Immigrants, Legal Status, and Illegal Trade

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What drives transnational trafficking?

- Anecdotally, social ties between countries facilitate international trafficking (Matrix Knowledge Group 2007; Marsh et al. 2012)
- Controversial but **untested** opinion: immigrants facilitate trafficking
- If so, policies imposed on immigrants may also affect trafficking (Freedman, Owens, and Bohn 2017; Pinotti 2017)

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2. How does immigration policy affect drug trafficking?

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Hard to establish causal effect of immigrants, legal status on trafficking:

- **Measurement:**
  - Matching illicit drug flows to immigrants' origin country difficult in illegal market context
  - Immigrants without legal status may evade government tabulation
- **Endogeneity:**
  - Other factors may drive both immigration and trafficking between two regions

Overview of Project

Novel data on ~10,000 confiscations of international illegal drug shipments detailing:

- Location of confiscation event
- Most immediate country from which drugs were trafficked
- Country to which drugs were intended to be exported

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- Superior data quality on drug confiscations and irregular immigrants
- Big policy changes: estimate event study of large immigrant regularization

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Empirical strategy:

- Estimate gravity equation of drug trafficking
- Adapt instrumental variables approach from Burchardi, Chaney, and Hassan (2019)

Preview of Results

Do immigrants facilitate drug trafficking?

- More immigrants from a given country $\uparrow$ local trafficking of illegal drugs:
  - coming from immigrants' origin country
  - intended for export to immigrants' origin country
- Mechanism: immigrants social connections with their origin country

Preview of Results

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  - coming from immigrants' origin country
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How does immigration policy affect drug trafficking?

- Immigrant legal status crucial determinant of drug trafficking
  - More *irregular* immigrants raise illegal drug *imports*
  - More *regular* immigrants raise illegal drug *exports*

Contributions

- First to estimate causal effect of immigrants, legal status on trafficking
  - Prior studies do not use exogenous variation in immigrant populations, do not explore role of immigration policy: Berlusconi et al. (2017), Giommoni et al. (2017), Aziani et al. (2019)
- Extend research on connection between immigrants and trade to illegal markets
  - Extensive literature finding immigrants increase legal trade: Gould (1994), Head et al. (1998), Rauch et al. (2002), Combes et al. (2005), Cohen et al. (2017), Parsons & Vezina (2018)
- Provide evidence for new mechanism–social connections–linking migration to crime
  - Prior literature on immigration-crime finds labor market returns important: Bell et al. (2013), Bianchi et al. (2012), Spenkuch (2014)

Talk Outline

1. Gravity Equation
2. Data
3. Baseline Estimation
   - Instrumental Variable
   - Gravity Results
4. Immigrant Legal Status

How do Immigrants Affect Drug Trafficking?

Gravity Equation

For foreign country o, Spanish province by d:

$$X_{o,d} = \alpha_o + \alpha_d + \beta M_{o,d} + \zeta \log(Dist_{o,d}) + \epsilon_{o,d}$$

Where:

- $X_{o,d}$ measures illegal drugs trafficked between o and d (either import or export)
- $M_{o,d}$ measures log number of immigrants from o living in d

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Problem: how to measure flows of illegal drugs between regions?

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Finding a Proxy for Illegal Drug Flows ($X_{o,d}$)

Drug Confiscations Data

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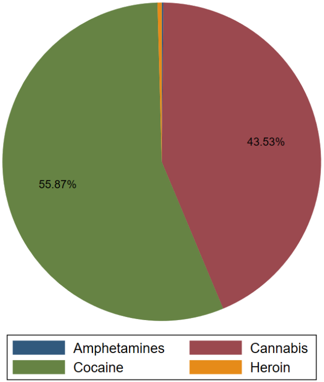
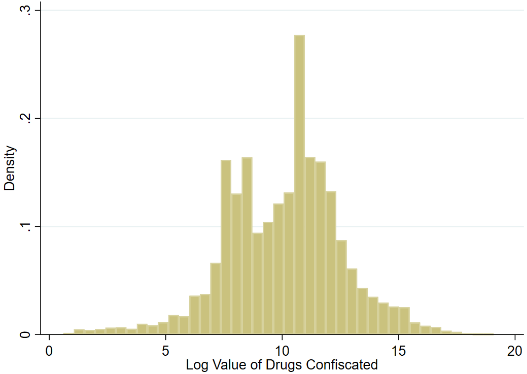
Drug Confiscations Data

Data reported by Spanish law enforcement on confiscated international drug shipments

- For most events, observe
  - province of confiscation
  - country from which drugs were trafficked
  - country of intended destination
- Country of origin/destination assigned through law enforcement investigation
- Primarily confiscations of wholesale quantities

Individual Drug Confiscations in Spain





Measured in 2012 US dollars using estimated wholesale prices of drugs.

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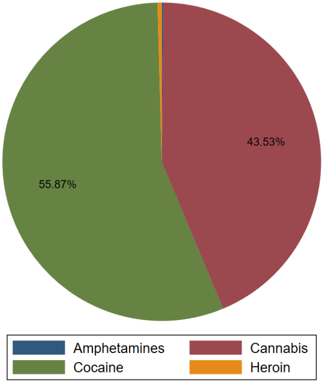
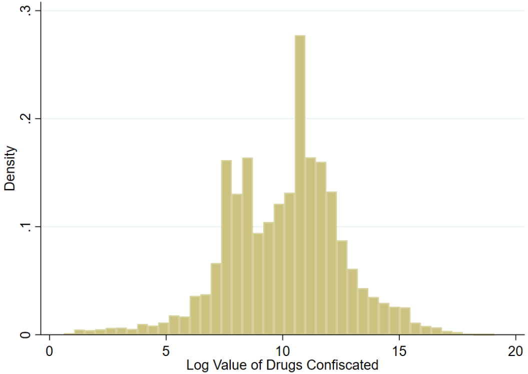


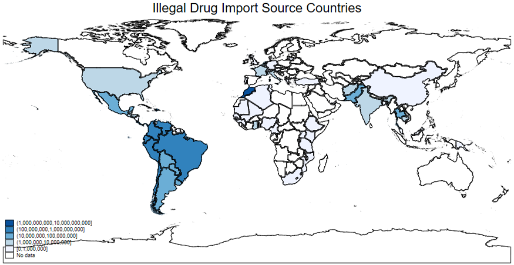


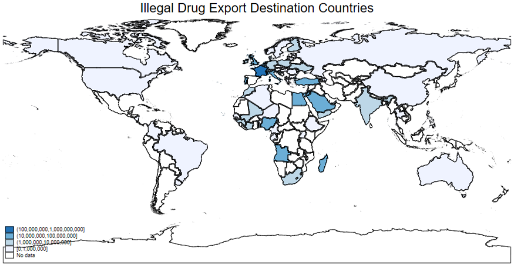
Measured in 2012 US dollars using estimated wholesale prices of drugs.

- Aggregate to country-by-province level for 2011 to 2016

Mode of Transport

Geography of Spain’s Illegal Drug Trading Partners

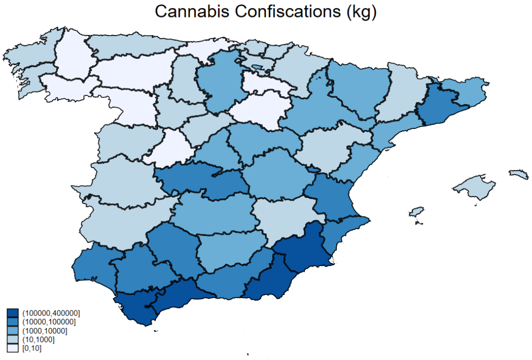


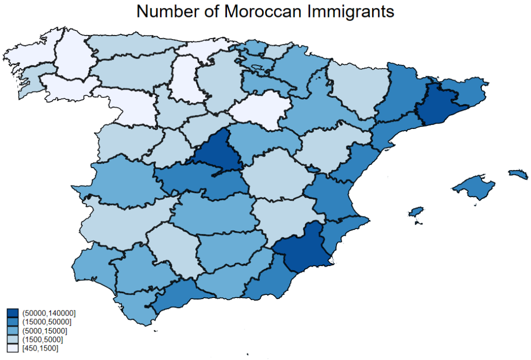


Cannabis & Cocaine | Meth & Heroin | Animated Map of Imports | Anitmated Map of Exports

Country-Province Variation in Drug Confiscations, Immigrants

From Morocco





Are Confiscations a Proxy for Actual Drug Flows?

- If drug confiscations in province $\uparrow$, then drug availability/use in province should $\uparrow$

Drug availability/use within Spain

- Survey on Alcohol and Drugs in Spain (EDADES)
- Respondents asked about ease of access to illicit drugs and evidence of use by others in their neighborhood

$\Longrightarrow$ find that more drug confiscations correlate positively with drug availability, use

Availability Local Use Personal Use

Talk Outline

Baseline Gravity Specification

For foreign country o, Spanish province by d:

$$Y_{o,d} = \alpha_o + \alpha_d + \beta M_{o,d}^{2011} + \zeta \ln(Dist_{o,d}) + \varepsilon_{o,d}$$

Where:

- $Y_{o,d}$ is a dummy for whether any confiscation occurred between 2011 and 2016
  - Estimated separately for imports and exports
- $M_{o,d}$ is the log number (in thousands) of immigrants from o living in d plus 1
- α_d controls for, e.g., economic/institutional/policing conditions of province d
- α_o controls for, e.g., national policies vis-a-vis country o
- $Dist_{o,d}$ is the distance in km between o and d

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- $Dist_{o,d}$ is the distance in km between o and d

$\rightarrow M_{o,d}^{2011}$ may be endogenous

Instrumental Variable for Immigrant Population $M_{o,d}^{2011}$

Intuition

Concern is that another factor (e.g., geographic/climatic similarity) may drive both drug and immigrant flows

- E.g., Moroccan immigration and drug flows to Barcelona both driven by similar Mediterranean climate

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Immigration from origin country *o* to destination province *d* is likely to occur when:

1. Immigrants are pushed out of *o*
2. Immigrants are pulled into *d*

in the same decade

Instrumental Variable for Immigrant Population $M_{o,d}^{2011}$

Immigration Push-Pull IV

- Goal: exogenous variation in distribution of immigrants across country-province pairs
- Use the interaction between variation in:

Push arrival of immigrants from different origin countries by decade

Pull attractiveness of different provinces to immigrants by decade

Following Burchardi et al. (2019), instrument for immigrant population $M_{o,d}^{2011}$ with predicted inflows in the 1990s and 2000s:

$$\tilde{IV}_{o,d}^{D} = I_o^D \times \frac{I_d^D}{I^D}$$

for number of immigrants $I_{o,d}^D$ inflowing from o to d in decade D

Instrumental Variable for Immigrant Population $M_{o,d}^{2011}$

Immigration Leave-out Push-Pull IV

Concern: Endogenous $I_{o,d}^{D}$ a large fraction of I_{o}^{D}, I_{d}^{D}, or I^{D}.

- Solution: Leave-out o, d pair when computing push-pull IV interaction

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Additional concern: may be spatial correlation in confounders

- Solution: leave out Spanish province's autonomous community and origin country's continent Identifying Assumption

$$IV_{o,d}^{D} = I_{o,-a(d)}^{D} \times \frac{I_{-c(o),d}^{D}}{I_{-c(o)}^{D}}$$

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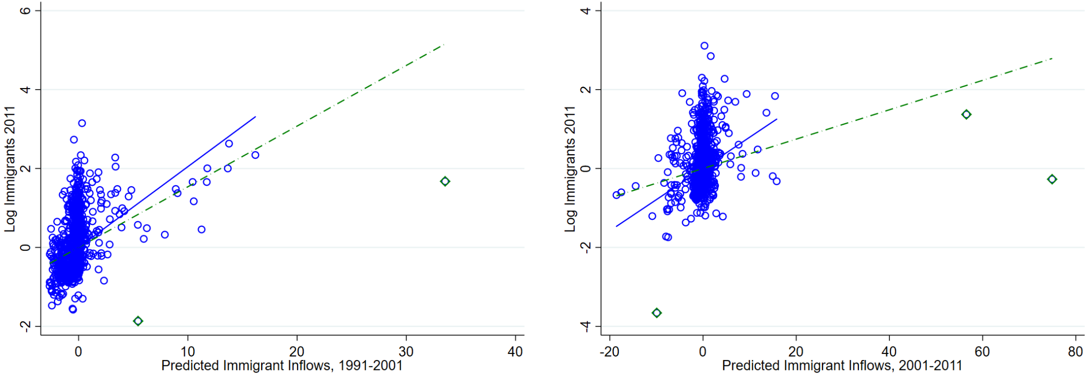
Deals with reverse causality:

- E.g., Moroccan trafficking organizations send immigrants to Barcelona
- IV predicts immigration excluding Moroccan immigration to Barcelona

Include second-order interaction terms in first-stage.

First-Stage Fit



Figures plot *Log Immigrants 2011* regressed on $IV_{o,d}^{D}$, both residualized on log distance, nationality and province fixed effects, and the IV from the other decade of inflows. The green diamonds are outlier country-province pairs; the dashed fitted green line plots the linear relationship including these outliers, while the solid blue line plots the relationship excluding these outliers.

Regr. table

Gravity Results: Immigrants Raise Imports, Exports of Illegal Drugs

	Dummy for drug confiscations	
	(1) Imports	(2) Exports
Log immigrants 2011	0.163***	0.058***
	(0.0455)	(0.0348)
Observations	5564	5564
Origin FE	Y	Y
Dest. FE	Y	Y
Ln dist.	Y	Y
1st-stg F-stat.	152.4	152.4

Notes: The table presents coefficient estimates from IV regressions at the country-province level. I instrument for *Log immigrants 2011* using $\{IV^D_{o,d} = I^D_{o,-a(d)} \times I^D_{-c(o),d}/I^D_{-c(o)}\}_{1991-2001,2001-2011}$ and second-order interaction terms as the excluded instruments. The dependent variable is a dummy for whether any drugs trafficked between country o and province d were confiscated between 2011 and 2016 (imports into Spain in column 1 and exports out of Spain in column 2). Standard errors are clustered at the nationality level. $*$, $**$, and $***$ denote statistical significance at the 10%, 5%, and 1% levels, respectively.

OLS | Value Confiscated | Drug hubs

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OLS Value Confiscated Drug hubs

A 10% $\uparrow$ in immigrants from *o* living in *d* (rel. to the mean) raises:

- the likelihood of illegal drug *imports* from country *o* to province *d* by 0.8 percentage points Calc.
  - 8.4% of *od* pairs have $>$ 0 illegal drug import confiscations

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A 10% ↑ in immigrants from o living in d (rel. to the mean) raises:

- the likelihood of illegal drug *imports* from country o to province d by 0.8 percentage points Calc.
  - 8.4% of *od* pairs have >0 illegal drug import confiscations
- the likelihood of illegal drug *exports* from d to o by 0.3 percentage points Calc.
  - 4.7% of *od* pairs have >0 illegal drug export confiscations

OLS | Value Confiscated | Drug hubs

Robustness Checks

Empirical Specification

- Alternative functional forms Table
- Flexible log functional form GMM
- Standard error clustering Table

Sampling

- Leaving-out each origin Figure
- By drug Figure
- Heterogeneity across countries (charts) and provinces (charts)
- Panel estimation Tables

Alternative Explanations

- Enforcement intensity Extensive margin exercise
- General equilibrium adjustment Province-level estimation

Mechanism: Immigrants' Social Ties to Origin Country

- Immigrants increase **both** imports and **exports** of illegal drugs
- Consistent with qualitative evidence (Matrix Knowledge Group 2007; Marsh et al. 2012)
  - E.g., *"L-15 was from Ghana. In 2000 he was approached by a Ghanian friend to manage his drug business in the United Kingdom. He was trusted by the dealers he had to manage because they knew his family in Ghana."* (Marsh et al. 2012)
- Social ties/trust particularly important in absence of legally binding contracts

More on ruling out demand

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How Might Immigrant Legal Status Affect Trafficking?

How legal status may affect trafficking in Spain:

- Access to formal sector jobs
- Access to social insurance (Fuentes and Callejo 2011)

$\Longrightarrow$ Becker model of crime predicts immigrants without legal status more likely to traffick illegal drugs

- However, many export destination from Spain are in the E.U., and irregularity not prevalent among E.U. migrants

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Past studies consistent with Becker (1968):

- Legalizing immigrants significantly reduces financially motivated crimes
  Baker (2015), Mastrobuoni & Pinotti (2015), Pinotti (2017), Freedman, Owens, & Bohn (2018)

Irregular Immigrants in Spain

- "Irregular" immigrants are those living in Spain without authorization to reside and/or work in the country
  - Most overstayed tourist visas (Gonzalez-Enriques, 2009)
- Very common in Spain during period I study
  - Various local surveys have found a 50% rate of irregularity among immigrants (Perez and Rinken 2005; CERES 2004)
- Access to healthcare and education granted in exchange for enrolling in the local population registry *regardless of legal status*

Estimating Irregular Immigrant Population

Take the difference between:

- The number of persons in the population registry by province-origin country
- The number of persons with residency permits by province-origin country

$\Longrightarrow$ number of irregular immigrants:

$$Irregular\ Immigrants_{o,d}^{2011} = Population\ Registry_{o,d}^{2011} - Residence\ Permits_{o,d}^{2011}$$

for country o, Spanish province d.

I estimate (across 81 origins) that nearly 27% of immigrants in Spain are without residency permits as of 2011.

Estimating the Effect of Immigrants by Legal Status

$$\textit{Any Confiscation}_{o,d}^{2011-2016} = \alpha_o + \alpha_d + \beta_{irreg} M_{o,d}^{2011,irreg} + \beta_{reg} M_{o,d}^{2011,reg} + \zeta \ln(Dist_{o,d}) + \varepsilon_{o,d}$$

- Estimate separately for imports and exports
- Instrumenting for $M_{o,d}^{2011,L}$ with

$$IV_{o,d}^{D,L} = m_{o,-a(d)}^{L} \times IV_{o,d}^{D}$$

for legal status $L \in \{regular, irregular\}$

- $m_{o,-a(d)}^{L}$ is the fraction of immigrants from o outside of autonomous community of d in 2003 with legal status L

Gravity Results by Immigrant Legal Status

	Dummy for Any Drug Confiscations	
	Imports	Exports
Log regular immigrants 2011	0.0911	0.157***
	(0.0606)	(0.0421)
Log irregular immigrants 2011	0.152**	-0.171***
	(0.0730)	(0.0602)
Observations	5200	5200
SW 1st-stg. F-stat. (regular immigrants)	63.8	63.8
SW 1st-stg. F-stat. (irregular immigrants)	18.8	18.8

Notes: The table presents estimates of IV regressions by legal status at the country-province level. The dependent variable is a dummy for whether any confiscation has occurred, separately for imports (column 1) and exports (column 2). Standard errors are clustered by country in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Exports explanation

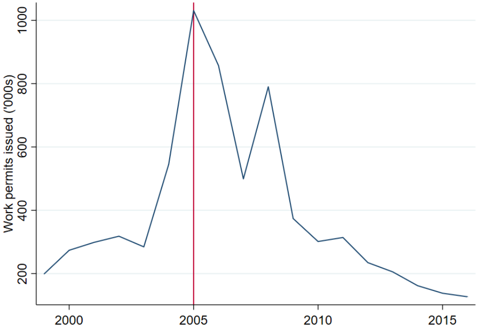
Can Immigration Policy Reduce Trafficking?

Found $\uparrow$ irregular immigrants, $\uparrow$ drug imports
& that $\uparrow$ regular immigrants, $\uparrow$ drug exports

- May be driven by characteristics of immigrants correlated with legal status, trafficking

Use extraordinary regularization event in 2005:

- Half a million irregular immigrants gained legal status



Event Study Setup

Specification

$$\textit{Any Confiscation}_{o,d}^{2011-2016} = \sum_{t \neq 2004q4} \theta_t \times \textit{Frac. immigrants}_o^{2003,irregular} + \delta_o + \delta_t + \epsilon_{d,t}$$

for nationality o, quarter t.

Effect of Immigrant Legalization on Illegal Drug Imports

Quarterly event study coefficients plotted. Dark grey area shows 90% confidence interval and light grey the 95% confidence interval.

Exports | Cannabis Imports | Naturalizations

Conclusion

- Significant public debate on immigration and crime relationship
- Show large, positive, causal effect of immigrants on drug trafficking
    - Estimate a gravity equation of drug trafficking using novel data on drug confiscations
    - Estimate event study of large immigrant regularization
    - Immigrants' social connections, legal status drive results

Effect of Immigrants on Legal Trade

	Value of Legal Trade	
	(1)	(2)
	Imports	Exports
Log immigrants 2011	-0.0173	-0.0840*
	(0.0567)	(0.0445)
First-stage residuals	0.105	0.193***
	(0.0780)	(0.0428)
Observations	5136	5136
Country FE	Y	Y
Province FE	Y	Y
Ln dist.	Y	Y
1st-stage F-statistic	152.4	152.4

Notes: The table presents coefficient estimates from PPML regressions at the country-province level. The dependent variable is the value of legal trade summed over the year 2011 through 2016 as reported from the ADUANAS-AEAT database (imports into Spain in column 1 and exports out of Spain in column 2). All regressions control for province and nationality fixed effects as well as log distance. Standard errors are clustered at the country level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Focusing on Spain

Spain is an entry point for drugs coming into Europe:

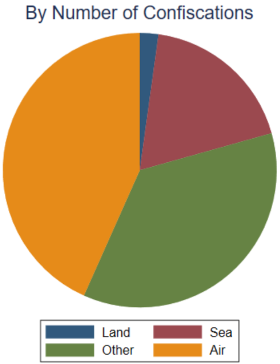
"As a result of its geographical location, Spain is one of the EU countries favoured by international drug traffickers for the transit of cannabis resin and cocaine to other European countries."
–European Monitoring Centre for Drugs and Drug Addiction, 2019

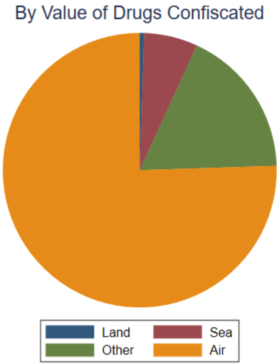
Back

Value of Confiscations per Year in Spain

Back

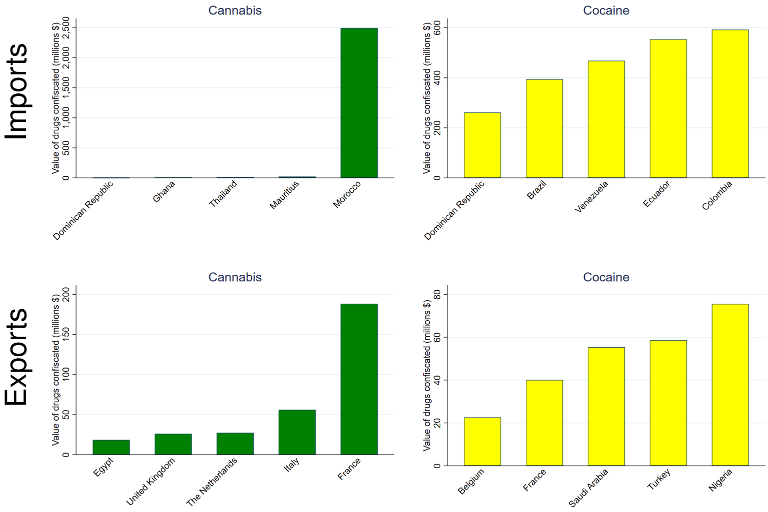
Confiscations by Mode of Transport





Back

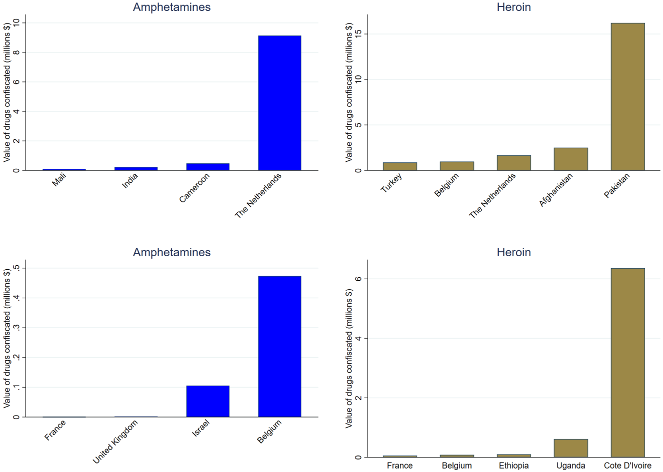
Top Exports, Importers of Cocaine and Cannabis



Back

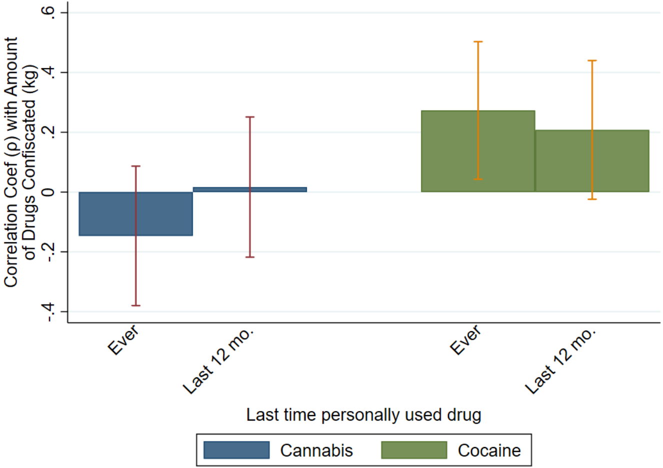
Top Exporters/Importers

Amphetamines and Heroin



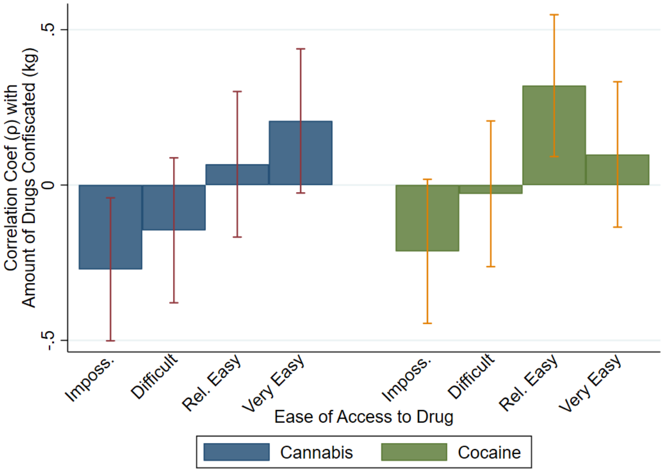
Back

Correlation of Personal Use to Confiscations



Back

Confiscations Positively Correlate with Ease of Access

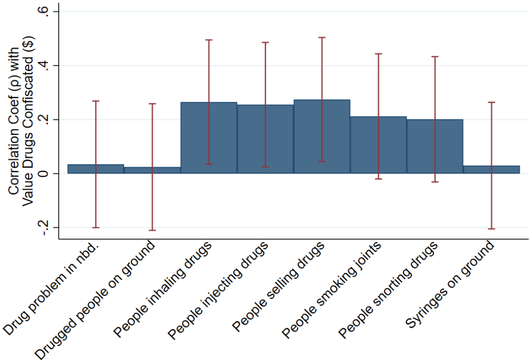


Confiscations from 2011 to 2016; EDADES waves 2011, 2013, and 2015. 90% confidence intervals.

Back

Drug Confiscations Positively Correlate with Local Drug Use

Spanish province-level with drug-use measured in EDADES



- Questions on whether various drug-related activities took place in respondent's neighborhood
- Confiscations from 2011 to 2016; EDADES waves 2011, 2013, and 2015. 90% confidence intervals

Back

Gravity Estimates (OLS)

Iteratively Adding Fixed Effects

	Outcome: Confiscated Imports Dummy			
	(1)	(2)	(3)	(4)
Log immigrants 2011	0.220***	0.187***	0.205***	0.137***
	(0.0393)	(0.0213)	(0.0465)	(0.0221)
Observations	5564	5564	5564	5564
	Outcome: Confiscated Exports Dummy			
Log immigrants 2011	0.0952***	0.120***	0.0671**	0.0696**
	(0.0214)	(0.0192)	(0.0220)	(0.0216)
Observations	5564	5564	5564	5564

Notes: The table presents OLS estimates at the country-province level. Standard errors are clustered by country in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

Effect of Immigrants on Value Trafficked

Pseudo-Poisson maximum likelihood

	Value of drug confiscations			
	(1) Imports	(2) Imports	(3) Exports	(4) Exports
Log immigrants 2011	0.732***	0.481*	0.0411	0.644*
	(0.212)	(0.249)	(0.275)	(0.350)
First-stage residuals		0.386		-0.712*
		(0.252)		(0.385)
Observations	3224	3224	2728	2728
Country FE	Y	Y	Y	Y
Province FE	Y	Y	Y	Y
Ln dist.	Y	Y	Y	Y
1st-stage F-statistic		152.4		152.4

Notes: The table presents coefficient estimates from pseudo-Poisson maximum likelihood estimation at the country-province level. I instrument for *Log immigrants 2011* using $\{IV^D_{o,d} = I^D_{o,-a(d)} \times I^D_{-c(o),d}/I^D_{-c(o)}\}_{1991-2001,2001-2011}$, their interaction across decades, and squared as the excluded instruments. The dependent variable is the value of illegal drug confiscations between country *o* and province *d* between 2011 and 2016. I implement a control function approach using Poisson pseudo-maximum likelihood estimation whereby I estimate residuals from a first-stage regression of all the instruments on *Log immigrants 2011*, and then include that residual as a control in the second-stage regression as in columns 2 and 4. All regressions control for province and nationality fixed effects as well as log distance. Standard errors are clustered at the country level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

A 10% ↑ in immigrants from *o* living in *d* (rel. to the mean) raises:

- the value of illegal drug *imports* from country *o* to province *d* by 2.3 percent Calc
  - Over \$860,000 in illegal drug imports from *o* confiscated in *d* 2011–2016
- the value of illegal drug *exports* from *d* to *o* by 3 percent
  - Over \$145,000 in illegal drug exports from *d* intended for *o* 2011–2016

Effect of Immigrants on Trafficking by Drug Hubness of Origin

	Drug Confiscations Dummy 2011-2016			
	(1)	(2)	(3)	(4)
	Imports	Exports	Imports	Exports
Log immigrants 2011	0.126**	0.0528	0.674***	0.245***
	(0.0543)	(0.0389)	(0.205)	(0.0844)
Log immigrants 2011 × % of seized drugs from *o*	1.377***	-0.192		
	(0.299)	(0.159)		
Log immigrants 2011 × Drug hubness rank			-0.00138***	-0.000409**
			(0.000338)	(0.000168)
Observations	5564	5564	5564	5564
R^2	0.054	0.018	0.071	0.006
Country FE	Y	Y	Y	Y
Province FE	Y	Y	Y	Y
Ln dist	Y	Y	Y	Y
1st-stage F-statistic	132.0	132.0	41.6	41.6

Notes: The table presents coefficient estimates from IV regressions of equation **??**, modified to include a term interacting *Log immigrants 2011* with a measure of the immigrants' origin country drug-hubness, either the fraction of confiscated drugs worldwide originating in the country or the ordinal rank of that fraction. I instrument for *Log immigrants 2011* using the IV defined in equation **??** and the IV interacted with the measure of drug hubness, as well as the IVs interacted across decades and squared. The dependent variable is a dummy for whether any illegal drugs imported from country *o* were confiscated in province *d* between 2011 and 2016 in columns 1 and 3, and a dummy for confiscated exports in columns 2 and 4. All regressions control for nationality and province fixed effects as well as log distance. Standard errors are clustered at the country level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

First Stage Regressions

	Log Immigrants 2011			
	(1)	(2)	(3)	(4)
Predicted immigration, 1991-2001	0.149***		0.154***	0.353***
	(0.0325)		(0.0331)	(0.0392)
Predicted immigration, 2001-2011		0.0559***	0.0370*	0.151***
		(0.0189)	(0.0203)	(0.0490)
(Predicted immigration, 1991-2001)$^2/10^9$				-8951202.8***
				(1419906.4)
(Predicted immigration, 2001-2011)$^2/10^9$				2280902.5
				(1941961.1)
IV interaction				-0.00348*
				(0.00204)
Observations	5564	5564	5564	5564
R^2	0.687	0.693	0.698	0.740
Origin FE	Y	Y	Y	Y
Dest. FE	Y	Y	Y	Y
Ln dist.	Y	Y	Y	Y
1st-stg F-stat.	21.1	8.8	11.5	152.4

Notes: The table presents coefficient estimates from first-stage regressions at the country-province level. Predicted immigration from country o to Spanish province d during decade D is predicted using $\{IV^D_{o,d} = I^D_{o,-a(d)} \times I^D_{-c(o),d}/I^D_{-c(o)}\}$. All regressions control for province and nationality fixed effects as well as log distance. Standard errors are clustered at the nationality level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

Identifying Assumption

Any confounding factors that make a given province more attractive for both immigration and drug trafficking from a given country do not simultaneously affect the interaction of the settlement of immigrants from other continents with the total number of immigrants arriving from the same country but settling in a different autonomous community.

Example of a violation:

- Immigrants skilled at drug trafficking from Morocco tend to settle in Alicante and from Lebanon in Barcelona in the same decade due to the similar Mediterranean climate
- Moroccans a large fraction of immigrants settling in Alicante, and Lebanese in Barcelona
- Then IV predicts large number of Moroccans in Barcelona due to confounding factor, climatic similarity

Unlikely, but can test for.

Back

Gravity, Different Functional Forms

Confiscations dummy

	Drug Confiscations 2011-2016 (Dummy)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Import	Export	Import	Export	Import	Export
Log immigrant population (2001)	0.203***	0.0920*				
	(0.0607)	(0.0495)				
$\ln\left(\frac{M_{o,d}^{2011}}{1000}\right)$ (-1 for ∞)			0.118***	0.0362		
			(0.0282)	(0.0243)		
$\left(M_{o,d}^{2011}\right)^{1/3}$					0.0224***	0.00946*
					(0.00774)	(0.00511)
Observations	5564	5564	5564	5564	5564	5564
Country FE	Y	Y	Y	Y	Y	Y
Province FE	Y	Y	Y	Y	Y	Y
Ln dist	Y	Y	Y	Y	Y	Y
1st-stage F-statistic	290.2	290.2	17.1	17.1	388.2	388.2

Notes: The table presents coefficient estimates from IV regressions at the country-province level using different functional forms to measure bilateral immigrant population. I instrument for the immigrant population measure using $\{IV_{o,d}^D = I_{o,-a(d)}^D \times I_{-c(o),d}^D / I_{-c(o)}^D\}_{1991-2001,2001-2011}$, their interaction across decades, and squared terms as the excluded instruments. The dependent variable is a dummy for whether any drugs trafficked between country o and province d were confiscated between 2011 and 2016 (either or imports or exports). All regressions control for province and nationality fixed effects as well as log distance. Standard errors are clustered at the country level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

Gravity, Different Functional Forms

Value of confiscations (PPML)

	Drug Confiscations 2011-2016 (Value)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Import	Export	Import	Export	Import	Export
Log immigrant population (2001)	-0.147	0.740*				
	(0.285)	(0.413)				
$\ln\left(\frac{M_{o,d}^{2011}}{1000}\right)$ (-1 for ∞)			0.685***	0.334		
			(0.183)	(0.290)		
$\left(M_{o,d}^{2011}\right)^{1/3}$					-0.0269	0.121**
					(0.0418)	(0.0515)
Observations	3224	2728	3224	2728	3224	2728
Country FE	Y	Y	Y	Y	Y	Y
Province FE	Y	Y	Y	Y	Y	Y
Ln dist	Y	Y	Y	Y	Y	Y
1st-stage F-statistic	290.1	290.1	17.1	17.1	388.1	388.1

Standard errors clustered by nationality in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Back

Why GMM?

In my baseline specification, I estimate

$$\mathbf{1}\{C_{o,d}^{Imports} > 0\} = \delta_o + \delta_d + \beta_2 \ln(\pi\, Immigrants_{o,d}^{2011} + 1) + \epsilon_{o,d}$$

$$\mathbf{1}\{C_{o,d}^{Exports} > 0\} = \delta_o + \delta_d + \beta_2 \ln(\pi\, Immigrants_{o,d}^{2011} + 1) + \epsilon_{o,d}$$

setting $\pi_1 = \pi_2$ following Burchardi et al. (2019) and their functional form diagnostics.

Log spec. Thousands

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Log spec. Thousands

Can instead nonlinearly estimate π's and β's simultaneously using Generalized Method of Moments (Hansen 1982)

- $E[Z\epsilon] = 0$
- $E[X\epsilon] = 0$

Moment Conditions

$$E\left[\begin{pmatrix} I_{o,d}^{IV,1991-2001} \\ I_{o,d}^{IV,2001-2011} \\ \left(I_{o,d}^{IV,1991-2001}\right)^2 \\ \left(I_{o,d}^{IV,2001-2011}\right)^2 \\ I_{o,d}^{IV,1991-2001} \times I_{o,d}^{IV,2001-2011} \end{pmatrix} \times \left(Y_{o,d} - \alpha_o - \alpha_d - \beta_1 \ln(\pi_1 M_{o,d}^{2011} + 1)\right)\right] = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$E\left[\begin{pmatrix} \alpha_o \\ \alpha_d \\ \delta_o \\ \delta_d \end{pmatrix} \times \left(Y_{o,d} - \alpha_o - \alpha_d - \beta_1 \ln(\pi_2 M_{o,d}^{2011} + 1)\right)\right] = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

for $Y_{o,d} \in \{\mathbf{1}[C_{o,d}^{Imports} > 0]\}, \mathbf{1}[C_{o,d}^{Exports} > 0]\}$

107 countries o + 52 provinces $d \implies$ 163 moments

GMM Results

Standard errors clustered by country:

$$\mathbf{1}[C_{o,d}^{Imports} > 0] = \delta_o + \delta_d + \underset{(0.07)}{0.26} \times \ln(\underset{(0.037)^1}{0.046} \times M_{o,d}^{2011} + 1) \underset{(0.015)}{-0.01} \ln(Dist_{o,d}) + \epsilon_{o,d}$$

$$\mathbf{1}[C_{o,d}^{Exports} > 0] = \delta_o + \delta_d + \underset{(0.067)}{0.072} \times \ln(\underset{(0.037)^1}{0.046} \times M_{o,d}^{2011} + 1) \underset{(0.007)}{-0.01} \ln(Dist_{o,d}) + \epsilon_{o,d}$$

Back

[1] SEs unadjusted for constraint that X in ln(X) must be strictly positive as suggested by Andrews (2002)

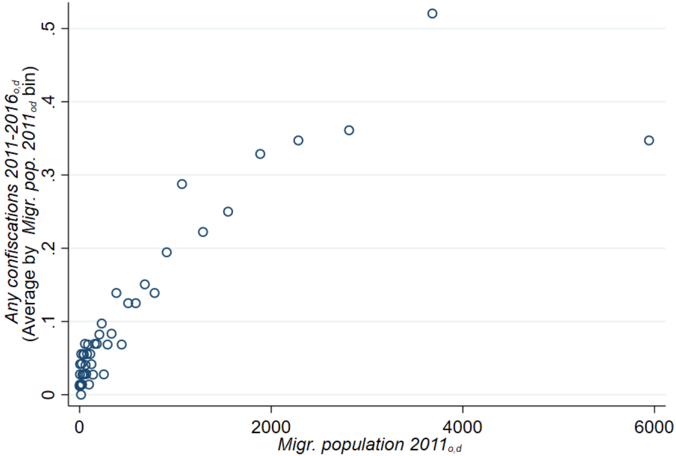
Alternative Standard Error Clustering

	(1) Imports (dummy)	(2) Exports (dummy)
Log immigrants 2011	0.163	0.0579
Cluster by country	(0.0455)	(0.0348)
Heteroskedasticity Robust	(0.0242)	(0.0277)
Cluster by province	(0.0241)	(0.0244)
2-way cluster by country & province	(0.0454)	(0.0322)

Notes: The table presents coefficient estimates and various standard errors from IV gravity regressions at the country-province level. I control for nationality and province fixed effects as well as log distance. *Log immigrants 2011* is instrumented with the leave-out push-pull IV. I cluster by country in my baseline specification.

Back

Log Relationship between Immigrant Population and Confiscations



Drop highest quantile for visual clarity

Back

Relationship between immigrant population and confiscations dummy

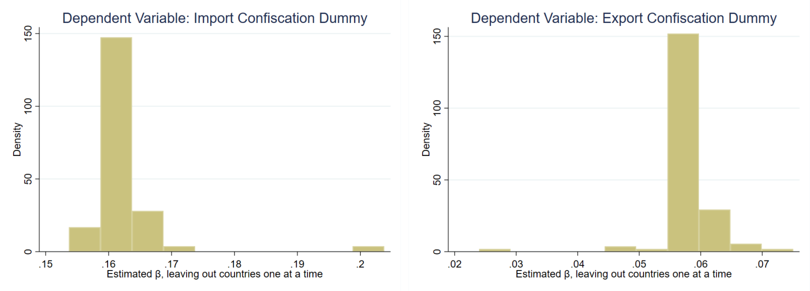
Non-linear least squares estimation

$$\mathbf{1}[C_{o,d}^{Imports} > 0] = \widehat{-0.24} + \widehat{0.16} \times \ln\left(1 + \widehat{0.002} \times Immigrants_{o,d}^{2011}\right) + \widehat{0.03} \times \ln(Distance_{o,d})$$

Back

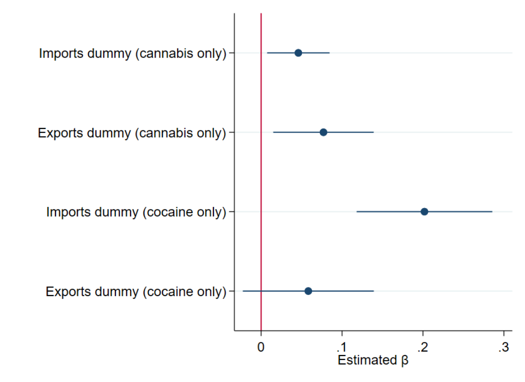
Bilateral Estimation

Leaving out origin countries one at time



Back

Bilateral Estimation By Drug



Back

Gravity Panel Specification

$$Y_{o,d,t} = \alpha_{o,t} + \alpha_{d,t} + \delta \ln(Dist_{o,d}) + \beta M_{o,d,t} + \varepsilon_{o,d,t}$$

OR

$$Y_{o,d,t} = \alpha_{o,t} + \alpha_{d,t} + \alpha_{o,d} + \beta M_{o,d,t} + \varepsilon_{o,d,t}$$

where $Y_{o,d,t} \in \{\mathbf{1}[C^{Imports}_{o,d,t} > 0], \mathbf{1}[C^{Exports}_{o,d,t} > 0]\}$ for the value of drugs confiscated in d from o in year t $C_{o,d,t}$ for both imports and exports.

Instrument using the following:

$$IV^{1991-2001}_{o,d} = I^{1991-2001}_{o,-a(d)} \times \frac{I^{1991-2001}_{-c(o),d}}{I^{1991-2001}_{-c(o)}}$$

$$IV^{recent\ years}_{o,d,t} = I^{2001-t}_{o,-a(d)} \times \frac{I^{2001-t}_{-c(o),d}}{I^{2001-t}_{-c(o)}}$$

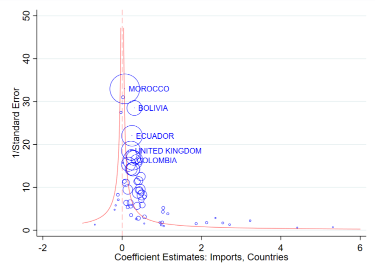
Gravity Panel Results

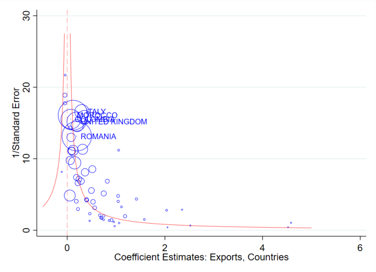
	Drug Confiscations Dummy			
	(1)	(2)	(3)	(4)
	Imports	Imports	Exports	Exports
Log immigrant population	0.185***	0.304***	0.0453***	0.120*
	(0.0121)	(0.0905)	(0.00786)	(0.0676)
Observations	74984	74984	74984	74984
Log distance	Y	Y	Y	Y
Origin-Year FE	Y	Y	Y	Y
Dest.-Year FE	Y	Y	Y	Y
Origin-Province FE	N	Y	N	Y
1st-stage F-statistic	747.8	32.2	747.8	32.2

Notes: The table presents IV panel gravity estimates at the country-province-year level. Standard errors are clustered by nationality-year in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

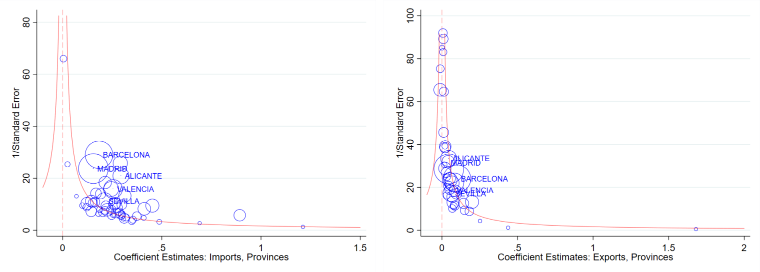
Heterogeneity of Effect Across Countries





Back

Heterogeneity of Effect Across Provinces



Back

Do Immigrants Raise Overall Imports of Illicit Drugs?

In baseline estimation found that:

- Immigrants raise trafficking at the country-province pair-level

However, immigrants may not raise total imports

- **Trade diversion**: e.g., aggregate trafficking constant, but reallocates to country-province pair with most immigrants

Do Immigrants Raise Overall Imports of Illicit Drugs?

In baseline estimation found that:

- Immigrants raise trafficking at the country-province pair-level

However, immigrants may not raise total imports

- **Trade diversion**: e.g., aggregate trafficking constant, but reallocates to country-province pair with most immigrants

To assess these channels, will aggregate to Spanish province level

- Lose variation at the immigrant origin country level

Back

Do Immigrants Raise Overall Imports of Illicit Drugs?

Estimation

$$\ln\left(Y_{d,t}\right) = \alpha_d + \alpha_t + \beta \ln\left(M_{d,t}\right) + \varepsilon_{d,t}$$

where

- t from 2003 to 2016
- $Y_{d,t}$ is either drug confiscations or drug use by the native-born
- $M_{d,t}$ measure number of immigrants in province d in year t

Do Immigrants Raise Overall Imports of Illicit Drugs?

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$$\ln\left(Y_{d,t}\right) = \alpha_d + \alpha_t + \beta \ln\left(M_{d,t}\right) + \varepsilon_{d,t}$$

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- t from 2003 to 2016
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- $M_{d,t}$ measure number of immigrants in province d in year t

Instrument for $\ln(M_{d,t})$ using ethnic enclave instrument from Cortes (2008):

$$IV_{d,t} = \ln\left[\sum_o \left(\frac{Immigrants_{o,d,1981}}{Immigrants_{o,1981}}\right) \times Immigrants_{o,t}\right]$$

Do Immigrants Raise Overall Imports of Illicit Drugs?

Estimation

$$\ln\left(Y_{d,t}\right) = \alpha_d + \alpha_t + \beta \ln\left(M_{d,t}\right) + \varepsilon_{d,t}$$

where

- t from 2003 to 2016
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$$IV_{d,t} = \ln\left[\sum_o \left(\frac{Immigrants_{o,d,1981}}{Immigrants_{o,1981}}\right) \times Immigrants_{o,t}\right]$$

Identification restriction: no persistent, time-varying shocks affecting distribution of immigrants, trafficking across Spanish provinces in both 1981 and 2000s

Back

Province-level Estimation

Immigrants raise illegal trafficking & use at the local level

	(1) First-Stage: Log immigrants	(2) PPML: Imports value confiscated	(3) PPML: Exports value confiscated	(4) 2SLS: Log native-born used drugs last 12 mo.	(5) 2SLS: Log native-born ever used drugs
Ethnic Enclave IV	0.180***				
	(0.0415)				
Log immigrants		11.5*	-17.74**	2.042	4.572
		(6.61)	(8.32)	(2.194)	(3.282)
Observations	728	728		728 310	312
Kleibergen-Paap F-stat	18.9	18.9	18.9	4.3	4.2
Province FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Notes: The table presents coefficient estimates from IV regressions at the province-year level. I instrument for *Log Immigrants* using the shift-share IV, with the first-stage shown in column 1. In columns 2 and 3, the dependent variable is the value of drugs confiscated for imports (col. 2) and exports (col. 3), estimated using control function PPML. The dependent variable of columns 4 and 5 is the log number of native-born Spaniards reporting to the EDADES survey that they used drugs in the last 12 months (column 4) or ever (column 5). Standard errors are clustered at the autonomous community-by-year level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

Effect Calculation

Extensive Margin of Imports

$$\overline{immigrants}_{o,d}^{2011} = 942$$

$$\hat{\beta} = 0.163$$

$$\mathbb{1}\left[C_{o,d}^{2011-2016} > 0 | M_{o,d}^{2011} = 942\right] =$$

$$0.163\left(\ln\left(1+\frac{1.1\times 942}{1000}\right) - \ln\left(1+\frac{942}{1000}\right)\right) = 0.0077$$

Back

Effect Calculation

Extensive Margin of Exports

$$\overline{immigrants}_{o,d}^{2011} = 942$$

$$\hat{\beta} = 0.0579$$

$$\mathbb{1}\left[C_{o,d}^{2011-2016} > 0 | M_{o,d}^{2011} = 942\right] =$$
$$0.0579\left(\ln\left(1 + \frac{1.1 \times 942}{1000}\right) - \ln\left(1 + \frac{942}{1000}\right)\right) = 0.0027$$

Back

Within-Spain Bilateral IV Effect Calculation

Intensive+Extensive Margin

$$\overline{immigrants}_{o,d}^{2011} = 942$$

$$\hat{\beta} = 0.48$$

$$\frac{C_{o,d}^{2011-2016}[M_{o,d}^{2011} = 1.1 \times 942]}{C_{o,d}^{2011-2016}[M_{o,d}^{2011} = 942]} - 1 =$$

$$\exp\left(0.48\left(\ln\left(1 + \frac{1.1 \times 942}{1000}\right) - \ln\left(1 + \frac{942}{1000}\right)\right)\right) - 1 = 0.023$$

Back

Can Policing Variation Explain my Results?

Thought experiment:

- Suppose immigrants do not affect illegal drug flows,
- But that immigrants only affect police enforcement intensity (fraction of drugs confiscated)

Back-of-the-envelope exercise:

- How much would enforcement have to change to rationalize baseline estimate?

$$\underbrace{Elasticity^{Confiscations}_{Immigrants}} = Elasticity^{Enforcement}_{Immigrants} + Elasticity^{Trafficking}_{Immigrants}$$

- Estimated that a 10% $\uparrow$ in immigrants from *o* led to $\uparrow$ in confiscations of illegal drugs from *o* by 2.3%

Can Policing Variation Explain my Results?

Immigrant Population Change

- Mean bilateral immigrant population of 942
- Consider 2 standard deviation increase: 10,597 more immigrants on bilateral pair
- Represents over 12 times $\uparrow$ bilateral immigrant population

$\Longrightarrow$ 282% $\uparrow$ in enforcement intensity based on baseline elasticity estimate

Enforcement Intensity Change

- Spain confiscates an estimated 6% of imported cocaine and cannabis in transit
- Implied increase in enforcement intensity is from 6% to 17%

Back

Gravity Specification: Measurement Error

If true illicit drug flows $X_{o,d}$ observed, would estimate

$$\ln(X_{o,d}) = \alpha_o + \alpha_d + \beta M_{o,d}^{2011} + \zeta \ln(Dist_{o,d}) + \tilde{\varepsilon}_{o,d}$$

Gravity Specification: Measurement Error

If true illicit drug flows $X_{o,d}$ observed, would estimate

$$\ln(X_{o,d}) = \alpha_o + \alpha_d + \beta M_{o,d}^{2011} + \zeta \ln(Dist_{o,d}) + \tilde{\varepsilon}_{o,d}$$

Actually observe $C_{o,d} = E_{o,d} X_{o,d}$ for enforcement intensity $E_{o,d} \in [0,1]$. Can estimate,

$$\ln(C_{o,d}) = \alpha_o + \alpha_d + \beta M_{o,d}^{2011} + \zeta \ln(Dist_{o,d}) + \underbrace{\tilde{\varepsilon}_{o,d} + \ln(E_{o,d})}_{\varepsilon_{o,d}}$$

where $E_{o,d}$ is unobserved

Gravity Specification: Measurement Error

If true illicit drug flows $X_{o,d}$ observed, would estimate

$$\ln(X_{o,d}) = \alpha_o + \alpha_d + \beta M_{o,d}^{2011} + \zeta \ln(Dist_{o,d}) + \tilde{\varepsilon}_{o,d}$$

Actually observe $C_{o,d} = E_{o,d} X_{o,d}$ for enforcement intensity $E_{o,d} \in [0,1]$. Can estimate

$$\ln(C_{o,d}) = \alpha_o + \alpha_d + \beta M_{o,d}^{2011} + \zeta \ln(Dist_{o,d}) + \underbrace{\tilde{\varepsilon}_{o,d} + \ln(E_{o,d})}_{\varepsilon_{o,d}}$$

where $E_{o,d}$ is unobserved

- α_o captures enforcement intensity/discrimination faced by immigrants from o common across Spain
- α_d captures enforcement intensity/police strength at province level
- Assumption: $Cov(E_{o,d}, M_{o,d} | \alpha_o, \alpha_d) = 0$

Back

Confiscations, Enforcement, and True Flows

For $E_{o,d} \in [0, 1]$

$$C_{o,d} = E_{o,d} X_{o,d}$$

for actual illegal drug flows $X_{o,d}$.

Confiscations, Enforcement, and True Flows

For $E_{o,d} \in [0, 1]$

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Alternative solution: look at extensive margin of drug trafficking where $X_{o,d} \approx 0$ (Akee et al. 2013)

- Difficult to identify o, d pairs on extensive margin of drug trafficking

Back

Estimating Effect for Marginal Trafficking Links

I estimate my baseline specification:

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- how d targets drug trafficking coming from continents other than $c(o)$

Back

Enforcement Intensity Cannot Explain Total Baseline Result

	Imports Confiscations (Dummy)		Exports Confiscations (Dummy)	
	(1)	(2)	(3)	(4)
Log immigrants 2011	0.163***	0.0837*	0.0579*	0.0418
	(0.0455)	(0.0461)	(0.0348)	(0.0335)
Observations	5564	4642	5564	5125
R^2	0.047	0.027	0.019	0.016
Country FE	Y	Y	Y	Y
Province FE	Y	Y	Y	Y
Ln dist	Y	Y	Y	Y
1st-stage F-statistic	152.4	372.5	152.4	165.4
Sample	All	$<$ 15000 USD predicted confiscations	All	$<$ 15000 USD predicted confiscations

Notes: The table presents coefficient estimates from IV gravity regressions at the country-province level. I instrument for the immigrant population measure using $\{IV^D_{o,d} = I^D_{o,-a(d)} \times I^D_{-c(o),d}/I^D_{-c(o)}\}_{1991-2001,2001-2011}$, their interaction across decades, and squared terms as the excluded instruments. In column 2, I subset to the set of country-province pairs for which predicted import confiscations fall below $15,000; I do the same for predicted export confiscations in column 4. Standard errors are clustered by country in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

Ruling out Demand-Driven Explanation

Alternative explanation: immigrants may have idiosyncratic taste for drugs trafficked from origin country. However,

- Immigrants consume drugs at much lower rates than the native-born:

	Used Illegal Drugs	
Place of Birth	Ever	Past 12 months
Spain	33.8%	12.6%
Abroad	21.3%	8.6%

Source: EDADES.

- At retail level, nearly impossible to differentiate drugs by trafficking origin

Back

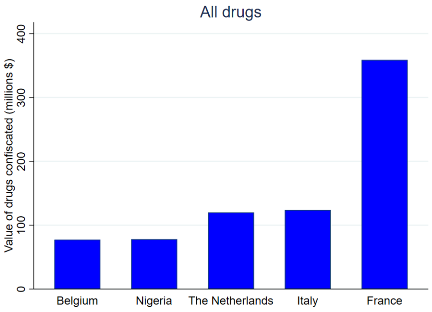
Value Trafficked by Legal Status

	Value of Drug Confiscations	
	Imports	Exports
Log irregular immigrants 2011	-0.523	0.969
	(0.472)	(0.973)
Log regular immigrants 2011	0.0548	0.629*
	(0.203)	(0.339)
First-stage residuals (regular immig.)	0.553***	-0.844*
	(0.209)	(0.460)
First-stage residuals (irreg. immig.)	1.037**	-0.129
	(0.428)	(0.944)
Observations	2964	2596
SW 1st-stg. F-stat. (regular immigrants)	63.8	63.8
SW 1st-stg. F-stat. (irregular immigrants)	18.8	18.8

Notes: The table presents control function PPML estimates with dependent variable the value of drugs confiscated. Standard errors are clustered by nationality in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Back

Exporting Drugs within the European Union

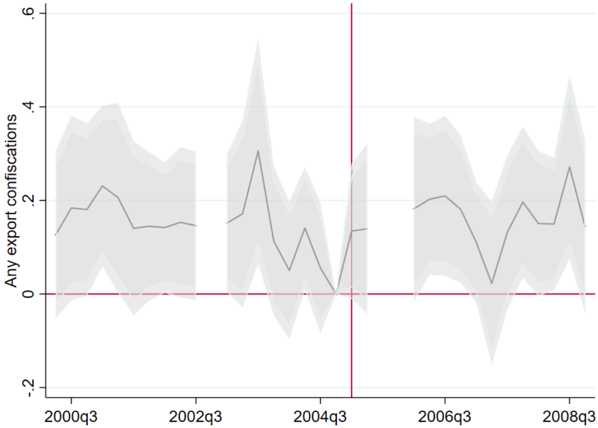


From Fukumi (2008):

"The introduction of the Schengen Agreement in 1985, and the full implementation of the Schengen Treaty in 1995 opened a window of opportunity to cocaine traffickers because it enabled free movement within a major part of Western Europe." (p. 50)

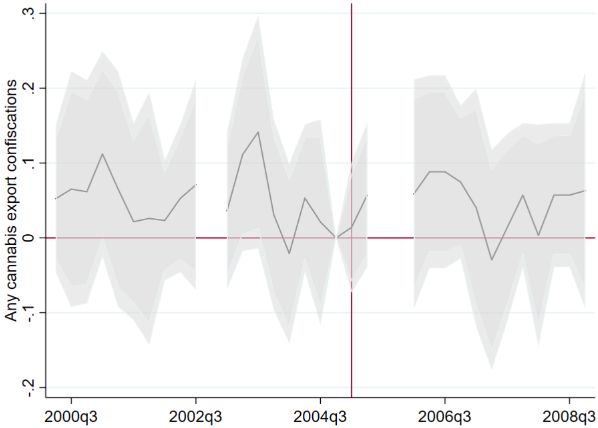
"In the same way that tomatoes can be sent to Europe, anything else can," says one investigator with the Civil Guard. El Pais Back

Effect of Immigrant Legalization on Illegal Drug Exporting



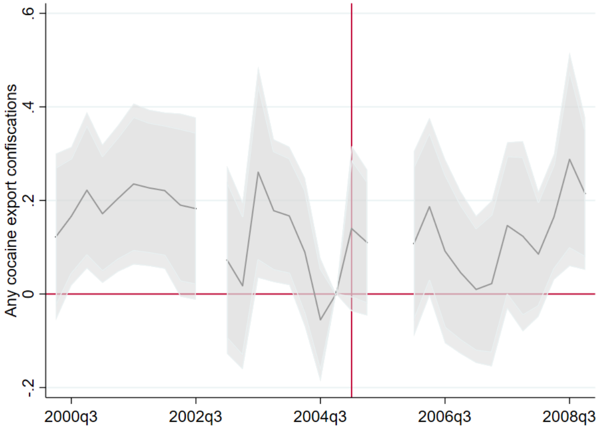
Back

Effect of Immigrant Legalization on Cannabis Exporting



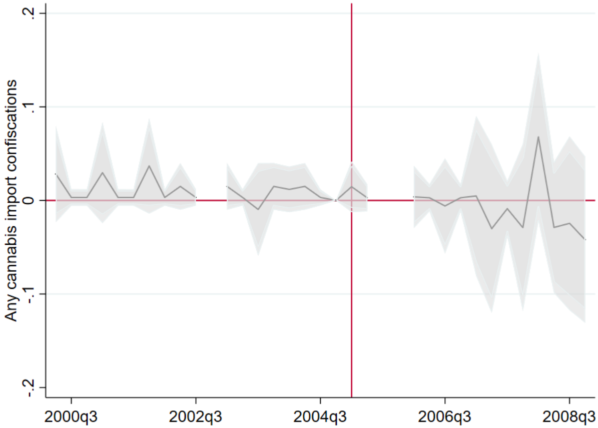
Back

Effect of Immigrant Legalization on Cocaine Exporting



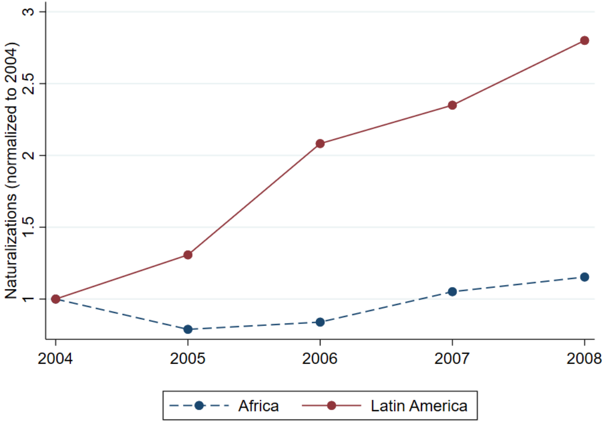
Back

Effect of Immigrant Legalization on Cannabis Importation



Back

Acquisition of Citizenship by Continent of Origin



Back