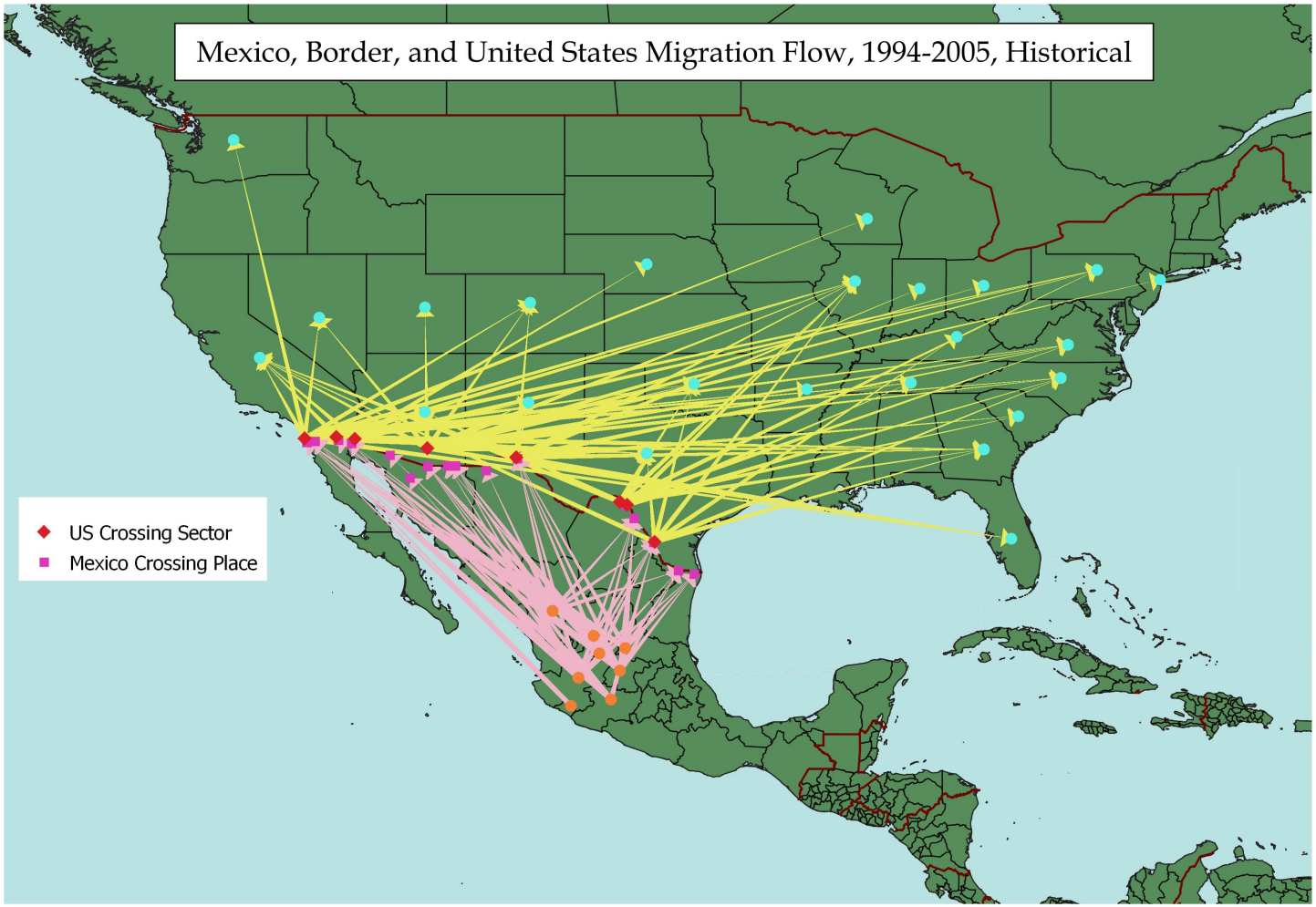
Caveats

- More Circular than Permanent: Surveys typically rural areas with high migrant concentrations
- More Undocumented than Legal ($> 99\%$) at first crossing
- Advantageous to focus on individuals most mobile and susceptible to border conditions

Data

Source: Mexican Migration Project

Do Migrants Minimize Distance?



Summary Statistics

Variables	Crossing Choice and Year						
	1980-1992			1993-2005			All Years
	All Choices	Tucson	Not Tucson	All Choices	Tucson	Not Tucson	All Choices
Education (years)	6.29	6.73	6.26	7.08	7.20	6.97	6.58
Age at First Crossing (yrs)	27.29	26.55	27.33	29.68	28.97	29.62	28.16
% Female , (%)	5.09%	9.09%	4.85%	4.75%	6.16%	4.60%	4.96%
% with US Connections (%)	45.07%	34.09%	45.72%	37.46%	36.66%	37.42%	42.29%
# of US Connections	1.00	0.80	1.01	0.75	0.73	0.77	0.91
N	1,573	88	1,482	905	253	652	2,478

Source: Mexican Migration Project.

Characteristics with Alternative Specific Effects, V_i^d, V_i^o

- **Family Destination Network Control:** MMP data, proxy for n_{is} at crossing year s

$$n_{is} = 1$$

if either father, or mother, or both have prior US migration experience. Starting from $t = 1980, 1985, 1990, 1995, 2000$,

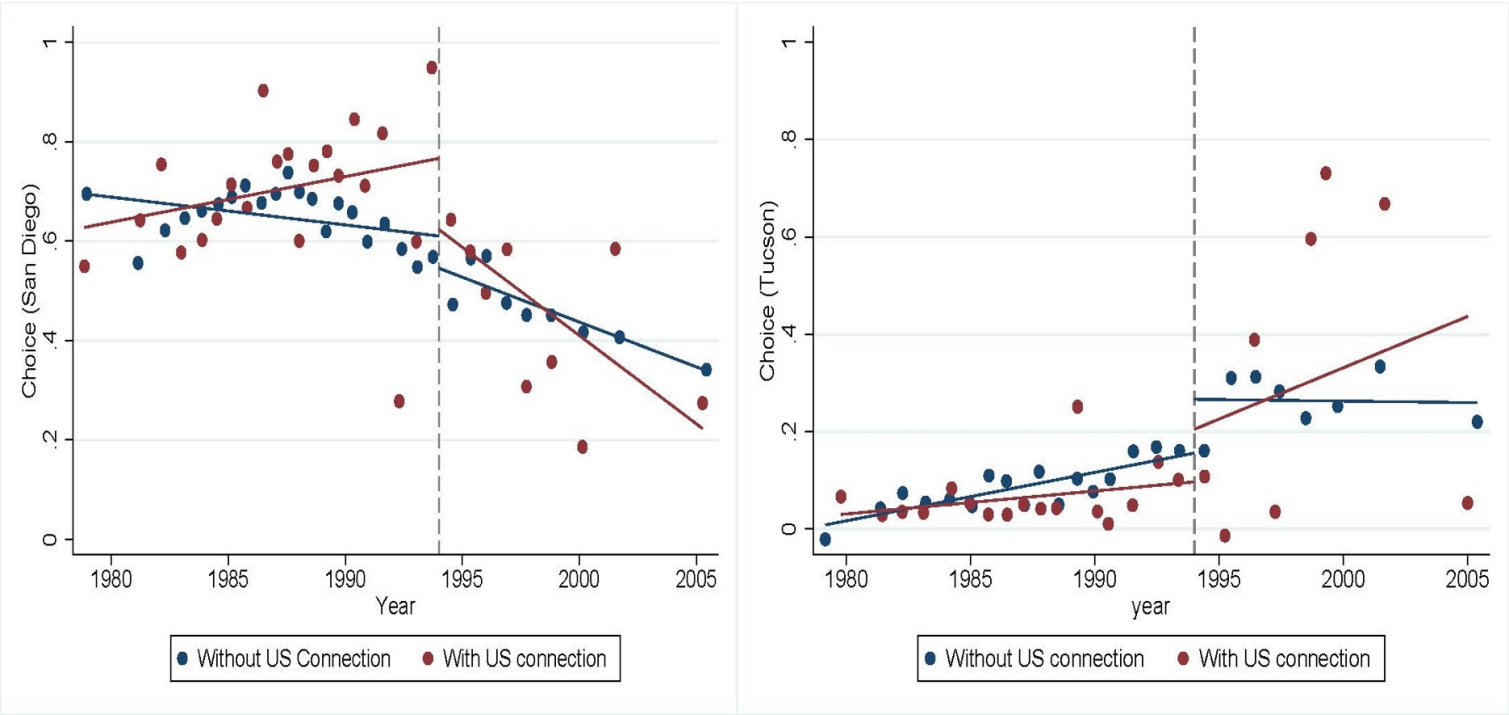
$$D_{s,t} = 1 \text{ if } s \in \{t, ..., t+4\}]$$

and zero otherwise. Each $D_{s,t}$ is a five-year dummy. To track changes in network effects that varies over time as probability of discovery changes, we construct:

$$D_{s,t} \times n_{is}.$$

there are $(9-1) \times 5$ of these coefficients to estimate for each n_i.

Binscatter Plots of Crossing Choices by Network Types Over Time



Source: Data from Mexican Migration Project.

Data

Border Enforcement Controls $(c_k - c_1)$

- cumulative mileage of sector-level border fencing (Guerrero and Castaǹeda 2017): 0 to 84 miles in 6/9 border sectors (1990-2005):
- border sector $\times$ $D_{s,t}$ fixed effects: To account for sector-level changes in border policies that are time varying.
- there are $(9-1) \times 4$ of these coefficients to estimate – $(80, 84)$ as base.

Migration Cost Controls $(d_{ik} - d_{i1})$

- Minimum Road Distance from origin community to border sector (Google Maps, miles)
- second and third price discrimination by smugglers – lagged community level crossing shares, average age of first time crossers.

Results: Base Specification (San Diego Base) in Odds Ratio

VARIABLES	Sectors	El Centro	Yuma	Tucson	El Paso	Big Bend	Del Rio	Laredo	Rio Grande
Border Sector Specific Variables									
$Dist_{ok}$	0.999								
	(0.000803)								
$Dist_{kd}$_miles	0.998***								
	(0.000168)								
Individual Specific Variables									
d85_89		0.471**	0.431	0.571*	0.424**	0.931	0.340***	0.239***	0.376***
		(0.165)	(0.397)	(0.183)	(0.147)	(0.707)	(0.124)	(0.0821)	(0.135)
d90_94		0.590	0.623	1.607*	0.600	0.573	0.382**	0.196***	0.308***
		(0.235)	(0.575)	(0.403)	(0.248)	(0.809)	(0.159)	(0.0830)	(0.133)
d95_99		1.252	2.559	4.953***	1.573	1.598	0.716	0.294***	0.573*
		(0.446)	(2.139)	(1.294)	(0.570)	(1.194)	(0.293)	(0.131)	(0.189)
d00_04		2.051*	5.877**	8.155***	1.125	3.40e-07***	1.581	0.270**	0.741
		(0.854)	(5.076)	(2.915)	(0.620)	(3.66e-07)	(0.755)	(0.151)	(0.396)
d80_84_n_i		1.448	2.98e-07***	0.165*	0.159	5.318	0.518	0.792	1.137
		(0.896)	(1.79e-07)	(0.166)	(0.181)	(7.993)	(0.385)	(0.421)	(0.694)
d85_89_n_i		0.683	2.231	0.757	0.741	4.71e-07***	0.763	5.24e-07***	1.273
		(0.513)	(2.735)	(0.436)	(0.447)	(3.65e-07)	(0.564)	(2.08e-07)	(0.670)
d90_94_n_i		0.628	3.96e-07***	0.673	0.402	8.48e-07***	1.155	2.318	6.052**
		(0.641)	(2.84e-07)	(0.380)	(0.437)	(8.98e-07)	(1.480)	(2.379)	(4.307)
d95_99_n_i		3.24e-07***	3.12e-07***	0.850	0.833	4.98e-07***	6.21e-07***	1.227	4.126**
		(1.28e-07)	(2.06e-07)	(0.498)	(0.660)	(4.24e-07)	(3.51e-07)	(1.174)	(2.844)
d00_04_n_i		2.66e-07***	2.62e-07***	1.173	3.98e-07***	0.775	4.33e-07***	2.954	4.43e-07***
		(1.40e-07)	(1.96e-07)	(0.756)	(2.68e-07)	(0.489)	(3.24e-07)	(3.634)	(3.13e-07)
Clustered SE (Group = Community)		X							
Number of Obs.		20817							
Number of Cases		2313							
Number of Alternatives		9							

Results: Base Specification – Common Effect

	(Full Sample) Odds Ratio
Border Sector Specific Variables	
Dist_{ok}	0.999
	(0.0008)
Dist_{kd}	0.999***
	(0.0002)
Clustered SE (Group = Community)	X
Number of Obs.	20817
Number of Cases	2313
Number of Alternatives	9

- Longer distance (1 more mile) to and from a border sector decreases the likelihood of crossing (odds ratio 0.999).

Results: Main Specification and Role of Skills

(Base alternative: San Diego)				
	(1) Full Sample Tucson	(2) High School or Less Tucson	(3) Middle School or Less Tucson	(4) Ag. or Manu. Tucson
(x_i: Indi. Var.)				
d80_84 X n_i (Direct)	-1.681*	-1.638	-15.468***	-16.127***
	(1.004)	(1.003)	(0.337)	(0.390)
d85_89 X n_i (Direct)	-0.272	-1.656	-1.414	-1.380
	(0.575)	(1.073)	(1.099)	(1.114)
d90_94 X n_i (Direct)	-0.405	-0.987	-0.506	-0.414
	(0.564)	(0.696)	(0.655)	(0.690)
d95_99 X n_i (Direct)	-0.164	0.129	1.052	0.796
	(0.585)	(0.599)	(0.700)	(0.691)
d00_05 X n_i (Direct)	0.224	0.408	16.976***	17.880***
	(0.637)	(0.687)	(0.919)	(0.904)
Constant	-2.426***	-2.394***	-2.281***	-2.079***
	(0.381)	(0.377)	(0.388)	(0.422)
Observations	16100	14350	10507	7910
Log Likelihood	-2300.380	-2043.991	-1467.618	-1158.403
p-value	0.000	0.000	0.000	0.000

Push-Pull Mediators:

- Networks are more salient for low skill households in determining migration decisions (McKenzie and Rapoport 2010)
- (Marg. Effects) With less than middle school education, US family ties increase the relative odds of Tucson crossing by 10% in 1995-99.

Results: Main Specification (Proximate vs. Distant Ties)

(Base alternative: San Diego)			
(1) Family Networks	Tucson	(2) Community Networks	Tucson
(x_i: Indi. Var.)			
d80_84 X n_i (Family)	-0.859	d80_84 X n_i (Avg. Comm.)	-1.428
	(0.554)		(1.201)
d85_89 X n_i (Family)	-0.815	d85_89 X n_i (Avg. Comm.)	-0.645
	(0.534)		(1.029)
d90_94 X n_i (Family)	-0.726*	d90_94 X n_i (Avg. Comm.)	-1.099
	(0.393)		(1.030)
d95_99 X n_i (Family)	0.168	d95_99 X n_i (Avg. Comm.)	0.727
	(0.361)		(0.845)
d00_05 X n_i (Family)	1.133*	d00_05 X n_i (Avg. Comm.)	2.916
	(0.608)		(3.076)
Constant	-2.242***	Constant	-2.309***
	(0.402)		(0.391)
Observations	10507		10507
Log Likelihood	-1473.758		-1471.079
p-value	0.000		0.000

Push-Pull Mediators:

- Proximate ties are more salient than distant ties when risky and long distance migration is involved (Garip and Assad 2016, DiMaggio and Garip 2010)

Alternative Stories

- Alternative Network Effects I:

  Networks beget networks – a (local) history of migration can change the cost of smuggling (DiMaggio and Garip 2012):

  - Construct community-level lagged share of first time migrant crossing choices – Networks Externality;
  - Second-degree price discrimination – controlling for year, community, sector fixed effects, elasticity of log coyote cost with respect to lagged share of same border cost is -0.31.
  - Include community-level lagged share of first time migrant crossers with direct US network.

Alternative Stories

- Alternative Network Effects II

  Networks beget networks: family ties can change the average characteristics of first time migrants:

  - Construct community-level average age of first time movers;
  - Third-degree price discrimination – controlling for year, community, sector fixed effects, elasticity of log coyote cost with respect to average age of first time movers is -0.005.
  - Include community-level average age of first time migrant as control.

Alternative Stories

- Time-varying network incidence –

  parental connections among migrants may have changed over time

  - From pre- to post-1995, mean fraction of individuals with parent connections in the US *decreased* from 18% to 8%. The difference is statistically significant.

Variables	Crossing Choice and Year						
	1980-1992			1993-2005			All Years
	All Choices	Tucson	Not Tucson	All Choices	Tucson	Not Tucson	All Choices
% with US Connections (%)	45.07%	34.09%	45.72%	37.46%	36.66%	37.42%	42.29%
# of US Connections	1.00	0.80	1.01	0.75	0.73	0.77	0.91
N	1,573	88	1,482	905	253	652	2,478

Source: Mexican Migration Project.

Alternative Stories

- Unobserved heterogeneity

  Enforcement changed the individual characteristics of migrants (e.g. risk tolerance):

  - For pre- and post-1994, mean years of education were 6.65 to 7.12.
  - For pre- to post-1994, mean age of individuals at first crossing were 27 and 29.
  - But conditional on family connections, cannot reject the H_o that mean education and mean age did not change after 1994
  - Include education and age at first crossing as controls.

Conclusion

- Why do migrants embark on dangerous border crossing journeys along the Mexican US border?
- Evidence shows the relevance of the push-pull forces of migration as a trigger.
- Theory-based identification: the role of family ties changes with border risks (enforcement and hazards).
- Add to the list of network effects on migration patterns – as a self-selection criterion of border crossing choices.
- Family-based immigration policy – giving weight to facilitate family reunification makes sense for migrants, and has the potential to reduce border deaths conditional on enforcement.

Threats to Identification

- Alternative Network Effects I:

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Threats to Identification

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  - Construct community-level average age of first time movers;
  - Third-degree price discrimination – controlling for year, community, sector fixed effects, elasticity of log coyote cost with respect to average age of first time movers is -0.005.
  - Include community-level average age of first time migrant as control.

Threats to Identification

- Alternative Mechanism:

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  - From pre- to post-1995, mean fraction of individuals with parent connections in the US *decreased* from 18% to 8%. The difference is statistically significant.

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Do Migrants Minimize Distance?

The deviation of actual distance traveled ($actualdist_{i,m}$) and the minimum distance traveled is denoted

$$devdist_{od} = actualdist_{i,m} - \min_{k=1,\ldots,9}(Dist_{ok} + Dist_{kd}).$$

Deviation of Actual Total Distance from Minimal Total Distance By Origins and Destinations (miles)

	Post 1994						
	Border-lands	Deep South	Great Lakes	North-east	North-west	Plains Plains	South-east
Border	78.69	163.00	37.50	17.20	39.00	46.64	43.33
Central	111.07	1695.17	1065.53	1443.29	78.58	737.84	1100.20
Historical	140.93	1116.67	688.69	1137.44	108.50	638.28	824.15
Southeast	167.85	1267.00	1068.26	1187.57	99.63	652.00	1337.44

Back