

Economic freedom of North America at state borders¹

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Abstract. I use matched county pairs on either side of US state borders to investigate the causal effects of the Economic Freedom of North America index (EFNA) on local outcomes. This method is similar to Dube *et al.* (2010). I construct a panel of county pairs running from 1981–2012 and four measures of outcomes, logged real incomes, logged real per capita incomes, employment, and logged real wages, employing single year and five year differences-in-differences. I find small, but precisely estimated, effects on incomes but mixed effects on wages and employment. All regressions show low R^2 . This supports the hypothesis that state-level economic freedom improves capital income or that it attracts capital income across state borders.

1. Introduction

The use of economic freedom indices is becoming very widespread across several literatures (Hall and Lawson, 2014). Primarily, these studies have employed cross-sectional, time series, or panel analysis, as there have been few obvious opportunities to employ experimental and quasi-experimental methods that have gained popularity in recent decades (as in Angrist and Pischke, 2010). While the most work has been done using country indices (especially using Gwartney *et al.*, 2015), *Economic Freedom of North America* (EFNA) (Stansel *et al.*, 2014), which measures economic freedom of states and provinces of the US, Mexico, and Canada, is becoming commonly used as well (Hall *et al.*, 2015; Stansel 2013).

The innovation in this paper is to employ a quasi-experimental method, namely differences-in-differences in EFNA of matched county pairs at US state borders. Differences-in-differences became widespread following its use by Ashenfelter and Card (1985); this implementation here shares similarities to the implementation by Dube *et al.* (2010). The closest existing literature to this paper is Holmes (1998), who used state borders to argue that right-to-work legislation encourages manufacturing activity; however, my measure of economic

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¹ I thank Jiayi Li for her research assistance.

institutions is much more complete. Also, very similar is Crum and Gohmann (2016), who use border counties to measure the effects of various policies on firm deaths and firm births. Typically, the preferred LHS variable for studies using freedom indices is output. Due to the lack of output data at the county level, I use income. In addition, I also run identical analyses using wage and employment data.

I find statistically significant and positive effects of EFNA on both logged real income and logged real income per capita. However, these effects are quite small. A one point increase in EFNA corresponds approximately to a 1% increase in both income and income per capita, depending on the variable and on whether a 1 year or 5 year difference is used. The identical analysis using wage and employment data does not find clear effects. This is consistent with EFNA, in the short- and medium-run having a positive effect on capital income while leaving other outcomes approximately unchanged. There are two interpretations to this, that economic freedom improves capital productivity (through any number of mechanisms, perhaps by reducing disincentives to invest), or that economic freedom encourages in-migration of individuals possessing high capital income.

The structure of this paper follows. Section 2 will discuss data and the relatively simple implementation of differences-in-differences to the question of interest. Section 3 discusses the results. Section 4 concludes.

2. Data and method

The primary variable of interest, the EFNA index, has yearly data from 1981 to 2012. There is more than one version of EFNA. The version used here measures only state and local policies, as opposed to federal government policies (e.g., levels of spending) that happen to occur within state borders. Since much of the difference between the versions of EFNA amount to issues such as the location of retirees (and, therefore, Social Security and Medicaid benefits), the strictly subnational version of the index is more appropriate.

The subnational EFNA has three areas: Size of Government, Takings and Discriminatory Taxation, and Regulation. Much of it mirrors the worldwide index created by Gwartney *et al.* (2015), though the variables used are restricted so as to allow for a consistent index to measure Mexican states and Canadian provinces identically. The index may take values 0 to 10; in 2012, Texas ranked first in the US with a rating of 7.8 and Maine ranked last with a rating of 5.2. More variance is obtained when Mexican states and Canadian provinces are included.

Data on income and income per capita were found in the 'Personal Income, Population, and Per Capita Personal Income (CA1)' component of Bureau of Economic Analysis's Regional Economic Accounts. This data is complete from 1969 to present. Each were made real using annualized CPI data from the Bureau

Table 1. Descriptive statistics

Variable	<i>n</i>	Mean	Std dev	Min	Max
LN Real Income per cap, 1-year diff	42,485	0.0017	0.0595	-0.7709	1.0029
LN Real Income, 1-year diff	42,467	-0.0010	0.0603	-1.6404	0.7012
LN Real Income per cap, 5-year diff	37,285	0.0002	0.1034	-0.8059	1.2700
LN Real Income, 5-year diff	37,290	-0.0042	0.1106	-0.9367	0.9937
EFNA, 1-year diff	40,393	-0.0039	0.1440	-0.7908	0.8362
EFNA, 5-year diff	35,136	-0.0142	0.3134	-1.6897	1.2335
LN Real Avg Wage, 1-year diff	31,224	-0.0007	0.0461	-0.9056	0.7434
LN Real Avg Wage, year diff	26,014	-0.0038	0.0849	-0.9284	0.9378
Total Employment, 1-year diff	31,248	-98.6914	4286.6470	-122420	126553
Total Employment, 5-year diff	26,040	-525.3938	13252.6900	-267719	229960

Note: All variables are difference-in-difference county pairs.

Table 2. Centiles of economic freedom of North America differences-in-differences data

Percentile	1-Year Difference	5-Year Difference
0	-0.7908	-1.6897
10	-0.165	-0.376
20	-0.088	-0.213
30	-0.042	-0.106
40	-0.018	-0.039
50	-0.002	-0.000
60	0.013	0.034
70	0.038	0.094
80	0.079	0.196
90	0.158	0.338
100	0.8362	1.2335

of Labor Statistics.² Wage (total compensation) and employment data at the county level is made available from 1990 to present by Quarterly Census of Employment and Wages at the Bureau of Labor Statistics. Therefore, regressions with income as the LHS variable are 1981–2012 and regressions with wages and employment as the LHS are 1990–2012. Descriptive statistics of all differenced variables can be found in Table 1. Table 2 provides quartiles of the differences in differences of EFNA, to alleviate concerns regarding a small number of data points having a disparate effect on the results.

A total of eight regressions were performed, all with the same approximate structure. A general version of the model can be seen in equation (1). y is one of the four aforementioned outcome variables. The variables a and b denote each county of the county pair, t denotes year, and i denotes the number of years of

2 Consumer price index, all urban consumers, Series ID CUUR0000SA0.

the difference. i can take values of one and five in the regressions of this paper. This specification, with differences-in-differences on both sides of the equation, differs slightly from others but may offer even a greater level of control.³

$$(y_{t,a} - y_{t-i,a}) - (y_{t,b} - y_{t-i,b}) = \beta_0 + \beta_1((EFNA_{t,a} - EFNA_{t-i,a}) - (EFNA_{t,b} - EFNA_{t-i,b})) + \varepsilon. \quad (1)$$

The state border running through the county pair is assumed to be an arbitrary political boundary. Differencing across both time and the state border holds a host of other factors constant, from culture to weather to macroeconomic conditions. Still other variables can be argued to be endogenous (i.e., a common trend), but this methodology is still an improvement over earlier work. Moreover, this concern is partially addressed by estimating the model at the two different time horizons and not always finding consistent results, as we will see in the next section.

3. Results

Table 3 provides the results for regressions using income and income per capita. All regressions show economic freedom as being positive and significant at the 1% level. Nonetheless, the effects are very small, explaining less than 1% of the variation in each variable. A state increasing from the worst performing state (Maine) to the best (Texas) would increase EFNA by 2.6 points. Regression (1) implies that this would yield an increase in per capita income of 3.17%. However, the coefficient of the 5 year differenced per capita income, found in Regression (3), is statistically greater than that found in Regression (1), which suggests that it has an effect over time as well as on impact. Regressions (2) and (4), while both statistically significant and positive, do not exhibit a similar, increasing pattern over time.

Table 4 provides the results for regressions using wages and employment. Here, we find even smaller effects, if any at all. A 1 year difference in wages is negative, but this loses significance at 5 years. Similar effects can be found in employment, but at 5 years the sign flips. The regressions explain even less in terms of R^2 , with values approaching or hitting 0.0000. Given this, the best interpretation of Table 4 may be that economic freedom has no impact on labor markets. The implication of more income but no effect on wages is more capital income, which also means a higher capital share, contradicting Young and Lawson (2014).

3 Contrast to, for example, Dube et al. (2010). Crumm and Gohmann (2016), following Holcombe and Lacombe (2004), compare each county to the average of the contiguous counties on the other side of the state border on both sides of the equation. The approach here differs in that each county pair is its own data point, but it is otherwise very similar.

Table 3. Difference-in-difference analysis results, income, and income per capita

Regression	(1)	(2)	(3)	(4)
LHS	LN Real Income per cap, 1 year diff	LN Real Income, 1 year diff	LN Real Income per cap, 5 year diff	LN Real Income 5 year diff
EFNA, 1	0.0122*** (0.0021)	0.0120*** 0.0002		
EFNA, 5-year diff			0.0176*** (0.0017)	0.0094*** (0.0019)
constant	0.0001 (0.0003)	-0.0011*** (0.0003)	(0.0020) (0.0005)	-0.0038*** (0.0006)
<i>n</i>	39,917	39,904	34,675	34,684
Adj. <i>R</i> ²	0.0009	0.0008	0.0029	0.0007

*denotes significance at 90%. ** denotes significance at 95%. *** denotes significance at 99%.

Table 4. Difference-in-difference analysis results, wages, and employment

Regression	(5)	(6)	(7)	(8)
LHS	LN Real Avg. Wages, 1-year diff	LN Real Avg. Wages, 5-year diff	Employment, 1-year diff	Employment, 5 year diff
EFNA, 1-year diff	-0.0041** (0.0016)		-266.8292* (151.7782)	
EFNA, 5-year diff		-0.0014 (0.0015)		360.2751 (235.6425)
constant	-0.0007** (0.0003)	-0.0035*** (0.0006)	-97.0331*** (25.6445)	-539.180*** (88.7822)
<i>n</i>	28,628	23,414	28,644	23,436
Adj. <i>R</i> ²	0.0002	0.0000	0.0001	0.0001

*denotes significance at 90%. ** denotes significance at 95%. *** denotes significance at 99%.

Making sense of these results may require closer inspection of EFNA. EFNA contains no measure of the legal system or property rights enforcement, which may be the most important component of economic freedom (Gwartney, 2009). Moreover, while in the world index taxation and spending is a single area among five (20% of the index), spending and taxation are two of the three components of EFNA (67%). Additionally, one-third of the measures used to calculate labor market freedom (the only component of regulation that varies in the subnational index), is the percentage of all employees that are public employees. This too, while not identical to the size of government, is closely related, so much so that describing EFNA as 78% measures of the size of government is entirely reasonable. Given this, it is possible to interpret Table 4 as something akin to local austerity with short run effects and local multipliers, though the interpretation of local multipliers is far from straightforward.⁴

The results of Table 3 may be interpreted as a well-identified causal mechanism of economic freedom (with heavy weights on the size of government) on income and income per capita. This is consistent with either the view that broadly there is a causal mechanism between economic freedom and economic growth (de Haan *et al.*, 2006) or narrowly that there is a clear relationship between income growth and tax rates at the state level (Reed, 2008). However, it is also consistent with the argument that economic freedom is attracting incomes to move across state borders, as argued, in so many words, by Brown (2013). This is consistent with the small literature on economic freedom driving migration (Ashby, 2007; Cebula *et al.*, 2016). Thus, even if the method fails on ‘general equilibrium’ grounds, what we may simply be observing are Laffer Curve effects.

4. Conclusion

Applying the ‘credibility revolution’ to institutions presents challenges for researchers. In this paper, I attempt to meet this challenge by employing differences-in-differences and state borders as a means of matching pairs of counties. Economic freedom, as measured by the EFNA index, has a positive and statistically significant effect on income and income per capita at the 1% level in both 1 year and 5 year differences, but the effect is relatively small. Where 2.6 points spans the range of scores across all 50 states in 2012, one point of EFNA corresponds to only a 1% increase in income, approximately. The effects on wages and employment are ambiguous but may be roughly zero.

This collection of conclusions is consistent with the recognition that the variation in EFNA amongst states is driven greatly by the size of government,

⁴ First, even this is not exactly clear, as generally fiscal stimulus works through allowing inflation to decrease the real wage of workers while keeping their nominal wage constant (or increasing it), whereas what is found here is an *increase* in real wage. Second, whether or not this should be interpreted as increasing total aggregate demand or as shifting aggregate demand from other localities to the state very much depends on the policy function of the central bank. See Murphy (2015).

much more so than its world counterpart. Another caveat, however, is that while economic freedom causes per capita income to increase, my method is unable to determine whether this reflects more income overall in the US or attracting income from other states, with no positive sum gain. Having said that, the identification strategy found in this paper rivals or exceeds those found elsewhere, such as those employing traditional cross-sectional and panel methods.

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