REGULATORY BURDENS AND INTERNATIONAL INCOME PERFORMANCE

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Abstract: Many studies indicate that excessive regulatory burdens can hamper national economic performances. In spite of that, there are relatively few empirical estimates of the potential income gains that may accrue to countries that deregulate their business sectors. This paper partially fills that gap in the literature by using World Bank data to estimate the relationships between various measures of national regulatory burdens and per capita incomes. Potential impacts of deregulation and greater transparency on income performance are also estimated for the various countries in the sample. Results indicate
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1. Introduction

Starting a business, registering property, or opening a line of credit can be very difficult and long processes in countries where large numbers of regulations are imposed. The exact number of regulations varies substantially from country to country. For example, to open a business in Brazil, 17 different procedures are required that will take a total of 152 days to complete. In contrast, the only 2 procedures required to open a business in Australia can be completed in 2 days (World Bank, 2005).

Cumbersome regulatory process can discourage investment and the slow distribution of permits can impede the process by which technology improvements are incorporated into production (Mauro 1995; Nicoletti and Scarpetta, 2003). Many times, long regulatory processes are associated with more pronounced levels of corruption as well. Gerlagh and Pellegrini (2004) report that corruption exercises a negative effect that is quite substantial. Favorable environments for households and firms to save, invest, and increase productivity foster growth (Collier and Dollar, 2001). Development of those conditions is hampered when regulatory procedures are cumbersome.

This study examines the linkages between regulatory burdens and per capita gross national income (GNI). To do this, GNI per capita is modeled as a function of various regulatory measures for which data now exist. Examples include the number of procedures, days, and costs required to start a business, register property, hire workers, fire workers, obtain credit, enforce contracts, and close a business. Regulatory data for those items are reported by the World Bank (2005). Per capita GNI is also reported by the same source and is available for 135 countries.

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The second section of the study includes a brief review of earlier research on regulation and growth. The third section provides a discussion of data and methodology. It also includes a summary of the empirical analysis. Policy implications and potential income gains are discussed in the fourth section. Concluding remarks and suggestions for future research are included in the final section.

2. Previous Research

Numerous studies examine the impacts of institutions, institutional failures, and corruption on international economic performance. Méon and Sekkat (2003) allow for the possibility that corruption may sometimes accelerate economic growth rather than slow it down. Corruption is generally assumed to increase the cost and time required to complete a process. In some cases, however, it can potentially increase productivity if it compensates for a poorly working bureaucracy. For example, bribes may be used to reduce the time required to complete administrative filing procedures. The study employs a specification where gross domestic product (GDP) per capita is modeled as a function of corruption indices, quality of governance, and other variables. Results indicate that corruption slows economic growth directly via reduced investment and also through indirect channels, especially if the quality of governance is lower.

Similar conclusions have been reached in other studies. Pellegrini and Gerlagh (2004) also report an inverse relationship between corruption and growth. Those results further illustrate the indirect influence of corruption on growth by quantifying the negative impact it exerts on investment, schooling, and openness to trade. The outcomes are similar in magnitude to estimates uncovered in earlier analyses such as those completed by Mauro (1995) and Mo (2001) that independently point to strong negative correlations between graft and rates of economic expansion.

Institutions have also been found to play central roles in determining the economic performance of a country. Assane and Grammy (2003) perform an empirical analysis where GDP for 100 countries is modeled as a function of physical capital, labor force, human capital formation, economic freedom, and institutional framework. Quality institutions are found to improve public sector efficiency and accelerate economy-wide expansion. Those results confirm earlier international empirical evidence reported by Keefer and Knack (1997) as well as regional domestic evidence obtained by Rupasingha, Goetz, and Freshwater (2002) for counties in the United States.

Along similar lines, Bhattacharyya (2004) uncovers evidence that long run growth is affected more by institutions than either geography or openness to trade. That material leaves open the question of whether good institutions promote prosperity or whether prosperity promotes good institutions. Glaeser et al. (2004) examine the correlations between economic progress, human capital, and institutions. Human capital formation and good policies are found to contribute more to growth than institutions, but an improvement in human capital will lead to institutional improvements.

Widespread evidence points to better institutions and lower levels of graft as useful elements in the quest for stable economic growth. The combinations of conditions that favorably influence growth can vary as a function of current levels of performance. Barreto and Hughes (2004) argue that among the important determinants of growth for under-performing low income countries are social infrastructure, civil liberties, and latitude. Significant determinants of growth for over-achieving low income economies

include trade, social infrastructure, public infrastructure, investment, as well as demographic traits.

Higher regulation of entry is frequently associated with greater corruption. Djankov et al. (2002) use extensive data for 85 nations to test the public interest theory of regulation and the public choice theory of regulation. The former argues that regulation is needed to overcome market failure, while the latter holds that regulation is inefficient, benefits industry incumbents, and gives politicians opportunities to collect bribes. Linear regression results indicate that greater levels of regulation give rise to higher incidences of corruption, thus supporting the public choice theory of regulation.

At present, there is relatively little information available with respect to regulatory burdens and national income performance. From the perspective of international development, this represents an intriguing question because answering it may allow quantifying the potential gains that can result from reduced levels of domestic market regulation. Such a possibility is attractive from the perspective that deregulation policies can be adopted internally without reliance on trading partners or multilateral organizations. This study attempts to partially fill this gap in the literature by empirically analyzing the relationship between regulatory burdens and per capita income.

3. Data and Empirical Results

Data employed in this study are from the World Bank (2005). Cross-sectional information reported is for 135 countries in 2004. Complete data are available for 114 countries. Collectively, those countries account for 96 percent of the 2004 world population in the 135 nations. Among the regressors, regulation of entry data are divided into several different categories: starting a business, contracting and terminating workers, registering property, obtaining credit, protecting investors, enforcing contracts, and closing a business. A total of 22 separate variables are defined among these various classifications. Definitions for the various items are listed in Table 1. Because some of the variables result from composite calculations, inclusion of all of the series leads to multicollinearity. Given that, a subset of the various series is used below.

Ordinary least square regression is used to model GNI per capita as a function of the various regulatory variables collected. The specification for GNI per capita is shown in Equation 1. Because of the large variation observed in per capita GNI, heteroscedasticity may be present in the sample. Testing is conducted below using the squares of the residuals from ordinary least squares estimates for Equation 1 to examine that possibility (White, 1980). Summary statistics for the data series employed are reported in Table 2.

$$1.\ GNI = b_0 + b_1BSN + b_2BSC + b_3HRD + b_4NPR + b_5CRC + b_6CRL + b_7CRI + b_8CRV + b_9\,DI + b_{10}\,TPC + b_{11}FC + e$$

Although excess regulatory burdens are expected to be negatively correlated with per capita income performance, not all of the coefficients shown in Equation 1 are hypothesized to be negative. More specifically, regulations that increase transparency are likely to exert upward effects on income performance by improving market efficiency and raising overall productivity (Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2002). Accordingly, b_1, b_2, b_3, b_4, b_5, b_{10}, and b_{11} are hypothesized to be less than zero. Conversely, b_6, b_7, b_8, and b_9 are expected to be positive.

Table 1. Variable Categories, Names, and Definitions

__Category	*Variable Name*	*Definition*
Income	*GNI*	*Gross national income per capita*
Starting a Business	*BSN*	*Number of procedures*
	BST	*Time, number of days*
	BSC	*Cost, percent of income per capita*
	BSK	*Minimum capital requirement*
Hiring and Firing Workers	*HRD*	*Difficulty of hiring index*
	HRH	*Rigidity of hours index*
	HRF	*Difficulty of firing index*
	HRE	*Rigidity of employment index*
	HRC	*Firing Costs, number of weeks*
Registering Property	*NPR*	*Number of procedures*
	PRT	*Time, number of days*
	PRC	*Cost, percent of property value*
Getting Credit	*CRC*	*Cost to create collateral*
	CRL	*Legal rights index*
	CRI	*Credit information index*
	CRP	*Public registry coverage*
	CRV	*Private bureau coverage*
Protecting Investors	*DI*	*Disclosure index*
Enforcing Contracts	*TPC*	*Number of procedures*
	TTC	*Time, number of days*
	TCC	*Cost, percent of debt*
Closing a Business	*FT*	*Time, years of insolvency*
	FC	*Cost, percent of estate*
	FRR	*Recovery rate, cents on dollar*

Table 2. Summary Statistics ($)

Variable	Maximum	Minimum	Median	Mean	*Standard Deviation*
GNI	43,350	90	1,870	6,570	*10,027*
BSN	19	2	10	9.9	*3.3*
BST	203	2	41	50.7	*38.3*
HRD	100	0	33	36.7	*29.9*
NPR	21	1	6	6.2	*2.9*
CRC	175.3	0	7.7	19.6	*31.1*
CRL	10	0	5	4.9	*2.1*
CRI	6	0	3	3.0	*2.0*
CRV	1000	0	0	174.6	*309.3*
DI	7	0	3	3.3	*2.0*
TPC	58	11	29	31.1	*11.3*
FC	*76*	*1*	*8*	*15.0*	*13.5*

As shown in Table 3, the null hypothesis of homoscedasticity is rejected. Given that, the error covariance matrix is corrected for heteroscedasticity using the White (1980) procedure. Table 4 reports the empirical results for Equation 1. All of the parameter estimates exhibit the arithmetic signs that are hypothesized for them. Even though the total number of regressors included is much smaller than the total number of variables available, multicollinearity is present and a number of the t-statistics in Table 4 do not satisfy the 5-percent criterion. The F-statistic is significant, however, and the coefficient of determination, 59.4 percent, is relatively high for cross-section sample data.

Table 3. White Procedure Heteroscedasticity Test without Cross Terms

Computed Test Statistic, $114*R^2$	*Chi-Square 43.387*	*Probability 0.004*

Note: The null hypothesis of residual homoscedasticity is rejected. Complete data are available for 114 of the 135 countries included in the 2005 World Bank sample.

Table 4. Parameter Estimation Results

Variable	*Coefficient*	*Standard Error*	*t-statistic*	*Probability*
Constant	*12,176.31*	*5,542.131*	*2.197*	*0.03*
BSN	*-606.01*	*265.531*	*2.362*	*0.02*
BST	*-21.41*	*15.113*	*-1.417*	*0.16*
HRD	*-44.74*	*27.858*	*-1.606*	*0.11*
NPR	*-367.29*	*212.673*	*-1.727*	*0.09*
CRC	*-1.27*	*15.921*	*-0.080*	*0.94*
CRL	*195.40*	*360.048*	*0.543*	*0.59*
CRI	*986.76*	*423.06*	*2.332*	*0.02*
CRV	*7.51*	*3.379*	*2.224*	*0.03*
DI	*830.81*	*418.159*	*1.987*	*0.05*
TPC	*-43.82*	*72.873*	*-0.601*	*0.55*
FC	*-41.537*	*45.569*	*-0.912*	*0.36*

R-squared	*0.594*	*Dependent variable mean*	*7,304.36*
Adjusted R-squared	*0.550*	*Dependent variable S.D.*	*10,638.59*
S.E. of regression	*7,136.880*	*F-statistic*	*13.554*
Sum of squared residuals	*5.20E+09*	*F-statistic probability*	*0.000*
Log likelihood	*-1,166.945*	*Observations*	*114*

Notes: The dependent variable, GNI, is measured in dollars. Complete data are available for 114 of the 135 countries included in the World Bank sample.

The magnitudes of the estimated parameters in table 4 reflect interesting global income performance patterns. Increasing by one the number of procedures required to register a business leads to $606 decline in per capita income. Increasing by one the number of procedures required to register property lowers per capita income by $367. Greater market transparency leads to substantial income gains. Growth in the credit information index generates $986 per person for each one unit improvement. Similarly, increases in the disclosure index are associated with $830 income per capita income increments.

4. Policy Implications

The regression results can also be used for policy analytic purposes. Namely, what income impacts are likely to be associated if governments take steps to deregulate their economies. Because deregulation may reverse long-standing policy practices, it tends to be a controversial topic in most countries where it is considered (Barnes, Gartland, and Stack, 2004). One means for clarifying why regulatory policy departures may be helpful is to quantify the potential gains associated with them (Kirkpatrick and Parker, 2004).

Because regulatory changes are generally not easy to enact, this section of the paper examines the implied income impacts associated with countries moving to the means for the various measures included in Equation 1. This step is taken because policies that bring countries in line with prevailing international practices are likely to be regarded as less extreme than policies that push an economy's regulatory framework beyond prevailing world norms (Stein, Tommasi, Echebarría, Lora, and Payne, 2006). This approach has also been utilized in other development policy contexts such as education (Arellano and Fullerton, 2005). Empirical evidence in favor of it exists in fiscal policy settings, as well (Ladd, 1992).

To estimate the gains that may result from deregulation and greater transparency, model simulations are conducted for the countries whose 2004 regulatory profiles lagged behind the international averages compiled by the World Bank (2005). Steps involved with each simulation are fairly easy to carry out. The change required to raise the explanatory variable of interest to the global average is multiplied by the regression coefficient that is estimated for that particular regressor. Because the dependent variable is measured in dollars per capita, each result is also multiplied by the population of its corresponding country in order to calculate aggregate national GNI gains.

Model simulations indicate that substantial income gains can result from deregulation. As shown in Table 5 (see Annex), the implied global per capita gain is nearly $4,720. For some countries such as Australia, no gains are available. A number of other economies where private sector enterprise can already operate fairly flexibly have per capita gains of less than $1,000 available to them. Examples of the latter include Austria and Finland.

At the other end of the policy spectrum, there are a number of countries where large income gains are potentially within reach as a consequence of deregulation. Many of the nations in this group are from Africa, including Chad where approximately $15,950 in earnings growth is estimated to result from deregulation. Income gains in excess of $10,000 per person also result for countries in other regions of the world such as the Lao PDR in Asia, and Brazil and Venezuela in South America.

In aggregate terms, the greatest national earnings increase occurs for India. For the world as a whole, a GNI increase of nearly $28,837 billion results from the simulation exercise. That figure represents more than a 70 percent increase relative to aggregate GNI of almost $40,148 billion in 2004 for the 110 countries in the sample. While the time frame required for this gain to be realized cannot be calculated using the model in Table 4, the results underscore that substantial improvements in economic performance are likely to result from less restrictive policy practices.

5. Conclusion

A number of studies have previously indicated that economies can grow more rapidly if they take steps to reduce corruption and improve institutional performance. Those earlier efforts have not, however, attempted to quantify the linkages between regulatory burdens and national incomes. This study attempts to partially fill this gap in the literature by empirically analyzing international per capita income patterns.

Data utilized in the analysis are available from the World Bank. Complete data can be assembled for 114 of the 135 countries in the sample. Those countries represent 96 percent of the total population in the 135 World Bank nations in 2004. Per capita gross national income ranged from a minimum of $90 to a maximum of $43,350. Parameter estimation is corrected for heteroscedasticity. Results indicate that better income performance is broadly associated with lower regulatory requirements. Model simulations for individual economies point to substantial income improvements if governments reduce regulatory requirements to global averages. Because such steps can be taken domestically without time consuming international negotiations, they represent an avenue for policy innovation that government analysts may wish to consider.

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Annex. Table 5. Implied Income Gains from Deregulation

Country	**Per capita Gain**	**Population (millions)**	***National Income Gain (millions)***
Albania	*6,782.74*	*3.188*	*21,623.378*
Algeria	*13,454.78*	*32.373*	*435,571.658*
Angola	*9,096.65*	*13.963*	*127,016.468*
Argentina	*3,998.54*	*38.226*	*152,848.228*
Armenia	*4,757.23*	*3.050*	*14,509.552*
Australia	*0.00*	*20.120*	*0.000*
Austria	*124.61*	*8.115*	*1,011.218*
Azerbaijan	*9,678.00*	*8.280*	*80,133.799*
Bangladesh	*2,520.11*	*140.494*	*354,060.053*
Belarus	*7,818.51*	*9.832*	*76,871.541*
Belgium	*1,311.25*	*10.405*	*13,643.515*
Benin	*6,950.64*	*6.890*	*47,889.889*
Bhutan	*9,896.16*	*0.896*	*8,866.955*
Bolivia	*8,273.15*	*8.986*	*74,342.562*
Bosnia & Herzegovina	*4,919.33*	*3.836*	*18,870.531*
Botswana	*2,018.02*	*1.727*	*3,485.112*
Brazil	*11,260.93*	*178.718*	*2,012,531.603*
Bulgaria	*4,213.40*	*7.780*	*32,780.252*
Burkina Faso	*11,998.51*	*12.387*	*148,625.506*
Burundi	*7,448.36*	*7.343*	*54,693.307*
Cambodia	*9,076.56*	*13.630*	*123,713.445*
Cameroon	*8,134.26*	*16.400*	*133,401.880*
Canada	*0.00*	*31.902*	*0.000*
Central African Rep.	*9,136.73*	*3.947*	*36,062.661*
Chad	*15,947.17*	*8.823*	*140,701.890*
Chile	*300.47*	*15.956*	*4,794.315*
China,P.R.: Mainland	*3,275.14*	*1,296.500*	*4,246,216.417*
Colombia	*5,896.76*	*45.300*	*267,123.092*
Congo, D.R.	*14,042.62*	*54.775*	*769,184.730*
Congo, Rep.	*6,439.73*	*3.855*	*24,825.151*
Costa Rica	*3,894.71*	*4.061*	*15,816.409*
Côte d'Ivoire	*7,206.93*	*17.142*	*123,541.177*
Croatia	*6,931.80*	*4.508*	*31,248.554*
Czech Republic	*511.81*	*10.183*	*5,211.802*
Denmark	*778.04*	*5.397*	*4,199.060*
Dominican Republic	*3,049.53*	*8.861*	*27,021.841*
Ecuador	*9,977.56*	*13.213*	*131,833.447*

Egypt	*6,735.17*	*68.738*	*462,961.978*
El Salvador	*6,349.59*	*6.658*	*42,275.550*
Estonia	*2,041.01*	*1.345*	*2,745.154*
Ethiopia	*9,178.77*	*69.961*	*642,156.138*
Finland	*199.77*	*5.215*	*1,041.780*
France	*4,925.97*	*59.991*	*295,513.866*
Georgia	*4,945.86*	*4.521*	*22,360.215*
Germany	*326.60*	*82.631*	*26,987.450*
Ghana	*5,819.22*	*21.053*	*122,511.976*
Greece	*8,320.96*	*11.075*	*92,154.676*
Guatemala	*7,027.71*	*12.628*	*88,745.935*
Guinea	*6,679.56*	*8.073*	*53,924.120*
Haiti	*9,461.84*	*8.592*	*81,296.164*
Honduras	*6,703.62*	*7.141*	*47,870.572*
Hong Kong, China	*0.00*	*6.845*	*0.000*
Hungary	*1,423.55*	*10.072*	*14,337.945*
India	*6,324.00*	*1,079.721*	*6,828,153.445*
Indonesia	*6,070.16*	*217.588*	*1,320,794.192*
Iran, I.R. of	*4,406.47*	*66.928*	*94,916.291*
Ireland	*0.00*	*4.019*	*0.000*
Israel	*1,854.76*	*6.798*	*12,608.686*
Italy	*2,244.18*	*57.573*	*129,203.887*
Jamaica	*5,476.19*	*2.665*	*4,594.046*
Japan	*666.61*	*127.764*	*85,168.888*
Jordan	*3,456.29*	*5.440*	*18,802.212*
Kazakhstan	*5,491.08*	*14.958*	*2,135.530*
Kenya	*4,074.85*	*32.447*	*132,216.755*
Korea	*1,566.45*	*48.142*	*5,412.180*
Kuwait	*5,431.04*	*2.460*	*13,360.358*
Kyrgyz Republic	*5,467.52*	*5.099*	*27,878.879*
Lao People's D.R.	*14,424.57*	*5.792*	*83,547.104*
Latvia	*4,554.71*	*2.303*	*10,489.497*
Lebanon	*4,856.48*	*4.554*	*22,116.419*
Lesotho	*6,929.22*	*1.809*	*12,534.959*
Lithuania	*1,487.11*	*3.439*	*5,114.158*
Macedonia	*5,131.99*	*2.062*	*10,582.159*
Madagascar	*5,301.24*	*17.332*	*91,881.057*
Malawi	*6,369.64*	*11.182*	*71,225.314*
Malaysia	*1,435.86*	*25.209*	*36,196.519*
Mali	*8,480.54*	*11.937*	*101,232.158*
Mauritania	*8,872.28*	*2.906*	*25,782.831*
Mexico	*2,469.47*	*103.795*	*256,318.742*
Moldova	*4,839.91*	*4.218*	*20,414.732*
Mongolia	*1,560.49*	*2.515*	*3,924.630*
Morocco	*5,875.42*	*30.586*	*179,705.627*
Mozambique	*9,417.56*	*19.129*	*180,148.410*
Namibia	*4,702.75*	*2.033*	*9,560.687*
Nepal	*1,736.35*	*25.190*	*43,738.631*
Netherlands	*0.00*	*16.250*	*0.000*
New Zealand	*0.00*	*4.061*	*0.000*
Nicaragua	*3,691.80*	*5.604*	*20,688.853*

Niger	*7,174.34*	*12.095*	*86,773.654*
Nigeria	*6,933.75*	*139.823*	*969,497.307*
Norway	*0.00*	*4.582*	*0.000*
Oman	*7,315.72*	*2.659*	*19,452.499*
Pakistan	*4,631.87*	*152.061*	*704,326.328*
Panama	*5,616.91*	*3.028*	*17,007.991*
Papua New Guinea	*6,297.81*	*5.625*	*35,425.181*
Paraguay	*8,302.39*	*5.782*	*48,004.419*
Peru	*2,137.45*	*27.547*	*58,880.445*
Philippines	*4,325.75*	*82.987*	*358,981.015*
Poland	*1,479.52*	*38.160*	*56,458.560*
Portugal	*1,969.06*	*10.436*	*20,549.110*
Puerto Rico	*3,263.13*	*3.929*	*12,820.842*
Romania	*5,597.50*	*21.858*	*122,350.177*
Russia	*4,892.03*	*142.814*	*698,650.230*
Rwanda	*5,562.01*	*8.412*	*46,787.637*
Saudi Arabia	*7,188.79*	*23.215*	*166,887.806*
Senegal	*6,016.91*	*10.455*	*62,906.815*
Serbia & Montenegro	*4,840.16*	*8.152*	*39,457.009*
Sierra Leone	*11,023.12*	*5.436*	*59,921.686*
Singapore	*0.00*	*4.335*	*0.000*
Slovak Republic	*1,464.33*	*5.390*	*7,892.712*
Slovenia	*1,716.98*	*1.995*	*3,425.377*
South Africa	*988.09*	*45.584*	*45,041.231*
Spain	*3,405.51*	*41.286*	*140,599.927*
Sri Lanka	*3,312.31*	*19.444*	*64,404.536*
Sweden	*0.00*	*8.985*	*0.000*
Switzerland	*0.00*	*7.382*	*0.000*
Syrian Arab Rep.	*8,195.57*	*17.783*	*145,741.786*
Taiwan	*2,574.29*	*22.700*	*58,436.338*
Tanzania	*11,389.24*	*36.571*	*416,515.859*
Thailand	*2,495.72*	*62.387*	*155,700.421*
Togo	*8,676.67*	*4.966*	*43,088.343*
Tunisia	*3,564.60*	*10.012*	*35,688.815*
Turkey	*2,830.22*	*71.727*	*203,003.046*
Uganda	*11,270.72*	*25.920*	*292,137.140*
Ukraine	*8,764.44*	*48.008*	*420,763.380*
United Arab Emirates	*6,812.20*	*4.284*	*29,183.473*
United Kingdom	*0.00*	*59.405*	*0.000*
United States	*0.00*	*293.507*	*0.000*
Uruguay	*3,772.06*	*3.399*	*12,821.246*
Uzbekistan	*6,572.71*	*25.930*	*170,430.267*
Venezuela, Rep. Bol.	*10,572.73*	*26.127*	*276,233.612*
Vietnam	*5,424.68*	*82.162*	*445,702.887*
Yemen, Republic of	*8,387.60*	*19.763*	*165,764.159*
Zambia	*6,182.39*	*10.547*	*65,205.657*
Zimbabwe	*5,509.87*	*13.151*	*72,460.28*
World Total	*4,718.93*	*6,110.915*	*28,836,981.565*

Notes: All data are reported in dollars. Complete data are available for 114 of the 135 countries included in the World Bank sample.