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Economic Development, Technological Change, and Growth

An Academic paper on the concept of this correlation and its applicability for effective interventions in economies

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INTRODUCTION

Not many years ago, the world became FLAT. And no one was surprised. The technological change has affected everyone, so much so that each new generation takes a new leap forward blurring any known boundaries of any form. Does this also have an effect on economy?

Local, domestic and international…Does advancement of technology have a direct correlation to better economic conditions? Is the vice versa true as much? What play do markets have? Is it a policy decision? And are governments more responsible than markets? Or is it only based on bursts of innovation?

Do we need to be connected? And interconnected? The questions are many but there aren't direct answers. Fortunately, since the early 1980s, growth theory and development theory have increasingly analysed

the process of technological innovation as a central feature of growth rather than as something that was simply ''brought in'' from the outside.

Today, the goal is to understand the transition from technological change as an ''exogenous'' feature of an economy to technological change as an ''endogenous'' feature.

Broadly, the aim is to understand how a society produces technological advancement.

Theoretical models stress that there are two basic modes of advancing technology:

1. Innovation (developing one's own new technologies), and
2. The other is adoption of technologies that have been devised elsewhere

Of course, all economies pursue both modes to some extent, and there is no doubt that every economy produces only a modest fraction of the technologies that it uses. Adoption of technology from across borders is sufficient to raise living standards substantially, and even to achieve long-term growth based on the continuing technological innovations achieved overseas, however radical improvements may happen through customization to local economy (in case the country does not have enough resources to create technology for itself). But technology adoption has its limitations as well.

In this paper we will look at all aspects of economic development, technological impacts on the economic development and the changes which take place due to this.

SIMPLIFYING THE PARADIGM OF ECONOMIC DEVELOPMENT, TECHNOLOGICAL CHANGE, AND GROWTH

It would be correct to state that significant aspects of economic development for a nation are controlled and manoeuvred by financial institutions (either domestic or foreign) with contributing factors like human resources, policy, controls, government support and most importantly stability of the country.

When it comes to mature markets like US and Europe, they are dependent on large private sector organizations to help grow the economy while others would require significant government support. The economic growth of Mature markets has ranged from 1-2% in the last 3-4 years and the growth markets like India, China, Brazil have grown in the range of 4-6% in the same period. Technology has played a significant role in the economic development for these growth markets and during last decades we have observed increased economic development in these countries through technological interventions.[1]

Dependency theorists argue that poor countries have sometimes experienced economic growth with little or no economic development initiatives; for instance, in cases where they have functioned mainly as resource-providers to wealthy industrialized countries. There is an opposing argument, however, that growth causes development because some of the increase in income

[1] En.wikipedia – Economic Growth – 1

gets spent on human development such as education, health and technology.

Economic growth is a two-way relationship. The first chain consists of economic growth benefiting human development with the rise in economic growth, families and individuals will likely increase expenditures with heightened incomes, which in turn leads to growth in human development. Further, with the increased incomes, people improve quality of lifestyle and there is focus on health and education which propels growth further.

In the United States, Project Socrates outlined competitiveness as the driving factor for successful economic development in government and industry. By addressing technology directly, to meet customer needs, competitiveness was fostered in the surrounding environment and resulted in greater economic performance and sustained growth. Economic development typically involves improvements in a variety of indicators such as literacy rates, life expectancy, and poverty rates. GDP does not take into account other aspects such as leisure time, environmental quality, freedom, or social justice. Essentially, a country's economic development is related to its human development, which encompasses, among other things, health and education. These factors are, however, closely related to economic growth so that development and growth often go together.[2]

[2] ECLAC – Structural Change and Productivity growth, Old Problems and New Opportunities-2

METHODOLOGY - THE EQUATION BETWEEN ECONOMIC DEVELOPMENT TECHNOLOGICAL CHANGE AND GROWTH

According to neoclassical growth theory, long-run growth in income and physical capital per worker is entirely driven by productivity growth (more precisely, by the rate of labor-saving technological progress). Unfortunately, however, neoclassical growth models treat this growth rate as exogenous. They focus on transitional dynamics where the prime engine of income growth per worker is capital accumulation, depending on rates of investment and population growth in addition to the productivity growth rate. Thereby, neoclassical growth theory predicts falling growth rates within countries over time and convergence between countries, conditional on economic fundamentals.[3]

Historical evidence points to a relative stability of growth rates for more than a century in the U.S. Moreover, there is long term divergence in per capita income between major regions in the world. Economics started roughly with the beginning of the modern era, characterized by relatively fast growth in Western countries and slow growth in Africa during the last two centuries. From this brief discussion, it is evident that models which endogenize technological change are highly desirable to understand the process

[3] Globalization, structural change and productivity growth* Margaret McMillan,Director, Development Strategies and Governance, IFPRI Associate Professor of Economics, Tufts University-3

of economic development in the long-run. The theory rests on the basic premise that intentional innovations require resources spent prior to both production of goods and then product market competition. It thereby abandons the neoclassical paradigm of perfect competition and constant-returns to scale in the production process, which runs into the fundamental problem that it leaves no resources for the private sector to finance the search for innovations.[4]

The second premise of endogenous growth theory is that technological knowledge, in the form of a set of instructions on how to produce goods and services (called "idea", "blueprint" or "design" in the literature), is a non-rival good; that is, an innovation can be used by others without diminishing the knowledge of the innovator. This implies that, without ways to exclude others from (some of) the newly created knowledge, in a large society no agent would have an incentive to incur any costs to innovate. (At least this is true when potential innovators are motivated alone by material benefits which accrue from applying the innovation.) An innovation would then be a pure public good, which suffers from under provision when privately supplied (with zero provision when the number of agents goes to infinity). Intellectual property rights protection, which emerged in Britain in the seventeenth century, may thus play an important role for stimulating innovations. In sum, endogenous growth theory captures the notion that knowledge accumulates through the arrival of new ideas which are an outcome of profit-oriented R&D investments. By outlining basic approaches of this theory we demonstrate that it generates a wide range of interesting hypotheses and policy implications.

LAST 20 YEARS OF CHANGE

Nearly 20 years ago, ECLAC studied the structural change and productivity growth with social equity. At the time, the countries of the region were emerging from the severe crisis of the 1980s, with all its associated difficulties in terms of internal stabilization and external adjustment, and headed into a decade of structural reform which heeded the call of the Washington Consensus. In the midst of perplexity and pessimism regarding the region's prospects, ECLAC espoused a view of the situation that ran counter to the extremely orthodox line of thought (from marked economic policy tenets of the time).[5]

The idée-force underlying this view situated the region within the universe of developing countries and highlighted the deteriorating situation by using the metaphor of an "empty box" to symbolize the difficulties that the region was having in reconciling growth with social equity. This proposal for structural change and productivity growth was thus

[4] Dani Rodrik,Professor of International Political Economy Harvard Kennedy School IMF – Jobs and: Analytical and operational considerations for the fund.

[5] The Impact of Remittances on Economic Growth and Development in Africa – Bichaka Fayissa, Middle Tennessee State University,Christian Nsiah,Black Hills State University.

aimed at promoting economic expansion and social equity, not sequentially, but at one and the same time. In addressing the issue of economic growth, ECLAC started out by taking stock of the major changes that were then taking place in the world and the way in which they were redefining a recurring theme in its thinking: the generation and propagation of technical progress. It contended that, in order to achieve technical progress and boost productivity, the region's economies had to become more open, but it also drew a distinction between genuine and spurious competitiveness and emphasized the systemic nature of this phenomenon. At the same time, it maintained that the transition to greater economic openness should be gradual, should place priority on exports, and should be underpinned by a stable competitive real exchange rate. Unfortunately, the way in which the region's economies were opened up during the 1990s exhibited very few traces of these essential components of structural change.

At the same time, given the absence of social equity, it was important to adopt an integrated view of development. This approach departed from unilateral perspectives according to which economic policies and social policies were two completely different and separate spheres of activity which would, nonetheless, naturally tend to balance each other. ECLAC argued that, without the type of growth that would strengthen the demand for skilled labour and create opportunities for small and medium-sized enterprises, it would be very difficult for the region to increase social equity or achieve a sustained reduction in poverty. This line of thinking clearly accorded preference to policies that would help attain both objectives. Hence the crucial importance of education for this attempt to bring about structural change and productivity growth while achieving greater social equity.

The pace of the global changes that were discussed in 1990 proposal accelerated, and new actors emerged which have significantly altered pre-existing balances in the world economy in terms of both supply and demand. The events triggered major structural changes and growth Markets found themselves in varying positions in terms of competitiveness and learning, and it is on the basis of these positions, in conjunction with their stock of resources and capacities, that they take part in the global economy. Diversifying and developing these positions is the crux of any strategy for structural change and productivity growth. The must clearly have national characteristics, closer coordination and greater economic integration among the countries of the region could help in achieving greater economies of scale, complementarities and lessons learned. Moving forward with this task within the framework of each national reality entails mobilizing a broad range of social energies and public policy that plays a key role in this respect. It is important, first of all, to organize each country's search for a medium- and long-term vision (for eg Mahatir defined the vision for Malaysia 2020 in 1991 and aimed to be a developed nation in 30 years, with clear growth and focus areas) within the global context and catalyse efforts

to detect present and future opportunities. Second, it is also crucial to build lasting alliances with neighbour's and private sector based on reciprocal benefits and commitments that will make it possible to formulate and implement strategies for gradually making that vision a reality and taking advantage of the opportunities that present themselves (North – south corridor between Thailand and Singapore and rapidly privatizing public enterprises during the decade).

China, India, and the transition economies opened up in the 1980s and 1990s, have undoubtedly helped raise overall global growth and welfare, but have also posed many challenges. For advanced countries, it has meant reduced demand for lower skilled workers in part because of outsourcing of both manufacturing and service sector jobs. Growth models in some of these countries relied, for example, on the construction sector for jobs for these workers and/or on excessive financial sector deregulation. The challenge for these countries is to find new sources of growth, as earlier models proved unsustainable. For developing countries, the need is to continue to enable structural transformation and catch up while addressing

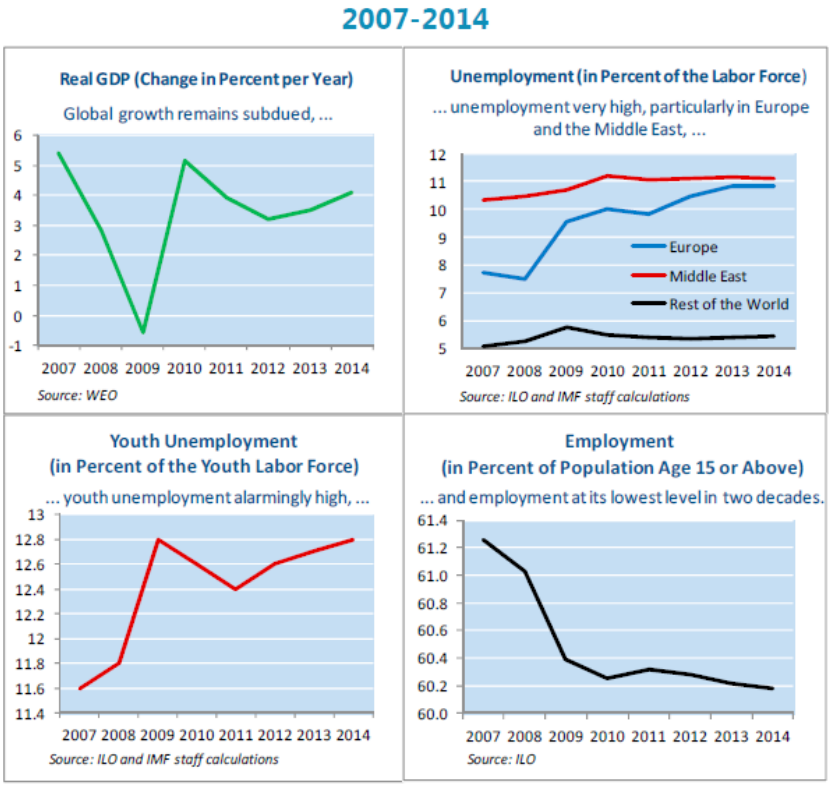

Figure 1: Development of World Employment and Growth[6]

[6] Growth, Development, and Technological Change- Volker Grossmann, Thomas M. Steger

challenges ranging from employing large numbers of young people entering the labor force to upgrading skills and innovation to avoid the middle income trap.

Figure above shows very weak growth since 2009, world growth is projected to be only around 3½ percent this year, about 2 percentage points below the pre-Great Recession years (IMF, 2012a). Over 200 million people across the world are unemployed, with youth and long term unemployment at alarming levels in many countries. The jobs which are the number one priority for the growth of the economy remain a major concern. Job creation and inclusive growth are imperatives that resonate today in every country in the world—be it small, large, advanced, emerging, developing, post-conflict, or resource rich. For those countries at the epicenter of the global financial crisis, the objective is front and center and urgent, as they focus on the large numbers of people who lost their jobs; for others, which are further removed from the epicenter of the crisis, the jobs imperative arises from the need to foster structural transformation and accommodate the large numbers of new entrants into the labor markets so as to reap the demographic dividend and for some, the objective is to find ways of enhancing labor force participation and productivity in the face of aging populations.

GAPS AND CO-RELATION

There are significant income and non income development gaps around the world. Closing these gaps will require not only increasing and sustaining economic growth in low-income regions, but also policies that close non income development gaps directly. Governments need to support private investment and entrepreneurship by investing in human capital and infrastructure; developing the financial sector; improving governance; and eliminating other impediments created by market, institutional, or policy failures. Policy makers should improve access to and quality of health, education, and other social services. This means better targeting and increased public spending on social services that directly benefit the poor; innovative delivery mechanisms informed by rigorous evaluation; and social protection systems. The experience of developing Asia and others has shown that external trade and finance—including foreign direct investment, remittances, and aid—play a critical role. It is therefore imperative that governments continue to promote globalization and regional integration. The countries that manage to pull out of poverty and get richer are those that are able to diversify away from agriculture and other traditional products. As labor and other resources move from agriculture into modern economic activities, overall productivity rises and incomes expand. The speed with which this structural transformation takes place is the key factor that differentiates successful countries from unsuccessful ones. Developing economies are characterized by large productivity gaps between different parts of the economy. Dual economy models à la W. Arthur Lewis have typically emphasized

productivity differentials between broad sectors of the economy, such as the traditional (rural) and modern (urban) sectors. More recent research has identified significant differentials within modern, manufacturing activities as well. Large productivity gaps can exist even among firms and plants within the same industry. Whether between plants or across sectors, these gaps tend to be much larger in developing countries than in advanced economies. They are indicative of the allocative inefficiencies that reduce overall labor productivity. The upside of these allocative inefficiencies is that they can potentially be an important engine of growth. When labor and other resources move from less productive to more productive activities, the economy grows even if there is no productivity growth within sectors. High-growth countries are typically those that have experienced substantial growth-enhancing structural change. Developing countries, almost without exception, have become more integrated with the world economy since the early 1990s. Industrial tariffs are lower than they ever have been and foreign direct investment flows have reached new heights. Clearly, globalization has facilitated technology transfer and contributed to efficiencies. Yet the very diverse outcomes we observe among developing countries suggest that the consequences of globalization depend on the manner in which countries integrate into the global economy. In several cases – most notably China, India, and some other Asian countries – globalization's promise has been fulfilled. High-productivity employment opportunities have expanded and structural change has contributed to overall growth. But in many other cases – in Latin America and Sub-Saharan Africa – globalization appears not to have fostered the desirable kind of structural change. Labor has moved in the wrong direction, from more productive to less productive activities, including, most notably, informality. This conclusion would seem to be at variance with a large body of empirical work on the productivity-enhancing effects of trade liberalization. For example, study after study shows that intensified import competition has forced manufacturing industries in Latin America and elsewhere to become more efficient by rationalizing their operations. Typically, the least productive firms have exited the industry, while remaining firms have shed "excess labor." evident that the top tier of firms has closed the gap with the technology frontier – in Latin America and Africa, no less than in East Asia. However, the question left unanswered by these studies is what happens to the workers who are thereby displaced. In economies that don't exhibit large inter-sectoral productivity gaps or high and persistent unemployment, labor displacement would not have important implications for economy-wide productivity. In developing economies, on the other hand, the prospect that the displaced workers would end up in even lower-productivity activities (services, informality) cannot be ruled out. That is indeed what seems to have typically happened in Latin America and Africa. We also find evidence that countries with more flexible labor markets experience greater

growth-enhancing structural change. This also stands to reason, as rapid structural change is facilitated when labor can flow easily across firms and sectors. By contrast, we do not find that other institutional indicators, such as measures of corruption or the rule of law, play a significant role.[7]

THE CURRENT IMPACT AND GROWTH WITH INCLUSIVITY (HAVE AND HAVE NOTS)

For more than half a century, there have been heated debates on the sources of economic growth in developing economies. The perceived factors of economic growth have ranged from surplus labor to capital investment and technological change, foreign aid, foreign direct investment, investment in human capital, increasing returns from investment in new ideas and research and development. The positive or negative impacts of the above listed traditional sources of economic growth have been well documented in literature. Three sets of forces have had a large impact on growth and job creation in advanced and developing countries in recent decades. Technological innovation, globalization, and the growing global labor force. Technological change and trade, which have occurred through much of history, have had an overwhelmingly positive impact on world income and overall welfare. The impact on within-country income distribution, however, has varied over time. In the decades following World War II, for example, productivity growth and growing trade co-existed with increasing equality in income distribution in advanced countries. Over recent decades, these broad forces – including importantly financial globalization – along with the doubling of the global work force as China, India, and transition economies moved to more market-based economies and opened up to the global economy, led to momentous changes. Many emerging markets experienced rapid growth, and millions of people in these countries were able to emerge out of poverty, with inequality measured at the global level (or assuming the world is one country) declining, reflecting large income gains in developing countries. Advanced countries, too, reaped substantial benefits, for example, in the form of real income gains thanks to lower prices. But at the same time, it has meant reduced demand for lower skilled workers in advanced economies and some emerging markets, particularly in manufacturing, and more recently in services. As a result, while inequality fell on a global scale, within-country inequality rose, especially in almost all advanced countries. These have been offset by improved education and changes in the sectoral composition of employment. Trade liberalization and export growth are associated with lower income inequality, especially in developing countries. These findings of course do not imply that technological progress should be stopped or globalization reversed. These two trends are sources of long-run gains in prosperity.

Demographic trends: The situation has been further complicated by shifts in demographic

[7] Mckinsey – Economic Study - 7

trends across different countries. In many developing countries, particularly in East Asia, South Asia, the Middle East, and Africa, the recent period during which the number of workers has been growing more rapidly than the number of dependents was able to provide a tailwind in support of policy reform, as the resources saved from having fewer dependents provided a "demographic dividend". By contrast, populations in most advanced countries are aging. This has implications for how the labor force responds to changes in demands for certain skills, for the room for investment as the economy enters the phase where savings are drawn down, and for the strains on public budgets in the form of growing pension and health care costs.

STRUCTURAL CHALLENGES (MATURE MARKET AND GROWTH MARKET)

Confronted with these megatrends, countries at different income levels are facing different challenges and different policy priorities. Advanced countries: The most urgent priority in many advanced countries is to reduce the massive unemployment arising in the aftermath of the global financial crisis. Policies need to focus on boosting aggregate demand (within available fiscal and financial space) to rekindle growth and close the output gap. Measures to boost aggregate demand need to be supported by reforms to remove structural bottlenecks to productivity growth so as to enable these countries to draw the largest possible advantages from the ongoing megatrends, while mitigating the impact on more vulnerable portions of their populations, improving income distribution, and addressing labor market segregation along gender lines. New sources of growth may also be needed in some of these countries, as earlier models based on financial services and construction has proved unsustainable. Developing countries: Many dynamic emerging markets and developing countries have already drawn large benefits from integrating into the world economy and from the absorption of new technologies. But many still face the challenge of catching up to advanced countries, a process that involves structural transformation, including both faster rates of factor accumulation and growth in total factor productivity. Many developing countries also face high and, in some cases, growing inequality. In rapidly growing countries, this may reflect rapid structural change In others, high inequality may instead reflect a lack of economic and political inclusion and market imperfections that allow a small elite to capture large funds. Redistribution, including by removing privileges that lead to capture by a few, are likely important prerequisites for accelerating growth.

The current phase of globalization is yielding unprecedented opportunities but is also creating uncertainty and difficulties in the economic, social, political and cultural life of millions. Extraordinary growth in world trade and dynamic technological change have been taking place even as inequality within and between nations has been rising. In these circumstances, what were once developing

economies have been undergoing remarkable transformations, moving in a few generations from poverty to prosperity and forming a new group of emerging actors in the global economy. For all their special characteristics, these cases share a common element, which is their strong productive linkage with one or other of the three hubs (United States, Europe and Asia-Pacific) that account for the bulk of manufacturing and service activities, trade and investment and, most particularly, the human and material resources that drive technological progress. The underlying causes of economic growth have been the subject of far-reaching theoretical study and reflection that began in the 1940s. The conclusions are that the development process does not take place gradually and automatically, since steady economic growth brings into play a variety of elements and mechanisms associated with the mobilization and allocation of resources and the social and institutional characteristics that provide the framework of motivations and incentives to which economic actors respond. On the one hand, the engine of globalization is fuelled by productivity growth resulting from the emergence of new technologies and faster change in existing ones, factors that have substantially altered the way production is organized in firms, production sectors and, ultimately, the global economy. These changes were given an enormous boost when China, India and the former Soviet Union opened up to trade and foreign direct investment. From the end of the 1970s, and particularly in the decade that followed, these economies gradually turned into leading actors in the new systems of productive organization and business models that provided the basis for the strategies of the most globalized firms. At the same time, high incomes in the developed world, the growing concentration of personal income in both developed and developing countries and the greater diversity of consumer interests and lifestyles are leading to diversification and stratification in the consumption structure. A twofold development is therefore expected: an explosion in demand for various high-volume but low-value goods, and the emergence of consumption niches for high-priced differentiated, unique or personalized goods and services.

These developments paved the way for a boom period in the global economy and is expected to carry on intensifying over the coming years.

LIMITATIONS AND SCOPE FOR FUTURE WORK

The paper considers significant information and trends from mature markets and with economic development shifting to growth markets, which are intrinsically absorbent of technology that is founded on large amount of R&D performed in mature economies. This might lend itself to certain changes in equilibrium of 'direct vs indirect correlations' and a vector that defines value creation vs value delivery in the equation of Development vs technological changes.

CONCLUSION

While there is some discussion whether the pace of technological innovation has slowed, there can be little doubt that innovation will

continue, raising global welfare but likely also continuing to increase the relative demand for higher skills, thereby possibly further exacerbating inequality in income. This effect is likely to be more pronounced in advanced countries, where the use of technology is widespread in both manufacturing and services, affecting a substantial segment of the economy. The global labor force is also set to continue growing, albeit at a reduced pace as East Asia's economies mature. Most of the growth in the labor force will be driven by non-Asian developing countries whose export-weighted working-age population is expected to surpass that of East Asia by 2040. In addition to the usual argument about the gap between the social and private benefits of innovation, the stage of development the region is currently at and the characteristics of its production structure need to be taken into consideration. First, although in most developed countries today, private-sector activities account for about two thirds of national innovation efforts, the situation was almost the reverse a few decades ago. It should also be borne in mind that innovations inside the technology frontier are by no means easily appropriated, and enterprises need to be encouraged to upgrade in the value chains. Whatever the specific form that development strategies may take, innovation and productive diversification do not happen spontaneously and solely in response to market signals. The externalities associated with the innovation process and coordination and information failures have to be considered so that appropriate interaction procedures and incentive systems can be designed. In one way or another, this point has been highlighted in the classical texts on development economics and is plainly illustrated by the historical experience of what are now developed economies, as well as by cases of rapid convergence like those of the different Asian countries in the last half-century. The transformation of activities and behaviour, which is the outcome of a huge array of mutually complementary actions, is a collective process by its very nature and thus demands public policies that are designed to mobilize a wide variety of dispersed social energies.

On the whole, as can be seen, economic growth does not happen gradually and automatically, but brings into play a variety of elements and mechanisms associated with the mobilization of resources for accumulation, the principles and processes governing their allocation and the social and institutional characteristics that provide the framework of motivations and incentives to which economic actors respond. Faced with these challenges, many governments have set for themselves the goal of "inclusive growth" – growth where the benefits are widely shared across the population – and have realized that enabling strong employment growth is an essential part of the strategy to achieve that goal.