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Baumol's migrants: Productive and unproductive entrepreneurship and between-MSA migration ☆

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ABSTRACT

William Baumol proposes that there are two types of entrepreneurship: productive or unproductive. Productive entrepreneurship, characterized by innovation and efficient resource allocation, fosters economic growth and can act as a potent magnet for migration. Conversely, unproductive entrepreneurship, which often involves rent-seeking and regulatory circumvention, deters migration and potentially provokes out-migration. To test this link from the types of entrepreneurship and migration, we use a new index of entrepreneurship (productive and unproductive) in conjunction with a dataset covering migration to and from Metropolitan Statistical Areas (MSA) from 2005 to 2019. Our analysis reveals that regions high in productive entrepreneurship experience significant net in-migration, while those dominated by unproductive entrepreneurship see the opposite effect.

1. Introduction

Given relatively low migration costs, citizens will "vote with their feet". This has long been understood and studied, largely due to the seminal work of Tiebout (1956). Numerous studies have followed on the determinants of migration. We propose analyzing a previously unexplored determinant of migration: productive and unproductive entrepreneurship. The former drives economic growth through innovation and efficient resource allocation, while the latter involves entrepreneurs dedicating resources to circumvent regulations or engage in rent-seeking activities (Baumol, 1996; Baumol et al., 2013; Kirzner, 1973, 2002, 1985).

The two different types of entrepreneurship may have distinct impacts on incentivizing migration via pull and push factors. The former could encourage (pull) individuals to relocate for multiple reasons. One important channel is through the positive spillovers generated by innovation—benefits that either were not anticipated by the original innovator or were not fully appropriated, even if foreseen (Nordhaus, 2004; Buchholz, 2021). For example, an innovative firm in a given area can attract smaller firms that provide services to it. The result is a denser (and more competitive) labor market with lower search costs for employees, greater quality job matches and greater opportunities for learning (Puga, 2010). The attractiveness of the area as a place to live and work rises. New residents are drawn in—even if they are not interested in working for the innovative firm itself.

In contrast, the latter might deter in-migration and encourage out-migration (push people out). The reason is that unproductive entrepreneurship fits the bill for rent-seeking. In that case, the entrepreneur seeks to appropriate all the rents possible

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from government-legislated privileges. No spillovers exist, which limits the attractiveness for others to come. Moreover, while unproductive entrepreneurship might attract high-ability rent-seekers to an area, other workers with low abilities in rent-seeking but higher abilities in other skills refuse to come—or, if they are already in the area, they might leave (Mariani, 2007; Peng, 2009; Holcombe, 2018).

In other words, all else equal, regions characterized by productive entrepreneurship are more likely to experience net in-migration, while those dominated by unproductive entrepreneurship are more likely to experience out-migration—or, at best, stagnation. This is the hypothesis we set out to test.

In testing this hypothesis, we make four key innovations. First, to our knowledge, we are the first to formally examine this relationship in the context of within-country migration. To do so, we construct a novel index that captures productive, unproductive, and net productive entrepreneurship. Second, in doing so, we depart from prior studies that rely on institutional proxies such as economic freedom (Ashby, 2007; Arif et al., 2020; Cardazzi and Lawson, 2023). While institutions may influence entrepreneurial activity, it is the type of entrepreneurship that ultimately shapes expectations about the returns to migration. The third improvement from our work is that we are able to separate migration by different demographic characteristics, like age, education, and employment status (self-employed and non-self-employed).

The fourth and final innovation of our research is that our dataset is at the level of Metropolitan Statistical Areas (MSA) from 2005–2019, providing advantages over much of the previous literature. Previous studies used states as units of analysis which left out the possibility of intra-state migration. Because the vast majority of states have multiple MSAs, we capture a degree of intra-state migration.[1] This is especially beneficial for large states with large differences in the entrepreneurial environment. For instance, within California, Sacramento, Los Angeles, and San Francisco score quite low in productive entrepreneurship, while San Jose always ranks as one of the most productive climates.

Using panel instrumental variables (IV) on all MSA-pairs over the 2005 to 2019 period (excluding COVID-19-related issues), our findings reveal that a productive entrepreneurial ecosystem is a strong overall positive predictor of net migration (a "pull" factor). Consistent with our theory, we also find evidence that regions with more unproductive entrepreneurial climates repel migrants (a "push" factor).

To reflect the role of different propensities to migrate based on age or education, we also test the impact on net migration among those aged 25–54, younger than 25 years old, 55 years old or older, with a college degree, with a high school degree or less, who are self-employed, and non-self employed. Our results hold for every sub-section we assessed, with the smallest marginal "pull" effect on workers who are self-employed. Self-employed individuals often have business licenses or an established customer base in the origin area, leading to higher migration costs relative to the non-self employed. Similarly, unproductive entrepreneurship is a negative and statistically significant "push" factor for several groups including college educated, non-self-employed works, and older individuals.

We further review the literature in the next section. We explain the data and our methods in Section 3. Our results are reported in Section 4, and we conclude in Section 5.

2. Background

Migration decisions are guided by pull and push factors. Highly dynamic areas offer greater chances at upward income mobility and thus act as a pull factor all else being equal. In contrast, stagnating or declining areas produce push factors.[2] These relative differences in dynamism complement the effect of local amenities (e.g., climate, public goods provisions etc.).[3]

The idea that highly-dynamic areas can attract people can be tied easily to the distinction between the productiveness of different types of entrepreneurship. In Baumol (1996) and Baumol et al. (2013), productive entrepreneurship leads to new products and services, new production techniques and greater specialization which enhance consumer welfare and productivity. In Kirzner (1973, 1985), the equivalent is the alert entrepreneur who discovered allocatively superior ways of arranging inputs and outputs (which pushes out the production frontier). Conversely, Baumol's unproductive entrepreneurship is about exploiting legal advantages and privileges that create no wealth and may even destroy it. In Kirzner, the analogous concept is the superfluous entrepreneur who expends resources to rent-seek or circumvent regulations—which ultimately reduces the production frontier (Czeglédi, 2014; Belzile et al., 2022).

One reason productive entrepreneurship significantly influences migration is its strong link to innovation. In environments where innovation thrives, there are often substantial spillover—benefits that extend beyond the innovators themselves. These spillovers mean that a large share of the returns from innovation are captured by non-innovators—either because other firms can benefit by increasing their productivity (boosting labor demand) or because other entrepreneurs can build upon innovation by tinkering on the margin (Nordhaus, 2004; Buchholz, 2021).

[1] Moreover, exploring these effects at the local level mitigates concerns about the migration costs, as opposed to across countries, where different factors like immigration restrictions exist.

[2] Declining or stagnating areas are dubbed "zombies" by Pritchett (2006) since nothing other than out-migration can prevent a fall in future living standards.

[3] Richard Cebula in particular has done much work in this space. Between 2000 and 2004, Cebula and Alexander (2006) find that people are more likely to move to states with higher median family income, higher previous growth in employment, warmer temperatures, and more government spending (state and local) on primary and secondary education. Factors that "push" individuals to other states over this time period include higher cost of living, hazardous waste sites, and higher individual income tax burdens. This aligns with his previous work over a slightly earlier time period (see Cebula, 2005), where income per capita, warmer temperatures, sunshine, and amenities such as parks and recreation increase migration to a state; crime rate, hazardous waste sites, and cost of living push people away from a state.

One example of a spillover is that innovative firms attract new firms that provide complementary outputs or higher-quality inputs to the innovators. The result is a thicker labor market with lower search costs, higher-quality job matches, and better opportunities for learning (Puga, 2010).[4] This helps explain results such as those of Costa and Kahn (2000), who show that dual-college-educated couples are increasingly concentrated in the largest metropolitan areas, which have thicker labor markets. Such couples face co-location constraints, and large cities offer thicker labor markets that improve the odds of both spouses securing suitable employment. In other words, by attracting more firms to an area, productive entrepreneurship leads to thicker labor markets, which in turn fuel further migration. In the process of creating thicker labor markets, these areas may also offer more opportunities for training and learning among less experienced workers (Glaeser, 1999), such that younger individuals increasingly move to these cities and form families there.[5]

Income and economic growth are also strong mechanisms for driving migration, as more productive and innovative areas experience increases in income, wealth accumulation, and more frequent investment into public and private ventures (Sobel, 2008). Areas with high levels of productivity are both more affluent and have higher rates of year-to-year economic growth. This economic growth and productive entrepreneurial environment, and the lack of growth in unproductive areas, influence amenities, income, and trends that are also related to the push and pull factors behind migration. These trends are not a unique experience for the United States, as there are several examples of international level linkages between economic growth and migration (Kreft and Sobel, 2005; Sobel, 2015).

In contrast, unproductive entrepreneurship (or the superfluous entrepreneur) is about securing rents that are largely if not wholly appropriated by the rent-seeking entrepreneurship. Little or no spillovers exist. Consequently, there are far smaller returns to migration. In fact, the very goal of unproductive entrepreneurship is to prevent entry—something that newcomers to a particular area could provide. Moreover, unproductive entrepreneurship can act as a type of "negative" spillover that deters migration. A highly rent-seeking environment reallocates talent away from productive sectors and discourages high-ability individuals whose comparative advantage lies in innovation or production. It does, however, recompense high-skill in rent-seeking.[6] Intuitively, the returns to rent-seeking can outweigh those of productive activity in a given area (Mariani, 2007; Peng, 2009). This depresses local productivity, which on its own can incentivize out-migration toward regions with less unproductive entrepreneurship. More importantly, it disproportionately lowers the relative returns to high-skill individuals who lack the political networks or political capital — that is, the specific skills required for rent-seeking contests — to compete effectively in such environments. An ambiguous effect may arise: regions characterized by unproductive entrepreneurship might attract high-skill rent-seekers from elsewhere, such that measures of unproductive entrepreneurship could be associated with offsetting — and potentially even dominant — in-migration.

The most analogous work to ours is Arif et al. (2020). They found that economic freedom — an indicator of institutional quality strongly related with economic dynamism — is a strong predictor of migration choices. Their findings suggest that a 10 percent increase in economic freedom in the destination MSA (relative to their origin MSA) increases net migration by 27.4 percent; at the mean level of net migration, this corresponds to 22 individuals per year from each other MSA. Also related (but less so) is the state-level analysis of Ashby (2007) who finds that economic freedom is positively correlated with net migration flows. However, states with smaller governments (more economic freedom) were negatively correlated with net migration rates; areas with fewer labor market regulation were positively associated with migration. Similarly related is Cardazzi and Lawson (2023) who use one-way rental truck fares for a cross-section of 378 cities within the United States and find that economic freedom in the destination city increase prices (i.e. greater demand to move to better places).

The downside with these earlier analogous studies is that they use institutional factors proxied by measures of economic freedom. While it is reasonable to use such proxies — since economic freedom clearly influences the prevalence of different types of entrepreneurship — there are downsides. An obvious, if somewhat ungenerous, objection is that individuals considering migration are unlikely to consult indexes of economic freedom.[7] The immediate follow-up regarding this reply about proxy relevance is that what truly matters for potential migrants is their expected return from migration. The automatic implication is that a better proxy exists.

We argue that the entrepreneurial environment serves as a superior proxy—one that more directly captures the expected returns to migration. That superior proxy is now available, as we discuss below, thanks to the work of Callais et al. (2025). The indexes they

[4] Another spillover is that a surge in productive entrepreneurship can attract other innovators and promote innovation among the local population. For example, inventors are more likely to cite local patents than distant ones, suggesting that knowledge spillovers are geographically concentrated (Araki et al., 2024; Wagner and Bologna Pavlik, 2020; Jaffe et al., 1993). Local populations may thus be incentivized to innovate by recombining ideas, even across less-related industries than the one driving the surge (Koppl et al., 2023). By fostering innovation, these dynamics can attract other skilled workers from elsewhere by offering higher returns to their abilities. These returns are not entirely appropriated by the original firm that sparked the surge. In that sense, the effect constitutes a spillover.

[5] This may also be tied to why workers in large cities exhibit a wage premium even after controlling for ability—one that persists even after they move elsewhere (Glaeser and Maré, 2001). In our context, workers present in a city following a surge in productive entrepreneurship would benefit from better work experience, driven by higher-quality job matches. This would raise the return to a unit of experience (e.g., a year) relative to that of workers elsewhere. At the same time, the observed premium among incumbent workers could attract new workers who wish to increase their earnings.

[6] This is analogous to Holcombe (2018) who speaks of "political entrepreneurs". Just as market entrepreneurs reduce transaction costs in markets (e.g., making trade easier, coordinating resources), political entrepreneurs reduce the costs of organizing rent-seeking coalitions.

[7] We say "ungenerous" because migrants may consider certain institutional features that reflect the provision of public goods (Tiebout, 1956), tax rates (especially for superstar workers with rare skills—see Kopkin (2012) for example), business regulations, or occupational restrictions relevant to their profession. Indeed, both Baumol et al. (2013) and Kirzner (1973) assign an important role to institutions in shaping the composition of entrepreneurial activity—lending some weight to the validity of economic freedom as a proxy.

produce remedy this issue by directly measuring productive (venture capital, firm growth, patents) and unproductive (lobbying and poor legal system quality) entrepreneurship at the MSA-level from 2002–2019. As such, we can directly look at migration between pairs of MSA and the difference in the types of entrepreneurship that prevail. As such, using the productive and unproductive entrepreneurship indexes addresses this particular reply.

A more generous reply regarding the limitations of using economic freedom as a proxy is that it may have an *independent* effect on migration. That effect is separate from that of productive or unproductive entrepreneurship. Incorporating measures of entrepreneurial types alongside economic freedom thus strengthens and extends earlier studies.

This also helps address a final complication: the effects of different types of entrepreneurship on net migration may be ambiguous in two ways. First, while productive entrepreneurship more clearly attracts migrants, unproductive entrepreneurship could either attract or repel them, as we argue above. A clear illustration is the growth of capital cities, which may expand alongside government as they attract a mix of individuals—including rent-seekers (Sobel and Garrett, 2002; Garrett and Kolesnikova, 2019). This possibility aligns with the logic of Mariani (2007) and Peng (2009), whose arguments, when extended to subnational contexts, suggest a potential regional concentration of high-skill rent-seekers. These considerations underscore the importance of distinguishing between different types of entrepreneurship—and the types of migration they induce. Second, both types of entrepreneurship — productive and unproductive — can coexist within a given area, potentially offsetting each other in the aggregate. For instance, a region may experience strong innovative activity while simultaneously hosting entrenched rent-seeking behavior that deters competition or reallocates resources toward unproductive channels. This dualism reinforces the need to build upon previous studies by using economic freedom and the different types of indexes of entrepreneurship.

3. Data and methods

3.1. Data

Our main independent variables of interest are productive and unproductive entrepreneurship. We utilize the Net Productive Entrepreneurship (NPE) index compiled by Callais et al.'s (2025) extension on Sobel's (2008) work, which measured entrepreneurship at the state level in 2000. It measures productive and unproductive types of entrepreneurship across 381 MSAs annually from 2002 through 2019.

The index offers two key advantages. First, by using MSAs, it implicitly acknowledges the regional (e.g., San Jose, CA which scores among the highest on the index for net productive entrepreneurship) rather than statewide nature (e.g. California) of productive entrepreneurship. Similarly, unproductive entrepreneurship occurs in certain key regions (e.g., capital cities where rent-seeking efforts through lobbying occurs) (Campos and Giovannoni, 2007; Mayer et al., 2017; Garrett and Kolesnikova, 2019). Second, it separates the productive and unproductive entrepreneurship as two things that can co-exist rather than be a value on a spectrum.

The productive entrepreneurship index, PEI, is built using measures of venture capital expenditures per capita, the growth rate in the number of sole proprietors, the number of patents awarded, the number of patent applications,[8] the total birth rate of establishments, and the birth rate of large firms. The unproductive entrepreneurship, UEI, includes the number of lobbying establishments, employment in lobbying firms as a share of total employment, and the U.S. Chamber of Commerce's State Liability Systems.[9] Each variable is standardized using the equation:

$$Z_{it} = (Y_{it} - MeanY_i)/(StdDevY_i), \tag{1}$$

where Z is the standardized score for each indicator variable (e.g., patent rates and lobbying employment). Thereafter, the variables that are measures of productive and unproductive entrepreneurship are averaged to obtain the PEI and UEI. Higher scores correspond to more productive and unproductive MSAs, respectively. For illustration, San Jose, CA in 2013 has the highest PEI score (6.475), while Carson City, NV in 2003 has the lowest PEI (−1.192). This implies that San Jose in 2013 was almost 6.5 standard deviations above than the average MSA. For the UEI, Corpus Christi, TX in 2003 is the *most* unproductive entrepreneurial area in the sample (9.639), while the minimum (or least unproductive) area is Dover, DE (−0.904).

There is substantial variation across MSAs, but also within MSAs located in the same state, justifying our assessment of migration flows at the MSA-level. Again, take California as example: San Jose had an average NPE score of 3.139 whereas Los Angeles was over five standard deviations to the left, with a score of −2.924. The vast majority of the other MSAs in California had an average NPE score between 0 and −1. This is true for multiple other states (e.g., New York, Texas, etc.) and across states as well. Along with variation across geographic areas, there is a large amount of variation across time. While the average change from 2002–2019 is just −0.05, the standard deviation is 0.56. For example, Greenville, SC had a change of −3.637, while Utica, NY and St. Cloud, MN had the largest positive changes in NPE (4.017 and 3.242, respectively). Since our dependent variable is migration between pairs of MSA (see more below), our independent variable is difference in PEI and UEI between origin MSA and destination MSA.

The migration data are constructed from the annual 1% American Community Survey (ACS) samples available through IPUMS, USA. Survey respondents report whether they changed residences in the past year and where those residences are located. Beginning

[8] The United States Patent and Trademark Office finds that only near-half of all patent applications are actually awarded a patent, so omitting applications may underestimate local innovation.

[9] This measure is from the U.S. Chamber of Commerce's Institute for Legal Reforms resulting from survey data of around 1300 experts general counsels, senior-level attorneys, and senior executives at large companies. The surveys were conducted in 2002–2008, 2010, 2012, 2015, 2017, and 2019. Callais et al. (2025) linearly interpolates the missing years.

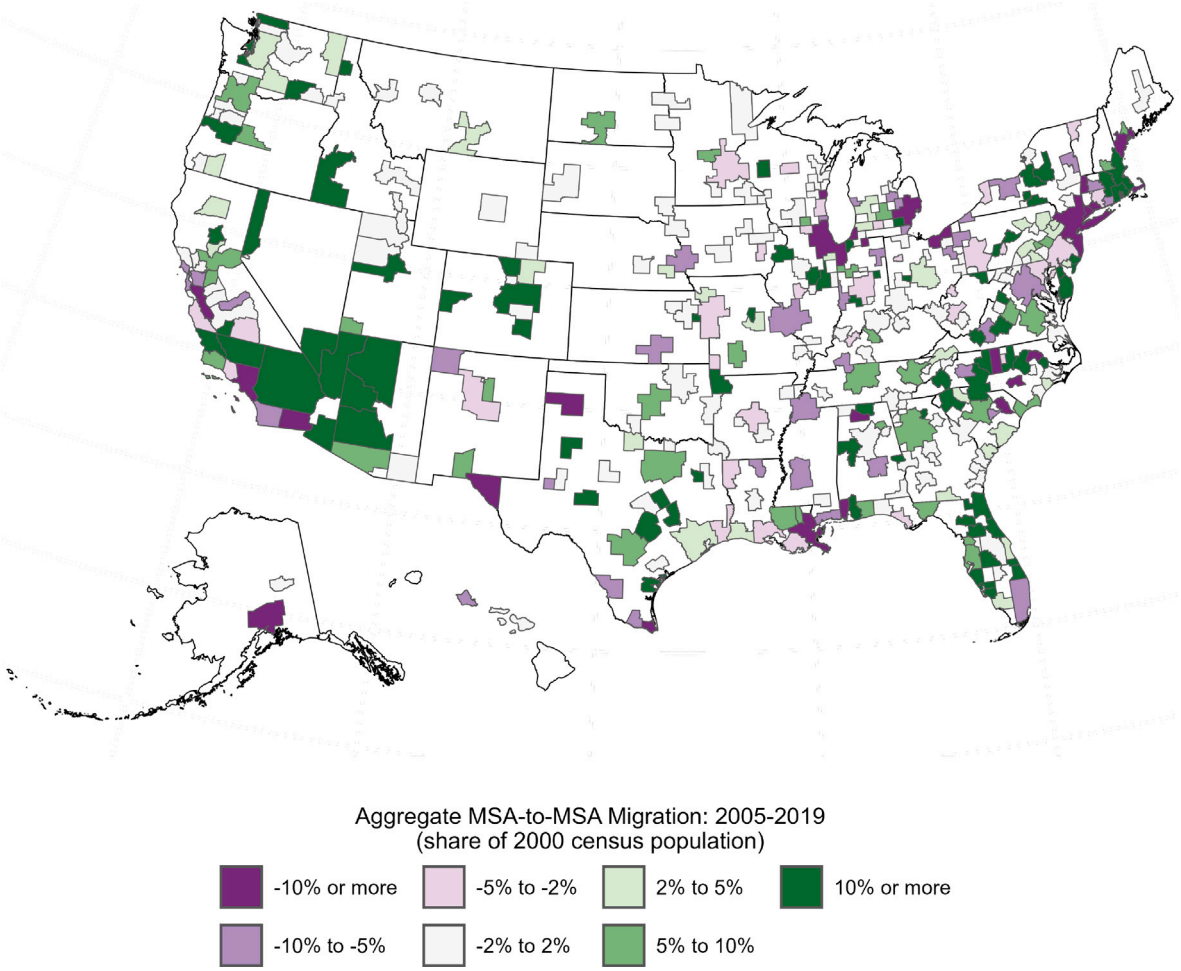


Fig. 1. Aggregate MSA-to-MSA migration flows: 2005–2019.

in 2005, the lowest level of geography reported in the data are at the MSA dimension. Since the productive and unproductive entrepreneurship indices are only available at the state or MSA dimension, our analysis is limited to MSA-to-MSA flows. This means that we are not capturing migration from foreign countries to states or MSAs, nor do our figures reflect rural to urban migration (or vice versa) either within or between states. Naturally, we also omit moves that occur within the same MSA.

Relative to other sources of subnational migration data in the United States, such as the Internal Revenue Service's Statistics on Income migration data, the American Community Survey (ACS) samples also capture a rich set of demographic related characteristics on migrants including, for instance, age, education level, and employment type.[10]

Because the focus of our analysis is on the role *relative* differences in productive and entrepreneurship shape region-to-region migration, it is important to note that our migration figures are not measuring *total* migration to a region inclusive of all people. Most notably, foreign immigration and rural-to-urban migration — both within and across states — are excluded because measures of productive and entrepreneurship are unavailable for those geographic areas.

Fig. 1 shows aggregate net MSA-to-MSA migration flows over our full sample period (2005–2019) relative to the region's 2000 decennial census population. As is evident, there is considerable heterogeneity across regions, with MSAs in the southern part of the United States tending to experience the largest region-to-region gains. Many of the MSAs that have experienced the largest aggregate MSA-to-MSA population losses during the sample, such as Detroit, Cleveland, Chicago, are located in the midwest (or industrial heartland). More generally, the trends in region-to-region migration mimic the broader trends with domestic and international migration over the past few decades (Molloy et al., 2011).

[10] The Internal Revenue Service (IRS) migration figures are based on changes in the primary address on annual tax return filings. The number of returns filed is a proxy for the number of *households* that relocate, while the number of exemptions claimed is a proxy for the number of individuals who move. An advantage of these data is that they are available at the county dimension for a longer period of time. A major limitation is that no demographic information on the filers is available. See Arif (2025) for more details on the IRS data.

Given the variation in MSA-to-MSA migration flows and rates — they are over-dispersed because the variance is greater than the mean — we use an inverse hyperbolic sine transformation in the empirical specifications. We do this instead of transforming the variable by taking the natural logarithm, since logging the variables requires strictly positive values, meaning we could not include zero or negative values without employing an *ad hoc* transformation.[11] This is a common approach in the migration literature (Mullins and Bharadwaj, 2021; Hean et al., 2019; Wilson, 2021; Eyer et al., 2018).

For each MSA pair, we study the net migration between origin and destination. We use overall net migration as our main specification. However, we also split the dependent variable seven different ways. We assess net migration among those that are "prime working age" (25–54 years old), where the net present value of moving to an area is highest. We also include this measure for those who are younger than 25, and migration patterns of those 55 years or older. We also include only those with college education, as well as those with just a high school degree or lower. Finally, we examine net migration between those that are self-employed and those who are not.

These breakdowns are based on certain key observations in the literature on migration. It is expected that younger individuals, or those in prime working-age, can best take advantage of a productive entrepreneurial area. This is especially true for the college educated. High quality of life amenities (cultural and recreational) lowers out-migration for young, college-education individuals (Whisler et al., 2008; Molloy et al., 2011). Younger individuals with high levels of education also tend to move with higher quality business environments (Chen and Rosenthal, 2008) (i.e., places with higher PEI), while couples near retirement-age move to places with more amenities. Similarly, self-employed workers are expected to be less likely to move. Because of these group-specific propensities to migrate, it is reasonable to attempt separate estimations.

In terms of controls, Whisler et al. (2008) shows that college-educated individuals tend to prefer places with greater safety and warmer climates which would entail using "geographic" amenities. We also include controls for median home price (in 100,000 s) from the American Community Survey which is a proxy for local cost of living differences (Cebula, 2005; Cebula and Alexander, 2006; Cebula, 2014; Zabel, 2012). From the Bureau of Economic Analysis, we use differences in real per capita income (in 10,000 s) to reflect differences in living standards. From NBER's TAXSIM, we also use the marginal tax rate for an individual earning $75,000 a year.

We also add year-fixed effects. This is motivated by Olney and Thompson (2024) who find a trend towards less internal migration in the United States. Furthermore, times of crises like the Great Recession (included in our period) can help explain the decline in internal migration over time (Molloy et al., 2011). This aligns more broadly with findings that suggest migration is procyclical (Greenwood et al., 1986; Pissarides and Wadsworth, 1989) which motivates the use of year-fixed effects. Fixed effects for the origin and destination MSA are also included.

There is also evidence that diversity, particularly through immigration, tends to enhance entrepreneurship by introducing varied skills, perspectives, and knowledge that create new combinations and opportunities for innovation (Azoulay et al., 2022; Edo and Rapoport, 2019; Ottaviano and Peri, 2012). As one example, Azoulay et al. (2022) find that immigrants are more likely to expand local labor demand through entrepreneurial activities than natural-born citizens. To control for differences in diversity across MSAs, we re-construct the U.S. Census Bureau's measure of ethnic diversity using data from the American Community Survey. The index, which varies from 0 to 100, captures the probability that two individuals selected at random will be from different ethnic groups, with higher values indicating more diversity.[12] Over our sample period, the average MSA ethnic diversity index value was 43.01, ranging from a low of 9.35 in Laredo, TX to a high of 76.29 in Kahului–Wailuku–Lahaina, HI.

It is also important to adjust for other regional factors and general economic dynamism that can drive job growth and attract (or repel) migrants apart from productive and unproductive entrepreneurship. Entrepreneurship is an important growth-enhancing component (Galindo and Méndez-Picazo, 2020; Acs et al., 2012), but is not the only factor. We include four variables to adjust for the local economic climate and dynamism that could attract (or repel) migrants. First, we include the MSA's unemployment rate. Next, we leverage the Census Bureau's Business Dynamic Statistics database and include the region's job creation rate, job destruction rate, and the (job) reallocation rate. The reallocation rate is a commonly used metric for local dynamism because it captures the flow of jobs across different establishments (Albrecht and Decker, 2024). All else equal, we expect higher rates of job creation to attract migrants and higher levels of job destruction to repel migrants.

Finally, we include a state-level economic freedom score from Stansel et al. (2023). The rationale for utilizing the economic freedom score stems from earlier studies which suggest that these scores, by reflecting the quality of local governance, are positively correlated with net migration (Arif et al., 2020). Higher scores typically indicate a more favorable environment, thereby attracting

[11] The inverse hyperbolic sine transformation, defined as $\sinh^{-1}(x) = \ln\left(x + \sqrt{x^2+1}\right)$, is a useful alternative to using the natural logarithm plus one when in presence of a zero. For long, the common practice was to employ the *ad hoc* adjustment $\ln(x+1)$ to log variables that are non-negative but include zeros. This can distort interpretation and introduces biases when x is small because the +1 introduces a kink at zero. In contrast, the inverse hyperbolic sine retains the log-like behavior and is smoothly defined for *all* real numbers (positives, zeros and negatives). As a result, it provides a more robust and theoretically justified way to handle zeros without dropping observations or distorting scale. In the process, it also addresses over-dispersion by compressing the scale of extreme values (which, by definition, also compresses the variance). Ultimately, it allows one to estimate elasticities and semi-elasticities with greater quality (Bellemare and Wichman, 2020). In our case, the usual *ad hoc* transformation of adding +1 before applying the logarithm only addresses the presence of zeros. It fails to accommodate negative values in net migration. Given these issues, the inverse hyperbolic sine is clearly superior alternative for our context.

[12] The diversity index is calculated as one minus the sum of squared population proportions (expressed as decimals) from eight different (non-mutually exclusive) ethnic categories available to survey respondents. The categories include white alone, not Hispanic; Black/African American alone, not Hispanic; American Indian/Alaska Native alone, not Hispanic; Asian alone, not Hispanic; Native Hawaiian/Pacific Islander alone, not Hispanic; Some other race alone, not Hispanic; Two or more races, not Hispanic; Hispanic or Latino (of any race). For more information on the index, see https://www.census.gov/newsroom/blogs/random-samplings/2021/08/measuring-racial-ethnic-diversity-2020-census.html [accessed: 5/5/2025].

Table 1
Descriptive statistics and data sources.

Variable	Mean	StdDev	Min	Max
Overall net migration rate	0.000	2.040	−12.451	13.487
Under 25	0.000	1.592	−10.917	12.591
55 & older	0.000	1.115	−9.758	11.633
25–54	0.000	1.616	−11.208	12.581
College	0.000	1.405	−10.736	11.345
High school	0.000	1.585	−10.976	12.604
Self employed	0.000	0.713	−9.842	9.843
Non-self emp	0.000	2.020	−12.195	13.362
Productive entrep.	0.000	0.337	−3.407	3.317
Unproductive entrep.	0.000	0.337	−9.209	8.462
Per capita personal income	0.000	0.315	−3.912	3.536
Median home price	0.000	0.004	−0.033	0.033
avg high temperature	0.000	0.082	−0.951	0.888
Marginal income tax rate	0.000	0.008	−0.095	0.108
State economic freedom	0.000	0.329	−2.050	1.601
Ethnic diversity index	0.000	2.453	−20.661	25.025
Job creation rate	0.000	2.154	−24.081	24.038
Job destruction rate	0.000	2.348	−24.955	30.974
Reallocation rate	0.000	3.343	−37.292	35.559
Unemployment rate	0.000	0.013	−0.106	0.110

Notes: All variables are measured and reported as the difference between origin and destination. Net migration figures are per 1,000,000 (destination) residents and transformed using the inverse hyperbolic sine to reduce dispersion. Migration figures were constructed from the 1% American Community Survey annual samples provided by IPUMS USA (https://doi.org/10.18128/D010.V16.0). Per capita income and the unemployment rate are from the Bureau of Economic Analysis and Bureau of Labor Statistics, respectively. Median home prices are from the 5-year American Community Survey samples. The ethnic diversity index was constructed from data from 5-year American Community Survey samples. The job creation rate, job destruction rate, and reallocation rate are from the Census Bureau's Business Dynamic Statistics database. State marginal income tax rates are for a household with $75,000 in taxable income and are from NBER's Taxsim. State economic freedom indices are from the Fraser Institute. Average high temperatures are from the National Oceanic and Atmospheric Administration's Global Historical Climatology Network daily database. Finally, the productive and unproductive entrepreneurship indices are from Callais et al. (2025).

greater migration. While we use MSA-level migration and entrepreneurial scores, the MSA-level economic freedom index is available only every 5 years, so we would be left with only 3 years (2007, 2012, and 2017). The fear of losing multiple years (and the associated datapoints) motivates our use the state-level index. We assign the state-level score to an MSA; when the MSA consists of two or more states, we assign the most populous state.[13] Table 1 provides a description of our variables. We visually represent average PEI and total net migration flows over our sample in Fig. 2.

3.2. Methods

Given the evidence, such as Azoulay et al. (2022), Edo and Rapoport (2019) and Ottaviano and Peri (2012), that immigrants affect local entrepreneurial ecosystems, we pursue an instrumental variables strategy to explore a causal link between productive/unproductive entrepreneurship and net migration.

If one allows both productive and unproductive entrepreneurship to be endogenously determined with net migration rates, this system of equations can be expressed as:

$$\text{NetMigration}_{nmt} = \beta_0 + \beta_1 \text{PEI}_{nmt} + \beta_2 \text{UEI}_{nmt} + \beta_3 \text{X}_{nmt} + \mu_m + \lambda_n + \tau_t + \epsilon 1_{nmt} \tag{2}$$

$$\text{PEI}_{nmt} = \alpha_0 + \alpha_1 b_{1nmt} + \alpha_2 b_{2nmt} + \alpha_3 w_{1nmt} + \alpha_4 w_{2nmt} + \alpha_5 \text{X}_{nmt} + \mu_m + \lambda_n + \tau_t + \epsilon 2_{nmt} \tag{3}$$

$$\text{UEI}_{nmt} = \gamma_0 + \gamma_1 b_{1nmt} + \gamma_2 b_{2nmt} + \gamma_3 w_{1nmt} + \gamma_4 w_{2nmt} + \gamma_5 \text{X}_{nmt} + \mu_m + \lambda_n + \tau_t + \epsilon 3_{nmt} \tag{4}$$

[13] It is important to note that there is variation in economic freedom within states. The most obvious case is California, where San Jose, CA has an MSA-level economic freedom score of 6.25 in 2017 (ranked 241 of 383), while El Centro, CA has a score of just 3.31 (ranked last). Other MSAs in California, like Riverside, Los Angeles, and Sacramento have scores of less than 6. While there is important variation within states, the loss of sample size (near 80 percent) would not justify including MSA-level in the main results.

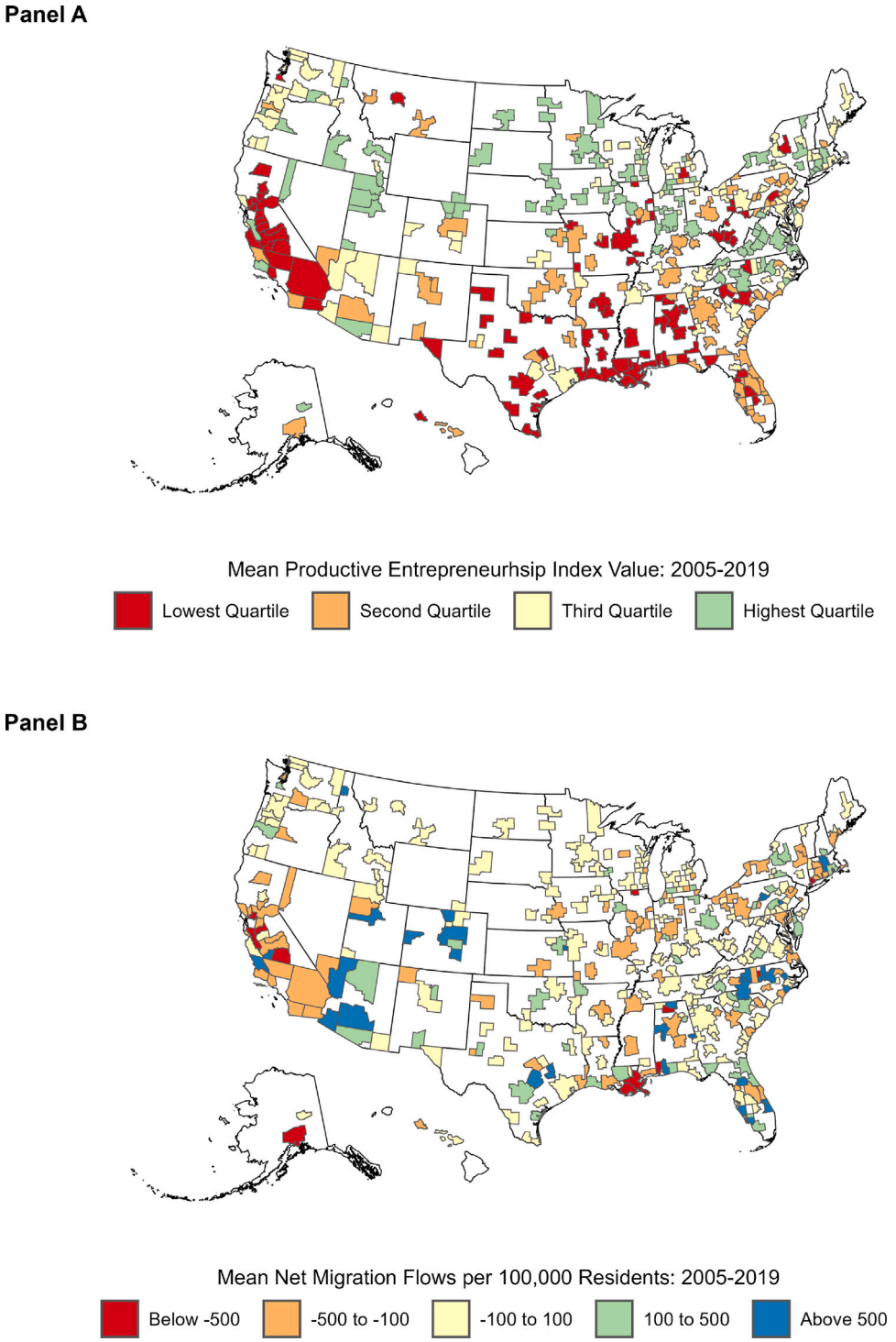


Fig. 2. Average productive entrepreneurship and net migration MSA.

where n refers to the origin MSA, m is the destination MSA, and t is the year between 2005–2019.[14] X denotes the control variables outlined in the previous section. μ_n, λ_m, and τ_t denote origin MSA, destination MSA, and year fixed effects, respectively. The full sample includes 72,010 distinct MSA-pairs covering a total of 380 MSAs.[15]

For our identification strategy, we employ regional banking and political variables as external instruments that are theoretically and empirically associated with both productive and unproductive entrepreneurship, while remaining plausibly exogenous to migration patterns. These instruments provide variation in entrepreneurial activity that is independent of population movement decisions.

In response to the 2008 financial crisis, President Obama signed the Dodd–Frank Wall Street Reform and Consumer Protection Act of 2010, often referred to as just Dodd–Frank. This legislation established a tiered regulatory framework that imposed progressively stricter requirements based on bank size. For instance, banks with assets of $10 billion or more were subject to higher capital requirements, stricter liquidity standards, and annual stress tests. In contrast, community banks, defined as those with fewer than $10 billion in assets, were generally exempt from the most burdensome requirements (Hogan and Burns, 2019).

A recent study by Minuci (2025) estimates how Dodd–Frank changed average bank cost-efficiency (or inefficiency) for banks of three size categories: small banks (assets below $100 mil), medium banks (assets between $100 mil and $10 bil), and large banks (assets of $10 bil or more). Using data from 2005 to 2016, Minuci (2025) finds that average bank cost-efficiency decreased by 16.2% in large banks, 13.9% in medium banks, and 14.1% in small banks.

We combine the pre- and post-Dodd–Frank cost-efficiency estimates with individual bank data from the Federal Reserve Bank of Chicago to construct (per capita) cost-weighted bank variables. The variables have the form:

$$b_{t,m} = \frac{\sum_g w_{g,t} \cdot B_{t,m,g}}{P_{t,m}} \tag{5}$$

where $B_{t,m,g}$ denotes an aggregate bank variable at time t for MSA m in bank group g, $P_{t,m}$ is the MSA's population at time t, and g denotes the bank group size classification ($g \in$ {small, medium, large}) from Minuci (2025). $w_{g,t}$ represents the inverse average bank cost-efficiency for group g in year t. These weights shift discretely in 2010 when Dodd–Frank was enacted: we use pre-reform efficiency estimates from Minuci (2025) for 2010 and earlier, and post-reform estimates for 2011 onward. We use inverse cost-efficiency estimates as weights so that banks with lower efficiency (higher costs) receive greater weight in capturing the regulatory shock's impact.[16]

Because the Dodd–Frank regulatory changes were made at the federal level, and are unrelated to migration patterns, each MSA's exposure to the regulatory shock will vary based on the composition of local bank sizes (which should also be unrelated to migration). All else equal, two regions with the same total dollar amount of bank assets will experience different shocks based on the distribution of assets held by small, medium, and large banks. For instance, an MSA with many large banks will experience a larger shock because large banks faced the steepest efficiency decline under Dodd–Frank.

We construct two instruments using Eq. (5) for total bank assets and total demand deposits. The per capita total asset variable, weighted by inverse cost-efficiency, captures the regional impact of Dodd–Frank on bank asset holdings, while the per capita deposit variable with the same weighting scheme measures how the regulatory shock affected banks' primary income generation mechanisms.[17]

To connect the inverse cost-efficiency weighted banking variables directly to the formal empirical specification, b_{1nmt} represents the per capita inverse cost-efficiency weighted total banking assets, calculated as the difference between origin and destination MSAs. Similarly, b_{2nmt} denotes the per capita inverse cost-efficiency weighted deposits, also measured as the difference between origin and destination MSAs.

We also exploit variation in state-level campaign finance reforms as additional external instruments. Specifically, w_1 is equal to unity if an MSA located in state s and year t requires campaign advertisements to disclose their funding sources. Similarly, w_2 equals unity if an MSA located in state s at time t requires candidates for political office to disclose the source of their donations.[18] Research by Dowling and Wichowsky (2015), Ridout et al. (2015), and Wood and Grose (2021) find that advertisements are less influential and legislators behave differently when greater transparency is required. To maintain consistency with the empirical specifications, w_1 and w_2 enter the regressions measured as the difference between origin and destination MSAs (w_{1nmt} and w_{2nmt}).

In our application, there is no reason from a theoretical perspective to believe that productive and unproductive entrepreneurship should be independent of one another. Baumol's primary assertion is that institutions shape the allocation of entrepreneurial activities between productive and unproductive uses. It is plausible, and perhaps even likely, that some institutions could induce substitution between productive and unproductive activities, while other institutions could create barriers or disincentives that affect entrepreneurial activity more broadly, rather than just redirecting it from one type of activity to another.

[14] The productive and unproductive indices begin in 2002 but MSA-level migration flows from the American Community Survey do not begin until 2005.

[15] For each pair, there is a reciprocal pair (Lafayette, LA to Morgantown, WV, and Morgantown, WV to Lafayette, LA) and we drop one, to avoid double-counting.

[16] Minuci (2025) average cost-efficiency metrics are bounded by 0 and 1. One minus the cost-efficiency metric provides an estimate of the cost-inefficiency. The average bank cost-efficiency estimates are available in Figure 4 of Minuci (2025).

[17] Financial data on individual commercial banks is available from the Federal Reserve Bank of Chicago: https://www.chicagofed.org/banking/financial-institution-reports/commercial-bank-data [accessed: 7/2/2025]. The variable mnemonics for total assets and demand deposits are RCFD2170 and RCON1645, respectively.

[18] State campaign finance rules were obtained from the Campaign Finance Institute: http://www.cfinst.org/ [accessed: 2/17/2023]. Multi-state MSAs are assigned to the state where the most populated county is located.

In a regression with two endogenous variables that are *independent* of one another, an external instrument that significantly predicts both endogenous variables in the first stage should raise red flags. This pattern suggests the instrument may directly affect the outcome variable through pathways beyond its influence on the endogenous variables, potentially violating the exclusion restriction.

Given this theoretical framework, we now examine how our specific instruments operate. In terms of our instruments and endogenous variables, the Dodd–Frank Act increased the regulatory burden for banks and created a negative credit shock. Since traditional credit markets are major funders for entrepreneurial ventures, particularly nascent and small businesses that lack alternative financing sources, we expect the passing of Dodd–Frank to lower productive entrepreneurial activity because of increased lending standards and reduced access to credit (Hogan and Burns, 2019).

At the same time, these credit constraints imposed by Dodd–Frank may have induced substitution toward unproductive entrepreneurship. As traditional financing became scarcer and more expensive, activities requiring political connections, such as securing government grants, contracts, or regulatory advantages, became relatively more attractive compared to traditional credit-dependent innovation. The regulatory complexity introduced by Dodd–Frank also created new opportunities for rent-seeking through compliance consulting, regulatory capture, and lobbying activities (Zywicki, 2015).

In contrast to Dodd–Frank's substitution effects, campaign finance transparency illustrates how institutions can simultaneously dampen both types of entrepreneurship. Since greater transparency lowers monitoring costs for the public and increases reputational risks, unproductive entrepreneurs may reduce their rent-seeking because their (self-interested) behavior is easier to observe. However, higher levels of campaign finance transparency could also increase reporting requirements that affect both donors and recipients, thereby raising the cost of political engagement for all actors. This increased cost burden may deter productive entrepreneurs from engaging in legitimate political advocacy for policies that would enhance innovation and economic growth, such as supporting research funding, intellectual property protections, or regulatory reforms that facilitate market entry for new technologies. Thus, while Dodd–Frank may primarily reallocate entrepreneurial effort between productive and unproductive uses, campaign finance reforms could reduce overall entrepreneurial engagement with the political process.

4. Results

4.1. First-stage estimates

The first stage regression can be found in Table 2. Column (1) reports the first-stage estimates for productive entrepreneurship, while column (2) reports coefficients for unproductive entrepreneurship. Both regressions were estimated with a constant term, origin fixed effects, destination fixed effects, and year fixed effects that are not reported. All variables, including the instruments, enter the regressions measured as the difference between origin and destination MSAs.

The instrumental variables demonstrate strong predictive power for both entrepreneurship measures, with directional effects aligned with theoretical expectations and prior empirical evidence from Section 3. Regarding Dodd–Frank's impact, MSAs facing larger relative banking sector shocks experienced significant reductions in productive entrepreneurial activity coupled with significant increases in unproductive entrepreneurship. This substitution pattern confirms that credit market constraints redirected entrepreneurial talent from innovation-based activities toward rent-seeking, as traditional financing became scarce while politically-connected opportunities grew more attractive.

In contrast, campaign finance transparency reforms produced markedly different effects: MSAs implementing greater disclosure requirements saw broad declines in both productive and unproductive entrepreneurial activity. Rather than inducing substitution, transparency created generalized institutional friction that raised participation costs across all forms of political engagement. Both rent-seeking entrepreneurs and productive entrepreneurs pursuing legitimate advocacy faced higher barriers through increased reporting burdens and reputational risks, resulting in reduced political activity regardless of entrepreneurial type.

The relevance (or strength) and empirical exogeneity of the instruments is explored in more detail in the next section.

4.2. Instrumental variables estimates

The second-stage instrumental variables results, estimated by two-stage least squares, are reported in Table 3. We easily reject the null hypothesis of exogeneity using the Wu–Hausman test in each specification. For comparison purposes, however, we also report OLS estimates in Table 5 of Appendix A.

Prior to discussing the magnitude and significance of individual coefficients, it is important to establish the relevance of our instruments. We do so by utilizing a new weak instrument test, developed by Lewis and Mertens (2025), that accommodates models with multiple endogenous variables while remaining robust to general forms of heteroskedasticity and serial correlation. The test is a generalized version of Stock and Yogo's (2005) well-known concentration parameter test. In essence, when multiple endogenous variables are present, the test statistic is derived from the weakest instrument and critical values can be calculated for each regression based on a user-defined level of coefficient bias.[19] The null hypothesis is that the instruments are weak.

The Lewis and Mertens (2025) weak instrument test statistic and critical value are reported as "gMin" and "gMin crit val" in Table 3. Assuming a maximum bias in the endogenous coefficients of 5%, we easily reject the null hypothesis that the instruments are weak in every specification.

[19] Lewis and Mertens (2025) provide Matlab routines to calculate the test statistic and critical values. We acknowledge the use of those programs.

Table 2
First-stage regressions.

	Dependent variable:	
	Productive entrep.	Unproductive entrep.
	(1)	(2)
	OLS	OLS
Advertising requirements	−0.0627***	−0.1111***
	(0.0024)	(0.0027)
Expenditure disclosure requirements	−0.0736***	−0.0660***
	(0.0036)	(0.0062)
Inverse efficiency weighted bank assets	−474.2866***	488.9754***
	(9.8155)	(10.6880)
Inverse efficiency weighted bank deposits	−0.0103***	0.0081***
	(0.0004)	(0.0006)
Per capita personal income	0.0060***	0.0049***
	(0.0015)	(0.0017)
Median home price	0.4687***	−3.9988***
	(0.1641)	(0.1449)
avg high temperature	−0.0382***	0.1083***
	(0.0040)	(0.0075)
Marginal income tax rate	−1.8204***	−1.6709***
	(0.0471)	(0.0521)
State economic freedom	0.0226***	0.0620***
	(0.0013)	(0.0018)
Ethnic diversity index	−0.0003*	0.0098***
	(0.0002)	(0.0003)
Job creation rate	0.0017***	0.0030***
	(0.0002)	(0.0002)
Job destruction rate	0.0016***	0.0020***
	(0.0002)	(0.0002)
Reallocation rate	−0.0015***	−0.0023***
	(0.0001)	(0.0001)
Unemployment rate	−1.2795***	0.6894***
	(0.0383)	(0.0456)
N	1,080,150	1,080,150

This table presents estimates of the first-stage regressions for productive entrepreneurship and net unproductive entrepreneurship. Standard errors are clustered at the origin-by-destination dimension. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Regressions were estimated with a constant term, origin fixed effects, destination fixed effects, and year fixed effects that are not reported. All covariates are measured as the difference between origin and destination.

In addition to instrument relevance, we also perform a Sargan over-identifying restrictions test because we have more external instruments (four) than endogenous variables (two). While the exclusion restriction cannot truly be tested because we do not observe the true error term, the Sargan test can provide at least some within-sample evidence for instrument validity. Consistent with the weak instrument test, we fail to reject the null hypothesis that the overidentifying restrictions are valid in each specification. Thus, from an empirical perspective, our instruments are both strong and exogenous.

Turning to the coefficient estimates, recall that net migration rates have been transformed using the inverse hyperbolic sine to reduce dispersion. Using the overall net migration estimates reported in column (1), if an MSA's productive entrepreneurship index is one point higher relative to another MSA, the estimates suggest an increase in net migration equal to 0.8252 per 1 million residents.[20]

If an MSA's productive entrepreneurship index was one-point higher *relative* to every other MSA, it could expect a total net migration gain of 312.7 per million people.[21] With an average MSA population of 700,000 in our sample, increasing an MSA's productive entrepreneurship by one-point *relative* to every other MSA would lead to the typical MSA experiencing an influx of 218.9 people in a given year.

Consistent with theory, we also find that overall net migration rates (column 1 in Table 3) are negatively correlated with unproductive entrepreneurship. The point estimate is smaller in magnitude than productive entrepreneurship and statistically significant at the 5% level. Working from the previous example, if an MSA's UEI index increases by one point *relative* to all other MSAs, the typical MSA in our sample would experience an outflow of 54.9 people in a given year, all else equal.[22]

In terms of control variables, we find some evidence that higher per capita incomes attract more migrants, but our results are less consistent than Arif et al. (2020). This may be due to the fact that income differences matter less when productive entrepreneurship

[20] If x has been transformed using the inverse hyperbolic sine, the actual coefficient estimate can be recovered using the hyberbolic sine ($\sinh(x) = \frac{e^x - e^{-x}}{2}$).

[21] This number is calculated by taking the hyperbolic sine of 0.7523 (0.8252) and multiplying it by 379 (the number of other MSAs).

[22] This number is calculated by taking the hyperbolic sine of −0.2058 (−0.2072), multiplying it by 379 (the number of other MSAs), and multiplying by 0.7 (the average population of an MSA in millions).

Table 3
Effect of net productive/unproductive entrepreneurship on mobility.

	Dependent variable:							
	Overall	Under 25	25–54	55 & older	College	High school	Self-emp	Non self-emp
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Productive entrep.	0.7523***	0.4195***	0.3332***	0.4995***	0.4544***	0.4353***	0.1178*	0.7549***
	(0.1359)	(0.1112)	(0.0827)	(0.1235)	(0.1159)	(0.1072)	(0.0660)	(0.1357)
Unproductive entrep.	−0.2058**	−0.1063	−0.0915	−0.2026**	−0.1745**	−0.1430*	−0.0212	−0.2529***
	(0.0963)	(0.0773)	(0.0569)	(0.0844)	(0.0773)	(0.0752)	(0.0443)	(0.0956)
Per capita personal income	0.0203***	0.0042	0.0051	0.0268***	0.0268***	0.0087	0.0022	0.0190**
	(0.0075)	(0.0058)	(0.0044)	(0.0061)	(0.0054)	(0.0056)	(0.0027)	(0.0074)
Median home price	−4.2819***	−1.4397**	−2.5444***	−4.0209***	−1.9104***	−2.8953***	−0.5536*	−4.3573***
	(0.7375)	(0.5815)	(0.4078)	(0.6104)	(0.5425)	(0.5577)	(0.2852)	(0.7269)
avg high temperature	0.1006***	0.0372*	0.0329**	0.0766***	0.0632***	0.0482**	0.0001	0.1070***
	(0.0263)	(0.0210)	(0.0145)	(0.0215)	(0.0194)	(0.0207)	(0.0100)	(0.0262)
Marginal income tax rate	−0.3451	−0.2729	0.0098	−0.4996**	−0.5500**	0.0008	−0.0903	−0.3886
	(0.3061)	(0.2319)	(0.1621)	(0.2425)	(0.2171)	(0.2290)	(0.1062)	(0.3021)
State economic freedom	0.0130	0.0021	0.0048	0.0132*	0.0124**	0.0071	0.0000	0.0168*
	(0.0088)	(0.0066)	(0.0048)	(0.0069)	(0.0061)	(0.0067)	(0.0029)	(0.0087)
Ethnic diversity index	0.0046***	0.0028***	0.0015**	0.0035***	0.0032***	0.0023**	0.0002	0.0051***
	(0.0013)	(0.0010)	(0.0007)	(0.0011)	(0.0010)	(0.0010)	(0.0005)	(0.0013)
Job creation rate	0.0027***	0.0032***	−0.0004	0.0024***	0.0019***	0.0021***	0.0006*	0.0029***
	(0.0010)	(0.0008)	(0.0005)	(0.0008)	(0.0006)	(0.0008)	(0.0003)	(0.0010)
Job destruction rate	−0.0032***	−0.0001	−0.0026***	−0.0010	0.0001	−0.0017**	−0.0003	−0.0027**
	(0.0011)	(0.0008)	(0.0006)	(0.0008)	(0.0007)	(0.0008)	(0.0004)	(0.0011)
Reallocation rate	0.0009	−0.0004	0.0017***	−0.0003	−0.0006	0.0004	−0.0003	0.0006
	(0.0008)	(0.0006)	(0.0005)	(0.0007)	(0.0005)	(0.0007)	(0.0003)	(0.0008)
Unemployment rate	0.2341	−0.0478	0.4577***	−0.0732	0.2703	0.0066	0.0471	0.2587
	(0.2641)	(0.2133)	(0.1567)	(0.2349)	(0.2120)	(0.2099)	(0.1213)	(0.2641)
N	1,080,150	1,080,150	1,080,150	1,080,150	1,080,150	1,080,150	1 080 150	1080150
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wu–Hausman	36.696***	19.221***	23.768***	28.522***	31.055***	21.733***	6.822***	40.15***
gMin	970.889	970.889	970.889	970.889	970.889	970.889	970.889	970.889
gMin crit val	7.561	7.561	7.561	7.561	7.561	7.561	7.561	7.561
IV Sargan P	0.924	0.782	0.557	0.924	0.642	0.885	0.594	0.830

This table presents estimates of the effect of net productive and net unproductive entrepreneurship on net migration flows between metropolitan statistical areas. Net productive and net unproductive entrepreneurship are treated as endogenous variables. gMin denotes the Lewis and Merten (2025) minimum eigenvalue measure of instrument strength for regressions with multiple endogenous variables. gMin crit val denotes the associated critical value assuming no more than 5% bias. The outcome variables have been transformed using the inverse hyperbolic sine to reduce dispersion. Standard errors are clustered at the origin-by-destination dimension. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Regressions were estimated with a constant term, origin fixed effects, destination fixed effects, and year fixed effects that are not reported. All covariates and instruments are measured as the difference between origin and destination.

is controlled for because it captures some of the income effect by providing a productive environment that is conducive to higher standards of living.[23]

Across all specifications, we find that differences in median home prices are a very strong and negative correlative to net migration. For overall migration (column 1), the estimates indicate that every $100,000 difference in median home prices corresponds to a migration loss of 36.4 people per million from a given MSA, or 13,810 fewer migrants per million from all MSAs combined. Additionally, consistent with the previous literature, we find that higher average temperature has a positive relationship with net migration, while higher marginal personal income tax rates have a negative relationship with net migration.

We also find that local economic dynamism affects net migration, independently of productive and unproductive entrepreneurship. Regions with higher levels of job creation, all else equal, attract more migrants, while regions with higher job destruction rates repel them. Consistent with Azoulay et al. (2022), Edo and Rapoport (2019) and Ottaviano and Peri (2012) (and others), regions with higher levels of ethnic diversity are more attractive to migrants, all else equal.

Finally, in contrast to Arif et al. (2020), we find weaker evidence that differences in state-level economic freedom are significant determinants of net migration. Using the point estimate from overall net migration (column 1), a one standard deviation increase in the difference of economic freedom is associated with 0.013 more migrants per million people from any given MSA. From all other MSAs combined, this implies an additional 4.92 migrants per million residents. For an average-populated MSA (700,000), this translates into an additional 3.4 individuals. This is much lower than the predicted outcome in Arif et al. (2020), where a 10%

[23] In Table 4, we show the pairwise correlation matrix. PEI is strongly correlated with per capita income and median home prices (0.425 and 0.455, respectively).

Table 4
Correlation matrix.

	NM	NM 25	NM 25–54	NM 55	NM Col	NM HS	NM Se	NM Nse	PEI	UEI	PCPI	MHP	Tmax	MTR	STEC	DIDX	JCR	JDR	Rrate	Urate
NM	1	.81	.73	.48	.34	.87	.42	1	.02	−.03	−.05	.04	.07	−.03	.09	−.03	.11	.00	.05	−.05
NM 25	.81	1	.25	.13	−.09	.67	.26	.82	.04	−.04	−.07	.03	.00	−.01	.05	−.03	.02	−.04	−.02	−.08
NM 25–54	.73	.25	1	.32	.64	.69	.35	.72	.00	.01	.00	.02	.05	−.01	.05	−.01	.13	.04	.08	.01
NM 55	.48	.13	.32	1	.38	.38	.32	.47	−.03	−.02	.00	.04	.21	−.09	.15	−.01	.15	.05	.09	.00
NM Col	.34	−.09	.64	.38	1	.22	.22	.33	.01	.05	.10	.07	.07	−.01	.03	.02	.14	.08	.10	.05
NM HS	.87	.67	.69	.38	.22	1	.34	.86	−.01	−.03	−.08	−.01	.05	−.02	.07	−.02	.09	.00	.04	−.01
NM Se	.42	.26	.35	.32	.22	.34	1	.34	−.01	−.01	−.01	.04	.09	−.04	.06	−.01	.09	.02	.05	.00
NM Nse	1	.82	.72	.47	.33	.86	.34	1	.02	−.03	−.05	.04	.07	−.03	.09	−.03	.11	.00	.04	−.05
PEI	.02	.04	.00	−.03	.01	−.01	−.01	.02	1	.28	.43	.46	−.09	.06	−.10	.17	.12	.00	.08	−.09
UEI	−.03	−.04	.01	−.02	.05	−.03	−.01	−.03	.28	1	.10	.21	.20	−.03	−.18	.31	.21	.21	.25	.14
PCPI	−.05	−.07	.00	.00	.10	−.08	−.01	−.05	.43	.10	1	.43	−.10	−.05	.04	.20	.00	−.18	−.11	−.32
MHP	.04	.03	.02	.04	.07	−.01	.04	.04	.46	.21	.43	1	−.03	.17	−.25	.23	.20	.10	.16	−.03
Tmax	.07	.00	.05	.21	.07	.05	.09	.07	−.09	.20	−.10	−.03	1	−.27	.37	.47	.30	.20	.27	.15
MTR	−.03	−.01	−.01	−.09	−.01	−.02	−.04	−.03	.06	−.03	−.05	.17	−.27	1	−.51	−.07	−.16	−.11	−.14	.01
STEC	.09	.05	.05	.15	.03	.07	.06	.09	−.10	−.18	.04	−.25	.37	−.51	1	.09	.23	−.02	.12	−.38
DIDX	−.03	−.03	−.01	−.01	.02	−.02	−.01	−.03	.17	.31	.20	.23	.47	−.07	.09	1	.20	.12	.19	.10
JCR	.11	.02	.13	.15	.14	.09	.09	.11	.12	.21	.00	.20	.30	−.16	.23	.20	1	.28	.68	−.16
JDR	.00	−.04	.04	.05	.08	.00	.02	.00	.00	.21	−.18	.10	.20	−.11	−.02	.12	.28	1	.70	.27
Rrate	.05	−.02	.08	.09	.10	.04	.05	.04	.08	.25	−.11	.16	.27	−.14	.12	.19	.68	.70	1	.00
Urate	−.05	−.08	.01	.00	.05	−.01	.00	−.05	−.09	.14	−.32	−.03	.15	.01	−.38	.10	−.16	.27	.00	1

Notes: The correlation matrix presents raw pairwise correlations calculated from the original untransformed data. These variables appear in their natural form—they have not been subjected to inverse hyperbolic sine transformation and are not expressed as differentials between origin and destination Metropolitan Statistical Areas (MSAs). NM = net migration rate per 1,000,000 residents. NM 25 = net migration under 25, NM 25–54 = net migration 25–54, NM 55 = net migration 55 plus, NM Col = net migration college graduates, NM HS = net migration high school, NM Se = net migration self-employed, NM NSe = net migration non-self employed, PEI = productive entrepreneurship index, UEI = unproductive entrepreneurship index, PCPI = per capita personal income, MHP = median home price, Tmax = average high temperature, MTR = highest marginal personal income tax rate, STEC = state economic freedom index, DIDX = ethnic/racial diversity index, JCR = job creation rate, JDR = job destruction rate, RRate = labor reallocation rate, and URate = unemployment rate.

relative increase in economic freedom increased net migration by 27.4%. According to their findings, at the mean net migration flow, a 10% increase in economic freedom raises net migration by 22 individuals per year from every *other* MSA. Referring back to the correlation matrix (Table 4), there is little correlation between state-level economic freedom and PEI and UEI. We can therefore infer that we are not soaking up the impact of economic freedom on net migration by including these entrepreneurship measures.

Moving to the under 25 group (Column 2), we find that productive entrepreneurship is still positive and statistically significant at the 1% level, but the magnitude is roughly half of the effect size the for overall net migration category. This large difference in the effect of changes in productive entrepreneurship may be related to general trends within the under 25 population. For example, individuals with fewer years of work experience are less likely to have built capital or equity, which may be a barrier due to being unable to afford the high cost of moving at the same rate as more senior peers. They may also be evidenced by the under 25 population having a much weaker and smaller negative reaction to changes in the median home prices, as they have substantially lower rates of home ownership than the overall population. Additionally, we find no empirical evidence that unproductive entrepreneurship repels young migrants, implying that underlying factors in UEI, such as political and campaign finance transparency, are not drivers of relocation decisions among younger populations.

For prime working age (25–54, Column 3), the estimates are very similar to the under 25 group. We find that MSAs with relatively more productive entrepreneurial activity attract this cohort. Differences in average temperature, ethnic diversity, and the job reallocation rate are positive and statistically significant; As theory predicts, differences in job destruction rates and median home prices are negative and statistically significant.

Moving to the older group (55 and older, Column 4), we find that this group is attracted to regions with relatively more productive entrepreneurial activity at about the same magnitude as workers under 25. However, older individuals are also more likely to migrate away from regions with more unproductive entrepreneurial activity than younger cohorts. While migration rates generally decline with age (Zaiceva, 2014), the location decisions of adult children significantly influence older adults' migration patterns (Artamonova et al., 2020; van der Wiel et al., 2021).

We interpret these findings for older adults through two complementary mechanisms. First, the strong attraction to productive regions may reflect a "follow the children" effect, where older adults relocate to areas where their adult children have previously moved, drawn by the same productive entrepreneurial environments. Second, the pronounced aversion to unproductive entrepreneurship may stems from wealth protection concerns: older individuals typically possess greater accumulated wealth but face shorter time horizons for financial recovery. This may make them particularly sensitive to economic environments characterized by unproductive entrepreneurial activity. Given limited time to recover from financial setbacks before retirement, older workers may be more risk-averse and motivated to migrate away from regions where unproductive economic activity could threaten to erode their wealth.

Comparing college educated (Column 5) and those with a high school degree or lower (Column 6), the results are fairly consistent across specifications in terms of magnitude and significance. For example, both cohorts are attracted to areas with more productive entrepreneurship and are less drawn to regions with more unproductive entrepreneurship, all else equal. Both groups are also sensitive to home prices, average temperature, ethnic diversity, and regions with higher job creation rates. We also find that college graduates are sensitive to the state's marginal income tax rate, whereas high school graduates are not. This is consistent with the relationship between education and income. On average, the marginal tax rate of someone who makes $75,000 or more will be relevant to someone with a college education. Likewise, living in an area with high per capita personal income, which is positive and statistically significant for the college educated by not the high school educated groups, may matter more to the subpopulation with historically higher paying jobs than their peers. Median home prices are negative and statistically significant for both groups as well.

Finally, we compare the self-employed to non self-employed (Columns 7 and 8). While both types of workers are attracted to regions with more productive entrepreneurship, self-employed workers are much less sensitive based on the coefficient estimates (0.12 versus 0.75). Self-employed workers are more likely to deal with business and occupational licenses, which create substantial hurdles and financial costs for moving between states that is not as frequently experienced by their non self-employed peers. Furthermore, they may have an already established business and customer base in their area, making moving to another area more costly relative to non self-employed workers. Both cohorts are sensitive to home prices and rates of job creation, while non self-employed workers are attracted to regions with higher average temperatures, other factors constant.

4.3. Robustness checks

The causal interpretation of the preceding empirical results rests on the assumption that the exclusion restriction holds, meaning that the instruments only affect migration rates indirectly through their effect on the endogenous variables rather than through any direct pathways. In this section, we explore the sensitivity of our results to potential violations of the exclusion restriction using Conley et al.'s (2012) union of confidence intervals approach. This method is particularly well-suited to our setting because we have multiple endogenous variables that are not independent of one another.

Rather than maintaining the identifying assumption that instruments Z satisfy the strict exogeneity condition $E[\varepsilon|Z] = 0$, Conley et al.'s (2012) method allows for modest departures from exogeneity by permitting direct effects of the instruments on the outcome variable. For example, suppose that 5% of an instrument's total effect on the outcome variable is direct (and the remainder is indirect through the intended channel). The method tests multiple violation scenarios within this range and obtains confidence intervals for the endogenous variables of interest under each scenario. The union takes the most conservative bounds across all scenarios: the lowest lower bound and highest upper bound from any scenario tested.[24] This yields robust confidence intervals that remain valid even if the instruments have modest direct effects on migration rates.

We estimate the union of confidence intervals for productive and unproductive entrepreneurship under three scenarios: conservative, moderate, and liberal. The conservative scenario allows up to 5% of each instrument's total effect on migration rates to be direct. The moderate and liberal scenarios increase these percentages to 10% and 15%, respectively.

Fig. 3 illustrates the midpoint and 95% union of confidence intervals for the estimated effects of productive and unproductive entrepreneurship on migration rates. Each violation scenario regression includes origin and destination fixed effects and all exogenous control variables, with all covariates measured as differences between origin and destination MSAs consistent with our empirical specifications.

The results demonstrate considerable robustness to potential instrument violations. Although the union of confidence intervals widens as the magnitude of potential violations increases, we continue to find that productive entrepreneurship has a positive causal effect on migration rates across all demographic cohorts and violation scenarios. Additionally, unproductive entrepreneurship significantly reduces migration rates across all three violation scenarios for college-educated workers, those aged 55 and older, and non-self-employed workers. Given that the baseline estimates showed weaker effects for unproductive entrepreneurship relative to productive entrepreneurship, the reduced statistical significance for some coefficients in this robustness exercise is expected.

5. Discussion and conclusion

Economist Lant (Pritchett, 2006) depicted nations as divisible into varying regions. Some regions — boom towns he calls them — experience positive shifts in labor demand and rising wages. Conversely, other regions face declining prospects and remain trapped in a perpetual state of mediocre outcomes, leading Pritchett to label them "zombie" places. The ability to migrate, he argues, is crucial, as it allows people to escape these zombie places. Improvements in living standards occur through the reallocation of people to the best places and allowing for people to "vote with their feet" (Tiebout, 1956). The key point to extract from this is that letting people escape the zombie places yields the same effect as improving economic policy in them. Relying on Baumol's (1996) work on productive and unproductive entrepreneurship, we can expand on Pritchett's analogy.

The zombie places are those that one would expect to score high on the unproductive entrepreneurship index, which in turn will push people away from residing there. The rent-seeking behaviors associated with these high scores generally imply fewer opportunities, as they often involve zero-sum games where gains for one party come at the expense of another (push) (Kirzner, 1973). In contrast, the boom towns score highly on the productive entrepreneurship index. In these areas, entrepreneurial activity centers around product development and innovation in both production techniques and new outputs. In these regions, entrepreneurial efforts focus on product innovation, including the development of new production techniques and outputs. Entrepreneurs in these areas benefit from mutual learning and continual innovation, enhancing firm productivity, which in turn leads to higher wages (pull) (Sobel, 2015). By creating a migration magnet, productive entrepreneurship allows for improving living standards via people moving to the best places. This can be connected to the literature on how agglomeration effects (e.g., wage premium for being in cities, thicker labor markets, higher quality job matches, more learning in cities) emerge (Glaeser, 1999; Glaeser and Maré, 2001; Costa and Kahn, 2000; Puga, 2010).

We find several potential policy recommendations for attracting new residents, or reducing the outflow of current residents, through creating healthy entrepreneurial environments. For example, when city planners focus on reducing the loss of 55 & older

[24] See Conley et al. (2012) for technical details. We use a grid search with combinations of extreme values within each instrument's allowable violation range.

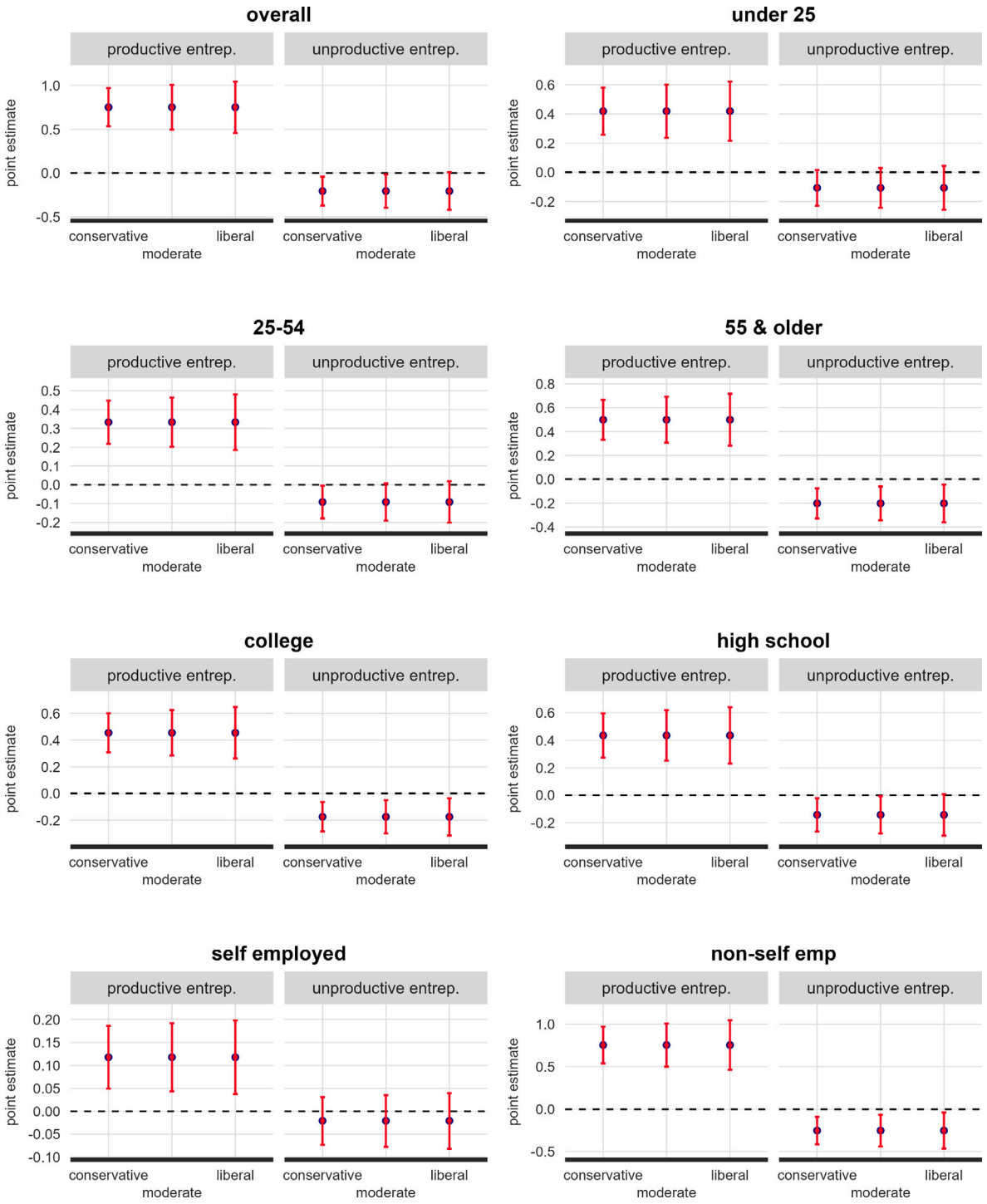


Fig. 3. Union of confidence interval robustness checks. Notes: This figure shows robustness bounds for the endogenous variables using the Conley et al. (2012) union of confidence interval approach under three scenarios. The conservative, moderate, and liberal scenarios test whether our results hold if 5%, 10%, or 15% of each instrument's effect operates through direct channels on the outcome rather than solely through an indirect effect via the endogenous variables. The grid radius is the combination of extreme ends of the instruments' allowable violation ranges.

residents or non-self-employed individuals, policies that discourage unproductive entrepreneurship, such as mandating political and campaign finance transparency, may have a large influence on retaining these subpopulations. Likewise, all subgroups in our sample are heavily inclined to move to MSAs with policies that encourage productive entrepreneurship. City planners or policymakers

focused on attracting new residents may benefit from targeted policies that encourage venture capitalism, increase the ease of starting a business for sole proprietors or new entrants, and provide strong legal protection for patent rights.

Our results also open up new questions. Earlier works argued for the great importance of institutional variables — such as the economic freedom index — in determining migration (Ashby, 2007; Arif et al., 2020; Cardazzi and Lawson, 2023). While we find an association with economic freedom, the magnitude is far smaller than in earlier studies. And, as we pointed out above, this cannot be attributed to collinearity between economic freedom and the PEI and UEI scores.[25] Does this mean that institutional variables do not matter to migration? We do not believe it does, and in no way does this discount earlier research. Our migration measure is for all individuals regardless of the domain of economic activity. It is not a dataset specifically of entrepreneurs, firm-owners, and capital-owners. These individuals — who can easily be argued to be those that create conditions that incentivize others to relocate to where they went — are probably more responsive to institutional quality and policies. In other words, there is a subset of individuals that — in the present paper — we could not easily distinguish, but who are likely to be a sort of leaders. A close analogy would be that of "superstars". For example, superstar inventors — those at the forefront of innovation — have been shown to respond strongly to tax differentials (a component of economic freedom indexes) (Akcigit et al., 2016). Similarly, superstar startups also respond strongly to many components of the economic freedom index (Weik et al., 2024). And, most obviously, superstar athletes respond to components of economic freedom as well (Kopkin, 2012; Bykova and Coates, 2022).

This points to the next step in research, which would be to replicate our approach using measures such as entrepreneurial migration, inventor migration, firm migration, or capital migration. These could then be linked to institutional variables involved in the emergence of a productive entrepreneurship area—one that, in turn, may incentivize others to migrate by following those who helped create the favorable conditions. Combining our present work with such future work would help inform policy-makers about how to generate the productive entrepreneurship environments that attract people from lower opportunities areas.

CRediT authorship contribution statement

Justin T. Callais: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Vincent Geloso:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Alicia Plemmons:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Gary A. Wagner:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.ejpoleco.2025.102733.

Data availability

We will upload our data on a repository.

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[25] In fact, the point estimate would not be affected by this—only the confidence interval around it. As such, the issue of the relative size of the coefficients we found is unaffected.

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