Partial Legalization and Parallel Markets: The Effect of Lawful Crossing on Unlawful Crossing at the US Southwest Border

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Abstract

Legal and illegal markets often coexist. In theory, marginal legalization can either substitute for the remaining parallel market, or complement it via scale effects. I study migrants crossing without prior authorization at the US southwest border, where large-scale unlawful crossing coexists with substantial, varying, and policy-constrained lawful crossing. I test whether lawful and unlawful crossing are gross substitutes or complements, using lag-augmented local projections to analyze a monthly time-series on the full universe of 10,658,497 inadmissible migrants encountered from October 2011 through July 2023. Expanded lawful crossings cause reduced unlawful crossings, an effect that grows over time and reaches elasticity −0.3 after approximately 10 months. That is, in this case, expanded activity on the lawful market substitutes for the parallel market, even net of scale effects. This deterrent effect explains approximately 9 percent of the overall variance in unlawful crossings. In an ancillary finding, I fail to reject a null effect of depenalizing unlawful crossings on future attempted unlawful crossings.

1   Introduction

Many official markets exist alongside black markets for similar or identical goods, known as parallel markets. Regulators have options in the spectrum between strict enforcement and outright legalization, including a *marginal expansion* of legalization—explicitly permitting a limited growth in the scope of activity on the official market. Expanded legalization at the margin might complement or substitute for the scope of the parallel market. Economists and legal scholars have examined this effect in parallel markets including foreign exchange, digital media, wildlife products, antiquities, narcotics, tobacco, and several others.[1] Any direct substitution effect of partial legalization on the parallel market can be offset by scale effects that act through prices, networks, or herding. The net effect is central to effective policy, but opportunities to estimate it are rare. It is inherently difficult to measure black market activity.

This paper considers the effects of marginal expansion in lawful channels for crossing the US Southwest border on attempted unlawful crossing of the same border. Migrants who cross into high-income countries from lower-income countries make a costly, risky investment (Schultz 1961; Sjaastad 1962; Hanson 2006, 887) with typically large and lasting effects on the returns to their human capital (McKenzie et al. 2010; Clemens et al. 2019; Mobarak et al. 2023). Crossing the border, in this sense, corresponds to costly purchase of a risky asset with potentially great value. Lawful and unlawful crossing of the border, by broadly similar migrants, occur simultaneously and in close proximity. Lawful crossing is restricted and regulated; unlawful crossing is extensively interdicted, monitored, and thus measured. The border is a useful setting to study how changes in the scope of licit economic activity shape illicit activity.

I estimate this effect using monthly time series data on the full universe of 10,658,497 initially inadmissible migrants encountered by US Customs and Border Protection (CBP) at the Southwest border between October 2011 and July 2023. Inadmissible migrants are, with immaterial excep-

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[1] Examples include studies on the relationship between market regulations and parallel markets in foreign exchange Dornbusch et al. (1983); on digital media by Aguiar and Waldfogel (2018); on wildlife products by Hsiang and Sekar (2019), Santiago-Ávila et al. (2020), and Dang Vu et al. (2022); on antiquities by Beltrametti and Marrone (2016); on alcohol by e.g. Dills (2004) and surveyed by Hall (2010); on narcotics by DiNardo and Lemieux (2001), Becker et al. (2006), and Auriol et al. (2023b); on gambling by Albanese (2017); on tobacco by Merriman (2010), Kulick (2017), and Bate et al. (2020); on organ transplants by Mendoza (2010); on child adoptions by Marquez (2000); on firearms by Braga (2017); and on various other goods and services by *inter alia* Polterovich (1993), Cameron (2003).

tions, non-US nationals who either 1) cross the border unlawfully, without inspection, between government-run Ports of Entry, or 2) cross the border lawfully, but when inspected at a Port of Entry they lack documents obtained prior to arrival—such as a visa—to authorize entry. Yet CBP officials have and exercise the legal authority to release a substantial share of inadmissible migrants into the United States. That is, many migrants arriving without *prior* authorization to enter are nevertheless permitted by federal officials, exercising their legal authority, to lawfully cross the border. Most migrants released after crossing lawfully are or become eligible to apply for temporary lawful employment authorization, unemployment insurance, and subsidized health insurance, and in practice can receive protection from deportation for a period of years.

I classify such migrants as entering by a "lawful channel" when they cross the border without subterfuge at official Ports of Entry, and are inspected and eventually released into the US by law enforcement officials exercising their legal authority. These channels include a complex set of legal authorities for officials to release migrants with *humanitarian parole*, *asylum cases pending*, *Orders of Supervision*, and others detailed below. Such lawful channels to cross the border do not directly convey a lawful immigration "status", such as a visa, which contributes to confusion about whether a person who crosses the border lawfully is "migrating" lawfully. Creating a lawful channel for the marginal migrant to cross the border bundles together the legalization of their *entry* (by definition) and the temporary depenalization of their *presence* (for most, in practice).[2] I study the effect of expanded lawful *crossing* on unlawful *crossing*.

The analysis proceeds as follows. I first explore in theory why the effect of lawful channels on unlawful crossing can be ambiguous. I build a simple two-stage nested discrete choice dynamic programming model of the decision to migrate. In the first stage (outer nest), migrants choose whether to migrate from their country of origin to the border. In the second stage (inner nest), they choose whether to attempt to cross the border through lawful channels (which are tightly constrained) or unlawful channels (which are risky and costly). Expanding lawful channels can have an obvious substitution effect in the inner nest (Becker 1968; Draca and Machin 2015), but also an offsetting scale effect in the outer nest. For example, marginal legalization could affect the

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[2]There is widespread controversy in courts and in the public about whether an inadmissible migrant who *crosses* via a lawful channel is lawfully or unlawfully *present* in the United States. I do not engage that controversy here. I follow the literature (e.g. Hanson 2006) and the US Department of Homeland Security (DHS) in defining unlawful crossing as occurring between official Ports of Entry, not at Ports of Entry—with the immaterial exception of migrants who cross at a Port of Entry but represent themselves fraudulently.

scale of overall migration by affecting the price of complementary inputs like travel and smuggling services (Gathmann 2008). Marginal legalization could also complement the scale of overall migration via networks, expanding the resources and information by which prior migrants can assist later migrants (Munshi 2003; Beine et al. 2015; Elsner et al. 2018; Cascio and Lewis 2023), or separately through herd behavior (Epstein 2008). If scale effects dominate, a marginal expansion of lawful channels could even expand the parallel market—as has been observed in other black markets (e.g. Fijnaut and De Ruyver 2015, 112; Hsiang and Sekar 2019). The dominance of such scale effects in migration at the US Southwest border has been advanced as an explanation for historical surges in unlawful migration there (e.g. Massey and Liang 1989). The potential for similar contemporary effects continues to drive policy debate.[3]

I proceed to estimate empirically the net effect of an expansion in lawful channels on unlawful crossing: the cross-elasticity of lawful channels and unlawful crossing. It can be misleading to estimate this effect with simple correlations between the series, given that unobserved common factors could have first-order confounding effects on both. I address the identification problem using lag-augmented local projections (Jordà 2005, 2023), estimating the response of monthly unlawful crossings to a shock in monthly releases of migrants who cross lawfully. I find that a one percent increase in lawful channels causes a decline in unlawful crossing that begins 1–2 months later and grows over time, causing a 0.2–0.3 percent decline in unlawful crossings 5–10 months later. The deterrent effect of expansions in lawful channels is an important determinant of unlawful crossings, explaining approximately 9 percent of the historical variance in unlawful crossings from 2011 through 2023. This deterrent effect, as the model predicts, is least when migrants' prospects for US employment are greatest. The core result is robust to a range of specifications including alternative lag structures, alternative time-series estimators, additional endogenous and exogenous controls, and truncating the sample to exclude early years or the shock of the Covid-19 pandemic.

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[3]Some migration analysts claim that releasing inadmissible migrants to live and work in the United States acts as a "pull factor" increasing the volume of migration to the border, including for unlawful crossing. For examples see Executive Office for Immigration Review, Department of Justice, and U.S. Citizenship and Immigration Services, Department of Homeland Security, 2022, "Procedures for Credible Fear Screening and Consideration of Asylum, Withholding of Removal, and CAT Protection Claims by Asylum Officers", *Federal Register* 87: 18078–18226, pages 18119, 18120, 18127 *passim*; US Dept. of Homeland Security, 2020, "Asylum Application, Interview, and Employment Authorization for Applicants", *Federal Register* 85: 38532–38628, at 38596 *passim*; and Charles D. Stimson, Hans A. von Spakovsky, and Lora Ries, 2020, "Assessing the Trump Administration's Immigration Policies", Washington, DC: Heritage Foundation.

In principle, this effect could arise from varying demand for lawful channels (by migrants) or varying supply of lawful channels (by law enforcement officials). But the local projections detect no reverse effect of changes in unlawful crossings on lawful releases, an effect that would be expected if the core results arose from migrants switching their demand from unlawful crossing to lawful crossing unconstrained by policy. And a natural experiment of exogenous policy change (Amuedo-Dorantes and Bucheli 2023) approximately replicates the core finding, implying that the core estimates do reflect the effects of changes in policy, the Policy-Relevant Treatment Effect (Heckman and Vytlacil 2001). At the Southwest border, I find that a policy of marginally expanding legalized crossing substantially substitutes for the parallel market. While this finding is highly relevant to discretionary policy decisions made on a daily basis, its external validity to other policy changes, such as the creation of work visas, must be carefully examined.

Prior empirical research on the effect of lawful channels on unlawful migratory behavior is limited. Researchers have instead highlighted the effect on unlawful border crossing from enforcement against unlawful crossing itself (surveyed by Hanson 2006; Hanson et al. 2023)—such as increased patrol effort (Ethier 1986; Orrenius 2004; Gathmann 2008), punitive consequences (Bazzi et al. 2021), or physical barriers (Allen, Dobbin and Morten 2019).[4] But comparatively few studies have investigated quantitatively how parallel *unlawful* migration is shaped by expansions of *lawful* migration, despite the advance of theoretical models implying such an effect (e.g. Auriol and Mesnard 2016; Devadoss and Luckstead 2018; Simon et al. 2018; Kovak and Lessem 2020; Devadoss et al. 2020; Auriol et al. 2023a). In rare empirical tests, Amuedo-Dorantes and Bucheli (2023) find that a dummy variable for limits on access to US Ports of Entry for lawful crossing in a given Border Patrol sector is associated with greater apprehensions of migrants crossing the border unlawfully in that sector. Czaika and Hobolth (2016) find that European countries with greater asylum rejection rates receive more irregular migrants.[5]

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[4]Empirical work on the effect of border patrol effort and sanctions includes Todaro and Maruszko (1987); Hanson and Spilimbergo (1999); Hanson et al. (2002); Dávila et al. (2002); Orrenius (2004); Cornelius and Salehyan (2007); Angelucci (2012); Bohn and Pugatch (2015); Massey et al. (2016); Lessem (2018); Bazzi et al. (2021); Fasani and Frattini (2024). Evaluations of physical barriers include Allen, Dobbin and Morten (2019); Feigenberg (2020). Rodríguez Sánchez et al. (2023) and Deiana et al. (2024) evaluate the effects of at-sea rescues on irregular migration across the Mediterranean.

[5]Bither and Ziebarth (2018) examine "plausible" but inconclusive evidence that a 2015 law in Germany opening lawful channels to six Western Balkan countries caused a reduction in irregular migration to Germany from those countries. Gunadi (2021) uncommonly focuses on a major group of asylum seekers, inadmissible Venezuelan migrants legally permitted to enter the US, studying the effect of their arrival on US workers.

In an ancillary result, I find that the evidence fails to reject a null effect on unlawful crossings from depenalizing unlawful crossing—that is, releasing those apprehended crossing unlawfully rather than creating channels for lawful crossing. This relates to a different strand of literature that studies depenalization in a migration setting. Prior literature focuses on one form of depenalization: *ex post* regularization or "amnesty" programs for prior arrivals, and how they affect natives and the migrants themselves (Pinotti 2017; Kuka et al. 2020; Battaglia 2023), or on subsequent lawful migration (Cascio and Lewis 2023).[6] My result, in contrast, relates to concurrent or *ex durante* depenalization, that is, exempting unlawful crossers from punishment at the moment they cross unlawfully. I am not aware of prior quantitative evaluation of this particular form of depenalizing unlawful crossing.

The rest of the paper is structured as follows. Section 2 describes the regulatory context for lawful and unlawful crossing of the US Southwest border, and details the distinction between unlawful crossing and unlawful "migration". Section 3 presents a model of the offsetting substitution and scale effects of lawful channels. Section 4 discusses the data and empirical method. Section 5 presents the core empirical results, and Section 6 discusses their robustness and interpretation. Section 7 considers the evidence for policy change as the causal mechanism, and Section 8 concludes.

2 Policy context: Migrant encounters at the US Southwest border

The classification of migrant encounters used here depends on regulatory complexities of the US-Mexico border. This section explains how migrants' choice of border-crossing channel, and their treatment under different and interacting regulations, creates marginal variation in channels for lawful crossing alongside a parallel market in unlawful crossing.

The 1,954 mile-long frontier that connects the United States and Mexico is a formidable barrier. Large fences cover 741 miles of its more accessible stretches; most of the rest is remote from transportation infrastructure and obstructed by rivers and mountains.[7] But this border is also

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[6]Evaluations of depenalization for those who migrated unlawfully on the migrants themselves include White et al. (1990); Donato et al. (1992); Cobb-Clark et al. (1995); Orrenius and Zavodny (2003); Kaushal (2006); Amuedo-Dorantes et al. (2013); Hoekstra and Orozco-Aleman (2021).

[7]There were 654 miles of border fencing in 2016, and 87 additional miles have been fenced since (Government

one of the world's most transited. In 2022 alone, 166 million people entered the United States overland from Mexico, by car, bus, or walkway at government-run Ports of Entry.[8] The vast majority of those crossing the border are considered admissible when inspected by US Customs and Border Protection (CBP), and thus admitted.

But also in 2022, CBP encountered 2.58 million migrants entering at the US-Mexico border that it ruled inadmissible, that is, lacking prior authorization to enter. These migrants can be broadly classified in two intersecting dimensions: method of crossing, and final disposition.

2.1 Classifying inadmissible migrants by border-crossing

First, inadmissible migrants can be classified by how they cross the border. They are either encountered by CBP after crossing either at a Port of Entry, where they are inspected, or between Ports of Entry and thus without inspection. Crossing the border to present oneself for inspection at a Port of Entry *per se* is not a violation of US criminal or civil law, regardless what documents a migrant might lack. Crossing the border without inspection is a crime regardless of what documents a migrant might possess.[9] In 2022, 9.1 percent of migrants ruled inadmissible had been encountered at a Port of Entry, the rest between Ports of Entry.

Figure 1 shows the locations of different methods of crossing the US-Mexico border. Green diamonds indicate the locations of the the 28 Ports of Entry for lawful border-crossing, run by CBP's Office of Field Operations (OFO). The solid red lines dividing US territory indicate the nine operational sectors of the US Border Patrol (USBP), which interdicts migrants crossing between Ports of Entry. The red circle next to each sector's name is sized to indicate that sector's relative share of all migrants encountered crossing the border unlawfully 2011–2022. The figure shows that unlawful crossing typically occurs in areas where Ports for lawful crossing are available nearby. The sector with the lowest density of Ports, Big Bend, is also the sector with the smallest share of unlawful crossing. Any given inadmissible migrant faces a choice of how to cross.


Accountability Office: GAO-17-331, p. 6; GAO-23-105443, p. 19).

[8]US Bureau of Transportation Statistics, Border Crossing/Entry Data, Washington, DC: US Dept. of Transportation, accessed Nov. 3, 2023.

[9]See 8 USC § 1325.

Figure 1: THE LOCATION OF LAWFUL AND UNLAWFUL CROSSING AT THE US SOUTHWEST BORDER: Ports of Entry for lawful crossing (green diamonds); Border Patrol sectors and relative volume of unlawful crossing between Ports of Entry (red lines and circles)
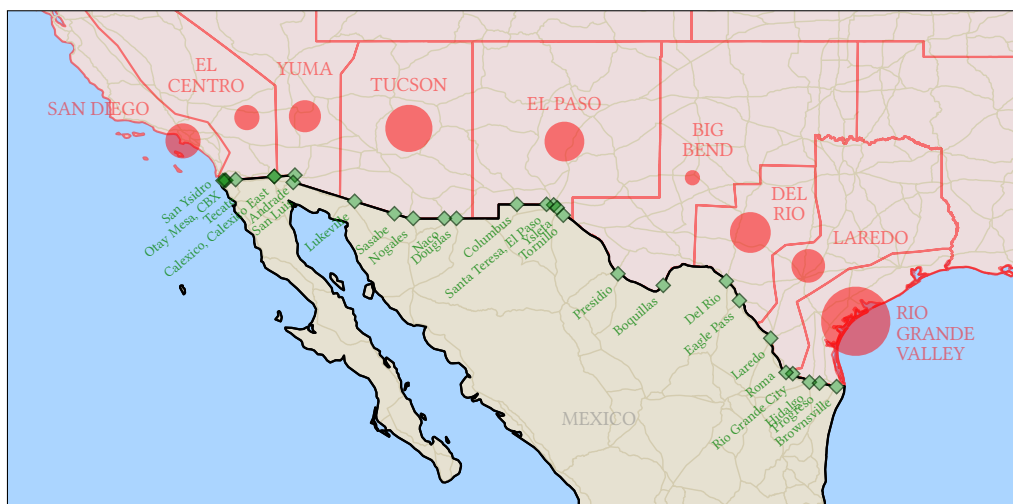

Ports of Entry along the US-Mexico border are shown with green diamonds, as operated by the US Customs and Border Protection Office of Field Operations (OFO) as of August 2023. The nine US Border Patrol sectors along the border are shown with solid red lines dividing US territory, and labeled in red capital letters. The relative sizes of the shaded red circles in each sector show the relative number of migrant apprehensions in that sector, cumulatively October 2011 through May 2022. The corresponding absolute numbers of US Border Patrol apprehensions range from 106,669 in Big Bend Sector to 2,200,138 in Rio Grande Valley Sector. Brown lines show major highways in the United States and Mexico as of 2010.

2.2 Classifying inadmissible migrants by disposition

Second, inadmissible migrants can be classified by their final disposition: where they are sent by CBP officers. Some inadmissible migrants are released into the United States—either released soon after encounter, or released after a period of detention by Immigration and Customs Enforcement (ICE). The numerous reasons for such release include DHS officials' assessment of a lack of danger to the community, legal constraints on detention of (e.g.) children, and lack of space in detention facilities (Harrington 2021). Those not eventually released are classified here as given "*no access*" to the United States: either removed, returned, expelled, or imprisoned.[10]

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[10]The colloquial word 'deported' has not been used by CBP in a technical sense to describe migrant disposition since 1996. 'Removed' means a person forced to depart the United States under authority of US Code Title 8, even if they just crossed the border, which can include legal consequences such as a five-year bar on reentry. 'Returned' means person physically turned around and forced to leave the United States, without formal legal proceedings or consequences. (This includes "voluntary" returns and "withdrawals" of application for admission.) 'Expelled' means a person forced to depart the United States under authority of public health provisions of US Code Title 42, also without the legal consequences of Title 8 removal. https://www.dhs.gov/immigration-statistics/reporting-terminology-definitions

Figure 2: US Southwest Border Migrant Crossings and Dispositions
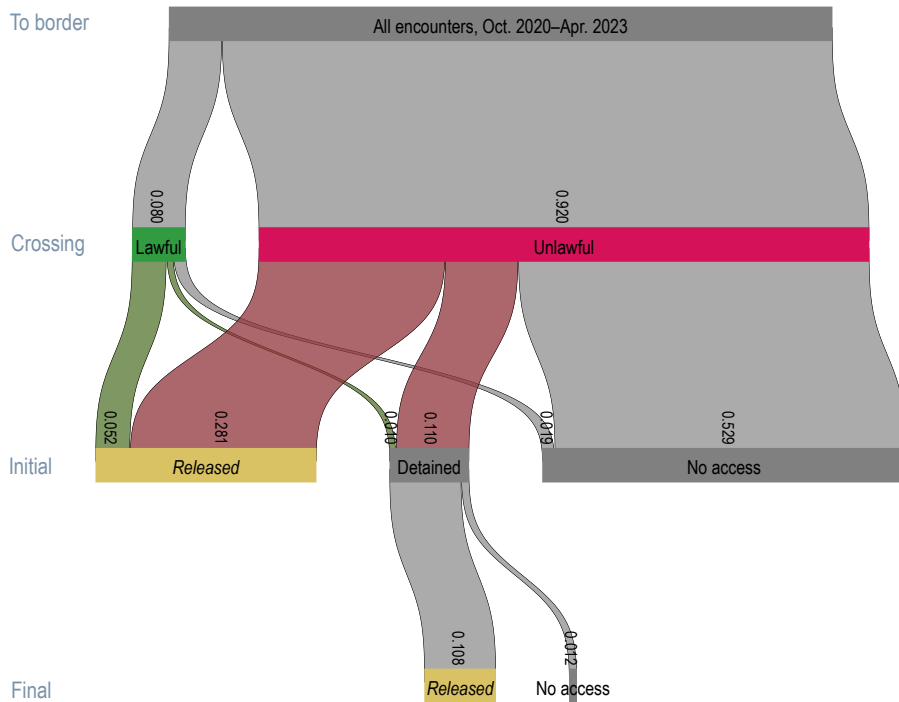
This Sankey plot displays the universe of inadmissible migrant encounters by US Customs and Border protection at the US Southwest border from October 2020 through April 2023. The numerical label of each flow, in each row, shows its fraction of *total* encounters in the first row. Green flows show migrants who did not, by crossing the border, violate US law. The first row ("To border") shows all migrant encounters at the border (5,551,930). The second row ("Crossing") divides total encounters into migrants who crossed lawfully at Ports of Entry and were encountered by the Office of Field Operations (443,795) and those who crossed unlawfully and were encountered by the Border Patrol (5,108,135). The third row ("Initial") shows the initial disposition of migrants who crossed by each channel: *Released* into the US; *Detained* by Immigration and Customs Enforcement; or given *No access* to the US (removed, expelled, or returned abroad, or imprisoned on criminal charges). The fourth row ("Final") shows the final disposition of migrants initially detained, where *Released* comprises Bonded Out, Paroled, Order of Recognizance, or Order of Supervision. The window of dates is chosen according to availability of data on releases from detention.

All combinations of crossing method (*lawful*/*unlawful*) and disposition (*released*/*no access*) are possible for any given migrant. Figure 2 shows the relationship between crossing method and disposition for the universe of inadmissible migrants encountered at the Southwest Border from October 2020 through April 2023.[11] The first row represents all 5.6 million inadmissible migrants encountered during this period. The second row compares the fraction of these migrants

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[11]This range of dates is the broadest one that allows all fractions in the figure to be estimated with reasonable precision based on publicly available data. For the months and years before October 2020, ICE does not publish monthly final releases from detention. Before this date only a lower bound on the fraction eventually released is possible to estimate, an exercise carried out in the Appendix. After April 2023, at the time of writing, a substantial fraction of CBP transfers to ICE who will eventually be released may not yet have been released. This too is discussed in depth in the Appendix.

encountered while crossing lawfully at Ports of Entry (green, 0.08) to the number crossing un-lawfully, between Ports of Entry (red, 0.92). The third row decomposes the preceding row by initial disposition. The fourth row decomposes migrants initially transferred to detention by their final disposition.

This final disposition—*Released* vs. *No Access*—arises from a process that differs by the migrant's method of crossing. The key feature of this complex process is that it creates a class of migrants who, despite their status as inadmissible, 1) cross the border lawfully and 2) are released into the US by DHS officials acting on legal authority. Below I detail the four possible classifications of each migrant.

1. *Lawful Crossing, Immediate Release*: When a migrant crossing lawfully at a Port of Entry is ruled inadmissible, CBP determines an initial disposition. Several different initial dispositions result in the migrant's release into the United States, either directly after initial processing or after a brief period of holding in CBP facilities. Migrants can be released with *humanitarian parole*, a temporary legal status given at CBP discretion for reasons of humanitarian or "significant public" benefit, or under a variety of *ad hoc* statutory provisions such as for Cuban nationals to pursue US citizenship.[12] Over the entire period analyzed here roughly one quarter of lawfully-crossing migrants have been released with parole of this kind.[13] Alternatively, lawfully-crossing migrants can be immediately released on *conditional parole* to pursue a claim of asylum with a *Notice to Appear* in immigration court, after persuading CBP officers that they face a "credible fear" of violent persecution in their country of origin (or, if they had already been ordered removed after a previous entry, a higher standard of "reasonable fear").

Though I focus here on the fact that migrants via lawful channels experience legalized crossing, most of them furthermore experience temporarily depenalized *presence* and work in the US. Migrants released with humanitarian parole can apply for employment authorization shortly after arrival. Those released on conditional parole can apply for employment authorization six

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[12]"Parole authorized at the port upon noncitizen's arrival; used at the discretion of the supervisory immigration inspector, usually to allow short periods of entry, and applies to a wide variety of situations, such as allowing noncitizens who could not be issued the necessary documentation within the required time period, or who were otherwise inadmissible []." https://www.dhs.gov/immigration-statistics/reporting-terminology-definitions Parole has been given by CBP officers at Ports of Entry for a range of other reasons under *ad hoc* provisions of law, including for Cuban nationals, Central American Minors, Ukrainian nationals, Filipino World War II veterans, and others.

[13]Details in Table 1.

months after applying for asylum, as well over two thirds of such migrants do.[14] Migrants with employment authorization can apply for federally subsidized health insurance under the Affordable Care Act, and in most states are eligible to apply for unemployment insurance.

2. *Lawful Crossing, Initially Detained*: Among those inadmissible migrants crossing lawfully who are *not* immediately released, a further subset is released after being initially detained. Some inadmissible migrants encountered at a Port of Entry are transferred for detention by ICE in one of several holding facilities around the country run by ICE itself, local governments, or private firms. The decision to transfer migrants for ICE detention is based in part on past criminal history and on family relationships. For example, adults with prior convictions for severe crimes are subject to mandatory detention by ICE; most minor children, or adult parents traveling with their children, are typically not detained.[15] The detention decision is based "on whether the alien is subject to mandatory detention, the alien's risk to public safety, the effort to promote compliance with removal proceedings or removal orders (i.e., reducing flight risk), and the availability and prioritization of resources."[16]

ICE has discretion to release detained migrants into the United States on their own recognizance, with parole, on bond, or on 'Alternatives to Detention'/Order of Supervision, which releases migrants using various technologies to monitor their compliance with release conditions. *De jure*, migrants seeking asylum are subject to detention until their court hearings.[17] *De facto*,

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[14]The Appendix reviews the evidence on the fraction of released migrants who later file asylum cases with the Dept. of Justice. Migrants released without parole but with a Notice to Appear receive a permission to enter formally known as *Conditional Parole*. Conditional Parole does not by itself allow application for employment authorization, but a migrant entering on conditional parole can subsequently apply for asylum, during the adjudication of which the migrant may apply for employment authorization following a waiting period. A small number of migrants (<0.05 percent) are also released under *Prosecutorial Discretion*, without legal proceedings but also without a status allowing them to pursue employment authorization, though such migrants can apply for asylum at any time after release. See Government Accountability Office (2022), "Southwest Border: Challenges and Efforts Implementing New Processes for Noncitizen Families", GAO-22-105456, Washington:DC: GAO.

[15]Inadmissible migrants with earlier convictions for certain criminal offenses (such as domestic violence or aggravate felonies) must be initially detained even if they have already served their time for that offense. See Congressional Research Service, "The Law of Asylum Procedure at the Border: Statutes and Agency Implementation", April 9, 2021.

[16]Mike Guo and Ryan Baugh, "Immigration Enforcement Actions: 2018", Washington, DC: US Dept. of Homeland Security Office of Immigration Statistics, p. 2. The same source notes ICE's wide discretion in the final disposition of a migrant once detained: "Options available to ICE include immigration detention, supervised alternatives to detention, release on bond, parole, or release on the alien's own recognizance. ICE may redetermine custody at any point while the alien is in removal proceedings." Ryo (2019) provides additional background.

[17]Congressional Research Service, "The Law of Asylum Procedure at the Border: Statutes and Agency Implementation", April 9. 2021.

most are released after 1–2 months.[18] A major determinant of releases is constrained space and resources in detention facilities, given that the average inadmissible migrant with a *Notice to Appear* in immigration court waits several years before the case is heard.[19] I return below to the exact magnitude of these releases. Most lawfully-crossing migrants released by ICE, like those released by CBP, experience temporarily depenalized *presence* in the country. Those released with parole or an Order of Supervision, and some migrants released on bond, are eligible to apply for lawful employment authorization and subsidized health insurance from the federal government, as well as unemployment insurance in most states.

3. *Unlawful crossing, Immediate Release*: Migrant encounters between Ports of Entry are considered here "unlawful crossings".[20] Each of these migrants is likewise assigned an initial disposition by the US Border Patrol. Several such dispositions result in immediate or near-immediate release into the United States, similarly to those assigned at Ports of Entry. As above, migrants encountered crossing unlawfully between Ports of Entry can be quickly released with *Parole*, with a *Notice to Appear*, or without any status ('*Released*') at officers' discretion. As above, the Notice to Appear can be given to encountered migrants placed in full formal removal proceedings; to migrants placed in abbreviated "Expedited Removal" proceedings if Border Patrol officers determine they face a "credible fear" of violent persecution if they returned to their home countries; or for those already ordered removed due to a previous entry attempt, if they face (a somewhat higher standard of) "reasonable fear".[21]

4. *Unlawful crossing, Initially Detained*: Of migrants encountered crossing unlawfully who are not immediately released, just as for those encountered at Ports of Entry, a substantial share are later released into the United States. Many of those encountered during unlawful crossing are quickly removed, returned, or expelled. But a large share are transferred to ICE detention, from

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[18]Average ICE detention times for CBP transfers hit roughly 4 months for a short period after the beginning of the COVID-19 pandemic; see Appendix.

[19]Government Accountability Office, GAO-23-105431, April 2023.

[20]In addition to all USBP encounters between Ports of Entry, I include in "unlawful crossings" the small number of OFO encounters at Ports of Entry that are unlawful due to a false or fraudulent claim by the migrant, including an attempt to enter on a visa that is not valid, or smuggling activity detected by CBP. But for the present purpose, unlawful crossings are substantively identical to USBP encounters.

[21]"No published regulations or policy documents explain how CBP decides whether to place an undocumented migrant apprehended at the border into expedited or full removal proceedings.118 But space and logistics appear to be determinative factors" (Congressional Research Service, "The Law of Asylum Procedure at the Border: Statutes and Agency Implementation", April 9. 2021).

which most—as described above—are typically released into the United States on bond, parole, own recognizance, or 'Alternatives to Detention' supervision.

2.3   Defining and measuring lawful channels

In this paper, the creation of a 'lawful channel' for an inadmissible migrant is the concession by DHS officials, to migrants *crossing lawfully*, of release into the United States. This does not come with a direct route to lawful *presence*, but it does entail a high probability to live and (eventually) lawfully work in the United States for an extended period—often several years.[22] Migrants crossing at a Port of Entry without breaking US law in the act of crossing, and then released into the United States by CBP or ICE officers acting under authority of law, are considered here to have crossed into the US via a 'lawful channel'. Examples include migrants released with parole from CBP or ICE after having entered at a Port of Entry; migrants released under prosecutorial discretion or with a 'Notice to Appear' charging document who subsequently apply for asylum after crossing at a Port of Entry; migrants detained and then released by ICE under an Order of Supervision after having crossed at a Port of Entry—all of which can in principle apply for lawful employment authorization.[23]

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[22]Asylum seekers with asylum cases pending for 180 days are eligible to apply for employment authorization for a period of up to five years (https://www.uscis.gov/humanitarian/refugees-and-asylum/asylum, accessed Jan. 18, 2024). This definition of 'lawful channel' used here contains the caveat 'high probability' because a small fraction of lawful crossers whose initial disposition is to remain in the US in detention are never released, as discussed below, and a small fraction of those released on Conditional Parole do not apply for asylum and thus lack a clear path to legal employment authorization. In the Appendix I review the evidence that the large majority of migrants encountered at Ports of Entry and released eventually apply for asylum, well above two thirds. A small fraction of those released from detention face supervised release conditions that limit their geographic movement within the United States, but can lawfully remain in the area defined by their release conditions.

[23]The Dept. of Homeland Security explains the parole authority in stating that it "*uses its discretion to authorize parole. Parole allows an individual, who may be inadmissible or otherwise ineligible for admission into the United States, to be paroled into the United States for a temporary period. The Immigration and Nationality Act (INA) allows the secretary of homeland security to use their discretion to parole any noncitizen applying for admission into the United States temporarily for urgent humanitarian reasons or significant public benefit. (See INA section 212(d)(5).) An individual who is paroled into the United States has not been formally admitted into the United States for purposes of immigration law. …If authorized, we will specify the duration of parole for a temporary period of time to accomplish the purpose of the parole. For example, if parole is requested to attend a civil court proceeding between private parties, we may authorize parole for the period of time necessary to attend the proceedings. We typically grant parole for no more than 1 year, although we may grant parole for a longer duration depending on the reason for the parole. Parole ends on the date the parole period expires or when a parolee departs the United States or acquires an immigration status, whichever occurs first. …We may, at our discretion, grant a parolee temporary employment authorization, if it is not inconsistent with the purpose and duration of their parole.*" https://www.uscis.gov/humanitarian/humanitarian_parole, accessed Jan. 18, 2024.

The magnitude of lawful channels is a policy decision. CBP has at different times enacted limits on migrants' access to Ports of Entry, and for migrants who can access Ports of Entry, DHS has exercised differing degrees of discretion in determining the number of encountered migrants who remain in the United States, as well as what fraction of those remaining in the United States are detained while remaining there.[24] Any migrant who does not cross lawfully, whether or not released, *or* who crosses lawfully but is not released into the United States, is not considered to pass through a 'lawful channel'.

An empirical specification of 'lawful channels' requires a decision on how to treat migrant encounters whose initial disposition is detention. These migrants are not immediately removed, returned, or expelled out of the United States; nor are they immediately released into the United States. The available data on CBP dispositions indicate who was initially detained, but do not indicate whether each individual was later released.[25]

Here I proxy for the number of migrants crossing lawfully who are later released ('lawful releases') simply with the number of migrants crossing lawfully whose initial disposition is either release or detention. These are the migrants whose flows are colored green in Figure 2. The reason is that the vast majority of migrants encountered at Ports of Entry who are not immediately removed, returned, or expelled end up being released into the United States. In other words, there is limited quantitative difference between the number of lawful crossers who remain in the US immediately after encounter, either released or detained, and the number whose *final* disposition is release. Considering migrants who crossed lawfully and did not depart the country after initial processing, the fraction who were eventually released into the United States hovered near or above 0.9 during the entire period of analysis, 2011 through 2023. Those initially

[24]See for example Congressional Research Service (CRS), "The Department of Homeland Security's 'Metering' Policy: Legal Issues (LSB10295)", version 7, July 17, 2023 update; CRS, "An Overview of the Statutory Bars to Asylum: Limitations on Applying for Asylum", September 7, 2022; CRS, "Asylum Bar for Migrants Who Reach the Southern Border through Third Countries", August 16, 2019.

[25]ICE currently publishes monthly data on flows of migrants into and out of detention for FY2021–2023 only. In the Appendix, I use this information to estimate the fraction of CBP transfers in the last three years whose disposition is final release. ICE only publishes the requisite data on an annual basis for FY2019–2020, and no data for FY2018 and before. That said, CBP transfers to ICE detention can be estimated from CBP data sources, but only from October 2011–June 2018, and starting again in October 2020. (The data on OFO dispositions from July 2018 through September 2020 contain a field for reporting how many OFO encounters were transferred to detention, but it black in those dates, and inspection of the data makes it clear that NTAs with detention are folded into overall NTAs for those dates.) I use all available information in the CBP and ICE data in the Appendix to show that there is no plausible fraction of releases from ICE detention, for migrants crossing lawfully, that would place the overall fraction of migrants remaining in the country after initial encounter who are eventually released far below 0.9 for the entire 2011–2023 period.

detained had typically spent no more than a month or two in detention.[26]

The precision of this estimate varies in different years according to the public availability of data on flows into and out of detention. In fiscal years 2021 through 2023, approximately a 0.98 share of migrants encountered crossing lawfully whose initially disposition was to remain in the US, released or detained, were eventually released.[27] The high share can be visualized for these years in Figure 2, which shows that almost all migrants crossing lawfully who were *not* diverted to *No Access* were eventually released. The same share was approximately 0.88 in FY2020, 0.86 in FY2019, and approximately 0.95 in typical months before 2019. I detail these estimates in the Appendix.

In short, inadmissible migrants encountered at Ports of Entry who were initially allowed to remain in the United States faced a very high probability of being allowed to live and work in the country at least for an extended period, often several years. For this reason I define such migrants' crossing and disposition as 'lawful releases' or 'lawful channels' in the analysis to follow. These are the migrants whose flows are colored green in Figure 2.

2.4   Lawful crossing versus lawful migration

It is necessary to clarify the term 'lawful' as it applies to acts of crossing the border in this paper. In brief, a migrant who crossed lawfully may or may not be lawfully present in the US. A person colloquially referred to as an undocumented, unauthorized, or unlawful migrant might have crossed the border unlawfully and lack lawful immigration status; *or* might have crossed the border lawfully at a Port of Entry but then fallen out of lawful immigration status (such as with an expired or revoked visa); *or* might have crossed the border unlawfully between Ports of Entry and then acquired a lawful immigration status (such as via asylum). Lawful crossing is distinct from "lawful migration".

In this paper I do not engage the question of whether migrants crossing by lawful channels

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[26]This average duration rose for short periods when detention facilities were least full, as detailed in the Appendix.

[27]Using the flow fractions in Figure 2, during October 2020 through April 2023, of all migrants encountered crossing lawfully, a fraction $\frac{0.052+0.010}{0.080} = 0.78$ were either released immediately or initially detained. Of these, a share $\frac{0.010}{0.080} = 0.13$ were initially detained. Thus, using my estimate that 90.1 percent of CBP transfers to ICE detention in those years resulted in final release, $\frac{0.052+(0.901)(0.010)}{0.052+0.010} = 0.984$.

are lawfully *present* in the country. Though all of the migrants I consider were inadmissible when they crossed, and thus were not lawfully "admitted", they crossed the border and were released with explicit permission of law enforcement.[28] Whether or not that makes them lawfully "present" in the country following release has been the subject of extensive controversy in court. The application of the term "lawfully present" to migrants such as parolees or asylum seekers—which determines their eligibility for government benefits such as immigration status, welfare, or health insurance—has varied across states, agencies, and courts (e.g. Sacco and Saxena 2020; Siddiqi 2020, 960).

Technically, the legal doctrine that encompasses "lawful channels" as I use the term is the permission granted those migrants to enter and remain *under the color of law*, a doctrine dating to the 13th century whose application to immigration law enforcement is detailed by Sacco and Saxena. As they report, even Supreme Court justices have voiced confusion over the apparent incongruence of defining "lawfully present" in a way that does not include migrants eligible for permission to lawfully work in the United States. Almost all courts that have considered the issue have found that migrants such as parolees and asylum-seekers enter and remain *under the color of law* (with some unrelated disagreement over which of these can be described as residing 'permanently' in the United States).

This paper studies lawful and unlawful crossing, only, and thus does not consider or address whether presence *under the color of law* makes a migrant "authorized" or "documented". I define unlawful crossing as crossing of the border that occurs between Ports of Entry, or (rarely) by fraud at Ports of Entry. This is consistent with the literature (e.g. Hanson and Spilimbergo 1999; Hanson 2006) and with standard usage of DHS officials.[29]

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[28]The full definition of 'inadmissible alien' in US law (8 USC §1182) contains numerous exceptional reasons why foreign nationals without a visa can be deemed admissible (e.g. at the discretion of the Attorney General), and those with a visa can be deemed inadmissible (e.g. drug traffickers). But quantitatively, the vast majority of inadmissible migrants at the US Southwest border are inadmissible due to lacking a valid visa. Crossing the border without inspection is illegal *per se* (8 USC §1325); crossing the border with inspection at a Port of Entry is not illegal *per se*, regardless of documentation status.

[29]The US Secretary of Homeland Security said in 2018, "If you're seeking asylum, go to a port of entry. You do not need to break the law of the United States to seek asylum" (DHS Office of the Inspector General, 2020, "CBP Has Taken Steps to Limit Processing of Undocumented Aliens at Ports of Entry", Washington, DC: US Dept. of Homeland Security, p. 8).

3   A two-stage model of migration choice

How could lawful channels, in principle, augment rather than substitute for crossing on the parallel market? Here I derive the effect of lawful channels on unlawful crossing in a nested two-stage discrete choice dynamic programming model of the decision to migrate. In the first stage the migrants decides to migrate to the US border or remain in the home country; in the second stage the migrant decides to cross the border lawfully or unlawfully. The model is based on the canonical search model due to McCall (1970) and Mortensen (1970) (and surveyed by Rogerson et al. 2005; Abbring 2010). Migration decisions were first modeled in this way by David (1974), followed by a long literature surveyed by Molho (1986) and later by Faggian (2014).

The potential migrant makes two decisions in order the maximize the present value of wages, across discrete time with discount factor β. The second decision is nested within the first. The first decision is whether to remain in the home country or migrate to the border. If the decision in the first stage is to migrate, the migrant faces a second-stage decision of whether to cross lawfully at a regulated Port of Entry, or cross unlawfully between Ports of Entry. Migration and border crossing are absorbing states. The potential wage in the destination country w is drawn from an exogenous, stationary distribution $F(w)$ with finite support $\mathbb{W}$, from which draws are independent and identically distributed.

3.1   Inner nest of the decision: Crossing the border, conditional on migration

The migrant's decision problem is best considered starting with the second and terminal stage, the inner nest. A migrant who has arrived at the border can cross lawfully at a Port of Entry with probability of success $\theta \in [0, 1]$ in the current period. If they are turned away, they can wait another period and try again to cross lawfully, or give up and cross unlawfully at cost C. The cost of unlawful crossing could encompass costs from the proximate (smuggling fees, a compensating differential for fear) to the distal (a wage penalty for black-market labor).

The migrant decides whether to cross unlawfully in the second stage, conditional on having migrated in the first stage. *Unlawful* crossing conditional on *migration* is denoted '$u|m$'. The

alternative is to wait for a chance to cross lawfully. This optimal stopping problem is governed by the Bellman equation

$$\mathcal{V}_{u|m}(w) = \text{MAX}\left\{\frac{w}{1-\beta} - C, \ \theta\frac{w}{1-\beta} + (1-\theta)\beta\mathcal{V}_{u|m}\right\}, \tag{1}$$

where the continuation value of waiting before crossing unlawfully is $\mathcal{V}_{u|m} = \int_{\mathbb{W}} \mathcal{V}_{u|m}(\omega)dF(\omega)$. The reservation wage $\overline{w}_{u|m}$, the minimum destination-country wage that induces unlawful crossing in the second stage conditional on migration in the first stage, is

$$\overline{w}_{u|m} = C \cdot \left(\frac{1}{1-\theta} - \beta\right) + \frac{\beta}{1-\beta}\int\limits_{w \geq \overline{w}_{u|m}} \left(w - \overline{w}_{u|m}\right)dF(w). \tag{2}$$

The derivation of this and further steps is in the Appendix. We can then characterize $\frac{d\overline{w}_{u|m}}{d\theta}$, the effect of a greater probability of lawful crossing on the reservation wage for unlawful crossing for a migrant at the border, as follows. The second term of (2) represents the expected benefit of one additional attempt to cross lawfully, defined now as $\mathcal{L} \equiv \frac{\beta}{1-\beta}\int_{w \geq \overline{w}_{u|m}} \left(w - \overline{w}_{u|m}\right)dF(w)$. The Leibniz rule implies $\mathcal{L}'(\overline{w}_{u|m}) = -\frac{1}{1-\beta}\left(1 - F(\overline{w}_{u|m})\right) < 0$. This, together with an application of the Implicit Function Theorem to (2), yields

$$\frac{d\overline{w}_{u|m}}{d\theta} = \frac{C}{\left(1 - \mathcal{L}'\right)\left(1 - \theta\right)^2} > 0. \tag{3}$$

The hazard rate for this second-stage decision—the fraction of migrants who migrated in the first stage who choose unlawful crossing in the second stage—is $h_{u|m} \equiv 1 - F(\overline{w}_{u|m})$. Thus,

$$\frac{dh_{u|m}}{d\theta} < 0. \tag{4}$$

A greater probability of lawful crossing intuitively reduces the rate of unlawful crossing conditional on migration.

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3.2 Outer nest of the decision: Migration to the border

Prior to arriving at the border, the first-stage decision the potential migrant is whether to wait in the origin country or migrate. The Bellman equation for this first-stage problem is

$$\mathcal{V}_m(w) = \text{MAX}\left\{\frac{\widehat{w}(w, \theta)}{1 - \beta}, w^* + \beta\mathcal{V}_m\right\}, \tag{5}$$

where $\widehat{w}(w, \theta)$ is the expected wage from migrating to the border, which depends on the optimal decision in the second-stage, w^* is the origin-country wage, and the continuation value of waiting before migrating is $\mathcal{V}_m = \int_{\mathbb{W}} \mathcal{V}_m(\omega)dF(\omega)$.

Analogously to the second stage above, this implies the existence of a reservation wage $\overline{w}_m$ in the first stage, the minimum wage offer in the destination country that causes migration from the origin country to the border. An increase in the probability of lawful border crossing, θ, increases the probability that a given wage offer in the destination country w exceeds the reservation wage $\overline{w}_m$. This is because

$$\widehat{w}(w, \theta) = h_{u|m}\left(\frac{w}{1 - \beta} - C\right) + \left(1 - h_{u|m}\right)\overline{w}_{u|m}, \tag{6}$$

which by (4) implies that $\frac{d\widehat{w}}{d\theta} > 0$ for a given destination-country wage offer w. This equates to the conclusion that an increase in the probability of lawful crossing reduces the (destination-country) reservation wage for migration in the first stage: $\frac{d\overline{w}_m}{d\theta} < 0$. Defining the migration hazard rate as $h_m \equiv 1 - F(\overline{w}_m)$, we have

$$\frac{dh_m}{d\theta} > 0. \tag{7}$$

A greater possibility of lawful crossing raises the rate of migration from the origin country to the border, for home-country wage $w^* > 0$.

3.3 The nested decision to migrate and cross unlawfully

We can now consider the impact of a policy to increase lawful crossing at Ports of Entry on the volume of unlawful border crossing. Combining the first and second stages of the decision problem, a given *potential* migrant in the origin country both migrates and crosses unlawfully

if the wage offer in the destination country causes the composed decision in both stages. This occurs with probability

$$h_u(\theta) = \left(1 - F(\overline{w}_m)\right) \times \left(1 - F(\overline{w}_{u|m})\right), \tag{8}$$

so that the causal elasticity of unlawful crossing to a greater probability of lawful crossing is characterized by

$$\tilde{h}_u = \tilde{h}_m + \tilde{h}_{u|m} \gtreqless 0, \tag{9}$$

where the elasticity for each hazard rate is written in the shorthand $\tilde{h}(\theta) \equiv \frac{d \ln h(\theta)}{d \ln \theta}$. The sign of the effect (9) is ambiguous by (4) and (7). In the first term on the right-hand side of (9), an increase in the probability of successful crossing at a Port of Entry increases the expected wage of those who migrate to the border—some of whom ultimately cross unlawfully. This tends to raise the overall rate of unlawful crossing. But in the second term, the same increase in the probability of lawful crossing decreases the rate of unlawful crossing conditional on migration.[30] The net effect is theoretically ambiguous.[31]

3.4 Heterogeneous effects

The Bellman equations (1) and (5) imply that the net effect of θ on the hazard rate for unlawful crossing is heterogeneous in the expected US wage w:

$$\frac{d^2 h_u(\theta)}{d\theta dw} > 0. \tag{10}$$

That is, lawful channels on net should be gross substitutes for unlawful crossing to a lesser (greater) degree when US employment conditions are best (worst). To see this, consider the

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[30]Intuitively, these competing tendencies are analogous to the textbook example of an ambiguous net effect of an increase in the wage returns to labor on the supply of leisure, comprising an income effect and a substitution effect. The positive tendency in unlawful crossings that might arise from encouraging more migration to the border corresponds to the income effect; the negative tendency in unlawful crossings that might arise from rewarding lawful crossing corresponds to the substitution effect.

[31]I note in passing an implication of the model for forced migration. A migrant who feels certain of extreme poverty or even death in the origin country might behave as if $w^* \approx 0$. This would spur universal migration in the first stage as long as $\theta > 0$ or $w > C$, by (5), eliminating the first term in (9). Under forced migration, then, a rising chance of lawful crossing strictly reduces unlawful crossings: $\tilde{h}(\theta) = \tilde{h}_{u|m}(\theta) < 0$. Clemens (2021) finds that homicides in countries of Northern Central America are an important cause of migration to the US border by unaccompanied children.

Bellman equation (1) for the inner nest, the migrant's decision after arriving at the border. An increase in earning prospects in the United States Δw linearly raises the reward to unlawful crossing but raises the reward to lawful crossing by only $\theta \Delta w$, with $\theta < 1$. And in the Bellman equation (5) for the outer nest, there is no offsetting effect: the rise Δw raises the return to migrating without affecting the return to staying. In short, for a given increase in the chance of successful lawful crossing θ, the effect on unlawful crossing should be reduced in absolute value when the migrant's economic prospects in the US are greater. That is, $\frac{dh_{u|m}}{d\theta dw} > 0$ and $\frac{d^2 h_m}{d\theta dw} > 0$, thus $\frac{dh_u}{d\theta} < 0 \implies \frac{d^2 h_u}{d\theta dw} > 0$. Intuitively, if w were sufficiently high relative to the cost of unlawful crossing C, few migrants would choose lawful crossing even if θ rose enough for lawful crossing to be almost certain. Better US employment prospects reduce the magnitude of the substitution effect in the second stage (inner nest) and increase the magnitude of the scale effect in the first stage (outer nest).

3.5 Migrants vs. crossing attempts

The model further clarifies what the empirical results do and do not imply. In the inner nest (second stage), the migrant chooses between attempting to cross lawfully (which may require only one attempt, or may require multiple attempts) and crossing unlawfully (which may likewise require one or multiple attempts). The data in the analysis below reflect encounters with migrants observed in the act of crossing, not necessarily unique migrants. The same individual making two attempts to cross the border would be recorded as two encounters.

For this reason, the scale effect posited in the outer nest (first stage) is not directly observable. The outer nest models individuals, not crossing attempts. If the effect of θ on the overall hazard rate (9) is negative, that is compatible with any value of its effect on the outer-nest hazard rate $(\tilde{h}_m)$. For example, suppose that the origin-country wage (w^*) were so low relative to the destination-country wage (w), even accounting for the costs and uncertainty of irregular migration, that there is no substantial scale effect: $\tilde{h}_m \equiv \frac{d \ln h_m}{d \ln \theta} \approx 0$. Alternatively, suppose that $\frac{d \ln h_m}{d \ln \theta} > 0$ but the countervailing effect in the inner nest is negative: $\tilde{h}_{u|m} \equiv \frac{d \ln h_{u|m}}{d \ln \theta} < 0$. In both cases we can observe the negative net effect $\tilde{h}_u < 0$. That finding does not imply per se any particular value of the scale effect. It would imply only that the scale effect is more-than-offset

by the substitution effect as a determinant of unlawful crossing attempts.[32]

4   Data and empirical method

I test the preceding model by examining time-series relationships in full-universe monthly data on inadmissible migrants and their processing dispositions at the US Southwest border over a 12-year period. The database and empirical methods are summarized here.

4.1   Data on migrant crossing and disposition

The database I use comprises two parts. The first is anonymized individual-level data on the full universe of inadmissible migrant encounters by the US Border Patrol (USBP) and the CBP Office of Field Operations (OFO) between October 2011 and May 2022. These records were obtained by the Syracuse University Transactional Records Access Clearinghouse (TRAC) from the US Dept. of Homeland Security via a series of requests under the Freedom of Information Act. The second part is detailed totals of migrant encounters and dispositions published directly by the CBP Public Data Portal for the period October 2018 through July 2023. I combine the two parts by taking the latter, directly-reported figures as authoritative for the dates they are available, after verifying that the two series exhibit a near-perfect match during their several years of overlap (October 2018–May 2022). I then collapse all observations to monthly totals, keeping only encounters at the Southwest border. Though the raw data often refers to fiscal years, in this paper years refer to calendar years unless explicitly noted.

The resulting database contains monthly statistics on the full universe of 10,658,497 migrants encountered from October 2011 through July 2023. It decomposes each month's encounters by agency and thus border-crossing method; border and sector of encounter; and migrant disposition following the encounter.[33] *Unlawful crossings* are migrants encountered crossing unlawfully

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[32]Nor can the scale effect be directly observed in the data used below. To see this, consider testing for an effect of lawful channels on overall encounters at the border. If this were positive, that would be compatible with the existence of a scale effect; but it would also be compatible with shifting migrants from channels with fewer encounters per migrant to channels with more encounters per migrant. The test would not be dispositive for a scale effect on *individuals*, which is what is modeled in the outer nest.

[33]For robustness checks, I include lags of the US unemployment rate for Hispanic/Latino workers: Federal Reserve Economic Data (FRED) series LNU04000009 from the Federal Reserve Bank of Saint Louis.

Table 1: Classifying inadmissible migrant encounters by crossing and disposition, 2011–2023

| Crossing	Entry Status	CBP Disposition	Count
Unlawful crossing			
Between Ports	Any	Any	9,134,524
At Port of Entry	Fraud*	Any	65,209
Lawful, released			
At Port of Entry	Any *but* fraud	Notice to Appear (NTA, *detained or not*)	652,330
"	"	Paroled	263,321
"	"	Expedited Removal—Credible Fear	151,028
"	"	Prosecutorial Discretion	84
Unlawful, released			
Between Ports	Any	Warrant of Arrest/NTA (*detained*)	1,473,528
"	"	Notice to Appear (NTA, *released*)	1,044,117
"	"	Paroled	717,839
"	"	Expedited Removal—Credible Fear	347,612
"	"	Released	108,052
"	"	Reinstatement—Reasonable Fear	22,276

*'Fraud' includes CBP classifications 'Fraudulent claim', 'False claim', 'Overstay', and 'Smuggler'. 'Count' reports the cumulative total number of encounters in each category, October 2011 through July 2023. The encounters in this table do not sum to the total number of encounters because the categories in the table are neither mutually exclusive nor collectively exhaustive. 'Unlawful, released' is a subset of 'Unlawful crossing'; migrants who cross lawfully and are not released are not shown.

between Ports of Entry, plus a very small number whose encounter at a Port of Entry revealed fraud or smuggling, regardless of disposition. *Lawful, released* are migrants encountered crossing lawfully whose CBP disposition indicates that they are allowed to remain in the United States; that is, they were encountered at Ports of Entry and were not removed, returned, or expelled by CBP. In a minor category used in robustness checks, *Unlawful, released* are migrants encountered crossing unlawfully, between Ports of Entry, whose CBP disposition indicates that they are allowed to remain in the United States. Table 1 summarizes the classification.

Figure 3 gives an overview of the data. It shows the two key variables in the subsequent analysis: the number of releases of migrants who crossed lawfully (that is 'lawful channels' for migration) and the number of migrants encountered while crossing unlawfully, each month from October 2011 through July 2023. Visual inspection suggests broad patterns to be tested more rigorously below. Some periods of relatively fast growth in lawful channels appear to coincide with subsequent periods of relatively slow growth in unlawful crossings, such as 2012–2016, early 2021, and early 2023. Other periods of relatively slow growth in lawful channels appear to coincide with subsequent periods of relatively fast growth in unlawful crossings, such as late 2017 to mid-2019.

Figure 3: Releases after Lawful Crossing and Attempts at Unlawful Crossing: Full universe of migrants crossing the US Southwest border, October 2011–July 2023
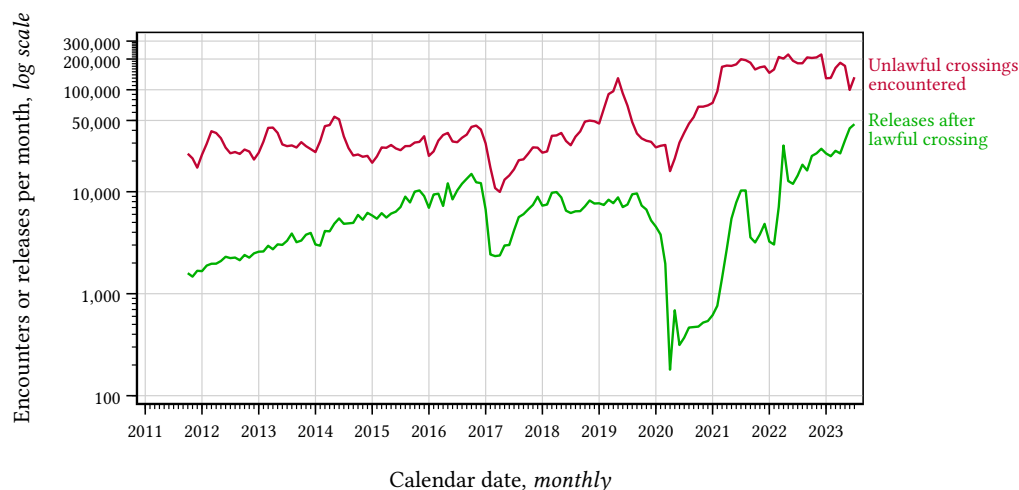
Releases after Lawful Crossing comprise all migrants encountered by the US Customs and Border Protection (CBP) Office of Field Operations (OFO) at a Port of Entry, who was subsequently released into the United States (without or after detention). *Attempts at Unlawful Crossing* comprise all migrants apprehended by the US Border Patrol after crossing the border unlawfully between Ports of Entry. All data from CBP, some directly and some via the Transactional Records Access Clearinghouse at Syracuse University. See Appendix for details.

A central issue of data quality in this setting is that the number of migrant encounters by CBP is not identical to the number of migrants crossing the border. Potential gaps between observed unlawful activity and actual unlawful activity are a central concern in studies of any black market. For migrants crossing between Ports of Entry, there is a gap between the number of overall migrants crossing unlawfully and the number who are encountered by USBP. The previous literature has generally considered percent changes in USBP encounters to be a reliable proxy for percent changes in unlawful crossing (e.g. Hanson and Spilimbergo 1999; Bazzi et al. 2021), but the concern merits scrutiny.[34]

For the purposes of the present analysis, the absolute magnitude of this gap need not be of concern. Because the unlawful crossings variable undergoes logarithmic transformation in the local projections, as the goal is to estimate a cross-elasticity, any *constant* percentage difference between USBP encounters and actual unlawful crossings would be absorbed into the constant term. But in principle, large time-series variation in the relative share of unlawful crossings

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[34]For migrants crossing at Ports of Entry, this makes little difference. Almost all migrants crossing at Ports of Entry are detected and recorded.

interdicted, if somehow correlated with lagged values of lawful releases, could introduce bias.

This potential concern, however, is unlikely to be quantitatively important in the present setting. The US Congress has directed CBP to devote substantial resources to estimating the magnitude of unlawful crossing between Ports of Entry that is not interdicted—via satellite imagery, physical sensors, surveillance cameras, and other publicly undisclosed methods. This allows estimation of the Border Patrol's Interdiction Effectiveness Rate, the fraction of attempted unlawful border crossings that are interdicted, in year.[35] This rate is high and varies little over time, lying between 79 and 83 percent in every year 2014–2021, except 2019 when it rose slightly to 86 percent. It does not exhibit a substantial trend over time. In other words, the available evidence suggests high correlation between time-series variance in (*ln*) USBP encounters and (*ln*) actual unlawful border crossing, with little scope for large time-series shifts in the fraction of unlawful crossing that proceeds without interdiction.[36]

A naive analysis reveals a positive correlation between releases of migrants crossing lawfully and attempts at unlawful crossing. In Figure 4a, the absolute level of lawful releases in each month and the level of unlawful crossings in the same month exhibit a positive relationship with elasticity +0.29 that is highly statistically significant, October 2011–July 2023. Figure 4b shows a similarly strong relationship between month-to-month *changes* in the two variables, with elasticity +0.21. But it is well known that such correlations could diverge sharply from causal effects. For example, suppose that for a given supply-driven flow of migrants to the border, those who perceive a higher chance of being permitted to cross in order pursue asylum claims self-sort to cross at Ports of Entry (with a certain fraction ending up released), and other migrants self-sort to cross between Ports of Entry. This would generate a positive correlation between releases of lawful crossers and attempts at unlawful crossing, even in the absence of any causal effect of lawful releases on unlawful crossing. What we wish to estimate is what happens to unlawful crossing when there is a positive shock to the number of successful and lawful crossers,

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[35]In the Interdiction Effectiveness Rate at the Southwest border, the numerator is the sum of USBP apprehensions under Title 8 authority, USBP expulsions under Title 42 authority, and 'turn-backs', the number of people observed by USBP crossing back into Mexico after entering unlawfully without having been apprehended by USBP. The denominator is equal to the numerator plus the number of 'got aways', the number of people known by remote sensing and other methods to have crossed unlawfully but who are neither apprehended nor turned back. See US Dept. of Homeland Security, 2023, *Border Security Metrics Report: 2022*, Washington, DC: DHS Office of Strategy, Policy, and Plans, p. 22 *passim*.

[36]Demographic modeling to compare monthly observed border apprehensions to monthly unobserved overall clandestine migration has, in the past, found a correlation of 0.9 between the two quantities (Espenshade 1995).

Figure 4: NAIVE REGRESSIONS: Simple relationship between Unlawful Crossings and Releases of Migrants Crossing Lawfully, 2011–2023

(a) *Naive regression of levels on levels*   (b) *Naive regression of changes on changes*
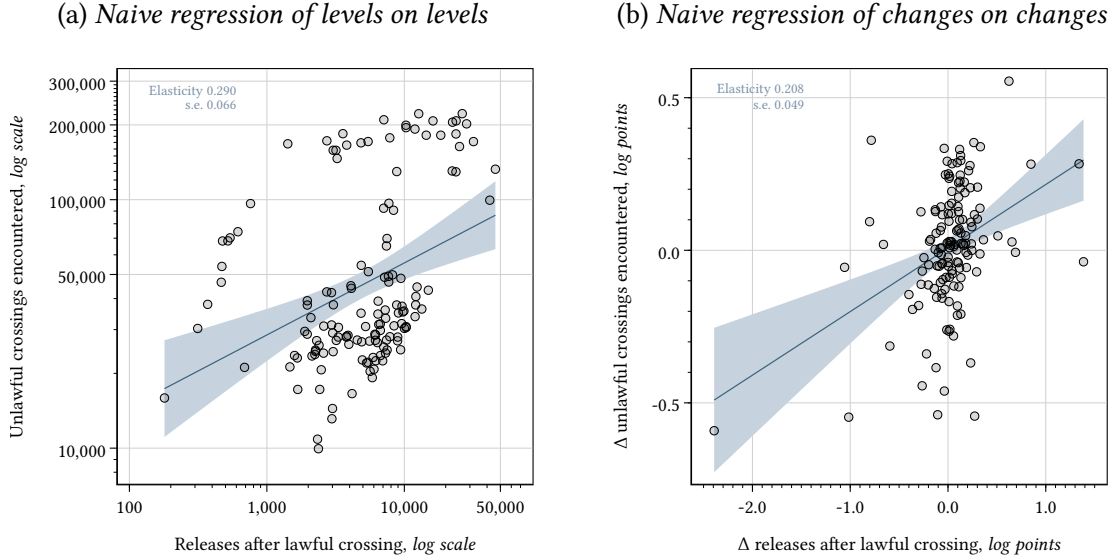
Monthly data from October 2011 through July 2023. Linear fit in each pane is an OLS regression with Huber-White robust 95 percent confidence interval, with no control variables, showing relationships in the same month. *Changes* are first differences in log points in a monthly series. Elasticity printed on the graph is the slope of the regression line; the standard error is Huber-White robust.

all else equal.

4.2 Empirical specification

I test the effect of impulses in the magnitude of lawful channels on the response of unlawful crossings by directly estimating the impulse-response functions with lag-augmented local projections (Jordà 2005, 2023). These estimates are known to be attractively robust to potential nonstationarity and to alternative lag structures (Montiel Olea and Plagborg-Møller 2021). I estimate generalized impulse responses for month t of the standard form

$$\boldsymbol{y}_{t+h-1} = \boldsymbol{c}_h + \sum_{i=1}^{p} \boldsymbol{\Gamma}_i^h \boldsymbol{y}_{t-i} + \boldsymbol{u}_{t+h-1}, \quad h \in \{1, \ldots, 12\}, \tag{11}$$

where $\boldsymbol{y}$ is the $k \times 1$ vector of endogenous variables, p the number of lags, $\boldsymbol{\Gamma}_i^h$ is the $k \times k$ matrix of impulse-response coefficients at horizon h, vector $\boldsymbol{u}$ is an error term, and vector $\boldsymbol{c}$ a constant.

I report White-robust standard errors as recommended by Montiel Olea and Plagborg-Møller (2021). I also check for sensitivity to the reliance on local projections by reestimating with the more traditional impulse-responses estimated from Vector Autoregressions (VAR; Sims 1980; Lütkepohl 2013), which can differ in finite samples (Plagborg-Møller and Wolf 2021).[37]

It is well known that the impulse-response coefficients estimated by (11) need not strictly represent causal effects (e.g. Stock and Watson 2018). One clear way for such bias to arise is through foresight: For example, if CBP officers adjust the number of migrants inspected at Ports of Entry and released according to their expectation of future unlawful border crossings, the impulse responses could in principle differ from zero under zero causal effect of lawful channels on unlawful crossings. But this concern is unlikely to be relevant in the present setting. Policy changes over time have limited or expanded the number of inadmissible migrants who can be inspected at Ports of Entry, and their eligibility for dispositions that would allow them to remain in the US following inspection. But I am not aware of any evidence that these changes have been made in response to *expected future* attempts to cross the border unlawfully, away from Ports of Entry—conditional on the lagged trends in those attempts that are controlled for in the Local Projection regressions.

Another possible divergence between the estimates in (11) and causal effects could arise because the specification cannot account for contemporaneous endogenous responses—such as the effect of lawful channels on unlawful crossings in the same period (month). This mechanism, too, is of limited concern in the present setting. In order for a change in lawful channels to cause a change in unlawful crossings within the same month, the effect must arise on average just ten days after the cause.[38] Migrants from countries that lie south of Mexico, who constitute two thirds of border encounters in the last several years, typically spend at least 20 days in transit through Mexico alone—to say nothing of the transit time prior to reaching Mexico, or the time it might take them after US arrival to become sufficiently established to encourage or assist others

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[37] I apply no asymmetric exclusion restrictions to impose structure. I am not aware of an obvious theoretical reason, for example, to allow contemporaneous effects of lawful releases on unlawful crossings but strictly exclude the reverse effect.

[38] In general, if the day of a 30-day month on which each of two events occur are uniformly and independently distributed, and one event must be caused by (occur after) the other, the average elapsed time between the two events is 10 days. For $X, Y \sim U[0, 30] \implies E[Y - X | Y > X] = \frac{\int_0^{30} \int_x^{30} (y-x) \cdot \frac{1}{30} \, dy \, dx}{\Pr[Y > X]} = (30) \left(\frac{1/6}{1/2} \right) = 10.$

to migrate.[39] The average transit time for Mexican migrants is unknown, but in Appendix A7, the core result is robust to restricting unlawful crossings to those by Mexican nationals only. In short, the limited plausibility of substantial within-period effects reduces potential concern about bias from the assumption that these effects are zero, embodied in the local projections equation (11).

5 Core results

Here I present the estimated responses of unlawful crossings to an impulse in lawful releases—first in the bivariate specification and then in a trivariate specification that controls for releases of migrants crossing unlawfully.

5.1 Bivariate specification

The core estimates of the local projections impulse responses (11) are presented in Figure 5. The specification shown is bivariate, with the vector y consisting of *lawful released* and *unlawful crossing*. In the upper left pane, an impulse in *lawful released* is followed by a negative shock to *unlawful crossing* whose absolute value grows over time. The absolute value of the elasticity exceeds 0.2 after 5 months and 0.3 after 8 months. By month 6 after the shock, this response is statistically distinguishable from zero at the 5 percent level in a two-sided test.

This response of unlawful crossings to an impulse in lawful releases, with elasticity circa −0.3, is the opposite sign of the naive regression elasticity between the same two variables reported

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[39]Given that migrants must travel far, and that the mechanism for the encouragement effect requires prior migrants to reach their destination and be sufficiently established to provide information or assistance, it appears unlikely that large scale effects in Section 3.2 could arise on such an extremely short timescale. In the model in Section 3, any positive effect of lawful releases on unlawful crossings arises not by creating the incentive for more migrants already near the border to shift into unlawful crossings—which would be irrational—but by creating the incentive for more people to depart from the origin country and migrate to the border. Jasso Vargas and Barboza Lara (2017) use systematic surveys with irregular migrants to report that the average migrant from Northern Central America deported by US authorities spent 25 days traveling from the southern border of Mexico to the Southwest border of the United States, during the period 2009–2014. Using the same methodology and a newer round of the same survey, I estimate this travel duration as 33 days for Guatemalans and 21 days for Hondurans during October–December 2022. The literature typically finds that migrants are in transit for several weeks before arriving at the border (Vogt 2013; Sladkova 2016). In fiscal year 2022, 66.5 percent of US Border Patrol apprehensions were non-Mexican, that is, from Northern Central America or more distant. For FY2014–2021 collectively, the same percentage was 60.5.

Figure 5: LOCAL PROJECTIONS IMPULSE RESPONSES: Releases of migrants who crossed lawfully vs. unlawful crossings, October 2011 through July 2023
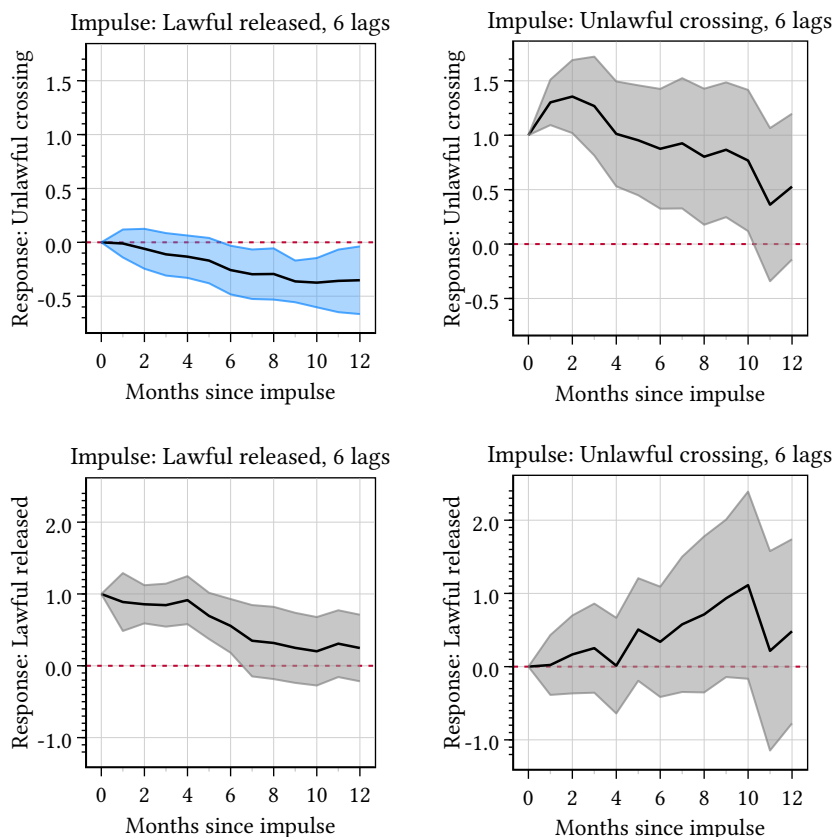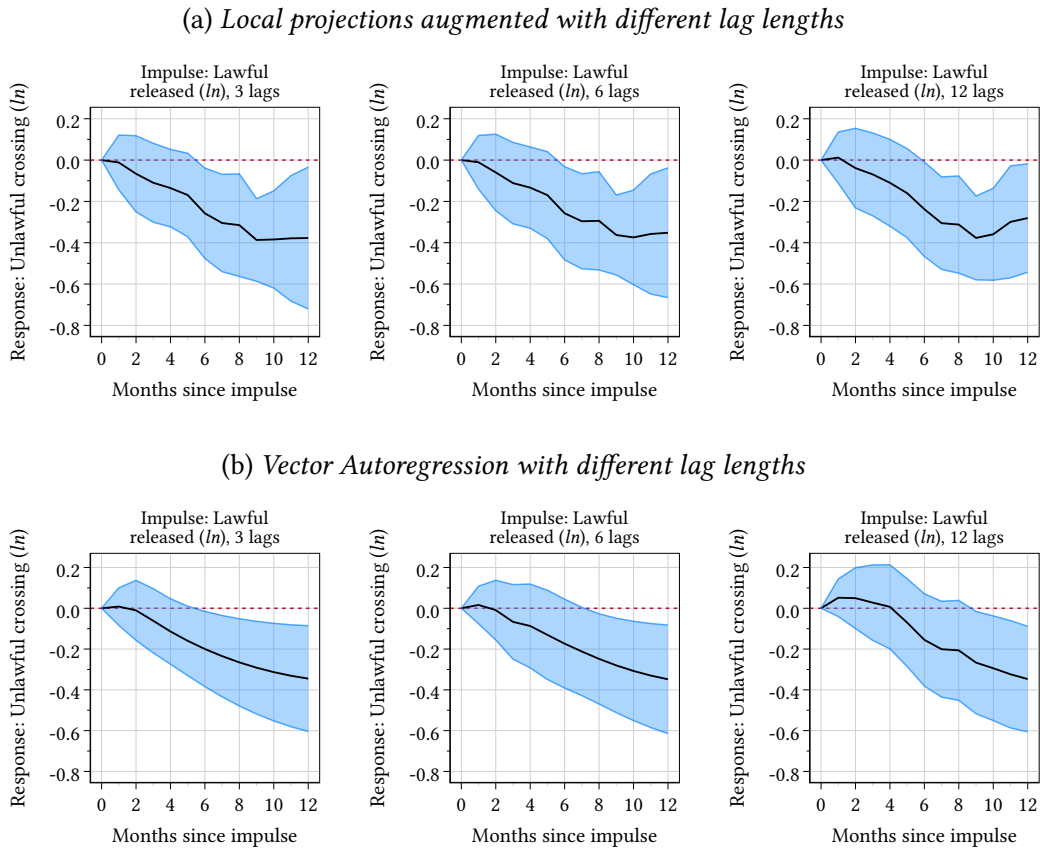

Shaded areas show 95 percent confidence intervals using robust White-corrected standard errors as recommended by Montiel Olea and Plagborg-Møller (2021). Solid black lines show 12-step generalized impulse responses from bivariate local projections augmented with six lags (Jordà 2005), showing the response of unlawful crossings (natural log points) to an impulse in releases of migrants crossing lawfully (of one natural log point). The responses can thus be interpreted as estimated elasticities.

above in Figure 4, either in levels (+0.29) or changes (+0.21). The confidence interval around the impulse-response does not contain the naive elasticity estimates at any time horizon. This suggests that those naive estimates suffer from first-order bias due to common factors affecting both time series.

The rest of Figure 5 further characterizes the responses to shocks in the bivariate specification. There is persistence in both shocks to *lawful released* (lower left) and shocks to *unlawful crossing* (upper right); migration comes in waves. A positive impulse to *unlawful crossing* is followed by a rise in *lawful released* (lower right), though this response is not statistically distinguishable

Figure 6: ALTERNATIVE ESTIMATORS AND LAGS: Response of Attempted Unlawful Crossings to Impulse in Releases of Migrants Crossing Lawfully

(a) *Local projections augmented with different lag lengths*

(b) *Vector Autoregression with different lag lengths*

Panel (a) shows 12-step generalized impulse responses from bivariate local projections augmented with six lags (Jordà 2005), with different numbers of included lags, showing the response of unlawful crossings (natural log points) to an impulse in releases of migrants crossing lawfully (of one natural log point). The responses can thus be interpreted as estimated elasticities. Shaded areas show 95 percent confidence intervals using robust White-corrected standard errors as recommended by Montiel Olea and Plagborg-Møller (2021). Panel (b) shows the corresponding generalized impulse responses based on a vector autoregression of the same variables with the same numbers of included lags.

from zero in any given month. This likely reflects the fact that when overall migration to the border rises, lawful and unlawful crossings tend to rise—a relationship that is controlled for when estimating the impulse-response of interest (upper left).

In the analysis so far allows for the impulse response to be determined by six lags of the endogenous variables. Figure 6 presents tests of the robustness of estimated response to an impulse in *lawful released* to to alternative numbers of included lags. Figure 6a shows the local projections impulse-response augmented with six lags, from Figure 5, in the middle. On the left and

right is shows estimates from alternative specifications with 3 and 12 lags, respectively. The overall magnitudes and statistical inference are similar across a wide range of included lags. Figure 6b displays the same impulse response estimated by a traditional vector autoregression. The magnitude and statistical inference are similar to those yielded by local projections (see Plagborg-Møller and Wolf 2021).

Finally, Table 2 presents the impulse-response coefficient estimates underlying both Figure 6a and Figure 6b. In the six-lag augmented local projections impulse response, my preferred estimate in column 2, the elasticity response of *unlawful crossing* to an impulse in *lawful released* reaches −0.26 by six months, and −0.37 by ten months. Columns 1 and 3 present otherwise identical estimates from alternative specifications with 3 and 12 lags, respectively; columns 4 through 6 repeat the exercise with impulse responses from a traditional vector autoregression. The broad features of the impulse response in column 2 are robust to these variations.

5.2 Trivariate specification including releases after unlawful crossing

A key concern for causal identification might be that releases of migrants crossing lawfully are correlated with releases of migrants crossing unlawfully, since both might be driven by common factors, such as general government sentiment toward migration or by limits on detention capacity. If releases of those crossing unlawfully cause more unlawful crossing, and releases of those crossing lawfully or unlawfully are correlated, this could bias the estimates of the core impulse response—though in this example, such bias would be towards zero rather than a more worrying bias away from zero.

Figure 7 reports a trivariate specification of the local projections (11), in which the vector $\boldsymbol{y}$ consists of *lawful released* and *unlawful crossing* as before, but with the added variable if *unlawful released* (defined in Table 1). This counts the number of migrants encountered while crossing unlawfully who are allowed to remain in the country. As seen in Figure 8c, controlling for *unlawful released* in this way does not substantially alter the response of *unlawful crossing* to *lawful released.*

Figure 7 also tests for a necessary condition of bias through this channel. Such bias, as noted

Table 2: Generalized Impulse Response Functions: Response of *ln* unlawful crossings to impulse in *ln* releases of migrants who crossed lawfully in month *t*, October 2011–July 2023

	Local projections			Vector autoregression		
Lags:	*3*	*6*	*12*	*3*	*6*	*12*
t+1	−0.011	−0.011	0.012	0.008	0.016	0.052
	(0.068)	(0.066)	(0.063)	(0.047)	(0.047)	(0.047)
t+2	−0.066	−0.060	−0.039	−0.010	−0.009	0.050
	(0.094)	(0.094)	(0.098)	(0.075)	(0.075)	(0.076)
t+3	−0.110	−0.111	−0.069	−0.061	−0.067	0.028
	(0.097)	(0.101)	(0.102)	(0.080)	(0.093)	(0.094)
t+4	−0.136	−0.133	−0.110	−0.114	−0.087	0.007
	(0.096)	(0.100)	(0.107)	(0.082)	(0.105)	(0.105)
t+5	−0.169	−0.170	−0.160	−0.160	−0.130	−0.070
	(0.103)	(0.107)	(0.110)	(0.087)	(0.112)	(0.110)
t+6	−0.258	−0.257	−0.238	−0.200	−0.173	−0.155
	(0.112)	(0.115)	(0.117)	(0.094)	(0.111)	(0.115)
t+7	−0.305	−0.296	−0.305	−0.235	−0.212	−0.201
	(0.120)	(0.117)	(0.114)	(0.102)	(0.110)	(0.120)
t+8	−0.315	−0.294	−0.312	−0.265	−0.248	−0.206
	(0.127)	(0.121)	(0.120)	(0.109)	(0.113)	(0.125)
t+9	−0.387	−0.363	−0.377	−0.291	−0.280	−0.266
	(0.102)	(0.099)	(0.104)	(0.116)	(0.118)	(0.128)
t+10	−0.384	−0.374	−0.359	−0.313	−0.307	−0.294
	(0.120)	(0.117)	(0.113)	(0.122)	(0.124)	(0.131)
t+11	−0.379	−0.358	−0.299	−0.331	−0.330	−0.324
	(0.155)	(0.148)	(0.138)	(0.128)	(0.130)	(0.134)
t+12	−0.377	−0.352	−0.281	−0.345	−0.348	−0.347
	(0.175)	(0.160)	(0.134)	(0.132)	(0.136)	(0.132)
Obs.	128	125	119	139	136	130

All estimates use two endogenous variables: unlawful crossings (natural log points) and releases of migrants crossing lawfully (natural log points), with no exogenous variables and no exclusion restrictions. Local projections estimates (Jordà 2005) use robust White-corrected standard errors, following Montiel Olea and Plagborg-Møller (2021).

above, would require that releases of migrants crossing unlawfully have a substantial positive effect on subsequent unlawful crossings. The center pane in the first row of Figure 7 shows the response of unlawful crossings to an impulse in releases of those who crossed unlawfully. The point estimate of the response is at or below zero in all of the subsequent twelve months. Only in one month can the analysis reject the hypothesis, using a 95 percent confidence interval, that the response is zero (month 2), and in that month the response is negative. This evidence is not compatible with an important positive effect of releases for unlawful crossers on future unlawful crossing.

Figure 7: FULL LOCAL PROJECTION IMPULSE RESPONSES WITH THREE ENDOGENOUS VARIABLES: Including releases after unlawful crossings, October 2011 through July 2023
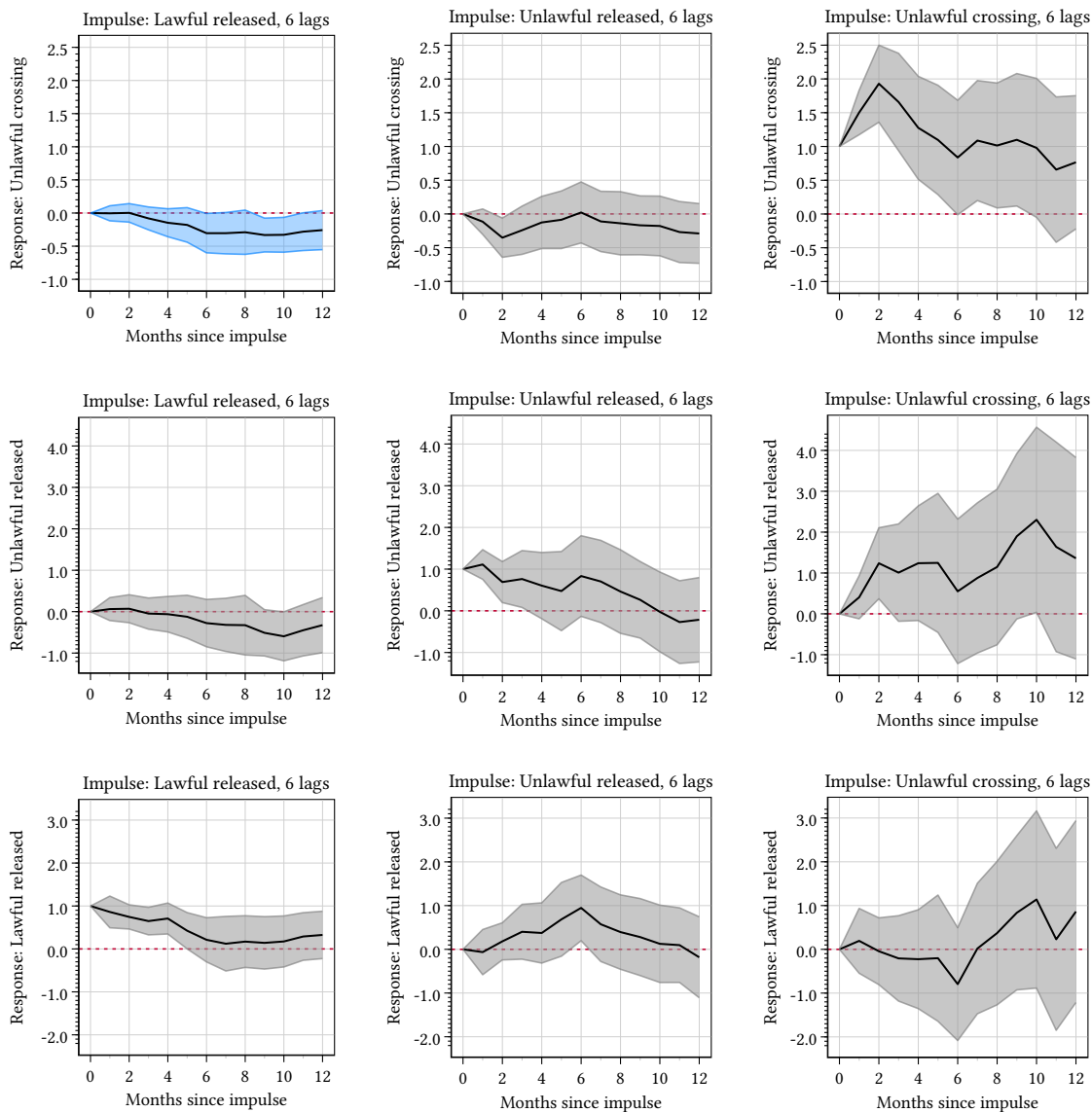
Shaded areas show 95 percent confidence intervals using robust White-corrected standard errors, following Montiel Olea and Plagborg-Møller (2021). Solid black lines show 12-step generalized impulse responses from six-lag augmented bivariate local projections (Jordà 2005).

Releases for those who crossed unlawfully cannot accurately be described as marginal 'legalization' because the act of crossing without inspection, between Ports of Entry, remains proscribed by law. Thus the above result suggests an ancillary finding related to the *depenalization* of un-

lawful crossings: the analysis fails to reject the hypothesis that the effect of depenalization on unlawful crossings is zero.

Collectively these results imply that, flexibly controlling for up to twelve months of prior levels and trends in both variables, a positive shock to *lawful releases* is followed on average by a lasting negative shock to *unlawful crossing*, reaching an elasticity of around 0.3 after 10 months.

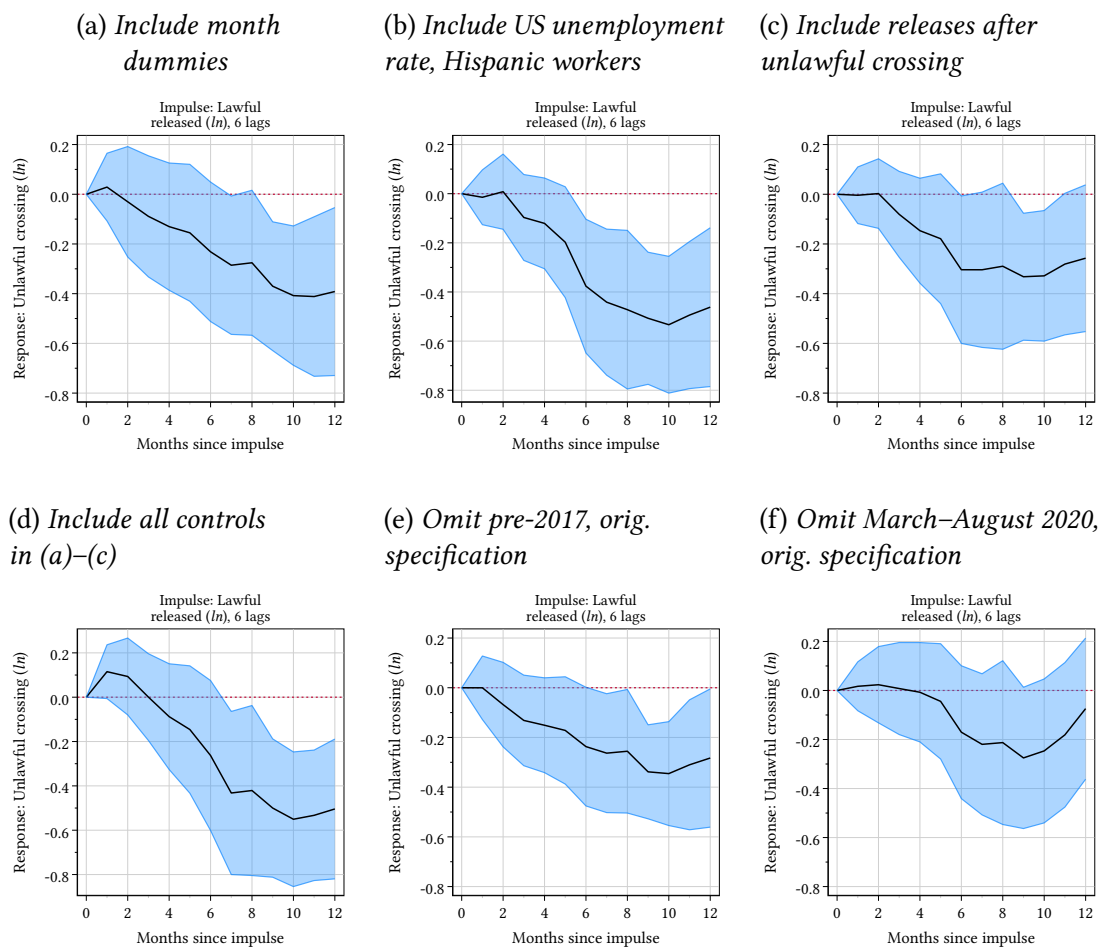# 6 Robustness, Heterogeneity, and Interpretation

The rest of the results explore robustness of the core results above to alternative specifications and time periods, predicted heterogeneity in the effect of interest, and the magnitude of the overall influence of *lawful released* as a determinant of variance in *unlawful crossing*.

6.1 Alternative specifications

Figure 8 reports several checks on the robustness of the core results. Migration flows at the Southwest border have long been known to exhibit clear seasonal patterns (e.g. Davila 1986), often larger in summertime and tapering in wintertime. Although some specifications reported above include 12-month lags that could capture persistence by season, a more direct way to control for these patterns is simply to include an exogenous indicator variable for each month. Figure 8a presents the core impulse-response from the upper left of Figure 5 with month dummies included. There is no substantial attenuation of the response from the core estimate.

The condition of the US labor market for migrant workers has been widely studied as a potential driver of migration volume at the Southwest border (e.g. Hanson and Spilimbergo 1999; Bühn and Eichler 2013; Lessem 2018; Smith 2023). It is possible in principle that expansions and contractions of lawful channels occur in response to US labor-market conditions. That is, it is possible in principle that migrants learn about favorable US job prospects through their networks (Munshi 2003, 2016), migrants thus become more likely to arrive at Ports of Entry when employment prospects are favorable, and CBP officials increase processing capacity in response to this pressure, resulting in more releases of lawfully-crossing migrants. Figure 8b displays the

Figure 8: ROBUSTNESS TO CONTROLS AND TIME PERIOD: Response of Attempted Unlawful Crossings to Impulse in Releases of Migrants Crossing Lawfully, Local Projections

(a) *Include month dummies*

(b) *Include US unemployment rate, Hispanic workers*

(c) *Include releases after unlawful crossing*

(d) *Include all controls in (a)–(c)*

(e) *Omit pre-2017, orig. specification*

(f) *Omit March–August 2020, orig. specification*

The bivariate specification (a, b, e, f) includes two endogenous variables: unlawful crossings, and releases of migrants crossing lawfully. Trivariate specification (c, d) includes the additional endogenous variable of releases of migrants crossing unlawfully. Exogenous controls are: dummies for month of the year (a, d), and six lags of the US unemployment rate for Hispanic or Latino workers, FRED code LNU04000009 (b, d).

core impulse-response from the upper left of Figure 5 when six lags of the US unemployment rate for Hispanic/Latino workers are added as exogenous controls. Again there is no substantial attenuation of the core estimate.

Figure 8c juxtaposes with these results, for reference, the impulse-response of interest from the trivariate specification (identical to the upper-left pane of Figure 7). Figure 8d then combines in a single specification the three changes in Figures 8a, 8b, and 8c. That is, it reports the impulse-

response of interest in a trivariate specification that includes *unlawful released*, and it includes both month dummies and six lags of the US Hispanic/Latino unemployment rate as exogenous controls. As before, the broad pattern of the core result is robust to these changes.

A further concern might be that the core result is generated by migration patterns in the early years of the long period considered, such as the years 2011–2016, and thus of lesser relevance to contemporary policy. Figure 8e presents the core impulse-response from the upper left of Figure 5 when the sample is restricted to omit months prior to the Trump Administration, but is otherwise identical to the core (bivariate) specification. Again, the broad pattern of the impulse response estimates are robust to this change.

Finally, a concern might be that the core result is somehow an artifact of the large, common shock to both *lawful released* and *unlawful crossing* that occurred at the onset of the COVID-19 pandemic. It is not obvious how the shock could produce the *negative* impulse-response in the core results, given that the collapse of each variable was positively correlated with the collapse of the other (Figure 3). Nonetheless, I check the robustness of the core result to omitting the first six months of the COVID-19 shock.[40] As shown in Figure 8f, the broad pattern of the core (bivariate) impulse-response is robust to this adjustment.

In sum, Figure 8 suggests that the core result is robust to controlling for several possible confounders suggested by the literature, and robust to omitting time periods that might be viewed as having less contemporary policy relevance.

6.2 Heterogeneous effects

The model in Section 3 makes an unambiguous prediction about the treatment effect of increased lawful releases: In equation (10), the net effect is less negative or more positive when migrants' employment prospects in the US improve. This is because better US employment prospects raise the magnitude of the scale effect relative to the substitution effect.

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[40]The duration of the shock could be disputed. I choose six months because by September 2020, USBP apprehensions of irregular migrants had risen above the level of September from the previous year, prior to the shock; indeed they had risen above USBP apprehensions in *any* September since 2006. Migration pressure at the border had clearly and substantially recovered by September from the sudden stop of March 2020. Thus in this robustness check I truncate observations from March–August 2020.

To test the prediction, I proxy for variance in migrants' earning prospects in the US with variance in the US unemployment rate of Hispanic/Latino workers. That is, positive shocks to unemployment proxy for negative shocks to migrants' earning prospects w, and vice versa. Figure 9 presents a reanalysis of Figure 8b in which the local projections specification allows for the impulse-response to be heterogeneous by unemployment, applying the local projections Kitagawa decomposition due to Cloyne et al. (2023).

The results confirm the model's prediction. When unemployment is lower (high w), the impulse response is less negative at all time horizons; when unemployment is higher (low w), the impulse response is more negative. The solid blue line in the figure shows the impulse response at mean unemployment, surrounded by a shaded blue 95 percent confidence interval. The long-dashed black line shows the impulse response when Hispanic unemployment is at the 10th percentile of the monthly values it takes between October 2011 and July 2023: 4.2 percent. The short-dashed black line shows the impulse response when Hispanic unemployment is at the 90th percentile: 11.1 percent. Ten months after a positive shock to lawful releases, for example, the causal elasticity of unlawful crossings is lower in absolute value by 0.42 when migrants' employment prospects are at the 90th percentile relative to the 10th percentile. Expanded opportunities to cross lawfully do less to reduce unlawful crossing when the incentive to cross *by either channel* is greatest.

6.3 Historical variance decomposition

How important is the deterrent effect of lawful releases as a determinant of unlawful crossings? I estimate the fraction of the overall variance in (ln) unlawful crossings explained by variance in the shocks to (ln) lawful releases as

$$\Phi \equiv \frac{\text{COV}\left[z_t, \sum_{i=1}^{12} \hat{\rho}_i \hat{\varepsilon}_{t-i}\right]}{\text{VAR}\left[z_t\right]}, \tag{12}$$

where (in the base specification) the $\hat{\rho}_i$ are the response coefficients at each step i of (ln) unlawful crossings z_t to an impulse in (ln) lawful releases ℓ_t implied by bivariate local projections with six included lags; and the shocks to lawful releases are estimated as $\hat{\varepsilon}_t = \ell_t - \sum_{j=1}^{6} \hat{\beta}_j \ell_{t-j} - \sum_{j=1}^{6} \hat{\gamma}_j z_{t-j} - \hat{\zeta}$ where the $\hat{\beta}$, $\hat{\gamma}$, and $\hat{\zeta}$ are the coefficient estimates on the lags of lawful releases,

Figure 9: Heterogeneous Effects: Local projections impulse response functions by level of US Hispanic unemployment, October 2011 through July 2023
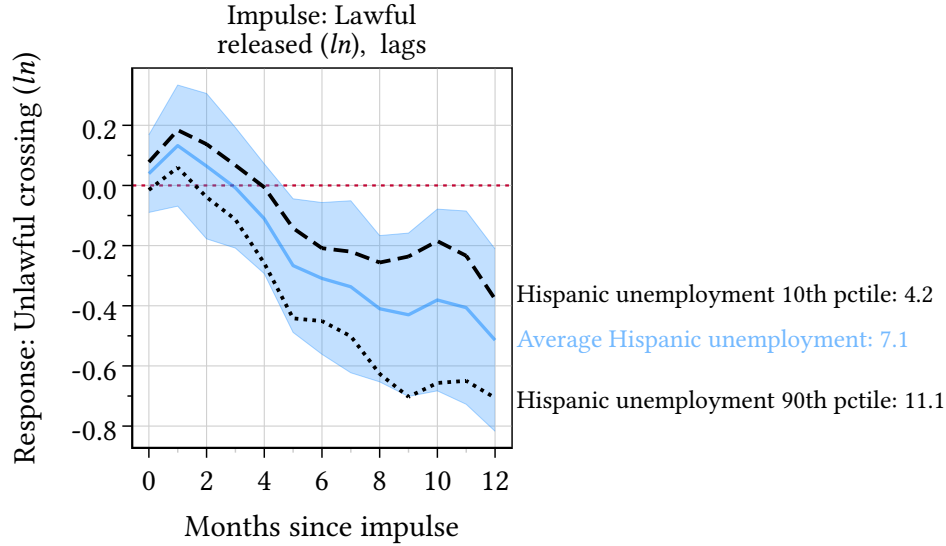
Solid blue line shows the impulse response at the mean US unemployment rate for Hispanic/Latino workers Oct. 2011–Jul. 2023; the surrounding shaded area shows 95 percent confidence interval using robust White-corrected standard errors as recommended by Montiel Olea and Plagborg-Møller (2021). The long-dashed black line shows the impulse response at the 10th percentile of monthly Hispanic/Latino unemployment during this period (4.2 percent). The short-dashed black line shows the impulse response at the 90th percentile of monthly Hispanic/Latino unemployment (11.1 percent). Shown are 12-step generalized impulse responses from bivariate local projections augmented with six lags (Jordà 2005) and including six lags of Hispanic/Latino unemployment as in Figure 8b. These show the elasticity response of (*ln*) unlawful crossings to an impulse in (*ln*) releases of migrants crossing lawfully.

the lags of unlawful crossings, and the constant term, respectively, in a regression of (*ln*) lawful releases on six lags each of (*ln*) lawful releases and (*ln*) unlawful crossings. I estimate standard errors on Φ by bootstrapping equation (12) using 10,000 draws with replacement.

This base specification yields $\Phi = 0.068$, in the first column of Table 3. That is, in bivariate local projections with no exogenous control variables, shocks to lawful releases can explain 6.8 percent of the overall variance in unlawful crossings. The second column of Table 3 shows the corresponding estimate for the trivariate specification, that is, when six lags of (*ln*) releases of migrants crossing unlawfully are included in both the local projections estimates of the impulse-response coefficients $\hat{\rho}_i$ and in the regression to estimate the shocks to lawful releases $\hat{\varepsilon}_t$. In this specification the estimate of Φ falls to 0.053. The final column of Table 3 adds exogenous controls to the trivariate specification: month dummies and six lags of the US unemployment

Table 3: Historical Variance Decomposition, October 2011–July 2023

| | Local Projections Specification | | |
	Bivariate	*Trivariate*	*Trivariate, exog. controls*
Φ	0.0680	0.0531	0.0876
	(0.0325)	(0.0263)	(0.0385)
Lags	6	6	6
Obs.	168	168	168

Φ is the fraction of variance in monthly unlawful crossings (in natural log points) explained by covariance between unlawful crossings and the estimated impulse-response to observed shocks in lawful releases, in equation (12). Bootstrapped standard errors from 10,000 replications of sampling with replacement. Bivariate specification includes two endogenous variables: unlawful crossings, and releases of migrants crossing lawfully. Trivariate specification includes the additional endogenous variable of releases of migrants crossing unlawfully. Exogenous controls are: dummies for month of the year, and six lags of the US unemployment rate for Hispanic or Latino workers (Federal Reserve Economic Data [FRED] code LNU04000009).

rate for Hispanic/Latino workers.[41] In this specification the estimate of Φ rises to 0.088. This last estimate may come closest to estimating the historical variance decomposition based on a *ceteris paribus* causal effect of releases of migrants crossing lawfully, by absorbing the effects of unobserved confounders. I conclude that variation in lawful releases explains approximately 9 percent of historical variation in unlawful crossings.

6.4 Magnitude of the effect

Note that the hazard rate for unlawful crossing conditional on arrival at the border in equation (4) represents *attempts* to cross unlawfully, not successful crossing. The cost C of crossing unlawfully could include the cost of multiple attempts, which are very common (e.g. Martínez et al. 2018; Bazzi et al. 2021). There need be no relationship between the probability of success in an attempt at unlawful crossing and the probability (θ) of success in an attempt at lawful crossing. Thus the net effect (9) represents the effect on the number of crossing attempts, not necessarily the number of migrants who successfully enter.

For example, suppose that a migrant crossing lawfully typically makes one attempt to cross, but

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[41]That is, not only are the third endogenous variable and the vector of exogenous variables added to the local projections estimation, but also to the estimation of the shocks to lawful releases: $\hat{\varepsilon}_t = \ell_t - \sum_{j=1}^{6} \hat{\beta}_j \ell_{t-j} - \sum_{j=1}^{6} \hat{\gamma}_j z_{t-j} \sum_{j=1}^{6} \hat{\xi}_j \ell_{t-j}^u - \delta' x - \hat{\zeta}$, where the ℓ^u are releases of migrants who crossed unlawfully and x is a vector of exogenous variables.

a migrant crossing unlawfully typically makes three attempts. If the expansion of the lawful channel by one migrant typically diverted one migrant from the unlawful to the lawful channel, this would then reduce the number of migrant encounters in the unlawful channel by three—reducing the number of overall encounters by two, without changing the level of overall successful migration (across both channels).

For this reason, the estimates here cannot be interpreted as a number of individuals diverted from unlawful to lawful channels, but a number of attempted crossings. A reduction in the overall number of attempts across both channels does not necessarily imply a reduction in successful migration across both channels. But in the model, if lawful channels were to cause an increase in *successful* unlawful crossing via the scale effect, this would be detectable as an increase in the number of unlawful crossing attempts—which is not observed.

7   Policy as Causal Mechanism

Even if the cross-elasticity between lawful releases and unlawful crossings has been accurately estimated as a causal parameter, it need not reflect the effect of exogenous changes in *policy*. In principle, exogenous shifts in the number of people released after crossing lawfully could arise either from shifts in migrants' demand to cross at Ports of Entry, or officials' supply of opportunities to cross at Ports of Entry. This section presents three arguments that the parameter estimates here reflect the effects of policy change—marginal legalization—arguments based in the institutional setting, features of the core results, and a corroborating natural experiment in policy changes.

First, several features of the institutional setting suggest that US officials exert influence over migrants' access to Ports of Entry and their disposition after processing at Ports of Entry, for any given level of migration pressure at the border. US officials have legal authority to shut Ports of Entry entirely, bar access to Ports of Entry for inadmissible migrants, or limit the rate at which migrants can cross—an authority they have exercised at different times in recent years (Cuffari 2020; Amuedo-Dorantes and Bucheli 2023). US officials at Ports of Entry can furthermore limit the number of encountered inadmissible migrants who are granted parole or other forms

of lawful entry, under both shifting agency rules and discretion at the agency and even officer level, rather than detained (Harris 2018; Harrington 2021). Moreover, DHS has legal authority to detain most migrants not given parole (other than children) for the entire period in which they remain inadmissible, though it commonly declines to do so for operational reasons.[42]

Second, the empirical results above fail to exhibit a feature that we should expect if exogenous variation in lawful releases is driven by demand, that is, by variation in migrants' preferences for lawful crossing, instead of policy-constrained supply of lawful crossing. Suppose that each increase in lawful releases represented additional migrants who had simply chosen to cross lawfully rather than unlawfully, for reasons unconstrained by policy. If this were true, we should expect not only that increases in lawful crossing are followed by decreases in unlawful crossing, but also that—symmetrically—decreases in unlawful crossing are followed by increases in lawful crossing. Both of these, the direct effect and its reverse, would capture the exogenous change in migrants' preferences for different modes of crossing. But there is no evidence of the reverse effect. In Figure 5 and Figure 7, shocks to lawful releases cause significant changes in unlawful crossings, but *not* vice versa. In other words, exogenous shocks to lawful releases driven by migrant preferences would *mechanically* require a symmetry in the impulse-responses that is not observed.

Third, a natural experiment of exogenous policy change corroborates the sign and magnitude of the core estimates above. As reported and analyzed by Amuedo-Dorantes and Bucheli (2023), the US federal government suddenly began limiting access to all Ports of Entry on April 27, 2018. This policy of admitting only limited numbers of people was known as 'metering'.[43] This clear policy shock caused an immediate downturn in lawful releases and constrained their growth over the following two years, as seen in Figure 3 above. Figure 10a zooms in on the period before and after this shock. The dashed lines show counterfactual encounters if each time series had remained in a proportion to the other series fixed in April 2018. In the nine months before the policy shock, lawful releases were an almost constant fraction of unlawful crossings. They fell immediately after the policy shock, while unlawful crossings rose.

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[42]Hillel R. Smith (2020), "Immigration Laws Regulating the Admission and Exclusion of Aliens at the Border", Washington, DC: Congressional Research Service. Hillel R. Smith (2022), "The Department of Homeland Security's Authority to Expand Expedited Removal", Washington, DC: Congressional Research Service.

[43]Hillel R. Smith (2023), "The Department of Homeland Security's 'Metering' Policy: Legal Issues", CRS Report LSB10295, Washington, DC: US Congressional Research Service.

Figure 10: CHECKING THE ESTIMATES WITH A NATURAL EXPERIMENT: Response of Unlawful Crossings to the Advent of 'Metering' Limits at Ports of Entry after April 2018

(a) *Diff-in-diff after metering*　　　　　(b) *Implied impulse-response*
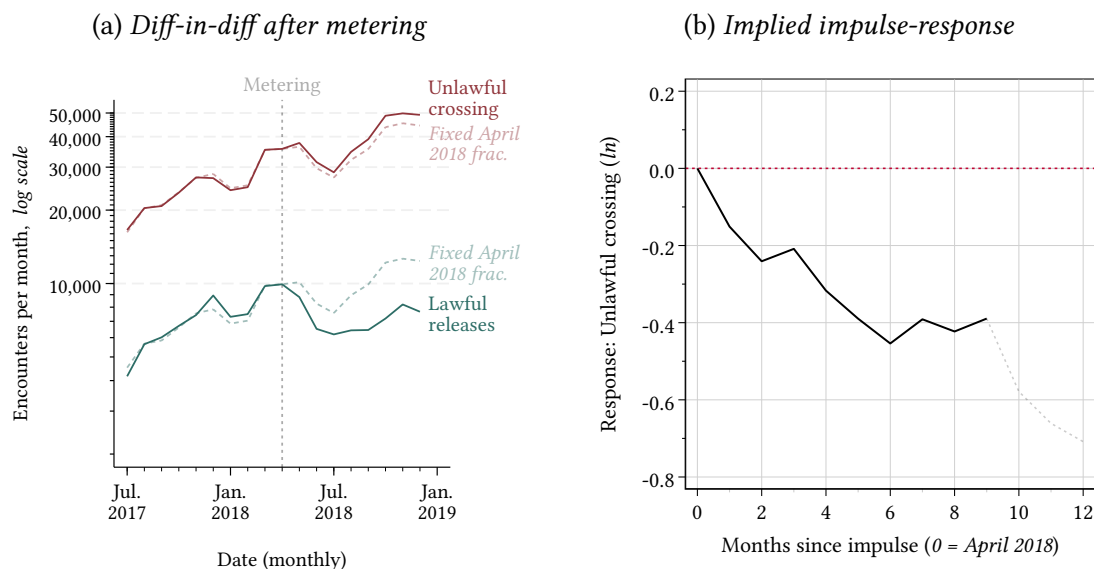
This natural experiment is reported and analyzed by Amuedo-Dorantes and Bucheli (2023). The impulse response in Figure 10b is grayed after month 9 (January 2019) because after that date a major new policy change affecting border encounters began: the Migrant Protection Protocols, also known as 'Remain in Mexico'. The order to begin metering at all Ports of Entry was issued on April 27, 2018. Because Figure 10a suggests that the initial shock was realized over the first two months after that date, rather than in the first month, the impulse for Figure 10b is defined as the gap between *ln* lawful releases and counterfactual (constant fraction) *ln* lawful releases as of June 2018, that is, −0.238 log points.

Beyond this, the magnitude of the post-policy shock shifts in Figure 10a correspond to the magnitude of the estimates in Figures 5–8. The gap between lawful releases and counterfactual, constant-fraction lawful releases in Figure 10a two months after the policy shock is −0.238 log points. The same gap for unlawful crossings seven months after the policy shock is +0.093 log points, implying a seven-month impulse response of approximately −0.4. This matches well with the 12-year estimates in the core results above. Figure 10b plots several months of the impulse-response implied by this exogenous policy change, with striking similarity to the estimates in Figures 5–8.

For these reasons I interpret the causal cross-elasticity estimated in the core results as broadly reflecting the effect of exogenous changes in policy—what Heckman and Vytlacil (2001) call the Policy-Relevant Treatment Effect. Under that interpretation, the cross-elasticity estimated in this paper captures the effect of a marginal policy change of expanded legalization on the remaining

parallel market.

8   Conclusion

This paper estimates that each policy change resulting in a one percent expansion of lawful channels for initially inadmissible migrants at the US Southwest border, over the last 12 years, caused a reduction of roughly 0.3 percent in the monthly rate of unlawful border crossings 8–12 months later. This gross substitution of the black market by marginal expansion of the legal market explains approximately 9 percent of the overall variance in monthly unlawful border crossings.

Economists have long suggested that, in theory, "opening channels for legal migration can deter irregular migration" (Martin and Straubhaar 2002, 5). Policy makers including the European Commissioner for Home Affairs have embraced this idea: "If we would like fewer irregular arrivals, we have to invest in legal pathways".[44] Direct evidence of this phenomenon has been limited (Cooper 2019; Belmonte et al. 2019).

The findings of this paper only begin to address that broad question. Findings about the effect of marginal legalization of border crossing are not necessarily externally valid estimates of other forms of legalizing migration behavior, such as expanding grants of work visas. My goal has been to begin to gather internally valid evidence regarding a genre of policy where there has been too little. Future studies can and should explore the effects of exogenous changes in other types of legalization.

This result is therefore not at odds with some findings in the literature that might appear discordant. Durand and Massey (2019, 9) argue that a large program of lawful channels for Mexico-US migrants 1942–1964, the *Bracero* program, built employer-employee networks that were a first-order cause of increased unlawful crossing starting in the mid-1970s.[45] But the policy change they study is different in multiple dimensions. Obviously, increased grants of work visas are different from releases of inadmissible migrants. Moreover, the *Bracero* history represents the

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[44]Ylva Johansson spoke June 15, 2021 at the Egmont Royal Institute for International Relations, in Brussels.

[45]This concern is echoed by others including Martin and Teitelbaum (2001, 123) and Gratton and Merchant (2013).

effect of two policy treatments, bundled: the pre-1964 creation of large-scale lawful channels and accompanying network formation, followed by the elimination of those channels at the end of 1964—not the *ceteris paribus* effect of expanded lawful channels alone. Had the lawful channels been retained permanently, the *ceteris paribus* effect of creating those work visas may well have continued to deter unlawful migration. The present study investigates the *ceteris paribus* effect of marginal expansions of lawful channels over a one-year time horizon.

A separate and ancillary finding relates to the effect of depenalizing unlawful crossings. The evidence fails to reject the hypothesis that releases into the United States for migrants who crossed unlawfully, between Ports of Entry and without inspection, causes increases in attempted unlawful crossing on a timescale of 12 months. The point estimates in the impulse-response, which cannot be statistically distinguished from zero, lie at or below zero for the entire period.

Shifting border crossings between unlawful and lawful channels affects not only the rule of law, but also the welfare of migrants and non-migrants. Deaths and disappearances of migrants crossing the US southwest border—with 686 recorded in the year 2022 alone—occur almost exclusively during unlawful crossings between Ports of Entry, not lawful crossings at Ports of Entry.[46] Migrants crossing unlawfully can be barred from seeking legal admission or immigration status in the future (Bazzi et al. 2021). Unlawful crossings of the border shape public perception of migrants and of Hispanics more generally. Hispanic US citizens receive longer sentences for the same crime at times when unlawful crossings of the southwest border are high (Bertoli et al. 2023). Policies that reduce unlawful crossings *per se* can thus have important welfare effects regardless of their effect on overall migration pressure or successful entry.

The study does not test, and does not attempt to test whether the scale effect is nonzero. The number of migrants traveling to the border, in the outer nest of the model, is not observed in the data used here. The results are thus compatible with a negligible or zero scale effect; they are also compatible with a substantial scale effect offset by an even larger substitution effect. Decomposing the two offers one of many opportunities for fruitful future research.

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[46]United Nations International Organization for Migration (2023), "*Proyecto Migrantes Desaparecidos, Resumen Regional Anual, Las Américas, Enero a Diciembre*, New York: United Nations."

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Online Appendix

Partial Legalization and Parallel Markets: The Effect of Lawful Crossing on Unlawful Crossing at the US Southwest Border

Michael A. Clemens — April 2024

This Appendix presents material to supplement the main text. Section A1 presents a derivation of the nested discrete-choice dynamic programming model. Section A2 presents summary statistics for the variables used in the core empirical analysis. Section A3 examines the rate of asylum filing among overall migrant releases. Section A4 presents descriptive cross-correlation plots for the variables in the core local projections estimation. Section A5 discusses in detail the evidence to support the assertion that the vast majority of migrants who remain in the United States after leaving Customs and Border Protection custody receive a final disposition of release into the United States. Section A6 presents an estimate of the average travel time across Mexico for migrants from Northern Central America. Section A7 presents a reanalysis of the core result with non-Mexican migrants omitted.

A1 Model derivation

I begin with the Bellman equation for the inner nest,

$$\mathcal{V} = \text{MAX}\left\{\frac{w}{1-\beta} - C, \ \ \theta\frac{w}{1-\beta} + (1-\theta)\beta\mathcal{V}\right\} \tag{A.1}$$

and since $\mathcal{V} = \int_w v(\omega)dF(\omega)$, $\tag{A.2}$

then $\mathcal{V} = \text{MAX}\left\{\dfrac{w}{1-\beta} - C, \ \ \theta\dfrac{w}{1-\beta} + (1-\theta)\beta \displaystyle\int_w v(\omega)dF(\omega)\right\}$ $\tag{A.3}$

The reseservation wage is by definition

$$\frac{\overline{w}}{1-\beta} - C \equiv \theta\frac{\overline{w}}{1-\beta} + (1-\theta)\beta\int_w v(\omega)dF(\omega) \tag{A.4}$$

$$\left(\frac{1}{1-\beta} - \frac{\theta}{1-\beta}\right)\overline{w} = C + (1-\theta)\beta\int_w v(\omega)dF(\omega) \tag{A.5}$$

$$\left(\frac{1-\theta}{1-\beta}\right)\overline{w} = C + (1-\theta)\beta\int_w v(\omega)dF(\omega) \tag{A.6}$$

$$\frac{\overline{w}}{1-\beta} = \frac{C}{1-\theta} + \beta\int_w v(\omega)dF(\omega) \tag{A.7}$$

For $w < \overline{w}$, all offers declined, so:

$$v(w < \overline{w}) = \theta\frac{w}{1-\beta} + (1-\theta)\beta v, \tag{A.8}$$

that is, the value of staying at the border and trying again to cross lawfully. But the right hand side of (A.8) is just the definition of the reservation wage $\frac{\overline{w}}{1-\beta} - C$, and for all $w \geqslant \overline{w}$, $v(w > \overline{w}) = \frac{\overline{w}}{1-\beta} - C$, thus

$$\int_w v(\omega)dF(\omega) = \int_{w<\overline{w}} v(\omega)dF(\omega) + \int_{w\geqslant\overline{w}} v(\omega)dF(\omega) \tag{A.9}$$

$$= \int_{w<\overline{w}} \left(\frac{\overline{w}}{1-\beta}\right) dF(\omega) + \int_{w\geqslant\overline{w}} \left(\frac{\overline{w}}{1-\beta}\right) dF(\omega) \tag{A.10}$$

$$= \left(\frac{\overline{w}}{1-\beta}\right) \int_{w<\overline{w}} dF(\omega) + \int_{w\geqslant\overline{w}} \left(\frac{\overline{w}}{1-\beta}\right) dF(\omega) \tag{A.11}$$

Noting that $\int_{w<\overline{w}} dF(\omega) \equiv F(\overline{w})$, plug (A.11) into the reservation wage (A.7) to get

$$\frac{\overline{w}}{1-\beta} = \frac{C}{1-\theta} + \beta\left(\frac{\overline{w}}{1-\beta} - C\right) F(\overline{w}) + \beta \int_{w\geqslant\overline{w}} \left(\frac{\overline{w}}{1-\beta} - C\right) dF(\omega) \tag{A.12}$$

$$\int_{w<\overline{w}} \left(\frac{\overline{w}}{1-\beta}\right) dF(\omega) + \int_{w\geqslant\overline{w}} \left(\frac{\overline{w}}{1-\beta}\right) dF(\omega)$$

$$= \frac{C}{1-\theta} + \beta\left(\frac{\overline{w}}{1-\beta} - C\right) F(\overline{w}) + \beta \int_{w\geqslant\overline{w}} \left(\frac{\overline{w}}{1-\beta} - C\right) dF(\omega) \tag{A.13}$$

$$= \frac{C}{1-\theta} + \beta \int_{w<\overline{w}} \left(\frac{\overline{w}}{1-\beta} - C\right) dF(\omega) + \beta \int_{w\geqslant\overline{w}} \left(\frac{\overline{w}}{1-\beta} - C\right) dF(\omega). \tag{A.14}$$

Subtracting from both sides $\beta \int_{w<\overline{w}} \left(\frac{\overline{w}}{1-\beta}\right) dF(\omega) + \beta \int_{w\geqslant\overline{w}} \left(\frac{\overline{w}}{1-\beta}\right) dF(\omega)$, the left hand side reduces to $\overline{w}$ and the right hand side reduces to

$$\overline{w} = C \cdot \left(\frac{1}{1-\theta} - \beta\right) + \frac{\beta}{1-\beta} \int\limits_{w\geqslant\overline{w}} (w - \overline{w})dF(\omega). \tag{A.15}$$

We can then characterize $\frac{d\overline{w}}{d\theta}$, the effect of a greater probability of lawful crossing on the reservation wage for unlawful crossing for a migrant at the border, as follows. The second term of (A.15) represents the expected benefit of one additional attempt to cross lawfully, defined now as $\mathcal{L} \equiv \frac{\beta}{1-\beta} \int_{w\geqslant\overline{w}_{u|m}} (w - \overline{w}_{u|m})dF(w)$. The Leibniz rule implies $\mathcal{L}'(\overline{w}_{u|m}) = \frac{1}{1-\beta}\left(-(\overline{w} - \overline{w}f(\omega)\frac{d\overline{w}}{d\overline{w}} - \int_{w\geqslant\overline{w}} dF(\omega))\right) = -\frac{1}{1-\beta}(1 - F(\overline{w}_{u|m})) < 0$. We seek $\frac{d\overline{w}}{d\theta}$. The implicit function theorem gives $\frac{dy}{dx} = -\frac{\Phi_x}{\Phi_y}$ for $\Phi(y, x) = 0$, thus

$$\Phi(\overline{w}, \theta) \equiv 0 = -\left(\overline{w}0\left(\left(\frac{1}{1-\theta} - \beta\right) \cdot C\right)\right) + \frac{\beta}{1-\beta} \int\limits_{w\geqslant\overline{w}} (w - \overline{w})dF(\omega) \tag{A.16}$$

$$\frac{d\overline{w}}{d\theta} = -\left(\frac{d\Phi/d\theta}{d\Phi/d\overline{w}}\right) \tag{A.17}$$

$$= -\left(\frac{c/(1-\theta)^2}{-1 + \mathcal{L}'(\overline{w})}\right) \tag{A.18}$$

$$= \frac{c/(1-\theta)^2}{1 - \mathcal{L}'(\overline{w})} \tag{A.19}$$

$$> 0. \tag{A.20}$$

The hazard rate for this second-stage decision is $h_{u|m} \equiv 1 - F(\overline{w})$. Thus $\frac{dh_{u|m}}{d\theta} < 0$. The derivation for the outer nest proceeds analogously. Since

$$\widehat{w}(w, \theta) = h_{u|m}\left(\frac{w}{1-\beta} - C\right) + \left(1 - h_{u|m}\right)\overline{w}_{u|m} \tag{A.21}$$

$$= h_{u|m}\left(\frac{w}{1-\beta} - C - \overline{w}_{u|m}\right) + \overline{w}_{u|m}, \tag{A.22}$$

note that $\frac{dh_{u|m}}{d\theta} < 0$ and $\frac{d\overline{w}_{u|m}}{d\theta} < 0$, thus since for the marginal switcher from unlawful to lawful crossing, by definition $\frac{w}{1-\beta} - C < \overline{w}_{u|m} \implies \frac{w}{1-\beta} - C - \overline{w}_{u|m} < 0$, we have

$$\frac{d\widehat{w}}{d\theta} > 0. \tag{A.23}$$

Thus

$$\frac{dh_m}{d\theta} > 0, \tag{A.24}$$

that is, a greater possibility of lawful crossing raises the expected wage conditional on having migrated to the border, and thus raises the rate of migration from the origin country to the border.

A2 Descriptive statistics

Table A1 presents simply summary statistics for the core database, where each observation represents one month.

Appendix Table A1: Descriptive statistics, October 2011–July 2023

	mean	sd	min	max	count
ln Unlawful crossing	10.740	0.807	9.205	12.311	144
ln Lawful released	8.494	1.002	5.193	10.736	142
ln Unlawful released	9.336	1.387	6.248	11.948	143
Unemployment (Hisp./Latino)	7.064	2.841	3.600	18.500	152

A3 Rate of asylum filing among overall releases

The federal government does not publish comprehensive statistics that allow a precise calculation of what fraction of inadmissible migrants released into the US eventually apply for asylum. Nevertheless, available data suggest that this application rate is high, and likely to constitute the large majority.

First, the Dept. of Justice (DOJ) Executive Office for Immigration Review (EOIR) has published an overall assessment of the fraction of migrants claiming "credible fear" to CBP who eventually file an asylum claim with DOJ (EOIR "Rates of Asylum Filings in Cases Originating with a Credible Fear Claim, FY2008–2023", accessed Jan. 19, 2024). Between fiscal years 2008 and 2023, this rate was 62 percent. The denominator of this statistic could include migrants who left the US; for this reason one might expect the fraction of migrants applying for asylum after arriving with a "credible fear" determination *who are present in the US* to exceed 62 percent. But this rate need not represent the application rate among migrants released under prosecutorial discretion or other circumstances in which a "credible fear" determination was not made by CBP.

Second, increases in overall releases by CBP are typically followed, within a year, by proportionate in-

Figure A1: Releases vs. Asylum Applications the Following Year, fiscal years 2011–2023
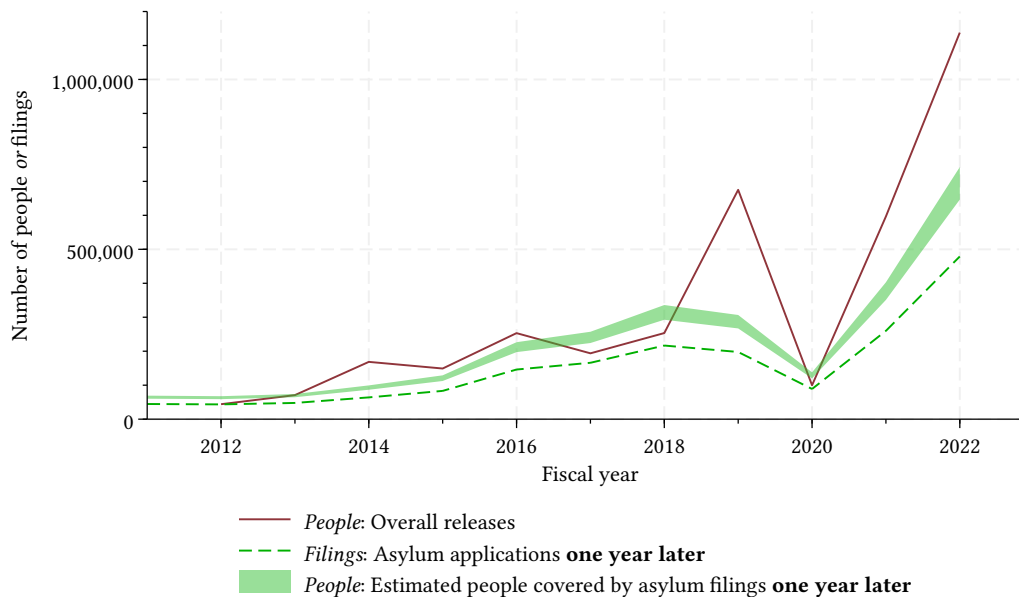
Source for asylum filings is DOJ Executive Office for Immigration Review. Shaded green band shows estimated number of people covered by asylum filings. Does not include fiscal year 2023 releases because one-year-later asylum application (FY2024) not currently available.

creases in the number of asylum filings. Figure A1 shows this relationship. The solid red line shows the overall number of migrant releases in each fiscal year (the sum of "lawful, released" and "unlawful, released" in the main text). The dashed green line shows the number of new asylum filings *in the following fiscal year* published by the Dept. of Justice (at https://www.justice.gov/d9/pages/attachments/2018/10/30/14_total_asylum_applications.pdf, accessed Jan. 19, 2024). For example, the number of one-year-later filings graphed at fiscal year 2022 shows the number of filings that occurred in fiscal year 2023. This is done because there is typically a delay between arrival and filing an asylum application with DOJ; released migrants must file within one year of arrival.

The number of filings in the graph (dashed green line) is not strictly comparable to the number of releases (solid red line) because each filing can cover one migrant or multiple migrants. The Dept. of Homeland Security currently publishes annual data on the number of filings going back several years, but only publishes data on the number of *people* covered by those filings for 1) fiscal years 2020, 2021, and 2022, and 2) affirmative asylum applications only, that is, for applicants who are not already in removal proceedings. The ratio of the number of *people* to the number of *filings* was 1.54, 1.44, and 1.43 in fiscal years 2020, 2021, and 2022 respectively. For this reason the graph shows an estimate (shaded green band) of the range between 1.35 and 1.55 times the number of one-year-later asylum filings. This rough estimate proceeds from the assumption that the ratio of individuals to filings fell in roughly the same range in the years before 2020 that it did during 2020–2022, and that this ratio was similar for overall asylum applications to its value for affirmative asylum applications. Note that the number of releases in the graph could include migrants who later departed or were removed from the US, thus the fraction applying for asylum suggested by the graph could be higher *among those remaining in the US.*

Both of the piece of evidence reviewed here consider *all* releases by CBP, whether encountered at Ports

of Entry (by OFO) or between ports of entry (by USBP). It is likely that the rate of asylum application among those arriving at Ports of Entry is higher than the rate for other migrants, given that migrants who perceive themselves to have a lower likelihood of convincing CBP officers of a valid asylum claim would have a stronger incentive to cross without inspection. Thus the rate of asylum application among "lawful released" migrants—crossing at Ports of Entry—is likely to exceed the rate in the above estimates.

In sum, the evidence reviewed here suggests that substantially above two thirds of "lawful, released" migrants apply for asylum, a process that allows application for legal employment authorization six months after application, and subsidized health insurance under the Affordable Care Act. In most states such migrants are also eligible for unemployment insurance. An additional share of "lawful, released" migrants could attain employment authorization without applying for asylum, based on their legal status as a parolee or "supervised release".

A4   Descriptive cross-correlation plots

Figure A2 displays simple, descriptive cross-correlation plots for the key variables in the core analysis. Because *increasing* lag numbers proceed backwards in time, correlations to the right of the graph represent the correlation between the current value of the variable on the vertical axis and lagged values of the variable on the horizontal axis; correlations to the left of the graph show correlations with *forward* lags.

The cross-correlation plots show descriptively that both *unlawful crossings* and *lawful releases* come in waves: current values are positively associated with many months of lagged values. But the simple correlation over time between *unlawful crossings* and *lawful releases* is strikingly different. Current values of *unlawful crossings* are, month-by-month and without controlling for the values of other lags, negatively correlated with a wide range of past values of *lawful releases*.

A5   Release from detention after lawful crossing

The analysis in the main text considers, as a proxy for the number of lawfully-crossing migrants released into the US, the number who initially remain in the US—either immediately released, or transferred by Customs and Border Protection (CBP) to detention by Immigration and Customs Enforcement (ICE). This is a reasonable approximation because the fraction who initially remain in the US who are either immediately or eventually released typically falls in the range 0.85–0.99. I explain the reasons for and method of this proxy estimation in this section.

It is not possible to directly calculate the fraction of lawfully-crossing migrants (encounters by the Office of Field Operations or OFO at Ports of Entry) who are initially detained by ICE but eventually released into the United States, for two reasons. First, ICE does not publish final releases broken down according to whether the transferring agency was OFO. Second, ICE does not publish final releases broken down by time of arrival in ICE custody. The fraction of interest can nevertheless by estimated by the methods described here.

A5.1   The period of most complete data: October 2020–April 2023

ICE, at the time of writing, published *monthly* statistics on book-ins and final releases starting in fiscal year 2021—that is, starting in October 2020—and not before. This includes the monthly numbers of book-ins who were transferred from CBP. This number is not broken down by transfers from OFO (lawful crossings) vs. USBP (unlawful crossings).

Comparing those book-ins to final releases would ideally require a direct measure of monthly final releases, into the United States, of all book-ins transferred from CBP. ICE does not publish this. What it publishes instead is 1) the monthly number of final releases according to whether migrants are convicted

Figure A2: CROSS-CORRELATION PLOTS: Unlawful crossings and releases of migrants who crossed lawfully (natural log points)
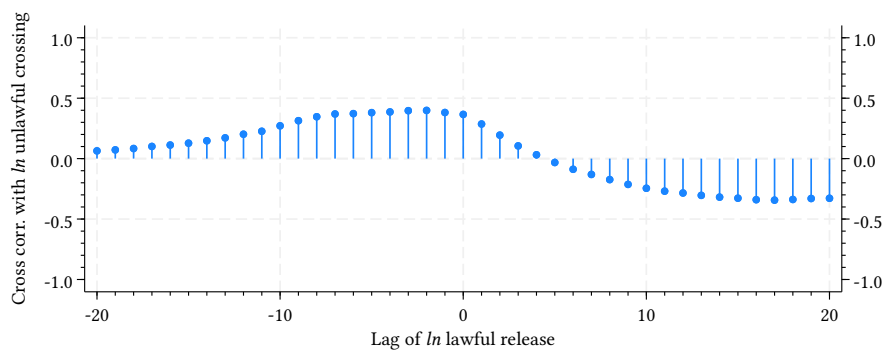
(a) *Unlawful crossings vs. Unlawful crossings*
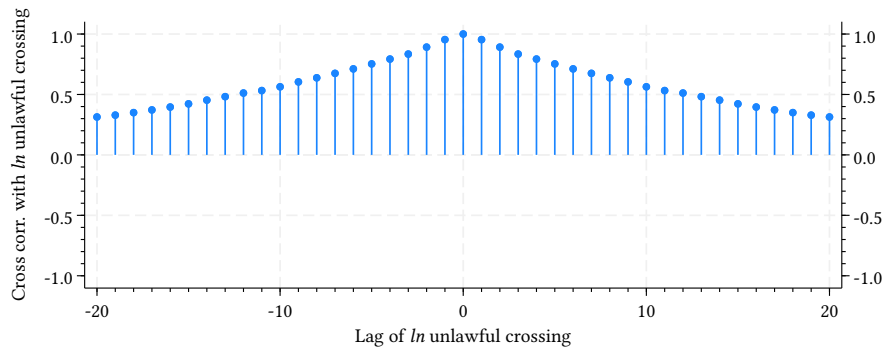
(b) *Releases (lawful) vs. Releases (lawful)*
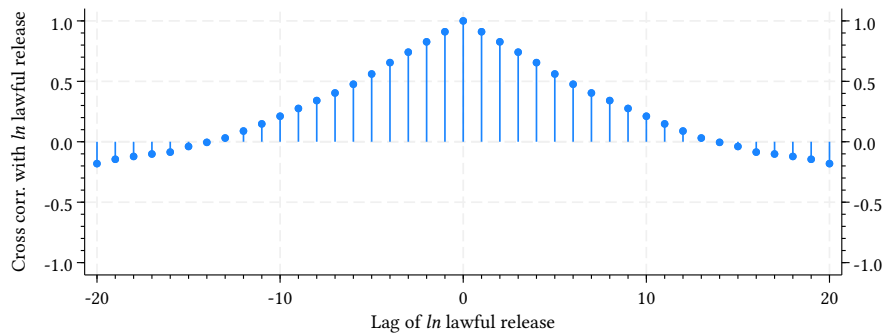
(c) *Releases (lawful) vs. Unlawful crossings*

Increasing lags proceed backwards in time. Thus positive numbers on the horizontal axis represent backwards in time (lag +1 is $t-1$) and negative numbers represent forwards in time (lag -1 is $t+1$).

criminals, have pending criminal charges, or are 'other immigration violators'; and 2) the monthly fraction of detained migrants in each of those three categories who were transferred from CBP (that is, from the border) vs. transferred from ICE officers (that is, from the interior). This allows a simple estimate of the number of final releases in each month who arrived in ICE custody from CBP. I estimate this number as

$$r_{\text{cbp}} \approx r_{\text{imm}} \cdot \frac{d_{\text{imm}}^{\text{cbp}}}{d_{\text{imm}}} + r_{\text{con}} \cdot \frac{d_{\text{con}}^{\text{cbp}}}{d_{\text{con}}} + r_{\text{pen}} \cdot \frac{d_{\text{pen}}^{\text{cbp}}}{d_{\text{pen}}} \tag{A.1}$$

in each month, where r_{imm}, r_{con}, and r_{pen} are respectively releases of 'other immigration violators', 'convicted criminals', and 'pending criminal charges'; d_{imm}, d_{con}, and d_{pen} are the average number of migrants of each type in detention that month; and $d_{\text{imm}}^{\text{cbp}}$, $d_{\text{con}}^{\text{cbp}}$, and $d_{\text{pen}}^{\text{cbp}}$ are the number of detainees of each type in each month that were transferred from CBP. Final releases comprise migrants who were released from ICE custody into the United States, for any of four reasons: 'bonded out', 'paroled', 'order of recognizance', or 'order of supervision'. Migrants removed from the United States are not included in final releases, nor are migrants transferred to the Office of Refugee Resettlement or to US Marshals Service.

Figure A3a shows monthly book-ins to ICE detention transferred from CBP, compared to the estimated final releases from equation (A.1). A vertical line appears at October 2020, the earliest date for which monthly final releases by type are published by ICE. A second vertical line appears at April 2023, pointing out that substantial numbers of those booked in after that date will be released but have not yet been released in the most recent data available at the time of writing. The *average* time spent in detention for a migrant transferred from CBP has hovered between 1 and 2 months in the most recent months (Figure A3b). In fiscal year 2023, the average duration of stay in ICE detention for a migrant transferred from CBP ranged between 29.8 days and 44.6 days in different months of the year. This would suggest omitting at a minimum the last three months of data if we seek an accurate estimate of the fraction of book-ins over an extended period who are eventually released. To be conservative I omit the last five months, indicated by the second vertical line in Figure A3a.

This allows estimation of the fraction of cumulative total book-ins that are eventually released from detention into the United States after transfers from CBP. During October 2020 through April 2023 there was a cumulative total of 488,619 book-ins from CBP. Of these, equation (A.1) estimates 440,447 final releases, a fraction of 0.901.[47]

During fiscal years 2021–2023, substantial fractions of migrants crossing lawfully were initially detained rather than initially released (Figure A3c). But given that 90.1 per cent of these were eventually released into the US, on average 1–2 months later, it is reasonable to consider the number of lawfully-crossing migrants who remain in the US as a proxy for the number released into the US.

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[47]I consider this a lower bound on the fraction for OFO encounters specifically, given that the probability of final release from ICE detention for convicted criminals is plausibly lower than for 'other immigration violators', and many convicted criminals are aware that their status would be revealed by crossing at a Port of Entry and would thus plausibly self-select into crossing between Ports of Entry and thus being encountered by USBP.

Figure A3: Estimating Final Disposition of Lawfully-Crossing, Detained Migrants
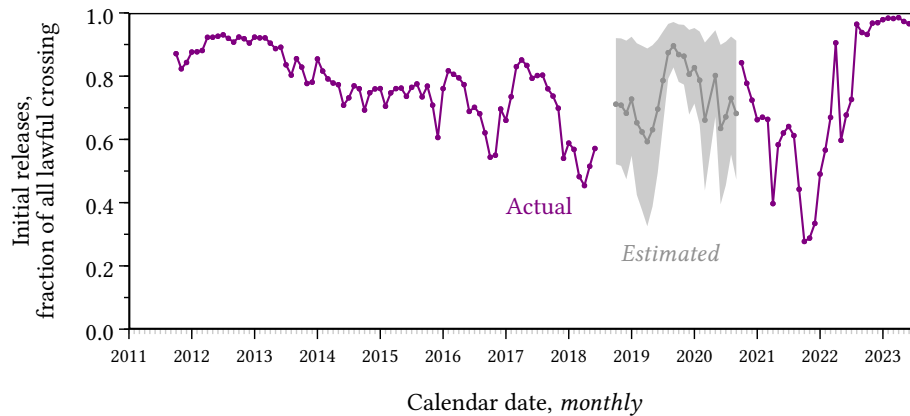
(a) *CBP book-ins to ICE detention vs. estimated final releases, Oct. 2020–Apr. 2023*
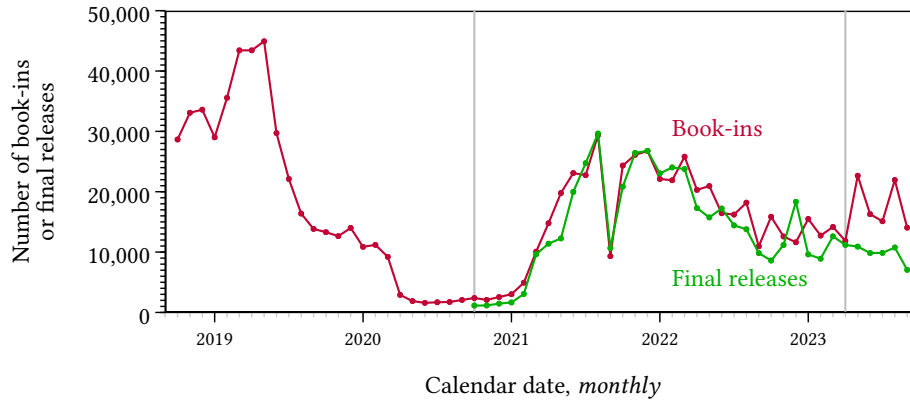
(b) *Average length of detention, CBP transfers, Oct. 2018–Sep. 2023*
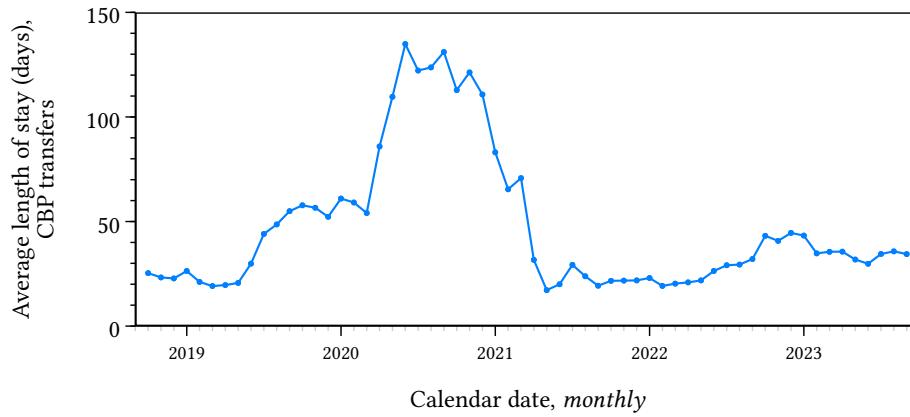
(c) *Fraction of migrants crossing lawfully and remaining in the United States who are released by CBP without ICE detention, 2011–2023*

A5.2 Fiscal years 2019 and 2020

For two earlier fiscal years, ICE publicly releases *annual* final releases broken down by offender type, but not monthly. Thus equation (A.1) can be estimated for each of those years as a whole, but not by month. This yields a cumulative total estimated final releases of CBP transfers in FY2020 of 40,171, which given 83,095 book-ins transferred from CBP in that year, gives a final release fraction of 0.483. The same method for FY2019 yields 199,740 estimated final releases, which compared to 373,770 book-ins in that year, gives a final release fraction of 0.534.

What fraction of migrants crossing lawfully were initially detained? This can be directly calculated only for the dates on which CBP publishes the number of OFO encounters who were transferred to detention: from October 2011–June 2018, and starting again in October 2020. For the intervening period CBP only publishes the total number who remain in the US, without decomposing this into those initially detained and those immediately released. I therefore estimate the fraction initially detained as follows. For October 2020 through August 2023, CBP publishes the number of OFO encounters transferred to detention and the number of USBP encounters transferred to detention. This allows calculation of the fraction of overall transfers to detention that were encountered by OFO (lawful crossers) by month, with a mean of 0.0724 and typically falling in the range 0.02–0.12 (10th percentile to 90th percentile) in any given month. Multiplying that typical fraction by the total number of OFO encounters who remain in the country, which is published by CBP, allows estimation of the range of plausible values for the fraction of those encounters that are initially released in the years when that fraction is not published.

This estimate is shown in gray in Figure A3c. The dark gray line shows the fraction of OFO encounters who remain in the US who are initially released, *if* OFO transfers to detention as a fraction of overall CBP transfers to detention during the estimate period (Oct. 2018–Sep. 2020) were the same as its mean during the months that that fraction is published (Oct. 2020–Aug. 2023). The mean value of the fraction of initial releases in the figure during the estimate period is 0.735. The light gray range around that estimate shows how the result varies if the OFO fraction of all transfers to detention ranges from low (0.02) to high (0.12) values observed during the post-Oct. 2020 period.

This allows an approximation of the fraction of OFO encounters initially remaining in the US who are eventually released into the US by either CBP or ICE in the years, FY2019 and FY2020, where this fraction is not directly observed. As calculated above, the fraction of those detained who are released into the US in those two years is between 0.483 in FY2020 and 0.534 in FY2019. The lower of these implies that the fraction of OFO encounters who initially remain in the US who are either initially or later released into the US is approximately $1 - 0.483 \times (1 - 0.735) = 0.872$ in FY2020 and in $1 - 0.534 \times (1 - 0.735) = 0.858$ FY2019.

I conclude that in fiscal years 2019–2023, the vast majority of migrants crossing lawfully at a Port of Entry who were not immediately removed, returned, or expelled released into the United States. These releases occurred either immediately or within 1–3 months of lawful crossing. I estimate that the fraction of these released ranged from 0.86 to over 0.99 in typical months of each year since October 2018.
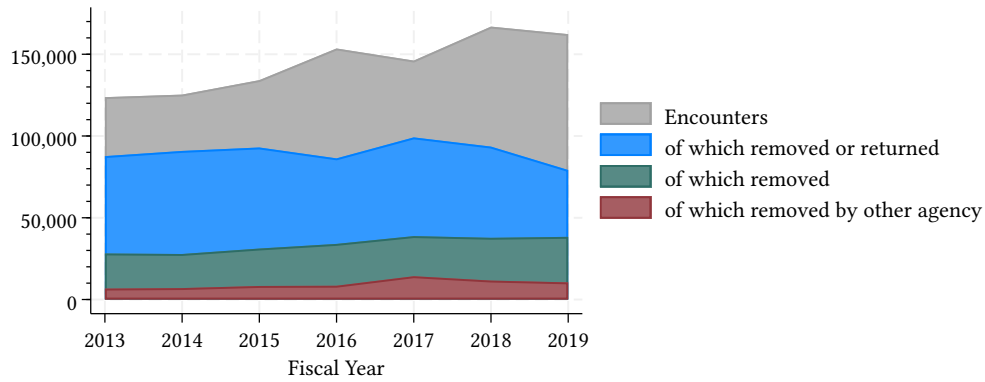
A5.3 Fiscal years 2013–2019

Prior to fiscal year 2019, ICE does not publish data on final releases at the time of writing. Thus an analysis corresponding exactly to the above analysis for preceding years is not possible.

But DHS does publish data on the number of migrants encountered by OFO at a Port of Entry who are later removed by another agency, typically ICE, for the period 2013–2019.[48] Figure A4 shows that the large

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[48]Sean Leong (2023), *Immigration Enforcement Actions: 2022*, Office of Immigration Statistics, Washington, DC: US Dept. of Homeland Security, Tables 1, 6, and 10. The same source contains data for 2020–2022 as well, but I do not include those in the figures here, for two reasons: 1) the source does *not* indicate what fraction of OFO

Figure A4: ENCOUNTERS AT PORTS OF ENTRY, with subsequent returns/removals, 2013–2019

Figure A5: ENCOUNTERS AT PORTS OF ENTRY: Removals by other agencies as a fraction of encounters *not* removed/returned by OFO itself, 2013–2019
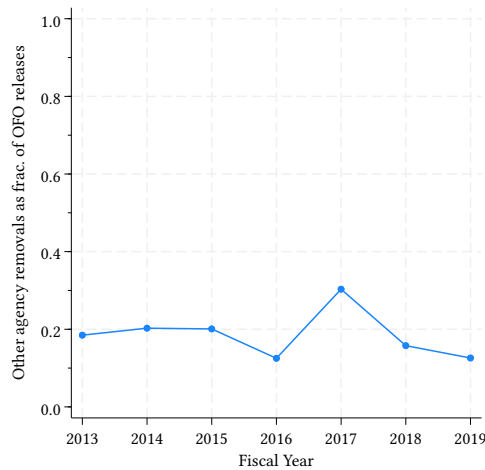
Source: Estimated from the data in Figure A4.

majority of removals or returns for OFO encounters are removed/returned by OFO itself, not by another agency. Put differently, removals by other agencies are typically a low fraction of those who remain in the United States after being encountered by OFO. Figure A5 shows this fraction, which averages 0.186 during this period.

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encounters became Title 42 expulsions (which began in 2020) so focusing exclusively on removals and returns would be misleading during the period 2020–2022 only, and at any rate 2) the years 2020–2023 have been covered with more direct and granular data, above.

In other words, for earlier years as well, removals by other agencies (such as from ICE detention) do little to alter the probability that a given migrant encountered at a Port of Entry is allowed to remain in the US. Figure A3c shows the fraction of those encountered by OFO that are immediately released into the US; of the rest, Figure A5 implies that during 2013–2019, over 80 percent were allowed to remain in the US even after being initially detained.

This allows estimation of the relationship between the number of lawfully-crossing migrants allowed to remain in the US, whether or not initially detained, and the number eventually released into the interior of the US. In Figure A3c, the average fraction of lawfully-crossing migrants directly released into the US by OFO averages 0.77 in the years before 2019. If roughly 80 percent of the rest are *not* eventually removed from the US after detention, the fraction of lawfully-crossing migrants eventually released into the US during 2013–2019 is approximately $0.77 + (0.8 \times (1 - 0.77)) = 0.95$.

A5.4   Summary

In summary, the fraction of lawfully-crossing migrants who are initially allowed to remain in the United States—with or without detention—is an excellent proxy for the number *eventually* released into the United States. The number of lawful crossers eventually released into the US interior as a fraction of the number initially who initially remain in the country (with or without detention) hovers approximately in the range 0.85–0.95 for the entire period of this analysis.

What happens to migrants released into the interior of the US after detention? DHS has published assessments of outcomes for migrants following detention, by linking records in 19 different immmigration law-enforcement databases that capture essentially all immigration enforcement-related actions with respect to each released individual. Three years after release, 97.9 percent have "no confirmed departure" from the United States, indicating that they were not deported. Seven years after release, the fraction is 94.3 percent.[49] In other words, the best available evidence suggests that deportation after final release from detention is uncommon.

For this reason, the core analysis in the main text defines 'releases' of migrants crossing lawfully as the number who are either released immediately or detained. This number, for the reasons given here, is close to and highly correlated with the number known to have been released into the US. It is a conservative proxy in that ICE final releases do not count transfers from ICE detention to the Office of Refugee Resettlement, essentially all of whom are likewise released into the US.

A6   Duration of travel to the US border

EMIF SUR (*Encuesta sobre Migración en la Frontera Norte de México*) is a survey of migrants carried out by El Colegio de la Frontera (COLEF) with support from several agencies of the Mexican government as well as the International Organization for Migration of the United Nations. Microdata are open-access at https://www.colef.mx/emif. I use the October–December 2022 samples of Guatemalans and Hondurans age 18 or over removed from the United States. I use responses to question p21 ("*¿Cuánto tiempo transcurrió desde que cruzó la frontera Guatemala-México hasta entrar a Estados Unidos?*", "How much time elapsed after you crossed the Guatemala-Mexico border until you entered the United States?"), translated into days and weighted by the sampling weight. The mean duration for Guatemalans is 32.6 days (std. err. 6.84, $N = 77$); for Hondurans 20.7 days (std. err. 2.06, $N = 210$).

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[49]Marc R. Rosenblum and Hongwei Zhang (2020), *Fiscal Year 2020 Enforcement Lifecycle Report*, Office of Immigration Statistics, Washington, DC: US Dept. of Homeland Security, Appendix Table "*Standard Detention*", Detention Status "Partially Detained", years 2013 and 2017 (relative to 2020).

Figure A6: LOCAL PROJECTION IMPULSE RESPONSE OF UNLAWFUL CROSSINGS BY MEXICAN NATIONALS ONLY, to impulse in Releases of Migrants Who Crossed Lawfully, Oct. 2011–July. 2023
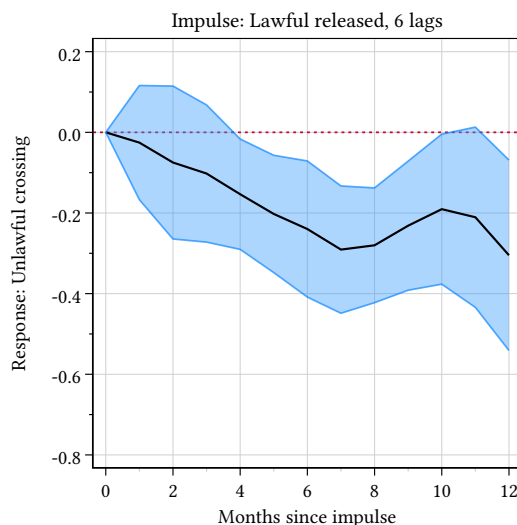
Unlawful crossings are restricted to Mexican nationals only; lawful releases are migrants of *any* nationality, since Mexican migrants' choices could be affected by the disposition of non-conationals. Shaded areas show 95 percent confidence intervals using robust White-corrected standard errors as recommended by Montiel Olea and Plagborg-Møller (2021). Solid black lines show 12-step generalized impulse responses from six-lag augmented bivariate local projections (Jordà 2005), showing the response of unlawful crossings (natural log points) to an impulse in releases of migrants crossing lawfully (of one natural log point). The responses can thus be interpreted as estimated elasticities.

A7   Robustness: Unlawful crossing by Mexican nationals only

Figure A6 shows the response of unlawful crossings by *Mexican nationals only* to an impulse in lawful releases (of any nationality). The core result, that the net effect of lawful releases deters unlawful crossings, is robust to restricting unlawful crossings to those by Mexican nationals only.[50] As discussed in the main text, it is possible in principle that the scale effect of lawful releases offsets the substitution effect to a different degree for Mexican nationals than for other migrants, given the lower cost of initiating migration from a relatively nearby origin to the United States. If this were the case I would expect to observe an impulse response systematically less negative, or more positive, for Mexican migrants in isolation. But I do not observe this. In Figure A6, as in the core results in main-text Figure 6a, the impulse response point estimates reach circa −0.3 around 6 months post-impulse and remains close to that value through 12 months post-impulse. The impulse response in Figure A6 could lie slightly above the original result in months 9–11, but nowhere is it statistically distinguishable from the original result.

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[50]The impulse in this figure is releases after lawful crossing for migrants of *any* nationality, given that Mexican migrants' incentives need not only be affected by the disposition of other Mexican migrants, but could be shaped by the disposition of non-Mexican but otherwise similarly situated migrants.