

THE ADVERSE EFFECT ON INNOVATION, OF STATE REPRESSION, AND OF GROUPS WITH UNDESIRABLE WORK ETHICS

William R. DiPietro*

*Daemen College, USA

Abstract

Innovation is crucial for economic growth, development, and progress. Using cross country regression analysis, this paper tests for two hypothesis regarding the determinants of innovation. The first is that state repression has a negative effect on innovation. The second is that lifestyles that devalue work, such as those obtaining their incomes from criminal activity or through natural resource rents, are detrimental to innovation. The findings from the empirical work of the paper provide evidence that tends to uphold both of these hypothesizes.

Keywords: Innovation, State Repression, Work Ethics

1. INTRODUCTION

In a world rapidly becoming smaller because of population growth, a world where essential nonrenewable resources are being depleted at an accelerated rate, a world in which environmental and ecological constraints are becoming more pressing and more prevalent, a world with so very many impoverished people, innovation is essential. Innovation is the fundamental means for increasing economic development, for dealing with environmental, physical, cultural, political, and social problems, and, in general, for sustaining and improving mankind's standard of living.

Understanding innovation is therefore of utmost importance. This paper empirically investigates two potential barriers to innovation. They are state repression and groups with native valuations toward work. The paper hypothesizes that both state repression and groups embodying negative attitudes toward work have a negative effect on innovation. State repression completely undermines the free environment necessary for innovation. Groups with negative attitudes toward work do not themselves undertake business innovation and raise the opportunity cost of undertaking innovation by others.

The paper is divided into five distinct sections. The first reviews some of the recent literature on innovation and its causes. The second incorporates the ideas on innovation of the paper into a simple model. The third section identifies the sources of the various variables that are used in the empirical research. The fourth section presents and analyzes the results of cross country regressions on innovation. The fifth finishes with concluding remarks and comments.

2. BACKGROUND LITERATURE

Chang and Chang propose that national innovative capacity is a function of international connection

(Chang and Chang 2013). In regressions on fifty eight different countries, they find, when controlling for GDP per capita and market size, that innovative capacity, measured alternatively by an index of scientific research, and by the percentage of high tech exports of manufacturing products, is positively and significantly related to the extent of international connections.

Taylor and Wilson look at the potential relationship between innovation and national culture (Taylor and Wilson 2012). Using two measures of innovation, citations weighted technology patents and citations weighted science-engineering patents, they employ ordinary least squares with Huber-White estimates of standard errors on several cultural data sets for sixty two countries over the two decade period from 1975 to 1995. Both in their simple regressions, and in their bivariate regressions after controlling for the level of development, military spending, trade openness, national resources, education, and R&D spending, they find that individualism is favorable to national innovation in the long run. In addition, they find that nationalism is also favorable for innovation, while loyalty to family and friends has a negative effect.

On the basis of institutional anomie theory, which maintains that positive social deviation is associated with creativity, Nam, Parboteeah, Cullen, and Johnson focus, at the national level, on three cultural variables (achievement orientation, uncertainty avoidance, and collectivism), two institutional variables (education and political stability), and the interaction between them as determinants of firm level innovative activity (Nam, Parboteeah, Cullen, and Johnson 2014). In their multi level empirics at the firm and national level, they use hierarchical linear modeling on a data set consisting of 28,859 firms in twenty-seven countries. Controlling for a host of firm level variables, they find evidence that all three national level cultural variables, and one of the institutional variables, political stability, matter for firm

innovation. With regard to the interaction effects, greater national level of education, as well as greater political stability, appear to dampen the negative relationship between national level collectivism and firm level innovation.

Buesa, Heijs, and Baumert, assuming there is substantial interdependence among the variables determining innovation, use European regional data from 1995 to 2001 to perform factorial analysis on twenty one determinants of innovation (Buesa, Heijs, and Baumert 2010). From their factorial analysis, they come up with five relevant factors, regional innovative and productive environment, innovative firms, institutes of higher education, public administration, and national innovation. Subsequently, employing a variety of estimating techniques within a knowledge production function framework, they undertake regressions of innovation on the five factors they obtained by the factorial analysis, measuring innovation either by patents, high tech patents, patents per capita, or high tech patents per capita. In general, their regression show, in order of importance, that regional environment, innovatory firms, and national environment have positive effect on innovation.

Song and Oh study drivers of innovation by looking at ninety six companies in energy intensive industries in South Korea (Song and Oh 2015). Their probit model, using survey data from the 2008 Korea innovation survey, show that product innovation in energy intensive companies depends on exports to sales, the capital ratio, advertising to sales, and R&D personnel to employees, and that process innovation in energy intensive firms depends non-linearly on firm size (U shaped), exports to sales, advertising to sales, and R&D personnel to employees.

With the growing importance of the service sector in most economies, Silva, Simoes, Sousa, Moreira, and Mainardes undertake to research the sources of innovation in Portuguese service firms (Silva, Simoes, Sousa, Moreira, and Mainardes 2014). Looking at 1306 Portuguese service firms and using logistic regression, they find some evidence that innovative capacity at the firm level is positively related to firm in house investment in R&D, to external R&D, to marketing, and to acquisition of machinery, equipment and software.

Lau, Yang, Zhang, and Leung are interested, especially in the case of emerging economies, on the impact of corruption, in the form of firm bribery of government, on national innovation, and, whether this form of corruption can modify the relationship between national innovation and foreign direct investment. (Lau, Yang, Zhang, and Leung 2013). Using patent applications as their innovation dependent variable on a panel of fifty seven European and Central Asian countries for the period 1995 to 2010, they find, using either a fixed effects estimator or a general method of moment estimator, that the percentage of firms making bribes to government officials and educational expenditures exert a positive effect on patent applications, and that foreign direct investment inflows are not of consequence for innovation after adjusting for firm bribery of government.

Bellmann, Crimmann, Evers, and Hujer consider whether three regional variables, the percentage of all regional graduates in mathematics,

informatics, natural sciences and technology, regional nearness to research and technology centers and universities, and the rate of regional unemployment, are relevant for innovation in individual business establishments within regions (Bellmann, Crimmann, Evers, and Hujer 2013). Their empirical research uses a three-level logistic random intercept model estimator on data for 16000 establishments and 141 regions in Germany for the years 2007, 2008, and 2009. Controlling for a variety of establishment level variables, they find that, even though regional proximity to research and technology centers and universities surprisingly does not have a significant effect on the probability of various types of business establishment innovation in a region, regional unemployment significantly reduces the probability of both establishment radical innovation and establishment process innovation within a region, and the percentage of regional graduates in mathematics, informatics, natural sciences, and ethnological sciences significantly increases the probability of radical and process innovation in establishments within a region.

3. FORMAL MODEL

The formal model, consisting of a single equation, is as follows.

$$I=f(R, W, C) \quad \delta I/\delta R < 0, \quad \delta I/\delta W < 0 \quad (1)$$

In the model, I stands for innovation, R is state repression, W represents lifestyle activities in which the people who are engaged place a low or negative valuation on work, and C is a set of control variables.

Innovation is expected to be negatively related to state repression, as a repressive environment is considered to be a major barrier to innovation. Repression raises the cost of engaging in innovative and innovative related activity. Any free talk in a repressive environment can lead to loss of job, social ostracism, incarceration, torture, and ultimately to loss of life to one's self, one's friends, or a member of one's family. At a minimum, innovation requires the absence of fear so that new ideas, concepts, and techniques can be introduced, discussed, and circulated without apprehension of negative consequences. For innovation to thrive, it needs to be encouraged, not discouraged.

In addition, innovation is predicted to be negatively related to criminal groups, rental income-sourced groups, and other groups whose lifestyles are associated with, or fundamentally based on, negative values toward work.

Two contrasting attitudes toward work at opposite ends of the spectrum can be identified. The first places a high value on work. The second places a negative value on working to obtain a living. An individual possessing the first attitude desires to make a contribution to production, gauges himself on how much he provides benefits to society, and prides himself in what he make. An individual with the second attitude has a condescending attitude toward work and those who engage in it. The first attitude is conducive to business innovation, while the second is not.

While there are others, two major groups can be identified that fall into the second category with a negative attitude toward work. They are the criminal and the aristocratic. Both will be considered in the subsequent empirical analysis. The primary objective of criminals is to obtain money without work, and to seek ways to get money without work. Easy money is their fundamental goal. Those who toil to obtain money are looked upon with disdain. For aristocrats, the central aim is to obtain income through rents without getting their hands dirty. Those, without ownership of land based resources, who must work to obtain their daily living, are viewed as second class citizens.

Finally, the last determinants of innovation in the model are the control variables. Only one control variable, the level of economic development, will be considered. theoretically, it is postulated that there is a positive relationship between innovation and the level of economic development. Higher levels of economic development are associated with a host of favorable conditions for innovation, such as better physical infrastructure, and a greater quantity and quality of education.

4. VARIABLE SOURCES

Innovation is quantified by using the 2014 global innovation index (Global Innovation Index 2014). The global innovation index considers eighty-one different indicators in its construction. In 2014, the index ranged from a low value of 12.7 for Sudan to a high value of 64.8 for Switzerland.

The political terror scale for the year 2010 is employed to capture political repression (Political Terror Scale 2010). The terror scale is an average of U.S. State Department ratings and the ratings of Amnesty International on state repression for countries. In their ratings, they use a scale from one to five with higher values signifying greater state repression.

Criminality is proxied by using Alm and Embaye's estimate of the percentage share of the shadow economy in the GDP for 2006 (Alm and Embaye 2013). Their numbers are generated using a currency demand approach.

Finally, the measure of the share of natural resource rental income in the economy is the World Bank's percentage of natural resource rental income to GDP for 2010 (World Bank 2014).

5. EMPIRICAL FINDINGS

Table 1 shows the results of cross country regressions of innovation on state repression and other variables of the model.

The table is put together in the following fashion. The first row numbers the regression equations. The second to the last row shows the r-squared value for each regression. The last row provides the number of sample countries entering the equations. The potential explanatory variables are displayed in the first column. If and when a variable enters an equation, the estimated coefficient is supplied in corresponding variable row and equation column as the top entry. Right below the estimated coefficient is the individual t-statistic for a variable in an equation. Finally, an asterisk under a t-statistic indicates that a variable is significant at

the one percent level of significance or better in that equation.

Table 1. Cross country innovation regressions

	(1)	(2)	(3)	(4)
CONSTANT	52.716 (29.00) *	69.384 (30.87) *	68.549 (31.32) *	53.156 (15.81) *
REPRESSION	-6.5619 (-9.49) *	-3.4432 (-5.14) *	-3.0260 (-4.57) *	-1.8532 (-3.00) *
CRIMINALITY		-7.7458 (-9.49) *	-7.7010 (-9.05) *	-4.4452 (-5.45) *
RENTAL INCOME SHARE			-1.939 (-2.83) *	-1.976 (-3.31) *
DEVELOPMENT				.0003 (5.57) *
RSQ	.397	.687	.712	.785
N	139	98	98	97

The table has four equations. The first equation is the regression of innovation on state repression alone. The next two equations add the anti-work variables, criminality, measured by percentage of the shadow economy of GDP, in the second equation, and, in the third equation, the rental share of GDP. Finally, the fourth equation, representing the complete model, adds the development control variable, GDP per capita, to the three other explanatory variables.

The results lend strong support for the hypothesis that state repression has a negative effect on innovation. In every one of the four equations, the estimated coefficient on repression is negative, and, in each of the equations, the estimated coefficient on repression is significant at the one percent level of significance or better. Whether repression is used alone as in first equation, or, as in the second and third equations, accounting for variables that lead to diminished valuation of legitimate work, repression matters for innovation. In addition, the fourth equation indicates that repression is of consequence for innovation regardless of the level of economic development. Finally, a look at the r-squared value for the first equation in the table reveals that state repression on its own accounts for close to forty percent of the cross country variation in innovation.

The results also provide verification for the second hypothesis, that anti-work values are detrimental to innovation. Criminality, as measured by the percentage of the shadow economy to GDP, has, right in line with this theoretical notion, a negative sign in the three equation in which it appears. The criminality variable is also significant at the one percent level or better in each of these equations. Similarly, just as theoretically anticipated, the estimated coefficient on the percentage share of rental income to GDP is negative in the two equations that it enters, and it is significant at the one percent level or better in both equations. Thus, it certainly appears from the empirical findings, that groups in society that hold and propagate negative work values and attitudes dampen innovative activity.

Finally, the sole control variable, the level of economic development, as measured by per capita GDP, is well behaved. The development variable is positive and significant at the one percent level of significance in the fourth equation, the only equation in which it appears.

6. CONCLUSION

From the empirical findings of the cross country regression analysis in this paper, It appears that state repression, and values that belittle or denigrate work, have negative effects on innovation.

State repression needs to be minimized, not just because it is so inhuman, but also because, it is likely to downshift the future trajectory of the economy, working through its negative effect on innovation. Leaders, when their power is threatened, are always inclined to resort to repression in an effort to retain their power. Institutional constraints must be devised and implemented to make it more difficult for them to do so. The leader selection process needs to be designed so that leaders who are selected by the process are truly public spirited and not prone to choose repression as an option. Leaders must be well informed of (and leaders must be concerned with) the dire long term consequences on the economy from the use of repression.

Furthermore, means other than repression must be found to attain social and political stability. Finding these other means is difficult task and is likely to become more so in the future with the advent of the information age. Unfortunately, computerization and the internet have greatly reduced the cost of surveillance- a key instrument of repression.

In addition to minimizing repression, in terms of policy, the results of the paper also suggest that, for innovation to thrive, the right cultural atmosphere needs to be established and sustained . Values and attitudes that place a high value on work and creativity need to become part of the very fabric of society. They must be internalized in citizens through family rearing, education, the media, and other means. Groups espousing negative work values need to be reduced and discouraged. Crime needs to be kept in check. The negative effect of groups obtaining the mainstay of their income through rents must be brought under control . Perhaps, a special tax, imposed on rental incomes from oil and natural resources, with the proceeds earmarked to public purposes, may be helpful.

Finally, as far as future research is concerned, a promising area might be to focus on other groups holding values that are potentially damaging to innovation, such as groups having fatalistic views.

REFERENCES

1. Alm, James and Abel Embaye. 2013 "Using Dynamic Panel Methods to Estimate Shadow Economies Around the World, 1984-2006." Tulane University Working Paper Series, Working Paper #1303, <http://econ.tulane.edu/RePEc/pdf/tul1303.pdf>, October 23, 2014.
2. Bellmann, Lutz, Andreas Crimmannn, Katalin Evers, and Reinhard Hujer. 2013. "Regional Determinants of Establishments' Innovation Activities: A Multi-Level Approach." IZA Discussion Paper No. 7572, <http://ftp.iza.org/dp7572.pdf>, August 21, 2015.
3. Buesa, Mikel, Joost Heijs, and Thomas Baumert. 2010. "The Determinants of Regional Innovation in Europe: A Combined Factorial and Regression Knowledge Production Function Approach." *Research Policy*, 39, pp.722-735.
4. Chang, Shu-Hao and Hsin-Yuan Chang. 2013. "Study on National Innovation Capacity and International Connection." *Innovation: Management, Policy & Practice*, 15(4), pp. 452-462.
5. Lau, Chi Keung Marco, Fu Steve Yang and Zhe Zhang, and Vincent K. K. Leung. 2013. "Determinants of Innovative Activities: evidence from europe and Central Asia region." MPRA Paper No. 52587, https://mpra.ub.uni-muenchen.de/47153/1/MPRA_paper_47153.pdf, August 20, 2015.
6. Silva, Mari Jose Madeira, Jorge Simoes, Gastao Sousa, Jacinta Moreira, and Emerson Wagner Mainardes. 2014. "Determinants of Innovation Capacity: Empirical Evidence from Services Firms." *Innovation: Management, Policy & Practice*, 16(3), pp. 404-416.
7. Nam, Dae-il, K. Praveen Parboteeah, John B. Cullen, and Jean L. Johnson. 2014. "Cross-National Differences in firms Undertaking Innovation Initiatives: An Application of Institutional Anomie Theory." *Journal of International Management*, 20, pp.91-106.
8. Taylor, Mark Zachary and Sean Wilson. 2012. "Does Culture Still Matter?: The Effects of Individualism on National Innovation Rates." *Journal of Business Venturing*, 27, pp. 234-247.
9. The Global Innovation Index. 2014. <https://www.globalinnovationindex.org/content.aspx?page=data-analysis>, August 4, 2015.
10. Political Terror Scale. 2010. <http://www.politicalterrorsscale.org/>, July 1, 2015.
11. Song, ChiUng and Wankeun Oh. 2015. "Determinants of Innovation in Energy Intensive Industry and Implications for Energy Policy." *Energy Policy*, 81, pp. 122-130.
12. World Bank. 2014. World Development Indicators, <http://databank.worldbank.org/data/views/variableSelection/selectvariables.aspx?source=world-development-indicators>, May 20, 2014.