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The impact of US deportation policies on the US, Canadian, and Mexican economies

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Abstract

North America (Canada, US, Mexico) is a highly inter-connected regional economy (ICRE) with extensive cross-country value chains in production and strong trade, financial, and labor market links. The impact of new US deportation policy would affect the US economy in the short to medium term by reducing the labor force by nearly five percent as foreign-born labor leaves the country or drops out of the labor market. Analysis with a global computable general equilibrium (CGE) simulation model indicates that the shock would cause a supply-side recession in the US and reduce real GDP by four percent. The wage in the labor markets with high participation of the remaining undocumented labor would increase, which would provide an incentive for increased future migration. There would also be a decline in the wage of native-born workers; studies indicate that they are complements not substitutes for non-native labor in their sectors of employment. The US macro shock would also induce macro shocks to both Mexico and Canada, yielding reductions in their GDP. In addition, there would be a dramatic decline in remittance flows from foreign-born workers to their countries of origin. For Mexico, the reduction in remittances would lead to a financial shock due to lost foreign exchange, resulting in a major depreciation of the real exchange rate and changes in macro aggregates: lower GDP, lower imports, increased exports, and much lower aggregate final demand. The financial shock in Mexico would feed back to Canada and the US, affecting the sectoral composition of trade and production in both countries. In sum, the impact of US policies to remove

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[1] The views expressed in this presentation are those of the author(s) and do not reflect the official policy or position of the U.S. Naval Academy, Department of the Navy, the Department of Defense, or the U.S. Government

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foreign-born labor would reverberate across all three countries, damaging their economies and weakening economic integration in North America.
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1. Introduction

In the United States, recent political debate has focused on issues of controlling the border to deter potential immigrants and dealing with the existing stock of noncitizens, both authorized and unauthorized. In 2025, the US dramatically expanded programs to deport migrants residing in the US with arrests by Immigration and Customs Enforcement (ICE) increasing significantly. Unauthorized workers contribute to the US economy, accounting for nearly five percent of the US labor force in 2022 (Passel & Krogstad 2024). Deportation policies that either remove labor from the US or induce workers to leave the labor force, affect real GDP, trade, wages, and the structure of production. A computable general equilibrium (CGE) model is the appropriate tool to analyze the economy-wide effects of a labor supply shock because it accounts for the direct and indirect linkages within the economy and the linkages between countries via trade and financial flows.

Previous CGE studies have addressed different aspects of US deportation policies. Dixon et al. (2011) focus on the cost of different policies to reduce illegal immigrants, evaluating options such as tighter border security, taxes on employers, and vigorous prosecution of employers. They find that a tax on employers, which reduces demand for illegal immigrants, is the most efficient way to reduce illegal immigrants in the US.

Other studies address the effects of a decrease in the labor supply on US production and trade, finding that production and exports decline in sectors that rely on immigrant labor. Aguiar and Walmsley (2013), in their CGE model of the US, include broad industry aggregates (agriculture, manufacturing, textiles and services) and find that deportation lowers real GDP and increases wages in the US for unskilled foreign-born authorized labor which is highly substitutable for unauthorized labor. The real wage of skilled labor declines slightly due to the overall reduction in GDP. Other studies focus on agriculture, given the importance of immigrants in farm production. Zahniser et al. (2011) consider a reduction in the supply of unauthorized workers and find that earnings per job for farm workers increase, with gains to US-born and authorized foreign-born workers. Agricultural output and exports decline. Devadoss and Luckstead (2011) also focus on agriculture and find deportation scenarios detrimental to farm output and exports. Devadoss et al. (2020) find that deportation reduces production of labor-intensive agriculture in the US. Deportation also increases the wage of undocumented workers in the US, providing an incentive for Mexican workers to return to the US. Richards (2018) focuses on agriculture in California and also finds that deporting unauthorized workers will increase wages in agriculture.

The previously mentioned studies assume limited macroeconomic responses to the deportation shock. McKibbin et al. (2024) use a detailed macro model with forward-looking households and firms. They consider policy shocks representing deportation, tariff changes, and damage to the Federal Reserve. Their simulations cover the period 2024–2040. (See McKibbin and Wilcoxen (1999, 2013) for a detailed description of the model, called G-Cubed). The model includes a detailed description of macroeconomic relationships and an aggregated CGE model, with six broadly defined sectors. They find that deportation leads to a persistent decline of US real GDP over a long time period (2024 – 2040).

Our work complements other CGE studies of changes in immigrant labor supplies in the US. We consider the economic impacts of policies to deport migrants working in the US on economic performance in the short to medium run. Shocks include both changes in the US labor supply, under-utilization of capital, and changes in remittance flows from the US to Mexico.[1] While the policy shock originates in the US, there are reverberations across Mexico and Canada whose economies are highly integrated with the US through trade dependencies and integrated production processes. Like Aguiar and Walmsley (2013), we use a nested production function to allow different substation possibilities between authorized foreign-born, unauthorized foreign-born, and native labor. We treat foreign-born and native workers as complements in production following Ottaviano and Peri (2012), Card and Peri (2016), and Wolla (2014). Other studies (Aguiar & Walmsley, 2013; Devadoss et al., 2020) assume deported workers become employed in the Mexican economy. We do not because we assume a contagion induced recession in Mexico. Like Aguiar and Walmsley (2013), we consider remittance losses as deported workers no longer have income to send to households in Mexico. We contribute further to the CGE literature on deportation through our specification of trade relationships between the US, Mexico, and Canada. We use a nested constant elasticity of substitution (CES) function to represent supply chain links in the region.

Similar to other studies, we find that US deportation reduces its output and real GDP. Wages for native labor declines because they are complements with foreign-born workers. Like Richards (2018), we find an increase in wages to foreign-born workers still in the US, which would encourage more illegal migration. We also find that deportation, without accounting for the loss in remittances, reduces real GDP in Mexico and Canada through contagion effects as they are tightly linked to the US via production supply chains. A loss in remittance income in Mexico adds a major financial sector shock to the deportation shock, resulting in a large depreciation of the Mexican exchange rate and changes in the sectoral structure of production and trade.

The remainder of the paper is organized as follows. In section two, we describe the background data on trade dependencies and employment in the US, Mexico, and Canada. Then we describe the model used for analysis. We discuss our results in section four and present our conclusions in section five.

2. Trade and labor market data in the analysis

Mexico and Canada are tightly linked to the US via trade. There is a lopsided export dependence among the three USMCA countries. Mexico and Canada are heavily dependent on exports to the US, 77.8 percent of Mexico's total exports and 69.4 percent of Canada's total exports are to the US. In contrast, the US is much less dependent on Mexico (it accounts for 12.4 percent of US exports) and Canada (it accounts for 14.7 percent of US exports). Unlike Mexico and Canada, US exports are more diversified and evenly allocated to major trade groups: 27.1 percent to NAFTA countries; 27.4 percent to East and Southeast (E&SE Asia), 24.1 percent to Europe and 21.2 percent to the rest of the world (see Table 1). The US is the export platform for production in the USMCA region.[2]

[1] See Hinojosa-Ojeda et al. (2024) for an earlier CGE analysis of deportation scenarios with a focus on the effects in Mexico by state. Hinojosa-Ojeda et al. (2021) consider both trade reform and deportation scenarios. They find that the economic impacts are much larger from changes in the labor force than from changes in trade policy.

[2] See Robinson and Thierfelder (2019) for a description of trade among Inter-Connected Regional Economies (ICREs): NAFTA, Europe, and E&SE Asia.

Table 1
Base export shares.
Source, GTAP v11, 2017 base year

	Canada	Mexico	USA	China	Other E&SE Asia	EU	Rest of World	Total
Canada	0.0	1.2	69.4	6.0	6.1	10.6	6.8	100.0
Mexico	2.6	0.0	77.8	3.5	3.8	6.2	6.2	100.0
USA	14.7	12.4	0.1	9.3	18.2	24.1	21.2	100.0

Note: Exports (fob) from row country to column country/region

For certain sectors, Mexico and Canada depend almost exclusively on exports to the US. For example, 88.5 percent of Mexico's fruits & vegetables exports are sold to the US as are 100 percent of Mexico's crops. Other sectors in Mexico that export primarily to the US (i.e. over 90 percent of exports are to the US) include: health services, textiles & clothing, beverages & tobacco, and cement. The US accounts for 83.8 percent of Mexico's exports of autos & other transport equipment. Likewise, the US is the major destination for selected Canadian exports; health services, utilities, cement, and beverages & tobacco, and mining are sold primarily to the US which accounts for 80 percent or more of Canada's total exports (see Table 2 for a listing of each sector's share of exports to the US in Mexico and Canada).

Mexico and Canada rely more heavily on trade than does the US. For example, Mexico's total exports account for 22.3 percent of total production; Mexico's imports account for 21.9 percent of total consumption. Canada is less dependent on trade, where 16.4 percent of

Table 2
Commodity export shares to the US as a share of total exports.
Source: GTAP 11.c, 2017.

	Mexico	Canada
Fruits and vegetables	88.5	46.6
Grains		18.9
Other crops	100.0	14.4
Livestock	100.0	78.7
Forestry and Fisihng	100.0	55.0
Mining	43.7	80.7
Processed meat	70.1	51.0
Processed food	76.8	76.7
Beverages and tobacco	90.5	91.5
Textiles and Clothing	92.2	88.6
Metal and metal products	78.9	62.6
Leather and wood productgs	81.2	67.8
Motor vehicles and other transp	83.8	86.9
Cement	95.6	100.0
Other Manufacturing	80.9	73.8
Utilities		91.6
Construction		100.0
Wholesale and retail trade	59.6	32.7
Accomodation and food services	60.0	45.0
Transport	48.2	33.8
Business services	56.2	57.2
Recreation services		27.9
Health services	100.0	100.0
Other services	58.9	55.3

Table 3
Trade dependence by sector.
Source, GTAP v11, 2017 base year, author's calculations.

	US		Mexico		Canada	
	Exports as a percent of output	Imports as a percent of consumption	Exports as a percent of output	Imports as a percent of consumption	Exports as a percent of output	Imports as a percent of consumption
Fruits and vegetables	28	35.7	87.6	42.2	67.6	80.1
Grains	23.4	2.5	9	41.7	58	7.2
Other crops	40	21.2	6.3	33	56.4	24.2
Livestock	2.4	2.3	3.6	2.1	11	5.3
Forestry and Fisihng	4	5	2.3		17.8	5.1
Mining	11.2	26.1	45.2	36.7	58.5	21
Processed meat	7.7	3.8	5.5	14	22.9	14.2
Processed food	7.3	10.4	12.2	12.9	31.3	30.7
Beverages and tobacco	5.4	11.3	22.9	7.1	10.1	26.3
Textiles and Clothing	25.4	69	32.7	44.8	48.5	82.5
Metal and metal products	14.3	19.8	29.8	42.3	50.6	45.5
Leather and wood productgs	11.8	21.5	41.5	37.3	43.7	47.2
Motor vehicles and other transp	23.3	36.5	66.9	50.6	69.9	71.2
Cement	11.4	19.4	18.2	17.8	16.2	33.4
Other Manufacturing	31	34.8	62.4	67.2	44.5	58.6
Utilities	0.2	0.7			7.8	0.7
Construction	0.2	0.2		0.1	0.1	0.1
Wholesale and retail trade	0.9	0.7	0.2	0.8	1.8	1.2
Accomodation and food services	9.5	8.3	39.1	27.5	19.1	29.6
Transport	10	5.8	6.8	3.6	12.9	10.4
Business services	4.1	3.6	5.6	7.7	8.8	9.5
Recreation services	1	0.2		2.1	1.5	0.8
Health services	0.6	0.1	0.7	1.7	0.1	0.8
Other services	2.6	1.8	0.9	2.5	3.1	3.3
Total	6.6	8.3	22.3	21.9	16.4	17.3

production is exported, and 17.3 percent of consumption is imported. The US has substantially lower numbers – 6.6 percent of production is exported, and 8.3 percent of consumption is imported (see Table 3). Furthermore, in Mexico some sectors are extremely reliant on trade: 87.6 percent of fruits & vegetables production is exported; 66.9 percent of production in motor vehicles & other transport are exported; and 62.3 percent of other manufacturing production is exported. At the same time, imports are an important share of consumption for fruits & vegetables (42.2 percent); for motor vehicles & other transport (50.6 percent); and for other manufacturing (67.2 percent). A similar pattern of sectors with high shares of exports in production and imports in consumption holds for Canada, particularly in fruits & vegetables, other crops, textiles & clothing, metal& metal parts, leather & wood products, motor vehicles & other transport, cement, and other manufacturing. (See Table 3) These trade dependencies suggest that there are strong global value chains between Mexico and the US and Canada and the US. A policy shock that reduces GDP in the US will have spillover effects on Mexico and Canada through these trade links.

Table 4A
US employment by activity.
Source: Authors' calculations using employment data from Walmsley and Carrico, (2014) and data on foreign-born authorized and unauthorized from Passel and Krogstad (2024).

Greatest to lowest foreign born as a percent of total employment

	Skilled labor			**Unskilled labor**				**Total Employment**		
	Foreign Born			**Foreign Born**						
	Unauthrozied	Authorized	Native	Unauthrozied	Authorized	Native	**Total**	Foreign Born	Native	**Total**
Fruits and vegetables	3.9	0.8	14.9	41.1	8.9	30.4	100.0	54.7	45.3	100.0
Processed meat	1.0	2.3	12.0	12.1	28.8	43.8	100.0	44.2	55.8	100.0
Grains	1.3	1.3	22.9	13.7	13.7	47.0	100.0	30.1	69.9	100.0
Other crops	1.3	1.3	22.9	13.7	13.7	47.0	100.0	30.1	69.9	100.0
Construction	2.6	2.7	19.9	11.9	12.3	50.5	100.0	29.6	70.4	100.0
Processed food	2.2	5.3	25.5	6.5	15.4	45.2	100.0	29.4	70.6	100.0
Textiles and Clothing	2.6	6.2	27.5	6.0	14.2	43.5	100.0	29.0	71.0	100.0
Cement	0.6	1.4	25.5	7.0	16.7	48.8	100.0	25.7	74.3	100.0
Transport	1.5	6.3	23.3	2.6	11.2	55.1	100.0	21.6	78.5	100.0
Business services	2.6	7.0	37.8	3.6	8.1	40.8	100.0	21.4	78.6	100.0
Recreation services	2.1	6.0	40.0	3.5	9.3	39.0	100.0	21.0	79.0	100.0
Other Manufacturing	2.9	6.9	44.7	3.0	7.0	35.6	100.0	19.8	80.2	100.0
Accomodation and food services	1.0	3.1	21.9	3.4	10.3	60.3	100.0	17.8	82.2	100.0
Leather and wood productgs	1.5	4.1	33.4	3.5	8.4	49.1	100.0	17.5	82.5	100.0
Health services	1.2	10.6	54.2	0.6	5.0	28.4	100.0	17.4	82.6	100.0
Wholesale and retail trade	1.7	5.1	27.9	2.5	7.2	55.6	100.0	16.6	83.4	100.0
Motor vehicles and other transp	2.2	5.3	39.4	2.5	5.9	44.6	100.0	15.9	84.1	100.0
Metal and metal products	1.6	3.7	28.7	3.1	7.3	55.7	100.0	15.6	84.4	100.0
Other services	1.1	8.8	60.1	0.5	3.5	25.9	100.0	14.0	86.0	100.0
Beverages and tobacco	1.5	3.6	41.8	2.6	6.2	44.3	100.0	13.9	86.1	100.0
Livestock	1.3	1.3	27.4	5.4	5.4	59.3	100.0	13.4	86.6	100.0
Mining	2.1	5.4	41.1	1.6	4.1	45.8	100.0	13.1	86.9	100.0
Utilities	0.9	4.0	47.6	0.7	3.1	43.7	100.0	8.7	91.3	100.0
Forestry and Fisihng	0.9	0.9	25.3	3.1	3.1	66.9	100.0	7.9	92.1	100.0

Note: sectors are ranked by highest percentage share of foreign-born.

Table 4B
Employment by labor type.
Source: Authors' calculations using employment data from Walmsley and Carrico, (2014) and data on foreign-born authorized and unauthorized from Passel and Krogstad (2024).

	Skilled labor			**Unskilled labor**		
	Foreign Born			**Foreign Born**		
	Unauthrozied	Authorized	Native	Unauthrozied	Authorized	Native
Fruits and vegetables	0.7	0.0	0.1	**4.1**	0.4	0.2
Grains	0.0	0.0	0.0	0.3	0.1	0.1
Other crops	0.2	0.1	0.2	1.4	0.6	0.4
Livestock	0.4	0.1	0.4	0.9	0.4	0.8
Forestry and Fisihng	0.1	0.0	0.1	0.1	0.1	0.2
Mining	0.3	0.2	0.3	0.1	0.2	0.3
Processed meat	0.2	0.1	0.1	1.3	1.4	0.4
Processed food	1.1	0.7	0.6	1.8	1.9	1.0
Beverages and tobacco	0.2	0.1	0.3	0.2	0.2	0.3
Textiles and Clothing	0.5	0.3	0.2	0.6	0.7	0.4
Metal and metal products	0.8	0.6	0.7	1.0	1.0	1.4
Leather and wood productgs	1.1	0.8	1.1	1.5	1.6	1.7
Motor vehicles and other transp	1.9	1.3	1.6	1.2	1.3	1.8
Cement	0.1	0.1	0.2	0.7	0.8	0.4
Other Manufacturing	5.2	3.4	3.7	3.0	3.2	3.0
Utilities	0.4	0.5	1.0	0.2	0.4	0.9
Construction	**10.4**	3.0	3.6	**27.0**	12.5	9.4
Wholesale and retail trade	**10.4**	8.7	7.8	**8.8**	11.3	16.1
Accomodation and food services	1.2	1.0	1.2	2.3	3.1	3.4
Transport	1.6	1.9	1.2	1.6	3.1	2.9
Business services	**32.8**	24.4	21.8	**26.3**	26.2	24.2
Recreation services	**10.7**	8.4	9.2	**10.2**	12.0	9.2
Health services	**7.7**	18.4	15.6	2.1	8.0	8.4
Other services	**11.9**	25.7	29.0	3.2	9.5	12.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

Employment in the US is disaggregated to include authorized and unauthorized foreign born as well as native workers by skill category. When considering employment by production activity, fruits & vegetables production is the most reliant on foreign born workers who account for 54.7 percent of employment in that sector. Other sectors heavily dependent on foreign born labor include processed meat (44.2 percent), grains (30.1 percent), other crops (30.1 percent), construction (29.6 percent), processed food (29.4 percent), textiles & clothing (29.0 percent), and cement (25.7 percent). These sectors also employ a high share of unauthorized unskilled workers, the most extreme being fruits & vegetables production, in which 41 percent of its labor is unauthorized unskilled. (see Table 4A).

When considering employment by labor type, skilled unauthorized labor are employed primarily in business services (32.8 percent), all other services (total to 33.1 percent), wholesale and retail trade (10.4 percent), construction (10.4 percent of total employment). Unskilled unauthorized labor is employed primarily in construction (27.0 percent) and business services (26.3 percent). The fruits & vegetables sector is a small share of total output and accordingly accounts for 4.1 percent of the unskilled unauthorized employment (see Table 4B).

3. Model and Scenarios

3.1. GLOBE Model

We use GLOBE, a multi-country, multi-region, multi-factor computable general equilibrium (CGE) model, to analyze the effects of US deportation on the US, Canadian, and Mexican economies.[3] The production and consumption relationships are based on multi-sectoral single country CGE models, as described in Dervis et al. (1982). The GLOBE model is a member of a family of CGE models that model trade relationships using principles described in the 1–2–3 model (de Melo & Robinson, 1989; Devarajan et al., 1990).[4]

The GLOBE model is calibrated using GTAP v11c data, aggregated to 24 commodities, 15 regions, and five factors.[5] Labor quantity data from Walmsley and Carrico (2014) are used to identify the number of workers by sector and region in the GTAP database. Additional data are used to disaggregate skilled and unskilled labor in the US into native workers, authorized foreign-born workers and unauthorized foreign-born workers, resulting in nine factors for the US.[6] We assume that unauthorized foreign-born workers are paid less than authorized foreign born workers in the same sector (see Borjas & Cassidy, 2019 for a detailed analysis of the wage differential between authorized and unauthorized workers.)

The underlying approach to multi-region modeling is the construction of a series of single-country CGE models that are linked through their trading relationships. This modeling assumes that aggregate imports and domestic goods are imperfect substitutes in consumption, modeled using a constant elasticity of substitution (CES) function; it assumes that exports and domestic goods are imperfect substitutes, modeled using a constant elasticity of transformation (CET) function. To better represent trade dependencies among regions, we extend the trade nest: aggregate imports are a CES function over aggregate regions: NAFTA, Europe, East and Southeast Asia, and the Rest of the World. Imports by aggregate regions are modeled as a CES function over imports from the region's members. For example, the aggregate region NAFTA is comprised of the US, Canada, and Mexico. Within the three inter-connected regional economies, there is low trade substitution among members for intermediate goods – this reflects the integrated nature of trade in each region – production is highly specialized, and intermediate goods are shipped multiple times across borders in the region – imports of intermediate goods by different countries in the region are poor substitutes.

As is common in CGE models, the focus is on relative, rather than absolute, price changes. Consequently, each region in the model has its own numeraire price, the consumer price index (CPI); the model requires a global numeraire, which is an aggregate exchange rate index, a trade-weighted average of the nominal exchange rates for high-income countries.

[3] See Thierfelder (2021) and McDonald et al. (2007) for documentation of the GLOBE model. The model is programmed in the General Algebraic Modelling System (GAMS).

[4] The 1–2–3 model is a small analytic general equilibrium model that has one region, two production activities and three goods.

[5] See Aguair et al. (2023) for a description of the GTAP v11 database. Appendix Table A1, A2, and A3 describe the region, sector, and factor aggregations of the GTAP data base used in this study.

[6] Data on foreign-born and native-born employees by North American Industrial Classification System (NAICS) are from the Current Population Survey for 2022. To further disaggregate foreign-born employees into authorized and unauthorized, shares are taken from Krogstad et al. (2020). The author's constructed a mapping from NAICS sectors to the 65 sectors in the GTAP database.

The model's production structure has a nested formulation that allows for substitution among labor types, accounting for complementarities between foreign born and native workers.[7] Value added is a CES aggregate of land, natural resources, capital, and aggerate labor. Aggregate labor is a CES aggregate of skilled and unskilled labor. Skilled labor is a CES aggregate of native- and foreign-born workers. Finally, foreign-born workers are a CES aggregate of authorized and unauthorized workers. A similar pattern holds for the unskilled labor nest.

A major issue in the migration literature is how substitutable native and migrant labor are in production. In his extensive work on migration, George Borjas tends to assume that migrant and native labor are highly substitutable.[8] In a review of that work, Card and Peri (2016) question that assumption in many cases and explore the implications of assuming that migrant and native labor are complements (substitution elasticity less than one). In the case of Latino migrants in the US, given the sectors where they are employed, we the assumption of complementarity to be persuasive. In the GLOBE model, we assume that authorized and unauthorized foreign-born workers are highly substitutable; native and foreign-born workers are complements.

The global CGE model includes macro "closure" rules that incorporate macroeconomic behavior. These closure rules provide the mechanism by which macro shocks are incorporated into the CGE model.[9] For all countries, the external current account balance is assumed to be exogenous.[10] Changes in economic activity will not lead to a change in foreign borrowing. Instead, the exchange rate will adjust in each region to equilibrate foreign exchange flows. The model specifies a "balanced" adjustment in macro aggregates to economic shocks: changes in the economy will uniformly affect all components of aggregate final demand: consumption, government, and investment. Aggregate domestic final demand (often called "absorption" in internation trade theory) is equal to GDP plus imports minus exports and provides a measure of welfare in the economy. Any change in tax revenue collected is redistributed to households as a lump-sum change in income taxes. Aggregate supplies of labor and capital are exogenous and wages/rental rates adjust to achieve a sectoral allocation of factors that equilibrates the markets.

The macro shocks are imposed on the CGE model by changing exogenous variables: aggregate labor supplies, capital utilization, and the current account balances of the US and Mexico to account for changes in remittance flows. The labor markets in the US are disaggregated by skill and citizenship status. Workers are assumed to be mobile across sectors, but not across labor markets (e.g., change citizenship status). With macro shocks, aggregate capital utilization is assumed to decline along with the loss of labor supplies. The sectoral distribution of lower capital utilization is endogenous, with differential adjustments across sectors.

[7] See Card and Peri (2016), for a discussion of nested production functions, elasticities of substitution and supply changes in a model with labor categories based on education and experience. They have information on immigrant by skill group and consider changes in immigrant labor supply on wages for native workers. They note that immigration inflows improve wages of native workers. We do not have education categories but do have nested production by skilled and unskilled workers and further nesting for foreign-born and native workers. We find the same conclusion – a decline in immigrant labor reduces native wages.

[8] See, for example, Borjas and Cassidy (2019).

[9] See Robinson (2006) for a general discussion of how closure rules can be used to incorporate macro adjustments in CGE models.

[10] In each region, the current account balance is valued using the global numeraire exchange rate (a weighted average of exchange rates of high-income countries).

3.2. Scenarios

We consider three deportation scenarios which are described in Table 5. All three assume that 8.32 million foreign-born workers are removed from the US labor force, which represents 5.1 percent of the work force. They are either deported ("mass deportations") or go underground, leaving the labor force in fear of deportation. The first scenario ("Deport") considers the impact of this shock alone. Following the results from a similar scenario by McKibbin et al. (2024), labor unemployment is assumed to be accompanied by a decline in capacity utilization of capital and negative spillovers from the US macro shock hit both Canada and Mexico.

The second scenario ("Deport + Remit") assumes that the unemployed workers drastically reduce remittances sent back to Mexico, adding to the "Deport" shock. Remittances are an important transfer between Mexicans in the US and households in Mexico. In 2022, remittances accounted for 4.04 percent of Mexico's GDP and 10.7 percent of Mexico's real exports. We assume that 95 percent of the remittances from the US to Mexico are lost. The third scenario ("Deport + Remit + Unemp") assumes that the loss of remittances causes an additional macro shock to Mexico that further reduces employment and capital utilization (both by 2 percent). The results from the three scenarios are shown in Tables 6–8.

4. Results

When the US deports labor, the first scenario, GDP falls in all three countries by 4.0 percent (see Table 6). For the US, the result is a supply-side recession, driven by the fall in the labor force. While the GLOBE model is not dynamic, the fall in GDP for the US would essentially be permanent. McKibbin et al. (2024), in their dynamic model, find that the US economy follows a new dynamic path below the non-deportation path for the entire period of analysis (2024–2040). For Canada and Mexico, the projected loss of GDP is essentially the same but for both countries the impact on employment and capital utilization would be transitory. They would be expected to recover over time.

The second two scenarios include remittances lost as deported workers do not send money to households in Mexico. The loss of remittance income from the US to Mexico has little

Table 5
Scenarios.

Name	Description
Deport	8.32 million workers deported, 5.1 % o f the US labor force, a combination of unauthorized and authorized: 80 % reduction in the supply of unauthorized skilled and unauthorized unskilled 6.6 % reduction in the supply of authorized skilled and authroized unskilled 2.5 % reduction in utilization of capital for US Contagion in Canada and Mexico: unemployment and reduced capital utilization: fixed return to factors
Deport+Remit	Deport and 95 % of the remittances into Mexico from the US are lost remittances are 4.04 % of Mexico's GDP and 10.7 % of Mexico's exports
Deport+Remit+Unemp	Deport+Remit and more contagion in Mexico: unemployment and lower capital utilization, 2 additional pecentage points

Note: 1. All sims are done with base level trade elasticities-low elasticities of substitution among ICRE memebers
2. All sims have low ealsticity of substituion (0.75) in value-added for: aFrtVeg, aMining, aMeat, aConst,and aHotel and higher elasticity (1.5) for all other activities

Table 6
Macro results.
Source: Authors' calculations using the GLOBE model.

	US			Mexico			Canada		
Percent change in:	Deport	Deport + Remit	Deport + Remit + Unemp	Deport	Deport + Remit	Deport + Remit + Unemp	Deport	Deport + Remit	Deport + Remit + Unemp
Real GDP	−4.0	−4.0	−4.0	−3.8	−4.6	−6.3	−3.7	−3.6	−3.6
Real Exports	−4.7	−5.9	−5.9	−3.8	8.4	5.9	−3.8	−3.4	−3.5
Real Imports	−2.0	−0.2	−0.5	−4.2	−10.5	−10.8	−3.9	−1.9	−2.3
Real Final Demand	−3.6	−3.3	−3.3	−3.9	−11.9	−12.8	−3.7	−3.1	−3.3
Real Exchange Rate	−1.4	−2.1	−2.1	−0.2	14.5	11.8	−0.4	−3.0	−2.5
Indices Base = 100									
International Term of Trade	102.1	103.3	103.0	99.8	92.3	94.2	99.6	101.5	101.1
Labor force	94.9	94.9	94.9	96.2	96.2	94.3	96.3	96.3	96.3
Capital utilization	97.5	97.5	97.5	96.1	96.1	94.2	96.2	96.2	96.2

Note: The exchange rate is measured as the domestic currency price relative to the global numeraire. An increase in the exchange rate is a depreciation of the domestic currency.

additional impact over the effect of deporting labor for Canada or the US. The fall in GDP is similar for the US and Canada in all three scenarios. For Mexico, however, the addition of a remittance shock has a major impact on GDP, subtracting an additional 2.5 percentage points when there are remittance losses and further unemployment, compared to the scenario with only deportation. When workers are deported and no longer send income to households in Mexico, the trade accounts must adjust for this decline in income. Mexico's real exchange rate depreciates by 14.5 percent, real exports increase 8.4 percent, and real imports decline 10.5 percent; real GDP in Mexico falls 4.6 percent (see "Deport + Remit" for Mexico in Table 6). Real GDP at market prices declines slightly because Mexico suffers a terms of trade loss, its terms of trade index falls to 92.3.[11] When there is further contagion in factor markets following the loss in remittance income, real GDP falls further, by 6.3 percent compared to the base level.

In all three countries, aggregate final demand (a measure of welfare) declines when the US deports workers. For the US and Canada, the welfare result does not change when there are losses in remittances. However, Mexico suffers much more when there is a loss in remittances in addition to deportation. Aggregate final demand falls as much as 12.8 percent (see Table 6, Deport + Remit + Unemp scenario) The additional welfare loss can be explained by changes in international prices, or the terms of trade index. When Mexico increases its exports, the world price of its exports falls and likewise, when Mexico decreases its imports, the world price of its imports rises. Both changes contribute to a decline in Mexico's terms of trade.

In the US and Canada, all three scenarios result in modest appreciation of their exchange rates. They both experience declines in imports and exports. For Mexico, the impact of the Deport scenario alone is similar to that for Canada, but very different for the Remit scenarios, where the exchange rate depreciates dramatically, and imports decline over 10 percent. In the US and Canada, exports fall in all three scenarios while in Mexico they increase in the remittance scenarios as the country exports more to recoup lost foreign exchange.

Table 7 provides the scenario results on average factor returns (labor wages and capital rental rates). For the US, the results are essentially the same for all three scenarios and are driven by the labor supply shocks. The supplies of both skilled and unskilled foreign-born labor (both authorized and unauthorized) fall. The result is a dramatic increase in wages in their respective labor markets, with much higher increases for the unauthorized (which had much larger declines in labor supply). The dramatic rise in wages of foreign-born labor is to be expected given the dramatic supply change. The result would be a situation where there is a strong incentive for increased migration, authorized and unauthorized, in response to the change in wages.

The wages of native labor in the US, both skilled and unskilled, fall (about 5–10 percent), reflecting the fact that native labor is complementary to foreign-born labor in the sectors where they work. This result contrasts with conventional wisdom that views migrant labor as displacing native workers so their wage should rise with increased deportation that removes competitive workers.

By assumption, wages of labor in Mexico and Canada are unaffected by the Deport scenario. Canadian labor wages rise slightly with the two remittance shock scenarios, reflecting a small shift in world prices in favor of Canada that, as noted earlier, lead to a smaller loss of welfare (real final demand) in the Deport + Remit + Unemp scenario compared to the Deport scenario (Table 6). Mexican labor wages fall along with GDP in the two remittance shock scenarios.

[11] When real GDP is calculated at factor cost, it changes very little when Mexico loses remittances in addition to the deportation scenario.

Table 7
Real wages.
Source: Authors' calculations using the GLOBE model.

	US		
percent change in:	Deport	Deport + Remit	Deport + Remit + Unemp
Land	−4.0	−4.6	−4.6
Skilled labor			
Unauthorized	108.2	108.6	108.6
Authorized	22.7	23.0	22.9
Native	−4.6	−4.4	−4.4
Unskilled labor			
Unauthorized	170.6	171.3	171.2
Authorized	59.3	59.5	59.5
Native	−10.1	−9.9	−10.0
Capital	−0.9	−0.7	−0.8
Natural resources	−9.3	−10.1	−10.2
	Mexico		
percent chage in:	Deport	Deport + Remit	Deport + Remit + Unemp
Land	−2.7	−0.1	−1.8
Skilled labor	0.0	−5.0	−4.0
Unskilled labor	−0.1	−3.1	−2.1
Capital	0.0	−3.4	−2.4
Natural resources	−5.4	12.2	7.9
	Canada		
percent change in:	Deport	Deport + Remit	Deport + Remit + Unemp
Land	−2.3	−2.6	−2.6
Skilled labor	0.0	0.9	0.7
Unskilled labor	0.0	1.0	0.7
Capital	0.0	0.9	0.7
Natural resources	−6.9	−7.8	−7.6

Table 8 shows the impact of the scenarios on sectoral output. For the US, the results are driven by the increased deportation. The Deport scenario leads to somewhat larger declines in output for the sectors most dependent on non-native labor: fruits & vegetables and processed meat (see Table 4A for the employment share by labor type). The construction sector, which employs the highest share of unauthorized foreign-born workers (27 percent, see Table 4B), declines by a smaller percentage, but it is a much bigger sector in US economy than fruits & vegetables so has a bigger absolute decline in production. However, the differences are small relative to the overall impact of the supply-driven recession that leads to significant declines in production for all sectors. The contagion recessions in Mexico and Canada in the Deport scenario are similar in that they hit all sectors. In each country, the macro shocks are transmitted across the entire economy through a web of sectorally linked production and demand relationships.

The remittance shock causes a major exchange rate depreciation in Mexico, leading to increased production and exports of fruits & vegetables, mining, and manufacturing. The result

Table 8
Sectoral output.
Source: Author's calculations using the GLOBE model.

	US			Mexico			Canada		
	Deport	Deport + Remit	Deport + Remit + Unemp	Deport	Deport + Remit	Deport + Remit + Unemp	Deport	Deport + Remit	Deport + Remit + Unemp
Fruits and vegetables	−6.3	−7.9	−7.6	−1.1	13.8	10.9	−2.9	−2.8	−2.7
Crops	−4.4	−5.4	−5.3	−2.8	−1.1	−3.6	−3.0	−5.2	−4.8
Livestock	−4.9	−5.1	−5.1	−3.4	−7.4	−8.9	−3.3	−4.1	−4.0
Forestry and Fisihng	−4.5	−5.1	−5.0	−3.6	−1.4	−3.4	−3.3	−3.7	−3.6
Mining	−4.8	−5.4	−5.4	−3.1	9.2	6.1	−3.7	−4.6	−4.4
Processed meat	−5.3	−5.5	−5.5	−3.5	−7.7	−9.2	−3.3	−4.1	−4.0
Processed food	−4.6	−4.6	−4.6	−3.6	−5.8	−7.4	−3.3	−3.8	−3.7
Manufacturing	−5.0	−5.9	−5.8	−4.1	6.8	4.1	−3.9	−3.0	−3.2
Construction	−4.3	−3.9	−4.0	−4.0	−13.3	−13.9	−3.8	−3.1	−3.2
Services	−3.8	−3.8	−3.8	−3.8	−6.2	−7.9	−3.7	−3.8	−3.7

Notes: Aggregation of 24 commodities in the GLOBE model to the 10 sectors reported in Table 8; see Table A2b for the aggregation.

for the US is a larger decline in production for those sectors, as imports from Mexico divert domestic production to other sectors. The effects of the Mexican remittance shock on Canada are similar to the US, but muted. Production of crops, livestock, forestry/fishing, mining, processed meat, and processed food decrease slightly more in the remittance scenarios than in the Deport scenario.

The results at the sectoral level reflect the strong economic links across the three countries. The depth of trade integration in North America implies that any shock to industries in one country strongly will be transmitted to industries in the other countries. This is particularly important for sectors that have a high share of exports in production. In Mexico, the fruits & vegetables sector exports 87.6 percent of production and sends 88 percent of its exports to the US (see Tables 3 and 2). A similar pattern (high export share of production and high share of total exports sent to the US) holds for autos and other manufacturing.

5. Conclusion

North America (Canada, US, Mexico) is a highly inter-connected regional economy (ICRE) with extensive cross-country value chains in production and strong trade, financial, and labor market links. Recent US policy has sought to reduce the share of immigrants in the labor force through a policy of mass deportation of undocumented and some documented foreign-born workers. Even if only part of the immigrant labor force is actually deported, the impact of the policy regime leads workers to leave the labor market where they are at risk of apprehension.

The impact of US deportation policy would affect the economy in the short to medium term by reducing the labor force by nearly five percent, with a concomitant reduction in capacity utilization of capital. Analysis with a global simulation model indicates that the shock would cause a supply-side recession, reducing US real GDP by about four percent. The wage in labor markets with high participation of undocumented labor would increase, which would provide an

incentive for increased future migration. There would also be a decline in the wage of native-born workers; studies indicate that they are complements not substitutes for non-native labor in their sectors of employment.

The US macro shock would also induce macro shocks to both Mexico and Canada, yielding slightly smaller reductions in their real GDP. In addition, forcing immigrants to leave the labor force in the US would result in a dramatic decline in remittance flows to their countries of origin. For Mexico, the reduction in remittances would lead to a financial shock due to lost foreign exchange, resulting in a major depreciation of the real exchange rate and changes in macro aggregates: lower GDP, lower imports, increased exports, and much lower aggregate final demand. The financial shock in Mexico would feed back to Canada and the US, affecting the sectoral composition of trade and production in both countries. In sum, the impact of US policies to remove foreign-born labor would reverberate across all three countries, damaging their economies and weakening economic integration in North America.

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Appendix

Table A1
Aggregation of GTAP regions to GLOBE regions

	GLOBE regions	**GTAP regions**		
		No.	Code	Description
1	Japan	6	jpn	Japan
2	Other High-income Asia	1	aus	Australia
		2	nzl	New Zealand
		3	xoc	Rest of Oceania
		7	kor	Republic of Korea
		11	brn	Brunei Darussalam
		17	sgp	Singapore
3	China and Hong Kong	4	chn	China
		5	hkg	China, Hong Kong SAR
4	Other East and Southeast (E&SE) Asia	8	mng	Mongolia
		9	twn	Taiwan Province of China
		10	xea	Rest of East Asia
		12	khm	Cambodia
		13	idn	Indonesia
		14	lao	Lao People's Democratic Republic
		15	mys	Malaysia
		16	phl	Philippines
		18	tha	Thailand

(*continued on next page*)

Table A1 (*continued*)

	GLOBE regions	**GTAP regions**		
		No.	Code	Description
		19	vnm	Viet Nam
		20	xse	Rest of Southeast Asia
5	India	23	ind	India
6	Other South Asia	21	afg	Afghanistan
		22	bgd	Bangladesh
		24	npl	Nepal
		25	pak	Pakistan
		26	lka	Sri Lanka
		27	xsa	Rest of South Asia
7	Canada	28	can	Canada
8	Mexico	30	mex	Mexico
9	USA and Puerto Rico	29	usa	United States of America
		53	pri	Puerto Rico
10	Other South America	31	xna	Rest of North America
		32	arg	Argentina
		33	bol	Bolivia
		34	bra	Brazil
		35	chl	Chile
		36	col	Colombia
		37	ecu	Ecuador
		38	pry	Paraguay
		39	per	Peru
		40	ury	Uruguay
		41	ven	Venezuela
		42	xsm	Rest of South America
11	Central America and Caribbean	43	cri	Costa Rica
		44	gtm	Guatemala
		45	hnd	Honduras
		46	nic	Nicaragua
		47	pan	Panama
		48	slv	El Salvador
		49	xca	Rest of Central America
		50	dom	Dominican Republic
		51	hti	Haiti
		52	jam	Jamaica
		54	tto	Trinidad and Tobago
		55	xcb	Caribbean
12	Europe	56	aut	Austria
		57	bel	Belgium
		58	bgr	Bulgaria
		59	hrv	Croatia
		60	cyp	Cyprus
		61	cze	Czechia
		62	dnk	Denmark
		63	est	Estonia
		64	fin	Finland
		65	fra	France
		66	deu	Germany
		67	grc	Greece
		68	hun	Hungary

(*continued on next page*)

Table A1 (*continued*)

GLOBE regions		GTAP regions		
		No.	Code	Description
		69	irl	Ireland
		70	ita	Italy
		71	lva	Latvia
		72	ltu	Lithuania
		73	lux	Luxembourg
		74	mlt	Malta
		75	nld	Netherlands
		76	pol	Poland
		77	prt	Portugal
		78	rou	Romania
		79	svk	Slovakia
		80	svn	Slovenia
		81	esp	Spain
		82	swe	Sweden
		83	gbr	United Kingdom of Great Britain)
		84	che	Switzerland
		85	nor	Norway
		86	xef	Rest of EFTA
		87	alb	Albania
		88	srb	Serbia
		89	blr	Belarus
		91	ukr	Ukraine
		92	xee	Rest of Eastern Europe
		93	xer	Rest of Europe
13	Former Soviet Union	90	rus	Russian Federation
		94	kaz	Kazakhstan
		95	kgz	Kyrgyzstan
		96	tjk	Tajikistan
		97	uzb	Uzbekistan
		98	xsu	Rest of Former Soviet Union
		99	arm	Armenia
		100	aze	Azerbaijan
		101	geo	Georgia
14	Middle East and North Africa	102	bhr	Bahrain
		103	irn	Iran (Islamic Republic of)
		104	irq	Iraq
		105	isr	Israel
		106	jor	Jordan
		107	kwt	Kuwait
		108	lbn	Lebanon
		109	omn	Oman
		110	pse	Palestine
		111	qat	Qatar
		112	sau	Saudi Arabia
		113	syr	Syrian Arab Republic
		114	tur	T rkiye
		115	are	United Arab Emirates
		116	xws	Rest of Western Asia
		117	dza	Algeria
		118	egy	Egypt

(*continued on next page*)

Table A1 (*continued*)

GLOBE regions		GTAP regions		
		No.	Code	Description
		119	mar	Morocco
		120	tun	Tunisia
		121	xnf	Rest of North Africa
15	Africa	122	ben	Benin
		123	bfa	Burkina Faso
		124	cmr	Cameroon
		125	civ	C te d'Ivoire
		126	gha	Ghana
		127	gin	Guinea
		128	mli	Mali
		129	ner	Niger
		130	nga	Nigeria
		131	sen	Senegal
		132	tgo	Togo
		133	xwf	Rest of Western Africa
		134	caf	Central African Republic
		135	tcd	Chad
		136	cog	Congo
		137	cod	Democratic Republic of the Congo
		138	gnq	Equatorial Guinea
		139	gab	Gabon
		140	xac	South-Central Africa
		141	com	Comoros
		142	eth	Ethiopia
		143	ken	Kenya
		144	mdg	Madagascar
		145	mwi	Malawi
		146	mus	Mauritius
		147	moz	Mozambique
		148	rwa	Rwanda
		149	sdn	Sudan
		150	tza	United Republic of Tanzania
		151	uga	Uganda
		152	zmb	Zambia
		153	zwe	Zimbabwe
		154	xec	Rest of Eastern Africa
		155	bwa	Botswana
		156	swz	Eswatini
		157	nam	Namibia
		158	zaf	South Africa
		159	xsc	Rest of Southern African Customs Union
		160	xtw	Rest of the World

Table A2a
Aggregation of GTAP sectors to GLOBE sectors

	GLOBE sectors	**GTAP sectors**		
		No.	Code	Description
1	Fruits and vegetables	4	v_f	Vegetables, fruit, nuts
2	Grains	1	pdr	Paddy rice
		2	wht	Wheat
		3	gro	Cereal grains nec
3	Other crops	5	osd	Oil seeds
		6	c_b	Sugar cane, sugar beet
		7	pfb	Plant-based fibers
		8	ocr	Crops nec
4	Livestock	9	ctl	Bovine cattle, sheep and goats
		10	oap	Animal products nec
		11	rmk	Raw milk
		12	wol	Wool, silk-worm cocoons
5	Forestry and Fisihng	13	frs	Forestry
		14	fsh	Fishing
6	Mining	15	coa	Coal
		16	oil	Oil
		17	gas	Gas
		18	oxt	Minerals nec
7	Processed meat	19	cmt	Bovine meat products
		20	omt	Meat products nec
8	Processed food	21	vol	Vegetable oils and fats
		22	mil	Dairy products
		23	pcr	Processed rice
		24	sgr	Sugar
		25	ofd	Food products nec
9	Beverages and tobacco	26	b_t	Beverages and tobacco products
10	Textiles and Clothing	27	tex	Textiles
		28	wap	Wearing apparel
11	Metal and metal products	37	i_s	Ferrous metals
		38	nfm	Metals nec
		39	fmp	Metal products
12	Leather and wood productgs	29	lea	Leather products
		30	lum	Wood products
		31	ppp	Paper products, publishing
		45	omf	Manufactures nec
13	Motor vehicles and other transp	43	mvh	Motor vehicles and parts
		44	otn	Transport equipment nec
14	Cement	36	nmm	Mineral products nec
15	Other Manufacturing	32	p_c	Petroleum, coal products
		33	chm	Chemical products
		34	bph	Basic pharmaceutical products
		35	rpp	Rubber and plastic products
		40	ele	Computer, electronic and optic
		41	eeq	Electrical equipment
		42	ome	Machinery and equipment nec
16	Utilities	46	ely	Electricity
		47	gdt	Gas manufacture, distribution
		48	wtr	Water
17	Consruction	49	cns	Construction

(*continued on next page*)

Table A2a (*continued*)

	GLOBE sectors	**GTAP sectors**		
		No.	Code	Description
18	Wholesale and retail trade	50	trd	Trade
19	Accomodation and food services	51	afs	Accommodation, Food and service
20	Transport	52	otp	Transport nec
		53	wtp	Water transport
		54	atp	Air transport
21	Business services	58	ins	Insurance
		60	obs	Business services nec
22	Recreation services	61	ros	Recreational and other service
23	Health services	64	hht	Human health and social work activities
24	Other services	55	whs	Warehousing and support activities
		56	cmn	Communication
		57	ofi	Financial services nec
		59	rsa	Real estate activities
		62	osg	Public Administration and defense
		63	edu	Education
		65	dwe	Dwellings

Table A2b
GLOBE sector aggregates for tables

Reported Sectors	**GLOBE sectors**
Fruits and vegetables	Fruits and vegetables
Crops	Grains
	Other crops
Livestock	Livestock
Forestry and Fisihng	Forestry and Fisihng
Mining	Mining
Processed meat	Processed meat
Processed food	Processed food
	Beverages and tobacco
Manufacturing	Textiles and Clothing
	Metal and metal products
	Leather and wood productgs
	Motor vehicles and other transp
	Cement
	Other Manufacturing
Construction	Construction
Services	Utilities
	Wholesale and retail trade
	Accomodation and food services
	Transport
	Business services
	Recreation services
	Health services
	Other services

Table A3
Aggregation of GTAP factors to GLOBE factors

	Factor Aggregation			
	GLOBE factors	**GTAP factors**		
		No.	Code	Description
1	Land	1	Land	Land
2	Skilled labor	2	tech_aspros	Technicians/ AssocProfessional
		5	off_mgr_pros	Officials and Managers
3	Unskilled labor	3	clerks	Clerks
		4	service_shop	Service/Shop workers
		6	ag_othlowsk	Agricultural and Unskilled
4	Capital	7	Capital	Capital
5	Natural Resources	8	NatlRes	Natural Resources

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