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Economic freedom and migration: A metro area-level analysis

Imran Arif[1] | **Adam Hoffer**[2] | **Dean Stansel**[3] | **Donald Lacombe**[4]

[1]Department of Economics, Appalachian State University, Boone, North Carolina

[2]Department of Economics, University of Wisconsin-La Crosse, La Crosse, Wisconsin

[3]Cox School of Business, Southern Methodist University, Dallas, Texas

[4]Department of Personal Financial Planning, Texas Tech University, Lubbock, Texas

Correspondence
Dean Stansel, Cox School of Business, Southern Methodist University, Dallas, TX, 75275.
Email: dstansel@smu.edu

Abstract

We examine the determinants of intra-U.S. population migration at the metropolitan area level (MSA), with an emphasis on the presence of policies that are consistent with economic freedom. We are the first to produce a multivariate regression analysis of migration and economic freedom at the local level. Combining a 1993–2014 unbalanced panel of MSA-to-MSA migration data from the Internal Revenue Service with a new economic freedom index for U.S. metropolitan areas, we find that a 10% increase in economic freedom of a destination MSA, relative to the economic freedom of an origin MSA, was associated with a 27.4% increase in net migration from the origin MSA to the destination MSA. If we use mean net migration flows as a benchmark, we would expect a 10% increase in relative economic freedom to increase net migration to the destination MSA by 22 workers per year from each other MSA.

KEYWORDS

economic freedom, local government, migration, metropolitan areas

JEL CLASSIFICATION

R23; H73

1 | INTRODUCTION

The rise of cities has been well documented (Glaeser, 2011). New transportation technologies have lowered transport costs for goods (though not for people), freeing businesses to more easily move to new locations, to the benefit of some areas and the detriment of others (Glaeser and Kohlhase, 2004; Moretti, 2012). Those lower costs allow movers to pay closer attention to inter-jurisdictional differences in other factors such as public policies. To investigate the importance of policy differences, we examine recent data on population migration and economic policies for U.S. metropolitan areas.

Economists have long identified that individuals will move to governing jurisdictions most amenable to their preferences. Tiebout's (1956) model suggests individuals will "vote with their feet" as long as individuals are mobile and informed, restrictions to employment opportunities are low, and public services provide no spillovers across communities.

Tests and extensions of Tiebout's model abound.[1] Ashby (2007) offered the first paper to explore the relationship between migration within the United States and the presence of policies and institutions that are consistent with economic freedom, using the *Economic Freedom of North America* report, an annual state-level index. We extend that research by focusing on metropolitan statistical areas (MSA's), where data can provide a more granular analysis of the relationship between public policy and migration.

We combine a 1993–2014 unbalanced panel of county-to-county aggregate migration data provided by the Internal Revenue Service (which we cross-walk to the MSA level) with a new economic freedom index (EFI) for U.S. metropolitan areas (Stansel, 2019). We are the first to contribute such a granular and robust multivariate regression analysis of migration and economic freedom at the local level.

Such a unique perspective on migration can yield valuable insight to economists and policymakers alike. Unlike international migration, which has been the focus of most of the empirical literature, the greatest barriers to migrating are mitigated or removed entirely by focusing on intra-country migration. In our U.S. MSA data, all MSAs use the U.S. Dollar. English is the primary language. Social norms and cultures do vary somewhat across MSAs, but the difference in norms and culture is certainly less than the differences across most countries. No barriers to employment are present for most professions. And while the United States is one of the largest countries in geographic area, the distance needed to migrate to another MSA is smaller than the distance in most international migration.

We can even identify individuals that moved to different MSAs within the same state. This further decreases the barriers to move. Stansel's (2019) MSA EFI illustrates that significant heterogeneity exists across MSAs, even within the same state. Midland, TX had one of the highest EFI scores for any MSA (8.5 in 2012), nearly three *SD*s greater than the score of the Brownsville-Harlingen, TX MSA (6.5 in 2012).

What focusing on intra-U.S. migration allows us to do is better isolate the economic factors related to migration decisions. This may be particularly attractive to economists because public policy may be more flexible and amenable to change than other factors.

Overall, we find a positive relationship between economic freedom and migration. A 10% increase in the economic freedom score of a destination MSA, relative to the economic freedom score of an origin MSA, was associated with a 27.3% increase in net migration from the origin

[1]As of the writing of this manuscript, Tiebout (1956) had over 17,000 citations on Google Scholar.

MSA to the destination MSA. At the mean, a 10% relative increase in economic freedom increases net migration flows to the destination MSA by 22 workers per year from each other MSA. Each component of the economic freedom index showed a positive relationship with migration, and push-pull factor estimates displayed a similar positive relationship.

2 | LITERATURE REVIEW

Many studies have used economic freedom indices to explain differences in well-being measures such as income, poverty, and human development. The bulk of this literature uses the country-level *Economic Freedom of the World* (EFW) index, the most recent version published by Gwartney *et al*. (2018). Hall and Lawson (2014) summarize the rapidly growing literature,

> "Of 402 articles citing the EFW index, 198 used the index as an independent variable in an empirical study. Over two-thirds of these studies found economic freedom to correspond to a 'good' outcome such as faster growth, better living standards, more happiness, etc. Less than 4% of the sample found economic freedom to be associated with a 'bad' outcome such as increased income inequality. The balance of evidence is overwhelming that economic freedom corresponds with a wide variety of positive outcomes with almost no negative tradeoffs."

Similarly, the *Economic Freedom of North America* (EFNA) index, most recently published by Stansel *et al*. (2018), has a growing list of citations. Like the country-level literature, about two-thirds of the papers using the state index found it to be associated with positive economic outcomes (Stansel and Tuszynski, 2018). For example, Ashby and Sobel (2008) find that greater levels of economic freedom are associated with lower levels of income inequality in the U.S. states. Karabegovic *et al*. (2003), Compton *et al*. (2011), Wiseman and Young (2013), and Bologna *et al*. (2016) find that the EFNA is positively associated with economic growth. Garrett and Rhine (2011) find that economic freedom positively correlates with employment growth. Kreft and Sobel (2005) and Wiseman and Young (2013) also find that economic freedom is positively associated with entrepreneurial activity across U.S. states. More recently, Hall *et al*. (2019) found that a 10% increase in economic freedom was associated with a 5% increase in real per capita gross state product, after accounting for spatial spillovers.

The migration literature is quite large in its own regard.[2] Clemens (2011) provides a detailed summary of the research with a focus on productivity gains through emigration. Regarding the effect policy plays on migration, the broad findings from the migration literature can be summarized as migrants being attracted to areas with lower living costs, better income prospects, lower taxes, and a warmer climate (Conway and Houtenville, 2001; Chi and Voss, 2005; Cebula and Alexander, 2006; Francis, 2007; Ashby, 2010; Leeson and Gochenour, 2015; Cebula *et al*., 2016).

The overlap of the economic freedom and migration literatures is fairly scarce. Recently, Arif (2020) explored the role of economic freedom, political institutions, and social institutions on *international* migration. Their study used bilateral migration data of 103 countries and PPML estimation method to find that economic freedom has the most substantial pull and push effect on international migration as compared to either political or social

[2]For an interesting discussion of the mass migration in China from unfree rural areas to relatively freer urban areas, see Gardner (2017).

institutions. At the subnational level, Ashby (2007) wrote the seminal empirical paper on intra-U.S. migration and economic freedom. He used cross-sectional data from the early 1990–1995 *Economic Freedom of North America* index to explain state aggregate migration flows from the 2000 U.S. Census. Ashby (2007) found that migration was positively associated with total economic freedom, but not in all model specifications. Disaggregating the index into its primary components, he discovered the reasons for the initially inconsistent results. Where higher spending levels (lower economic freedom scores in the size of government area) were positively associated with migration rates, higher levels of labor market restrictions (lower scores in Area 3—labor market freedom)—were negatively associated with migration. (Note that Ashby used the raw data for the components, for which higher values reflect lower freedom.) The results for taxation were mixed, but they did indicate that a higher top marginal income tax rate (lower freedom scores in the taxation area) was negatively associated with migration.

Cebula *et al*. (2016) extend Ashby's (2007) analysis to explore the pre- and post-recession effects of economic freedom on migration, as well as to incorporate a new index of personal freedoms. Using cross-sectional analysis at the U.S. state level, they find evidence that migrants prefer to move to states affording higher levels of two separate indexes of economic freedom as well as a freedom index that incorporates both economic and personal freedom. Similarly, Shumway and Davis (2016) find that economic freedom is positively associated with migration-related income change at the state level.

Mulholland and Hernández-Julián (2013) also use a cross section of U.S. state data from the 2000 Census, but the authors separate migrants by education level. They find that states with greater overall economic freedom attract individuals with only a secondary education or some college experience, but not those with only an elementary education. States with greater levels of government consumption expenditure experienced a net in-migration of those with college experience and a net out-migration of those with only an elementary education. The opposite was true for government transfer spending (e.g., welfare payments).

More recently, Shumway (2018) extended the state literature by using a previous version (Stansel, 2013) of the local-level index that we use (Stansel, 2019). The analysis primarily consisted of dividing the metro areas into three groups ranked by economic freedom level (high, medium, and low) and taking group averages of the migration of population and income. In the author's own words "A more rigorous modeling approach is needed in order to control for other important variables and determine their relative contribution to variations in spatial mobility." We attempt to provide that more rigorous approach by incorporating other variables that can be associated with migration and by using the new expanded economic freedom index, which allows us to include four years of data rather than only one year.

3 | DATA AND METHODOLOGY

We extend the literature on migration and economic freedom by using data with greater detail and scope. We analyze migration and economic freedom at the MSA level, examining the 382 metropolitan statistical areas as defined in the official 2015 definitions.[3]

[3]We use the 2015 MSA definitions in order to match with those used in our source of economic freedom data (Stansel, 2019). Those definitions can be found here: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/bulletins/2015/15-01.pdf.

Our migration data are a panel of MSA-to-MSA in- and out-migration, which we have produced by aggregating the relevant county-to-county data from the Internal Revenue Service (IRS). Each year, the IRS compiles a single file (the Individual Master File), which contains administrative data collected for every Form 1040, 1040A, and 1040EZ that they process. They estimate this includes data for 95 to 98% of the individual income tax filing population. The IRS then, with the assistance of the Census Bureau, assigns a Zip-4 level geo-code to each individual.

Once the geographic codes are assigned, the Census Bureau determines who in the file has, or has not, migrated by matching returns filed in the current year to those filed the prior year. The return is classified as a "migrant" if the taxpayer's Zip-4 geo-code also changed from one year to the next. The IRS then aggregates these migrants at the county and state level. The IRS then releases the county-to-county and state-to-state aggregates in which a minimum of ten individual tax filers moved. The data are publicly released and include the number of tax filers (we call these workers), number of tax filers plus number of exemptions (total individuals migrated), and the aggregate gross income those migrants reported in that tax year.

In total, our migration data comprise nearly 1.5 million unique county-to-county aggregates. To obtain the MSA estimates, we use the NBER county-to-MSA cross walk. Our unit of observation is those pairs of MSAs. Since our economic freedom (EF) data are only available in five-year intervals, we use five-year averages centered on the EF years (e.g., 1995–1999 migration for 1997 EF). Our migration data limit us to four such five-year averages. After the cross walk and consolidation to four five-year averages, we have 148,204 MSA to MSA migration observations and 33,289 MSA pairs.

Our measure of MSA-level economic freedom comes from Stansel (2019). That work provides an MSA economic freedom index on a scale from 0 to 10, where 10 indicates the most most-free and 0 represents the least least-free MSA. There are three broad areas of this index: government spending, taxes, and labor market freedom. Each area contains three separate variables. The data for each variable is converted to a 0–10 scale and then the three scores are averaged to get an area score. The three area scores are then averaged to get an overall score. The

TABLE 1 Areas and components of the U.S. metro area economic freedom index.

Area 1. Government spending
1A. General consumption expenditures as a percentage of personal income
1B. Transfers and subsidies as a percentage of personal income
1C: Insurance and retirement payments as a percentage of personal income
Area 2. Taxation
2A. Income and payroll tax revenue as a percentage of personal income
2B. Sales tax revenue as a percentage of personal income
2C. Revenue from property tax and other taxes as a percentage of personal income
Area 3. Labor market freedom
3*A. Minimum* wage (full-time income as a percentage of per capita personal income)
3B. Government employment as a percentage of total employment
3C. Private union density (private union members as a percentage of total employment)

TABLE 2 Summary statistics

	(1)	(2)	(3)	(4)	(5)
Variables	***N***	**Mean**	***SD***	**Min**	**Max**
Net migration	148,204	79.09	1,253.69	0.00	262,423.00
Overall EFI gap	147,160	1.00	0.16	0.46	2.21
EFI Area 1 gap	147,160	1.02	0.28	0.16	6.41
EFI Area 2 gap	147,160	1.01	0.18	0.27	3.21
EFI Area 3 gap	147,160	1.01	0.20	0.37	2.79
ln(distance)	148,204	6.42	0.99	2.82	8.55
ln(income gap)	133,156	−0.00	0.26	−1.56	1.56

TABLE 3 Correlation matrix

Net migration	**1.00**						
Overall EFI gap	0.32	1.00					
EFI Area 1 gap	0.21	0.81	1.00				
EFI Area 2 gap	0.26	0.67	0.32	1.00			
EFI Area 3 gap	0.28	0.84	0.56	0.37	1.00		
ln(distance)	−0.08	0.01	0.04	0.01	0.01	1.00	
ln(income gap)	−0.01	0.22	0.12	−0.09	0.43	0.00	1.00

methodology is intended to avoid subjectivity by not weighting individual variables differently. Table 1 lists the nine variables.

Because states differ in how much they decentralize authority, in order to facilitate valid comparisons across metro areas in different states, the index incorporates not only local level data but also state level data. A population-weighted state figure is calculated for those metro areas that cross state boundaries. Due to fiscal data limitations, the index is only available in five-year intervals (years ending in "2" and "7"). We use the most recent four: 1997, 2002, 2007, and 2012. A more detailed discussion of the methodology can be found in Stansel (2019). Table 2 contains our summary statistics. Table 3 provides our correlation matrix. Our data sources are listed in Appendix A.

To estimate the relationship between economic freedom and migration, we follow Nejad and Young (2016) by using a modified gravity model to capture the relationship between economic freedom and migration. We first estimate an OLS and then a Poisson pseudo-maximum likelihood estimator (PPML). We estimate:

$$\text{Net Migration}_{ij,t} = \beta_0 + \beta_1 \text{ Economic freedom gap}_{ij,t} + \beta_2 X_{ij,t} + \beta_i + \beta_j + \beta_t + \varepsilon_{ij,t} \quad (1)$$

where $\text{Net Migration}_{ij,t}$ is the net migration flow from MSA_i to MSA_j at time t defined as:

$$\text{Net Migration}_{ij,t} = \text{Migration}_{j,t} - \text{Migration}_{i,t} \quad (2)$$

And the *Economic freedom gap* shows the difference between economic freedom in the origin and destination MSA and is defined as:

$$\text{Economic freedom gap}_{ij,t} = \left(\frac{\text{Economic freedom }_{j,t}}{\text{Economic freedom}_{i,t}}\right) \tag{3}$$

and $X_{ij,t}$ is a vector of control variables including log geographic distance, and the log of the per capita income difference between the two areas..[4] β_i, β_j, β_t are origin, destination, and time-fixed effects. $\varepsilon_{ij,t}$ is a robust error term that captures the effects of omitted variables and noise.

Because the economic freedom gap is calculated as a ratio, the estimated coefficients can be interpreted as elasticities. If the origin and destination country start with the same economic freedom score, this ratio will be equal to 1; in this case, β_1 indicates the percentage change in the migration flow as a result of 1% increase in destination's economic freedom (Ashby, 2010; Nejad and Young, 2016).

Further, endogeneity is a concern when studying the relationship between institutions and migration, as migrants may influence the institutions of both the origin and destination location (Lodigiani and Salomone, 2012; Docquier *et al*., 2014; Nejad and Young, 2016). While Clark *et al*. (2015) find little empirical evidence that lagged migration affects economic freedom scores, we elect to directly address potential reverse causation by using an instrumental variable approach. We follow Hall *et al*. (2018) and use real GSP from the finance, insurance, and real estate sector GDP per capita as an instrumental variable for economic freedom.

Next, we examine whether there may be a difference between the "push" of low economic freedom and the "pull" of high economic freedom. Instead of using the economic freedom (EF) gap, we include separate variables for the destination EF and home EF. That is, we estimate:

$$\begin{aligned}\text{Net Migration}_{ij,t} = \gamma_0 + \gamma_1 \text{ Economic freedom }_{j,t} + \gamma_2 \text{ Economic freedom}_{i,t} \\ + \gamma_3 X_{ij,t} + \gamma_i + \gamma_j + \gamma_t + \mu_{ij,t}\end{aligned} \tag{4}$$

where j and i subscripts refer to economic freedom index at the destination and home MSA, respectively.

We start with benchmark OLS estimates because we feel a wider audience better understands the OLS coefficients, however, we prefer the Poisson pseudo-maximum likelihood estimator because it has many advantages over ordinary least squares when estimating a gravity model. PPML, a relatively new estimator, is suggested by Silva and Tenreyro (2006) who argue that it has many advantages for estimating the gravity model. First, PPML is a non-linear estimator; thus, we do not take the logarithm of the dependent variable. This way, PPML includes observations with values of zero in the data, whereas OLS discards those (when using logged values). Zero observations with a value of zero may contain some

[4]As Gwartney *et al*. (2006) discusses, economic freedom is expected to have both a direct and indirect impact on economic outcomes like migration. Our results only capture the direct impact (through increasing the relative attractiveness of the area to some residents). The indirect impact on our dependent variable occurs through the impact economic freedom would be expected to have on things like income. Because we control for income, the coefficients on the economic freedom variables understate the overall impact of economic freedom.

vital information about migration flows (Nejad and Young, 2016). Second, PPML is consistent in the presence of fixed effects. Third, although the dependent variable enters in level, the estimated coefficients can be interpreted as elasticities, making the interpretation easier to understand. Finally, Silva and Tenreyro (2011) argue that OLS estimates suffer from heteroskedasticity in the gravity model. This heteroskedasticity originates from the variation in migration flows across pairs of areas, violating the assumption of constant variance in OLS. PPML estimates are unbiased in the presence of heteroskedasticity, as PPML estimation is consistent with the assumption of the underlying RUM model (Silva and Tenreyro, 2011; Nejad and Young, 2016).

Spatial effects may play a role in migration decisions that are not adequately captured by the distance variable we include as an independent variable. We estimate a spatial autoregressive origin–destination gravity model based on LeSage and Pace (2008, 2009). The spatial model takes the form,

$$Ay = \alpha i_{n^2} + X_O\beta_O + X_d\beta_d + g\gamma + \varepsilon \tag{5}$$

$$A = (I_{n^2} - \rho_O W_O)(I_{n^2} - \rho_d W_d) \tag{6}$$

$$W_O = I_N \otimes W \tag{7}$$

$$W_d = W \otimes I_N \tag{8}$$

$$W_w = W_O \otimes W_d = W_d \otimes W_O = W \otimes W \tag{9}$$

The term g represents the $n \times n$ matrix of logged distances. The spatial filter, A, can be viewed as a spatial filter that captures origin-based dependence, destination-based dependence, and origin–destination-based dependence. The model and associated data generating process DGP for the spatial autoregressive interaction model take the form,

$$y = \rho_O W_O y + \rho_d W_d y + \rho_w W_w y + Z\delta + \varepsilon \tag{10}$$

$$Z = (i_{n^2}\, \mathrm{X}_O\, \mathrm{X}_d\, \mathrm{g}) \tag{11}$$

$$y = (I_{n^2} - \rho_O W_O - \rho_d W_d + \rho_w W_w)^{-1}(Z\delta + \varepsilon) \tag{12}$$

4 | RESULTS

Economic institutions are critical factors of migration flows. We hypothesize that migrants will move towards more economically free destinations as they may offer more economic opportunities. We expect $\beta_1 > 0$ in Equation (1). The gap variables are calculated as ratios between the destination and home MSA respective indicator. These estimated coefficients show the estimates of net migration flow with respect to each economic freedom index gap. If the origin and destination MSA start with the identical economic freedom index and the

TABLE 4 OLS estimation results

Variables	(1) ln(net migration)	(2) ln(net migration)	(3) ln(net migration)	(4) ln(net migration)
Overall EFI gap	1.299***			
	(0.198)			
EFI area 1 gap		0.271***		
		(0.070)		
EFI area 2 gap			0.473***	
			(0.129)	
EFI area 3 gap				−0.005
				(0.132)
Ln(distance)	−1.168***	−1.165***	−1.164***	−1.163***
	(0.011)	(0.011)	(0.011)	(0.011)
Ln(income gap)	0.422***	0.641***	0.730***	0.764***
	(0.151)	(0.146)	(0.143)	(0.147)
Observations	27,729	27,729	27,729	27,729
R-squared	0.474	0.474	0.474	0.473
Number of MSA pairs	12,347	12,347	12,347	12,347
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: *SE*s in parentheses. Ordinary least squares estimates.
***$p < .01$.
**$p < .05$.
*$p < .1$.

destination index increases by 1%, we would expect net migration flow to increase by the respective coefficient.

4.1 | OLS: Net migration

We used OLS as our benchmark method and present the results in Table 4. This table shows the log of net migration flow from MSA_i to MSA_j as a dependent variable. Our main explanatory variables, overall economic freedom index gap, Area 1 gap, Area 2 gap, and Area 3 gap, are given in Columns (1)–(4), respectively. All these economic freedom indicators show positive and statistically significant coefficients, indicating that economic freedom differences may be a significant factor in migration flows among MSAs.

In Column (1), EFI gap has a positive coefficient of 1.30. This coefficient indicates that a 10% increase in destination MSA's economic freedom score compared to the originating MSA's economic freedom score, would result in a 13.0% increase in migration from the origin MSA to the destination MSA. Examples of a 10% increase in economic freedom include moving from Detroit

(the 40th ranked MSA of the 52 largest) to Salt Lake City (25th ranked), moving from Seattle (32nd) to Atlanta (14th), and moving from Milwaukee (29th) to Oklahoma City (12th).

Government spending (Area 1) and taxes (Area 2) had a similar positive and statistically significant relationship with migration. It should be noted that an *increase* in those economic freedom scores represents a *decrease* in spending and taxation. A 10% relative increase in a subindex economic freedom score was associated with an increase in migration of 2.7% (government spending) and 4.7% (taxation), respectively. Labor market freedom (Area 3) had no statistically significant relationship with migration.

Geographic distance shows negative and statistically significant coefficient values. This variable indicates the tangible and intangible costs (e.g., residing away from family and friends) of migration and shows that as the distance between MSAs increases, migration flow decreases. Finally, income gap, a measure of the bilateral income gap, shows that migrants tend to move toward destinations with higher per capita income.

4.2 | IV: Net migration

Table 5 presents our estimates in which we use real GSP from the finance, insurance, and real estate sector GDP per capita as an instrumental variable for economic freedom. We include the standard Stock-Yogo first stage F-statistic for instrument strength at the bottom of Table 5. The F-statistic exceeds 25 in all four models, suggesting we can reject that our instrument is weak.

The parameter estimates on economic freedom from the IV approach have the same sign as the corresponding estimates in Table 4 and are all statistically different from zero at conventional levels. The magnitude of the coefficients all increased noticeably (in absolute value), suggesting our estimates in Table 4 may have *underestimated* the impact economic freedom plays in migration decisions. Overall, our estimates appear to be robust to our endogeneity correction.

4.3 | PPML: Net migration

Next, we turn to our preferred approach, the Poisson pseudo-maximum likelihood estimator. Table 6 reports net migration flow as a dependent variable and shows the overall economic freedom index gap, Area 1 gap, Area 2 gap, and Area 3 gap in Columns (1)–(4), respectively.[5] The results indicate that the overall economic freedom index gap, Area 1 gap, and Area 2 gap have positive and statistically significant coefficients. Economic freedom Area 3 has a positive but statistically insignificant coefficient value in Column (4).

Overall economic freedom gap in Column (1) shows an estimated coefficient value of 2.74, indicating that if the origin and destination MSAs start with the same level of economic freedom, and economic freedom at the destination increases by 10%, net migration flows increase by about 27.4%.[6] If we use mean net migration flows (79) as a benchmark, we would expect net migration flows to increase by 22 workers per year from each other MSA.

[5]As described previously, with PPML estimation, although the dependent variable enters in level (rather than being logged), the estimated coefficients can still be interpreted as elasticities.

[6]Recall from the previous section that examples of a 10% increase in economic freedom include moving from Detroit (the 40th ranked MSA of the 52 largest), to Salt Lake City (25th ranked); moving from Seattle (32nd) to Atlanta (14th); and moving from Milwaukee (29th) to Oklahoma City (12th).

TABLE 5 Two-stage least squares estimation results

	(1)	(2)	(3)	(4)
Variables	**IV**	**IV**	**IV**	**IV**
Overall EFI gap	3.215*			
	(1.681)			
EFI area 1 gap		2.511*		
		(1.348)		
EFI area 2 gap			0.966*	
			(0.505)	
EFI area 3 gap				−1.741*
				(0.949)
ln(distance)	−0.368***	−0.380***	−0.308***	−0.234***
	(0.050)	(0.058)	(0.020)	(0.024)
ln(income gap)	−0.926***	−0.820***	−0.405***	0.093
	(0.240)	(0.190)	(0.055)	(0.312)
Observations	26,971	26,971	26,971	26,971
R-squared	0.034	−0.040	0.046	−0.028
No. of MSA pairs	12,138	12,138	12,138	12,138
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
First stage F-stat	45.81	25.61	366.7	114.3

Note: Robust *SE*s in parentheses. Two-stage least squares estimates.
***$p < .01$.
**$p < .05$.
*$p < .1$.

Economic freedom Area 1 and Area 2 show estimated coefficient values of 0.62 and 0.71 in Columns (2)–(3), respectively. If both MSAs start with the same level of economic freedom in Areas 1 and 2, and both economic freedom Area 1 and Area 2 increases by 10%, we would expect net migration to increase by 6.2 and 7.1%, respectively. Using mean net migration flow of 79 workers as a benchmark, this indicates that net migration will increase by 5 or 6 workers (per year from each other MSA). The coefficient on labor market freedom (Area 3) was not statistically different from zero. We explore this result in more detail in Table 7 by separating the push-pull migration factors.

We can compare the PPML results with the earlier OLS results to highlight some key differences. First, PPML estimations are based on 100,000 more observations than OLS estimation because OLS discards from the estimation the observations for which our dependent variable is equal to zero (since we are using the logged values of that variable). Second, the performance of PPML is substantially better, as shown by the much higher values of R-squared.

TABLE 6 PPML estimation results

	(1)	(2)	(3)	(4)
Variables	**Net migration**	**Net migration**	**Net migration**	**Net migration**
Overall EFI gap	2.738***			
	(0.419)			
EFI area 1 gap		0.620***		
		(0.133)		
EFI area 2 gap			0.706**	
			(0.292)	
EFI area 3 gap				0.086
				(0.294)
Ln(distance)	−1.541***	−1.538***	−1.534***	−1.533***
	(0.023)	(0.023)	(0.023)	(0.023)
Ln(income gap)	0.767**	1.227***	1.462***	1.574***
	(0.381)	(0.374)	(0.370)	(0.384)
Observations	133,156	133,156	133,156	133,156
R-squared	0.814	0.816	0.814	0.816
Number of MSA pairs	33,289	33,289	33,289	33,289
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: *SE*s in parentheses. PPML estimates.
***$p < .01$.
**$p < .05$.
*$p < .1$.

4.4 | PPML: Push and pull factors

Our previous results provide insight about the relationship between economic freedom and migration. However, there is no particular reason to prefer our main explanatory variables on a ratio scale. Moreover, migrants evaluate both home and destination area economic factors, while making migration decisions, and our previous model does not isolate those two factors. For example, migrants may also decide to migrate if their home area economic freedom changes (negatively), even if the destination area economic freedom stays the same. In other words, economic freedom differences can both *pull* migrants to move to a destination area and also *push* migrants to *leave* a home area. Therefore, we segregate the home and destination area economic freedom levels and estimate the Equation (4).

Again, our hypothesis for the destination area economic freedom effect is the same as our previous model. Migrants may decide to move toward more economically free destinations as it may provide them more economic opportunities that is, we expect $\gamma_1 > 0$ in Equation (4). However, our hypothesis for the home area economic freedom is opposite. Migrants may decide to

TABLE 7 PPML push-pull estimation results

	(1)	(2)	(3)	(4)
Variables	**Net migration**	**Net migration**	**Net migration**	**Net migration**
Destination overall EFI	0.553***			
	(0.107)			
Home overall EFI	−0.611***			
	(0.105)			
Destination Area 1 EFI		0.389***		
		(0.063)		
Home Area 1 EFI		−0.255***		
		(0.056)		
Destination Area 2 EFI			0.212*	
			(0.116)	
Home Area 2 EFI			−0.243***	
			(0.075)	
Destination Area 3 EFI				0.001
				(0.078)
Home Area 3 EFI				−0.136**
				(0.065)
ln(distance)	−1.535***	−1.534***	−1.533***	−1.533***
	(0.023)	(0.023)	(0.023)	(0.023)
ln(income gap)	0.537	0.546	1.388***	1.515***
	(0.390)	(0.380)	(0.370)	(0.392)
Observations	133,156	133,156	133,156	133,156
R-squared	0.816	0.815	0.816	0.824
Number of MSA pairs	33,289	33,289	33,289	33,289
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: *SE*s in parentheses. PPML estimates.
***$p < .01$.
**$p < .05$.
*$p < .1$.

move away from a home area with bad economic freedom that is, we expect $\gamma_2 < 0$ in Equation (4) since our dependent variable is net migration *to* the destination MSA.

Table 7 presents PPML results for the above model. The push (home) effects of economic freedom are as predicted in each column. A relative increase in the home MSA economic freedom has a negative relationship on net migration to the destination MSA. Home MSA overall economic freedom has the most substantial push effect, and home MSA Area 3 economic freedom has the weakest push effect.

The home (push) overall economic freedom level in Column (1) shows an estimated coefficient value of about −0.61. Similarly, home Area 1, Area 2, and Area 3 coefficients indicate coefficient values of −0.26, −0.24, and − 0.14 in Columns (2)–(4), respectively. All four are statistically significant. This indicates that a 10% increase in an MSA's overall economic freedom score is associated with a 6.1% *decrease* in out-migration of its population.

The destination area economic freedom effects are also consistent with our previous model. Overall economic freedom, Area 1, and Area 2 in the destination MSA pull migrants toward that MSA, shown by positive and statistically significant coefficient values of these variables in Columns (1)–(3). This indicates that a 10% increase in an MSA's overall economic freedom score is associated with a 5.5% *increase* in in-migration of population from other MSA's.

Labor market freedom exhibited only a significant *push* factor, however. The *pull* factor was *not* statistically different from zero. In Table 6, we saw that the combined push-pull effect of labor market freedom was not statistically different from zero and the results from Table 7 may explain this finding.

Workers looking for work or switching jobs may be equally drawn to areas of high labor market freedom as they are drawn to areas with less labor market freedom due to higher perceived wages in areas with higher concentrations of unions, more government workers, and higher minimum wages. Therefore, labor market freedom may have no distinguishable effect. However, artificially higher wages created by unions and minimum wages may create unemployment and fewer job opportunities, which would then create motivation to out-migrate. The net effect is greater push migration from these MSAs with less-free labor markets.

4.5 | Spatial autoregressive origin–destination model

Table 8 displays the results from two spatial autoregressive origin–destination cross section models using data from 1997 and 2012. The signs of the coefficients match those in our previous models. Distance is negative and statistically different from zero. The destination MSA's economic freedom score is positive and the origin MSA's economic freedom score is negative; both statistically different from zero.

In terms of coefficient magnitude, the parameter estimates from the models that includes spatial lags of the dependent variable show a sizable decrease. However, a direct comparison of the magnitudes of the coefficients from least-squares and the spatial model is not valid (LeSage and Pace, 2008, 2009; Thomas-Agnan and Lesage, 2014). In the least-squares models, the coefficients for the rth explanatory variable x_r represents $\partial Y/\partial X_r$. For the spatial lag model, partial derivative impacts arising from a change in the rth explanatory variable involve an N by N matrix of effects.

4.6 | Lagged migration

We recognize that including fixed effects in a panel setting for origin, destination, and time period may still inadequately account for migratory trends. Therefore, we separately estimate our same three models, controlling for lagged migration between the origin and destination MSAs. The coefficient point estimates, thus, represent the marginal effect on the change of migration. We present these dynamic panel results in Tables 1A–4A in Appendix B.

We recognize that dual inclusion of lagged dependent variables and fixed effects may bias estimates. In each specification, lagged migration flow shows a positive and statistically

TABLE 8 Scalar summary measures of effects for the spatial autoregressive cross-section interaction models

Year	1997	2012
Variables	Net migration	Net migration
Dest. Overall EFI	0.02***	0.01***
	(0.00)	(0.00)
Home overall EFI	−0.01***	−0.00***
	(0.00)	(0.00)
Interaction EFI	−0.01	−0.02***
	(0.02)	0.02
ln(distance)	−0.01***	−0.01***
	(0.00)	0.00
ln(Dest income)	0.00***	0.00***
	(0.00)	0.00
ln(home income)	0.00***	0.00***
	(0.00)	0.00
ln(interaction income)	0.00***	0.00***
	(0.00)	0.00
Constant	0.01***	0.01***
	(0.00)	0.00
ρ_o	0.34***	0.31***
	(0.00)	0.00
ρ_d	0.44***	0.44***
	(0.00)	0.00
ρ_w	0.12***	0.11***
	(0.01)	0.01

Note: *SE*s in parentheses.
***$p < .01$.
**$p < .05$.
*$p < .1$.

significant coefficient value. MSA to MSA migration is persistent. Our primary coefficients of interest increase in magnitude compared to those presented in the main text. Two increase in statistical significance; all others maintain the same level. And, all coefficients maintain their same sign (with the exception of a few of the statistically insignificant coefficients). A 10% increase in overall economic freedom was associated with a 43.4% increase in net migration, compared to a 27.4% increase in net migration when we did not account for lagged migration.

5 | CONCLUSIONS

We examine intra-U.S. migration by using a panel of IRS data and a new economic freedom index for metropolitan areas (Stansel, 2019). We find that MSA-to-MSA migration is positively associated with economic freedom. EF Component 1 (Government Spending) and EF Component 2 (Taxation) are positively related to migration in all model specifications and have the

expected push-pull coefficient signs. EF Component 3 (Labor Market Freedom) displayed only a significant positive push factor on migration; no significant pull factor was observed on migration.

Our findings imply that differences in the level of economic freedom may be a significant driver of migration within the United States. Cities that are willing to set policies that enhance economic freedom tended to attract income-earners at the expense of other MSAs pursuing policies providing less economic freedom.

The implications for long-run city development are profound. Applying our point estimates at the mean, a city that increases its economic freedom score by 10% will pull 22 workers *each* year from *each* other MSA. (That 10% increase would be equivalent to moving from Detroit (the 40th ranked MSA of the 52 largest), to Salt Lake City (25th ranked); moving from Seattle (32nd) to Atlanta (14th); and moving from Milwaukee (29th) to Oklahoma City (12th)).With a median annual wage of $47,216,[7] an additional 22 migrant workers would create an aggregate increase of more than a million dollars in adjusted gross income *each year* from *each other* MSA.

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APPENDIX A: DATA SOURCES

MSA-to-MSA Migration:

Calculated by aggregating county migration data to the MSA level using 2015 MSA definitions. Internal Revenue Service, Statistics of Income (SOI) Tax Stats—Migration Data.

https://www.irs.gov/statistics/soi-tax-stats-migration-data

MSA Economic Freedom:

Stansel, Dean. (2019). Economic Freedom in U.S. Metropolitan Areas. *Journal of Regional Analysis and Policy*. 49(1): 40–48.

https://jrap.scholasticahq.com/article/8147-economic-freedom-in-u-s-metropolitan-areas

Distance:

Calculated as average distance among all the counties in MSA_i and MSA_j.

County Distances are great-circle distances calculated using the Haversine formula based on internal points in the geographic area. Counties are from Census 2000 SF1 and Census 2010 SF1 files. The county codes are FIPS County codes. The first two digits of the FIPS county codes are FIPS State codes.

http://www.nber.org/data/county-distance-database.html

Per Capita Income:

Calculated by aggregating county income and population to the MSA level using 2015 MSA definitions and dividing income by population.

County Income:

https://www.irs.gov/uac/soi-tax-stats-county-income-data-users-guide-and-record-layouts

County Population:

http://www.nber.org/data/census-intercensal-county-population.html

2015 MSA definitions.

https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/bulletins/2015/15-01.pdf

APPENDIX B: ALTERNATIVE MODEL SPECIFICATIONS WITH DYNAMIC PANEL MODELS

TABLE 1A OLS estimation results

	(1)	(2)	(3)	(4)
Variables	**Net migration**	**Net migration**	**Net migration**	**Net migration**
Overall EFI gap	1.887***			
	(0.259)			
EFI Area 1 gap		0.319***		
		(0.118)		
EFI Area 2 gap			0.802***	
			(0.151)	
EFI Area 3 gap				0.279
				(0.174)
Migration_t-1	0.069***	0.069***	0.069***	0.069***
	(0.004)	(0.004)	(0.004)	(0.004)
ln(distance)	−1.136***	−1.129***	−1.130***	−1.127***
	(0.013)	(0.013)	(0.013)	(0.013)
ln(income gap)	0.256	0.627***	0.739***	0.675***
	(0.192)	(0.186)	(0.179)	(0.188)
Observations	20,758	20,758	20,758	20,758
R-squared	0.488	0.487	0.488	0.487
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: *SE*s in parentheses. Ordinary least squares estimates.
***$p < .01$.
**$p < .05$.
*$p < .1$.

TABLE 2A PPML estimation results

	(1)	(2)	(3)	(4)
Variables	**Net migration**	**Net migration**	**Net migration**	**Net migration**
Overall EFI gap	4.338***			
	(0.553)			
EFI Area 1 gap		1.771***		
		(0.279)		
EFI Area 2 gap			1.254***	
			(0.323)	

TABLE 2A (Continued)

Variables	(1) Net migration	(2) Net migration	(3) Net migration	(4) Net migration
EFI Area 3 gap				−0.101
				(0.397)
$Migration_{t-1}$	0.013***	0.013***	0.013***	0.012***
	(0.003)	(0.003)	(0.003)	(0.003)
ln(distance)	−1.488***	−1.487***	−1.477***	−1.476***
	(0.028)	(0.028)	(0.028)	(0.028)
ln(income gap)	1.230**	1.629***	2.478***	2.689***
	(0.545)	(0.501)	(0.520)	(0.578)
Observations	99,726	99,726	99,726	99,726
R-squared	0.836	0.846	0.839	0.830
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: *SE*s in parentheses. PPML estimates.
***$p < .01$.
**$p < .05$.
*$p < .1$.

TABLE 3A PPML estimation results

Variables	(1) Net migration	(2) Net migration	(3) Net migration	(4) Net migration
Destination overall EFI	0.869***			
	(0.127)			
Home overall EFI	−1.036***			
	(0.137)			
Destination Area 1 EFI		0.567***		
		(0.080)		
Home Area1 EFI		−0.440***		
		(0.085)		
Destination Area 2 EFI			0.525***	
			(0.107)	
Home Area 2 EFI			−0.399***	
			(0.087)	
Destination Area 3 EFI				−0.048
				(0.101)
Home Area 3 EFI				−0.269***
				(0.077)

(Continues)

TABLE 3A (Continued)

	(1)	(2)	(3)	(4)
$Migration_{t-1}$	0.013***	0.013***	0.013***	0.013***
	(0.003)	(0.003)	(0.003)	(0.003)
ln(distance)	−1.477***	−1.474***	−1.474***	−1.475***
	(0.028)	(0.028)	(0.028)	(0.028)
ln(income gap)	0.760	0.972*	2.299***	2.340***
	(0.534)	(0.506)	(0.513)	(0.548)
Observations	99,726	99,726	99,726	99,726
R-squared	0.845	0.853	0.841	0.838
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: *SE*s in parentheses. PPML estimates.
***$p < .01$.
**$p < .05$.
*$p < .1$.

TABLE 4A OLS estimation results with clustered *SE*s

	(1)	(2)	(3)	(4)
Variables	**Net migration**	**Net migration**	**Net migration**	**Net migration**
Overall EFI gap	1.299***			
	(0.182)			
EFI Area 1 gap		0.271***		
		(0.068)		
EFI Area 2 gap			0.473***	
			(0.116)	
EFI Area 3 gap				−0.005
				(0.125)
ln(distance)	−1.168***	−1.165***	−1.164***	−1.163***
	(0.017)	(0.017)	(0.017)	(0.017)
ln(income gap)	0.422***	0.641***	0.730***	0.764***
	(0.133)	(0.128)	(0.124)	(0.128)
Observations	27,729	27,729	27,729	27,729
R-squared	0.474	0.474	0.474	0.473
Origin FE	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: Robust *SE*s clustered at the MSA pair level in parentheses.
***$p < .01$.
**$p < 0.05$.
*$p < 0.1$.