not exogenously impose free trade between PTA partners, but instead posit a shift in the tariff function. They find that the effect of a free trade agreement between two countries will be to raise the level of protection against the third, since labor is released from intra-bloc lobbying, thereby lowering the wage and encouraging inter-bloc lobbying. They also boldly extend the lobbying function to a customs union setting and explore the conditions under which a customs union will be more or less protective than a free trade agreement. This paper is an important contribution to the literature on the political economy of preferential liberalization.

These chapter discussions are meant to be illustrative of the high quality of work to be found in this collection. Other valuable contributions must go undescribed and await the interested reader. If I have a criticism of this volume, it is the lack of interconnection between the papers. This problem might have been ameliorated with the inclusion of discussions from the conference. I certainly would have been interested in what the authors had to say about the other papers, particularly when the papers are related (for example, Krugman, Brecher and Choudhri and Feenstra and Hanson are all addressing liberalization's effects on wages, each in a distinctive way). However, as individual examples of work on this topic, the papers are very good and deserve a large readership.

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Determinants of Economic Growth: *A Cross-Country Empirical Study*, by Robert J. Barro, Cambridge, Massachusetts, MIT Press, 1997.

Determinants of Economic Growth is a wonderful, concise examination of the empirical literature on economic growth by one of its most innovative and important contributors, Robert J. Barro. The book is based on Barro's 1996 Lionel Memorial Lectures delivered at the London School of Economics. Overall this is an impressive book that provides a lucid analysis of the fundamental driving forces of the wealth of nations and both synthesizes and expands upon the recent empirical developments in the economic growth literature.

Nothing matters more to the long-term economic welfare of nations than their rate of economic growth. Simple calculations reveal that even small differences in growth rates, compounded over many years, can cumulate to significant differences in standards of living and levels of income. Despite the economic and political importance of the subject, the study of economic growth languished for nearly two decades after the late 1960s before a rebirth of interest in the mid-1980s. Today, macroeconomists have come to appreciate that long-run growth is much more important than short-run fluctuations. This concern has turned economic growth into a central and fruitful area of research in macroeconomics which, as this book demonstrates, has resulted in a tremendous advance in our understanding of economic development during the last decade.

In this book, Barro does a careful and extensive empirical analysis of the main determinants of growth differences across roughly a hundred countries over the last three decades, and provides fascinating new evidence of their strength and interplay. As in Barro's previous work, the analysis is focused around the role of conditional convergence: the lower the starting level of real per capita GDP, relative to the long-run or steady state position, the faster is the growth rate.

The book contains three chapters. It starts with a preface in which he discusses the contributions of the endogenous growth and neoclassical theories and summarizes the theoretical and empirical literatures over the last decade. On the one hand, the theoretical understanding has progressed on various fronts, including the study of increasing returns to scale and endogenous technical innovation; the interaction of population, fertility, human capital and growth; international spillovers in technology and capital accumulation; and the role of institutions (see, for instance, Romer (1986, 1990), Becker et al. (1991), Barro and Sala-i-Martin (1995) and other references therein). On the other hand, the increasing availability of data sets for a larger sample of countries has led to an important empirical literature of cross-country growth. These data, as this book shows, have allowed a healthy interplay between theory and empirics.

The revival of interest in growth theory centered on endogenous growth theories. One shortcoming of the early versions of these theories is that they no longer predicted conditional convergence, a property that is a strong empirical regularity in the data. Barro also argues how even later versions of these theories ''*seem most important for understanding why the world as a whole can grow in the long run but have less to do with the determination of relative rates of growth across economies*.'' This has lead him to focus his interests on the analysis of the implications of the neoclassical growth model, whose main prediction is the convergence property.

The first chapter derives a simple empirical framework that embodies the idea of conditional convergence from an extended version of the neoclassical growth model. In this setting, the growth rate depends on the initial level of output and its long-run level. For given determinants of the long-run level, the growth rate varies inversely with initial output (the conditional convergence effect), and for given initial output the growth rate increases with the long-run level. The isolation of the convergence force thus requires a conditioning on the determinants of the long-run level.

The empirical findings in this chapter for a panel of around a hundred countries strongly support the general notion of conditional convergence. The novelty of the work is that it extends the use of a cross-sectional analysis typical in the literature to a panel setup, as well as evaluates the role of new, important variables.[3] The state and choice variables he examines include the initial level of GDP, measures of human capital in the forms of schooling and health, the fertility rate, government consumption spending, an index of the maintenance of the rule of law, change in the terms of trade, an index of the extent of democracy (political rights), and the inflation rate.

The results indicate that economies tend to approach their long-run position at a rate of 2.5 percent per year. This rate of convergence means that it would take a typical economy twenty seven years to get halfway towards its steady-state and ninety years to get ninety percent of the way.[4]

The results show a significantly positive effect on growth from years of schooling at the secondary and higher levels for males twenty-five and over. Also, more years of male schooling raise the sensitivity of growth to the starting level of GDP. This supports theories that stress the positive effect of education on an economy's ability to absorb new technologies. Surprisingly, female education is not significantly related to growth but is somewhat important for other indicators of economic development such as fertility, infant mortality and political freedom. Health or life expectancy (which also proxies for quality of human capital) also has a significantly positive effect. The fertility rate and government consumption (exclusive of spending on education and defense) have a significantly negative effect on growth. Improvements in the terms of trade and a rule of law index (based on the effectiveness of law enforcement, the sanctity of contracts, and the security of property rights) have in turn a significantly positive effect. Contrary to previous studies, regional effects for sub-Saharan Africa, Latin America and East Asia are found to be insignificant, as their effects are mostly accounted for by other explanatory variables.

Most of the variables that enhance the growth rate also appear to stimulate real (private plus public) investment. The results from the panel regressions are then used to construct interesting long-term forecasts of economic growth for individual countries which will be useful to economists, investors and policymakers alike. The forecasts show that: "*2 percent per capita growth seems to be as good as it gets for a country that is already rich*".

The second chapter details the interplay between economic development and democracy. The extent of democracy has a significant effect on growth but does not emerge as a critical determinant. There is however some interesting evidence of a non-linear relationship: at low levels of political rights, an expansion of democracy stimulates growth; however, once a moderate amount of democracy has been attained, further expansion reduces growth. This non-linear relation also

[3] Although the main evidence still turns out to come from the cross-sectional (between-country) variation, the time series (within-country) dimension provides some additional information.

[4] This rate of convergence is generally thought to be slightly underestimated as the variables used to hold fixed the determinants of the long-run values are, by nature, imperfectly measured.

appears in the effect of democracy on the investment ratio. A plausible, persuasive and important interpretation for these growth retarding effects is that as countries get wealthier, at some point, further democratization is accompanied by an intensified concern with income redistribution and an enhanced role of interest groups which retard economic growth. This finding has important economic, political and public policy consequences and seriously warns of the dangers of interfering with freedom in markets. It also has important implications for the literature on economic growth and income inequality which, contrary to these findings, often argues that inequality has a negative effect on growth.

In contrast to this weak effect of democracy on growth, there is a strong positive linkage from economic growth to the likelihood to experience democracy (the Lipsey hypothesis). Various measures of the standard of living – real per capita GDP, life expectancy, and a smaller gap between male and female educational attainment – are found to predict democracy. Additional variables such as the urbanization rate, natural resources, infant mortality, country size, inequality, population heterogeneity (with respect to ethnicity, language, and culture), the rule of law, prior colonial status, and most religion affiliations do not show a significant effect.

It is in this chapter that, based on this empirical evidence, Barro explicitly urges the need to develop new formal theories that can enable concision, promote intelligibility and help sort out the complex interactions among these variables.

The final chapter details the link between inflation, monetary policy and economic growth. The basic finding is that increases in the inflation rate lowers the growth rate of per capita GDP in a significant way. Moreover, there is no sign in any range of inflation rates that higher inflation has to be tolerated at any point to obtain more growth. The analysis also suggests that the direction of causality is from inflation to growth, rather than the reverse. This adverse effect of higher inflation on economic outcomes is quantitatively important: an increase by 10 percent in the annual inflation rate is associated with a decline by 0.3 percent in the annual growth rate of GDP. This pattern shows up clearly for inflation rates in excess of 15 to 20 percent annually but cannot be isolated statistically for the more moderate experiences. However, the data does not reject the hypothesis that the relation between inflation and growth is of the same magnitude at low rates of inflation than as high rates.

Interestingly enough, the evidence also suggests that increased central bank independence is not a sufficient condition to control inflation as previous evidence has suggested: it may have a positive effect on developed countries but across a greater number of countries the effect is null if it does not come accompanied by other measures.

The apparently small estimated effects of inflation on growth may be misleading. First, as Barro remarks, over a thirty year period a 10 percent increase in the inflation rate would lower GDP by 6 to 9 percent. Second, and at least as important, is the welfare cost in terms of the ‘‘initial’’ *level* of GDP. Recent research by Lucas (1994) estimates this cost to be very significant: for instance, the welfare cost of a 6 percent nominal interest rate can amount up to 1 percent of GDP while even at 3 percent interest rates the cost can be about 0.7 percent of GDP. And one percent of, for instance, U.S. GNP amounts to very significant (and real) money.

Other variables that the author suggests as likely to be important for growth include the extent of specific tax distortions, public pension systems and other transfer programs, market regulations (especially in the labor and financial sectors), quality of education, and infrastructure investments. Further research will undoubtedly examine their growth effects as data becomes available.

Extensions and future efforts should also analyze the effects that these (and other) variables may have over the *level* of GDP (Hall and Jones (1997)) and over the *variability* of GDP growth rates (Ramey and Ramey (1995)). A promising area of research shall ''merge'' the cross-country analysis of the neoclassical model (which is important to explain cross-country evidence) with the endogenous growth literature (which is more relevant to explain global long-run growth) as in recent research by the author and Sala-i-Martin. A particularly relevant area that may need further efforts and an explicit focus is the mapping of the evidence into useful policy recommendations. While the recommendations in some areas are straightforward (e.g., monetary policy) in other areas the translation may not be trivial.

The direct, clear and lucid way in which the book is written makes the work in these lectures available to a wide audience, including noneconomists. I have no doubt that this book will become an important reference in courses on macroeconomics and economic growth, both at undergraduate and graduate levels in economics, public policy, and other social sciences. The book is also a jewel as an important source of ideas for researchers, investors, and policymakers.

The bold and persuasive evidence presented in these lectures provide vision and understanding of socioeconomic and political realities which testify to the fundamental requirements of a sound, free society. Well might nations wish for economists and political leaders that understand the necessary foundations of a healthy society.

The vastness of the subject and the limitations of time and space in delivering the lectures may have caused the reach of the book to exceed its grasp. If so, take this work as an embarkation, or as a glimpse of the promise of empirical inquiry, or even merely as an invitation to meet the challenges of the fundamental economic, social, and political driving forces of the wealth of nations.

References

Barro, R.J., Sala-i-Martin, X., 1995. Economic Growth. McGraw Hill, Inc.

Becker, G.S., Murphy, K.M., Tamura, R., 1991. Human capital, fertility and economic growth. Journal of Political Economy 98 (5), S12–S37.

Hall, R.E., Jones, C.I., 1997. Levels of economic activity across countries. American Economic Review Papers and Proceedings 87 (2), 173–177.
Lucas, R.E., 1994. On the Welfare Costs of Inflation. Manuscript. Department of Economics. University of Chicago.
Ramey, G., Ramey, V.A., 1995. Cross-country evidence on the link between volatility and growth. American Economic Review 85, 1138–1151.
Romer, P.M., 1986. Increasing returns and long-run growth. Journal of Political Economy 94 (5), 1002–1037.
Romer, P.M., 1990. Endogenous technological change. Journal of Political Economy 98 (5), S71–S102.

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1. Barro and Sala i Martin [1990] show that the tendency for poor countries to grow faster than rich countries, termed P-convergence, need not imply a reduction in the dispersion of income levels, termed u-convergence, if each country's level of income is continually subject to random disturbances. The present study deals only with P-convergence.Â In these models the growth rate of per capita product is independent of the starting level of per capita product. Human capital plays a special role in a number of models of endogenous economic growth.Â Most of the results apply from 1960 to 1985 to a cross section of 98 countries (the largest number of countries on QUARTERLY JOURNAL OF ECONOMICS m " w w cn 0 w 6 cow c.10 1 m G t-rl 0 0 1 99 99 7s I m Robert J. Barro. person. abstract. Empirical findings for a panel of around 100 countries from 1960 to 1990 strongly support the general notion of conditional convergence. For a given starting level of real per capita GDP, the growth rate is enhanced by higher initial schooling and life expectancy, lower fertility, lower government consumption, better maintenance of the rule of law, lower inflation, and improvements in the terms of trade. For given values of these and other variables, growth is negatively related to the initial level of real per capita GDP.Â published as Robert J. Barro, 1998. "Determinants of Economic Growth: A Cross-Country Empirical Study," MIT Press Books, The MIT Press, edition 1, volume 1, number 0262522543, April. publication-status. published as Levine, Ross, 1998. Determinants of Economic Growth: A Cross-Country Empirical Study. November 2003. American Journal of Agricultural Economics 85(4):1087-1088.Â Review. Reviewed Work(s): Determinants of Economic Growth: A Cross-Country Empirical Study. by Robert J. Barro. Review by: Terry Roe. SourceÂ ical Study. Cambridge, MA: MIT Press, 1995. This three-chapter volume resulted from. Economic Growth Second Edition Robert J. Barro Xavier Sala-i-Martin. The MIT Press Cambridge, Massachusetts London, England. c 2004 Massachusetts Institute of Technology. All rights reserved.Â 12 Empirical Analysis of a Cross Section of Countries 12.1 Losers and Winners from 1960 to 2000 12.2 An Empirical Analysis of Growth Rates. 12.2.1 Effects from State Variables 12.2.2 Control and Environmental Variables 12.3 Regression Results for Growth Rates 12.3.1 A Basic Regression 12.3.2 Tests of Stability of Coefcients 12.3.3 Additional Explanatory Variables 12.4 Summary and Conclusions about Growth 12.5 Robustness 12.5.1 Levine and Renelt (1992) 12.5.2 Bayesian Averaging. By Robert J. Barro. Cambridge, MA: MIT Press, 1997. 145p. $22.50. Robert W. Jackman (a1). (a1). University of California, Davis. DOI: https://doi.org/10.2307/2585721. Published online by Cambridge University Press: 01 August 2014. Export citation Request permission. Abstract.Â Social Security and Sustainable Economic Growth: Based on the Perspective of Human Capital. Sustainability, Vol. 11, Issue. 3, p. 662.