THE DETERMINANTS OF SUBNATIONAL ECONOMIC FREEDOM

An Analysis of Data for Seven Countries with Implications for Optimal Jurisdiction Size

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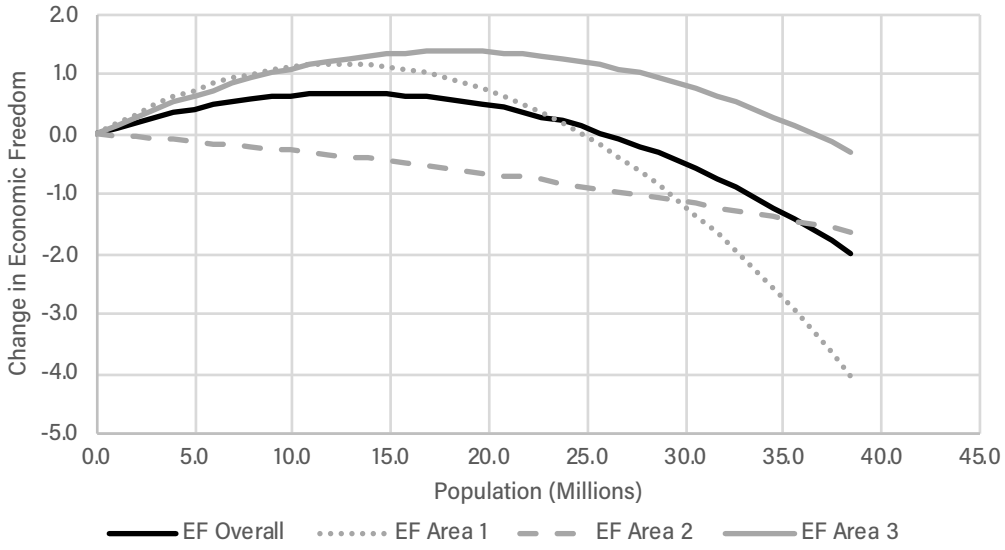
Executive Summary

It is now well-established that countries, states, and provinces with better institutions, as measured by the indices published in the Fraser Institute's *Economic Freedom of the World* (EFW) and *Economic Freedom of North America* (EFNA), have greater prosperity, growth, and human well-being. While the empirical determinants of country-level EFW economic-freedom scores have been examined, there is little outside specific studies for the United States on the determinants of EFNA's subnational economic-freedom scores.

Using data from EFNA and several other reports modelled after EFNA for other countries, covering a total of 158 states and provinces in seven countries, this report examines which geographic and demographic factors have predictable influences on subnational levels of economic freedom.

Among the most interesting and robust findings is that there appears to be an "optimal" population size for subnational jurisdictions that maximizes overall economic freedom of around 9.5 million people. Beyond that point, overall institutional quality begins to decline, and this decay starts at even lower population levels for the economic freedom subcategory of taxation (Area 2).

Effect of population on subnational economic freedom—EFNA countries



In contrast, measures of coastal access or ease of exit seem to have little predictable influence on the levels of subnational economic freedom, unlike the results found at the country level. Geographic size (square area) also has a less clear relationship, although beyond some point it does seem that economic freedom falls as the extent of a jurisdiction grows very large for states and provinces in North America. Latitude, age of a jurisdiction, and legal origins also matter, but mostly for subnational jurisdictions outside North America.

1 Introduction

Economic outcomes are a function of both available resources and the institutions under which these resources are put to productive use. While the link between institutions and economic growth has been recognized since the time of Adam Smith (1976 [1776]), a large literature now examines it empirically using various numerical indices of economic freedom that follow the general framework originating in the Fraser Institute's 1996 report, *Economic Freedom of the World* (EFW) (Gwartney, Block, and Lawson, 1996), which has since continued to be published annually.[1] While the EFW report contains measures of economic freedom for countries of the world, in 2002 the Fraser Institute published the first edition of *Economic Freedom of North America* (EFNA) with similar subnational measures for the US states and Canadian provinces (Karabegović, McMahon, and Samida, 2002), which has been published annually since 2010, and as of 2014 includes data for the Mexican states. There have now been similar reports irregularly published by various authors and institutes for the subnational jurisdictions of at least four other countries (Australia, Argentina, Germany, and India) that apply the Fraser Institute's framework for measuring economic freedom to the states and provinces of those countries as well.

While the literature is clear on economic freedom's effects on economic and social outcomes, it is less clear why some regions have higher levels of economic freedom than others.[2] Lawson, Murphy, and Powell (2020) provide a review of the literature that attempts to examine the factors explaining country-level differences in economic freedom. As is argued by Nattinger and Hall (2012), while there may be factors that can cause smaller year-to-year changes in economic freedom, these are relatively small in magnitude when compared to the larger, lasting differences in economic freedom explained by historical determinants of institutional quality such as geography or legal origins—factors referred to as "deep roots" by Lawson, Murphy, and Powell (2020). While studies such as Brown (2014) have examined these "deep root" factors at the country-level, there has yet to be a similar analysis for subnational jurisdictions. To date, studies using the EFNA often only analyze the data for the US states, and focus on the short-run effects of factors such as changes in political-party control.

Do factors such as latitude, legal origins, the size of a jurisdiction, the age of a jurisdiction, and ocean access have predictable "deep root" influences on the economic freedom levels of subnational jurisdictions across all countries as well? That is the question

1. The annual editions of *Economic Freedom of the World* and *Economic Freedom of North America* can be found at <https://www.fraserinstitute.org/economic-freedom/>. At the time of the current publication, the most recent versions were Gwartney, Lawson, Hall, Murphy (2020) and Stansel, Torra, and McMahon (2020).
2. For excellent summaries of the existing literature on economic freedom at both the national and subnational level, see Stansel and Tuszynski (2018), Hall and Lawson (2014), and Lawson, Murphy, and Powell (2020).

this report attempts to examine. One specific central question that will be explored is the impact of the size of a subnational jurisdiction on economic freedom. Is there an "optimal" size for a subnational jurisdiction that will maximize economic freedom? Interestingly, Canada's least economically free province is also its largest by geographic area, and second largest by population, while for the United States the two states with the largest geographic area and population are among the four least economically free states. Are some jurisdictions simply so large that size begins to erode economic freedom, perhaps suggesting they may improve by splitting into multiple smaller jurisdictions?

To quickly summarize the main findings, there do appear to be significant effects of jurisdiction size, particularly population, on the economic freedom levels of states and provinces. Beyond population sizes of roughly 9.5 million, overall institutional quality begins to decline, and this decay starts at even lower levels of population for the economic-freedom subcategory of taxation (EFNA, Area 2).[3] Geographic area is not robustly linked to overall levels of economic freedom across all countries, although jurisdictions with larger geographic areas in North America (in the United States and Canada, in particular) do tend to have lower scores for in the economic-freedom subcategory of government spending (EFNA, Area 1). Latitude does seem to be positively correlated with subnational economic freedom, particularly for the countries outside of North America. Older jurisdictions (that is, those that have a longer continuous history), particularly those outside of North America, seem to have higher levels of economic freedom, while those with prior Socialist legal origins have lower economic freedom. Interestingly, some factors found to matter at the country level, such as ocean access, population density, and ease of exit, do not seem to have significant influence on levels of subnational economic freedom. The report begins, next, with a review of the literature that will assist in formulating the empirical specification employed in the subsequent analysis.

3. To put this in perspective within the literature, regarding the optimal size of cities, Frick and Rodriguez-Pose (2018) conclude that cities of up to three million are most conducive to economic growth.

2 Literature Review

We begin by examining the literature related to how the size of a government's jurisdiction may affect aspects related to economic freedom. Because the economic freedom index includes multiple components, the impacts of jurisdiction size on taxes, spending, and regulation are all relevant considerations. There is also a narrower literature, mostly in public finance, explicitly examining how "optimal jurisdiction size" is related. For the empirical specifications, we will also examine (or at least need to control for) the non-size factors affecting economic freedom, so a review of the literature on these other determinants is worthwhile. This section categorizes and reviews these strands of literature.

Note that one can frame the "optimal size" question either in terms of geographic area or population, and the questions may be related. There is a literature on the optimal size of cities in terms of population, with Frick and Rodriguez-Pose (2018) concluding that cities of up to three million are most conducive to economic growth.[4] Also worthy of mention is that the literature can be separated into those studies that ask questions related to the size and number of jurisdictions based on purely public finance "operational efficiency" factors and those that approach the issue from a public choice "political economy" perspective, asking how democratic political outcomes are affected by the size of jurisdictions. Both offer theories with predictions for the analysis, and the variables we may want to consider empirically.

One final concept that aids in the literature review is to recognize that these various theories can predict one of only four possible types of relationships (or five if you include "no effect"). The first is that the degree of government intervention (measured in cost, efficiency, and so on) falls with jurisdiction size; the second is that it rises with jurisdiction size; the third is that there is some type of U-shaped relationship in which it initially falls, reaches a minimum, then rises; while the fourth is an inverted (upside down) U-shape in which it rises, reaches a maximum, then falls with jurisdiction size. Because the economic freedom index is inversely linked to the degree of government intervention, the economic freedom score would move in the opposite directions but with similar patterns. These theories are not mutually exclusive, so multiple factors may add up to the final overall effect. In fact, U-shaped relationships are often the result of an additive outcome of two effects, one continuously rising and the other continuously falling, where the sum of the two effects is minimized somewhere in the middle.

4. While Frick and Rodriguez-Pose (2018) do not examine economic freedom levels, we know there is a close link between economic freedom and economic growth, so it is likely they may both be maximized around the same size.

2a Economies of scale

The public finance literature often approaches optimal jurisdiction size in terms of the economies of scale in government provision of goods and services (Tiebout. 1960; Alesina and Spolaore, 1997; Southwick, 2012).[5] Economies of scale exist when per-unit costs of production decline with size. In standard microeconomic production theory, economies of scale usually occur initially, begin to fade, and eventually reverse with costs increasing again at even larger sizes (turning into diseconomies of scale). This U-shaped relationship implies that there is some jurisdiction of optimal size that minimizes the average "per unit" cost of government, which should be reflected in lower expenditures (and thus taxes) as a share of the economy, and therefore greater economic freedom. The extent of these economies of scale can vary across government policies and programs.[6] The empirical literature examining actual economies of scale has found that they tend to be exhausted quickly (Southwick, 2012; Frick and Rodriguez-Pose, 2018).[7] Thus, the U-shaped relationship may bottom out at jurisdiction sizes much smaller than the actual sizes of many current jurisdictions, and this inflection point is something we can estimate.[8] In fact, this makes our question even more interesting because the few US subnational studies of EFNA that do include variables reflecting jurisdiction size (geographic area or population) as a control variable when addressing other questions include the variable(s)

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5. A related literature examines the optimal size of currency jurisdictions (Mundell, 1961), such as the common central bank for the European Union and abandonment of national currencies. The conclusion is that an optimal currency region is one that shares similar economic shocks and within which labor and capital can flow freely, so that an activist central bank can respond to these shocks with monetary policy to stabilize the economy. This is more directly relevant for country-level economic freedom as monetary policies are controlled by national governments (a sub-component of the EFW index measures currency stability and inflation). The problem with this argument is that, if one questions the theoretical assumption that activist macroeconomic policies are effective, perhaps failing as a result of lags and timing issues or political incentives, then activist policies actually make the economy less stable (Mafi and Sobel, 2006). In that case, a more stable outcome is achieved if the central bank has to respond to a diversified average, causing it to be less active. While not directly relevant here, this concept would be so for any future analysis following this report using EFW data.

6. This has implications for which level of government (federal, state/province, local) should optimally undertake each activity as programs with significant economies of scale should be undertaken by the federal government, while those with significant diseconomies of scale should be done locally. But for any given set of programs a state or province undertakes, it will lead to a U-shaped relationship.

7. For some of the early contributions in this literature, see Hirsch (1968) and Bish (1971). A related literature examining how government spending is affected when land is added (annexed) to existing subnational jurisdictions also does not provide clear evidence as geographic size is intertwined with other issues such as population that may have independent and differential effects (Edwards and Xiao, 2009).

8. One reason to expect current jurisdictions to be smaller or larger than the cost-minimizing size is that, in reality, actual jurisdiction size is driven more by political factors than goals of operational efficiency (Mothorpe, Woolsey, and Sobel, 2020). Some political incentives simply push leaders to maximize the size or influence of the jurisdiction (Niskanen, 1971). Historically, jurisdiction sizes, particularly at the country level, have also been driven by the ability to defend territorial borders against hostile invasion, with each land mass held by the jurisdiction that has the comparative advantage in protecting it from being taken by aggressors, following the theory of Holcombe (1994).

only linearly and, to capture the U-shaped relationship that should be present, the specification needs to include a quadratic (squared) term, and this has never been done before in the empirical literature about subnational economic freedom, even as a control.

2b Buchanan's theory of clubs

The traditional economics literature classifies goods as "public goods" when they are both non-excludable and joint-in-consumption (or "non-rival in consumption"). In contrast to private goods for which one person's consumption detracts from the availability of the good for others, for public goods this is not the case. A radio broadcast provides an example of a good that is joint-in-consumption because multiple listeners can simultaneously listen to the same signal. Non-excludability means it is difficult (or prohibitively costly) to exclude non-paying customers from enjoying the good, making it difficult for private firms to generate enough revenue to efficiently produce these goods at a profit; this provides the traditional economic justification for government provision of these goods and services through taxation. Goods that are joint-in-consumption but for which non-paying customers can be excluded are known as collective-consumption goods, and they can be provided efficiently through private-sector clubs, the theory behind which was outlined in Buchanan's (1965) "theory of clubs" article.

In reality, governments provide many goods that are private in nature, and there are also cases of successful private provision of public goods. The relevant factor for our analysis is that the different goods and services actually provided by state and provincial governments have different degrees to which their consumption is collective in nature. Something like a road or public park, for example, while joint-in-consumption up to some point, will eventually be subject to congestion, as would a court system or the provision of law enforcement. The rate at which a road becomes congested, for example, depends both on the size of the road (amount provided) as well as the number of drivers (users). In Buchanan's theory, there are two conflicting forces at work. As the sharing group increases, the marginal congestion costs increase, lowering the value of the good to each user. On the other hand, because the good is jointly consumed, the cost of its provision per user declines as more users are added. There is thus an optimal size of the road or park, and an optimal number of users to share it, that are jointly determined (at the point at which the marginal costs of congestion rise to equal the marginal reduction in the cost per person). Sizes higher or lower than this are inefficient.

Returning to our topic, the implication is that to the extent that the goods and services provided by state and provincial governments are collective-consumption in nature, with minimal congestion effects, the large fixed cost of providing them will create a situation in which the cost per user declines as jurisdiction size grows because a given amount of the good provided can simply be shared by a larger group. This implies that government spending (and taxes to fund it) as a share of the economy may decline with the size of the jurisdiction for state and provincial activities that have these public-good characteristics. To the extent that the activities of these governments are instead

rival-in-consumption (for example, transfer payments or unemployment benefits), or have significant congestion effects, this will not be the case. For these items, total spending will rise with the size of the jurisdiction and the rate at which it rises relative to the size of the group will determine whether government's share of the economy rises or falls. Thus, if all governments provided were pure public goods, one might expect economic freedom to rise with jurisdiction size as spending and taxes per person fall. But in reality, given that few of the true activities of state and provincial governments meet the criterion for public goods, the prediction is less clear.[9]

2c Policy externalities

The broad literature on fiscal federalism concludes that each government program should be undertaken at the most decentralized level possible that fully internalizes all policy externalities (Inman and Rubinfeld, 1997; Oates, 1972). Because external effects lead to inefficient decisions, to the extent that government spending programs, services, or regulatory policies have geographic footprint effects, one would want the size of the jurisdiction to be such that it fully internalized these effects. When, for example, a particular government activity has significant benefits in only a small region, as would be the case of, say, providing a community park and swimming pool, it should be done by a local government. In contrast, activities like national defence, with benefits over a larger region, should be done federally. While this is more directly relevant in asking which level of government (national, state/provincial, local) should undertake an activity, the logic behind it has relevance for our analysis. Jurisdictions that are too small lead to possible inefficiencies as a result of externalities in policy effects. Less clear, however, is the effect this would have on economic freedom. To the extent that any externality-induced inefficiencies lead to higher (or lower) levels of taxes, spending, or regulation, they could have an effect on economic freedom, but which direction would prevail is not obvious.

The reason the externality argument does not simply lead to a conclusion in the literature that all policies should be done at the level of the national government is that the literature on fiscal federalism also argues that intergovernmental competition is a key factor to consider. Lower levels of government are more numerous and thus theoretically more competitive and efficient, and this degree of competition falls as one goes up to state/provincial or national governments. While this effect is the next topic we will discuss, it is the reason that the theory pushes each activity down to the lowest level that internalizes all externalities. Government sizes that are too small have lower economic freedom because of inefficient policy externalities, while government sizes that are too large have lower economic freedom because they are less competitive, again predicting an inverse U-shaped relationship between jurisdiction size and levels of economic freedom.

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9. The results of Holcombe and Sobel (1995), for example, suggest that perhaps 77% or more of what is produced at the US state level would be classified as private goods (not collective-consumption in nature).

2d Constraining Leviathan through fiscal federalism

The Leviathan model of Brennan and Buchanan (1980) suggests that government's objective is to maximize its budget, with constitutional constraints and intergovernmental competition being the only limits on its ability to do so.[10] According to Brennan and Buchanan (1980), total government intrusion into the economy (and thus the size of spending, taxes, and regulation) should be lower with a larger number of smaller-sized governments in a given geographic territory. This would suggest that economic freedom levels may fall with larger jurisdiction size as a result of reduced intergovernmental competition between jurisdictions.

Lawson and Block (1996) were the first to examine this issue using data on economic freedom but find no effect of the number of subnational jurisdictions on country-level economic freedom. In their recent review of the literature. Lawson, Murphy, and Powell (2020) conclude that the evidence is mixed, at best, on the impact of the number of jurisdictions on economic freedom, with only some studies finding significant results.[11] Thus, while based on the Leviathan model we may expect economic freedom to decline when larger jurisdiction sizes reduce the degree of intergovernmental competition, although the prior literature is not conclusive on this effect.[12]

2e Expressive voting and the charity of the uncharitable

The public choice literature also suggests jurisdiction size may have significant impacts on democratic political outcomes, which would affect economic freedom. Of relevance is the work of Brennan and Lomasky (1993) on expressive voting, and its further refinement by Tullock (1971) on the "charity of the uncharitable". In this theory, as the number of voters in a jurisdiction grows, the probability of casting a decisive vote in elections falls. Tullock explains that for each voter the expected personal cost associated with voting in favour of a new social-welfare program that requires more taxes and spending is the probability their vote is decisive times the expected tax cost per person. As jurisdiction size grows, this probability falls, and thus each individual voter faces

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10. In essence, constitutions are a substitute for mobility when limiting the power of government (Holcombe, 1994).

11. At the local level, Millsap, Hobbs, and Stansel (2019) use the economic freedom scores of 373 US Metropolitan Statistical Areas (MSAs) from Stansel (2013) to examine whether the number of local governments affects economic freedom in MSAs. They find no effect on overall economic freedom levels, nor on the Areas reflecting taxation and government size, but a positive effect on labor-market freedom when using the full sample.

12. One reason for the absence of consistent findings may be that the degree of subdivision has offsetting effects on the functioning of representative political democracy. Weingast, Shepsle, and Johnsen's (1981) "Law of 1/N" suggests that a larger number of smaller jurisdictions leads to greater spending by the national government, especially on transfers and special-interest programs, because each political district will be able to export a larger part of the tax costs of projects in their district onto other jurisdictions through national taxation. The literature also suggests that intergovernmental grants can be used as a form of collusion among subnational governments to overcome competitive dynamics (Holcombe and Stroup, 1993).

lower personal cost in voting for higher levels of government spending on collective-consumption goods and transfer spending. A perhaps simpler way of looking at this is that, if one's vote is not going to be decisive, then the tax cost is the same whether one votes in favour or against a proposal. It either happens or does not happen without their vote. The only thing the person's vote changes is whether they gain personal satisfaction from the vote as an act of expression of their personal values. Thus, voting in favour of a "feel good" social program may make one more mentally happy than voting against it, and voting in favour carries no additional personal cost as the vote will not change the outcome.[13]

This suggests higher populated jurisdictions lead to higher levels of spending and taxes, especially transfers. Tullock's idea has been supported in the empirical literature for the US states by Wagner and Sobel (2004) who find rising social-welfare spending with greater voting populations. Thus, levels of economic freedom are likely to fall as jurisdiction sizes increase as a result of these public-choice factors leading to higher spending and taxes because of reductions in the likelihood of an individual's being a decisive voter. These effects should be negative from the outset, rather than U-shaped, perhaps suggesting negative tax (or transfer) effects on subnational economic freedom starting earlier than for other subcategories of economic freedom.

2f Fractionalization and political outcomes

Larger jurisdiction sizes should generally lead to greater degrees of heterogeneity or "fractionalization" among the population as well. The literature on fractionalization concludes that greater heterogeneity among individuals in a political jurisdiction leads to greater social and political conflict and greater disagreement over the provision of government goods and services and could, therefore, lead to lower levels of government spending on welfare, education, infrastructure, and other public goods (Alesina and Spolaore, 1997; Alesina and La Ferrara, 2005; Easterly and Levine, 1997). Fractionalization and heterogeneity may lead, on the other hand, to more rent seeking, corruption, expropriation, and government spending to placate all groups, as well as weaker property rights institutions (Annett, 2001; Easterly and Levine, 1997; Glaeser and Saks, 2004). Thus, there are effects of the increased heterogeneity of the population with larger jurisdiction sizes, although the direction of the impact is less clear with some theories predicting it lowers spending while others predicting it increases it (Schneider, 1987).

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13. Caplan's (2007) theory about voter irrationality is also related. According to Caplan, some personal beliefs (such as those related to immigration, minimum wages, religion, etc.) are more emotionally appealing than others, which creates a situation in which holding false beliefs generates almost no negative personal cost to individuals whose votes are not likely to be decisive. Being wrong about gravity has specific and high negative personal consequences; being wrong about the minimum wage generally does not. This effect should grow with reductions in the likelihood of being a decisive voter that accompany larger jurisdiction sizes.

2g Population as a control variable and population density

While there are no studies specifically examining the effects of population on economic freedom, several studies using EFNA do include population as a control variable linearly when analyzing other issues, and it is worth briefly mentioning these estimates prior to turning to some of the variables not related to size that are relevant for the current analysis. Even if the true relationship is U-shaped (or an inverted U), if most actual observations are on one side or the other of the peak, a linear estimation will capture the slope on that side of the minimum or maximum, although with observations on both sides it will likely be insignificantly different from zero.[14]

Dove and Sutter (2018) include population as a control variable in their analysis of how economic-development incentives affect economic freedom in US states, and the coefficient is significant in only one of their six specifications (negatively). In their analysis of the relationship between voter ideology and state-level economic freedom scores, Crowley, Dove, and Sutter (2017) also include population (linearly) as a control variable. The coefficient on population is negative and significant in almost all specifications for the labor, tax, and overall scores, but is never significant for the size of government score.[15] Again, all of these studies include population only linearly; nonetheless it is interesting that to the extent it has been included it is often either insignificant or negatively correlated with economic freedom.

The issue of population density is worthy of further discussion. While the theoretical literature postulates that the level of negative externalities may grow with density, and thus also the size of government regulation, taxation, and spending to manage them, the empirical literature has found that offsetting productivity gains and agglomeration economies make this relationship very unclear (Turok and McGranahan, 2013). Articles by Hankins and Hoover (2019) and Campbell and Mitchell (2011) both analyze EFNA data and their results report positive coefficients on measures of urbanization or density as a control variable, while Gu, Compton, Giedeman, and Hoover (2017) and Crowley, Dove, and Sutter (2017) include similar measures as a control and find no effect on economic freedom. Using country EFW scores, Lawson and Block (1996) include urbanization as a control variable and also find it to be insignificant. Thus, while it is worthwhile to consider a variable reflecting population density as a robustness check, the expectations based on mixed findings in prior literature are unclear. Including it also has drawbacks for our estimation because it is a non-linear combination of the effects of both population and geographic area, combining effects of both variables. Including them separately allows identification of the separate effects of each.

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14. For example, while one would expect an inverted-U shaped relationship between the size of government spending and economic growth in a country, all OECD countries appear to be on the downward sloping portion of that curve with governments currently above the growth-maximizing levels (Gwartney, Lawson, and Holcombe, 1998).

15. Nattinger and Hall (2012) include the initial (not current) population for each state at time of statehood in a cross-sectional model of economic freedom, but never find it to be significant.

2h Other related control variables from prior literature

In addition to variables reflecting geographic size and population, the prior literature points to several other control variables that are worthy of consideration.

Age distribution of the population

The first considers the age distribution of the population. While they only include age as a control variable, Campbell and Mitchell (2011) find that a greater proportion of citizens over the age of 65 is associated with higher overall economic freedom in US states. In their analysis of economic freedom levels across US Metropolitan Statistical Areas (MSAs), Millsap, Hobbs, and Stansel (2019) also include a control variable reflecting the share of the population aged 65 and over, with positive effects on the overall level of freedom, mostly coming through the subcategory of government size, although the effects differed when they considered different regions separately.[16] In contrast, Murphy and Tuszynski (2017) use country-level EFW data and panel methods and find that the share of the population over 65 has a negative impact on economic freedom as it increases the size of subsidies and transfers, increasing the size of government. Thus, there are mixed results in the literature, and including a measure of the share of the population over 65 is worthwhile.

Age of the jurisdiction's government

Some studies suggest that the length of time a jurisdiction's government has been in continuous operation may have effects worth examining. Olson (1982) argues that, in theory, institutional declines predictably happen the longer the duration of a government regime because interest groups become more entrenched. Similarly, the work of Higgs (1987) suggests that over time governments respond to crisis events by increasing their size and that these "ratchets" in spending never dissipate, leading to a larger government sector and more government regulation in older jurisdictions. Both of those theories predict economic freedom may decline with the age of a jurisdiction. In contrast, Bockstette, Chanda, and Putterman (2002) find a strong relationship between countries with a long experience with governmental institutions and their current institutional quality and political stability. They argue that countries with longer statehood have better institutions. So, while these offer conflicting predictions, they do suggest that *year of statehood* might be a worthwhile control to consider in the analysis.

Legal origin

There is evidence that an additional historical factor—the legal origin—may affect institutional quality (La Porta, Silanes, and Shleifer, 2008), with those jurisdictions founded in the English common-law tradition having superior protections of private property

16. While the results from the South and West showed positive effects on the overall level of economic freedom and the government-size subcategory when considered alone, there were no effects on any subcategory for the Northeast and Midwest, and additional positive effects in the subcategory of labor-market freedom for the West. When a sample was run omitting the South but including all other regions, the only effect was a positive one on the score for the subcategory for size of government.

when compared to, for example, those with origins in French civil law (having its origins in Roman law), although this effect is not supported in all studies (Murphy, 2019; March, Lyford, and Powell, 2017). Relevant for our analysis, studies such as that by La Porta, Silanes, and Shleifer (2008) classify Mexico and Argentina has having French (civil law) legal origins, while the United States, Canada, Australia, and India are classified as having British (English common-law) legal origins.

There are several subnational considerations, however. In particular, while the rest of Canada is based on the British common law, Quebec is the lone province with a civil code based on the French Napoleonic Code (it is also the province with Canada's lowest overall subnational economic freedom score in the most recent year of data, 2018). For the United States, there are ten states that initially had civil-law origins because they were initially settled by France, Mexico, or Spain prior to the American Revolution. These states are Alabama, Arizona, Arkansas, California, Florida, Louisiana, Mississippi, Missouri, New Mexico, and Texas. Eventually all but one of these states transitioned to the common law, with Louisiana retaining its French civil-law system. Berkowitz and Clay (2005, 2006) find lasting, negative, effects on judicial quality and constitutional stability in these 10 US states, and Nattinger and Hall (2012) specifically find these US states have lower levels of economic freedom.

Also worthy of discussion is the case of Germany, which is the only country in our sample normally classified as having German legal origins, which will be captured by the Germany country fixed-effects variable. However, in the report on German economic freedom from which data is acquired, they explicitly note that the "old federal states" are much different in their levels of economic freedom from the new states that once were a part of Socialist East Germany because of their prior socialist institutional systems; so, in our subsequent analysis, any German state that was formerly part of East Germany is coded as having Socialist legal origins. The prior empirical literature using international data has indeed found that countries with Socialist legal traditions have lower levels of economic freedom so there is a basis for including this variable.

Latitude and access to the ocean

As Brown (2014) notes, for a variety of reasons related to climate, disease, and colonization, it is common to include measures of latitude and access to the ocean in studies of institutions and development (Hall and Jones, 1999; Gallup and Sachs, 1998; Sachs, 2003; Acemoglu, Johnson, and Robinson, 2001). Based on prior literature one generally expects to find worse institutions in tropical climates (so a latitude variable would be positive, as it rises in both directions away from the equator in absolute value), and Brown (2014) indeed finds latitude is positive and significantly related to the overall economic freedom score of countries, and for scores in all five subcategories of the EFW index. Thus, latitude of each subnational jurisdiction will be considered in our analysis.[17]

17. Studies generally use the capital city's latitude (employed here) but the literature has considered latitude of the jurisdiction's geographic centroid and found no significant difference (Fagerberg, Srholec, and Knell, 2007).

Other studies in the development literature have found countries that border oceans tend to out-perform landlocked countries, and those studies tend to use a simple indicator dummy variable for whether a country has an ocean border (Bauer, 1991; Gallup and Sachs, 1998; Sachs, 2003). Thus, it is worthwhile to include a dummy variable for whether a subnational jurisdiction has an ocean border. In his country-level analysis, Brown (2014) creates two alternative replacements for the simple ocean-border dummy. The first, "*exitability*", Brown (2014) defines as the sum of land borders and coastline divided by total geographic area. We will also consider this alternative measure of ease of exit computed at the subnational jurisdictional level.[18] As an additional alternative, Brown computes the variable pair "*coastalness*" and "*shapefactor*". His *coastalness* variable is defined as the length of coastline divided by total geographic area, and *shapefactor* is calculated as $shapefactor = 1 - ((4 \times \pi \times \text{area})/\text{perimeter})$ based on the circularity ratio from Selkirk (1982).[19] For robustness, we will consider these as well, computed at the subnational level.

2i Political factors—an omitted variable

While the above discussion points to some variables that need to be considered in the analysis, it is worthwhile discussing the issue of partisan political control, which because of the nature of our multi-nation subnational data is not possible to include. Based on the previous literature, however, is likely that this omission is not a factor as there is no robust finding that partisan political control affects economic freedom, at least at the subnational level.

Hankins and Hoover (2019), for example, find no evidence that the political party of the state's governor, partisan composition of the state legislature, nor the percentage of political-party voters affects either overall economic freedom or the economic freedom of any of the three subcategories using the EFNA scores for the US states. Sobel and Leeson (2007) similarly find no evidence that the partisan split of state voters affects the level of economic freedom across US states, while Gu, Compton, Giedeman, and Hoover (2017) find that overall economic freedom is not related to party control of US state legislatures. Campbell and Mitchell (2011) find that as party margins of control in US states increase to either extreme, economic freedom values increase regardless of

18. Based on the logic of intergovernmental competition through exit (i.e., 'voting with your feet'), following Tiebout (1956) and Diamond (1997), one might expect better institutions when the ease of exit is higher as a result of the shape of a jurisdiction. Places with more irregularly shaped borders have lower average distance from any given internal geographic point to a point in a different jurisdiction. Hall (2016) employs Brown's (2014) measure of exitability and finds that countries with higher degrees of exitability have faster convergence in levels of economic freedom.

19. Also theoretically rooted in the idea of ease of exit, the logic is that for any given region, more circular shapes lead to higher average distances to exit. This measure produces a value of zero for shapes that are perfectly round, while producing higher values for more elongated shapes with a maximum value of one. For jurisdictions that are islands, Brown's measure of *exitability* is equal to the measure of *coastalness*.

party, suggesting that size of political dominance may matter, but it does not depend on partisan party control. In one of the rare studies to employ the EFNA data for the Canadian provinces, Bjørnskov and Potrafke (2012) find no effect of either government or parliament ideology on overall levels of economic freedom, nor for the subcategory scores reflecting the size of government and takings and taxation.

At the international, country level, Murphy (2019) finds that there is no robust evidence of an effect stemming from the political ideology of the executive and dominant legislative party using country-level political data. In contrast, Castro and Martins (2021), using country-level EFW data, do find that right-wing governments are associated with greater economic freedom, mostly in developing (emerging economies), but not as strongly in developed countries such as the ones in our sample. The effects were most significant for monetary stability and freedom to trade internationally, which are also both national (central) government policies.

Thus, while it is impossible to control for subnational partisan political effects in this multicountry analysis, they have not been found to be significant determinants of subnational economic freedom in the prior literature.[20] The lack of robust political effects actually makes this examination of "deep root" geographic and demographic factors even the more interesting as the factors considered here may be better able to explain these cross-jurisdiction differences in economic freedom. We now turn to our description of the data and empirical results.

20. To the extent that any papers have found significant effects on subnational economic-freedom levels from political party control, they tend to be limited to the subcategory of labor-market freedom alone, with conservatives being associated with higher levels of labor-market freedom (Bjornskov and Potrafke, 2012, 2013; Millsap, Hobbs, and Stansel, 2019), and the effect mostly being associated with the lower levels of union density and government employment in conservative regions. Occasionally, a paper finds an effect on taxes or spending, but these results are not consistent across studies.

3 Data and the Empirical Model

The main dependent variables in the analysis are the subnational economic freedom scores for each jurisdiction (state or province), and, when available for the country, the three subcategory scores that it comprises; unless otherwise noted, Area 1 is Government Spending; Area 2 is Taxation; Area 3 is Labor Market Freedom. (Greater detail on the sources, years, and availability of all variables can be found in Appendix A, p. 38). The data for the states of the United States, provinces of Canada, and states of Mexico comes from *Economic Freedom of North America 2020* (EFNA). This includes the 50 subnational jurisdictions (states) of the United States and 10 subnational jurisdictions (provinces) of Canada for the period 1981 to 2018, and 32 subnational jurisdictions (31 states and autonomous Mexico City) of Mexico for the period 2003 to 2018, and gives an overall subnational score and scores for the three subcategories.[21] The EFNA data are computed similarly for each jurisdiction and make a natural multi-country sample of their own to consider.

Irregularly published reports for three other countries that attempted to derive similar scores for subnational jurisdictions based on the Fraser Institute's EFNA framework were identified as follows (see Appendix A for details): 24 subnational jurisdictions (23 provinces and autonomous Buenos Aires City) of Argentina (*Índice de Desempeño Provincial 2019*) for 2017 and 2018 including both an overall score for economic freedom and scores in the three subcategories; 6 subnational jurisdictions (states) of Australia (*Economic Freedom Index 2013*) for 2001 to 2011 with overall scores only; and 16 subnational jurisdictions (states) of Germany for 1994, 1998, 2002, 2006, 2009, 2010, 2012, 2013 including an overall economic freedom score, and subcategory scores for which transformations were made to match the EFNA categories (as explained in Appendix A). Throughout we will run subsample regressions using just the EFNA data, regressions using just the non-EFNA data (Argentina, Australia, and Germany), and a combined sample using all six countries (as well as some specifications using each country separately).

Reports on the economic freedom of two other countries were identified but they were not as directly comparable. A 2007 report for 20 subnational jurisdictions of Italy

21. In *Economic Freedom of North America*, there is both a "subnational" and "all-government" index; here we use the "subnational" data as that includes only the activities of the subnational governments for a better match with the other reports. Because the country-level dummy variables remove any effects common to all states or provinces within each country, the country-level differences would be captured in those variables. Note that in *Economic Freedom of North America 2020*, the "subnational" data for Area 3 consists only of one subcategory 3A ("Labor Market Freedom"). The "all-government" data in EFNA broadens Area 3 to include country-level data from *Economic Freedom of the World* (EFW) on business and credit market regulation (as well as three additional areas based on EFW that are captured here by our country-level fixed-effects variables.)

(*Come cresce l'Italia: libertà economica nelle Regioni e attrattività del Paese*) claimed to measure economic freedom but instead contained 7 subcategories based on economic outcome and activity variables that normally are not included in an "economic freedom" index, so data from that report was not included in this analysis.[22] A report containing economic freedom scores for only 20 of the 36 subnational jurisdictions of India (*Economic Freedom of the States of India: 2013*) for 2005, 2009, 2011, 2013 was identified but the data is based on a methodology different from that used in EFNA, and the report has a scale over a different range of values and many different variables were included to reflect things not considered in the EFNA report (for example, property rights in an attempt to mirror EFW).[23] The report is not directly comparable, and lacks complete coverage of the country, but was at least based on variables reasonably related to economic freedom, so we will analyze the data for India in separate regressions later in the report with an overall index adjusted to a more comparable scale as a robustness check.

In all specifications, country fixed effects (dummy indicator variables) will be used for each state or province within each country (excluding one to avoid perfect collinearity with the constant). This will "normalize" them by adjusting for any differences in the mean values of these index scores across countries and reports. Thus, if the Argentina report, for example, has a different mean value than the German report, these country indicator variables would remove those differences. The variables would also pick up any factors common to all states or provinces within each country. For example, the different countries have different government structures with different degrees of decentralization of powers that these country indicators would also capture. However, to be sure any possible differences in the scales of the reports on economic freedom are not affecting the conclusions, and to eliminate other reasons that a pooled sample may be inaccurate, specifications will also be performed for each country separately including only the states or provinces in that country.

The prior literature has helped us to identify variables that will be included as independent variables in our analysis. First, the geographic area and population of each subnational jurisdiction will be included (in millions of individuals and in millions of square miles), along with their squared terms to account for U-shaped patterns or nonlinearities.[24] For example, if economic freedom (*EF*) is a quadratic

22. The report on Italy included, for example, variables such as per-capita income, business failure rate, import/export balance, research and development spending, interest rates, number of bank branches, motorway transport capacity, rail transport capacity, several measures of unemployment, percentage of young and female business executives, number of beds, poverty, migration, and immigration.

23. India is a federation comprising 28 states and 8 union territories (36 subnational jurisdictions), but the report provides data only for the 20 states for which data was available. While it is consistent with the other reports to exclude territories from the index, all reports, except that on India, include all major states.

24. Square-kilometre conversions of the main results will be given in the text, but readers wanting to convert any of the other results should multiply by 2.59 (one square mile is approximately 2.59 square kilometres).

function of geographic area of the form: $EF = \beta_1 \times Area + \beta_2 \times Area^2$, then an inverted-U shape pattern (suggesting a single value of *Area* that maximizes economic freedom) is reflected in a positive coefficient on the main linear variable ($\beta_1 > 0$) and a negative coefficient on the squared term ($\beta_2 < 0$). The same would be true for the population variable included with both terms. The actual value of the variable (geographic area or population) that maximizes economic freedom can be found through partial differentiation $\partial EF/\partial Area = \beta_1 + 2 \times \beta_2 \times Area$, and then setting this equal to zero and solving for the *Area* that maximizes *EF*, which would be: $Area^* = -\beta_1 / (2 \times \beta_2)$.

In contrast, a negative coefficient on the linear term ($\beta_1 < 0$) and a positive coefficient on the squared term ($\beta_2 > 0$) would be reflective of a U-shaped pattern where the highest economic freedom would either occur at the lowest or highest levels of the variable within the sample range (depending on the underlying data range and coefficient values). When both β_1 and β_2 are positive, economic freedom would be highest at the highest sample value of the underlying variable, while if they were both negative, economic freedom would be highest at the smallest (zero) value of the underlying variable. It is also important to note that, when both a variable and its square are included in a regression as variables, they may both be individually insignificant, but the pair may be jointly significant, so we will provide this joint significance test (F-test) for the pairs in the corresponding tables along with the computations of the values of geographic area and population that maximize economic freedom.

Depending on specification (several will be shown) the other variables taken from the literature review that are included are the latitude of each subnational jurisdiction's capital city, the year of statehood, the percentage of the population aged 65 and over, population density (per square mile), a dummy variable for an ocean border or Brown's (2014) alternative measures of *exitability*, or Brown's (2014) *coastalness* and *shapefactor* pair variables, and indicators for French legal origin or Socialist legal origin. Finally, because some countries have an autonomous national capital region that is included as a subnational jurisdiction in the data we include a dummy indicator variable in case these regions are different, and also estimate specifications without these regions included in the sample.[25] For each country, demographic information was collected from the corresponding national statistical agency (details in Appendix A), and all geographic variables were computed from the Homeland Infrastructure Foundation-Level Data (HIFLD) GIS files.[26] Appendix B (p. 40) provides descriptive statistics for all variables employed in the report for the various regression samples estimated.

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25. Autonomous national capital cities in the analysis are Buenos Aires City (CABA) in Argentina, Berlin in Germany, Ciudad de Mexico (Mexico City) in Mexico. Washington, DC in the United States would be another case but the EFNA report does not contain data for Washington, DC.

26. I thank Chris Mothorpe from the College of Charleston for his help in acquiring this data.

As for our estimation strategy, because most of our variables are time-invariant (geographic area, latitude, statehood, ocean border, legal origins, etc.) we follow Feldmann (2019) and use a panel "between" specification using the entire panel sample of data for all years available.[27] For robustness we also consider specifications using just the final single cross-sectional year for which all variables are available for each country. For each regression, the number of cross-sectional units as well as the total sample on which the regression is based are shown in the results table.

27. Using state and year fixed effects to analyze panel data results in an isolation of only within-state (or province) variations caused by variables that change on a more frequent basis, for example, changes in political control or macroeconomic variables. It does not identify the effects caused by more permanent cross-sectional differences in geography or size (Hankins and Hoover, 2019; Fredriksson, Wang, and Warren, 2013). Panel random effects GLS estimators were rejected based on Hausman tests. Panel between models employ averages for each variable across all years for which data is available, employing the full sample of data for all countries and years in the analysis to extract correlations from differences across jurisdictions rather than changes within each jurisdictions, but using all observations.

4 Results for Overall Economic Freedom

Table 1 shows the initial regression results employing the EFNA sample (United States, Mexico, Canada) data in columns (1) and (2); the other countries for which economic freedom data exists (Argentina, Australia, and Germany) in columns (3) and (4); and a combined sample in columns (5) and (6) that includes the data for all six countries. For each pair of regressions, the first employs the traditional measure that uses an indicator dummy variable for whether the subnational jurisdiction has an ocean border (*ocean border*), while the second employs Brown's (2014) more sophisticated measure of *exit-ability* described in the literature review section. In all three samples, the simple *ocean border* dummy produced a better model fit according to Adjusted R^2, although neither variable was statistically significant. This suggests no systematic difference in the economic freedom scores within countries of landlocked provinces or states from the scores of those that border oceans, once all other variables are considered.[28]

Prior to discussing our main variables, let us consider the results for the other control variables. *Latitude* is positively correlated with economic freedom scores, and significantly so in the other country (non-EFNA) data sample. *Year of statehood* is negatively correlated with economic freedom scores, and significantly so in the other country (non-EFNA) data sample (meaning older states or provinces are more economically free). Economic freedom is significantly higher in jurisdictions with a greater percentage of the population over age 65 in the other country (non-EFNA) data sample (*Percentage aged 65+*). Jurisdictions with a *socialist legal origin* are significantly less economically free (*French legal origin* is insignificant), and several of the country fixed effects are significant, simply accounting for differences in the mean values of the index scores across countries.

In all six specifications, both *Population* and *Population*^{2} are individually significant (and they are jointly significant as well according to the F-test results at the bottom of the table). The coefficient on the linear term is positive, while the coefficient on the squared term is negative, implying an inverted-U shape to the relationship. Thus, economic freedom rises with population initially, attains a maximum, then begins to decline as population grows larger. The value that maximizes economic freedom computed from the coefficients according to the procedure outlined earlier is shown in the lower rows of the table and is roughly 12 million in the EFNA sample and combined sample, and 10 million in the other country (non-EFNA) sample.[29] A graphical depiction of this

28. One reason for this may be that there is relatively free migration within countries, so even an internal subnational jurisdiction has access to an ocean border if the country borders an ocean. Thus, it is possible that ocean access has country-level effects that do not differ by subnational jurisdiction.

29. Because the estimated maximums are non-linear combinations of coefficient estimates, there is no straightforward equation to compute the standard errors or confidence intervals of the values, and they must be computationally approximated through a non-trivial process of Monte Carlo simulation or the Delta method employing a Taylor series approximation (Xu and Long, 2005). This process was completed for several models using the

Table 1: Determinants of overall subnational economic freedom—between-group panel estimates

	Economic Freedom of North America (EFNA) countries		Other countries with economic freedom data		Combined sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	9.04*	8.51	16.4**	16.9**	9.32**	9.34**
	(1.69)	(1.60)	(2.38)	(2.43)	(2.07)	(2.07)
Area (millions miles^2)	−1.18	−1.34	3.12	2.30	1.11	1.08
	(−1.18)	(−1.22)	(1.11)	(0.835)	(1.22)	(1.15)
Area^2 (millions miles^2)	0.137	0.168	1.27	1.74	−0.510	−0.497
	(0.418)	(0.473)	(0.575)	(0.790)	(−1.61)	(−1.54)
Population (millions)	0.107**	0.101*	0.368**	0.359**	0.107**	0.107**
	(2.04)	(1.89)	(2.65)	(2.29)	(2.20)	(2.10)
Population^2 (millions)	−0.00412**	−0.00405**	−0.0181**	−0.0178**	−0.00428**	−0.00423**
	(−2.21)	(−2.15)	(−2.34)	(−2.12)	(−2.26)	(−2.18)
Latitude	0.00203	0.00143	0.136***	0.117***	0.0238	0.0240
	(0.0776)	(0.0533)	(4.13)	(4.26)	(1.21)	(1.24)
Autonomous national capital	−0.819	−0.397	0.762	0.820	0.539	0.565
	(−0.870)	(−0.399)	(1.06)	(0.859)	(0.856)	(0.754)
Year of statehood	−0.00128	−0.00101	−0.0112***	−0.0112***	−0.00311	−0.00312
	(−0.493)	(−0.391)	(−3.07)	(−3.03)	(−1.35)	(−1.35)
Percentage aged 65+	−0.0872	−0.0800	0.202**	0.199**	0.0597	0.0598
	(−1.19)	(−1.09)	(2.51)	(2.38)	(0.969)	(0.967)
Ocean border	−0.237		−0.440		0.0282	
	(−1.14)		(−1.02)		(0.146)	
Exitability		−2.52		−0.791		−0.122
		(−0.798)		(−0.332)		(−0.0632)
Canadian province	0.00599	−0.0328			−1.05**	−1.03**
	(0.0120)	(−0.0638)			(−2.11)	(−2.08)
Mexican state	−0.766	−0.668			0.811	0.814
	(−1.08)	(−0.950)			(1.26)	(1.26)
Argentinian province			3.20***	3.32***	0.262	0.252
			(4.41)	(4.58)	(0.553)	(0.536)
German state			0.237	0.706	0.479	0.485
			(0.217)	(0.681)	(0.733)	(0.718)
Australian state					−0.235	−0.208
					(−0.407)	(−0.376)
Socialist legal origin			−1.20**	−1.12*	−1.25**	−1.26**
			(−2.24)	(−1.92)	(−2.26)	(−2.20)
French legal origin	0.284	0.227			0.193	0.199
	(0.753)	(0.591)			(0.486)	(0.504)
Cross sectional obs.	92	92	46	46	138	138
Total observations	2792	2792	242	242	3034	3034
R^2	0.225	0.219	0.690	0.681	0.221	0.221
Adjusted R^2	0.107	0.100	0.577	0.565	0.118	0.118
F-stat (Area, Area^2)	2.618*	3.068*	12.355***	11.383***	1.638	1.562
F-stat (Pop, Pop^2)	2.453*	2.314*	3.757**	2.664*	2.628*	2.415*
EF Max Area (millions miles^2)	<0.0007 (sample min)	<0.0007 (sample min)	>1.213 (sample max)	>1.213 (sample max)	1.092	1.083
EF Max Pop (millions)	12.976	12.470	10.141	10.093	12.564	12.588

Notes: t-statistics in parentheses (robust standard errors); statistical significance as follows: *=10%; **=5%; ***=1%. *Economic Freedom of North America* (EFNA) countries are Canada, Mexico, and United States; other countries are Argentina, Australia, and Germany. Omitted country indicators are United States for EFNA and full samples, and Australia for other country data sample

relationship helps clarify, and is illustrated by the darkest shaded line (*EF Overall*) in figure 1A, figure 1B, and figure 1C, showing the estimated inverted-U patterns applied to the sample data ranges based on the coefficient estimates from table 1, columns (1), (3), and (5), for the overall economic freedom scores. The figures also include some lighter grey lines that will be discussed as additional empirical results are presented.[30]

Figure 1A: Effect of population on subnational economic freedom—EFNA countries

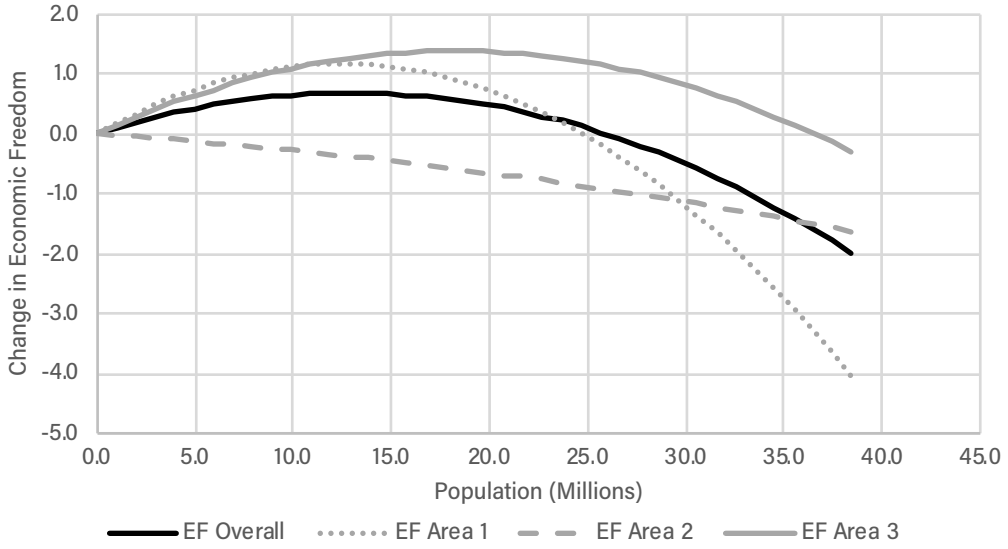
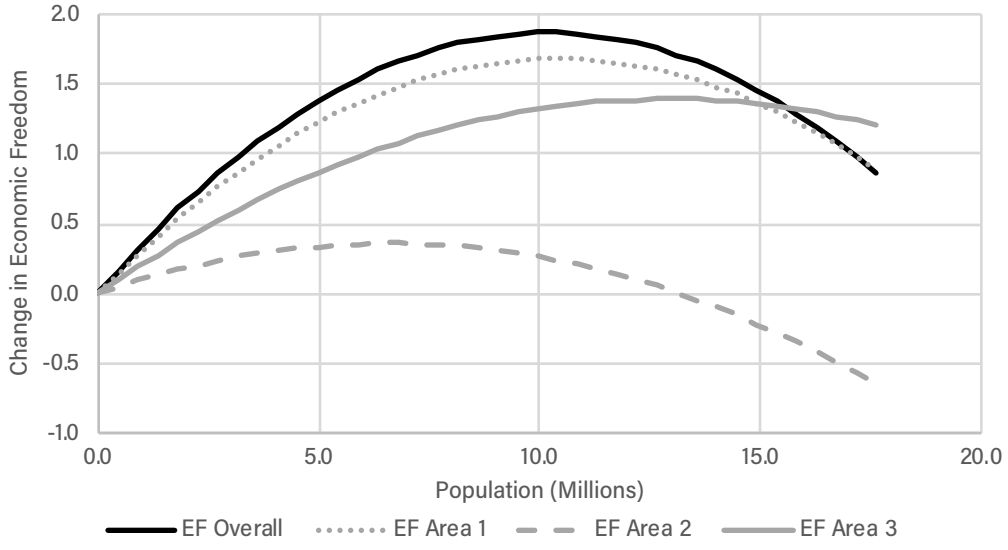


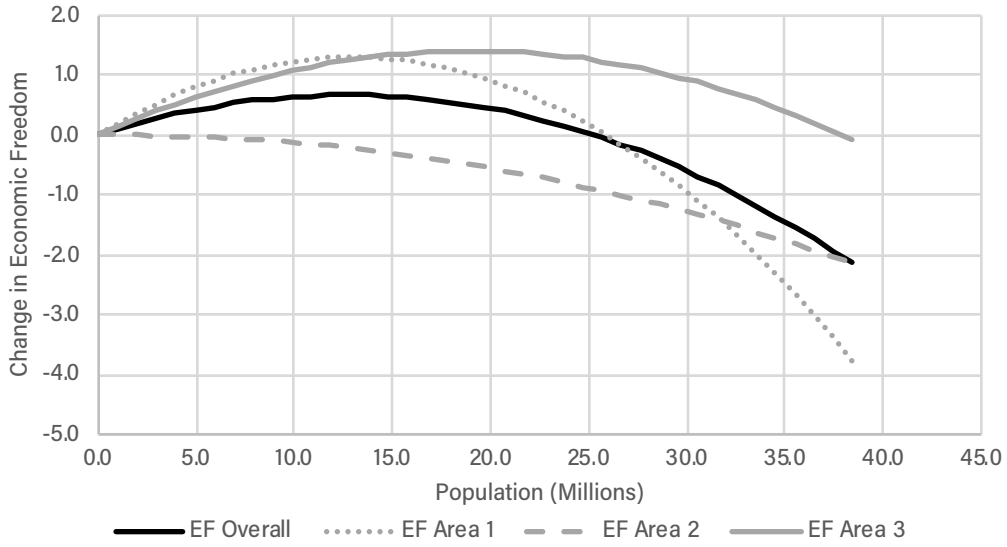
Figure 1B: Effect of population on subnational economic freedom—other countries



combined sample, and the standard errors were roughly 0.78 for the *Population* maximums and 0.97 for the *Area* maximums, implying 95% confidence intervals found by adding and subtracting roughly 1.52 from the *Population* maximum estimates, and 1.89 mi^2 (or 4.90 km^2) from the *Area* maximum estimates for all specifications presented.

30. These other lines refer to the results for the subcategory scores from table 5 that together form the influences on the overall freedom score that is shown.

Figure 1C: Effect of population on subnational economic freedom—combined sample



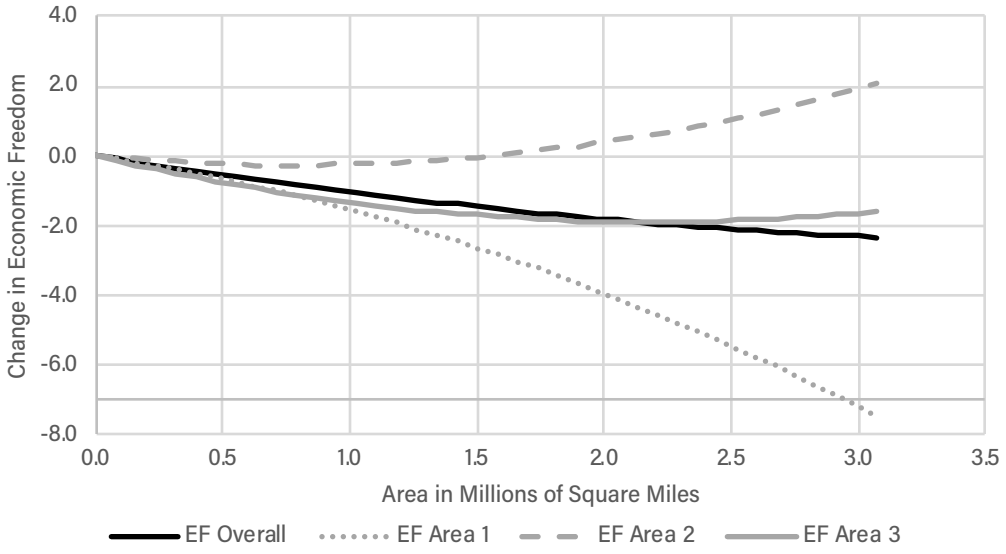
The results for geographic *Area* are not as clear or consistent. Both coefficients are individually insignificant, but the pair is jointly significant in both subsamples, although it becomes insignificant in the combined sample. For EFNA data, the linear term is negative, and the squared term is positive, suggesting a U-shaped pattern where economic freedom declines, then begins to improve, so the maximum could be at the lower or upper tail depending on the data range of the underlying variable.[31] Examining the data, indeed, the minimum point of the U is beyond the underlying maximum of the sample range-data, so across the entire actual sample values there is only a negative relationship. The maximum economic freedom occurs at the smallest geographic area (0.0007 million square miles or 0.0018 million square kilometres for the EFNA sample) and declines until the maximum sample value for geographic area (3.153 million mi^2 or 8.166 million km^2 for the EFNA sample). Again, the graphical depiction best clarifies, and it is illustrated by the darkest shaded line (*EF Overall*) in figure 2A showing the downward-trending line within the entire sample range for the EFNA sample data.[32]

In contrast, for the non-EFNA data for other countries, both *Area* and $Area^2$ are positive, suggesting economic freedom improves with the size of geographic area, and is thus highest at the sample maximum for the variable (1.213 million mi^2 or 3.142 million km^2 for the non-EFNA sample). For the combined sample, these two offsetting effects do average to produce an inverted-U shape pattern overall, where economic freedom

31. In cases where the maximum occurs at the endpoints of the actual underlying data values, those values will be given in the tables with an indication that it is a sample *min* or sample *max*; a ">" or "<" will also accompany the estimate because it is unclear how much further out of sample the relationship continues but it likely may continue below or above the value indicated, but for an uncertain range.

32. Because figure 2A includes the effects of subcategory scores based on the results from table 5, which excludes Australia (for which subcategory scores were not available from the publishing institute), the axis range is restricted to that sample-range maximum (0.217 million mi^2 or 0.562 million km^2).

Figure 2A: Effect of area on subnational economic freedom—EFNA countries



grows with geographic area up to around 1.09 million square miles (or 2.8 million square kilometres) and declines beyond that point. Both of these results are depicted graphically using the darkest shaded lines (*EF Overall*) in figure 2B for the sample for other (non-EFNA) countries, and figure 2C for the combined sample.

Table 2 shows three additional specifications for each sample. The first column of each shows the estimation when *Area* is included only linearly. The second column shows the estimates when *Area* is replaced entirely with a variable reflecting *Population density*. The third column of each sample shows the estimates when most of the controls are omitted and only the main country fixed effects are included with the *Population* and *Area* linear and squared terms. *Population density* is insignificant in all specifications.

Figure 2B: Effect of area on subnational economic freedom—other countries

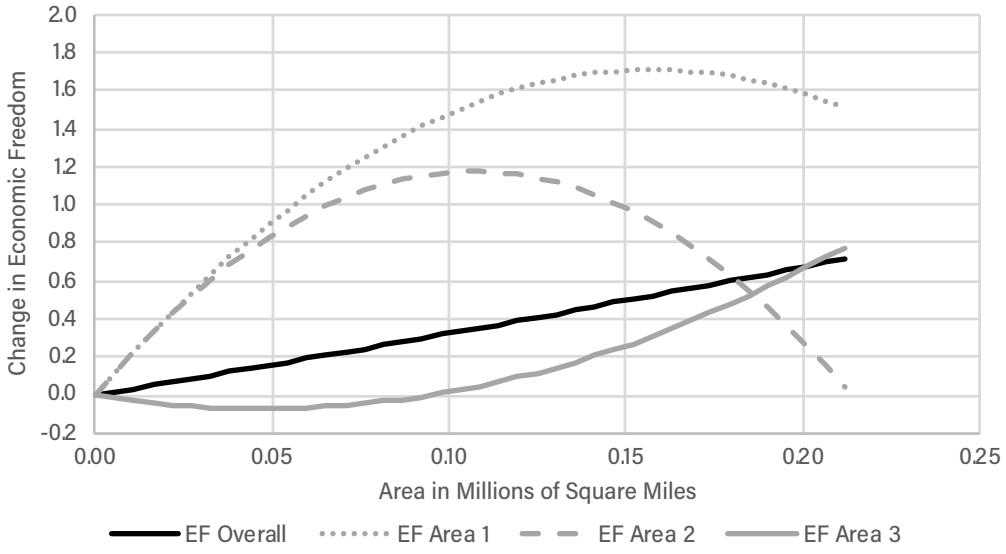
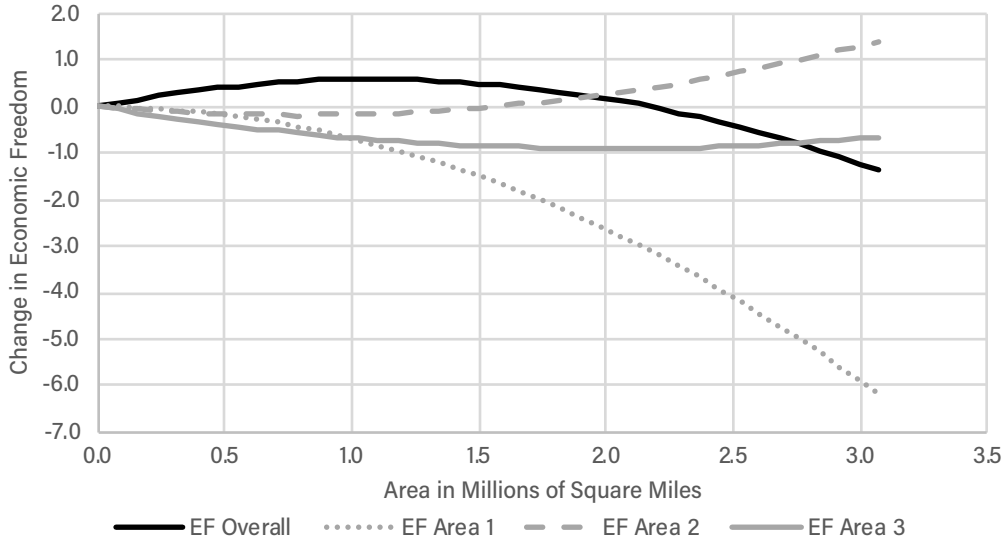


Figure 2C: Effect of area on subnational economic freedom—combined sample



As before, the results show that basically economic freedom declines with *Area* in the EFNA sample, but rises with *Area* in the non-EFNA sample, somewhat cancelling out in the combined sample to a point where the *Area* variables could be excluded without losing explanatory power (jointly insignificant). Nonetheless, the estimated maximums associated with *Population* are almost identical to what they were in table 1, with a population of around 12 million in the EFNA sample being associated with the highest levels of economic freedom, 10 million in the non-EFNA sample, and 13 million in the combined sample.

Table 3 shows three additional estimations for each sample, the first using only a single cross-sectional year of data (for each country the most recent year for which all variables are available), the second using the full panel of data that was used in the prior tables but using Brown's (2014) alternative measures of *Coastalness* and *ShapeFactor* (in substitute for *Exitability* or *Ocean Border*), and the third excluding the autonomous national capital regions from the analysis. Again, the results are entirely robust to these different estimations, with the only notable difference being that the single recent year cross-sectional results produce slightly larger maximum values for *Population* for the EFNA sample.

Table 4 shows estimations for each country individually. It is important to discuss why these regressions are specifically critical to the analysis. There are factors for which it is impossible to control that may differ across countries, such as the degree of centralization, or factors related to the intertwined nature of the number compared to the size of jurisdictions, or even simply that the economic freedom reports and scales may differ. By estimating each country separately these issues are removed. If regressions performed for each country separately produce similar results, we can be sure none of these other factors were affecting the results.

Table 2: Determinants of overall subnational economic freedom—alternative specifications set 1

	Economic Freedom of North America (EFNA) countries			Other countries with economic freedom data			Combined sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	9.36*	11.4**	5.60***	16.5**	17.3*	3.19***	8.43*	9.65**	5.33***
	(1.78)	(2.12)	(26.2)	(2.42)	(1.87)	(3.29)	(1.88)	(2.15)	(23.6)
Area (millions miles^2)	−0.788**		−0.642	4.63***		1.76	−0.266		0.803
	(−2.26)		(−0.724)	(4.99)		(0.512)	(−0.814)		(0.920)
Area^2 (millions miles^2)			−0.00597			0.921			−0.439
			(−0.0197)			(0.335)			(−1.43)
Population (millions)	0.102**	0.0732	0.0749	0.344**	0.378**	0.425**	0.123**	0.117**	0.123**
	(2.01)	(1.41)	(1.54)	(2.62)	(2.21)	(2.52)	(2.54)	(2.47)	(2.56)
Population^2 (millions)	−0.00401**	−0.00305	−0.00315*	−0.0172**	−0.0177*	−0.0202**	−0.00456**	−0.00440**	−0.00469**
	(−2.19)	(−1.65)	(−1.82)	(−2.29)	(−1.81)	(−2.10)	(−2.40)	(−2.35)	(−2.53)
Population density		0.000226			7.42e−05			0.000122	
		(0.449)			(0.734)			(1.63)	
Latitude	0.00110	−0.0262		0.135***	0.0933**		0.0240	0.0190	
	(0.0424)	(−1.12)		(4.14)	(2.25)		(1.22)	(1.01)	
Autonomous national capital	−0.778	−3.85		0.873	−0.307		0.455	−1.24	
	(−0.835)	(−0.588)		(1.28)	(−0.193)		(0.719)	(−1.03)	
Year of statehood	−0.00144	−0.00243		−0.0113***	−0.00906*		−0.00262	−0.00304	
	(−0.564)	(−0.936)		(−3.13)	(−1.91)		(−1.14)	(−1.33)	
Percentage aged 65+	−0.0878	−0.0195		0.200**	0.0799		0.0622	0.0422	
	(−1.20)	(−0.284)		(2.52)	(0.636)		(1.00)	(0.679)	
Ocean border	−0.216	−0.268		−0.487	−0.106		−0.0237	−0.0776	
	(−1.08)	(−1.30)		(−1.16)	(−0.186)		(−0.124)	(−0.402)	
Canadian province	−0.126	−0.268	−0.377				−0.590	−0.636	−0.849*
	(−0.328)	(−0.681)	(−0.852)				(−1.43)	(−1.63)	(−1.79)
Mexican state	−0.746	−0.503	−0.122				0.707	0.533	0.197
	(−1.06)	(−0.704)	(−0.339)				(1.10)	(0.824)	(0.488)
Argentinian province				3.27***	0.922	1.73**	0.194	0.0922	−0.0462
				(4.63)	(1.04)	(2.08)	(0.408)	(0.195)	(−0.113)
German state				0.480	−0.580	1.95*	0.319	0.518	0.703*
				(0.480)	(−0.454)	(1.97)	(0.491)	(0.789)	(1.92)
Australian state							0.200	0.133	−0.290
							(0.390)	(0.274)	(−0.558)
Socialist legal origin				−1.24**	−0.837	−1.02	−1.24**	−0.950	−1.18**
				(−2.38)	(−1.15)	(−1.62)	(−2.23)	(−1.64)	(−2.23)
French legal origin	0.256	0.0218	0.179				0.274	0.244	0.0452
	(0.693)	(0.0592)	(0.569)				(0.693)	(0.631)	(0.124)
Cross sectional obs.	92	92	92	46	46	46	138	138	138
Total observations	2792	2792	2792	242	242	242	3034	3034	3034
R^2	0.223	0.176	0.170	0.687	0.466	0.354	0.205	0.217	0.170
Adjusted R^2	0.117	0.063	0.101	0.585	0.293	0.235	0.107	0.121	0.097
F-stat (Area, Area^2)	N/A	N/A	3.450*	N/A	N/A	3.023*	N/A	N/A	1.910
F-stat (Pop, Pop^2)	2.415*	N/A	1.679	3.765**	N/A	3.701*	3.269**	N/A	3.413**
EF Max Area (millions miles^2)	<0.0007 (sample min)	N/A	<0.0007 (sample min)	>1.213 (sample max)	N/A	>1.213 (sample max)	N/A (insignificant)	N/A	0.91416
EF Max Pop (millions)	12.658	12.000	11.906	10.005	10.686	10.531	13.429	13.288	13.063

Notes: t-statistics in parentheses (based on robust standard errors); statistical significance levels denoted as follows: *=10%; **=5%; ***=1%. *Economic Freedom of North America* (EFNA) countries are Canada, Mexico, and United States, other countries are Argentina, Australia, and Germany. Omitted country indicators are United States for EFNA and full samples and Australia for other country data sample.

Table 3: Determinants of overall subnational economic freedom—alternative specifications set 2

	Economic Freedom of North America (EFNA) Countries			Other countries with economic freedom data			Combined sample		
	(1) Final Year	(2) Panel	(3) Panel No Cap	(4) Final Year	(5) Panel	(6) Panel No Cap	(7) Final Year	(8) Panel	(9) Panel No Cap
Constant	5.08	7.99	9.04*	14.6*	15.2**	18.3**	8.47*	10.4**	10.5**
	(0.813)	(1.50)	(1.69)	(1.84)	(2.18)	(2.52)	(1.88)	(2.29)	(2.33)
Area (millions miles^2)	0.0160	−2.42*	−1.18	0.638	−4.92	3.71	2.19*	0.203	1.02
	(0.0155)	(−1.79)	(−1.18)	(0.226)	(−0.845)	(1.28)	(1.76)	(0.163)	(1.13)
Area^2 (millions miles^2)	−0.271	0.525	0.137	3.32	5.82	0.774	−0.869**	−0.213	−0.501
	(−0.945)	(1.19)	(0.418)	(1.64)	(1.61)	(0.337)	(−2.44)	(−0.512)	(−1.61)
Population (millions)	0.114*	0.115**	0.107**	0.351***	0.343**	0.349**	0.0980**	0.121**	0.113**
	(1.95)	(2.17)	(2.04)	(3.46)	(2.43)	(2.47)	(2.39)	(2.45)	(2.36)
Population^2 (millions)	−0.00357**	−0.00434**	−0.00412**	−0.0174***	−0.0168**	−0.0171**	−0.00318***	−0.00465**	−0.00444**
	(−2.64)	(−2.32)	(−2.21)	(−3.12)	(−2.14)	(−2.18)	(−2.98)	(−2.45)	(−2.38)
Latitude	0.0277	−0.00420	0.00203	0.134***	0.102***	0.140***	0.0355*	0.0175	0.0232
	(0.958)	(−0.158)	(0.0776)	(3.56)	(3.01)	(4.20)	(1.68)	(0.885)	(1.21)
Autonomous national capital	−0.135	−0.758		0.479	1.06		0.602	0.523	
	(−0.384)	(−0.812)		(1.32)	(1.35)		(0.766)	(0.828)	
Year of statehood	0.000919	−0.000835	−0.00128	−0.0102**	−0.00993**	−0.0119***	−0.00241	−0.00373	−0.00339
	(0.323)	(−0.314)	(−0.493)	(−2.40)	(−2.61)	(−3.17)	(−1.05)	(−1.59)	(−1.48)
Percentage aged 65+	−0.115*	−0.0667	−0.0872	0.188***	0.168*	0.151	0.0205	0.0520	0.0147
	(−1.77)	(−0.903)	(−1.19)	(2.94)	(1.93)	(1.51)	(0.365)	(0.843)	(0.222)
Ocean border	−0.148		−0.237	−0.462		−0.579	−0.0704		−0.0632
	(−0.674)		(−1.14)	(−1.46)		(−1.25)	(−0.424)		(−0.326)
Shapefactor		−0.000382			−0.00243			−0.000586	
		(−1.02)			(−1.35)			(−1.52)	
Coastalness		−3.22			2.99			4.70	
		(−0.734)			(0.355)			(1.15)	
Canadian province	−1.35***	0.241	0.00599				−2.30***	−1.00*	−0.945*
	(−3.71)	(0.442)	(0.0120)				(−4.60)	(−1.90)	(−1.91)
Mexican state	−2.05***	−0.635	−0.766				−0.373	0.846	0.523
	(−2.69)	(−0.898)	(−1.08)				(−0.545)	(1.32)	(0.790)
Argentinian province				3.79***	2.57***	2.92***	0.277	0.351	−0.00268
				(6.66)	(2.88)	(3.65)	(0.561)	(0.745)	(−0.00550)
German state				0.222	0.879	0.512	0.0685	0.869	0.773
				(0.203)	(0.749)	(0.447)	(0.130)	(1.25)	(1.16)
Australian state							−1.35***	−0.125	−0.118
							(−2.87)	(−0.218)	(−0.207)
Socialist legal origin				−1.09***	−1.13**	−1.06*	−0.927***	−1.16**	−1.10*
				(−2.97)	(−2.14)	(−1.91)	(−3.03)	(−2.10)	(−1.94)
French legal origin	0.0759	0.202	0.284				−0.0354	0.189	0.218
	(0.234)	(0.532)	(0.753)				(−0.0857)	(0.484)	(0.559)
Cross sectional obs.	92	92	91	46	46	44	138	138	135
Total observations	92	2792	2776	46	242	232	138	3034	3008
R^2	0.498	0.238	0.224	0.659	0.700	0.665	0.403	0.238	0.221
Adjusted R^2	0.422	0.111	0.116	0.536	0.578	0.549	0.324	0.130	0.123
F-stat (Area, Area^2)	5.660***	3.829**	2.618**	23.825***	5.621***	12.138***	8.979***	0.894	1.834
F-stat (Pop, Pop^2)	5.000***	2.712*	2.453*	6.503***	3.190*	3.303**	4.626**	3.163**	2.957*
EF Max Area (millions miles^2)	0.02953	<0.0007 (sample min)	<0.0007 (sample min)	>1.213 (sample max)	>1.213 (sample max)	>1.213 (sample max)	1.2632	0.476	1.0186
EF Max Pop (millions)	15.943	13.270	12.976	10.115	10.115	10.186	15.422	12.963	12.768

Notes: t-statistics in parentheses (based on robust standard errors); statistical significance levels denoted as follows: *=10%; **=5%; ***=1%. *Economic Freedom of North America* (EFNA) countries are Canada, Mexico, and United States, other countries are Argentina, Australia, and Germany. Omitted country indicators are United States for EFNA and full samples and Australia for other country data sample.

Table 4: Determinants of overall subnational economic freedom—between-group panel estimates for individual countries

	Canada	United States	Mexico	Argentina	Australia	Germany
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	4.73***	5.49***	4.88***	3.72***	4.17	5.90***
	(8.72)	(18.9)	(13.3)	(4.25)	(2.04)	(28.7)
Area (millions miles^2)	−2.44	0.880	−7.92	13.2	−0.953	14.6
	(−1.07)	(0.475)	(−0.535)	(0.682)	(−0.136)	(1.00)
Area^2 (millions miles^2)	−0.196	−0.444	65.7	−24.9	3.11	−115
	(−0.0737)	(−0.770)	(0.515)	(−0.275)	(0.581)	(−0.539)
Population (millions)	1.46*	0.0577	1.05***	0.993**	−0.00104	0.150*
	(2.58)	(1.11)	(3.02)	(2.49)	(−0.000658)	(1.90)
Population^2 (millions)	−0.100*	−0.00306	−0.0549**	−0.0515**	0.0378	−0.00842*
	(−2.50)	(−1.64)	(−2.34)	(−2.19)	(0.179)	(−2.20)
Socialist legal origin						−1.30***
						(−7.22)
French legal origin	−2.59	0.425				
	(−0.804)	(1.34)				
Cross sectional obs.	10	50	32	24	6	16
Total observations	380	1900	512	48	66	128
R^2	0.838	0.180	0.300	0.323	0.749	0.904
Adjusted R^2	0.636	0.086	0.192	0.180	−0.256	0.856
F-stat (Area, Area^2)	3.245	2.154	0.144	0.919	1.179	0.757
F-stat (Pop, Pop^2)	3.371	1.814	5.645***	3.526**	0.319	2.614
EF Max Area (millions miles^2)	<0.005 (sample min)	0.990	>0.124 (sample max)	0.265	>1.213 (sample max)	0.006
EF Max Pop (millions)	7.308	9.433	9.576	9.649	>7.219 (sample max)	8.907

Notes: t-statistics in parentheses (robust standard errors); statistical significance as follows: *=10%; **=5%; ***=1%.

Because of the small sample sizes when using each country separately (6 states for Australia, 10 provinces for Canada, and so on) only the main *Population*, *Area*, and *Legal origin* variables are included in the analysis. As was shown in table 3, omitting the other control variables had no significant impact on the estimates, so their omission helps to ensure the models can be estimated on the smaller sample sizes, although the results from Australia and Canada should not be considered as reliable as the other estimates as a result of the small sample sizes on which these estimates are based. Figure 3A and figure 3B show the individual country results for population graphically for the overall scores taken from the underlying data and estimates in table 4. As a result of the differing magnitudes of the effects, the United States and Germany are shown in figure 3A, while Canada, Mexico, Argentina, and Australia are shown in figure 3B.

The rather interesting result from table 4 is that the estimated population size that maximizes economic freedom for the countries with the larger sample sizes are almost identical—for the United States (9.4 million), Mexico (9.6 million), Argentina (9.6 million), and only slightly smaller for Germany (8.9 million). The striking similarity of these estimates on the different country samples is remarkable and leads to what is likely the most robust and clear conclusion of the report. Even though the degrees of freedom are

Figure 3A: Effect of population on subnational economic—United States, Germany

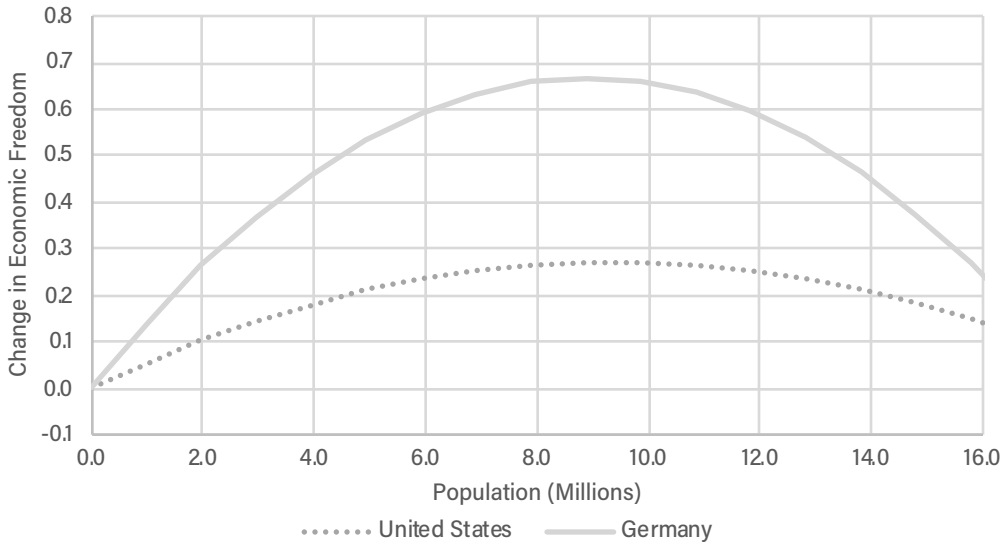
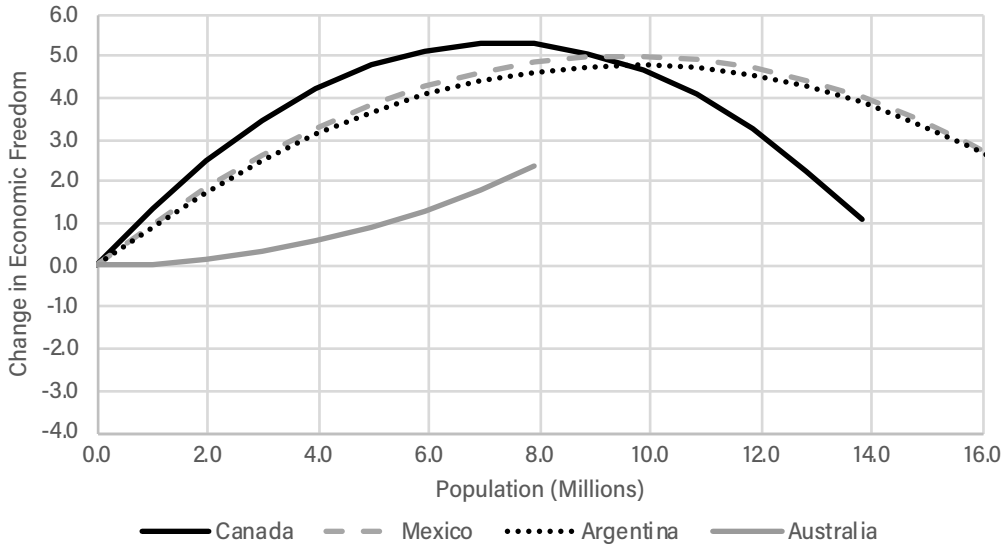


Figure 3B: Effect of population on subnational economic freedom—Canada, Mexico, Argentina, Australia



low, Canada's result is not much different (7.3 million). While Australia's result might seem out of line with the others, referring to figure 3B shows that it is estimated not only on a small sample, but over a range of actual data values that lie all below the estimated population maximum levels, so the relationship really only reflects the upward sloping part of the relationship that occurs below a population of around 9.5 million as Australia has no states with populations that size or larger.

The reason that the individual countries are all clustered at a slightly lower population value (9.5) than in the pooled samples (10.0 and 12.5) is that the pooled regressions force the effects of the other geographic *Area* variables to be the same for all countries, when they indeed differ. Allowing the coefficients on these other variables, particularly

geographic *Area*, to differ for each country brings the population coefficient estimates more in line across all countries. In addition, other complicating factors such as possibly different scales in the reports are removed. Thus, these individual clustered estimates at around 9.5 million are likely the more accurate value than the 10.0 or 12.5 found using the pooled samples. Based on these results, we can be fairly confident that jurisdictions with populations beyond around 10 million tend to have lower economic freedom scores, and economic freedom continues to decline as population grows larger for all countries with subnational jurisdictions of that size or larger in these samples of data.

The effects of the size of the geographic *Area* are interestingly different across the countries. Figure 4A and figure 4B show the individual country results for geographic *Area* graphically. As can be seen, for Canada and the United States the relationship is much more negative, such that the largest states and provinces have lower levels of economic freedom. In contrast, for Mexico, Argentina, and Germany there appear to be positive effects of size, and a nearly zero effect for Australia. One reason these graphical models are helpful is that it is possible to illustrate the estimated relationship using only the range of actual underlying data values, and one can see that, while the United States and Canada have jurisdictions exceeding 1.5 million square miles (or 3.9 million square kilometres), the other countries jurisdictions never exceed around 0.25 million square miles (0.65 million square kilometres), which is a completely different scale. What is going on, then, is that the estimated positive effects occur only at very small levels of geographic size, and once you reach large geographic areas like those present in Canada and the United States the negative effects of size become present. Thus, the conflicting estimates for the *Area* variables across countries may be more the result of the differences in the size distributions of the jurisdictions being on completely different scales, although the joint F-test results shown in table 4 suggest the *Area* variables add little to the explanatory power of the models. The fact that the individual country results for *Population* were so similar, particularly given the somewhat divergent results for the *Area* variable, make the population results even more intriguing and compelling.

Figure 4A: Effect of area on subnational economic freedom—United States, Canada

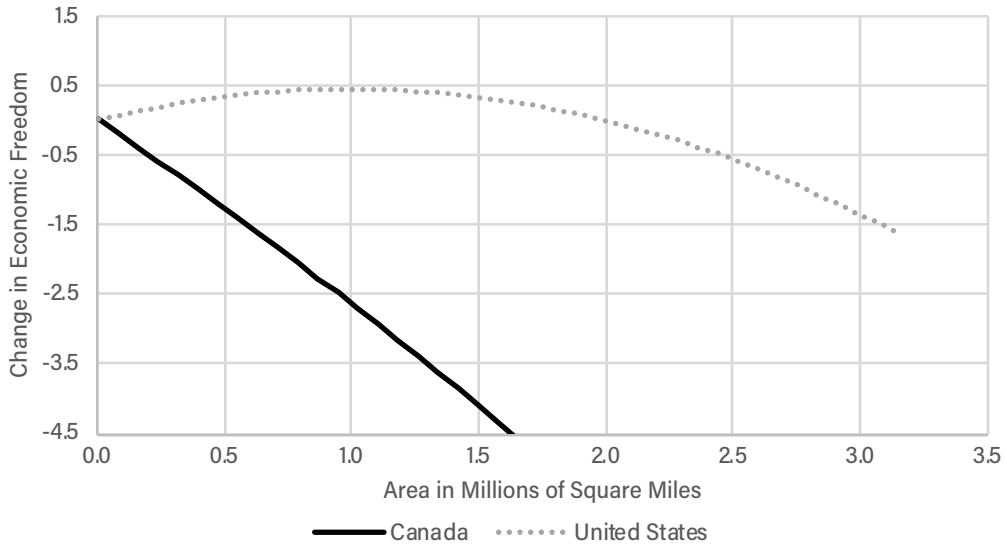
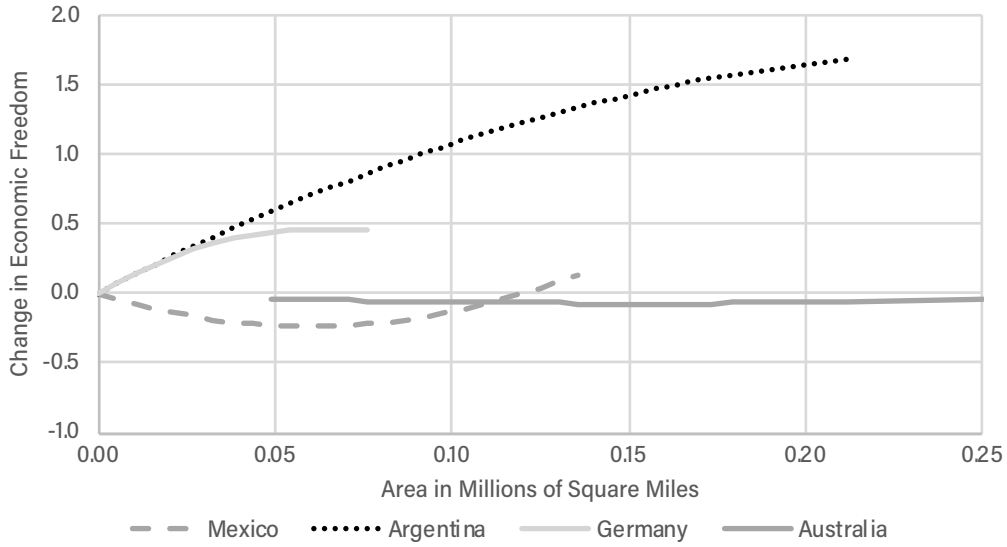


Figure 4B: Effect of area on subnational economic freedom—Germany, Mexico, Argentina, Australia



5 Scores for Economic Freedom Subcategories

While we now have a better understanding of how overall levels of subnational economic freedom change with size of jurisdiction, it is worthwhile to estimate these effects to the extent possible for the three subcategories that make up the overall subnational EFNA index (Area 1 is Government Spending; Area 2 is Taxation; Area 3 is Labor Market Freedom).[33] Returning to the pooled samples, table 5 and table 6 show estimations for the three subcategory scores.

Table 5 shows the models including both *Area* and $Area^2$, while table 6 shows the specifications excluding $Area^2$. The results from these tables help one to understand which of the economic freedom subcategories are affected most by each variable. The results are also shown graphically in the figures, being represented by the lighter grey lines in figures 1A, 1B, and 1C (pp. 20–21) for *Population*, and figures 2A, 2B, and 2C (pp. 22–23) for geographic *Area*, using the underlying data ranges and the coefficient estimates from table 5, columns (3), (6), and (9) for the subcategory economic freedom scores.

The population terms produce the same inverted-U for Area 1 (Government Spending) with estimated sizes of around 10 to 13 million, similar to the overall economic-freedom scores, and this similarity in the peaks can be seen in the figures 1A, 1B, and 1C. Area 2 (Taxation) scores, however, in most of the samples is maximized either at much lower levels of population or falls over the entire range. Thus, the first negative effects of larger population sizes on economic freedom are in Area 2 (Taxation), consistent with some of the public-choice theories. In contrast, for Area 3 (Labor Market Freedom), the maximums are roughly 6 million higher than for Area 1 (17 to 19 million). Thus, U-shape effects of population on overall economic freedom are produced by a combination of Area 2 beginning to decline earlier, while Area 3 begins to decline later, than Area 1, which is roughly in the middle.

The effects of jurisdiction size measured by geographic area are shown in figures 2A, 2B, and 2C. Geographic area is associated with declines in the Area 1 scores over the entire range in the EFNA sample and beyond a value of 0.158 in the non-EFNA sample, so it appears as mostly a negative relationship in the full sample as well that covers the larger range of values. The effects of geographic size on Area 2 scores are in different directions in the two samples (U-shape in EFNA and an inverted U-shape in non-EFNA), leading to a near linear muted effect in the combined sample. Area 3 similarly shows a different pattern in the two subsamples leading to a muted effect in the pooled sample.

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33. As was mentioned in an earlier note, for the "subnational" EFNA data employed here Area 3 consists only of Labor Market Freedom. The "all-government" index broadens this category by including country-level EFW measures of national policies regarding business and credit market regulation, as well as three other subcategories based on national-level policies and data. In this report, we examine only those data that differ among the states or provinces within each country and, in this analysis, any national level policies would be controlled for by the country-level fixed effects.

Table 5: Determinants of subnational economic freedom subcategory scores—between-group panel estimates

	Area 1: Government Spending			Area 2: Taxation			Area 3: Labor Market Freedom		
	(1) EFNA countries	(2) Other countries	(3) Combined sample	(4) EFNA countries	(5) Other countries	(6) Combined sample	(7) EFNA countries	(8) Other countries	(9) Combined sample
Constant	0.0720	21.9*	3.87	16.3**	6.18	10.1*	10.7*	19.9**	10.3**
	(0.00815)	(1.88)	(0.564)	(2.26)	(0.567)	(1.79)	(1.80)	(2.40)	(2.18)
Area (millions miles^2)	−1.13	21.7	−0.0270	−0.681	22.0	−0.475	−1.73	−2.97	−0.890
	(−0.681)	(1.12)	(−0.0162)	(−0.501)	(1.21)	(−0.348)	(−1.54)	(−0.214)	(−0.779)
Area^2 (millions miles^2)	−0.422	−68.8	−0.647	0.439	−103	0.304	0.395	31.4	0.220
	(−0.777)	(−0.758)	(−1.18)	(0.990)	(−1.21)	(0.674)	(1.08)	(0.487)	(0.583)
Population (millions)	0.190**	0.323	0.202***	−0.0215	0.109	0.00311	0.152**	0.216	0.149***
	(2.18)	(1.24)	(2.65)	(−0.303)	(0.443)	(0.0498)	(2.60)	(1.16)	(2.85)
Population^2 (millions)	−0.00767**	−0.0155	−0.00779***	−0.000533	−0.00829	−0.00153	−0.00415**	−0.00837	−0.00392*
	(−2.49)	(−1.10)	(−2.67)	(−0.212)	(−0.628)	(−0.635)	(−2.00)	(−0.835)	(−1.95)
Latitude	0.0626	0.223***	0.0962***	−0.0492	0.0662	0.00419	−0.00731	0.0949**	0.0211
	(1.45)	(3.83)	(3.04)	(−1.39)	(1.21)	(0.162)	(−0.251)	(2.29)	(0.973)
Autonomous national capital	2.59	2.26*	2.18**	−5.39***	−0.641	−2.44***	0.347	0.486	0.727
	(1.66)	(1.74)	(2.27)	(−4.23)	(−0.526)	(−3.10)	(0.330)	(0.525)	(1.10)
Year of statehood	0.00326	−0.0163***	−0.00119	−0.00481	−0.00515	−0.00336	−0.00227	−0.0119***	−0.00420*
	(0.759)	(−2.81)	(−0.338)	(−1.37)	(−0.952)	(−1.16)	(−0.786)	(−2.91)	(−1.74)
Percentage aged 65+	−0.165	0.225*	0.0519	0.0325	0.202	0.124	−0.129	0.290***	0.0727
	(−1.35)	(1.71)	(0.550)	(0.328)	(1.64)	(1.60)	(−1.58)	(3.10)	(1.12)
Ocean border	−0.174	−0.573	−0.0616	−0.327	0.0128	0.0156	−0.209	−0.289	−0.00853
	(−0.507)	(−0.798)	(−0.208)	(−1.17)	(0.0191)	(0.0644)	(−0.904)	(−0.567)	(−0.0419)
Canadian province	−1.11		−1.69**	0.639		−0.00184	0.493		−0.0965
	(−1.34)		(−2.10)	(0.944)		(−0.00278)	(0.881)		(−0.174)
Mexican state	−2.73**		−0.547	−1.46		−0.234	1.90**		3.82***
	(−2.34)		(−0.556)	(−1.53)		(−0.289)	(2.41)		(5.65)
Argentinian province		3.83*	−0.459		3.56*	−0.509		1.83	1.72***
		(1.91)	(−0.636)		(1.90)	(−0.858)		(1.29)	(3.46)
German state			−1.12			−2.09**			2.39***
			(−1.10)			(−2.51)			(3.42)
Socialist legal origin		−2.52***	−2.75***		3.08***	3.41***		−1.31**	−1.31**
		(−2.93)	(−3.29)		(3.83)	(4.96)		(−2.15)	(−2.27)
French legal origin	0.802		0.848	0.287		0.551	−0.236		−0.205
	(1.28)		(1.38)	(0.563)		(1.09)	(−0.561)		(−0.484)
Cross sectional obs.	92	40	132	92	40	132	92	40	132
Total observations	2792	176	2968	2792	176	2968	2792	176	2968
R^2	0.424	0.680	0.399	0.295	0.535	0.293	0.708	0.735	0.649
Adjusted R^2	0.336	0.554	0.322	0.188	0.353	0.202	0.664	0.631	0.604
F-stat (Area, Area^2)	8.474***	0.920	7.249***	1.239	0.756	0.663	1.745	0.333	0.429
F-stat (Pop, Pop^2)	3.105**	0.429	3.727**	0.697	0.388	0.906	3.720**	1.251	5.010***
EF Max Area (millions miles^2)	<0.0007 (sample min)	0.158	<0.0001 (sample min)	>3.153 (sample max)	0.107	0.780	<0.0007 (sample min)	>0.217 (sample max)	2.022
EF Max Pop (millions)	12.380	10.457	12.946	zero	6.545	1.020	18.331	12.887	19.002

Notes: t-statistics in parentheses (based on robust standard errors); statistical significance levels denoted as follows: *=10%; **=5%; ***=1%. *Economic Freedom of North America* (EFNA) countries are Canada, Mexico, and United States, other countries are Argentina and Germany (no area scores were able to be obtained for Australian data, so the sample descriptive statistics here differ from those in the Appendix as those include Australia). Omitted country indicators are United States for EFNA and full samples and Argentina for other country data sample.

Table 6: Determinants of subnational economic freedom subcategory scores—between-group panel estimates, alternative specifications

	Area 1: Government Spending			Area 2: Taxation			Area 3: Labor Market Freedom		
	(1) EFNA countries	(2) Other countries	(3) Combined sample	(4) EFNA countries	(5) Other countries	(6) Combined sample	(7) EFNA countries	(8) Other countries	(9) Combined sample
Constant	−0.924	21.6*	2.66	17.4**	5.80	10.7*	11.6*	20.0**	10.7**
	(−0.106)	(1.87)	(0.391)	(2.43)	(0.528)	(1.91)	(1.97)	(2.45)	(2.30)
Area (millions miles^2)	−2.35***	7.99	−1.89***	0.580	1.45	0.399	−0.597	3.31	−0.258
	(−4.05)	(1.13)	(−3.61)	(1.22)	(0.217)	(0.936)	(−1.52)	(0.664)	(−0.722)
Population (millions)	0.206**	0.382	0.223***	−0.0386	0.197	−0.00677	0.137**	0.189	0.142***
	(2.45)	(1.54)	(3.01)	(−0.561)	(0.834)	(−0.112)	(2.41)	(1.08)	(2.80)
Population^2 (millions)	−0.00800**	−0.0184	−0.00822***	−0.000188	−0.0127	−0.00133	−0.00384*	−0.00702	−0.00377*
	(−2.63)	(−1.37)	(−2.83)	(−0.0756)	(−0.993)	(−0.558)	(−1.87)	(−0.739)	(−1.90)
Latitude	0.0655	0.222***	0.102***	−0.0522	0.0646	0.00127	−0.00998	0.0954**	0.0190
	(1.52)	(3.84)	(3.28)	(−1.48)	(1.18)	(0.0497)	(−0.343)	(2.34)	(0.890)
Autonomous national capital	2.46	1.86	2.06**	−5.26***	−1.24	−2.39***	0.466	0.669	0.767
	(1.59)	(1.57)	(2.15)	(−4.15)	(−1.11)	(−3.05)	(0.445)	(0.803)	(1.17)
Year of statehood	0.00375	−0.0162***	−0.000640	−0.00533	−0.00502	−0.00362	−0.00274	−0.0120***	−0.00439*
	(0.887)	(−2.82)	(−0.183)	(−1.54)	(−0.921)	(−1.27)	(−0.956)	(−2.96)	(−1.84)
Percentage aged 65+	−0.163	0.240*	0.0551	0.0305	0.225*	0.122	−0.131	0.284***	0.0716
	(−1.34)	(1.85)	(0.584)	(0.308)	(1.83)	(1.58)	(−1.60)	(3.10)	(1.11)
Ocean border	−0.240	−0.709	−0.132	−0.259	−0.192	0.0489	−0.148	−0.227	0.0155
	(−0.721)	(−1.03)	(−0.455)	(−0.951)	(−0.292)	(0.206)	(−0.659)	(−0.466)	(0.0779)
Canadian province	−0.706		−1.09*	0.215		−0.286	0.112		−0.302
	(−1.10)		(−1.74)	(0.410)		(−0.560)	(0.258)		(−0.707)
Mexican state	−2.79**		−0.625	−1.40		−0.197	1.96**		3.85***
	(−2.40)		(−0.636)	(−1.47)		(−0.245)	(2.48)		(5.72)
Argentinian province		4.22**	−0.553		4.14**	−0.465		1.65	1.75***
		(2.20)	(−0.769)		(2.27)	(−0.790)		(1.22)	(3.56)
German state			−1.39			−1.97**			2.48***
			(−1.40)			(−2.43)			(3.66)
Socialist legal origin		−2.50***	−2.74***		3.11***	3.40***		−1.32**	−1.31**
		(−2.93)	(−3.27)		(3.84)	(4.96)		(−2.19)	(−2.28)
French legal origin	0.891		1.00*	0.196		0.480	−0.319		−0.257
	(1.45)		(1.66)	(0.390)		(0.972)	(−0.768)		(−0.622)
Cross sectional obs.	92	40	132	92	40	132	92	40	132
Total observations	2792	176	2968	2792	176	2968	2792	176	2968
R^2	0.419	0.673	0.392	0.286	0.511	0.291	0.704	0.733	0.648
Adjusted R^2	0.339	0.561	0.319	0.188	0.342	0.206	0.663	0.641	0.606
F-stat (Pop, Pop^2)	3.463**	1.272	4.561**	1.121	0.591	1.162	3.177**	1.169	4.940***
EF Max Area (millions miles^2)	<0.0007 (sample min)	N/A (insignificant)	<0.0001 (sample min)	N/A (insignificant)	N/A (insignificant)	N/A (insignificant)	<0.0007 (sample min)	N/A (insignificant)	<0.0001 (sample min)
EF Max Pop (millions)	12.897	10.381	13.556	<0.012 (sample min)	7.739	<0.012 (sample min)	17.804	13.444	18.782

Notes: t-statistics in parentheses (based on robust standard errors); statistical significance levels denoted as follows: *=10%; **=5%; ***=1%. *Economic Freedom of North America* (EFNA) countries are Canada, Mexico, and United States, other countries are Argentina and Germany (no area scores were available for Australia). Omitted country indicators are United States for EFNA and full samples and Argentina for other country sample.

Thus, the only possible robust relationship between geographic size and economic freedom found in this study is that, beyond around 0.158 million square miles (0.409 million square kilometres), economic-freedom Area 1 scores fall with geographic size. For context, roughly 30% of the subnational jurisdictions in the full sample are larger than that size. Beyond that point, government spending as a share of the economy (which is reflected in Area 1) rises with the geographic size of the jurisdiction.

The control variables produce some interesting results for the subcategory scores that are worth noting. In particular, the positive effect of latitude, negative effect of year of statehood, and positive effect of population aged 65+ found on overall economic freedom scores all seem to occur through their significant effects on both Area 1 and Area 3. Socialist legal origins are associated with lower levels of economic freedom in Area 1, but interestingly higher economic-freedom scores in Area 2. This is the opposite of the finding for national capital cities, which have higher Area 1 scores, but lower Area 2 scores. What is going on here is that, because this is subnational data, federal grants and transfers between jurisdictions create some regions that have higher government spending but lower taxes, and vice versa. In the case of national capitals, they tend to have less jurisdictional spending (which is obviously supplemented by the spending of the national government on its facilities and their protection in the region), with higher taxes. In the case of the former socialist East German states, with their significantly lower levels of economic development and income, they pay less in taxes but receive more in federal spending transfers when compared to the older states that were part of West Germany.

6 India

As was discussed in the data section, a subnational report exists for India containing scores for only a subset (20) of the Indian states. The index is on a different scale (0.23 to 0.65), and consists of subcategories and variables that do not match those of *Economic Freedom of North America* (for example, by including a subcategory reflecting property rights, and only one combined subcategory for government spending and taxes). However, to attempt to be as comprehensive as possible, we briefly also examine this data (multiplied by a factor of 10 to make it on a more comparable scale), and the regression results are provided in table 7.

Table 7: Determinants of subnational overall economic freedom for India—between-group panel estimates

	(1)	(2)
Constant	5.88	3.58***
	(0.249)	(4.76)
Area (millions miles^2)	35.1	12.6
	(0.937)	(0.580)
Area^2 (millions miles^2)	–150	–43.9
	(–0.712)	(–0.362)
Population (millions)	0.00261	0.00170
	(0.0929)	(0.121)
Population^2 (millions)	–0.0000549	–0.0000386
	(–0.421)	(–0.557)
Latitude	0.0210	0.0000386
	(0.349)	
Year of statehood	–0.00278	
	(–0.238)	
Percentage aged 65+	0.393	
	(1.12)	
Ocean border	–0.317	
	(–0.266)	
Cross sectional obs.	20	20
Total observations	80	80
R^2	0.300	0.119
Adjusted R^2	–0.209	–0.115
F-stat (Area, Area^2)	1.192	0.568
F-stat (Pop, Pop^2)	0.896	0.720
EF Max Area (millions miles^2)	0.117	0.144
EF Max Pop (millions)	23.801	21.989

Notes: t-statistics in parentheses (robust standard errors); statistical significance as follows: *=10%; **=5%; ***=1%.

For India, both population and geographic area show inverted-U patterns with distinct maximums, although with the small sample sizes the levels of statistical significance do not meet normal thresholds. Based solely on the coefficient estimates, the population level of Indian states that maximizes economic freedom is larger than for the other countries, around 22 to 24 million. This is not the entire story, however, because only three of the Indian states in the sample have populations less than the 22 million level that is the estimated maximum, so basically the estimate suggests that economic freedom falls with population across the remaining 17 Indian states. Accurately estimating the "turning point" where it began to decline is difficult with only three observations in that lower part of the sample. For reference, half of the Indian states in the sample have populations greater than 50 million, and the third most populated state is the one with the lowest overall economic freedom score in the sample. Thus, while the Indian data is not directly comparable, it basically produces the same result that subnational economic freedom levels are negatively correlated with population sizes above some level that is likely in roughly the same range as the other estimates of around 10 to 15 million. Thus, the India sample adds to the robustness of our conclusion about population.

The geographic area size that maximizes economic freedom in the Indian sample is 0.117 to 0.144 million square miles (0.303 to 0.373 million square kilometres), in the two estimations, but again this calculation is based on statistically insignificant coefficients. It is, however, interestingly similar to the value that was found maximizing the Area 1 scores in the prior section (0.158 million square miles or 0.409 million square kilometres). At best, it likely adds to the confidence that, beyond some point, economic freedom does decline with geographic area as well.

7 Conclusion

This report has attempted to provide the first-ever, multi-country, comprehensive examination of the determinants of subnational economic freedom scores using data from *Economic Freedom of North America* (EFNA) and several other reports modelled after the EFNA for other countries, covering a total of 158 states and provinces in seven countries. Variables reflecting geographic differences, demographic differences, and differences in legal origins were considered. One main focus of the analysis is to determine whether there are predictable effects of the size of jurisdictions on economic freedom. Given the likely inverted U-shape relationship between jurisdiction size and economic freedom, quadratic (squared) terms are important to include empirically, and this had never been done in any of the literature using the EFNA subnational data.

The main findings of the report are clear. Overall subnational economic freedom scores for states and provinces are negatively correlated with population above a size of around 9.5 million people, and this result is within a narrow band for all countries sampled, although it may be a bit lower for Canada, and a bit higher for India, but not by much. For a perspective within the literature, Flick and Rodriguez-Pose (2018) conclude that cities of up to three million are most conducive to economic growth. The negative effects of larger population on economic freedom occur in all three subcategories, although the onset times differ. The negative effects begin earliest on scores for Area 2 (Taxation) and latest on scores for Area 3 (Labor Market Freedom). Scores for Area 1 (Government Spending) follow a pattern similar to that of the overall average score.

In contrast, the effects of the szie of the geographic area of jurisdictions are slightly less clear. For countries in North America (Canada and the United States, in particular) with large jurisdictions, the effects seem to show negative influences of size for the largest jurisdictions, while for the other countries in the sample with only smaller jurisdictions the effects are either positive within their small sample ranges or zero. The one consistent finding is that scores for Area 1 tend to fall with geographic area, implying that government spending levels as a share of the economy are higher in larger jurisdictions, at least for those beyond a size of around 0.158 million square miles (0.409 million square kilometres). This is consistent with the idea that any economies of scale in the provision of government services indeed disappear very quickly with increases in geographic size, as the levels of spending (cost of government) rise disproportionately with larger jurisdictions. There may be a similar effect of geographic area on Area 3 but the results are less robust.

As far as other determinants, latitude does seem to be positively correlated with levels of subnational economic freedom, most significantly for states and provinces outside North America, and the effects mostly occur through Areas 1 and 3. Similarly, older subnational jurisdictions are more economically free, and the effects again are strongest outside North America, and on Areas 1 and 3. Subnational jurisdictions with socialist

legal origins tend to have lower overall levels of economic freedom, although there is not strong evidence that French legal origins have an effect beyond what is captured by the country fixed effects. Autonomous national capital regions have similar overall levels of economic freedom, although they tend to have higher own-source taxes (thus lower Area 2 scores) and offsetting lower levels of local spending (thus higher Area 1 scores). Finally, there seems to be no consistent evidence that, across the countries examined, ocean borders, ease of exit, or population density affect levels of subnational economic freedom after controlling for other factors.

Appendix A: Data Sources

Canada, Mexico, and United States

Dean Stansel, José Torra, and Fred McMahon (2020). *Economic Freedom of North America 2020*.<https://www.fraserinstitute.org/studies/economic-freedom-of-north-america-2020>. Years of data available: 1981–2018 (inclusive, for United States and Canada), 2003–2018 (inclusive, for Mexico); 10 subnational areas for Canada, 50 for the United States, 32 for Mexico, 3 area scores and overall subnational score (not the "all-government" score) employed.

Demographic data

U.S. Bureau of the Census, <https://www.census.gov/>; National Institute of Statistics, Geography and Informatics (INEGI) for Mexico <https://www.inegi.org.mx/>; Statistics Canada <https://www150.statcan.gc.ca/>; Mexico 65+ population age data only available for 2005, 2010, and 2015.

Argentina

Agustina Leonardi, Adriano Mandolesi, and Javier Bongiovanni (2019). *Índice de Desempeño Provincial 2019*. <https://libertad.org.ar/web/etiquetas/indice-de-desempeno-provincial/>. Years of data available: 2017, 2018; Annual reports from these years employed: 2018, 2019; 24 subnational areas, 3 area scores and overall score.

Demographic data

Instituto Nacional de Estadisticas y Censos - Republica Argentina, <https://www.indec.gob.ar/>.

Australia

Institute of Public Affairs (2014). *Economic Freedom Index 2013*. <https://ipa.org.au/wp-content/uploads/archive/FACTSHEET_2014.pdf>; Years of data available: 2001–2011 (inclusive). John Roskam at the Institute of Public Affairs confirmed that only this PowerPoint presentation remained (author departed), so overall score data was extracted from the bar graphs using WebPlotDigitizer (<https://automeris.io/WebPlotDigitizer/index.html>; see Drevon, Fursa, and Malcolm, 2017). 6 subnational areas, overall score only;

Demographic data:

Australian Bureau of Statistics, <http://stat.data.abs.gov.au/>

India

Bibek Debroy, Laveesh Bhandari, and Swaminathan S. Anklesaria Aiyar (2013). *Economic Freedom of the States of India: 2013*. <https://www.cato.org/economic-freedom-states-india>. Years of data available: 2005, 2009, 2011, 2013; 20 subnational areas, overall score on

different scale [0,1] so was multiplied by 10 to convert to [0,10] range, and subareas differ from *Economic Freedom of North America*, including areas reflecting property rights and a combined tax and spending area so areas are unable to be matched equivalently.

Demographic data:
2011 Census of India, <https://censusindia.gov.in/>. Population 65+ age data only available for 2011.

Germany

Clemens Fuest, Roman Bertenrath, and Patrick Welter (2015). *Wirtschaftliche Freiheit in den deutschen Bundesländern 2015*. <https://shop.freiheit.org/download/P2@535/47915/ Studie_Wirtschaftliche%20Freiheit%20in%20den%20deutschen%20Bundesl%C3%A4ndern_2015.pdf>. Years of data available: 1994, 1998, 2002, 2006, 2009, 2010, 2012, 2013; Annual reports from these years employed: 2009, 2013, 2014, 2015; 16 subnational areas, area scores were recombined to better match EFNA areas as follows: Areas 1A, 1B, 1D, 1E, 3A, 3B, 3C (Staatskonsum, öffentl. Investitionen, Sozialleistungen, Finanzhilfen, Sozialversicherungspflicht, Sozialhilfebezieher, Sozialhilfeniveau) were averaged to match EFNA Area 1; Areas 2A, 2B (Gewerbesteuerhebesatz, Steueraufkommen) were used to match EFNA Area 2; Area 1C (öffentl. Beschäftigte) was used to match EFNA Area 3.

Demographic data:
Federal Statistical Office, Germany, <https://www-genesis.destatis.de>.

Common data sources for all countries

Source for all geographic area data: Homeland Infrastructure Foundation-Level Data (HIFLD), <https://hifld-geoplatform.opendata.arcgis.com/datasets/political-boundaries-area>. The author would like to thank Chris Mothorpe (College of Charleston) for his help finding and retrieveing the GIS data. Legal origin sources and data cited in text; statehood data is compiled from various internet-searched sources. Google Translate was employed to translate country reports not written in English.

Appendix B: Descriptive Statistics

	Economic Freedom of North America (EFNA) countries			Other countries with economic freedom data			Combined sample			Appendix: data for India (not included in combined sample)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
EF Overall	5.63	2.21	8.78	5.80	1.72	8.75	5.64	1.72	8.78	4.07	2.30	6.50
Area 1	6.21	0.00	9.79	6.10	0.00	10.00	6.21	0.00	10.00	—	—	—
Area 2	5.51	0.00	9.42	5.05	0.00	8.90	5.49	0.00	9.42	—	—	—
Area 3	5.16	0.13	10.00	6.64	0.00	10.00	5.25	0.00	10.00	—	—	—
Area (million miles^2)	0.2073	0.0007	3.1530	0.1678	0.0001	1.2130	0.2041	0.0001	3.1530	0.0714	0.0152	0.1659
Population (millions)	4.45	0.12	39.46	3.98	0.16	18.08	4.41	0.12	39.46	56.21	6.38	206.30
Population density	133.00	0.13	13494.00	559.30	1.56	25191.00	171.00	0.13	25191.00	941.40	86.63	2403.00
Latitude	37.28	16.76	58.32	43.32	24.19	54.81	37.77	16.76	58.32	23.37	8.48	34.08
Autonomous national capital	0.01	0.00	1.00	0.04	0.00	1.00	0.01	0.00	1.00	N/A	N/A	N/A
Year of statehood	1847	1787	1974	1920	1783	1990	1853	1783	1990	1961	1912	2019
Percentage aged 65+	12.71	2.44	20.73	15.83	5.19	24.76	12.99	2.44	24.76	5.67	3.68	8.48
Ocean border	0.52	0.00	1.00	0.49	0.00	1.00	0.52	0.00	1.00	0.40	0.00	1.00
Exitability	0.04	0.01	0.22	0.08	0.01	0.48	0.04	0.01	0.48	0.05	0.02	0.14
Shapefactor	−672.60	−2510.00	−56.60	−443.30	−1258.00	−25.04	−654.40	−2510.00	−25.04	−318.00	−663.50	−91.59
Coastalness	0.02	0.00	0.16	0.02	0.00	0.11	0.02	0.00	0.16	0.01	0.00	0.08
Socialist legal origin	0.00	0.00	0.00	0.20	0.00	1.00	0.02	0.00	1.00	1961	1912	2019
French legal origin	0.33	0.00	1.00	0.20	0.00	1.00	0.32	0.00	1.00	5.67	3.68	8.48

Notes: : Economic Freedom of North America (EFNA) countries are Canada, Mexico, and United States, other countries with economic freedom data are Argentina, Australia, and Germany. Note regressions on subarea scores exclude Australia from the sample so the values in those samples differ slightly and are mentioned in the text where relevant. India is analyzed separately and is not included in the 'combined sample' measures.

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