

CONNECTING CATCH-UP GROWTH TO SUSTAINABLE DEVELOPMENT-A NEW THEORETICAL PERSPECTIVE

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Abstract

The theory of comparative advantage implicitly assumes that the world consists of a fixed amount of ideas, goods and services that are produced wherever there is a comparative advantage with respect to the availability of scarce rival inputs such as land, labor and capital. There is however one crucial non-rival input called 'knowledge'. It is embedded in rival goods in the form ideas that have been written down as instructions, protocols, designs and formulas. The effective use of ideas in an innovation-driven economy depends however on the availability of skilled labor and public policies that encourage investment in economic and technological change. The effective pursuit of such public policies explains the success of East Asia in catching up with Western economies. However, such policies are not based on the principles of orthodox neoclassical economics but on the insights gained from economic history. In this article, we review the recent history of economic theory and practice and conclude that Western countries need to revisit their economics textbooks and public policy strategies in order to better take advantage the opportunities of the global knowledge economy and cope with the sustainability challenges of the 21st century.

1. Introduction

In his book "Knowledge and the Wealth of Nations: A Story of Economic Discovery" [1] David Warsh discusses the question why the discipline of economics has failed to revise its textbooks in light of the successful formalization of the endogenous process of economic development by Paul Romer in 1990 [2, 3] and overwhelming empirical evidence, that the rise of Asia is strongly related to economic policies that are derived from New Growth Theory [4]. Today's textbooks continue to rely on Samuelson's rather ahistorical 'Economics' [5] which was first published in 1948 and is now in its 18th edition. Greg Mankiw, whose textbook [6] is widely seen as the successor of Samuelson's classic, continues to be attached to the same principles and convictions. Warsh [1] documented that throughout the 20th century many eminent scholars in economics have indirectly criticized the baseline assumptions of this textbook canon through their empirical research but without much effect. In an article in 1997, the economist Mark Skousen [7] focused his criticism directly on Samuelson's textbook, arguing that it consists of an uneasy mix of laissez faire on the micro level and government interventionism on the macro level. He rebutted Samuelson's claim to provide a unified approach to economics and warned that it would create a

false sense of a single way of thinking about how economies work [8]. Moreover, its Keynesian basis of "Economics" tended to ignore other aspects of economic development and lead to dubious policy prescriptions. In 2011, Mankiw's students at Harvard rebelled against the dogmas of Post-Cold War economics. In view of the changing circumstances in the global knowledge economy and the financial crisis, they accused Mankiw of teaching ideology rather than social science [9]. Yet, it is likely that they will be ignored once again since maverick economists often tend to leave economics faculties because they lose patience with the firmly entrenched and habitual modes of thinking of economists [1]. Moreover, policy makers, for a long time, did not really bother about the consistency of the underlying economic theory of their public policies as long as the economy was humming. Economists proudly talked of the era of great moderation that would be mainly due to their sophisticated economic equilibrium models. Federal Reserve Chairman Ben Bernanke still argued confidently in 2004 that thanks to a better understanding of macroeconomics in theory and public policy, economic life has ushered an era of not just reduced volatility of inflation but also reduced volatility of output and that this trend is likely to continue far into the future. It can be safely assumed today, that he would not make this claim anymore after the global financial crisis. Many principles of neoclassical economics have fallen into disgrace since then because the underlying models have not just failed to predict the crisis in Western countries [10], they also failed to explain the success of state capitalism in the rest of the World [11]. The crisis of economic theory is also reflected in recent book publications [12, 13, 14] and the call to revisit the importance of history in economics even comes from established economists such as Acemoglu and Rodrik [15, 16]. Finally, new economics textbooks have just been published that focus on the basic insights of New Growth theory and the formal falsification of the basic principles of neoclassical economics [17, 18].

All these changes may have implications for public policy in general and trade policies in particular. In the following paper, we discuss the question how trade policy would look like today if governments would embrace New Growth Theory rather than neoclassical economics as their guiding theory in the design of their trade policies. We deliberately use the term 'New Growth Theory' rather than endogenous growth theory or modern growth theory since apart from some advances in further formalizing the theory in very specialized policy fields, not many bold insights have been added since the two seminal articles published by Romer [2, 3]. Moreover, many economists that shaped the field of endogenous growth theory after Romer, such as Elhanan Helpmann [19], Philippe Aghion

[20] and Daron Acemoglu [21] tended to ignore many of the bold claims made by Romer by formalizing them away for fear of striking at the foundations of neoclassical economic models [1]. Romer himself built on his previous insights in recent articles [22, 23] to emphasize the importance of institutions in facilitating the process of endogenous economic growth. His recent initiative to promote Charter Cities in the developing world must be understood in this context [24]. Charter cities would allow entrepreneurs to take advantage of an institutional environment that enables them to flourish and grow through innovation. It is essentially a lesson learned from economic history (Hanseatic League, Hongkong, etc). The urgency for action becomes obvious if we consider that 200 million people already live in countries that are not their country of origin and more 600 million people still intend to migrate. But where are they to migrate? In the 19th century, during the first wave of industrial globalization, they did not need a passport or visa to migrate to another continent or region. Australia, New Zealand, Eastern Europe, Canada and the United States welcomed migrants who often even received an initial cash advance from their original countries to seek their fulfilment elsewhere. Today, the barriers to migration have become a major humanitarian disaster and youth unemployment is one of the major challenges to political stability (e.g. Arab spring). Charter cities suggest that, based on historical experience, something could be done about it.

Economic historians such as Angus Maddison [25] may also contribute to a better understanding of endogenous growth and the importance of trade and exchange in human development than economists. Maddison traced back data related to technological innovation and growth to ancient times. He highlighted the “hockey stick” pattern that shows both population and per capita GDP to remain essentially flat for nearly two thousand years and then, all of a sudden, to steeply rise in the past two centuries. Nordhaus [26] illustrates the trend with the ‘price of light’ calculation. The real price of light fell by a total of about 17% between 38,000 B.C. and 1750 B.C due to the transition from animal or vegetable fat to sesame oil as a fuel. In the early 19th century, the development of improved candles and whale oil reduced the price by a further 87%. Between 1800 and 1900, the introduction of the carbon filament lamp induced the price of light to fall at an annual rate of 2.3% (38 times faster than before). And then in the 20th century, the price of light has fallen by 6.3% per year with the use of tungsten filaments and fluorescent lighting. In addition, the development of LED (low-emitting diode) technology has caused efficiency and light output to rise exponentially, with a doubling occurring about every 36 months since the 1960s, similar to Moore’s law in the recent history of computing hardware. As Jones and Romer point out in a recent paper, new ideas are very clearly at the heart of this accelerating productivity growth [22].

Historical research therefore provides clear evidence that governments today should focus on investing in technological and economic change if they want to cope with the doubly challenge of reducing poverty and lessening the environmental impact of human activity. Policies would then move away from social and environmental planning

towards more progressive policy strategies as they were already pursued 19th century, when governments impact [27]. The nationalist policies in Europe and the United States back then might have been driven by mercantilist views but they were focused on catch-up growth rather than the protection of domestic markets. Among the industrialized countries today, only New Zealand [28], and to some extent the Scandinavian countries [29, 30], embraced the basic insights of New Growth Theory in public policy. They skipped neoclassical economics and instead embraced the basic lessons learned from economic history. As a consequence, they have rediscovered the role of government as a facilitator of sustainable technological and economic change, in addition to its responsibility as a regulator. The rise of the Asian economies followed the same principles but from a different stage of economic development [11]. For these countries, open trade in itself is not necessarily a desirable end in itself, but instead considered to be a means to an end, namely to ensure access to non-rival as well as rival goods that help the domestic private sector to innovate, advance human development and help coping with the environmental challenges. Despite the global financial crisis, most economists continue to cling to what they have learned from conventional economics textbooks, relying mostly on ahistorical equilibrium models. These highly abstract models, even though useful as an additional source of economic information, are hardly able to explain the complexity and often irrationality of the history of economic development.

2. Why we need to move beyond neoclassical economics in public policy

‘Economics is the study of how society manages its scarce resources’ (Mankiw 2006). However, is this textbook definition of economics still appropriate to describe economic change in the global knowledge economy? Can such a definition help us design public policies that enable catch-up growth and thus economic convergence within and between countries? Can it help to design environmental and agricultural policies that enable us to produce more with less?

Even though focusing on the optimal allocation of scarce resources has its merits in explaining the circular flow of goods and services in a stationary economy, there are three major reasons why it is unlikely to serve as a theoretical guide to sustainable policies in the 21st century:

1. Benefits from trade are explained in neoclassical economics through the concept of marginal utility: marginal gains and losses occur when one thing is traded away and another is acquired. Since both parties agreed to the trade due to their different preferences, everyone must better off. This Pareto efficient state would represent an economic equilibrium and any divergence from this equilibrium would eventually lead back to the Pareto optimal point. The problem of ‘marginal utility economics’ is that this Pareto efficiency is based on highly restrictive assumptions. It

implicitly assumes perfect competition, negligible transaction costs (assuming transparency and thus nearly perfect access to information) and all markets to be in full equilibrium. Pigou [31] already recognized that even if pareto efficient outcomes would be achieved, they do not take into account the externalities generated by private sector activities. Yet, Pigou himself tended to ignore the positive externalities that the private sector can generate for society and the environment (e.g. employment, producing more with less, etc) focusing instead on the social costs that result from private sector activities (negative externalities). Consequently, according to Pigou, the goal of government must be to avoid a divergence between the marginal private interest and the marginal social interest through the internalization of external costs via regulation and subsidies. A pareto-efficient outcome for society as a whole would then be possible again. Based on this view Kenneth Arrow [32] and other welfare economists portrayed the state as a rational social planner that looks at aggregated social preferences and allocates the scarce public resources in a pareto-optimal way (making at least someone better off without putting anyone worse off). Buchanan and Tullock [33] pointed out however that there can be different intensities of preferences. Moreover, the whole process of preference formation is endogenous in nature [34]. The aggregation of social preferences would therefore be highly problematic. Moreover Buchanan and Tullock showed that the democratic decision-making process is not a rational process on an aggregated level as Arrow assumes. Politicians are not rational social planners but primarily pursue their self-interest (e.g. they want to be re-elected) and are not necessarily driven by the desire to maximize social welfare. As a consequence, they try to frame everything that goes against their interest as a negative externality and to ensure that whatever serves their private interest generally also perceived to be in the public interest [35, 36]. Consequently, there is no such thing as a rational social planner unless it refers to an all-knowing and benevolent dictator. What matters instead is the role of institutions and the law. If the constitutional and operational rules of a democracy are able to channel the pursuit of self-interest in a way that allows for constructive compromises, it benefits society and the environment as a whole. Such rules can therefore be considered a public good that is based on non-rivalry and non-excludability [37]. In view of the importance of understanding the political economy in political decision-making processes, Buchanan and Tullock recommended in their noble-prize winning book 'The Calculus of Consent' [33] a shift in economics from neoclassical welfare economics to institutional economics. Yet, based on the new empirical insights in cognitive psychology [34], modern institutional economics will also have to move away from the concept of a purely rational and utility-maximizing homo oeconomicus and instead build upon a more complex and ambiguous understanding of human nature. It would then also be more in line with the recent findings in neuroscience, experimental psychology and anthropology [38].

2. The definition of economics as the study of the optimal allocation of scarce resources ignores that there is one resource that is not scarce: knowledge. Knowledge is not subject to the laws of scarcity and diminishing returns and since it is a non-rival good its increased use does not undermine its value but actually enhances it [37]. If it is employed to either continuously improve existing goods and services or to create discrete innovation that result in entirely new goods and services. It can generate value not just for the respective company that applies new knowledge but for society at large, especially if innovation spreads through international trade. These welfare gains generated through the introduction of new goods and services were demonstrated by Paul Romer [3] but largely ignored in neoclassical economics. As a consequence the public good character of private goods and services has hardly been discussed in the discipline of economics. Technological change is not just enhancing the potential of the private sector to contribute to the creation of public goods but also to public bads. Effective public policies therefore make use of public-private partnerships to maximize the public benefits and minimize the public risks of private sector activities [39], especially by providing incentives for companies to invest in new knowledge that helps solving problems that are of public concern. Once new knowledge is produced in the form of ideas, instructions, protocols, designs etc. that lead to innovative products and innovative solutions, this knowledge assumes the character of a non-rival good. Consequently, complete property rights and perfect competition that work so well in a world consisting solely of rival goods may no longer desirable because they is likely to stifle innovation and prevent the optimal allocation of resources. Yet the increasing returns resulting from the creation of product innovation will only be realized if a company can reasonable expect to be able to reimburse the fix costs for research and development (R&D) by selling the product for a price that is above the marginal cost of production per unit [2, 3]. In other words, the company must be able to extract a temporary monopolist rent (profit) which enables them to remain competitive, not in a market of perfect but monopolistic competition. It is this price-setting power in monopolistic competition that provides the main incentive to make use of new knowledge and invest in new goods and services that produce not just profits but welfare effects for the public at large. A single price, set by many buyers in a market of perfect competition is unable to simultaneously allocate goods to their most efficient uses and provide the appropriate incentives for innovation.

3. The amount of ideas to address technological, social, economic and environmental problems is not fixed but increases in proportion to population growth [22]. Governments and the private sector must therefore recognize that population growth can be an asset if it is translated into a higher share of qualified human capital that is able to make use of and generate new ideas that help to meet the needs and challenges of a growing population. Esther Boserup was the first scholar who discovered through her comparative field research in Kenya that population growth must not neces-

sarily be bad for sustainability if institutions are conducive to technological change [40]. Therefore, it is of crucial importance to design institutions that provide the necessary incentives to invest in people and their respective talents and allow them to engage in trade and exchange [41].

What could possibly replace neoclassical economics as the theoretical guide for national trade policies that aim to take advantage of the global knowledge economy to enable sustainable economic change on the domestic level and improved cooperation on the global level? One answer is to revisit the comprehensive and interdisciplinary theories of prominent economists that have been ignored by the guild due to their unorthodox dynamic views of economic development, the most prominent one is probably Joseph Schumpeter.

3. The early insights of Joseph Schumpeter

The opposition to comparative static formalism in economics has a long history by itself. One of the most prominent opponents was the great economist Josef Schumpeter who described the flaws in neoclassical economics already in the first half of the 20th century [27]. He suggested a more dynamic view of economics taking into account history and anthropology.

Schumpeter divided economic processes into three different classes [42]:

1. The circular flow of economic life as conditioned by given circumstances. This part comprises basic textbooks economics that illustrates the mutual interrelations of economic variables and phenomena under stationary conditions by means of a general equilibrium system. The stability and certainty of such a stationary economy would however eventually lead to standstill. Small and gradual increases in the labor force, savings and capital accumulation would merely lead to marginal economic expansion with no qualitatively new phenomena, but only processes of adaptation. The business man in this system is just the 'Economic Man' that manages and adjusts the system in response to external changes.
2. The concept of economic development. It portrays economics as an evolutionary science and as such discusses the irreversible processes of economic development while highlighting some of the reoccurring patterns. Some basic insights from this research are that (a) economic development comes from within the economic system, it is not an external factor, (b) it occurs discontinuously through qualitative changes (innovation, technical revolutions) which fundamentally displace old equilibria and create new ones, and, (c) economic development is accompanied by growth in national income, saving and population. The great innovations are supply-side driven and cannot be derived from a sovereign consumer demand. The process of innovation requires not an 'Economic Man' but an 'Entrepreneur' that is willing to take risks and cope with uncertainty. He must deal with uncertain factors about the potential market, lack of accurate data, sub-

jective reluctance to strike out into the unknown, and possible public resistance to change (habits, vested interests).

3. The importance of business cycles. Economic growth emerges from and as a consequence of cyclical development. Discontinuous bursts of innovative investment are the basic cause of these business cycles. Economic development comprises not just technological but also organizational and resource changes. They raise productivity, improve quality and reduce costs and thus constitute the foundation of economic growth causing and driven by the interruptions of the business cycles.

Policy makers often fail to take all three dimensions of economics into account. Instead they tend to implicitly assume an economy under stationary conditions (1) while considering disruptive technological change in economic development (2) and cyclical development (3) as something undesirable that has to be regulated. This is particularly so in trade regulation in affluent countries that are fearful of economic decline. Trade liberalization tends to be associated with unpredictable social and environmental changes, more exposure to global business cycles, a displacement of less competitive domestic companies by more competitive foreign companies and a general loss of national autonomy. Yet, if opponents to trade would long-term effects, they would realize that the foundation of poverty reduction, employment creation, economic empowerment and effective environmental management is actually based on economic and technological change fuelled through open international trade. Most developing countries, as well as small developed countries in the periphery, are still aware of these long-term benefits. They carried out economic reforms and underwent an economic transformation moving away from heavy-handed socialist policies and costly subsidies towards innovation-based economies. These countries did however not consider trade to be desirable by itself, instead they just looked at it as a vehicle to promote economic and technological change that would eventually also help to better cope with the sustainability challenges of the 21st century [28].

Schumpeter had the broad knowledge base and the curiosity to recognize that the foundations of economic development are based, first of all, on informal institutions (habits, behaviour, private enterprise, customary practices) and, second, on formal institutions (government, property, contract law, etc) that were necessary to extend collaboration beyond the in-group (e.g. tribe, extended family, village). These are insights gained from research in history, sociology, anthropology and psychology, rather than economics. Schumpeter admired Marx precisely because of his combination of economic analysis with economic sociology and history. Unlike Marx and Keynes however, Schumpeter did not necessarily consider economic inequality as a flaw or failure of capitalism. Profits are the expected reward for commercially viable innovation. They are the result of a temporary monopoly position that gives the entrepre-

neur price-setting power up to the moment when cheaper competitors enter the market. The expected profits are an essential driver in the motivation of the entrepreneur. Yet, as Paul Romer, who largely built his New Growth Theory upon the ideas of Schumpeter, illustrated in his article in 1994 [3], the welfare effects that the entrepreneur produces through the introduction of new goods and services are not captured in a partial equilibrium model that reflects the price-setting power of a monopoly. Since the entrepreneur is limited in his power to set the price by the willingness of consumers to buy the new product for the respective price, he or she cannot capture the whole benefit – thus part of it goes to the public at large. These public welfare gains which Romer calls the ignored ‘Dupuit’ triangle in the partial equilibrium model must also be taken into account in welfare economics. Otherwise it leaves the misleading impression that the private sector does not make any contribution to public welfare.

Based on his analysis, Romer suggests that economists should at least learn to distinguish between a monopoly position that was obtained through political lobbying for market protectionism and a monopoly that was achieved through the creation of an innovation that created a new market in which no one else has yet the ability to compete. The former does not produce any welfare gains while the latter does.

Schumpeter accepts that such innovation-based monopolies can generate short-run inefficiencies in resource allocation, inequalities in income distribution and social exposure to new risks. All these negative effects are the result of the disruption of the circular flow of goods and services in a stationary economy. But eventually such temporary monopolies enable technological change that benefits the poor more than the rich on the long run [42]. Yet, since people tend to take the benefits of technological change for granted while the risks are increasingly considered to be unbearable, governments tend to respond by merely regulating change induced through entrepreneurship and innovation rather than facilitating it. Schumpeter predicted that this would lead to a world of large public and private bureaucracies that would essentially deprive the entrepreneur of his or her nutrient medium [27].

4. Schumpeter and global trade in the 21st century

Looking at the broader trends in economic life in the 21st century, Schumpeter proved to be prescient in many ways. Large Corporations in cooperation with large non-governmental organizations (NGOs) increasingly assume government functions through self-regulation, comprising private standards, best practices, codes of conduct, certification, as well as accountability and transparency mechanisms [43]. It may be understandable that these large and globally active non-state organizations cannot wait until the different national governments pass adequate environmental and food safety regulation. Moreover, the different agencies of the United Nations in charge of the global management of public goods such as health, food security and the environment are not designed to facilitate action

but to slow things down and when necessary to prevent things. This makes sense when we consider that the original purpose of the creation of the United Nations after World War II was to prevent action, particularly if such action could lead to war [44]. However, in view of the end of the Cold War and its bipolar world, the preventive character of the institutional design of the UN and the fear of assuming public leadership in national governments have led to a power vacuum that is increasingly filled by powerful non-state actors that recruit politicians to frame change as risky and thus ensure their power as incumbents in the field of business, politics and civil society. In order to win public trust, these actors tend to wrap their private interests into a morally objective language that allows them to appear as representatives of the public interest while ensuring the growth and prosperity of their private organization [45, 36]. The particular brand that was created through this public-attention seeking and PR activities by the respective international NGOs or corporations also gives them the symbolic power to set the agenda with regard to their respective field of activity. In both cases these non-state actors have an interest to impose regulation on others that entrench their own power as de facto policy makers. At the same time the grip on regulation allows them to prevent the emergence of competitors that may try to win over their constituency or customer base through innovation. The result of the process may lead to decreasing growth rates. As a consequence, the cake size that is up for redistribution in politics is not getting bigger while the fight over the different shares is growing ever more grim [46].

5. Growing regulatory constraints to bottom-up innovation and entrepreneurship

Mancur Olson argues in his book ‘The rise and decline of nations’ [46] that Japan and Germany were able to produce economic miracles after World War II because all the established interest groups in domestic politics that previously focused on preventing change and taking part in the redistributive arrangements of public policy were destroyed. The ensuing lean regulatory environment gave entrepreneurs the freedom to respond rapidly to the countless unmet needs in the ravaged countries by investing in the production of new products and services. There were of course risks involved in bringing largely untested products on the market but it was widely perceived that the benefits outweighed the risks in view of the general poverty of the masses. As a result, entrepreneurs generated increasing returns through economies of scale and scope and further invested their profits in the development or further improvement of products.

In the 1970s, many newly founded environmental organizations protested against the new form of capitalism that created a lot of products with lots of undesirable side effects for society and the environment. The oil crisis further added to public grievance. Protesters found that the moment has been reached when the benefits of economic and technological change have stopped to outweigh the risks. Back then, the forms of protest as well as the political agenda of protest organizations were bottom-up, progressive and bold, and, as a result, policy makers responded by passing new laws and establishing new insti-

tutions for the protection of society and the environment. Today, these previously subversive protest organizations have grown themselves into large organizations (Greenpeace has a budget that is greater than the one of the World Trade Organization). As a result, they may have become more concerned with self-preservation than the environmental and social issues they claim to fight for. In this sense, it becomes increasingly hard to distinguish a global retail franchising chain from a globally active environmental organization [28]. Both pursue top-down strategies where regional representatives are instructed to follow the political line defined in the headquarters in Europe and the United States. This political line is meant to reflect the preferences of affluent donors and consumers in developed countries but are often not encouraging local people in developing countries to become active themselves.

These increasingly powerful public and corporate stakeholders that primarily focus on pleasing their respective constituencies would also show little interest in further trade liberalization, especially if the public associates it with undesirable change. Moreover, global trade is increasingly dominated by intra-firm trade anyway due to the trend towards global vertical integration [47]. The regulation of intra-firm trade is beyond the power of national governments and the World Trade Organization (WTO). Large corporations are not bound by the Most Favoured Nation (MFN) and National Treatment Principles of the WTO. Instead they have the power to set private standards that aim at the strict control and enforcement of process-oriented standardization, tend to discourage innovation among suppliers and further entrench their power as gatekeepers in the value chain [43]. As a result, entrepreneurship, experimentation and product innovation are being discouraged (apart from improvements in logistics). Large corporations are risk-averse and primarily concerned about their public image, especially if their brand is well known. Eventually, as Schumpeter rightly predicted, the entrepreneur will be replaced by the economic man and with it comes a transition from a dynamic towards a more stationary economy. This trend may eventually have a larger negative impact on the free exchange of goods and ideas, effective environmental management and economic empowerment than the failure of the Doha Round itself. Yet, this threats cannot be recognized by an economic theory that is unable to facture in the lessons from the history of economic development. As a consequence, public policy will not be up the challenges of the 21st century unless theory adjusts to economic reality.

6. Some adjustments in economic theory

Neoclassical economics is in crises but still remains in the mindset of most policy makers and economics. If there is any lesson to learn from past experience it is that Schumpeter and later on Paul Romer and his New Growth Theory were much more accurate in predicting global economic development over the past two decades than textbook economics.

Some economists like Aghion [48], Greenwald & Stiglitz [49], Rodriguez-Clare [50], Haussman and Rodrik [51], and Acemoglu [52] increasingly agree with this finding. They are primarily concerned with the adjustment of eco-

nomics theory to the new reality of Asia rising. The move of Asia from the periphery towards the centre of the global knowledge economy could not be deduced from the classical theory of comparative advantage. However, despite accurate and sophisticated formalizations, most economists continue to use fuzzy terms that are derived from these neoclassical concepts such as externalities, spillovers, multiple equilibria and public goods. The problem of using such terms is that they mean different things to different people. Romer proposes therefore to skip them and mainly focus on the less ambiguous and continuous terms of rivalry and excludability to define the private and the public good character of certain products and services [53].

Indirectly, Haussmann and Rodrik have embraced many of the ideas of Paul Romer even though they do not quote him. In their paper [51] they highlight the problems of economics when trying to understand the bottom-up process of economic and technological change. They admit that neither neoclassical economic theory nor management science is of much use in helping entrepreneurs (and the state) choosing appropriate investments among the full range of modern-sector activities that go beyond labor-intensive products or natural resource-based products. Yet, the move from a traditional and primarily domestic economic sector towards a modern one that is characterized by strong global economic integration, requires the role of the state as a facilitator of endogenous economic change. Unlike in routine economic activities in the traditional sector, Haussmann and Rodrik argue that the launching of a new product or service that has the potential of creating a new market with increasing returns, mostly fails in the initial stage because the costs of production and thus the production function are not yet known. They point out, as Paul Romer did before [3], that there is a role for industrial policy to create incentives for the private sector to invest in new knowledge and product development and thus go beyond routine business. However, the model used by Rodrik and Haussmann excludes the political economy dimension by assuming that the state acts as a rational social planner designing policies independent of established interest groups. Ideally, governments induce companies to invest in the creation of new markets (e.g. allowing them to have an initial temporary monopoly that allows them to appropriate the profits from increasing returns and thus cover the costs of launching a new product) and then withdraw support once the companies prove to be able to stand on their own feet. As a result, a country would become innovative as well as competitive and thus ensure long-term growth. In this context, the authors assume that the social planner is still aware of failed import substitution policies in the past and consequently would make sure that subsidies end in a second phase. This would make the profits from the temporary monopoly vanish unless the company further invests in product improvement. But as Buchanan and Tullock already argued: there is no such thing as a rational social planner in democratic government unless there is a benevolent and all-knowing dictator, and that is not even the case in China.

Institutions that govern economic life are primarily shaped by the perceptions, preferences and interests of the stakeholders in the formal economy that also participate in the political decision making process. Their rational strategies are first of all focused on pleasing the constituency that ensures their economic survival and political legitimacy [45]. Innovative entrepreneurs, in return, are mostly driven by irrational motives and their primary concern is not politics. They become obsessed with proving to the rest that they can succeed by doing things differently. They do so against all odds and often at the expense of tremendous social tension [54]. Whether they succeed or not depends less on the existence of a rational social planner than the institutional setting in which they operate [55]. The institutional setting largely determines whether the pursuit of private interests leads to relative welfare gains or welfare losses for the public at large. If the institutional setting and the infrastructure for entrepreneurs are able to keep the costs of launching a new product or service relatively low, then there will be investment in innovation and economic integration [3], otherwise the economy will remain in a routine and stationary circular flow as Schumpeter would explain it, or a low-productivity equilibrium, as the neoclassical economist would call it. Romer also showed that the establishment of charter cities that triggered economic development and cultural change throughout history (e.g. Lübeck, Philadelphia, Hongkong) were never really linked to the implementation of a rational master plan of economic development but rather to bold experimentation and learning from history.

7. Paul Romer's recent contribution to a better understanding of economic globalization

Paul Romer challenged the orthodox views in economics already in the 1980s and 1990s by using the formal language of neoclassic economics to disqualify some of its most essential baseline assumptions. In his New Growth Theory [2, 3], he explains long-run economic growth through endogenous factors such as human capital, knowledge and the process of technological change. He was certainly not the first one to do so, but the most radical one. His theory did not allow for a compromise with the incumbent doyens in economic growth theory [1]. Romer's central point was that the use of marginal concepts in economics and the focus on efficiency gains are unable to convincingly explain why we are better off today than hundred years ago. Economics should not be the science of the optimal allocation of scarce resources but the science of making best use of the only non-scarce resource, which is knowledge. Public and private investment in knowledge and human capital may lead to continuous product improvement and the introduction of new goods and services with increasing rather than decreasing returns. It would build upon the traditional economic sector that dominates the production and trade of commodities. These traditional markets are characterized by perfect competition, price-taking, decreasing marginal returns, and low profit margins. In return, the dynamic new markets of the knowledge-based economy are characterized by a relentless process of innovation. It is shaped by mo-

nopolistic competition where profits are used to invest in new products where the innovating companies enjoy temporary price-setting power. This process results in increasing returns to scale and scope on the microeconomic level. On the macroeconomic level it eventually leads to economic growth, a transition from low-productivity to high-productivity employment and welfare gains for the public at large thanks to the introduction of new goods and services that better meet the needs of the people. Economic prosperity is therefore not primarily based on the efficiency gains and the optimal allocation of scarce resources (rival goods) but the increasing returns generated through the effective use of non-rival goods (new knowledge) in the production process of rival goods. It requires institutions that encourage the investment in knowledge-intensive industries. This growth-oriented and innovative industries can emerge in all three economic sectors (mining and agriculture, manufacturing, and services) if the regulation of the respective sector is conducive to economic and technological change [28].

Institutions that are conducive to growth evolve through learning by doing rather than being derived from a historically detached theory. History therefore plays a crucial role in New Growth Theory, and this can be considered as being the most significant advance compared to the old comparative-static model of economic growth designed by Solow [56]. Yet, the Solow model and its implicit assumption that technological change is an exogenous factor that produces constant returns to scale may have been a convenient theory to explain economic development in the rather static bi-polar World of Cold War period. It is however no more applicable to the global knowledge economy of the 21st century. Empirical evidence over the past 20 years clearly shows that New Growth theory is better able to explain the success of the state-led capitalist models in Asia [4, 11] as well as endogenous economic growth in the manufacturing sector of OECD countries after the end of the Cold War [57, 58].

Recent papers by Jones and Romer [22] and Romer [53] provide evidence that thanks to population growth, increasing levels of human capital, growing urbanization rates and the revolution in information technology, catch-up growth in lagging developing countries happens much faster in the 21st century than any time before; provided that historically well-tested national institutions are in place that permit countries to take advantage of global economic and technological change and thus enable the economic empowerment of its people. If governments however reject institutions that enable trade and exchange with other countries or do no more allow for economic experimentation with new technologies and institutions (non-rival goods), then they are likely to stay poor and thus contribute to the trend of global economic divergence. Economic divergence is a process that puzzled economists in the mid 20th century as much as it puzzles economists in the 21st century who continue to predict economic convergence based on their comparative static equilibrium models.

8. Why is there global economic divergence and not convergence?

In some of today's developing economies the majority of people is almost as poor or even poorer than they were fifty years ago. Others experienced however rapid catch-up growth and a massive reduction in poverty rates. The result is increasing economic divergence. This divergence in income and total factor productivity was observed as one of the stylized facts by Kaldor in 1961 and considered already back then to stand in contradiction to the predictions of neoclassical economics [59]. This divergence was even more pronounced over the past two decades as the new stylized facts proposed by Jones and Romer suggest [22]. But unlike Kaldor, Jones and Romer are able to explain this divergence based on the insights of new growth theory. Kaldor's original stylized facts focused primarily on physical capital (rival goods), whereas in the new growth theory of Jones and Romer it is human capital and ideas that account most for economic growth and institutional change. They argue that it is the interaction between ideas, institutions, population, and human capital that determines whether a country seizes on or misses out on the economic opportunities of the global knowledge economy and international trade. If institutions are conducive to economic change these institutions are likely to enable rapid catch-up growth by closing the distance to the global technological frontier. The virtuous circle between population and ideas does not just enable the rapid adoption and local adjustment of new technologies and the resulting acceleration of endogenous economic growth but helps countries to better cope with the growing social and environmental challenges of the 21st century [28].

Whether economic globalization turns vicious or virtuous depends on institutional change. Institutions may hinder the adoption and utilization of ideas - or facilitate it. Even though institutions that proved to facilitate sustainable change are well known thanks to the historical record, they are not necessarily widely adopted because they sound counterintuitive to the public (why should private profits also increase public welfare? Why should trade be different from theft?) and the education system often fails to explain the long-term benefits of institutions that encourage trade, exchange, entrepreneurship and innovation. Even though institutions are themselves non-rival goods that can be adopted elsewhere [53] they often lack public support and therefore the political majority to be adopted. Instead the response to economic challenges in highly developed countries with less bottom-up pressure for economic change is often a sort of muddling through that is primarily designed to appease public anger with short-term gestures and the attribution of economic problems to external factors (technological change, the rise of China, global trade, intellectual property rights, greed, etc).

9. State failure or market failure?

The financial and sovereign debt crises in Europe largely reflect the lack of political will to embark on institutional reform [60]. The same trend can be observed with the trade negotiations in the World Trade Organization (WTO). The Doha Round, the latest round of trade negotiations, is

currently put on ice because governments tend to regard gains from multilateral trade as marginal and they are concerned about stiff domestic opposition to any multilateral trade deals [61]. It is not that trade liberalization was ever very popular in any country. But since it was obvious during the Cold war that socialist and protectionist policies are unable to deliver, governments agreed to strengthen the role of international trade by making the Uruguay Round succeed and thus enable the establishment of the WTO in 1995. Yet, while almost every national economy has an economic sector that is well-endowed with advanced human capital and highly integrated into the global economy, the majority of economic activities remain rather local [62]. But whereas the local economic activities in developed countries are firmly embedded in the formal economy and therefore able to grow through investment, most local economic activities in developing countries are stuck in the informal sector. Business in the informal sector is able to meet some of the needs in the respective neighbourhood but once an entrepreneur would like to offer his products and services on a regional or national scale, he or she has to comply with all the requirements of the formal economy. Even though a transition from informal to formal is associated with increasing costs of compliance and taxation, it also enables the respective business to attract investment to improve the quantity and quality of production, to enhance its customer base and eventually to grow and employ more people [63].

Arthur Lewis argued already in 1955 [64] that poverty in developing countries will eventually be reduced by bringing all the poor people in the informal sector into the formal economy that allows for investment, growth and the creation of more formal employment. This development did not happen and most people in the developing world remain locked-in in the informal economy. They are largely excluded from the benefits of trade and the exchange of ideas and this failure to embrace modern institutions to facilitate economic integration probably accounts most for the failure of the global economy to stop economic divergence. Yet many experts in development assistance continue to see poverty, inequality and environmental degradation as a result of global economic integration. This also helps explain why most university programs that deal with development and the environment frame technological and economic change as part of the problem rather than part of the solution. It is linked to the failure of the education systems in developed and developing countries to explain students the positive externalities generated by entrepreneurs that take advantage of non-rival goods to do things differently and produce things more cheaply or in better quality. There is overwhelming evidence that entrepreneurship and innovation must become one of the pillars of sustainable development and human empowerment [65]. They are the drivers of economic change and economic integration. Even though this process may lead to short-term regional economic divergence, it eventually contributes to economic convergence because it is the only way that a lagging developing country is able to catch-up and close the gap to the developed economies.

10. The stunning facts about global integration and to put them into a economic formula

International trade almost doubled in size from 1960 to 2006, but foreign direct investment increased by a factor of thirty in the same period. The same applies to the spread of innovation: in the 1960s, 83% of patents granted by the U.S. Patent and Trademark Office went to domestic entities. In the first decade of the 21st century it is only about 50%. Finally, the share of people living in cities increased from 30% to 50% in the past 50 years and the share is likely to be 70% in 2050 [22]. All these indicators hint at the fact that the extent of global economic integration is much larger than any economic model is able to capture. Efficiency gains from trade in existing goods are marginal compared to the benefits that result from the continuous introduction of new goods, services, technologies and ideas into the global knowledge economy. Often it is in fact not trade in goods and services that contributed to local development but the trade and exchange in new ideas (instructions, protocols, recipes, designs) that allow local entrepreneurs to produce things more cost-effective on the local level instead of importing the finished good. Yet, in order to be able to take advantage of non-rival goods (ideas) such as ideas elsewhere there need to be institutions in place that provide incentives to invest by means of awarding innovation and reducing risk and uncertainty.

Paul Romer highlighted the link between institutions and technological change in order to explain the gap between a developed and a developing country in a recent paper in the American Economic Review [53]. There is a world stock of technologies T^* and the stock of technologies T in a particular country. A country-specific factor R for 'rules' influences the rate at which ideas from the rest of the world enter a certain local economy. With good rules, T could catch-up with T^* very quickly. With bad rules, T might not grow at all and the country's economic stagnation becomes increasingly detached from global economic growth thus accounting for increasing economic inequality.

Paul Romer's new production function consists of a function A that captures the factors of productivity (non-rival goods such as ideas related to rules (R) and technologies (T), and function F (conventional production function homogenous of degree 1 in the standard of rival inputs such as physical capital, skilled labor, unskilled labor).

In this context the local stock of ideas depends on the stock of technologies in the rest of the world (T^*) and the local rules $> T(T^*(T^*, R)$. Because foreign technologies T^* are non-rival it is possible for T to equal T^* . Since components of T^* have some degree of excludability, the right incentives in the right local institutional design is crucial.

$$Y = A(T(T^*, R), R) F(.)$$

Yet, there are different types of technologies that have different interactions with rules. Rules may let in tech-

nologies that reduce mortality (R facilitating $T^*=T$) even as they keep out other technologies (R preventing $T^*=T$) that can lift income per capita. This explains why progress in global average life expectancy and decrease in child mortality (especially in Africa) is much more impressive than growth in global income per capita over the past century, because it is based on the exchange of non-rival and non-excludable goods such as formulas and recipes rather than rival and excludable goods such as imported pills (Bourguignon and Morrison, 2002). A non-rival and non-excludable good such as a formula to fight diarrhea (e.g. oral rehydration therapy) can be precisely defined: If you can explain it on the phone, present it in a lecture, describe it on paper, or send it over the Internet, it is non-rival. If no one has a legal right to exclude anyone from making use of the particular good or idea then it is non-excludable. Yet, in order to make use of such non-rival and non-excludable goods there needs to be human capital that is familiar with the codified knowledge and has the tacit knowledge to apply it. Human capital is however a rival good. It is a rival good (a physical organism) that produces non-rival goods (ideas). Institutions must be designed in a way that lead to the investment in R&D and human capital and create incentives to innovate and disseminate innovation, and to introduce the new knowledge back into the education system to adjust the formation of human capital constantly to the knowledge frontier and the needs of the private sector. This process can only succeed if all stakeholders participate in the implementation of the political strategy. Rather than relying on a social planner it is about relying on institutions that arrange the pursuit of private interests in a way that benefits the public as a whole.

Economic analysis should therefore focus on the institutions that make best use of the creation and dissemination of non-rival goods such as rules and ideas. The introduction of new rules and ideas may however face stiff resistance from incumbents in business and politics. Even these stakeholders may eventually agree to start with a small and temporarily limited pilot-project. Once this succeeds it becomes more likely to reach political momentum for political action. Sweden proved this when it introduced road-pricing in Stockholm [30].

11. Applying new growth theory to environment and agriculture policy

New Growth Theory managed to create an endogenous growth model of technological change that takes into account the special role of knowledge and the increasing returns it generates for society at large [2]. Unfortunately, Western economic and trade policies continue to rely on the mercantilist view that trade liberalization means sacrificing local production in favour of cheaper local consumption. And most domestic actors in developed countries that lobby against economic change because they manage to benefit from the status quo are able to convince that public that trade is a zero-sum game in which they are certain to lose. This is especially the case for agriculture.

The benefits from agricultural trade and the exchange of new ideas for society and the environment at large have

become obvious in the case of New Zealand. It decided to unilaterally liberalize its agricultural economy and increase its investment in domestic institutions that foster investment in human capital, R&D and the development and commercialization of new goods and services. Not surprisingly, all the negative predictions of trade liberalization as suggested by comparative static equilibrium models, did not happen. Instead the country proved that it is able to ensure the multifunctional character of agriculture as a positive side effect of the stimulation of entrepreneurship and innovation in the farming sector [28]. Moreover, it becomes increasingly clear that the biggest threat to sustainable development are often subsidies rather than competition in international trade. EU subsidies in the fisheries industry have delayed sustainable structural change, encouraged over-mechanization and thus the depletion of natural marine resources. The same applies to its subsidies for tomato and olive production in Mediterranean countries. Subsidised farmers care less about the cost-effective use of resources and they tend to focus on politics rather than innovation. In this context, the role of the public sector as a facilitator of the production of scientific and economically relevant knowledge and as a designer of new markets should get increased attention in the theory and practice of law and economics in general and international trade theory in particular [22].

12. Concluding Remarks

This article reviewed the best available recent economic approaches and public policies that prove that the exchange in knowledge and new ideas had a much larger impact on global economic integration than trade and exchange of physical goods and services over the past two decades. The countries that benefited most from this process of globalization tended to embrace a new form of industrial policy that aimed at investing in new knowledge and human capital to strengthen local private sector activities and make it ready for global change. Developed countries such as New Zealand, Finland, Sweden and Denmark that embraced new growth theory in their economic, environmental and agricultural policies tended to fare much better over the past decade than other industrialized countries where established interest groups that prefer to cling to old theory and practice were able to prevent change. In developing countries, China is probably the most striking example to prove that catch-up growth today is possible at a much faster rate than ever before. The recipe of success of China is related to the fact that international trade in itself was not considered to be good by itself but rather a means to achieved the end of national development. The major focus in China's effort was however on the acquisition and application of knowledge in the domestic economy. This strategy required exchange with the Western countries and therefore a selective opening of the Chinese economy. As a consequence, many other developing countries tended to copy the policies of Asian countries and stopped listening to Western policy advisors and their prevailing gospel of neoclassical economics. The result is a massive increase in south-south collaboration that is about to transform global economic trade patterns.

Why have all these changes hardly been noticed in text-

book economics? J. Bradford DeLong, a Professor of Economics at the Berkeley University, recently expressed his frustration about the state of economics in the following words "...perhaps economics will remain a discipline that forgets most of what it once knew and allows itself to be continually distracted, confused, and in denial" [66]. One reason for the inertia of economic theory is the fact that paradigm shifts in the social sciences and in economics in particular are almost impossible even in the face of overwhelming empirical evidence. Joseph Schumpeter already pointed out the inconsistencies of neoclassical economics in the 1930s and 1940s but to no avail. Followers of Schumpeter in the discipline of Economics tended to end up at faculties of business schools because they were no more seen as pure economists that acknowledged the discipline gradual approaching toward truth insights through comparative static modelling [1].

The basic message of Joseph Schumpeter and later Paul Romer that trade and exchange in non-rival rather than rival goods has produced the biggest welfare effects in the process of global economic integration is however meeting increasing interest even in Western countries due to the ongoing financial and economic crises. Governments that face an economic crisis realize that fiscal austerity and commodity trade by itself will not be sufficient for economic recovery and new employment. They need growth through innovation converting many of the formerly non-tradeable goods into tradeable goods. This kind of growth with its increasing returns must be recognized as the contribution of innovation and entrepreneurship to global welfare. Welfare economics however still ignores the fact that the private sector invests in R&D and often comes up with the most effective solutions not just with regard to business problems but also challenges related to poverty alleviation, improved environmental management or job creation – especially if only public policy sets the right incentives for the private sector to invest in possible solutions to global problems. Such public-private partnerships are likely to improve the acquisition and application of new knowledge to development and consequently improve a country's capacity to participate in global trade on favourable terms. It allows a country to reduce poverty and create employment through the active participation in economic globalization. Yet, often national governments refrain from undertaking the necessary reforms because they are unpopular. The lack of popularity is again a result of an education system that still teaches the old economic ideology that suggests that we live in a stationary economy that is largely concerned with the optimal allocation of scarce resources. If we want therefore to explain why the process of economic globalization did not lead to global economic convergence but rather divergence we need not blame international trade but national policies. Certain national governments have focused on reducing the gap between the global technology frontier and the national level of technology through the implementation of institutional rules that proved to be effective in mobilizing domestic entrepreneurship and innovation for economic growth. Others however preferred to refrain from unpopular reforms that would be necessary for institution-

al rules that are conducive to endogenous growth. As a result growth largely happened due exogenous factors meaning that if the rest of the world is in crisis they immediately become part of it. Since the primary goal of politicians in mature democracies is to get re-elected with the support of the major established stakeholders rather than in response to unpopular support for institutional rules that are conducive to change and long-term growth, reforms are postponed and growth opportunities are missed. Economic divergence may therefore increase as a result of globalization because certain countries are moving backwards rather than forward to please the powerful domestic stakeholders that benefit from the status quo. The consequences may be much more fatal for a country today than in previous times because catch-up growth today occurs at a much faster rate provided that national institutions do not prevent access to new markets, ideas, knowledge, technologies, goods, services. There is no doubt that the risks of economic and technological globalization are also real, but mankind will be unable to address them by economic, environmental and social planning alone. Coping with new challenges will always be a process of trial and error, and often the most effective solutions to sustainability problems do not come from social planners but innovation and entrepreneurship once again. Domestic and international institutions are therefore not just meant to regulate change but also to facilitate sustainable change by investing in necessary infrastructure and the economic incentives that encourage the local private sector to further invest in new markets and eventually participate in international trade with new goods and services. It will be the best way not just to decrease global economic divergence but to effectively address global sustainability problems through managed economic and technological change.

Endnotes

1. An earlier version of this paper was published as NCCR Trade Regulation Working Paper No. 10 (2012), with funding from the Swiss National Science Foundation
2. See <http://www.federalreserve.gov/BOARDDOCS/SPEECHES/2004/20040220/default.htm#fig1> (visited in April 2012)
3. Jones and Romer call it 'modern growth theory' in the paper, maybe to seek convergence with the work of other economists such as Rodrik and Hausmann who do not use the term 'New Growth Theory'.

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