Is North-America An Optimal Currency Area? Regional Versus National Shocks in the United States, Canada, and Mexico

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Abstract

In both Canada and Mexico there has recently been an open discussion on the possibility of adopting the US Dollar as legal tender. The paper addresses the issue of whether North America is an 'Optimal Currency Area' by analyzing the sources of asymmetric shocks to output in US states, Mexican states, and Canadian provinces, during the period 1971-1995. The paper uses a novel methodology called 'identified factor analysis' to distinguish between North-American, country, and state specific business cycles. Preliminary findings indicate that for Canada province specific shocks are more important than either North-American or country specific disturbances. Therefore, Canadian provinces may not loose too much from giving up monetary policy independence at the country level. In Mexico, North-American business cycles are the most prominent source of fluctuations in the growth rate of output, and affect the Mexican and the US economy in the opposite way. This indicates the presence of a substantial asymmetry between Mexico and the US. Further research is needed to establish whether such asymmetry is due to Mexican monetary policy itself, and therefore whether it would disappear following the adoption of the Dollar.

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1 Introduction

Should Mexico and Canada adopt the US Dollar as legal tender? After the apparent success of currency boards in a number of countries, and the recent wave of currency instability following the Asian crises, this question has been raised by politicians, academics, and business people in both countries.

According to the keynesian theory of Optimal Currency Areas[1] the desirability of such an option depends, among other things, on the extent to which the two countries are exposed to shocks that are 'asymmetric' with respect to those which affect the US economy. Even if one does not agree with the assumptions behind the theory, the degree of 'asymmetry' in the shocks to technology and preferences in these countries is likely to be one of the determinants of the success of Dollar adoption.

The paper addresses the issue of the asymmetry in the shocks to production in North America by analyzing the co-movements in detrended output across US and Mexican states, and Canadian provinces, from 1971 to 1995 (in the reminder of the paper Canadian provinces will sometimes be referred to as 'states' for ease of exposition). In order to do so, the paper estimates a factor analysis model where the factors are identified as North-American, country-specific, and state-specific business cycles.

The analysis of regional data sheds light on a number of issues. In the first place the comparison between the relative importance of state-specific versus country-specific shocks provides information on the extent to which the asymmetries within countries are more, or less, important than the asymmetries across them. For instance, the paper finds that in Canada the asymmetries among provinces are larger than the asymmetry between Canada and the United States. This suggests that, at least from the perspective of asymmetric shocks, Canadian provinces may not loose too much from giving up monetary policy independence at the country level.

A second advantage from using state-level data stems from the fact that the response of states to common shocks (North-American or country-specific) differs substantially across states, and often reflects the peculiarities of the productive structure of each state. This, in turn, is helpful in identifying the nature of the common shocks. For example, the paper finds that shocks to the North-American business cycle affect agri-

[1]See Mundell[23] and the large body of literature discussing the feasibility of the European Monetary Union (for instance, Eichengreen [13])

cultural and oil producing US states, and Mexican states, in the opposite way than they affect the other US states. This suggests the hypothesis that North-American business cycle are related to shocks to commodity prices such as the price of oil and agricultural products.

Finally, an additional advantage of using regional data is that it makes it possible, to some extent, to distinguish shocks that are potentially induced by monetary policy from other types of shocks. This is very important for the question addressed in the paper: if most of the asymmetric shocks are caused by domestic monetary policy, they would disappear following the adoption of the US Dollar. The results show for example that most of the asymmetry between Mexico and the United States arises from the opposite response of Mexican and most US states to what we called North-American business cycles. However, the fact that oil producing and agricultural US states respond to those shocks in the same way as Mexican states seems to suggest that these shocks are not due to Mexican monetary policy.

The answers obtained from this analysis are far from being conclusive. It is unlikely, for instance, that the study will be able to capture the impact of NAFTA on the Mexican economy, since the data set ends in 1995. Furthermore, if Mexico and Canada were to adopt the US Dollar other structural changes, in terms of capital mobility, banking regulation, and so forth, would follow, particularly for Mexico. In turn, such changes would have an impact on the co-movements of business cycles between Mexico and the US.[2] [3] Notwithstanding these objections, we believe that the original evidence presented in this study remains useful in addressing the question posed at the beginning.[4] The finding that most of the variability in provincial output for Canada stems mainly from province specific business cycles suggests that asymmetric shocks may not be much of an issue for Canada in deciding whether to adopt the Dollar. On the other hand, the finding that the bulk of the asymmetry between Mexico and the US seems to be related to shocks in commodity prices, and not to Mexican monetary policy, suggests that such asymmetry would be likely to persist, at least in the short run, if the US Dollar were adopted.

[2]Frankel and Rose [14] make a similar argument in regard to the empirical literature on the European Monetary Union.

[3]See also Kouparitsas [20] on the impact of capital markets integration on business cycles across countries.

[4]Other papers, notably Blanchard and Katz [5], Clark [8], Davis *et al* [10], Gosh and Wolf [16], Hess and Shin [18], Norrbin and Schlagenhauf [24] for the US, and Altonji and Ham [1] for Canada, have investigated business cycles at the regional level. This literature is summarized by Clark and Shin [7].

The remainder of the paper is as follows: section 2 presents the model, section 3 and 4 discuss the data and the results, and section 5 concludes.

2 The model

The paper uses a novel methodology called 'identified factor analysis', to distinguish between North-American, country, and state specific business cycles. This section will briefly describe the methodology, emphasizing the differences with standard factor analysis models.

The common feature of factor analysis models consists in the assumption that the cross-sectional co-movements in the variables of interest, in this case detrended regional output, can be summarized by k factors. Specifically, if y_t is the $n \times 1$ vector of demeaned output growth rates at time t ($t = 1, .., T$), the model assumes that:

$$y_t = Bf_t + \varepsilon_t \tag{1}$$

where f_t is the $k \times 1$ vector of unobservable common factors, the $n \times k$ matrix B represents the exposures of the states to the factors (called 'loadings' in the factor analysis jargon), and ε_t is the $n \times 1$ vector of state-specific (or 'idiosyncratic') shocks. Both factors and idiosyncratic shocks are uncorrelated among each other.[5] Under the additional assumption that both factors and idiosyncratic shocks are normally distributed, the likelihood function can be written as:

$$L(B, \Phi) = -\frac{T}{2}(\ln|BB' + \Phi| - tr((BB' + \Phi)^{-1}S)), \tag{2}$$

where $S = \frac{1}{T}\sum_{t=1}^{T} y_t y_t'$ is the actual covariance matrix of the observations, and Φ is the diagonal matrix of the standard deviations of idiosyncratic shocks. It is clear that the model is not identify, as one can rotate the factors (that is, postmultiply B by any $k \times k$ orthonormal matrix) and obtain the same likelihood. In standard factor analysis identification is obtained by means of the so-called 'canonical restrictions', that is, by imposing that the off-diagonal elements of the matrix $B'\Phi^{-1}B$ are equal to zero. These identification restrictions make the computation of the maximum likelihood estimates

[5]Formally:
$E[f_{r,t}f_{s,t}] = \begin{cases} 1 & \text{, if } r = s \\ 0 & \text{, if } r \neq s \end{cases}$ all t; $E[f_{r,t}\varepsilon_{i,t}] = 0$ all t, r, i; $E[\varepsilon_{i,t}\varepsilon_{j,t}] = \begin{cases} \phi_i^2 & \text{, if } i = j \\ 0 & \text{, if } i \neq j \end{cases}$ all t

relatively straightforward,[6] but have no economic content. As a consequence, the factors in standard factor analysis have no economic interpretation.

The innovation in the methodology used in the paper is that identification is achieved by a set of zero restrictions on the coefficients of the matrix B.[7]. These restrictions are imposed according to geography. We assume that there are factors, called country-specific business cycles, that affect all states within a country, but do not affect other states and provinces. Furthermore there are region-specific business cycles that affect all states within a given region (say, New England), but do not affect states outside the region. The zero restrictions on the loadings make the factors non interchangeable, and give them a precise geographical interpretation. Formally, the model is as follows:

$$y_{it} = \beta_i^{NA} f_t^{NA} + \sum_n \beta_i^n f_t^n + \sum_r \beta_{yi}^r f_t^r + \varepsilon_{it} \tag{3}$$

where

$$\beta_i^n = 0 \text{ and } \beta_i^r = 0 \tag{4}$$

if state i does not belong to country n or region r. The regions in the US are the Bureau of Economic Analysis regions.[8] Canada and Mexico were not subdivided into regions, given that the size of those countries in terms of output is approximately the size of a US region. The maximum likelihood estimates of the model are computed by means of the EM algorithm [9].

It is important to note that what we refer to as, for instance, US factor, does not necessarily coincide with the actual US business cycle. To the extent that booms and busts of the US economy spill over to the neighboring countries, part of the US business cycle will be captured by the North-American factor. In this model, the US factor only captures co-movements in output that are common to all US states, but are not shared by Mexican states and Canadian provinces. It is also important to remark that the model is a purely statistical one: its task is to summarize the co-movements in output across North-American states. The model per se will not provide any information on the 'source' of business cycles. However, as discussed in section 4, it is possible to learn something about the factors by comparing them with observed macroeconomic variables, such as oil and agricultural prices, as well as with the growth rates of gdp in

[6]See Magnus and Neudecker [21]

[7]There is a clear analogy with the identified VAR literature.

[8]These are New England, Mid East, Great Lakes, Plains, South East, South West, Rocky Mountains, and Farwest.

[9]See Del Negro [12]

the three countries. More importantly, the model is informative about the central question of the paper, namely whether North-America is an optimal currency area: from the analysis of the relative importance of state-specific, country-specific, and common factor one can learn about the main source of asymmetric shocks for North-American states and provinces.

Finally, the model is not dynamic, in the sense that neither the factors nor the idiosyncratic shocks are serially correlated. This assumption is partially justified by the fact that the data are annual, and therefore have low serial correlation.[10]

3 The data

3.1 Data for US states

The data on Real Gross State Product are obtained by deflating the data on nominal Gross State Product, obtained from the Bureau of Economic Analysis (BEA), using state level CPI data. The state CPI series are constructed using American Chamber of Commerce Association data on Cost of Living by metropolitan areas, Census data on CPI for large metropolitan areas, and Bureau of Labor data on cost of living for rural areas, and are weighted for each state using BEA data on population by metropolitan area.[11] The data on population are obtained from the BEA.

3.2 Data for Canadian provinces

Provincial data for Canada are from the CANSIM (Canadian Socio Economic Information Management System). Since 1961, information is available for provincial gross domestic product and for provincial consumer price indexes. The series were transformed to a per capita basis using provincial population. All the data are in 1986

[10]Other researchers, like Stockman [26], also neglect dynamic issues when working with annual data. Stockman estimates a similar model using dummy variables. The 'identified' factor analysis approach has two advantages over Stockman's. In the first place, it is more economical in terms of the number of parameters that need to be estimated. Furthermore, Stockman's method does not allow for the same factor to have a different impact on different states. Gregory *et al.* [17] estimate a similar factor analysis model. Their model has the advantage of being dynamic. However, due to computational difficulties, their cross section is much more limited than in this paper, and they have to standardize all variables by their standard deviation. Only Kose *et al.* [19] have so far managed to estimate a dynamic factor analysis model with a large cross section and more than one factor, using a Bayesian approach.

[11]Details on the construction of the CPI series can be found in Del Negro ??.

Canadian dollars. Data for Yukon and Northwest Territories begin after 1977, so these territories were omitted.

3.3 Data for Mexican states

Data on state output from 1970-1988 and 1993-96 are obtained from INEGI (*Instituto Nacional de Estadistica, Geografia e Informatica*). INEGI uses direct sampling for the years 1970, 1975, 1980, 1985, 1988, and 1993-96, and interpolation for the years in between.[12] Gross State Product data for the years 1988-1991 were obtained from the annual reports of State governments. The data for 1992 are obtained from BIMSA (*Burò de Investigaciòn de Mercados, SA*).
The data on population are obtained from CONAPO (*Consejo Nacional de Poblaciòn*). AS state CPI series are not available for Mexico, the nominal series are deflated using the national CPI, obtained from the *Banco de Mexico.*

The data on oil prices (Saudi Arabian Light) are obtained from the US Energy Information Administration, and the index of prices of agricultural raw materials is obtained from the International Financial Statistics (IMF).

The paper uses annual data from 1971 to 1995. Figure 1 shows that roughly 80% of the estimated first order autocorrelations in the growth rates of output are below .5. This evidence suggests that by neglecting serial correlation in the factor analysis model we may not be missing an important feature of the data.

4 The results

Figure 2 shows the distribution of the exposure to the different factors across Mexican states, US states, and Canadian provinces. For ease of exposition, the exposures to the different factors are expressed relative to the standard deviation of the growth rate of US gdp in the sample period: if a state has an exposure of one to the North-American factor, for instance, it means that a shock in that factor of the magnitude of a standard deviation of the growth rate of US gdp (which is roughly 3%) increases the growth rate in that state by 3%. Expressing the exposures relative to the standard deviation of the growth rate of US gdp is a convenient way to compare quantitatively the differences in the impact of the same shocks across states and provinces, as well as the relative importance of the different factors in explaining the variability of regional business cycles. In

[12]The interpolations are obtained using Chow and Lin (1971) methodology. See INEGI for further information.

figure 2 the horizontal axis displays the empirical range of the exposures (roughly from -2 to 3) subdivided in intervals of length approximately .5. The vertical axis shows the percentage of states whose exposure lies in each of the intervals, for each country and for each factor.[13]

The table shows that the North-American factor affects Canadian provinces and Mexican states in the opposite way than it affects the majority of US states. However, while for most Mexican states the impact is in absolute terms larger than the standard deviation of the growth rate of US gdp, for the large majority of US States and Canadian provinces the impact of the North American business cycle is limited, that is, less than half the standard deviation of the growth rate of US gdp. Country-specific shocks in Mexico are, for most states, less important than shocks in the North-American factor. Interestingly, a number of states are counter-cyclical with respect to this factor, and in general the response to country-specific shocks varies widely from state to state.[14] It is also interesting that state-specific shocks are the least important of all factors in Mexico in terms of impact on output growth rates. In the US country-specific business cycles play a dominant role: for most US states the exposure to national business cycles are roughly equal or larger than the standard deviation of the growth rate of US gdp.[15] Regional and state-specific shocks have roughly the same importance. In Canada, province-specific shocks are the most important: for the majority of provinces the exposure to province-specific shocks is at least as large as the standard deviation of the growth rate of US gdp, the exposures to national or North-American business cycles are in most cases about half of that or less.

Figure 3 shows the distribution across states of the percentage of the variance of the growth rate in output explained by each factor. This figure conveys the same message as the previous one: for the majority of Mexican states the North-American factor explains more than 50% of the variance in output; for US states the national factor is by far the most important; while for Canadian provinces most of the variations in output are due to idiosyncratic shocks.

[13]Table 1 at the end of the paper shows the estimates of the model, along with the associated standard deviations. As the number of parameters is very large we chose to base the discussion of our findings on figures 2 through ??, which provide a more accessible summary of the results than the table.

[14]It is well known in factor analysis that the factors are sign indeterminate (if one multiplies both factors and coefficients by -1, one obtains the same model). Therefore the word 'countercyclical' is used here to mean that a state has a loading on a given factor which has the opposite sign of the loadings of the majority of states that are affected by the same factor.

[15]Some states, notably Alaska, are however countercyclical.

Figures 4 and 5 show the geographical distribution of the exposures to the North-American and the country-specific factors respectively. Figure 4 shows that the distribution of the exposures to the North-American factor within the US has a clear geographical pattern: both the oil producing states of the South and South-West (Texas, Louisiana, Oklahoma, New Mexico) and the agricultural states of the North-West (North Dakota, Iowa, Wyoming, Montana, Kansas, Nebraska, and South Dakota) have a negative exposure to the North-American factor, like Mexican states, while all other states have a positive exposure (particularly positive in New England and in the Great Lakes region).[16]

The distribution of the exposures to the country-specific factor, displayed in figure 5, also shows a clear geographical pattern within each country. In Canada the extent to which provinces are affected by the national factor diminishes as one moves westwards. In the US many of the 'rust belt' states are highly procyclical, perhaps reflecting the concentration of durable producing industries, while most oil producing states are either only slightly procyclical, or countercyclical. In Mexico north-western states are all countercyclical, while southern states tend to be more procyclical.

The observation that the North-American factor has similar loadings for Mexico and for oil-producing and agricultural US states suggests the hypothesis that North-American business cycle is related to shocks to commodity prices such as oil and agricultural products. Figure 7 displays the estimates of the North-American factor, along with the projected values of three regressions.[17] In the first regression the factor is projected on a constant and a time trend, in the second regression the an index of oil prices is added to the independent variables, while in the third regression we further add an index of prices of raw agricultural products. The figure shows that both oil and agricultural prices have some explanatory power, but that the swings of the North-American factor in the early eighties, particularly during the period of the debt crisis, are left unexplained. The figure also shows that the factor displays serial correlation, suggesting that the model should be amended in that direction.

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[16] Alaska, which is not shown in the map, has a negative exposure of 2.3. Garcia-Mila and McGuire [15] also document the importance of industrial composition in affecting the growth rate of state output.

[17] The models delivers the conditional expectations of the unobservable factors, given the data and the estimated parameters:
$E[f_t/B, \Phi, y_t] = B'(BB' + \Phi)^{-1} y_t$
This conditional expectation is what is referred to as 'estimate' of the factor.

Figure ?? displays the estimates of the country-specific factors, along with the growth rates of gdp in each of the three countries. A striking feature of the figure is the extent to which the US country-specific factor mirrors the actual growth rate of US gdp. Since the US country-specific factor is identified by assuming that it affects US states *only*, one would think that it may not capture major US business cycles, to the extent that they affect neighboring countries as well. The fact that the US country-specific factor tracks the growth rate of US gdp so well can be interpreted to suggest that, on the contrary, Canada and Mexico are not very much affected by US business cycles, at least contemporaneously. On the other hand the discrepancy between the Mexican country-specific factor and the growth rate of Mexican gdp further emphasizes the importance of the North-American factor for Mexico.

This empirical evidence suggests the following conclusions. In regard to Canada, the predominance of province specific shocks over North-American or country-specific business cycles indicates that Canadian provinces may not loose too much by giving up monetary policy independence at the country level, given that Canada itself does not appear to be an homogeneous currency area. In regard to Mexico, the conclusions are less straightforward. On the one hand there is clear evidence that the main source of asymmetric shocks for Mexico comes from what we called North-American business cycles. Mexican country specific shocks are less important, and furthermore do not affect all Mexican states in the same way. On the other hand the source of North-American business cycles is harder to gauge. The fact that oil-producing and some agricultural US states are affected by the North-American factor in a similar way to Mexican states suggests that such shocks may be related to changes in commodity prices. However, the analysis of the time series properties of the North-American factor indicates that commodity prices do not fully account for North-American business cycles, although they explain part of them. Finally, the evidence shows that country-specific shocks are by far the main source of fluctuations in the US. This is a potential source of concern for countries that decide to adopt the US Dollar as legal tender: since US monetary policy may be driven by shocks that are orthogonal to the business cycles in neighboring countries, adopting the US Dollar may add a further source of fluctuations in these countries.

5 Conclusions

The paper addresses the issue of whether North-America is an Optimal Currency Area from the perspective of asymmetric shocks. In order to do so, the paper analyzes the co-movements in detrended regional output across US states, Mexican states, and

Canadian provinces, using a novel methodology, called 'identified' factor analysis. This methodology makes it possible to attribute shocks to regional output to business cycles that are common to all North-American states and provinces (North-American business cycles), to business cycles that are common to states or provinces belonging to the same country (country-specific business cycles), and to business cycles that are specific to a particular region, state, or province. This decomposition is used to identify the sources of asymmetric shocks.

The paper finds that province specific shocks are the main source of variability in the growth rate of output for Canadian provinces. Since the common Canadian monetary policy can hardly shield the provinces against such shocks, this finding suggests that the loss of monetary policy independence at the national level may not be too harmful for Canada. On the other hand, following the adoption of the US Dollar, Canada may inherit a further source of fluctuations, namely shocks to the US monetary policy.

The evidence presented in paper suggests that what we called North-American business cycles are the most important source of asymmetries for Mexico. Shocks to the North-American factor seem to affect Mexican states and the majority of US states in the opposite way. Furthermore the impact of these shocks on the Mexican economy appears to be very large. Interestingly, some US states, and in particular oil producing states, are affected by North-American business cycles in the same way as Mexican states, although in most cases not with the same intensity. However, recent literature shows that the degree of risk sharing among US states, either via federal transfers or via private capital markets, is relatively high.[18] The former channel of risk sharing is obviously going to be absent for Mexico, and the latter, certainly in the short run, is not going to be as effective. There is reason to believe that the degree of capital mobility among the states of the US will be, at least for some time, higher than the one between the US and Mexico.[19]

In regard to the source of the shocks to the North-American factor the evidence is mixed. On the one hand the similarities among oil producing US states and Mexican states indicates that North-American business cycles may be related to shocks in commodity prices. On the other hand, direct evidence suggests that commodity prices do not fully account for swings in the North-American factor. One possibility is that the

[18] See Asdrubali *et al.* [2], Athanasoulis and Van Wincoop [3], Del Negro [11], Melitz and Zumer [22], Sala-i-Martin and Sachs [25].

[19] A number of papers, see for instance Atkeson and Bayoumi [4], Crucini [8], Crucini and Hess [9], Del Negro [11], Melitz and Zumer [22], show that the degree of risk sharing at the intranational level is considerably larger than at the international level.

similarities between oil producing US states and Mexican are due to co-movements in the early part of the sample, namely the 1970s, and that some of the shocks to the North American factor in the late part of the sample are mainly shocks that affect the Mexican economy. Since the model does not allow for time-varying parameters, it may not be capturing this feature of the data. Further research is needed in order to investigate the source of asymmetric shocks for the Mexican economy.

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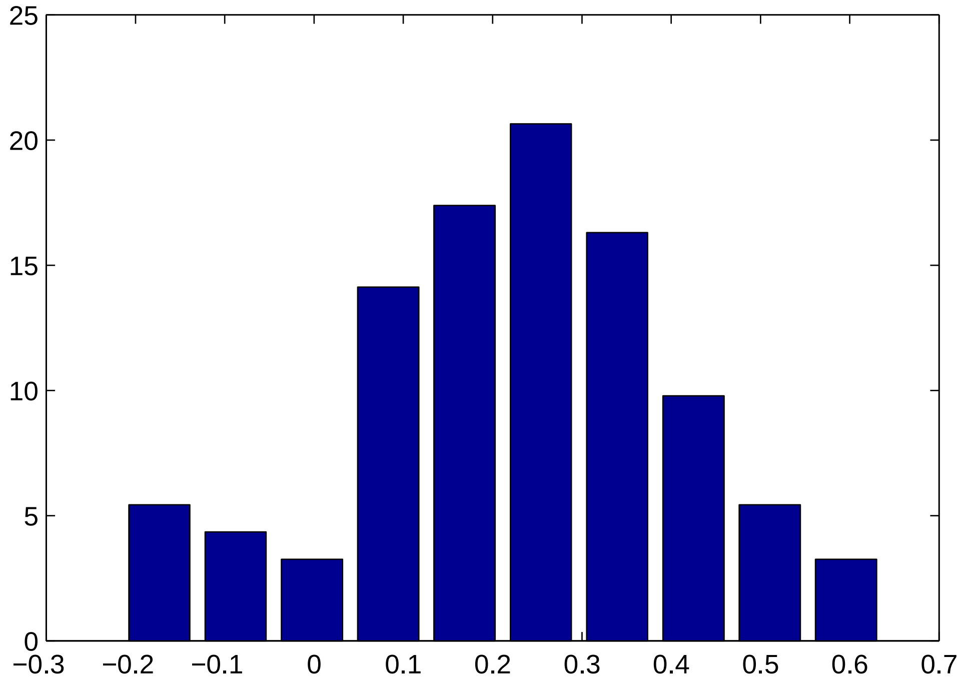

Figure 1: First order autocorrelations in the growth rates of output

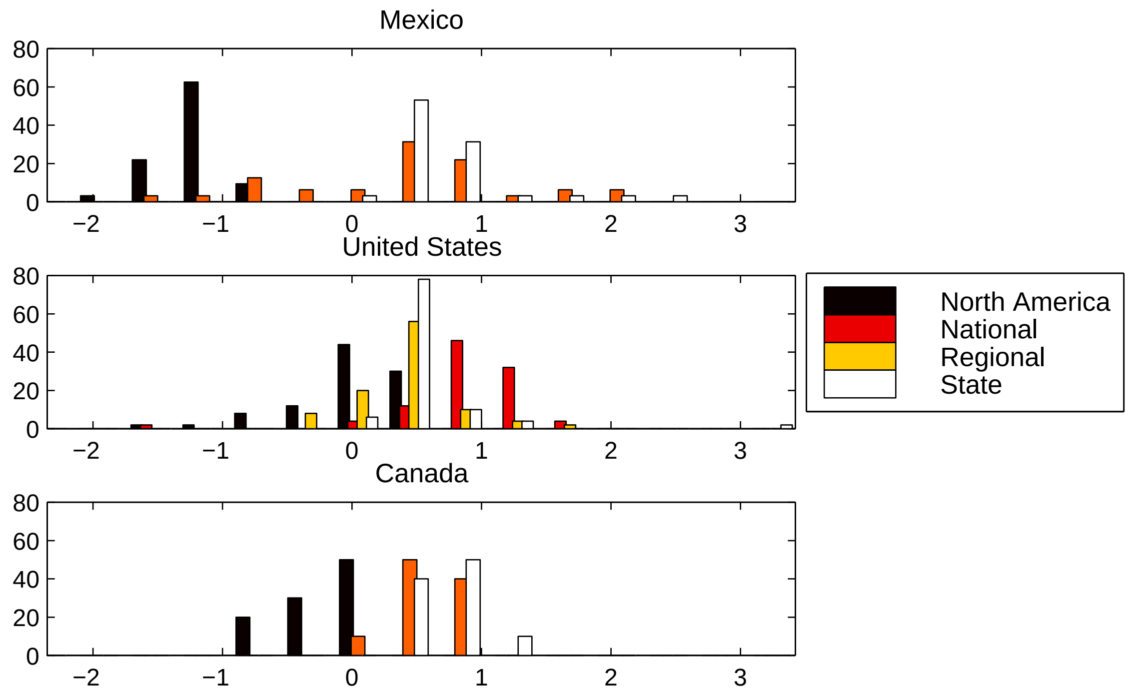

Figure 2: Distribution of the exposures to the North-American, country, region, and state specific factors for Mexican states, US states, and Canadian provinces. The exposures are expressed as a fraction of the standard deviation of the growth rate of US gdp in the sample period

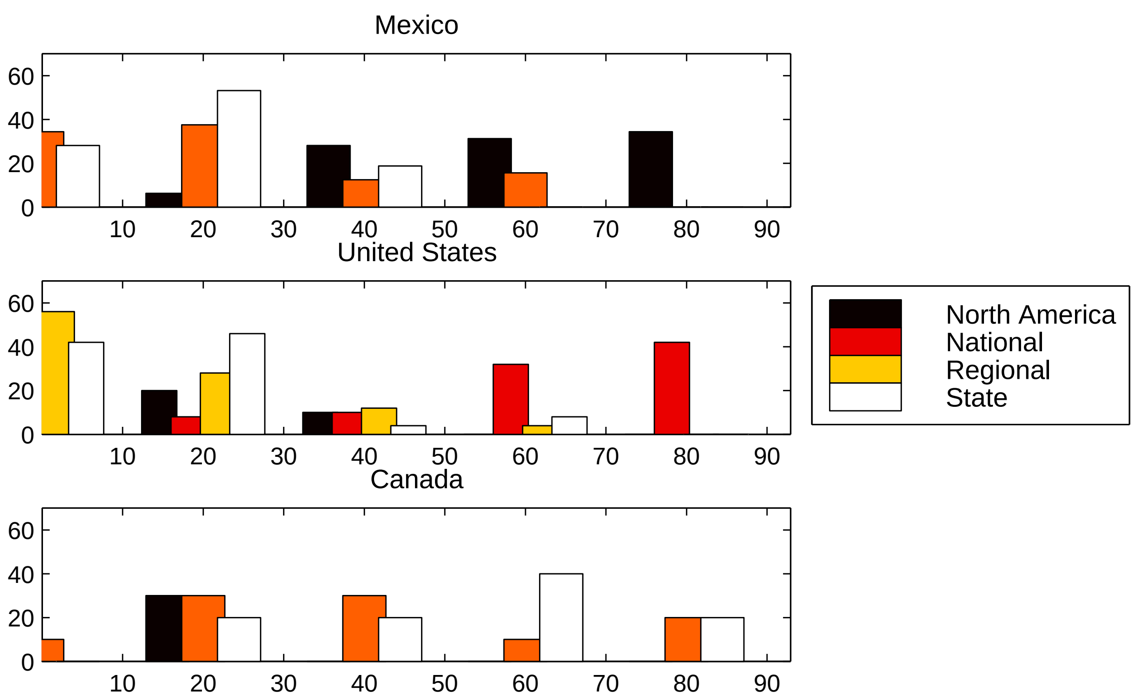

Figure 3: Distribution of the percentage of the variance of the growth rate in output explained by the North-American, country, region, and state specific factors for Mexican states, US states, and Canadian provinces

North American Factor

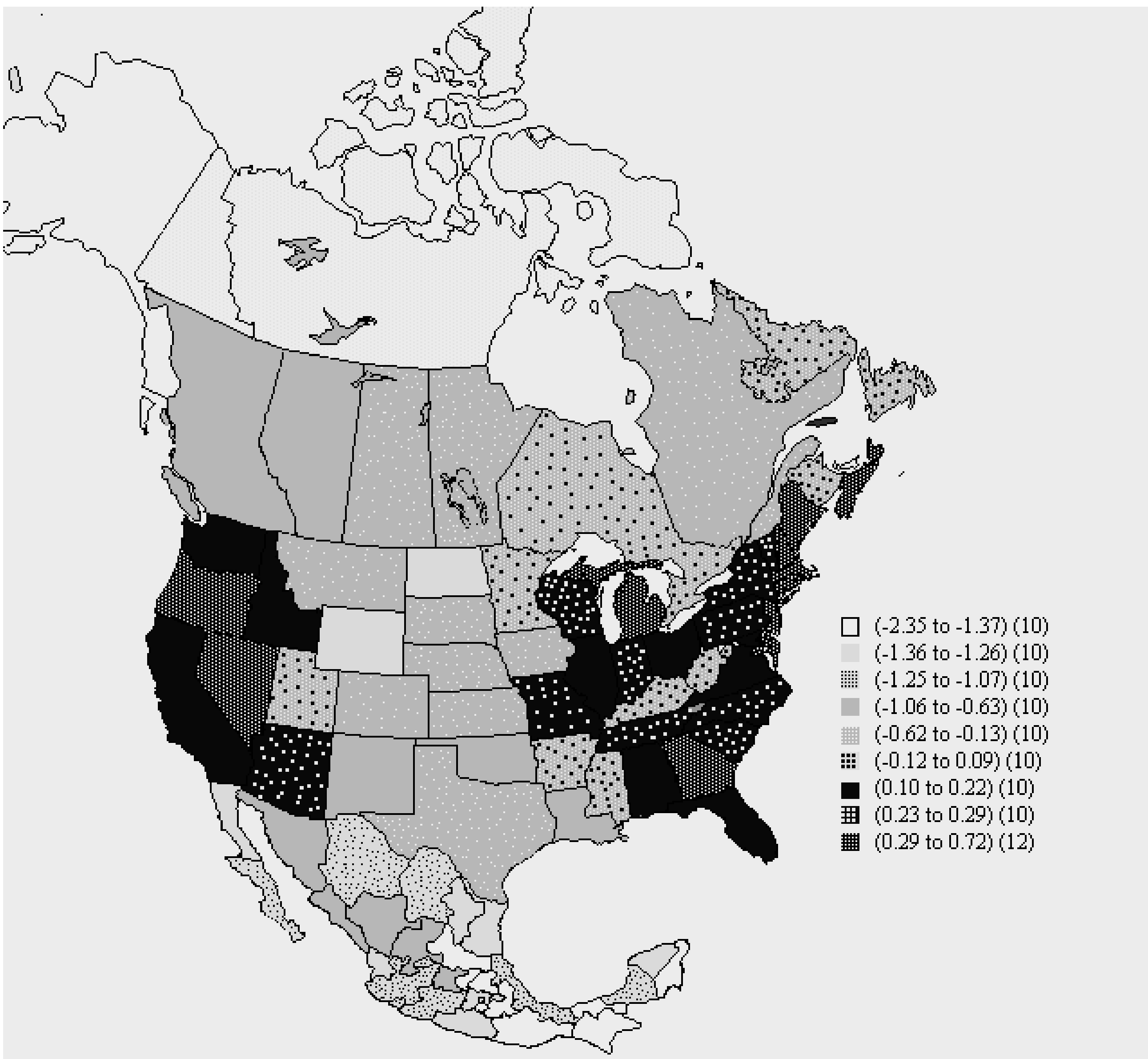

Figure 4: Geographical distribution of the exposures to the North American factor

National Factors

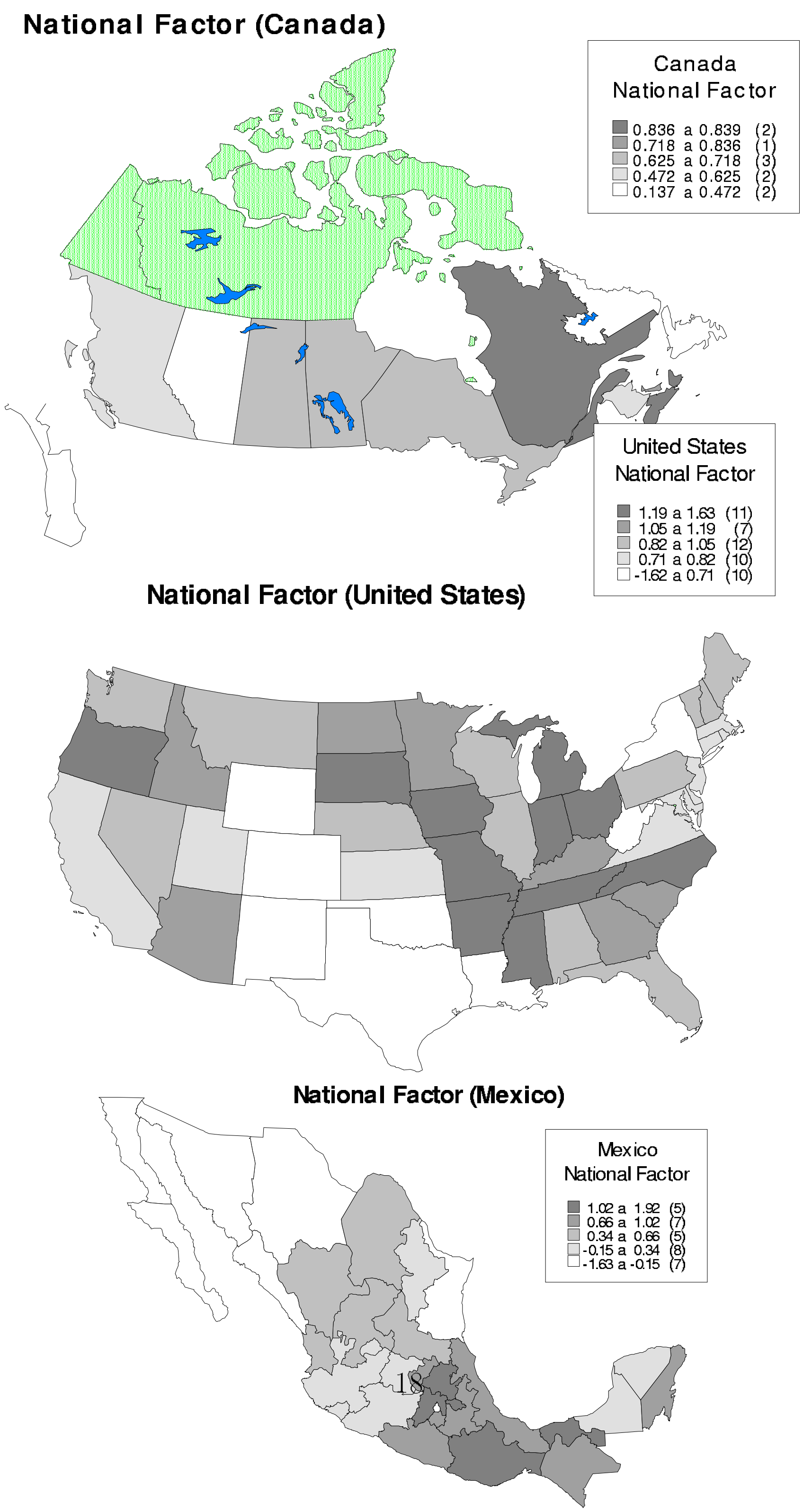

Figure 5: Geographical distribution of the exposures to the country-specific factor

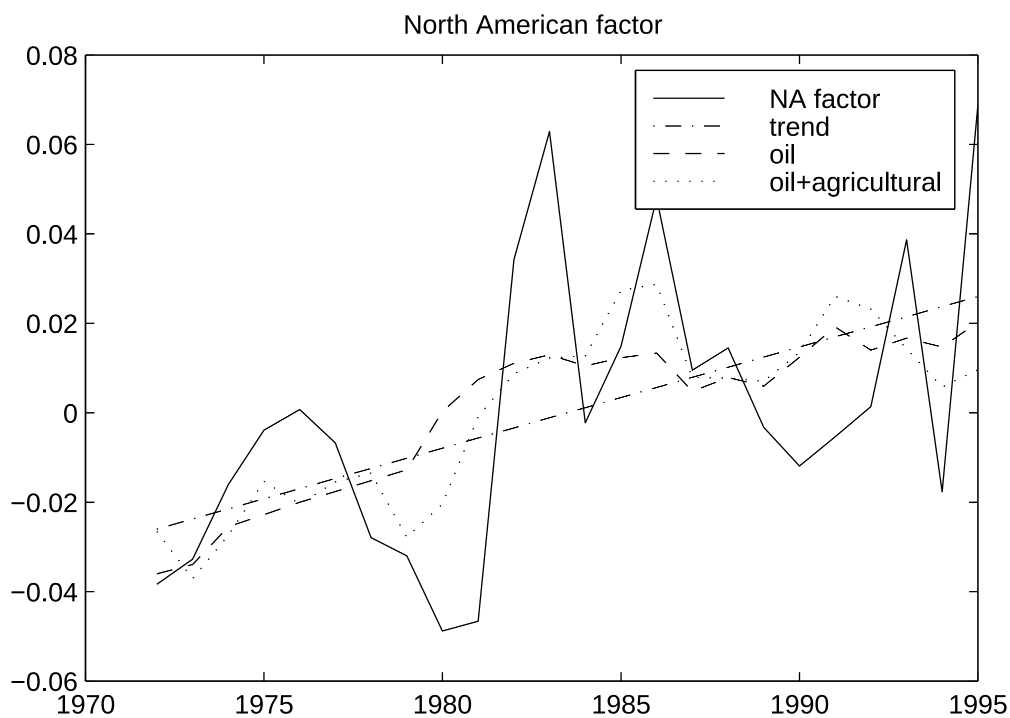

Figure 6: The North-American factor

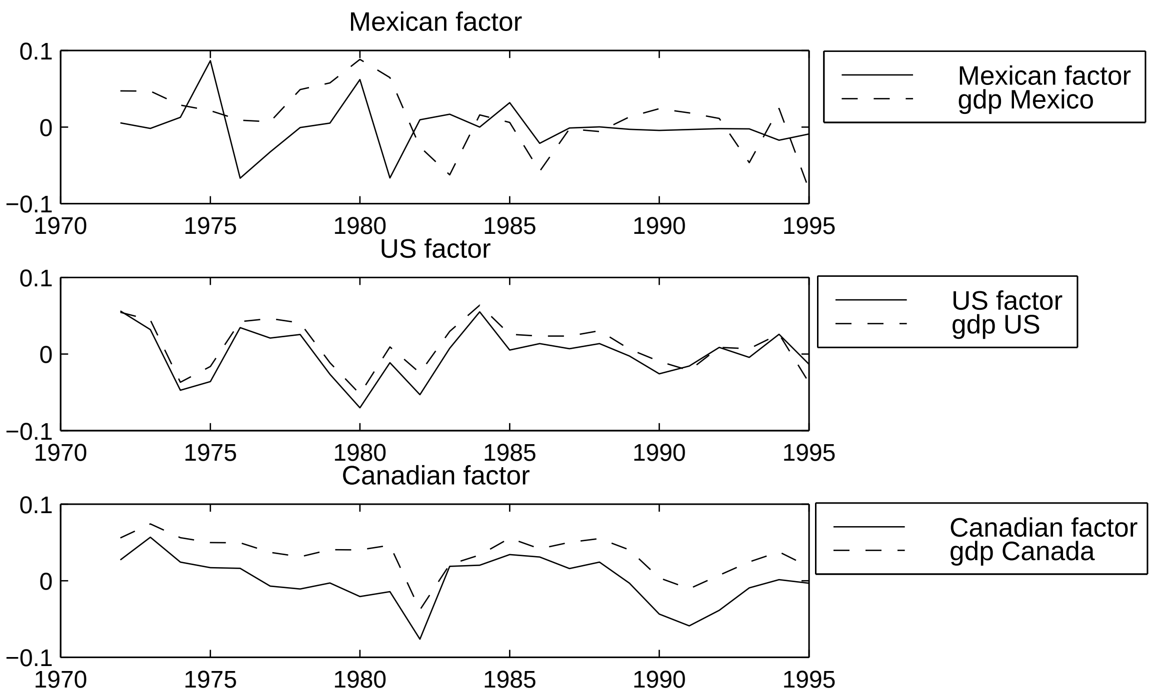

Figure 7: Country-specific factors

Table 1: Exposures to the North-American, country, region, and state specific factors for Mexican states, US states, and Canadian provinces. The exposures are expressed as a fraction of the standard deviation of the growth rate of US gdp in the sample period. Standard deviations are in parenthesis

Co.	Reg.	St.	N.Am factor	Nat. factor	Reg. factor	St. factor
MEX		AGS	-1.192 (0.229)	-0.155 (0.197)		0.716 (0.107)
		BC	-1.252 (0.454)	-1.638 (0.325)		0.838 (0.137)
		BCS	-1.096 (0.391)	-1.327 (0.288)		0.885 (0.141)
		CAM	-1.125 (0.250)	0.293 (0.221)		0.865 (0.126)
		COH	-1.075 (0.249)	0.488 (0.208)		0.776 (0.114)
		COL	-1.181 (0.215)	0.265 (0.177)		0.560 (0.083)
		CHI	-1.770 (0.537)	1.010 (0.478)		2.003 (0.290)
		CHI	-1.103 (0.227)	-0.396 (0.191)		0.650 (0.097)
		DF	-1.168 (0.311)	-0.837 (0.249)		0.849 (0.127)
		DUR	-0.982 (0.224)	0.639 (0.168)		0.437 (0.065)
		GUA	-1.052 (0.197)	0.154 (0.167)		0.589 (0.087)
		GUE	-1.273 (0.301)	0.976 (0.212)		0.364 (0.057)
		HGO	-1.667 (0.426)	1.425 (0.301)		0.592 (0.093)
		JAL	-1.200 (0.199)	-0.144 (0.163)		0.446 (0.069)
		MEX	-1.297 (0.487)	1.911 (0.321)		0.376 (0.078)
		MIC	-1.146 (0.215)	0.327 (0.175)		0.562 (0.084)
		MOR	-1.419 (0.286)	0.743 (0.217)		0.489 (0.078)
		NAY	-1.271 (0.243)	0.541 (0.188)		0.476 (0.072)
		NL	-1.272 (0.215)	0.329 (0.170)		0.398 (0.061)
		OAX	-1.382 (0.417)	1.505 (0.287)		0.546 (0.089)
		PUE	-1.455 (0.267)	0.696 (0.192)		0.147 (0.041)
		QUE	-1.429 (0.340)	0.965 (0.257)		0.739 (0.112)
		QRO	-1.609 (0.418)	0.713 (0.366)		1.491 (0.217)
		SLP	-1.435 (0.262)	0.498 (0.206)		0.540 (0.080)
		SIN	-0.674 (0.257)	-0.847 (0.196)		0.654 (0.101)
		SON	-0.833 (0.255)	-0.937 (0.173)		0.279 (0.056)
		TAB	-2.335 (0.758)	1.766 (0.653)		2.646 (0.384)
		TAM	-1.328 (0.237)	-0.557 (0.174)		0.250 (0.056)
		TLA	-1.318 (0.527)	1.862 (0.385)		1.148 (0.174)
		VER	-1.128 (0.248)	0.658 (0.190)		0.521 (0.077)
		YUC	-1.338 (0.279)	0.297 (0.242)		0.923 (0.135)
		ZAC	-0.850 (0.205)	0.545 (0.160)		0.509 (0.075)
US	NEWENG	CT	0.295 (0.209)	0.758 (0.171)	0.538 (0.108)	0.333 (0.056)
		MA	0.400 (0.233)	0.810 (0.193)	0.691 (0.119)	0.248 (0.074)
		ME	0.411 (0.246)	0.880 (0.196)	0.537 (0.131)	0.468 (0.075)
		NH	0.400 (0.287)	1.000 (0.239)	0.740 (0.161)	0.536 (0.090)
		RI	0.393 (0.198)	0.712 (0.157)	0.498 (0.096)	0.258 (0.054)
		VT	0.241 (0.258)	0.918 (0.216)	0.586 (0.153)	0.572 (0.088)
	MIDEAS	DE	0.492 (0.288)	0.808 (0.252)	0.312 (0.233)	1.034 (0.151)
		MD	0.212 (0.204)	0.804 (0.163)	0.423 (0.102)	0.349 (0.058)
		NJ	0.331 (0.201)	0.772 (0.158)	0.496 (0.092)	0.188 (0.081)
		NY	0.240 (0.185)	0.616 (0.156)	0.537 (0.107)	0.306 (0.073)
		PA	0.267 (0.198)	0.882 (0.140)	0.067 (0.065)	0.273 (0.047)
	GRLAKE	IL	0.200 (0.229)	1.028 (0.164)	0.293 (0.077)	0.160 (0.067)
		IN	0.235 (0.328)	1.463 (0.233)	0.274 (0.128)	0.390 (0.065)
		MI	0.626 (0.389)	1.625 (0.277)	0.263 (0.202)	0.646 (0.101)

Table 2: Table 1, continued

Co.	Reg.	St.	N.Am factor	Nat. factor	Reg. factor	St. factor
		OH	0.228 (0.270)	1.195 (0.192)	0.298 (0.095)	0.270 (0.051)
		WI	0.231 (0.231)	1.026 (0.166)	0.221 (0.089)	0.290 (0.047)
	PLAINS	IA	-0.373 (0.318)	1.328 (0.245)	0.627 (0.145)	0.355 (0.099)
		KS	-0.227 (0.198)	0.785 (0.155)	0.237 (0.109)	0.454 (0.069)
		MN	-0.000 (0.270)	1.149 (0.208)	0.363 (0.125)	0.489 (0.076)
		MO	0.291 (0.267)	1.191 (0.188)	0.092 (0.092)	0.355 (0.056)
		ND	-1.327 (0.542)	1.174 (0.481)	1.610 (0.412)	1.427 (0.279)
		NE	-0.267 (0.262)	1.047 (0.209)	0.564 (0.136)	0.399 (0.088)
		SD	-0.208 (0.397)	1.344 (0.343)	1.157 (0.248)	0.735 (0.191)
	SOEAST	AL	0.207 (0.230)	1.016 (0.171)	0.142 (0.104)	0.401 (0.061)
		AR	-0.016 (0.284)	1.280 (0.201)	0.071 (0.115)	0.380 (0.060)
		FL	0.136 (0.226)	0.931 (0.178)	0.425 (0.108)	0.363 (0.075)
		GA	0.304 (0.260)	1.153 (0.186)	0.256 (0.110)	0.289 (0.050)
		KY	0.084 (0.240)	1.095 (0.170)	-0.157 (0.125)	0.258 (0.084)
		LA	-0.867 (0.289)	0.168 (0.264)	-0.370 (0.301)	1.193 (0.182)
		MS	-0.038 (0.279)	1.206 (0.205)	0.051 (0.135)	0.528 (0.080)
		NC	0.275 (0.276)	1.237 (0.201)	0.306 (0.139)	0.298 (0.060)
		SC	0.230 (0.257)	1.130 (0.185)	0.257 (0.109)	0.323 (0.053)
		TN	0.260 (0.284)	1.276 (0.205)	0.243 (0.115)	0.349 (0.058)
		VA	0.213 (0.191)	0.799 (0.147)	0.287 (0.113)	0.321 (0.058)
		WV	0.013 (0.194)	0.701 (0.164)	-0.390 (0.178)	0.487 (0.127)
	SOWEST	AZ	0.243 (0.278)	1.132 (0.217)	-0.295 (0.142)	0.626 (0.094)
		NM	-0.718 (0.212)	0.275 (0.185)	0.235 (0.173)	0.824 (0.119)
		OK	-0.796 (0.212)	0.338 (0.176)	0.670 (0.132)	0.427 (0.066)
		TX	-0.630 (0.204)	0.409 (0.176)	0.778 (0.115)	0.025 (0.524)
	ROCKIE	CO	-0.163 (0.160)	0.637 (0.125)	0.324 (0.082)	0.249 (0.060)
		ID	0.163 (0.286)	1.097 (0.234)	0.435 (0.178)	0.716 (0.112)
		MT	-0.445 (0.261)	0.823 (0.222)	0.350 (0.231)	0.834 (0.133)
		UT	-0.078 (0.187)	0.724 (0.150)	0.315 (0.107)	0.416 (0.067)
		WY	-1.360 (0.354)	-0.057 (0.307)	1.293 (0.276)	0.623 (0.339)
	FARWES	AK	-2.352 (0.862)	-1.612 (0.763)	0.423 (0.848)	3.424 (0.504)
		CA	0.143 (0.195)	0.770 (0.155)	0.292 (0.115)	0.438 (0.073)
		HI	0.090 (0.204)	0.337 (0.199)	0.710 (0.190)	0.612 (0.142)
		NV	0.383 (0.227)	0.871 (0.177)	0.131 (0.138)	0.585 (0.087)
		OR	0.434 (0.282)	1.224 (0.204)	0.265 (0.107)	0.409 (0.069)
		WA	0.213 (0.231)	0.913 (0.182)	0.517 (0.119)	0.326 (0.107)
CAN		NWF	0.077 (0.149)	0.178 (0.153)		0.702 (0.102)
		BC	-0.537 (0.208)	0.548 (0.181)		0.761 (0.116)
		ALB	-0.792 (0.289)	0.705 (0.255)		1.085 (0.165)
		SKT	-0.560 (0.259)	0.737 (0.228)		0.943 (0.144)
		MBA	-0.207 (0.173)	0.630 (0.146)		0.535 (0.087)
		ONT	-0.079 (0.165)	0.707 (0.132)		0.387 (0.076)
		QUE	-0.163 (0.178)	0.789 (0.137)		0.337 (0.091)
		NBW	-0.050 (0.173)	0.423 (0.167)		0.728 (0.108)
		PEI	0.130 (0.215)	0.634 (0.201)		0.829 (0.128)
		NOS	-0.077 (0.152)	0.452 (0.142)		0.579 (0.090)