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The Resource Curse: A State and Provincial Analysis

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Abstract

A puzzling piece of empirical evidence suggests that countries rich in natural resources tend to have dismal economic performance. This paradigm has come to be known as the "resource curse". This paper deals with the role of institutional quality in explaining the transmission mechanism of the resource curse. I attempt to explain this phenomenon by using the index of economic freedom developed by the *Fraser Institute* as a proxy for the quality of institutions. The outcomes of the linear and non-linear interactions between resource abundance and institutional quality turn out to be the key elements that determine the intensity, if existent, or otherwise of the resource curse. Rather than look at cross country data like many others, I focus on the 10 provinces and 50 states in Canada and the US respectively over the 2000-2005 period.

1. Introduction

Most empirical studies of the "resource curse" do not explain in details the transmission mechanism through which natural resources impact the development process. The resource curse is a term in the economic literature that refers to the paradox that countries endowed with natural resources tend to have dismal economic performance. Sachs and Warner (1995) estimate that an increase of one standard deviation in natural resource intensity (on average 16% of GNP) leads to a reduction of about 1 percent per year in economic growth. This phenomenon has been coined the resource curse hypothesis. The fact that economies with little or no resources often do much better in terms of economic growth than resource-intensive economies remains a puzzle in resource economics, thereby paving the way for a critical examination of the transmission mechanism through which natural resources impact economic growth. The purpose of this paper is to examine whether the quality of institutions has a distinct role in the analysis of the resource curse.

Several examples abound in explaining how resource-poor jurisdictions often outperform resource-rich ones in economic growth. This, however, is not a generalization as there are many resource-abundant countries with very high economic growth rates. For instance, economic history reveals that resource-poor Netherlands did much better than Spain in economic growth despite the presence of gold and silver in the Americas where Spain had much of its empire in the seventeenth century (Sachs and Warner, 1997). Switzerland is one of the richest countries in the world today, and it is a good example of a country that depended on the financial and manufacturing sectors, and not natural resource extraction in the quest for economic development. The highly developed economies of the four Asian Tigers (Hong Kong, South Korea, Singapore and Taiwan) maintained exceptionally high growth rates and rapid industrialization between the early 1960s and 1990s which led to their transformation into advanced and high-income economies in the 21st century. The experience of all four Asian Tigers shows that they specialized where they had a competitive advantage. For example, Hong Kong and Singapore became world leading international financial centres, while South Korea and Taiwan became world leaders in information technology. This contrasts sharply with the situation in many resource-abundant economies such as Nigeria, Mexico and Venezuela where there is low standard of living, corruption, income inequality and civil disturbances – anecdotal evidence that natural resources may have a negative influence on economic development.

In economics, productive inputs are the resources employed to produce goods and services. They facilitate production but do not become part of the product or are significantly transformed by the production process. Likewise, economic theory suggests that increasing a country's stock of assets provides greater opportunities for economic prosperity and should translate into more production (Sullivan and Sheffrin, 2003). Economic history shows further that the development process of many of the highly industrialized countries of today follows the conventional economic reasoning in the preceding statement. For example, Britain and the United States both had abundant natural resources, either through colonies or through natural expansion, which provided the basis for strong economic growth and rising standards of living. Also, the prosperous agricultural, forest and mineral industries of many of the Scandinavian countries contributed immensely to sustained growth and large increases in living standards in these jurisdictions (WESS, 2006). These are good examples of how natural resources can be a blessing and not a curse in the development process.

The complex and diverse experiences of the various countries mentioned above reveal that the various links in the resource curse are not deterministic as suggested by most of the available models on resource endowments and economic performance. For instance, Botswana is one out of many developed and developing countries (e.g. Australia, Canada, Norway and Malaysia) that typify notable exceptions to the resource curse hypothesis. Since independence in 1996, Botswana has had one of the fastest growth rates in per capita income in the world through heavy reliance on the mining sector. This has led to the transformation of Botswana from one of the poorest countries in the world to a middle-income country. This example clearly explains why it is hazardous to jump to the conclusion that all resource abundant countries are cursed, and suggests the need for giving a satisfactory explanation as to why resource abundance retards growth in some countries and promotes development in others (Mehlum et al. 2006, Robinson et al. 2006).

The fundamental question posed by the resource curse is whether it is a curse to be rich in natural resources. If the answer to this is yes in some jurisdictions, then, the question to which I turn is whether the curse can be avoided by good institutions, which can be measured by a good indicator. I intend to answer these questions in this paper by developing a framework that further explores the efforts of previous researchers on the problems with resource-intensive economies by using the Economic Freedom Index (EFI) developed by the *Fraser Institute* (Karabegovic et al, 2008) as a proxy for institutional quality.

An interesting aspect of this study is that apart from looking at the interaction between resource abundance and institutional quality as a way of better understanding the transmission mechanism of the resource curse, the analysis focuses on Canadian provinces and US states. The provinces and the states share a great deal of common institutional framework. This is especially so for the 10 provinces within Canada and the 50 states within the United States, but it also is true that the US and Canada are also fairly similar in institutional quality – at least compared to other developing and developed countries. Consequently, variation in institutional quality across these regions is going to be subtle relative to cross country comparisons. In this regard, we have a potentially strong test of the role of institutional quality in the effect of resources on economic performance.

To achieve the above objectives, this paper will be presented in 5 sections. I review some extant literature in section 2, followed by a discussion of the possible explanations for the existence of the resource curse and the role of institutional quality. In section 3, I present the theoretical framework using the Mankiw-Romer-Weil (MRW) model which forms the basis of my estimation. Section 4 discusses the data, descriptive statistics, and then presents the estimation results for all the jurisdictions, Canadian provinces only, US states only, followed by implications of the results. The fixed effects estimator is used in addition to the ordinary least square estimator in order to allow for within-jurisdiction variations which take care of the variations among the observations in the sample data in response to jurisdiction-specific effects. Section 5 ends the paper with some concluding remarks.

2. Literature Review

Rents from natural resources constitute an important source of development finance if a country's resource policy, fiscal policy, institutions and the structure of governance are properly harnessed. Recent estimates compiled by the World Bank (2006) show that the natural capital share (26 percent) of total wealth is much greater than the share of produced capital (16 percent) in low-income countries. In developing countries where natural resources play a major role in the composition of wealth, the importance of good governance in transforming such natural resource endowments into good economic performance can not be over-emphasized (Hamilton and Giovanni, 2006). In a similar study on substitution between types of assets, Atkinson and Hamilton (2003) establish that rather than see the rents from natural resources as a source of finance for major public initiatives and recurrent expenditures, countries that succeeded in escaping the resource curse channeled such rents towards productive investments. From the foregoing, the importance of natural resources in breaking the vicious circle of poverty for sustainable economic growth is apparent, especially in poor countries. Also apparent is the potential role for high quality institutions to develop and manage natural resources.

The popular view that countries rich in natural resources, on average, tend to grow more slowly than countries without such resources is termed the 'resource curse'. There exist several explanations for the resource curse — the most notable one being that the exploitation of natural resources triggers the so-called Dutch disease, a situation in which increase in revenues from natural resources de-industrializes a nation's economy by raising the exchange rate, thereby making the manufacturing sector less competitive. The resource curse is a regularity documented by a number of studies in the empirical literature, starting with the famous work of Sachs and Warner (1995) which formally established the resource curse. Using the ratio of natural resource exports to GDP as a proxy for natural resource endowment, and 1971 as the base year, they control for other determinants of economic growth such as initial per capita income, trade policy, government efficiency, and investment rates. Their results, which support a dynamic version of the Dutch disease model, show that on average, resource-abundant countries lag behind countries with less resources. This has become the most commonly cited work in the resource curse literature.

A number of authors have further developed the work of Sachs and Warner, and they all argue in one way or the other that the resource curse is not as simple as they depict. While some are of the opinion that the resource curse is conditional on the political and economic environment; e.g. Mehlum et al (2006), Robinson et al (2006) and Bulte and Damania (2008), others maintain that resource abundance generates weak institutions e.g. Collier and Hoffler (2002). Some theoretical and empirical evidence for these divergent views are reviewed below.

Robinson et al (2006) present a formal political-economy framework of the resource curse by arguing that in order to understand whether or not natural resources are a blessing or a curse, it is imperative to analyze the political incentives that resource endowments generate – through a careful analysis of the interaction between institutions and resources. In order to fully analyze the effects of temporary and permanent resource booms, they use a two-period probabilistic model to consider some stock of natural resources with an intertemporal path of prices subject to exogenous price variation – capturing the environment faced by small developing economies subject to international commodity price variations. Their analysis reveals a complex relationship between resource extraction and the political environment. Where there are weak political institutions, resource booms will lead, through the political process, to inefficient resource allocations. They conclude that the extent to which the predictions in their model generate the curse is determined by the quality of institutions since countries with strong institutions benefit from resource booms, while those without suffer from the curse.

Bulte and Damania (2008) explain the resource curse phenomenon by developing a lobbying game model in which rent seeking firms interact with a corrupt government which acts strategically. Using the presence or absence of political competition to define incumbent governments' degree of freedom in the pursuit of development policies that maximize surplus in the lobbying game mentioned above, the main prediction of their analysis is that the presence or absence of political competition and the potential costs of political transitions are the key elements that generate the resource curse – by unleashing rent seeking and growth-depleting policies that put the economy off its optimal path. They run growth regressions similar to Sachs and Warner's and include an interaction term: [autocracy] x [resource abundance], to capture the transmission mechanism of the resource curse — with the ratio of primary goods exports to GDP serving as a proxy for resource abundance. They conclude that the interaction term captures the main effect of resource abundance on growth, and therefore suggest that it is reasonable to link resource booms to under-provision of semi-public goods (e.g. education), which adversely impacts productivity in the manufacturing sector through rent seeking and corruption.

Collier and Hoffler (2002) show in their analysis that natural resources often generate civil conflicts in many developing countries, and these in turn, adversely affect institutional quality due to the deleterious effects which economic inequality, political exclusion, political oppression and ethnic/religious hatred have on grievance – the major cause of rebellion. Using a data set of civil wars from 1960 to 1999, they show that primary commodity exports increase the probability of civil conflicts because they worsen governance, and generate stronger grievances – their estimated results show a strong and non–linear relationship between natural resources and conflict, with the risk of conflict at a maximum when the proportion of primary exports in GDP is 33%.

In an attempt to improve on the influential work of Sachs and Warner, Mehlum et al (2006) contrast the findings of Sachs and Warner that institutions are not decisive for the resource curse by using the latter's data and methodology to test their (Mehlum et al's) hypothesis that institutions are actually decisive for the resource curse. Using the average growth rate of real GDP per capita from 1965 to 1990 as the dependent variable, and an unweighted average of five indexes which ranges from zero to unity (rule of law index, bureaucratic quality index, corruption in government index, risk of expropriation index and government repudiation of contract index) as a proxy for institutional quality, they demonstrate that countries with good institutional quality will not experience any resource curse as natural resources only inhibit economic growth in countries with 'grabber friendly' institutions and not in countries with 'producer friendly' institutions.

Mehlum et al go beyond the regressions of Sachs and Warner by providing an alternative explanation for the understanding of the resource curse through the inclusion of an interaction term: [resource abundance] x [institutional quality], that captures their model prediction which states that it is only when institutions are weak that resource abundance is harmful to growth. In addition to finding a positive coefficient for the interaction term as stated in their apriori expectations, the empirical results equally show that countries with institutional quality index higher than the threshold value of 0.93 do not experience the resource curse. As such, 15 out of the 87 countries included in the regression have institutional quality strong enough to neutralize the resource curse – which is manifested through a negative growth impact of a marginal increase in resources.

From the foregoing review, it is apparent that institutions matter in the analysis of the resource curse – since the problem has come to be identified as one in which poor institutional quality interacts with other variables to generate social and economic outcomes which are not Pareto optimal. This paper fits into the various discussions so far because it is an extension of the study by Mehlum et al, albeit, the analysis here is at a state and provincial level. This is interesting because previous studies on the resource curse have been largely done at the cross-country level, notably because necessary data and information on resource issues often times fall under the portfolio of national jurisdictions. By looking at regions (in Canada and the United States) that share many common laws and institutions, I empirically investigate the role of institutions in the resource curse paradigm after controlling for a lot of country-specific features that might obscure the key role of resources and institutions.

3.0 Theoretical Framework

3.1 The Mankiw-Romer-Weil (MRW) Model

The Solow growth model presents a theoretical framework for understanding the sources of economic growth, and the consequences for long-run growth of changes in the economic environment. The pattern and speed of regional income and convergence has been a central issue in the growth literature for sometime. A framework available to directly test the Solow growth model is the growth empirics method of Mankiw, Romer and Weil (1992) where they argue that the Cobb-Douglas formulation of Solow's growth model should be extended to include human capital as well as physical capital. This would imply an underlying aggregate production function of the form:

$$Y_{jt} = K^{\alpha}_{jt}H^{\beta}_{jt}(A_{jt}L_{jt})^{1-\alpha-\beta} \quad (1)$$

Where *Y* is total income, *L* is labour supply and *A* is a technology parameter, with *L* growing at an annual rate *n* and *A* growing at rate *g*.

In line with Solow, MRW rewrite income, physical and human capita in (1) in terms of quantities per unit of effective labour, $y_t = Y_t / A_tL_t$, $k_t = K_t / A_tL_t$ and $h_t = H_t / A_tL_t$. The changes over time in physical and human capital per unit effective labour are:

$$k'_t = s_k y_t - (n + g + \delta)\, k_t \quad (2)$$

$$h'_t = s_h y_t - (n + g + \delta)\, ht \quad (3)$$

where δ is the proportionate depreciation for both physical and human capital, and s_k and s_h are the respective savings rates for physical and human capital which are assumed to be constant over time, though not across countries. Solving for steady-state solutions k^* and h^*, MRW derive an equation for steady-state income growth as follows:

$$\ln Y_t = \ln A_0 + gt - ((\alpha + \beta)/ (1 - \alpha - \beta)) \ln (n + g + d) + (\alpha / (1 - \alpha - \beta)) \ln s_k + (\beta / (1 - \alpha - \beta)) \ln s_h \quad (4)$$

The physical capital savings rate, s_k, was approximated by the investment share in GDP, while the human capital savings rate s_h was measured by the proportion of the working age population at any one time enrolled in secondary school. MRW conclude that augmenting the Solow model with measures of human capital leads to an improvement in its predictive power of explaining cross-country per capita output growth and levels.

3.2 Model Specification

In this paper, the objective is to assess the role of resource sectors and institutional quality on production using the MRW model as a general framework. Data limitations, especially US investment data and education data, preclude fully employing such a structural model. As an alternative, education share of total production is used in place of the percentage of working age population that is enrolled in secondary school used by MRW. Even though the model can not be estimated fully, I nonetheless use it as a framework as best as I can. This is outlined in the next subsection.

With the MRW framework as a guide, the analysis proceeds as follows. First, I present a simple summary of the possible linkages between output and resources using simple scatter plots. Second, I look more formally at the relationship using standard OLS regression methods for panel data. An important feature of the regression analysis is that I allow for an interaction between resource abundance and institutional quality as done by Mehlum et al[1] .

The robustness of the baseline specification is tested using two estimators – the ordinary least squares pooled estimator and the panel least squares fixed-effects estimator. Using the Chi square test, the null hypothesis which states that unobserved heterogeneity does not exist is either accepted or rejected. As well, other hypotheses which consider the interaction effect between resources and institutions, as well as the individual and combined effect of these variables on the level of real GDP per capita in the selected jurisdictions are considered.

3.2.1 The Model

The basic econometric specification for testing the proposed effects of resources and institutional quality on the level of real GDP per capita in each jurisdiction is given as:

$$\ln RGDP_{it} = \beta_0 + \beta_1 \ln(MIN_{it}) + \beta_2 \ln(EFI_{it}) + \beta_3 \ln(EFI_{it})^2 + \beta_4 \ln(EDU_{it}) + \beta_5 \ln(HLT_{it}) + \mu_{it} \ldots \quad (5)$$

The variables of the model are defined in the table below and μ_{it} is a random error term.

$RGDP_{it}$	Real GDP Per Capita levels for jurisdiction *i* at time *t*
MIN_{it}	Mining Share of Production (resource abundance) for jurisdiction *i* at time *t*
EFI_{it}	Economic Freedom Index (institutional quality) for jurisdiction *i* at time *t*
EDU_{it}	Educational Services Share of Production (control) for jurisdiction *i* at time *t*
HLI_{it}	Healthcare Share of Production (control) for jurisdiction *i* at time *t*
CDM_{it}	Country Dummy for jurisdiction *i* at time *t*
TDM_{it}	Time Dummy for jurisdiction *i* at time *t*

Equation (5) clearly departs considerably form the MRW model. It does so because of limited availability of data. Specifically, we do not have investment share data for the US states. What it does capture is the dependence of per capita output on the relative importance of the mining sector in overall production, which is our key means of identifying the contribution of the resource sector to overall production. Also included as controls, in part motivated by the MRW model, are measures of health and education services in total production.

As noted, a key focus of the paper is to determine to what extent institutional quality, measured by the EFI index, influences the role of resource dependence. We introduce the direct effects of institutional quality on output per capita in a quadratic fashion, which allows for greater flexibility in modeling the possible direct relationship.

We also introduce two dummy variables (CDM_{it} & TDM_{it}) are included to capture the effects of country and time differences. These are Country Dummy, CDM_{it} (Canadian provinces = 1, US states = 0) and Time Dummy, TDM_{it} (1, 2, 3, 4, 5 and 6 for the years 2000, 2001, 2002, 2003, 2004 and 2005 respectively). In effect, we are assuming that

$$\beta_0 = \delta_0 + \delta_1 \, CDM_{it} + \delta_2 \, TDM_{it} \quad \ldots\ldots (6)$$

Substituting for β_0 in the basic model (equation 5) above, we obtain the unrestricted model that captures the effects of country and time differences as follows:

$$lnRGDP_{it} = \delta_0 + \delta_1 \, CDM_{it} + \delta_2 \, TDM_{it} + \beta_1 ln(MIN_{it}) + \beta_2 ln\,(EFI_{it}) + \beta_3 ln(EFI_{it})^2 + \beta_4 ln(EDU_{it}) + \beta_5 ln(HLT_{it}) + \mu_{it} \ldots\ldots (7)$$

With the above model, for two jurisdictions with identical resource endowment and institutional quality, except that one is a Canadian province (with CDM = 1) and the other a US state (with CDM = 0), we would expect on the average, a difference of δ_1 percent in their respective output levels. These issues are discussed further in the next section.

We now introduce the possibility that the output effect of resource abundance β_1, depends upon institutional quality, possibly in a non-linear manner:

$$\beta_1 = \beta_0 + \beta_2 ln\,(EFI_{it}) + \beta_3 ln(EFI_{it})^2 \quad \ldots\ldots (8)$$

Substituting equation (8) into (7) and we get the following relationship:

$$lnRGDP_{it} = \delta_0 + \delta_1 \, CDM_{it} + \delta_2 \, TDM_{it} + \beta_0 ln(MIN_{it}) + \beta_1 ln(MIN_{it}) x ln(EFI_{it}) + \beta_2 ln(MIN_{it}) x ln(EFI_{it})^2 + \beta_3 ln(EFI_{it}) + \beta_4 ln(EFI_{it})^2 + \beta_5 ln(EDU_{it}) + \beta_6 ln(HLT_{it}) + \mu_{it} \ldots\ldots (9)$$

The motivation for equation (8) above comes from the reviewed literature in section 2 (especially Mehlum et al) where the main prediction agrees with the empirical findings which establish that resource abundance is harmful to growth only when the quality of institutions is weak. In equation (9) above, $ln(MIN_{it}) x ln(EFI_{it})$ and $ln(MIN_{it}) x ln(EFI_{it})^2$ are the two interaction terms that capture the fact that institutional quality is the medium through which the resource curse may be transmitted.

From equation (9) above, the impact of a marginal change in resource abundance ($lnMIN_{it}$) on the level of real per capita income ($lnRGDP_{it}$) is given below as:

$$\frac{d(\ln RGDP_{it})}{d(\ln MIN_{it})} = \beta_0 + \beta_1(\ln EFI_{it}) + \beta_2(\ln EFI_{it})^2 \quad \text{...(10)}$$

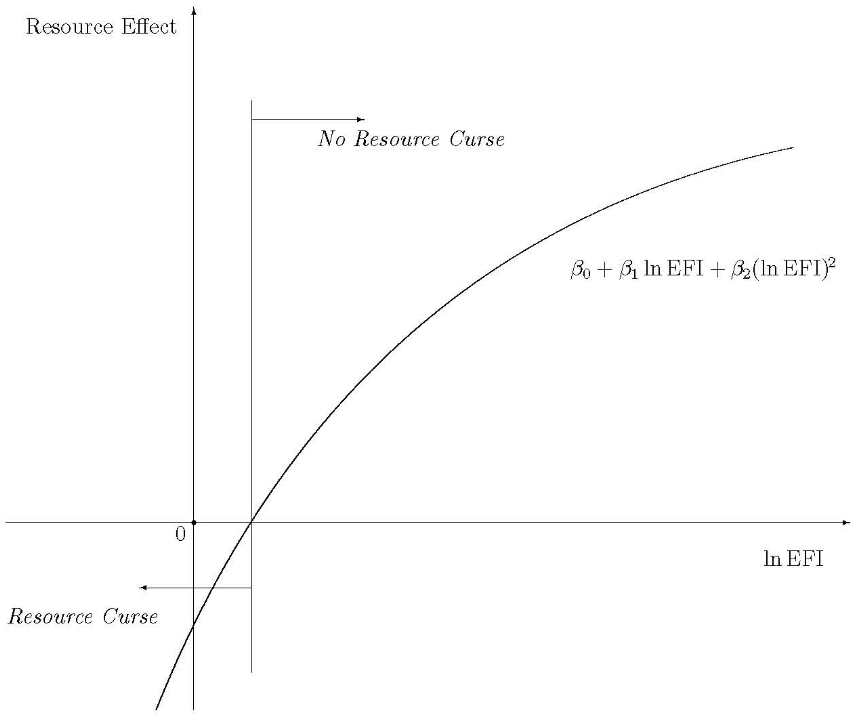
If institutional quality plays no role in the resource effect, then the two slope coefficients will be zero. Otherwise, resource dependence will depend upon the level of institutional quality. Figure 1 represents the relationship in (10). Here we have represented the relationship so that there is some level of EFI such that beyond this, resource abundance is a positive contribution to output per capita while below this point resource abundance is indeed a curse. We have also postulated that there are diminishing returns to instititutional quality: the incremental gain in output falls for higher levels of EFI. It is of course quite possible that the estimated coefficients might locate the curve entirely below zero – a pervasive resource curse – or entirely above zero. Moreover, we may observe constant or increasing returns to EFI. In the empirical section below, we report the resource effect in equation (10) evaluated at the mean levels of EFI; we also report an estimate of the function in (10) for all EFI.

We are also interested in the overall impact of a marginal change in institutional quality on the level of real output per capita. This is given as:

$$\frac{d(\ln RGDP_{it})}{d(\ln EFI_{it})} = \beta_3 + 2*\beta_4 \ln(EFI_{it}) + \beta_1(\ln MIN_{it}) + 2*\beta_2 (\ln MIN_{it})(\ln EFI_{it}) \quad \text{.........................(11)}$$

In this case, the effect of institutional quality depends not only on the resource sector, but also on the outcome of the interaction between the resource sector ($\ln MIN_{it}$) and institutional quality ($\ln EFI_{it}$). This fact is adequately captured by the last term on the right hand side of equation (11). In the empirical analysis below, we calculate this effect at the mean levels of EFI and MIN.

On final comment is in order. Unlike Mehlum et al (2006), this study focuses on levels of income per capita rather than growth rates. Our reasoning is as follows. First, it is levels, rather than growth rates that capture fundamental cross-country differences in in welfare levels. Second, the MRW framework (that is, the Solow model) that we follow has two relationships, one in levels, the other in growth rates. The former is only appropriate for countries in steady state, which is arguably reasonable for the jurisdictions in Canada and the United States; less so, though, for cross country studies such as Mehlum et al (2006). Of course, the growth rate relationships are also valid for steady state but as noted the level of output per capita is a more interesting measure than the output growth rate. Finally, there is a very short time frame for the data, limited by the EFI, for which analysis of growth rates is probably not suited.



Quadratic Model — showing diminishing returns to EFI

Figure 1

4.0 Estimation Results

4.1 Data

The data used in this study are compiled from four main sources: United States Bureau of Economic Analysis (Regional Economic Accounts), Statistics Canada (National Economic Accounts – CANSIM II), The Fraser Institute Report (Economic Freedom of North America, 2008 Annual Report), and Bank of Canada (Rates and Statistics – Annual Average Exchange Rates). The measure of total output from 2000-2005 for all the 60 jurisdictions (50 US states and 10 Canadian provinces) is Real GDP Per Capita (chained 2000 US dollars). Data for the US are obtained from the United States Bureau of Economic Analysis (Regional Economic Accounts). The initial Real GDP (chained 2002 Cdn dollars) data for Canadian provinces are obtained from Statistics Canada (National Economic Accounts – CANSIM II), and then standardized by adjusting with the annual population data, chained 2000 GDP deflator and average annual US-Cdn exchange rate for 2000. In all, there are 360 observations obtained from pooled cross section of 60 jurisdictions from 2000-2005.

The main measure of resource abundance in this study is Mining Share of Total Production (MIN), while the two control variables are Educational Services Share of Total Production (EDU) and Healthcare and Social Assistance Share of Total Production (HLT). Data for these three variables from 2000-2005 are obtained from the Regional Economic Accounts of the US Bureau of Economic Analysis for the 50 US states, and CANSIM II under the National Economic Accounts section of Statistics Canada for the 10 Canadian provinces. Institutional quality is measured by the Economic Freedom Index constructed by the Fraser Institute. Due to the important role which institutional quality plays in understanding the transmission mechanism of the resource curse, I take a closer look at the EFI as a measure of institutional quality in section 4.2 below.

4.2 EFI as a Measure of Institutional Quality

The term "institutional quality" refers to an institutional environment that is supportive of markets through property rights protection, enforcement of contracts, and voluntary exchange at market-determined prices – thereby supporting the institutional approach to growth which is based on the notion that both the availability and productivity of resources are influenced by the institutional and policy environment (Gwartney et al, 2004). A number of studies have linked levels of economic freedom with higher levels of economic growth and income. For example, Easton and Walker (1997) find that changes in economic freedom have a significant impact on the steady-state level of income even after the level of technology, the level of education of the workforce, and the level of investment are taken into account – leading to the conclusion that economic freedom is a separate determinant of the level of income. Equally, Hall and Jones (1999) conclude that a quality infrastructure is present when the institutions and government policies of a country encourage productive behaviour (e.g., accumulation of skills or the development of new goods and production techniques) and discourage predatory activities (e.g., rent seeking, corruption, and theft.)

To effectively capture the roles that institutions play in the resource curse hypothesis, I use the Economic Freedom of North America Index (EFI) constructed by Karabegovic et al (2008) as a measure of institutional quality in this paper. The EFI measures economic freedom on a 10-point scale and provides measures for US states and Canadian provinces. A high degree of economic freedom is indicated by the highest possible score of 10. The index weights a variety variables such as the size of government, taxation, labour market programmes, and other indicators that are assumed to contribute to economic freedom and the free operation of markets.

One major advantage of using the EFI as a measure of institutional quality in this study is that it encompasses many factors that economists generally agree would facilitate economic activities and enhance growth. Table 1 and Figure 2 below show the summary statistics for EFI values for the 60 jurisdictions between 2000 and 2005.

Table 1: Descriptive statistics of EFI from 2000-2005

	2000	2001	2002	2003	2004	2005	2000-05
Mean	6.29	6.29	6.33	6.46	6.55	6.59	6.42
Median	6.45	6.50	6.55	6.65	6.70	6.75	6.60
Maximum	8.10	8.20	8.30	8.40	8.40	8.50	8.50
Minimum	3.90	3.80	4.00	3.90	3.90	3.80	3.80
Std. Dev.	0.88	0.89	0.89	0.92	0.91	0.92	0.90
Obs	60	60	60	60	60	60	360

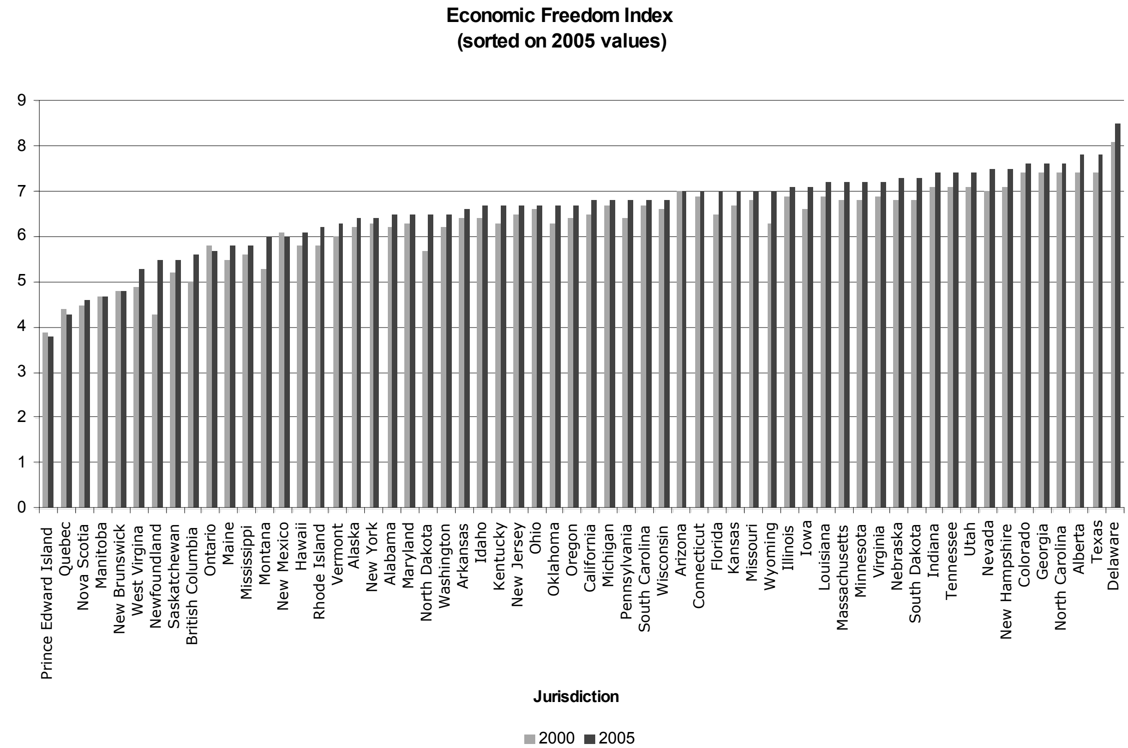


Figure 2

4.3 <u>The Resource Curse – A Quick Look</u>

In this section, I take a quick look at the data with respect to discussions so far on the resource curse. To achieve this, the level of real GDP per capita between 2000 and 2005 for 60 jurisdictions is plotted against natural resource abundance (measured by the Mining Share of Total Production). As depicted by Figure 3 below, there is some preliminary evidence of the resource curse.

In Figure 4, Real GDP Per Capita is plotted against the quality of institutions, which is measured by the Economic Freedom Index discussed earlier. There is a positive correlation between income level and the quality of institutions with an R^2 value of 0.68. This correlation suggests that if appropriate institutions are in place, the market system provides an incentive for economic growth by affecting the rate of investment as well as through the productivity of resource use.

While the high correlation is consistent with our priors as well as a large literature relating institutional quality to economic performance; e.g. Easton and Walker (1997) and Hall and Jones (1999), one has to be careful interpreting this as a causal. It is perfectly plausible that the causation runs in the opposite direction: a higher level of development permits greater economic freedom. Moreover, the construction of the index itself may be a source of problem. Suppose that in the process of constructing the EFI, measures that are associated with growth are considered while those that are not are discarded implicitly or explicitly. Then the correlation reflects a reverse causality inherent in the index construction. These concerns of reverse causality are difficult to address in our empirical work and qualify our results, both the simple correlations in these scatterplot figures and in the regression analysis that follows. Unfortunately, a more thorough treatment of this issue is beyond the scope of the paper.

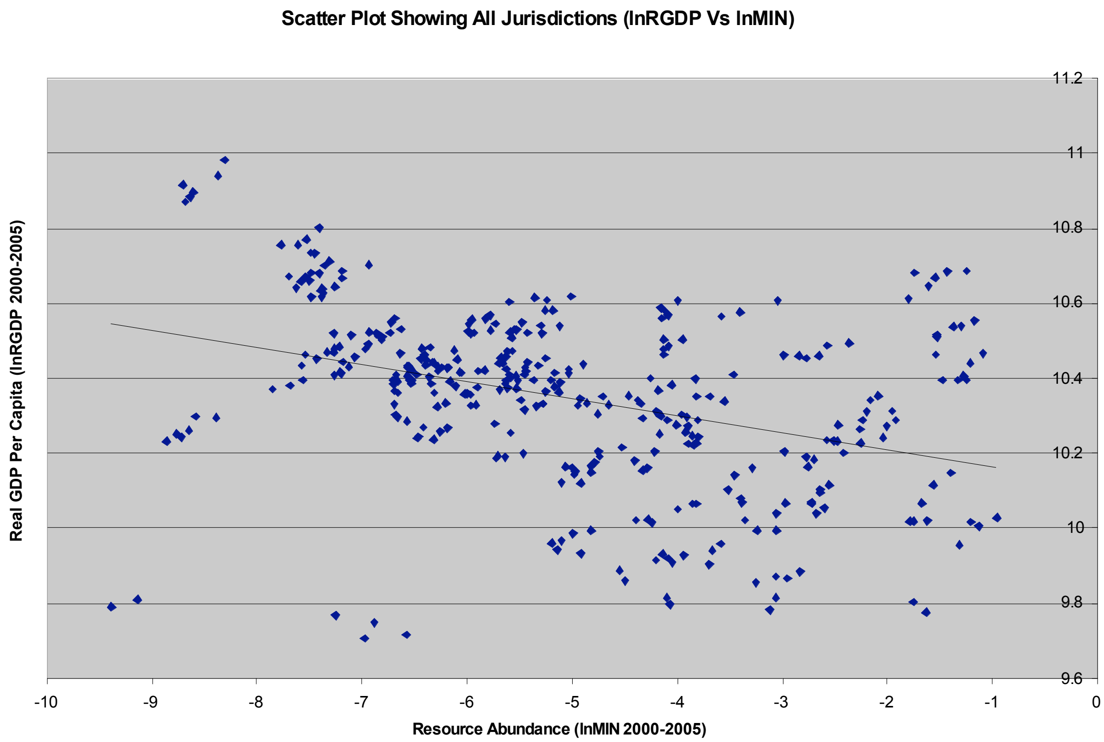


Figure 3

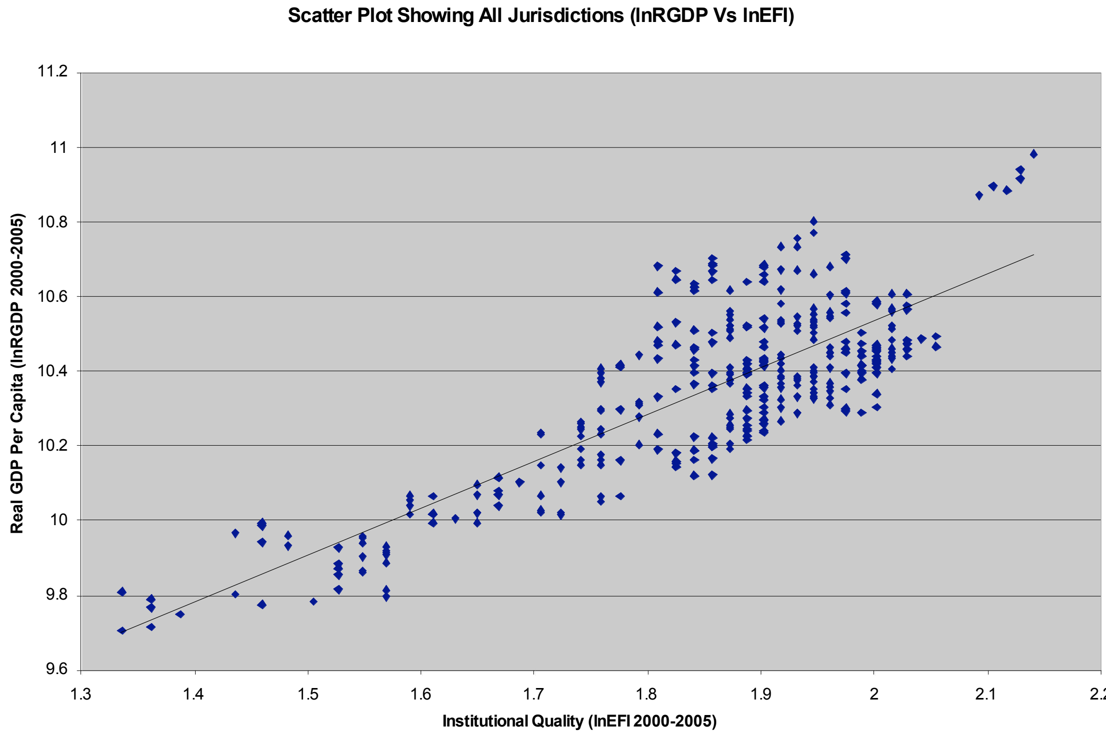


Figure 4

4.4 Institutional Dichotomy and the Resource Curse

A pertinent question to ask at this juncture is whether or not good institutions can prevent the curse. Mehlum et al (2006) plot the average yearly economic growth from 1965 to 1990 against resource abundance in countries that have more than 10% of their GDP as resource exports. In order to account for the quality of institutions, they split the sample further into two subsamples of equal size — with one sample consisting of countries with good institutions and the other, countries with bad institutions. Similarly, I split the EFI sample into two on the basis of the median value of 6.75 for EFI in 2005. Thus, jurisdictions with median values above 6.75 are categorized as having superior institutions while those with values below are said to have inferior institutions. Figure 5 shows the outcome of this dichotomy.

Again, the resource curse is established for jurisdictions with both superior and inferior institutions as measured by the median value of their EFIs in 2005. However, a careful look at the scatter plot shows that the relationship, as measured by the slope, does not appear to depend upon separation into low and high EFI categories. This may not be unconnected with the overall effects of omitted variables in the model. It may also reflect the relatively crude separation technique adopted for EFI above. Regression analysis will hopefully help resolve this ambiguity.

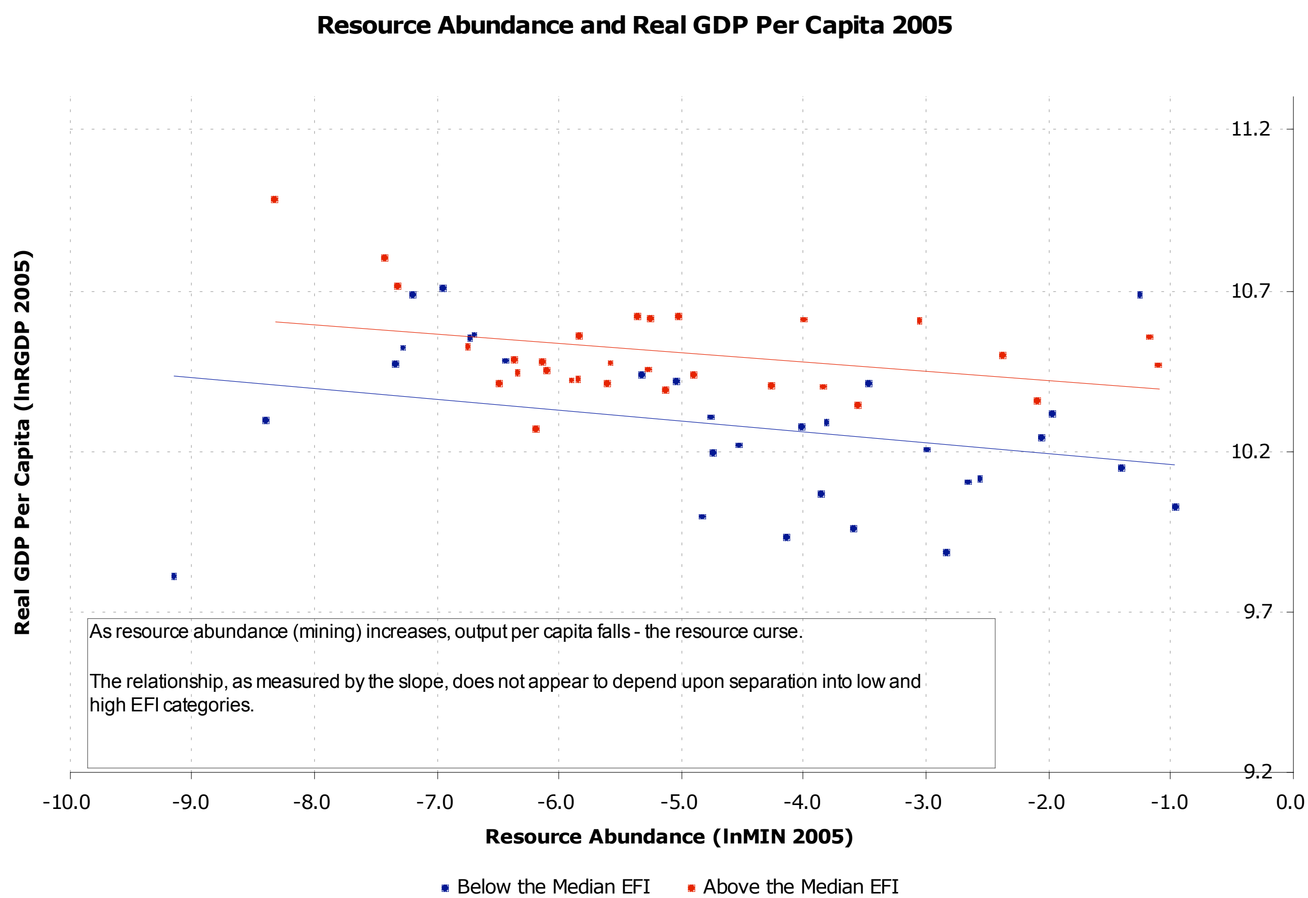


Figure 5

4.5 Estimation Results

In this section, four tables are presented to summarize the estimation results for the model. Tables 4–6 show the estimation results for our baseline specification using both ordinary least squares (pooled estimator) and the fixed effects estimator; Table 7 presents the output effects of institutional quality and resource abundance at their respective mean values for the regression models. Each table shows the results of using a fixed-effects estimator in order to check the robustness of the model. I use the fixed effects estimator in addition to the pooled estimator because the former allows for variation among the observations in the sample data in response to jurisdiction-specific fixed effects and, as a result, it takes into account within-jurisdiction variations. I leave out the time-invariant country dummies (CDM) that appear in each equation when estimating the fixed effects equations since the fixed effects fully account for jurisdictional differences.

For the full sample of jurisdictions, we estimate the model by OLS both with CDM and without CDM. The latter is reported because it is directly comparable to the fixed effect estimates reported. To determine the appropriateness of the fixed effects model for the specified model, a chi-square test for the presence of unobserved heterogeneity is reported.

The descriptive statistics and correlation matrix for all the variables included in the estimated model for all jurisdictions from 2000-2005 are provided in Tables 2 and 3 below. A cursory look at the correlation matrix for the entire sample in Table 3 reveals that a potential problem may arise because correlation coefficients of 0.976, 0.926, 0.998 and 0.986 between lnMIN and lnMINXlnEFI, lnMIN and $lnMINxlnEFI^2$, lnEFI and $lnEFI^2$, and lnMINxlnEFI and $lnMINxlnEFI^2$ respectively are very high, which points to the potential problem of multi-colinearity.

Table 2: Descriptive statistics for model variables

	lnRGDP	CDM	TDM	lnMIN	lnEFI	lnEDU	lnHLT
Mean	10.35	0.17	3.50	-5.04	1.85	-4.62	-2.67
Median	10.39	0.00	3.50	-5.29	1.89	-4.88	-2.66
Maximum	10.98	1.00	6.00	-0.97	2.14	-2.68	-2.24
Minimum	9.71	0.00	1.00	-9.39	1.34	-6.36	-3.27
Std. Dev.	0.23	0.37	1.71	1.92	0.15	0.89	0.20
Obs.	360	360	360	360	360	360	360

Table 3: Correlation matrix for key model variables

	lnRGDP	lnMIN	lnEFI	$lnEFI^2$	lnMIN x lnEFI	lnMIN x $lnEFI^2$	lnEDU	lnHLT
lnRGDP	1							
lnMIN	-0.373	1						
lnEFI	0.822	-0.204	1					
$lnEFI^2$	0.820	-0.211	0.998	1				
lnMINxlnEFI	-0.521	0.976	-0.393	-0.399	1			
$lnMINxlnEFI^2$	-0.616	0.926	-0.525	-0.530	0.986	1		
lnEDU	-0.496	-0.003	-0.604	-0.589	0.113	0.194	1	
lnHLT	-0.379	-0.272	-0.469	-0.476	-0.168	-0.079	0.316	1

The results for the general model using all jurisdictions are presented in Table 4. As noted, both OLS and fixed effects estimators are reported. Reported standard errors are robust to cross-section heteroscedasticity. For both the OLS and fixed effect (FE) estimator, all variables are statistically significant for two-sided tests at standard significance levels. Both the OLS and FE model fit the data well as measured by the adjusted R-squared statistic.

Table 4 reveals that the two dummies, CDM and TDM, included in the unrestricted version of the model estimated with OLS come out with highly significant coefficients for a two-sided test. The country dummy (CDM) coefficient comes out with a negative sign, which reflects the fact that the US jurisdictions are coded with value CDM = 0, and the these jurisdictions typically have higher levels of real GDP per capita than their

Canadian equivalents. The time dummy TDM has a positive sign and captures individual jurisdictions deterministic growth paths.

The two control variables in the model, education (lnEDU) and health (lnHLT), are also statistically significant as shown by their p-values. However, the coefficients in some instances are negative. This is always true for the healthcare variable and true for the education variable in one of the models. Clearly, these variables are not serving as controls in the manner we expect. This is a qualification of our results and merits further investigation.

For both models, all of the terms involving lnMIN and lnEFI are statistically significant, which means that the resource effect and the institutional quality effect are both measured as functions of the underlying data rather than simple elasticities. This is consistent with the previous studies that also find interdependence between resource abundance and quality of institutions, e.g. Mehlum et al (2006). We discuss this interdependence further below; prior to doing so, we investigate the robustness of the model by considering country specific estimates. Doing so allows for country specific slope coefficients whereas in the models of Table 4 the slope coefficients are restricted to be the same across all jurisdictions.

Table 5 reports the results for the US states. As before, there is evidence in favour of the fixed effect model and, for this model, the goodness of fit is essentially the same as for the fixed effect model in Table 4. In terms of the coefficients, all of the signs are preserved; there is, however, some substantial variation in coefficient magnitude.

Table 6 reports the regression results for the model estimated with both OLS and fixed effects estimator for Canadian provinces only. Again, there is evidence in favour of the fixed effect model. Here we find a much weaker set of results. In particular, all variables involving lnMIN are statistically insignificant. This means that for the Canadian provinces there is no evidence of a resource curse or indeed a resource effect at all. The weak results may be an implication of the relatively few jurisdictions under consideration (the ten provinces). Alternatively, it may be the case that the Canadian situation is very distinct from the US situation. Consequently, there are two possible conclusions relevant for Canada. The first conclusion, if one is happy with the relatively small sample set, is that there is no resource effect in Canada. The second conclusion, if one is happy lumping Canada in with the US, is that the resource effect is as measured by the coefficients in Table 4. We leave this decision to the reader, though we will proceed in our discussion to consider the results for the full set of regions reported in Table 4.

Table 4: Estimation results for all Canadian provinces and US states

Variable	OLS (Unrestricted)	OLS (Restricted)	Fixed Effects
Constant	5.615 (0.458) [0.000]	4.052 (0.691) [0.000]	5.866 (0.573) [0.000]
CDM	-0.352 (0.013) [0.000]	-	-
TDM	0.017 (0.001) [0.000]	0.014 (0.001) [0.000]	0.020 (0.001) [0.000]
lnMIN	-0.377 (0.069) [0.000]	-0.318 (0.096) [0.001]	-0.572 (0.068) [0.000]
lnEFI	4.110 (0.559) [0.000]	5.403 (0.835) [0.000]	4.087 (0.580) [0.000]
$\ln EFI^2$	-1.071 (0.160) [0.000]	-1.327 (0.233) [0.000]	-1.163 (0.161) [0.000]
lnMINxlnEFI	0.473 (0.082) [0.000]	0.378 (0.112) [0.001]	0.706 (0.084) [0.000]
$\ln MIN \times \ln EFI^2$	-0.152 (0.024) [0.000]	-0.122 (0.032) [0.000]	-0.217 (0.024) [0.000]
lnEDU	0.0890 (0.005) [0.000]	-0.009 (0.003) [0.001]	0.037 (0.011) [0.001]
lnHLT	-0.409 (0.020) [0.000]	-0.219 (0.016) [0.000]	-0.357 (0.022) [0.000]
Observations	360	360	360
Adjusted R^2	0.771	0.743	0.996
Fixed Effect (Cross-section χ^2)	-	-	1548.47 [0.000]

Values in brackets and parentheses indicate the standard errors and p-values of estimated coefficients respectively.

Table 5: Estimation results for US states only

Variable	OLS (Unrestricted)	Fixed Effects (Unrestricted)
Constant	0.722 (0.727) [0.322]	7.166 (1.050) [0.000
TDM	0.018 (0.001) [0.000]	0.019 (0.002) [0.000]
lnMIN	-1.472 (0.145) [0.000]	-0.255 (0.240) [0.289]
lnEFI	9.603 (0.736) [0.000]	2.810 (1.273) [0.028]
$lnEFI^2$	-2.592 (0.177) [0.000]	-0.829 (0.352) [0.019]
lnMINxlnEFI	1.659 (0.142) [0.000]	0.400 (0.281) [0.156]
$lnMINxlnEFI^2$	-0.473 (0.034) [0.000]	-0.142 (0.076) [0.080]
lnEDU	0.092 (0.004) [0.000]	0.0554 (0.013) [0.000]
lnHLT	-0.397 (0.022) [0.000]	-0.401 (0.041) [0.000]
Observations	300	300
Adjusted R^2	0.527	0.994
Fixed Effect (Cross-section χ^2)	-	1346.72 [0.000]

Values in brackets and parentheses indicate the standard errors and p-values of estimated coefficients respectively.

Table 6: Estimation results for Canadian provinces only

Variable	OLS (Unrestricted)	Fixed Effects (Unrestricted)
Constant	6.989 (0.793) [0.000]	5.151 (1.422) [0.001]
TDM	0.019 (0.002) [0.000]	0.019 (0.002) [0.000]
lnMIN	-1.083 (0.341) [0.003]	-0.048 (0.167) [0.777]
lnEFI	1.130 (0.700) [0.113]	4.809 (1.483) [0.002]
$\ln EFI^2$	-0.372 (0.217) [0.092]	-1.359 (0.463) [0.005]
lnMINXlnEFI	1.465 (0.439) [0.002]	-0.016 (0.212) [0.941]
$\ln MIN \times \ln EFI^2$	-0.486 (0.138) [0.001]	0.030 (0.067) [0.656]
lnEDU	-0.476 (0.214) [0.031]	-0.110 (0.152) [0.474]
lnHLT	-0.273 (0.126) [0.035]	-0.106 (0.128) [0.411]
Observations	60	60
Adjusted R^2	0.952	0.990
Fixed Effect (Cross-section χ^2)	-	105.59

Values in brackets and parentheses indicate the standard errors and p-values of estimated coefficients respectively.

We now consider the resource effects and institutional quality effects implied by the coefficient estimates reported in Table 4. To do so, recall that these effects are measured as

$$\frac{d(\ln RGDP_{it})}{d(\ln MIN_{it})} = \beta_0 + \beta_1(\ln EFI_{it}) + \beta_2(\ln EFI_{it})^2$$

$$\frac{d(\ln RGDP_{it})}{d(\ln EFI_{it})} = \beta_3 + 2*\beta_4 \ln(EFI_{it}) + \beta_1(\ln MIN_{it}) + 2*\beta_2 (\ln MIN_{it})(\ln EFI_{it})$$

Table 7 reports these effects measured at the mean levels of lnMIN, lnEFI, $\ln EFI^{2}$, and lnMINxlnEFI. Clearly, the resource effect (estimated at -0.026 using OLS and -0.013 using the fixed effects estimator) establishes the resource curse for all Canadian provinces and US states pooled together. This is not the case when Canadian provinces and US states are treated separately. For Canada, where we have already noted that the lnMIN coefficients are all statistically insignificant this is what we would expect. (Note that the effects reported for Canada only in Table 7 are using the estimated coefficients; one could also simply set these to zero.) For the US jurisdictions only, the effect is measured as -0.007 but this is statistically insignificant with a p-value of 0.347. So for both Canada and the US individually, there is no resource effect.

The results from Table 7 also reveal that the marginal impact of institutional quality at the respective means of $\ln EFI_{it}$, $\ln MIN_{it}$ and $\ln MIN_{it} x \ln EFI_{it}$ is positive for all the models, albeit, the effect for the model with Canadian provinces only is statistically insignificant. Again, this may reflect that there are only 10 provinces considered for the period under review. On balance, there seems to be reasonably strong evidence that at mean levels of EFI and MIN, changes in institutional quality are associated with increases in per capita output.

Table 7: Output effects of Resource Abundance and Institutional Quality

Output Effects	All (OLS)	All (FE)	US Only (FE)	Canada Only (FE)
Resource Effect	-0.026 (0.002) χ^2(d.f.1)=218.598 [0.000]	-0.013 (0.005) χ^2(d.f.1)= 6.392 [0.012]	– 0.007 (0.008) χ^2(d.f.1)= 0.883 [0.347]	0.006 (0.013) χ^2(d.f.1)= 0.184 [0.668]
Institutional Quality Effect	0.619 (0.023) χ^2(d.f.1)=708.917 [0.000]	0.302 (0.050) χ^2(d.f.1)= 36.847 [0.000]	0.408 (0.095) χ^2(d.f.1)=18.474 [0.000]	0.158 (0.158) χ^2(d.f.1)= 1.002 [0.317]

Values in brackets indicate standard errors of estimated output effects, while values in parentheses indicate p-values of Chi-square.

While Table 7 provides some information about the contribution of resources and institutional quality they do not give a complete picture since they are focused on mean levels of EFI and MIN. Figures 6 and 7 provide a more complete picture by using the fixed effect coefficient estimates of Table 4 and calculating the various effects across the entire sample.

Figure 6 is an empirical counterpart to Figure 1, showing how the resource effect depends upon the level of lnEFI. The figure is constructed by sorting the pairs of calculated resource effects and EFI for all jurisdictions and time periods. In Figure 6, we observe a slightly richer relationship than what we hypothesized in Figure 1. First, there are two regions of lnEFI that give rise to the resource curse: very low levels and very high levels of lnEFI are associated with negative marginal effects. There is a small region, below the mean of lnEFI, where the resource effect is positive.

Figure 6 provides a much richer answer to the question about the interdependence between institutional quality and the resource curse than has been given in the previous literature. The non-linear relationship clearly indicates that while improvements from very low level of institutional quality can indeed mitigate the curse, at higher levels the curse returns.

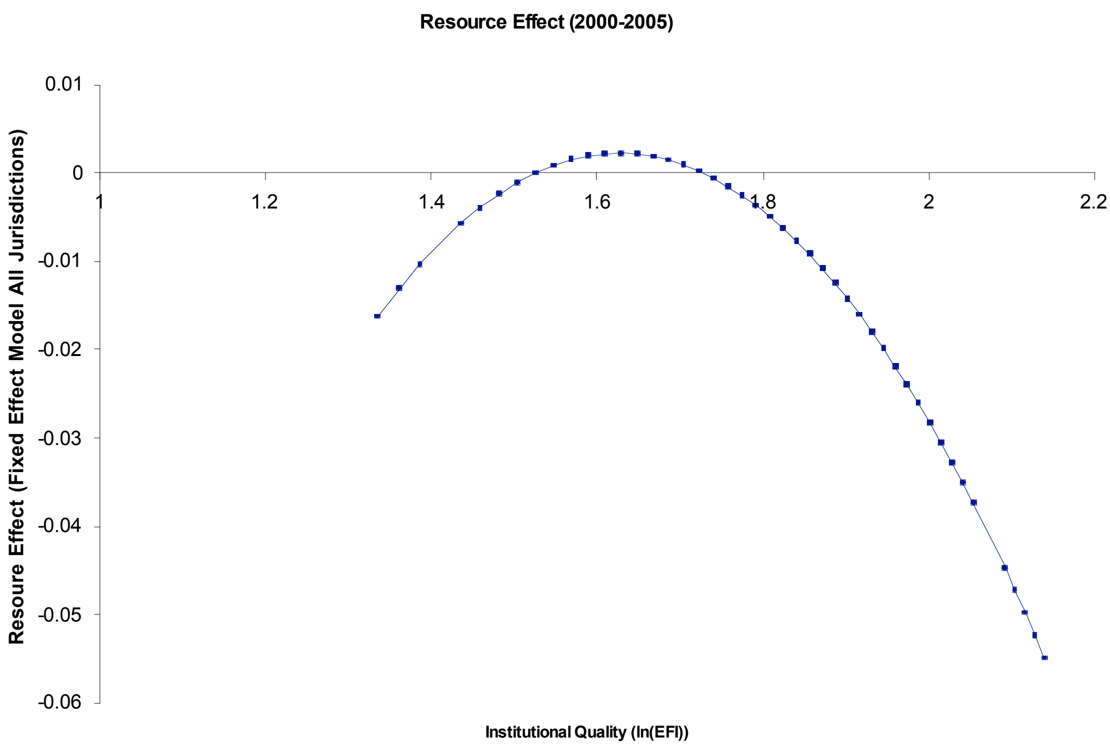


Figure 6

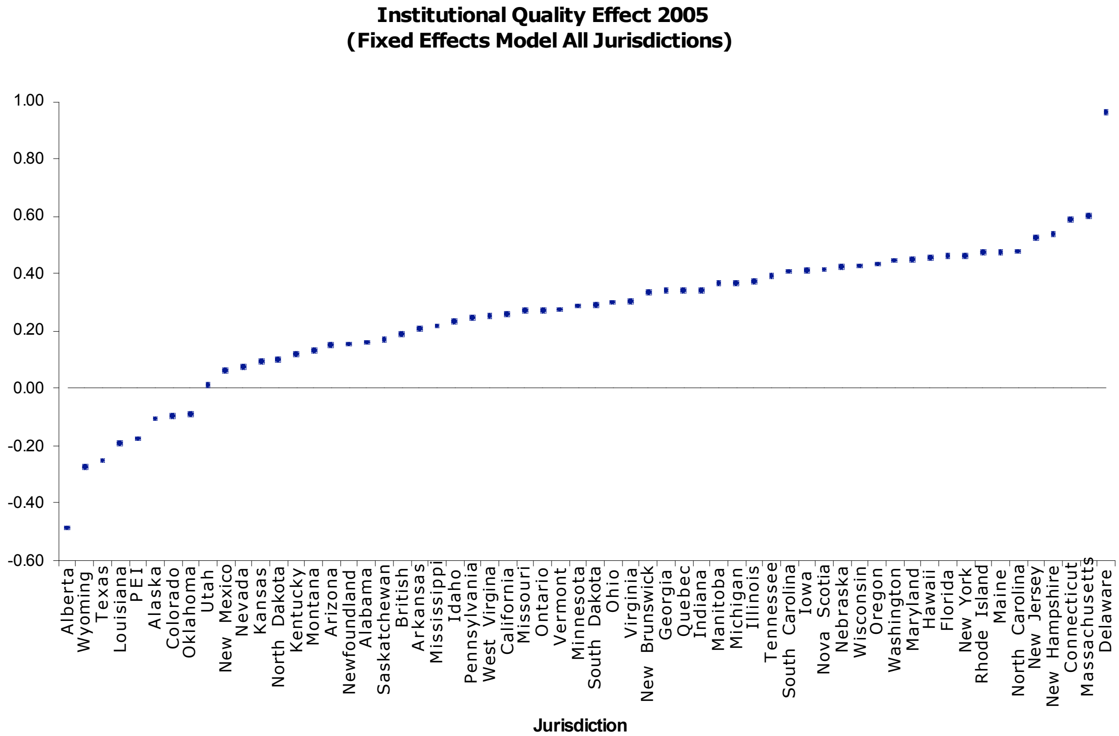


Figure 7

In Figure 7, the institutional quality effects for the 60 jurisdictions in 2005 are reported. These are constructed by substituting each jurisdictions lnMIN and lnEFI values into the formula above for the marginal effects of EFI. The results are then sorted from lowest effects to highest. What we observe is that for most jurisdictions, the effect of further improvements in institutional quality is associated with a rise in output per capita. There are, however, some exceptions, where the effect is negative. Generally speaking, these are jurisdictions with very high levels of the EFI index, such as Texas and Alberta. Although it is not a simple relationship (it depends upon both lnMIN and lnEFI), it appears that at high levels of EFI there are negative returns.

4.6 Fixed Effects Test

The ordinary least squares model can be generalized with a fixed-effects approach using the least squares dummy variable technique which allows the model to vary among the observations in the sample data in response to jurisdiction-specific fixed effects and, as a result, takes into account within-jurisdiction variations. To determine the appropriateness of the fixed-effects model, I test for differences across groups by testing the hypothesis that the constant terms are all equal with a chi-square test. Under the null hypothesis of equality suggested by Greene (2002), the efficient estimator is pooled least squares. The fixed effects model allows the unobserved individual effects to be correlated with the included variables, the differences between units are then strictly modeled as parametric shifts of the regression function.

A useful style I adopt here in estimating the fixed effects equation is to completely drop the country dummies since they are time-invariant. A cursory look and comparisons of the coefficients estimated using both OLS and the fixed effects estimator yield some interesting insights. First, the results of the former are quite similar to those of the latter save for the significantly large values of the adjusted R^2 which suggest that the fixed effects models have a better goodness of fit compared to the pooled estimator. Many of the qualitative conclusions from the model are the same whether a pooled or fixed effects estimator is employed.

4.7 Qualifications and Robustness Test

Several points in the econometric specification deserve special comment. First, the problems of country and time differences are addressed by the inclusion of the time and country dummies (TDM and CDM) shown in the unrestricted model estimated with OLS in Table 4.

Second, using the results from Tables 4 - 6, I test to see whether or not there was additional unobserved heterogeneity in the data not accounted for in the specified model. To achieve this feat, the estimates in each table contain both the restricted and unrestricted versions of the three models, using OLS and fixed effects estimator. It is noteworthy that since the time-invariant variable (CDM) is not included in the fixed effects model, it is reasonable to conclude that the resulting fixed effects estimated for each jurisdiction include the effect of both observed and unobserved heterogeneity across jurisdictions.

In line with Greene (2002), the F-test is relied upon to test for the presence of unobserved heterogeneity. For fixed effects testing, there are three sets of tests. The first set consists of two tests that evaluate the joint significance of the cross-section effects using sums-of-squares (*F*-test) and the likelihood function (Chi-square test). The corresponding restricted specification is one in which there are period effects only. In all cases, the two statistic values (*F*-test and Chi-square test) and the associated *p*-values strongly reject the null that the effects are redundant. In addition, the results evaluate the joint significance of the period effects, and of all of the effects, respectively. All of the results suggest that the corresponding fixed effects are statistically significant. Given the null hypothesis (H_0) which states that unobserved heterogeneity does not exist, the critical values from the chi-square tables at the 95% and 99% confidence levels are lower than the reported values in Tables 4 - 6 – a confirmation that unobserved heterogeneity does exist and so, the fixed effects estimator is a more reliable estimator than the pooled estimator in each case.

A closer look at the tables reveals that the use of fixed effects estimator does not alter the signs, and for the most part, statistical significance of all the variables. This implies that the impact of the asymptotic bias on the pooled estimator is small. Nonetheless, I choose to stick to the results of the fixed effects estimator for the singular reason that this estimation technique allows the various models to be estimated with a higher degree of precision as a result of the goodness-of-fit which is more impressive that what we have under OLS. Also, the fact that the fixed effects estimator provides more reliable estimates underscores the importance of using panel data and panel estimation techniques for further research on the resource curse.

5. Conclusions

The premise for this study is that natural resources may retard economic growth in some jurisdictions and promote it in others. This paper provides an alternative framework which gives new insights to the understanding of the resource curse. It establishes the nature of the interaction between resource abundance and institutional quality as the ultimate determinant of the existence, or otherwise, of the resource curse. Using data for Canadian provinces and US states, I show that both resource abundance and institutional quality interact in order to determine the level of per capita income. This helps in establishing that the quality of institutions determines whether or not jurisdictions avoid the resource curse.

Among other things, this paper further garners evidence against the findings of Sachs and Warner (1995) that the quality of institutions is not important in explaining the resource curse. What we find is that there is evidence of interdependence between institutional quality and the effect that resource abundance has on output per capita. The interdependence is, however, non-linear. Jurisdictions with either low or high levels of economic freedom, our measure of institutional quality, experience the resource curse; for jurisdictions with mid-range levels of economic freedom actually benefit from marginal increases in resource abundance.

We also show that the direct contribution of economic freedom is also dependent upon jurisdictional characteristics. Jurisdictions with very high levels of economic freedom have negative returns to further increases in economic freedom; for most jurisdictions, however, in our sample the returns are positive.

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APPENDIX I

Jurisdictions with below median[3] EFI values in 2005

Jurisdiction	lnRGDP	lnMIN	EFI Score
Prince Edward Island	9.811	-9.144	3.800
Quebec	9.997	-4.829	4.300
Nova Scotia	9.887	-2.838	4.600
Manitoba	9.961	-3.596	4.700
New Brunswick	9.933	-4.144	4.800
West Virgina	10.117	-2.559	5.300
Newfoundland	10.030	-0.966	5.500
Saskatchewan	10.150	-1.400	5.500
British Columbia	10.104	-2.650	5.600
Ontario	10.194	-4.745	5.700
Maine	10.297	-8.398	5.800
Mississippi	10.067	-3.860	5.800
Montana	10.206	-2.991	6.000
New Mexico	10.314	-1.965	6.000
Hawaii	10.522	-7.275	6.100
Rhode Island	10.472	-7.339	6.200
Vermont	10.416	-5.042	6.300
Alaska	10.689	-1.252	6.400
New York	10.704	-6.940	6.400
Alabama	10.277	-4.015	6.500
Maryland	10.552	-6.728	6.500
North Dakota	10.412	-3.471	6.500
Washington	10.563	-6.692	6.500
Arkansas	10.218	-4.534	6.600
Idaho	10.307	-4.763	6.700
Kentucky	10.291	-3.813	6.700
New Jersey	10.688	-7.199	6.700
Ohio	10.436	-5.326	6.700
Oklahoma	10.243	-2.049	6.700
Oregon	10.482	-6.437	6.700

[3]*Median value of EFI in 2005 = 6.75*

APPENDIX II

Jurisdictions with above median[3] EFI values in 2005

Jurisdiction	lnRGDP	lnMIN	EFI Score
California	10.621	-5.016	6.800
Michigan	10.423	-5.844	6.800
Pennsylvania	10.439	-4.899	6.800
South Carolina	10.269	-6.191	6.800
Wisconsin	10.446	-6.337	6.800
Arizona	10.403	-4.263	7.000
Connecticut	10.803	-7.418	7.000
Florida	10.412	-6.488	7.000
Kansas	10.400	-3.834	7.000
Missouri	10.391	-5.123	7.000
Wyoming	10.556	-1.177	7.000
Illinois	10.561	-5.828	7.100
Iowa	10.453	-6.101	7.100
Louisiana	10.355	-2.092	7.200
Massachusetts	10.714	-7.317	7.200
Minnesota	10.611	-5.248	7.200
Virginia	10.617	-5.363	7.200
Nebraska	10.476	-6.129	7.300
South Dakota	10.455	-5.262	7.300
Indiana	10.411	-5.603	7.400
Tennessee	10.421	-5.897	7.400
Utah	10.341	-3.559	7.400
Nevada	10.609	-4.003	7.500
New Hampshire	10.524	-6.744	7.500
Colorado	10.608	-3.054	7.600
Georgia	10.475	-5.578	7.600
North Carolina	10.485	-6.358	7.600
Alberta	10.469	-1.100	7.800
Texas	10.496	-2.370	7.800
Delaware	10.984	-8.318	8.500

APPENDIX III

Jurisdictions and years included in the full sample

Jurisdiction	Year	CDM	TDM	lnRGDP	lnMIN	lnEFI	lnMxlnE	lnEDU	lnHLT
Alberta	2000	1	1	10.397	-1.255	2.001	-2.512	-3.347	-3.253
Alberta	2001	1	2	10.397	-1.335	1.988	-2.654	-3.331	-3.199
Alberta	2002	1	3	10.397	-1.484	1.974	-2.930	-3.230	-3.111
Alberta	2003	1	4	10.408	-1.279	2.015	-2.577	-3.289	-3.151
Alberta	2004	1	5	10.442	-1.220	2.028	-2.474	-3.336	-3.192
Alberta	2005	1	6	10.469	-1.100	2.054	-2.260	-3.443	-3.270
British Columbia	2000	1	1	9.997	-3.245	1.609	-5.223	-2.976	-2.664
British Columbia	2001	1	2	9.996	-3.066	1.649	-5.054	-2.938	-2.622
British Columbia	2002	1	3	10.024	-3.365	1.649	-5.547	-2.928	-2.601
British Columbia	2003	1	4	10.042	-3.061	1.668	-5.105	-2.960	-2.619
British Columbia	2004	1	5	10.070	-2.974	1.705	-5.070	-3.000	-2.697
British Columbia	2005	1	6	10.104	-2.650	1.723	-4.565	-3.049	-2.737
Manitoba	2000	1	1	9.905	-3.702	1.548	-5.729	-2.943	-2.577
Manitoba	2001	1	2	9.910	-4.057	1.569	-6.364	-2.962	-2.516
Manitoba	2002	1	3	9.921	-4.094	1.569	-6.422	-2.941	-2.495
Manitoba	2003	1	4	9.930	-3.945	1.526	-6.020	-2.891	-2.461
Manitoba	2004	1	5	9.943	-3.676	1.548	-5.689	-2.912	-2.457
Manitoba	2005	1	6	9.961	-3.596	1.548	-5.565	-2.902	-2.473
New Brunswick	2000	1	1	9.799	-4.078	1.569	-6.397	-2.895	-2.631
New Brunswick	2001	1	2	9.817	-4.107	1.569	-6.442	-2.927	-2.562
New Brunswick	2002	1	3	9.863	-4.504	1.548	-6.970	-2.908	-2.548
New Brunswick	2003	1	4	9.890	-4.558	1.569	-7.150	-2.933	-2.555
New Brunswick	2004	1	5	9.917	-4.211	1.569	-6.606	-2.903	-2.584
New Brunswick	2005	1	6	9.933	-4.144	1.569	-6.501	-2.842	-2.543
Newfoundland	2000	1	1	9.777	-1.637	1.459	-2.388	-2.706	-2.458
Newfoundland	2001	1	2	9.805	-1.760	1.435	-2.526	-2.679	-2.395
Newfoundland	2002	1	3	9.958	-1.324	1.548	-2.050	-2.788	-2.487
Newfoundland	2003	1	4	10.019	-1.214	1.589	-1.929	-2.840	-2.512
Newfoundland	2004	1	5	10.007	-1.138	1.629	-1.853	-2.896	-2.571
Newfoundland	2005	1	6	10.030	-0.966	1.705	-1.647	-3.026	-2.670
Nova Scotia	2000	1	1	9.785	-3.124	1.504	-4.699	-2.824	-2.538
Nova Scotia	2001	1	2	9.817	-3.067	1.526	-4.680	-2.842	-2.486
Nova Scotia	2002	1	3	9.856	-3.259	1.526	-4.973	-2.842	-2.483
Nova Scotia	2003	1	4	9.869	-2.960	1.548	-4.580	-2.861	-2.477
Nova Scotia	2004	1	5	9.874	-3.070	1.526	-4.685	-2.860	-2.472
Nova Scotia	2005	1	6	9.887	-2.838	1.526	-4.331	-2.784	-2.475
Ontario	2000	1	1	10.152	-4.827	1.758	-8.486	-3.109	-2.881
Ontario	2001	1	2	10.153	-4.976	1.740	-8.661	-3.094	-2.846
Ontario	2002	1	3	10.166	-5.070	1.758	-8.911	-3.097	-2.838
Ontario	2003	1	4	10.165	-5.014	1.740	-8.727	-3.085	-2.797
Ontario	2004	1	5	10.178	-4.792	1.758	-8.424	-3.071	-2.776
Ontario	2005	1	6	10.194	-4.745	1.740	-8.259	-3.040	-2.776
Prince Edward Island	2000	1	1	9.718	-6.583	1.361	-8.959	-2.743	-2.456
Prince Edward Island	2001	1	2	9.708	-6.985	1.335	-9.325	-2.728	-2.430
Prince Edward Island	2002	1	3	9.751	-6.890	1.386	-9.551	-2.731	-2.404
Prince Edward Island	2003	1	4	9.770	-7.262	1.361	-9.884	-2.697	-2.340

Prince Edward Island	2004	1	5	9.792	-9.395	1.361	-12.786	-2.680	-2.332
Prince Edward Island	2005	1	6	9.811	-9.144	1.335	-12.207	-2.676	-2.328
Quebec	2000	1	1	9.935	-4.923	1.482	-7.293	-2.970	-2.658
Quebec	2001	1	2	9.945	-5.151	1.459	-7.513	-2.960	-2.624
Quebec	2002	1	3	9.962	-5.202	1.482	-7.707	-2.944	-2.623
Quebec	2003	1	4	9.969	-5.107	1.435	-7.329	-2.940	-2.594
Quebec	2004	1	5	9.989	-5.000	1.459	-7.292	-2.958	-2.593
Quebec	2005	1	6	9.997	-4.829	1.459	-7.044	-2.970	-2.584
Saskatchewan	2000	1	1	10.022	-1.626	1.649	-2.681	-3.026	-2.816
Saskatchewan	2001	1	2	10.020	-1.797	1.609	-2.892	-2.952	-2.726
Saskatchewan	2002	1	3	10.021	-1.760	1.609	-2.833	-2.937	-2.738
Saskatchewan	2003	1	4	10.068	-1.679	1.609	-2.703	-2.952	-2.756
Saskatchewan	2004	1	5	10.117	-1.572	1.668	-2.621	-3.014	-2.781
Saskatchewan	2005	1	6	10.150	-1.400	1.705	-2.387	-3.049	-2.813
Alabama	2000	0	1	10.156	-4.336	1.825	-7.912	-5.430	-2.729
Alabama	2001	0	2	10.162	-4.290	1.825	-7.828	-5.404	-2.697
Alabama	2002	0	3	10.183	-4.413	1.825	-8.051	-5.362	-2.647
Alabama	2003	0	4	10.207	-4.223	1.856	-7.839	-5.350	-2.656
Alabama	2004	0	5	10.253	-4.176	1.872	-7.816	-5.315	-2.666
Alabama	2005	0	6	10.277	-4.015	1.872	-7.514	-5.351	-2.665
Alaska	2000	0	1	10.671	-1.552	1.825	-2.832	-5.683	-3.048
Alaska	2001	0	2	10.614	-1.806	1.808	-3.265	-5.700	-2.908
Alaska	2002	0	3	10.683	-1.749	1.808	-3.163	-5.637	-2.899
Alaska	2003	0	4	10.649	-1.614	1.825	-2.945	-5.676	-2.844
Alaska	2004	0	5	10.687	-1.440	1.856	-2.673	-5.748	-2.853
Alaska	2005	0	6	10.689	-1.252	1.856	-2.325	-5.852	-2.928
Arizona	2000	0	1	10.331	-4.661	1.946	-9.070	-5.404	-2.859
Arizona	2001	0	2	10.336	-4.865	1.946	-9.467	-5.304	-2.803
Arizona	2002	0	3	10.329	-4.954	1.946	-9.640	-5.125	-2.749
Arizona	2003	0	4	10.348	-4.933	1.960	-9.668	-5.053	-2.702
Arizona	2004	0	5	10.354	-4.716	1.946	-9.176	-4.907	-2.673
Arizona	2005	0	6	10.403	-4.263	1.946	-8.296	-4.911	-2.695
Arkansas	2000	0	1	10.124	-5.111	1.856	-9.487	-5.633	-2.676
Arkansas	2001	0	2	10.123	-4.924	1.841	-9.063	-5.572	-2.618
Arkansas	2002	0	3	10.146	-4.987	1.825	-9.099	-5.507	-2.599
Arkansas	2003	0	4	10.167	-4.829	1.856	-8.964	-5.479	-2.582
Arkansas	2004	0	5	10.206	-4.759	1.872	-8.909	-5.499	-2.591
Arkansas	2005	0	6	10.218	-4.534	1.887	-8.556	-5.494	-2.579
California	2000	0	1	10.542	-5.125	1.872	-9.594	-5.034	-3.003
California	2001	0	2	10.523	-5.296	1.872	-9.913	-4.971	-2.909
California	2002	0	3	10.524	-5.431	1.887	-10.248	-4.873	-2.840
California	2003	0	4	10.542	-5.303	1.902	-10.087	-4.837	-2.815
California	2004	0	5	10.584	-5.188	1.917	-9.945	-4.830	-2.820
California	2005	0	6	10.621	-5.016	1.917	-9.615	-4.846	-2.841
Colorado	2000	0	1	10.589	-4.162	2.001	-8.331	-5.248	-3.015
Colorado	2001	0	2	10.582	-4.125	2.001	-8.257	-5.213	-2.937
Colorado	2002	0	3	10.571	-4.093	2.015	-8.247	-5.179	-2.870
Colorado	2003	0	4	10.566	-3.586	2.028	-7.273	-5.129	-2.845
Colorado	2004	0	5	10.578	-3.410	2.028	-6.917	-5.079	-2.839
Colorado	2005	0	6	10.608	-3.054	2.028	-6.194	-5.072	-2.873
Connecticut	2000	0	1	10.758	-7.781	1.932	-15.029	-4.354	-2.684
Connecticut	2001	0	2	10.758	-7.619	1.932	-14.717	-4.332	-2.644

Connecticut	2002	0	3	10.736	-7.498	1.917	-14.374	-4.241	-2.595
Connecticut	2003	0	4	10.736	-7.458	1.932	-14.405	-4.183	-2.565
Connecticut	2004	0	5	10.773	-7.538	1.946	-14.668	-4.190	-2.583
Connecticut	2005	0	6	10.803	-7.418	1.946	-14.435	-4.217	-2.596
Delaware	2000	0	1	10.873	-8.687	2.092	-18.172	-5.474	-3.042
Delaware	2001	0	2	10.898	-8.617	2.104	-18.132	-5.455	-3.025
Delaware	2002	0	3	10.886	-8.642	2.116	-18.289	-5.379	-2.980
Delaware	2003	0	4	10.917	-8.712	2.128	-18.540	-5.371	-2.965
Delaware	2004	0	5	10.942	-8.380	2.128	-17.834	-5.343	-2.959
Delaware	2005	0	6	10.984	-8.318	2.140	-17.800	-5.369	-2.976
Florida	2000	0	1	10.288	-6.582	1.872	-12.320	-5.076	-2.660
Florida	2001	0	2	10.298	-6.671	1.887	-12.590	-5.046	-2.617
Florida	2002	0	3	10.304	-6.687	1.917	-12.818	-4.998	-2.602
Florida	2003	0	4	10.333	-6.699	1.932	-12.939	-4.975	-2.585
Florida	2004	0	5	10.364	-6.666	1.932	-12.876	-4.949	-2.603
Florida	2005	0	6	10.412	-6.488	1.946	-12.625	-4.976	-2.649
Georgia	2000	0	1	10.473	-5.622	2.001	-11.253	-5.194	-3.003
Georgia	2001	0	2	10.457	-5.684	2.001	-11.377	-4.869	-2.946
Georgia	2002	0	3	10.442	-5.705	2.001	-11.418	-4.845	-2.896
Georgia	2003	0	4	10.443	-5.668	2.015	-11.421	-4.838	-2.854
Georgia	2004	0	5	10.459	-5.637	2.028	-11.433	-4.823	-2.846
Georgia	2005	0	6	10.475	-5.578	2.028	-11.313	-4.834	-2.846
Hawaii	2000	0	1	10.410	-7.269	1.758	-12.779	-4.603	-2.718
Hawaii	2001	0	2	10.415	-7.207	1.775	-12.792	-4.608	-2.696
Hawaii	2002	0	3	10.419	-7.214	1.775	-12.805	-4.591	-2.689
Hawaii	2003	0	4	10.445	-7.191	1.792	-12.884	-4.547	-2.680
Hawaii	2004	0	5	10.482	-7.273	1.808	-13.151	-4.553	-2.703
Hawaii	2005	0	6	10.522	-7.275	1.808	-13.155	-4.579	-2.727
Idaho	2000	0	1	10.201	-5.472	1.856	-10.158	-5.381	-2.822
Idaho	2001	0	2	10.191	-5.645	1.841	-10.389	-5.294	-2.735
Idaho	2002	0	3	10.189	-5.730	1.841	-10.546	-5.172	-2.686
Idaho	2003	0	4	10.195	-5.713	1.872	-10.694	-5.090	-2.660
Idaho	2004	0	5	10.257	-5.591	1.887	-10.551	-5.119	-2.689
Idaho	2005	0	6	10.307	-4.763	1.902	-9.060	-5.153	-2.721
Illinois	2000	0	1	10.527	-6.000	1.932	-11.588	-4.749	-2.853
Illinois	2001	0	2	10.523	-5.944	1.932	-11.481	-4.708	-2.799
Illinois	2002	0	3	10.521	-5.971	1.946	-11.619	-4.661	-2.764
Illinois	2003	0	4	10.545	-5.993	1.960	-11.747	-4.626	-2.750
Illinois	2004	0	5	10.558	-5.963	1.974	-11.772	-4.598	-2.738
Illinois	2005	0	6	10.561	-5.828	1.960	-11.423	-4.579	-2.723
Indiana	2000	0	1	10.371	-5.698	1.960	-11.168	-5.094	-2.761
Indiana	2001	0	2	10.344	-5.498	1.946	-10.699	-4.986	-2.680
Indiana	2002	0	3	10.374	-5.538	1.946	-10.776	-4.945	-2.661
Indiana	2003	0	4	10.402	-5.592	1.988	-11.116	-4.957	-2.649
Indiana	2004	0	5	10.426	-5.637	2.001	-11.282	-4.935	-2.644
Indiana	2005	0	6	10.411	-5.603	2.001	-11.215	-4.874	-2.618
Iowa	2000	0	1	10.335	-6.211	1.887	-11.721	-4.821	-2.740
Iowa	2001	0	2	10.326	-6.293	1.902	-11.970	-4.798	-2.680
Iowa	2002	0	3	10.364	-6.321	1.902	-12.024	-4.788	-2.683
Iowa	2003	0	4	10.388	-6.347	1.932	-12.260	-4.792	-2.674
Iowa	2004	0	5	10.442	-6.327	1.960	-12.402	-4.795	-2.704
Iowa	2005	0	6	10.453	-6.101	1.960	-11.959	-4.791	-2.688

Kansas	2000	0	1	10.334	-4.352	1.902	-8.277	-5.254	-2.742
Kansas	2001	0	2	10.344	-4.385	1.887	-8.275	-5.267	-2.700
Kansas	2002	0	3	10.356	-4.468	1.887	-8.432	-5.248	-2.670
Kansas	2003	0	4	10.369	-4.184	1.917	-8.021	-5.244	-2.655
Kansas	2004	0	5	10.384	-4.060	1.932	-7.843	-5.299	-2.637
Kansas	2005	0	6	10.400	-3.834	1.946	-7.460	-5.315	-2.646
Kentucky	2000	0	1	10.227	-3.904	1.841	-7.185	-5.315	-2.655
Kentucky	2001	0	2	10.225	-3.851	1.856	-7.149	-5.263	-2.589
Kentucky	2002	0	3	10.249	-3.867	1.872	-7.238	-5.251	-2.558
Kentucky	2003	0	4	10.258	-3.927	1.872	-7.351	-5.229	-2.519
Kentucky	2004	0	5	10.275	-3.904	1.887	-7.368	-5.204	-2.515
Kentucky	2005	0	6	10.291	-3.813	1.902	-7.253	-5.181	-2.518
Louisiana	2000	0	1	10.290	-1.928	1.932	-3.724	-4.969	-2.780
Louisiana	2001	0	2	10.274	-2.015	1.902	-3.832	-4.913	-2.737
Louisiana	2002	0	3	10.277	-2.473	1.872	-4.629	-4.820	-2.682
Louisiana	2003	0	4	10.291	-2.244	1.932	-4.334	-4.906	-2.701
Louisiana	2004	0	5	10.343	-2.170	1.946	-4.222	-4.953	-2.741
Louisiana	2005	0	6	10.355	-2.092	1.974	-4.130	-5.100	-2.845
Maine	2000	0	1	10.234	-8.869	1.705	-15.119	-4.716	-2.370
Maine	2001	0	2	10.246	-8.730	1.740	-15.195	-4.690	-2.318
Maine	2002	0	3	10.254	-8.770	1.740	-15.264	-4.635	-2.286
Maine	2003	0	4	10.263	-8.655	1.740	-15.063	-4.592	-2.258
Maine	2004	0	5	10.301	-8.594	1.758	-15.107	-4.610	-2.251
Maine	2005	0	6	10.297	-8.398	1.758	-14.762	-4.620	-2.238
Maryland	2000	0	1	10.433	-7.133	1.841	-13.129	-4.512	-2.676
Maryland	2001	0	2	10.460	-7.075	1.841	-13.022	-4.505	-2.646
Maryland	2002	0	3	10.479	-6.979	1.856	-12.956	-4.436	-2.629
Maryland	2003	0	4	10.492	-6.947	1.872	-13.004	-4.392	-2.605
Maryland	2004	0	5	10.522	-6.870	1.887	-12.964	-4.369	-2.611
Maryland	2005	0	6	10.552	-6.728	1.872	-12.593	-4.389	-2.631
Massachusetts	2000	0	1	10.674	-7.704	1.917	-14.768	-3.839	-2.603
Massachusetts	2001	0	2	10.673	-7.540	1.932	-14.564	-3.797	-2.562
Massachusetts	2002	0	3	10.663	-7.508	1.946	-14.610	-3.723	-2.505
Massachusetts	2003	0	4	10.683	-7.491	1.960	-14.683	-3.716	-2.462
Massachusetts	2004	0	5	10.704	-7.366	1.974	-14.541	-3.691	-2.449
Massachusetts	2005	0	6	10.714	-7.317	1.974	-14.444	-3.698	-2.429
Michigan	2000	0	1	10.430	-6.192	1.902	-11.778	-5.384	-2.785
Michigan	2001	0	2	10.394	-6.169	1.887	-11.641	-5.326	-2.713
Michigan	2002	0	3	10.421	-6.287	1.887	-11.863	-5.279	-2.691
Michigan	2003	0	4	10.431	-6.189	1.887	-11.678	-5.188	-2.655
Michigan	2004	0	5	10.419	-6.076	1.902	-11.557	-5.101	-2.617
Michigan	2005	0	6	10.423	-5.844	1.917	-11.203	-5.060	-2.588
Minnesota	2000	0	1	10.532	-5.551	1.917	-10.640	-4.900	-2.678
Minnesota	2001	0	2	10.529	-5.784	1.917	-11.088	-4.898	-2.613
Minnesota	2002	0	3	10.548	-5.737	1.932	-11.082	-4.852	-2.564
Minnesota	2003	0	4	10.571	-5.791	1.946	-11.269	-4.830	-2.529
Minnesota	2004	0	5	10.606	-5.606	1.960	-10.989	-4.835	-2.540
Minnesota	2005	0	6	10.611	-5.248	1.974	-10.360	-4.828	-2.536
Mississippi	2000	0	1	10.024	-4.401	1.723	-7.582	-5.281	-2.749
Mississippi	2001	0	2	10.018	-4.250	1.723	-7.322	-5.253	-2.697
Mississippi	2002	0	3	10.025	-4.286	1.705	-7.306	-5.229	-2.658
Mississippi	2003	0	4	10.053	-4.002	1.758	-7.035	-5.237	-2.650

Mississippi	2004	0	5	10.067	-3.821	1.775	-6.783	-5.231	-2.639
Mississippi	2005	0	6	10.067	-3.860	1.758	-6.785	-5.212	-2.651
Missouri	2000	0	1	10.358	-5.973	1.917	-11.450	-4.542	-2.690
Missouri	2001	0	2	10.358	-6.007	1.902	-11.425	-4.521	-2.651
Missouri	2002	0	3	10.364	-6.002	1.902	-11.416	-4.473	-2.621
Missouri	2003	0	4	10.377	-5.909	1.932	-11.413	-4.472	-2.600
Missouri	2004	0	5	10.388	-5.647	1.946	-10.988	-4.438	-2.589
Missouri	2005	0	6	10.391	-5.123	1.946	-9.969	-4.419	-2.586
Montana	2000	0	1	10.071	-3.390	1.668	-5.654	-5.551	-2.441
Montana	2001	0	2	10.083	-3.403	1.668	-5.675	-5.554	-2.419
Montana	2002	0	3	10.104	-3.526	1.686	-5.947	-5.503	-2.379
Montana	2003	0	4	10.144	-3.460	1.723	-5.961	-5.552	-2.398
Montana	2004	0	5	10.163	-3.294	1.775	-5.846	-5.511	-2.393
Montana	2005	0	6	10.206	-2.991	1.792	-5.358	-5.572	-2.422
Nebraska	2000	0	1	10.385	-6.704	1.917	-12.851	-4.912	-2.716
Nebraska	2001	0	2	10.389	-6.540	1.917	-12.536	-4.836	-2.673
Nebraska	2002	0	3	10.405	-6.366	1.917	-12.204	-4.825	-2.649
Nebraska	2003	0	4	10.450	-6.394	1.960	-12.533	-4.860	-2.642
Nebraska	2004	0	5	10.463	-6.415	1.974	-12.663	-4.831	-2.633
Nebraska	2005	0	6	10.476	-6.129	1.988	-12.184	-4.843	-2.621
Nevada	2000	0	1	10.506	-3.959	1.946	-7.703	-6.340	-3.094
Nevada	2001	0	2	10.488	-4.088	1.946	-7.955	-6.258	-3.019
Nevada	2002	0	3	10.480	-4.134	1.974	-8.161	-6.129	-2.984
Nevada	2003	0	4	10.506	-4.133	1.988	-8.215	-6.115	-2.971
Nevada	2004	0	5	10.563	-4.153	2.015	-8.368	-6.043	-3.008
Nevada	2005	0	6	10.609	-4.003	2.015	-8.066	-5.974	-3.051
New Hampshire	2000	0	1	10.466	-7.545	1.960	-14.790	-4.245	-2.659
New Hampshire	2001	0	2	10.454	-7.440	1.974	-14.687	-4.192	-2.577
New Hampshire	2002	0	3	10.465	-4.134	2.001	-8.274	-6.129	-2.984
New Hampshire	2003	0	4	10.486	-7.228	2.015	-14.563	-4.041	-2.497
New Hampshire	2004	0	5	10.517	-7.110	2.015	-14.327	-4.028	-2.499
New Hampshire	2005	0	6	10.524	-6.744	2.015	-13.588	-4.038	-2.485
New Jersey	2000	0	1	10.619	-7.394	1.872	-13.840	-4.788	-2.794
New Jersey	2001	0	2	10.641	-7.386	1.887	-13.938	-4.768	-2.748
New Jersey	2002	0	3	10.642	-7.636	1.902	-14.524	-4.703	-2.696
New Jersey	2003	0	4	10.662	-7.588	1.902	-14.434	-4.664	-2.674
New Jersey	2004	0	5	10.683	-7.415	1.902	-14.104	-4.775	-2.661
New Jersey	2005	0	6	10.688	-7.199	1.902	-13.693	-4.795	-2.647
New Mexico	2000	0	1	10.235	-2.522	1.808	-4.560	-5.436	-2.897
New Mexico	2001	0	2	10.235	-2.488	1.758	-4.373	-5.349	-2.811
New Mexico	2002	0	3	10.237	-2.586	1.705	-4.408	-5.316	-2.719
New Mexico	2003	0	4	10.266	-2.270	1.740	-3.951	-5.314	-2.720
New Mexico	2004	0	5	10.313	-2.204	1.792	-3.950	-5.250	-2.738
New Mexico	2005	0	6	10.314	-1.965	1.792	-3.520	-5.263	-2.755
New York	2000	0	1	10.619	-7.488	1.841	-13.782	-4.321	-2.670
New York	2001	0	2	10.636	-7.398	1.841	-13.617	-4.301	-2.645
New York	2002	0	3	10.629	-7.373	1.841	-13.570	-4.235	-2.592
New York	2003	0	4	10.646	-7.266	1.856	-13.489	-4.195	-2.560
New York	2004	0	5	10.669	-7.197	1.856	-13.361	-4.174	-2.572
New York	2005	0	6	10.704	-6.940	1.856	-12.883	-4.178	-2.598
North Carolina	2000	0	1	10.431	-6.243	2.001	-12.496	-5.057	-2.946
North Carolina	2001	0	2	10.432	-6.286	2.001	-12.581	-5.020	-2.877

North Carolina	2002	0	3	10.433	-6.576	2.001	-13.162	-4.946	-2.839
North Carolina	2003	0	4	10.436	-6.570	2.015	-13.238	-4.898	-2.781
North Carolina	2004	0	5	10.454	-6.446	2.015	-12.987	-4.848	-2.780
North Carolina	2005	0	6	10.485	-6.358	2.028	-12.895	-4.854	-2.794
North Dakota	2000	0	1	10.229	-3.826	1.740	-6.659	-5.440	-2.414
North Dakota	2001	0	2	10.245	-3.806	1.758	-6.690	-5.470	-2.387
North Dakota	2002	0	3	10.299	-3.919	1.775	-6.955	-5.432	-2.404
North Dakota	2003	0	4	10.354	-3.823	1.825	-6.974	-5.495	-2.424
North Dakota	2004	0	5	10.354	-3.697	1.856	-6.862	-5.467	-2.403
North Dakota	2005	0	6	10.412	-3.471	1.872	-6.498	-5.635	-2.443
Ohio	2000	0	1	10.396	-5.523	1.887	-10.422	-5.013	-2.673
Ohio	2001	0	2	10.377	-5.622	1.872	-10.524	-4.985	-2.599
Ohio	2002	0	3	10.396	-5.633	1.872	-10.543	-4.963	-2.579
Ohio	2003	0	4	10.408	-5.540	1.887	-10.454	-4.930	-2.549
Ohio	2004	0	5	10.430	-5.456	1.902	-10.379	-4.905	-2.540
Ohio	2005	0	6	10.436	-5.326	1.902	-10.131	-4.886	-2.536
Oklahoma	2000	0	1	10.165	-2.762	1.841	-5.084	-5.348	-2.760
Oklahoma	2001	0	2	10.185	-2.705	1.825	-4.936	-5.313	-2.720
Oklahoma	2002	0	3	10.192	-2.780	1.808	-5.027	-5.266	-2.677
Oklahoma	2003	0	4	10.203	-2.424	1.856	-4.500	-5.287	-2.673
Oklahoma	2004	0	5	10.230	-2.263	1.887	-4.271	-5.285	-2.675
Oklahoma	2005	0	6	10.243	-2.049	1.902	-3.898	-5.311	-2.706
Oregon	2000	0	1	10.397	-6.710	1.856	-12.456	-5.120	-2.758
Oregon	2001	0	2	10.369	-6.697	1.872	-12.535	-5.083	-2.644
Oregon	2002	0	3	10.395	-6.674	1.872	-12.492	-5.054	-2.617
Oregon	2003	0	4	10.410	-6.685	1.887	-12.615	-5.041	-2.574
Oregon	2004	0	5	10.469	-6.644	1.902	-12.637	-4.985	-2.587
Oregon	2005	0	6	10.482	-6.437	1.902	-12.244	-4.967	-2.576
Pennsylvania	2000	0	1	10.365	-5.133	1.856	-9.528	-4.069	-2.501
Pennsylvania	2001	0	2	10.380	-5.173	1.872	-9.683	-4.053	-2.461
Pennsylvania	2002	0	3	10.397	-5.206	1.887	-9.824	-4.007	-2.428
Pennsylvania	2003	0	4	10.417	-5.173	1.902	-9.839	-3.988	-2.402
Pennsylvania	2004	0	5	10.426	-5.043	1.902	-9.593	-3.964	-2.370
Pennsylvania	2005	0	6	10.439	-4.899	1.917	-9.391	-3.959	-2.377
Rhode Island	2000	0	1	10.373	-7.858	1.758	-13.813	-3.899	-2.467
Rhode Island	2001	0	2	10.383	-7.695	1.758	-13.526	-3.894	-2.441
Rhode Island	2002	0	3	10.397	-7.572	1.758	-13.310	-3.858	-2.386
Rhode Island	2003	0	4	10.436	-7.585	1.808	-13.715	-3.865	-2.387
Rhode Island	2004	0	5	10.472	-7.280	1.808	-13.164	-3.849	-2.397
Rhode Island	2005	0	6	10.472	-7.339	1.825	-13.390	-3.811	-2.378
South Carolina	2000	0	1	10.239	-6.328	1.902	-12.036	-5.381	-2.997
South Carolina	2001	0	2	10.243	-6.479	1.887	-12.227	-5.350	-2.916
South Carolina	2002	0	3	10.247	-6.472	1.887	-12.213	-5.295	-2.893
South Carolina	2003	0	4	10.271	-6.421	1.902	-12.214	-5.285	-2.885
South Carolina	2004	0	5	10.260	-6.260	1.902	-11.907	-5.243	-2.861
South Carolina	2005	0	6	10.269	-6.191	1.917	-11.867	-5.246	-2.847
South Dakota	2000	0	1	10.328	-5.347	1.917	-10.250	-5.030	-2.543
South Dakota	2001	0	2	10.335	-5.286	1.932	-10.211	-5.026	-2.505
South Dakota	2002	0	3	10.411	-5.463	1.960	-10.708	-5.006	-2.498
South Dakota	2003	0	4	10.420	-5.448	1.988	-10.830	-4.977	-2.454
South Dakota	2004	0	5	10.444	-5.433	1.988	-10.800	-5.030	-2.453
South Dakota	2005	0	6	10.455	-5.262	1.988	-10.460	-5.016	-2.455

Tennessee	2000	0	1	10.331	-5.923	1.960	-11.610	-4.862	-2.604
Tennessee	2001	0	2	10.330	-5.968	1.960	-11.699	-4.814	-2.545
Tennessee	2002	0	3	10.360	-6.032	1.960	-11.822	-4.754	-2.510
Tennessee	2003	0	4	10.381	-6.116	1.988	-12.158	-4.684	-2.488
Tennessee	2004	0	5	10.416	-6.061	1.988	-12.049	-4.639	-2.466
Tennessee	2005	0	6	10.421	-5.897	2.001	-11.803	-4.592	-2.454
Texas	2000	0	1	10.455	-2.779	2.001	-5.561	-5.304	-2.932
Texas	2001	0	2	10.461	-2.850	2.001	-5.705	-5.270	-2.878
Texas	2002	0	3	10.464	-2.995	2.015	-6.034	-5.205	-2.812
Texas	2003	0	4	10.462	-2.661	2.028	-5.397	-5.204	-2.804
Texas	2004	0	5	10.490	-2.581	2.041	-5.269	-5.199	-2.807
Texas	2005	0	6	10.496	-2.370	2.054	-4.868	-5.243	-2.853
Utah	2000	0	1	10.313	-4.206	1.960	-8.244	-4.636	-2.990
Utah	2001	0	2	10.302	-4.164	1.974	-8.220	-4.604	-2.947
Utah	2002	0	3	10.295	-4.338	1.974	-8.564	-4.568	-2.906
Utah	2003	0	4	10.291	-4.098	1.988	-8.147	-4.573	-2.875
Utah	2004	0	5	10.306	-3.964	2.001	-7.934	-4.545	-2.879
Utah	2005	0	6	10.341	-3.559	2.001	-7.124	-4.538	-2.903
Vermont	2000	0	1	10.280	-5.743	1.792	-10.290	-3.934	-2.528
Vermont	2001	0	2	10.319	-5.461	1.792	-9.785	-3.957	-2.465
Vermont	2002	0	3	10.334	-5.286	1.808	-9.558	-3.905	-2.410
Vermont	2003	0	4	10.367	-5.259	1.841	-9.679	-3.908	-2.385
Vermont	2004	0	5	10.398	-5.376	1.841	-9.895	-3.869	-2.383
Vermont	2005	0	6	10.416	-5.042	1.841	-9.279	-3.869	-2.365
Virginia	2000	0	1	10.511	-5.583	1.932	-10.783	-5.061	-3.047
Virginia	2001	0	2	10.532	-5.534	1.946	-10.769	-5.043	-3.002
Virginia	2002	0	3	10.526	-5.602	1.946	-10.900	-5.002	-2.950
Virginia	2003	0	4	10.551	-5.486	1.960	-10.753	-4.961	-2.931
Virginia	2004	0	5	10.583	-5.267	1.974	-10.398	-4.926	-2.948
Virginia	2005	0	6	10.617	-5.363	1.974	-10.588	-4.952	-2.962
Washington	2000	0	1	10.533	-6.637	1.825	-12.109	-5.295	-2.859
Washington	2001	0	2	10.513	-6.814	1.841	-12.541	-5.265	-2.778
Washington	2002	0	3	10.505	-6.823	1.856	-12.665	-5.226	-2.732
Washington	2003	0	4	10.514	-6.847	1.872	-12.815	-5.222	-2.706
Washington	2004	0	5	10.525	-6.937	1.872	-12.984	-5.170	-2.692
Washington	2005	0	6	10.563	-6.692	1.872	-12.526	-5.221	-2.719
West Virgina	2000	0	1	10.041	-2.680	1.589	-4.260	-5.272	-2.394
West Virgina	2001	0	2	10.057	-2.609	1.589	-4.146	-5.266	-2.385
West Virgina	2002	0	3	10.069	-2.730	1.589	-4.338	-5.303	-2.362
West Virgina	2003	0	4	10.071	-2.726	1.649	-4.495	-5.376	-2.336
West Virgina	2004	0	5	10.098	-2.650	1.649	-4.368	-5.398	-2.349
West Virgina	2005	0	6	10.117	-2.559	1.668	-4.268	-5.445	-2.379
Wisconsin	2000	0	1	10.395	-6.528	1.887	-12.318	-4.983	-2.653
Wisconsin	2001	0	2	10.398	-6.558	1.887	-12.376	-4.948	-2.590
Wisconsin	2002	0	3	10.408	-6.575	1.887	-12.408	-4.905	-2.547
Wisconsin	2003	0	4	10.423	-6.533	1.917	-12.523	-4.877	-2.512
Wisconsin	2004	0	5	10.438	-6.400	1.917	-12.269	-4.840	-2.491
Wisconsin	2005	0	6	10.446	-6.337	1.917	-12.147	-4.858	-2.495
Wyoming	2000	0	1	10.466	-1.546	1.841	-2.846	-6.359	-3.154
Wyoming	2001	0	2	10.512	-1.534	1.872	-2.872	-6.238	-3.141
Wyoming	2002	0	3	10.519	-1.537	1.902	-2.923	-6.013	-3.096
Wyoming	2003	0	4	10.539	-1.378	1.917	-2.642	-6.134	-3.120

Wyoming	2004	0	5	10.542	-1.304	1.946	-2.537	-6.110	-3.119
Wyoming	2005	0	6	10.556	-1.177	1.946	-2.291	-6.181	-3.190