

The Sustainable Growth Paradigm: Implications for Technology and Policy

by

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Abstract

While some scholars continue to insist that the concept of sustainability is vague and unwieldy, this thesis seeks to explore multidimensional elements of sustainability and seeks to offer an integrative, transdisciplinary approach to policy design for its attainment. Sustainability and the related concepts of development, globalization, and economic and environmental justice are interwoven with technological, social and institutional change, and with trade as drivers of the transformation of industrial and industrializing societies.

The discussion begins by an analysis of the dominant existing models of economic growth and innovation and advances to the effects of economic growth on sustainability. Included is an analysis of the limits of the GDP growth paradigm, the effects of growth on the developed and the developing world and the relationship between economic growth and ecological collapse.

The focus of analysis then shifts from the domestic to the international. Trade and the International Financial System are examined both with respect to their primary theories and characteristics, but also in relation to their effects to sustainability. The discussion is then concluded by an examination of the different policy options and analytical tools that could be employed for a transition to a more sustainable economic model.

Thesis Supervisor: Nicholas A. Ashford
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*“We become what our fathers teach us in odd moments, when they are not trying to teach us”
Umberto Eco, Foucault’s Pendulum*

One of the books I happened to read recently that had a significant impact on me was Malcolm Gladwell’s “Outliers”. Gladwell’s thesis is that success is more attributable to one’s social environment and personal effort, rather than to one’s inherent traits and talent. I could not agree more. These two years at MIT (and the previous two at Harvard) have been a life-changing experience for me. The people I met, interacted and worked with have made me a better scientist, a better thinker, a better person.

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My thesis advisor, Professor Nicholas A. Ashford, has been the driving force behind this work, and deserves my heartfelt gratitude for his guidance, support and mentorship, which extended beyond the content of this thesis. I met Professor Ashford as a student in his Law, Technology and Public Policy class. His scholarship and strong views early challenged my thinking and forced me to approach old questions with different, perhaps “heretic” approaches. The heretics of yesterday, however, are often the leaders of tomorrow, and these difficult times merit new approaches outside the failed paradigms of the past.

My old English teacher and mentor Emmanuel Ninos was the person who first ignited my interest to pursue graduate studies at MIT, by dedicating a book to me back in 2001 with the inscription “straight to MIT.” He was proven wrong in the respect that I first decided to spend two years at the Kennedy School, but I eventually made the cut. My Professor at the Athens University of Economics and Business Dimitris Gritzalis early located my interest in transdisciplinary problems and convinced me that even though I was a student in a highly specialized Department of Informatics, my trait was a virtue, rather than a vice.

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1. Introduction

1.1 Growth and Development Distinguished

Economic growth has been at the heart of economic analysis since the first founding documents of economic theory. Economic growth was, in essence, the topic of Adam Smith's treatise on the "Wealth of Nations." Growth, however, should not be considered as an end in itself. Economists have focused their efforts on analyzing the causes of growth for centuries since it has the potential to decrease poverty, increase the standard of living, support goals such as education and healthcare, and substantially affect the quality of life of the citizenry.

It is essential to note here that as an area of study of national economies, development is generally distinguished from economic growth. Economic growth is generally used to describe how already-developed nations further enhance their economies, while development is not a purely economic phenomenon. Todaro and Smith (2009) note that "development should [...] be perceived as a multidimensional process, involving the reorganization and reorientation of entire economic and social systems. In addition to improvements in incomes and output, it typically involves radical changes in institutional social and administrative structures as well as in popular attitudes and, in many cases, even customs and beliefs. Finally, although development is usually defined in a national context, its widespread realization may necessitate fundamental modification of the international economic and social system as well."

According to Todaro and Smith (2009), economic and social development in all societies should have at least the following three objectives:

- To increase the availability and widen the distribution of basic life-sustaining goods such as food, shelter, health, and protection.
- To raise the quality of life (securing more meaningful jobs and enhancing cultural and human values).
- To expand the range of economic and social choices available to individuals and nations, by freeing them from dependence to other nations, but also from the forces of ignorance and human misery.

The role of national governments in the context of economic development is essential. Contrary to the view of many economists of the neoclassical mainstream, this role should not be limited to ensuring the proper functioning of markets and the correction of market failures.

Traditional economics focuses on the efficient, least-cost allocation of scarce resources and the optimal growth of these resources over time in order to produce an expanding range of goods and services (Todaro and Smith 2009). Furthermore, traditional economics also focuses on neoclassical economics as taught in introductory and

intermediate economics textbooks in universities. Markets, in that context, are considered to be “perfect,” while the consumer is perceived as a rational utility maximizer.

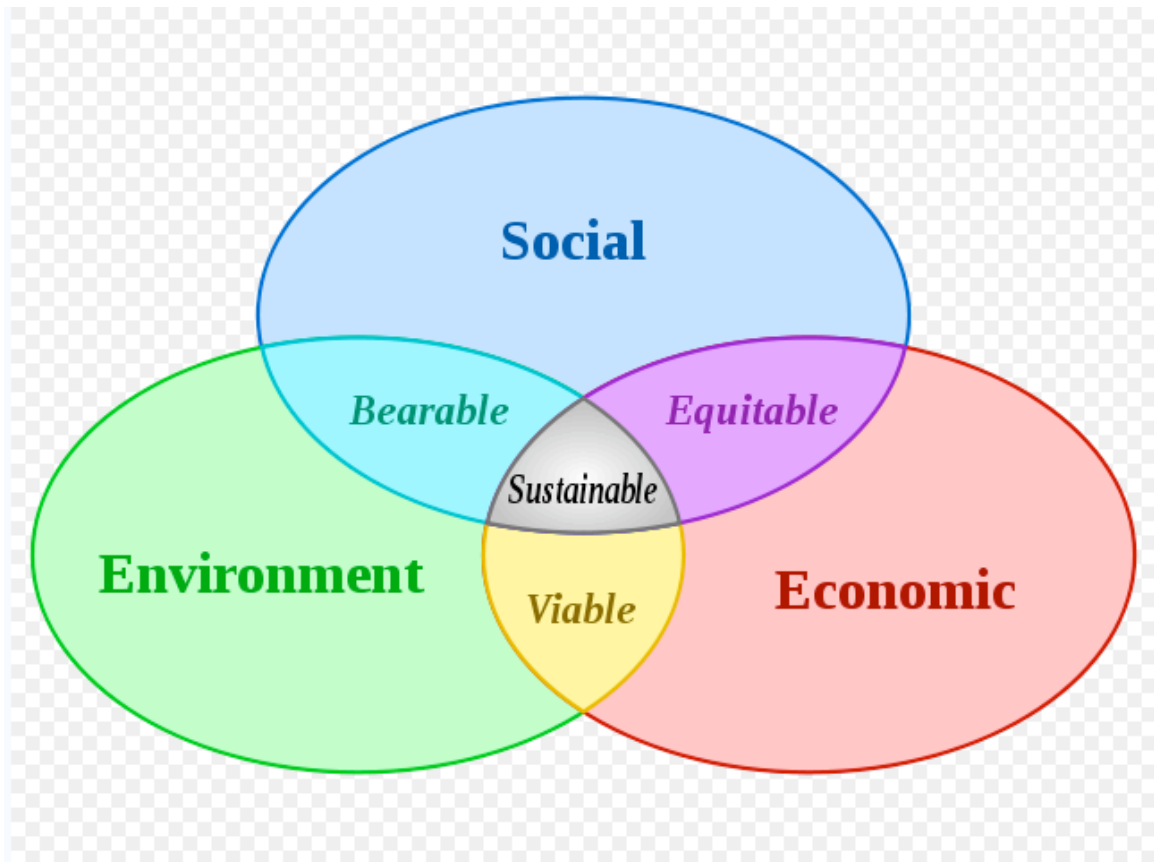
On the other hand, development economics has a more extensive scope. Apart from being concerned with the optimal allocation of scarce resources and with their sustained growth over time, development economics also deals with the economic, social, political, and institutional mechanisms necessary to bring about rapid and large-scale improvements for developing countries (Todaro and Smith 2009). In this context, market imperfections are the rule rather than the exception, and limited consumer rationality is taken as a given, while disequilibria often prevail in the economy.

Formal economic thinking remains essentially confined to static equilibrium, instead of examining the dynamics of the economy (Niehans 1990). The historical perspective and the empirical observations of the first classic economists (Smith, Ricardo, and Marx among others) led to some key intuitions about the growth process but not to coherent theories of economic growth (Niehans 1990). However, this was something which was destined to change in the era of model building, through the contributions of a series of scholars who dramatically shifted the way their contemporaries ended up viewing the process of economic growth.

1.2 The Meaning of Sustainable Development: Economic Welfare, Employment and Environment

The above discussion exemplifies the differences between a paradigm rooted on neoclassical economic growth metrics and a more comprehensive development framework, which focuses not only on economic efficiency, but also equity, quality of life and environmental quality.

During the last decades and especially the last years, there has been a significant increase in interest and important political/legal developments in the advancement of a new notion, that of “sustainable development”. The term sustainable development has been widely used to describe an alternative path of socioeconomic advancement. However, the many different definitions of sustainable development have been proposed, and many people end up using the same term to refer to different notions and policies. Different interpretations include those of “environmentally-friendly” growth, growth with less macroeconomic fluctuations, equitable development etc. The most widely used definition of sustainable development, according to the United Nations (1987), is that of a development paradigm “that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Smith and Rees 1998). This definition, however, is too broad for policy purposes.

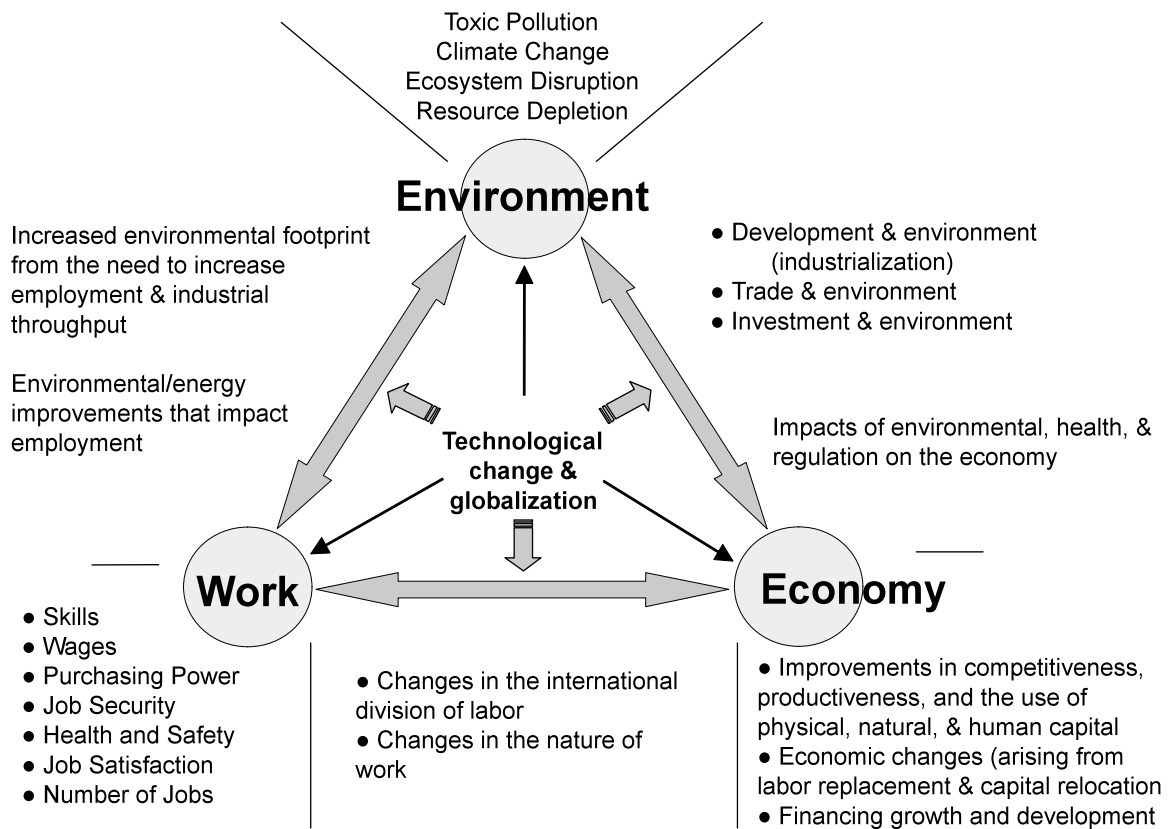


Source: (UCN 2006)

Figure 1.1: Prevalent Scheme of Sustainable Development

While the ‘sustainability sphere is often defined as the economy, the environment, and society (Figure 1.1), Ashford and Hall (2010) propose a different scheme (Figure 1.2), arguing that considerations of social impact and equity occur in each corner of the triangle. Thus, “social” is replaced with employment since technological change and globalization have direct implications on employment in both developed and developing nations, and labor market policies share importance with government policies focusing on improving economic competitiveness and environmental quality¹. In addition, if we are to meet the basic human needs for food, clothing, shelter, etc., the only practical way to do this is to satisfy the basic need for a sustainable livelihood by creating employment opportunities with adequate purchasing power (Ashford and Hall 2010).

¹ Most governments, for instance, do not have a Ministry of Social Affairs.



Source: (Ashford and Hall 2010)

Figure 1.2: The Dimensions of Sustainability

It is possible to consider the impact of rapid technological change and globalization on employment through three broad lenses: the international division of labor, the creation of purchasing power, and technology-enabled capital mobility. While it is recognized that technological innovations in products, industrial processes, and services can enhance our quality of life, these innovations can also bring with them social and environmental consequences.

Hence, a sustainable society could be characterized by at least the following (Ashford and Hall 2010):

- *Economy* – The economy provides goods and services adequate to satisfy the basic material needs of all members of society and provides abundant and equitable opportunities for the realization of human potential;
- *Work* – Livelihoods that are secure and available, which provide equitable reward for labor, permit the maintenance of a decent standard of living, and are conducted in a safe working environment; and
- *Environment* – Long-run flows of environmental services are maintained at a level sufficient to maintain a stable ecosystem and to support human health and welfare.

In order to move towards these goals on a worldwide basis, sustainability policy must be made in a dynamic environment in which economic linkages between nations are increasingly deep and pervasive, and changes in technology and these economic linkages are becoming more rapid and interconnected, respectively.

In general, sustainable development defies a simplistic definition, but rather constitutes a multidimensional concept characterizing development that seeks to (Ashford and Hall 2010):

- meet needs and avoid adverse effects of industrialization within and among nations and on subsequent generations
- provide an adequate and fair distribution of essential goods & services
- provide for good health, safety and an environment without environmental injustices
- provide for fair working conditions/occupational health & safety
- provide for fair and meaningful employment
- provide for adequate and fair purchasing power
- meet and expand the potential for a nation's self reliance, capacity for innovation, and participation in the global economy
- engage individuals in the society to realize their human potential

1.3 Growth in the Context of Globalization²

Overall, the international economy appears to be composed of the following five *highly interrelated* aspects:

- **trade in goods and services³**
- **international distribution of production⁴** (more commonly called the international division of labor)
- **flows of capital across national borders**
- **flows of information and knowledge**
- **flows of labor across national borders**

The inter-relatedness of the first three features of the international economy is quickly apparent: trade in goods and services reflects the geographic distribution of the production/generation of services – inputs must go to production/service centers; products/services (which may be used as inputs in turn) go to consumption centers/consumers. Capital flows, in part, as a consequence of production/service system investments, and, in part, as speculation on the future value of produced goods and services, and currencies.

² Drawn heavily from Ashford and Hall (2010).

³ As explored later in this section, this kind of industrial globalization is known as *internationalization*.

⁴ As explored later in this section, the location of production/assembly/service operations outside the parent country is a kind of industrial globalization known as *multi-nationalization*.

In the age of the so-called “knowledge-based” economy and information systems using sophisticated Information and Communication Technology (ICT), information/knowledge transfer is crucial not only for optimizing industrial activity, but also for the transfer of financial information and assets.

Labor mobility has two important, but different dimensions: (1) the flow of intellectual capital (~ the ‘brain drain’) to places where it is most highly valued and (2) labor migration to areas with shortages of people to perform physical or so-called ‘low-skilled’ work.

Not all aspects of globalization are seen to be positive. Stiglitz (2002, p. 248) notes:

Globalization has helped hundreds of millions of people attain higher standards of living, beyond what they, or most economists, thought imaginable but a short while ago. ... But for millions of people globalization has not worked. Many have actually been made worse off, as they have seen their jobs destroyed and their lives become more insecure. They have felt increasingly powerless against forces beyond their control. They have seen their democracies undermined, their cultures eroded.

Soros (1997, p. 45) as early as 1997, cautioned:

Although I have made a fortune in the financial markets, I now fear that the untrammelled intensification of laissez-faire capitalism and the spread of market values into all areas of life is endangering our open and democratic society. The main enemy of the open society, I believe, is no longer the communist but the capitalist threat.

When Nobel Prize economist Joseph Stiglitz (2002) and the legendary investor Gorge Soros (1997; 2002) expressed such concerns about economic globalization it sent a strong message that the current trajectory of economic development is flawed. Six years later in 2008, we saw the beginning of the worst world economic crisis since the 1930s.

In contrast to the early international debates around environment and development – which focused mainly on national issues – today’s discourse places sustainable development within the much broader concept of globalization. Indeed, globalization is described as adding a ‘new dimension’ to sustainable development in the Johannesburg Declaration.

Globalization can be conceived as a process by which the world is becoming more interconnected, both in economic relations – encompassing trade, investment, finance, and the organization of global production systems – and in social and political interactions among organizations, communities, and individuals across the world (WCSDG 2004).

There is no universally agreed upon definition for globalization and the concept is still being formulated (Held and McGrew 2002; Saha 2002).⁵ Thus, the discourse on globalization can be described as representing an area for discussion rather than an established mode of thought. Three main theories are often used to frame the process of globalization: [1] the World-System Theory (the spread of the capitalist system across the globe); [2] the World Polity Theory (the theory that “*a rationalized world institutional and cultural order has crystallized that consists of universally applicable models that shape states, organizations, and individual identities*”); and [3] the World Culture Theory (the formation of a ‘world consciousness’ that gives meaning to living in the world as a single place).⁶

An important element of the globalization discourse is its links to discussions on the “*nature and existence of the nation state, economically, politically and culturally*” (Voisey and O’Riordan 2001, p. 34). Since the ‘nation state’ has a *responsibility* to move towards the objectives of sustainable development (see the Stockholm, Rio, and Johannesburg Declarations and Agenda 21), any forces that might influence the effectiveness of government in this task will have important implications for the design of national and/or international strategies to address sustainable development. Hence, it is important to understand how globalization could enhance, undermine, or provide new opportunities for government action.

The OECD (1997, p. 19) viewed globalization “*as a process in which economic markets, technologies, and communication patterns gradually exhibit more ‘global’ characteristics and less ‘national’ or ‘local’ ones.*”⁷ More useful definitions (see the

⁵ For a useful list of definitions of globalization, see Streeten (2001, pp. 167-173). For a review and critique of the globalization scholarship see Marshall (1996). Marshall analyses the *ideological* content of globalization commentary and rhetoric and provides a useful counterpoint to the proponents of globalization.

⁶ Source: Emory University, The Globalization Website, *Globalization Theories*, <http://www.emory.edu/SOC/globalization/theories.html> (accessed on 04/09/06).

⁷ OECD’s (1997) four ‘effects’ of globalization are:

- **Scale effects:** increased world output, thought to arise from the increase in economic efficiency which results as resources are freed to flow to uses which reflect their greatest marginal contribution [a very neoclassical argument].
- **Structural effects:** shifts in the composition and location of production and consumption activities. Note that following the reasoning above shifts in production are *required* to realize scale effects. In general, “market structures [become] *deeper* (more geographic specialization in production; more contracting-out to independent, but related firms.) and *wider* (more countries participating actively in the global economy.” Further, foreign investment flows become larger, there is “an increase in overseas commercial transactions (especially for primary and intermediate products), and a greater tendency to export final goods. Expansion may also be expected in the number and extend to international co-operative agreements between firms, notably in the fields of R&D, product supply, distribution, and marketing. ...”
- **Technology effects:** promotion of different technology paths, and increases in the rate of technological change. [This is difficult, as technological change is seen both as an *enabler* of globalization – e.g., modern capital markets would be impossible without sophisticated information and communication technology – and as a *consequence* of globalization. (For example, free trade increases direct competition between manufacturing industries in “northern” and “southern economies.” Pressures

example below) characterize globalization as a linked set of trends in the international economy and elaborate on these trends by identifying their approximate cause. Lee (1996, p. 485) comments:

The rapid growth in world trade, foreign direct investment, and cross-border financial flows over the past decade has been the main manifestation of the increasing “globalization” of the world economy. This phenomenon has been driven primarily by a worldwide wave of economic liberalization – the lowering of tariff and non-tariff barriers to international trade, the encouragement of foreign investment, and the deregulation of financial markets. At the same time technological developments have magnified the effects of this liberalization by reducing the costs of transportation and communications, hence expanding the scope and volume of goods and services that are internationally tradable.

In contrast to Lee’s remarks, Judt (2005) argues that globalization is not about trade liberalization or expanding communication networks, but rather “*about the disappearance of boundaries – cultural and economic boundaries, physical boundaries, linguistic boundaries – and the challenge of organizing our world in their absence.*” In addition, the disappearance of boundaries has placed limitations on the ability of national governments to address problems adequately and has enhanced the importance of international law and institutions.

While consensus on a definition of globalization has not yet been reached, there appears to be some agreement on its core drivers (Held and McGrew 2002; Lall 2002; Saha 2002; Stiglitz 2002). These drivers are: [1] the gradual removal of barriers to trade and to the movement of capital, services, knowledge, and (to a lesser extent) people between nations; [2] the rapid reduction in the costs of transportation and communication; and [3] the creation of new institutions to supplement existing ones to formulate and oversee normative rules of engagement (especially for trade, but also increasingly for the environment) at the international level. The first driver highlights an interesting observation. While the mobility of goods, firms, and capital has grown significantly over the past two decades, the ability of people to crisscross national borders has not, which is an important difference to previous episodes of globalization (Bordo et al. 1999; WCSDG 2004).

These drivers have the effect of bringing nations, people, societies, cultures, economies, and markets closer together, affecting them “*in different ways through space and time*” (Voisey and O’Riordan 2001, p. 34). A concise description of the wide range of elements that form the process of globalization is put forward by Held and McGrew (2002, p. 3, emphasis added):

towards continuous innovation as a means of maintaining comparative advantage thus become more intense in the north.)

— **Product effects:** production and consumption of different product mixes; “globalization might lead to more uniform consumer tastes, influenced by transnational mass media and advertising.”

Interestingly, one effect which is not articulated is the effect upon financial systems which are affected by, as well as affect, economic welfare.

Globalization has been variously conceived as **action at a distance** (whereby the actions of social agents in one locale can come to have significant consequences for ‘distant others’); **time-space compression** (referring to the way in which instantaneous electronic communication erodes the constraints of distance and time on social organization and interaction); **accelerating interdependence** (understood as the intensification of enmeshment among national economies and societies such that events in one country impact directly on others); **a shrinking world** (the erosion of borders and geographical barriers to socio-economic activity); and, among other concepts, **global integration**, the **reordering of interregional power relations**, **consciousness of the global condition** and the **intensification of inter-regional interconnectedness**.

Like the sustainable development discourse, the globalization debate is somewhat polarized by those who are skeptical that such a phenomenon exists and those who believe it is an integral and unavoidable aspect of our lives. Held and McGrew (2002) provide a useful summary of the perceptions of those who believe in the existence of the globalization process and those who are skeptical (Table 1.1). It is important to recognize that the perceptions presented do not necessarily represent the views of all skeptics and globalists. By the very nature of the subject, it is highly likely that views on certain issues may begin to diverge *within* the skeptic and globalist camps.

Table 1.1: The Great Globalization Debate

	Skeptics	Globalists
Concepts	Internationalization not globalization Regionalization	One world, shaped by highly extensive, intensive and rapid flows, movements and networks across regions and continents
Power	The nation-state rules Inter-governmentalism	Erosion of state sovereignty, autonomy and legitimacy Decline of nation-state Rise of multilateralism
Culture	Resurgence of nationalism and national identity	Emergence of global popular culture Erosion of fixed political identities Hybridization
Economy	Development of regional blocs Triadization New imperialism	Global informational capitalism The transnational economy A new global division of labour
Inequality	Growing North-South divide Irreconcilable conflicts of interest	Growing inequality within and across societies Erosion of old hierarchies
Order	International society of states Political conflict between states inevitably persists International governance and geopolitics Communitarianism	Multilayered global governance Global civil society Global polity Cosmopolitanism

Source: Held and McGrew (2002, p. 37).

A relatively skeptical view of economic globalization is presented by Hirst and Thompson (2002), who provide a convincing set of evidence to show that:

1. The present highly internationalized economy is not unprecedented. ... In some respects, the current international economy is less open and integrated than the regime that prevailed from 1870 to 1914.
2. Genuinely transnational companies appear to be relatively rare. ...^[8]
3. Capital mobility is not producing a massive shift of investment and employment from the advanced to the developing countries. ...
4. As some of the extreme advocates of globalization recognize, the world economy is far from being genuinely 'global'. Rather trade, investment and financial flows are concentrated in the Triad of Europe, Japan and North America and this dominance seems set to continue.
5. These major economic powers, the G3, thus have the capacity, especially if they coordinate policy, to exert powerful governance pressures over financial markets and other economic tendencies. Global markets are thus by no means beyond regulation and control, even though the current scope and objectives of economic governance are limited by the divergent interests of the great powers and the economic doctrines prevalent among their elites.

Held and McGrew (2002, p. 20) support the notion of the “*triadization of the world economy*,” but argue that economic integration has occurred between the broader group of Europe, Asia-Pacific, and the Americas. This broader grouping incorporates the formation of the APEC, NAFTA, MERCOSUR, and ASEAN multilateral agreements and the recent economic integration of the EU. It also suggests that reducing globalization to a purely economic or technological discourse is misleading since it does not take into account other important forces shaping modern societies.

One additional aspect of globalization that has important challenges for sustainability, and an issue often neglected in discussions focusing on technology and industrialization, is the movement of labor/human resources in response to pressures for immigration and migration..

Globalization connects the world through the transfer and sharing of knowledge/information, financial systems, labor, and the production and consumption of goods and services. The latter is termed industrialization. It is possible to identify three main types of industrial globalization – i.e., *Internationalization*, *Multi-nationalization*, and *Trans-nationalization* (Gordon 1995)⁹ – the first two of which can have a direct impact on environmental degradation.

⁸ A transnational company, or corporation, is “*an economic entity operating in more than one country or a cluster of economic entities operating in two or more countries – whatever their legal form, whether in their home country or country of activity, and whether taken individually or collectively*” (ECOSOC 2003, p. 7)..

⁹ For an insightful (early) discussion of how competition in global industries drives the geographic configuration and coordination activities of firms/industries, see Porter (1986).

Internationalization is the expansion of product/service markets abroad with the locus of production remaining within the parent country. The process of internationalization is primarily facilitated by cheap transportation services, with information and communication technology (ICT) and e-commerce taking a secondary – but nevertheless, increasingly important – role. Technology, or products, that are produced in industrial nations and exported overseas can provide significant benefits to governments, firms, communities, and individuals in the importing nations. However, these technologies and products can also introduce new problems or worsen existing problems in these nations. For example, the sale of pesticides to a nation that previously had never used such chemicals can result in negative environmental and human health impacts. These problems are exacerbated by improper, or uncontrolled, use that can occur as a result of inadequate warnings, training, or monitoring. Of course, the impacts of such products need to be considered against the likely conditions that would exist had they not been introduced.

Multi-nationalization is where a (multi-national) company establishes production/service facilities abroad to be nearer to foreign markets and/or to take advantage of more industry-friendly labor, and environment and tax policies while maintaining research-and-development (R&D) and innovation-centered activities in the parent country. In this situation, the parent company is no longer *sending* products overseas, but is *manufacturing* or *assembling* its products overseas. However, it is important to recognize that very few companies actually operate branches abroad that are a direct extension of the parent company itself. As Clegg (1996, p. 104) comments, “[t]he preponderance of firms work through foreign affiliates incorporated according to local law. The parent firm in the home country will normally own significant equity in the foreign affiliate.” Clegg (1996) argues that the increased turbulence of international business environment combined with cheap and effective communication and transportation services provides the incentive for parent firms to coordinate with foreign affiliates.

In a study of the U.S. manufacturing industry, Whitford (2006) provides a more nuanced description of how firms have outsource their much of their productive capacity to other firms in the U.S. and abroad. He describes that “*most of what matters to manufacturing firms no longer happens under roofs they own or control. This has made the quality of relationships between firms much more important and their structure much more complex. ... How (and where) these large firms choose and direct their armies of suppliers has tremendous consequences for the regional economies in which they are embedded, because firms selling in the more profitable markets where competition depends as much on innovation and quality as it does on price are more likely to use skilled and better-paid workers*” (ibid, p. 3). Whitford (2006) also argues that the structure of manufacturing networks has more to do with how a firm is embedded in a particular historical and institutional context, than with factors such as trade policy or international regulatory arbitrage.

As with internationalization, the process of multi-nationalization has provided significant benefit to societies outside of a multinational enterprise’s (MNE’s) home nation.

However, MNEs are also responsible for some of the world's worst industrial accidents.¹⁰ The more industrial globalization that occurs in this second category, the more concerned we should become since the impacts on other nations can be extensive.¹¹

Benton and Redclift (1994) present another way to consider *multi-nationalization* by discussing how the spatial relocation of the Japanese car manufacturing industry has led to both positive and negative environmental impacts. On the one hand the relocation of car manufacturing plants in other nations is seen to have reduced the environmental pollution problem in Tokyo. On the other hand, the creation of new consumer markets for Japanese cars is seen to have increased the per capita consumption of energy and material at the global level, with a corresponding increase in the amounts of total pollution and waste. Hence, the authors argue that this second type of industrial globalization has the effect of redistributing environmental costs and benefits.

What is evident from these first two types of industrial globalization is that when technology is transferred between nations – primarily by MNEs - both the positive and negative aspects of the technology are transferred with the equipment and products. If the receiving nation's ability to control the new technology or industrial processes is limited, then what might well be an environmentally-sound technology in an industrialized nation can become environmentally destructive if used in an uncontrolled manner.

The third type of industrial globalization, what we will call *trans-nationalization*, is the creation of strategic alliances in which two different foreign enterprises merge/share their R&D and other capabilities to create a new entity or product line, reduce expenditures, and open up new markets (Gordon 1995; Mowery and Rosenberg 1989). A now unsuccessful example of a strategic alliance was the Daimler-Chrysler merger, where different technological and managerial capacities were combined ostensibly to create a whole that was expected to be greater and more efficient than the sum of its parts. This form of industrial globalization is not as common as the first two and is most likely to occur between developed nations as opposed to between developed and developing nations.

1.4 Structure of the Chapters

The motivation of this work stems from a dissatisfaction with the current state of the world and from a desire to identify those policies and strategies that will transform firms,

¹⁰ Ashford and Hall (2010) mention that an example of where a MNE's operation had devastating consequences to society in the recipient nation was the Bhopal incident in India. A leak of deadly intermediate methyl isocyanate at a Union Carbide pesticide plant killed some four thousand people and affected the health of tens of thousands more in the city of Bhopal. While Union Carbide batch processing plants in the U.S. are subject to strict health and safety and environmental controls, the Madhya Pradesh province in India did not have the motivation to deploy a similar monitoring/control regime. Indeed, it has been argued that the health and safety violations at the Bhopal plant were overlooked in the name of industrialization and agricultural self-sufficiency. In this case the problem was not due to the sale of products or equipment, but the transfer of manufacturing capacity – see Lopatin (2004).

¹¹ Note, however, that MNEs have come under greater scrutiny by NGOs and stockholders, and have increasingly responded to these concerns by adopting “at-home practices” abroad.

institutions, governments and societies in a more positive direction. The purpose of this thesis is to examine the international and domestic pillars of the economic and industrial system, in light of their consequences for society and the environment. At the same time, this thesis attempts to assemble the literature on alternative assessments of the economy, society and the environment, while trying to advance the notion of sustainable development, and proposes a series of policies and proposals for such a transition.

While some scholars continue to insist that the concept of sustainability is vague and unwieldy, this thesis seeks to explore multidimensional elements of sustainability with respect to the economy. Furthermore, it seeks to offer an integrative, transdisciplinary approach to policy design for its attainment. Sustainability and the related concepts of development, globalization, and economic and environmental justice are interwoven with technological, social and institutional change, and with trade as drivers of the transformation of industrial and industrializing societies.

The discussion begins by an analysis of the dominant existing models of economic growth (chapter 2) and innovation (chapter 3). Despite the fact that innovation has been considered the engine of economic growth, here it receives a distinct treatment from the literature of economic growth models. This is mainly due to the fact that the various economic growth models have omitted technological change until the recent decades, and the richness of the literature on innovation merits a chapter on its own right. The discussion then advances to the effects of economic growth on sustainability (chapter 4). This includes an analysis of the limits of the GDP growth paradigm, but also of the effects of growth on the developed and the developing world and the interconnection of economic growth and ecological collapse.

The focus of analysis then shifts from the domestic to the international. Trade (chapter 5), the international financial system (chapter 6) are examined both in respect to their primary theories and characteristics, but also in relation to their effects to sustainability. The discussion is then concluded by an examination of the different policy options and analytical tools that could be employed for a transition to sustainability (chapter 7).

Chapter 2: Economic Growth and Prosperity

2.1 Factor Endowments and the Classification of Capital

Economic historians speak in terms of “factor endowments” that nations might possess to explain their economic growth. Early lists included land, material resources, energy, and a physically-strong labor force. When nations were essential agricultural, land was the most highly valued factor – explaining the driving force behind colonialism – and only after the industrial revolution, did material resources, energy, and more skilled labor take on importance.

Advanced nations are often described now as being in the post-industrial era, in which services, rather than manufacturing, become increasingly important and “knowledge-based” work replaces physical work. Today an expanded list of factor endowments might include (Ashford and Hall, 2010):

- Land
- Material Resources (natural and physical capital)
- Energy
- Labor capable of performing physical labor
- Know-how (intellectual human capital)
- [innovation systems]
- Built capital (i.e., infrastructure such as railways, bridges, roads, ports, airports, dams, etc.)
- Information and Communication Technology (ICT)
- (Health and Environment)¹²
- Structural capital (knowledge and productive routines held by organizations)
- Networks and Outsiders (linking organizations, people, and entrepreneurs)
- Social capital (knowledge held by consumers and citizens)

While not listed in order of importance, nor in strictly chronological order in terms of when these factors emerged as important for growth, the list does describe an unfolding of factor endowments and characteristics that more-or-less parallels the phases of successive industrial development that have occurred and are discussed in the next chapter.

2.2 Theories and Perspectives on Economic Growth

The relationship between different factor endowments/types of capital and economic growth has been the subject of volumes of analysis, predictions, and reinterpretations. It is beyond the scope of this work to provide a comprehensive recantation of that

¹² Good human health (both physical and mental) and an unpolluted and preserved environment (what could be called ‘environmental capital’) are increasingly regarded as essential for maintaining the productiveness of human and natural/physical capital even if they are not factors of production *per se*. For this reason we place them in round brackets.

literature. What we do provide is the salient evolution of major thinking that has guided economic and industrial policy from Adam Smith to Ricardo to current innovation-based perspectives, including the so-called ‘knowledge-based’ economy. Below, we borrow heavily from the scholarship of Niehans (1990); Todaro and Smith (2009); Drucker (1994; 1999); and Schumpeter (1939).

2.2.1 Linear Stages of Growth Models: The Harrod-Domar Model

After the end of World War II, the question of economic growth became particularly prevalent, especially in the case of poor or underdeveloped countries. Western economists, however, only had one economic growth paradigm to draw conclusions from – that of the economic development of the western world. Their rationale lay in the fact that all developed western societies were in essence agrarian at some point of their histories, but industrialized through a series of steps or stages. Success in rebuilding Europe through massive financial aid in the Marshall Plan suggested that what was needed to advance the faltering economies of Asia, Africa, and Latin America was an influx of large injections of capital into those economies. Thus, a particular emphasis was placed on accelerated capital accumulation, (Todaro and Smith 2009), which is also known as “capital fundamentalism.”

In the context of this analysis, the mobilization of foreign investment and domestic saving was also deemed necessary for economic growth. The Harrod-Domar model offers a description of the economic mechanism by which increases in saving and investing would lead to accelerated growth.

The Harrod-Domar model, today often cited as the AK model because of the employment of a linear production function with output of the economy (Y) defined as the product of the capital stock (K) times a constant (A), was one of the first models to suggest that the economy could grow in perpetuity (Todaro and Smith 2009).¹³

The main point of the model is that if actual growth is above the warranted (i.e., expected or achievable) growth, the existing production of capital goods is below the required (i.e., demanded) level of capital goods; hence, growth will be stimulated through increases in orders. If growth, on the other hand, appears to be sluggish, the capital stock will appear as underutilized and growth will be further slowed down (Niehans 1990). Hence, the growth path appeared to be on a knife’s edge, with significant centrifugal forces at work.

¹³ The equation $\frac{\Delta Y}{Y} = \frac{s}{Yk}$ is a simplified version of the famous equation in the Harrod-Domar model of economic growth. The equation states that the GDP growth rate ($\Delta Y/Y$) is determined by the net national savings ratio s and the national capital-output ratio k , which in the Harrod-Domar model, is fixed. In fact, equation (1) can be interpreted simply as determining the savings necessary to achieve a certain growth rate depending on the capital/output ratio. One of the fundamental intuitions of the model was that doubling the savings rate would double the rate of economic growth, for a given capital-output ratio. An increase in the propensity to save and in the average productivity of capital appeared to be a sine-qua-non of rapid economic growth (Niehans 1990). For a given k , the corresponding growth rate is the warranted or justified rate of growth.

Furthermore, the stability problem of the model also related to the full employment of labor. For given rates of population growth and technical progress, continued full employment would result in a certain rate of output growth – or a “natural rate.” If the warranted rate appeared to be less than the natural rate, the implication of the model is that there is no reason why the economy should not enjoy boom conditions, which can also be potentially inflationary (Niehans 1990). Nevertheless, if the warranted rate surpasses the natural rate, actual growth must fall short of warranted growth most of the time. The consequence of that is that depressions will be long and considerable while booms ephemeral.

Aside from its potentially inadequate descriptive capacities, the model appeared to have other limitations. Labor force growth and technological progress constitute two other components of economic growth, apart from savings and investment. Labor force growth is omitted from the Harrod-Domar model and labor is assumed to be abundant, an assumption which can be valid in the developing-country context, though not always (Todaro and Smith 2009). Finally, technological progress can be expressed in the context of the Harrod-Domar model as a decrease in the required capital-output ratio for a specific growth rate target. Nevertheless, the fixed capital-output ratio does not allow for the most efficient use of each factor of production. However, this limitation of the Harrod-Domar model was one of the driving forces behind the introduction of Solow’s model, which is examined later.

While the linear stage of growth the model may be incomplete, it could be argued that high domestic savings and/or the injection of foreign capital are necessary, though not sufficient, conditions for economic growth in an under-developed economy.

2.2.2 Structural Change Models

Structural-change models focus on the mechanism by which poor or underdeveloped economies manage to transform their domestic economic structures from agrarian to more modern and industrially diverse manufacturing and service economies (Todaro and Smith 2009). The most well-known and representative example of the structural-change approach is the “two-sector surplus labor” theoretical model of W. Arthur Lewis.

Lewis’ model focused on the structural transformation of a primarily subsistence economy and became the general theory of the development process in surplus-labor developing nations during most of the 1960s and 1970s, while having a lot of adherents still today (Todaro and Smith 2009).

According to Todaro and Smith’s (2009) analysis, “in the Lewis model, the underdeveloped economy consists of two sectors: a traditional, overpopulated rural subsistence sector characterized by zero marginal labor productivity – a situation that permits Lewis to classify this as surplus labor in the sense that it can be withdrawn from the traditional agricultural sector without any loss of output – and a high-productivity modern urban industrial sector into which labor from the subsistence sector is gradually

transferred. The primary focus of the model is on both the process of labor transfer and the growth of output and employment in the modern sector.”

The key point of the model is that the process of self-sustaining growth of the modern sector along with employment expansion will continue until all surplus rural labor is absorbed in the new industrial sector. After that point, additional workers can be withdrawn from the agricultural sector only at the cost of lost food production. The above process shifts the balance of economic activity from traditional rural agriculture to modern industries (Todaro and Smith 2009).

However, even though the Lewis model reflects the historical experience of economic growth in the industrialized nations, a series of concerns have been voiced about the descriptive capacity of the model in the context of contemporary developing countries. Todaro and Smith (2009) focuses on four different points of criticism:

1. The model implicitly assumes that the rate of labor transfer and employment creation in the modern sector is proportional to the rate of modern-sector capital accumulation. However, Todaro and Smith notes that if capitalist profits are reinvested in more sophisticated laborsaving capital equipment rather than just duplicating the existing capital, then, even though output does increase, wages and employment rates remain unchanged, and all of the extra output accrues to capitalists in the form of profits. This is a process that some have described as “antidevelopmental economic growth,” with all of the extra input and output growth distributed to the owners of capital rather than the working classes.
2. The assumption of the Lewis model that surplus labor exists in rural areas while there is full employment in the urban areas is contradicted by the latest research that indicates that there is little surplus labor in rural locations.
3. An additional questionable assumption is linked to the notion of a competitive modern-sector labor market that can guarantee the continued existence of constant real urban wages up to the point where the supply of rural surplus labor is exhausted. Todaro and Smith (2009) notes that up until the 1980s, “a striking feature of urban labor markets and wage determination in almost all developing countries was the tendency for these wages to rise substantially over time (both in real and nominal terms), even in the presence of rising levels of open modern-sector unemployment and low or zero marginal productivity in agriculture.” This was due to a series of institutional factors, such as unionization, civil service wage scales, etc.
4. Finally, Lewis made the assumption of diminishing returns in the modern industrial sector. However, evidence suggests that increasing, rather than diminishing returns prevail in that sector.

Technological displacement (or the tendency of technology transfer to be biased towards labor-saving changes) may offset technology gains that accrue to workers. Finally, this model – as well as others – may not apply uniformly in all developing countries (Rodrik 2007).

2.2.3 The International Dependence Revolution

International-dependence models gained increasing support during the 1970s, as a result of increasing disenchantment with the linear stages of growth and the structural change models (Todaro and Smith 2009). This theory, even though it became less mainstream in the 1980's and 1990's, has resurfaced in various versions in the last decade, and has been adopted by proponents of the anti-globalization movement. The main intuition of these models is that developing countries are “beset by institutional, political and economic rigidities, both domestic and international, and caught up in a dependence and dominance relationship with rich countries” (Todaro and Smith 2009). There are three major streams of thought in the context of the international dependence models:

- The Neocolonial Dependence Model
- The False-Paradigm Model
- The Dualistic-Development Thesis

The neocolonial dependence model is a direct byproduct of Marxist analysis. Its basic thesis is that the existence of underdeveloped countries is a direct consequence of the highly unequal capitalist system. Even though it might not be the case that rich countries intentionally exploit poor and less developed countries, the very structure of the system which is dominated by unequal power relationships between the center and the periphery (the developed and under-developed nations) makes any attempt of poor nations to be self-reliant and independent difficult or even unattainable (Todaro and Smith 2009).

On the other hand, the false-paradigm model does not attribute underdevelopment to the inherent structure of the global economic system, but rather to “faulty and inappropriate advice provided by well-meaning but often uninformed, biased and ethnocentric international expert advisers from developed-country assistance agencies and multinational donor organizations” (Todaro and Smith 2009). These experts are considered to offer complex and theoretically sound, but often faulty and misleading models of development that often lead to inappropriate or incorrect policy approaches.

Central to the understanding of the dualistic-development thesis is the notion of dualism. Dualism is “a concept widely discussed in development economics. It represents the existence and persistence of substantial and even increasing divergence between rich and poor nations and rich and poor people” (Todaro and Smith 2009). This notion underlines that different sets of conditions – some superior and some inferior – can coexist in a given space. Wealthy, educated elites, for instance, can coexist with poor, uneducated masses. According to the dualistic-development thesis, this coexistence is not a mere systemic transition but it is actually chronic and hardwired in underdeveloped societies.

In developed nations, the growth of an ‘underclass’ parallels this dualism, with one part of a nation’s economy linking producers, workers, and consumers (even across borders), and another part of the nation’s economy comprised of low-wage workers or the unemployed, possibly but not necessarily subsidized by welfare programs of the state.

2.2.4 Neoclassical Growth Theory: The Solow Model

The Solow Neoclassical growth model, for which Robert Solow received the Nobel Prize, encapsulates the main features of the neoclassical growth theory and is probably the most famous model of economic growth to-date.¹⁴ Solow's basic innovation was to construct his model of production in a different way to that of the Harrod-Domar model, which did not allow for the substitution of labor for capital in production. The labor/capital ratio was fixed in the Harrod-Domar model, and steady growth occurred only under certain specific conditions. Solow substituted the fixed labor/capital ratio with a production function in which both capital and labor could vary. This had significant advantages. First, it allowed the producer to switch from capital to labor when capital became too expensive and vice versa (Warsh 2006). Furthermore, the model also allowed for an exogenous parameter which described the rate of technical change. Because the rate of technological progress is given exogenously, the Solow neoclassical model is sometimes called an exogenous growth model. Thus, the model has no explanatory power with respect to the source of technical change.

The key implication of the Solow model is that unlike the Harrod-Domar model, an increase in savings in the Solow model will not by itself increase growth in the long run. In fact, according to the model, growth depends only on population and technology. An increase as a result of increased savings will occur, but it will only be temporary, and the economy will eventually return to the level of steady state growth. An increase in savings, on the other hand, will only increase the equilibrium level of capital (Todaro and Smith 2009). However, Mankiw et al. (1992), from analyzing cross-national data, note that it appears that if the rate of savings is increased, then the economy may not return even half-way to its former lower steady state for decades. Furthermore, even though the model predicts that an increase in savings does not change the equilibrium rate of growth, it does increase the equilibrium output per person. Hence, from an empirical standpoint, even if the Solow model does depict the economy accurately. Mankiw et al. (1992) argue that an increase in the savings rate can boost the rate of economic growth for decades. This expectation, however, remains controversial for some – see Todaro and Smith (2009).

Another key point in Solow's analysis was the estimated contribution of technical change to the rate of US GDP growth over the period 1909-1949. Through the use of a modified

¹⁴ The equation $\Delta k = sf(k) - (\delta+n)k$ is the fundamental equation of the Solow model. The intuition behind this equation is that the change in the capital-labor ratio k (or growth in capital intensity in the course of time) depends on aggregate savings $sf(k)$ (savings rate s times $f(k)$ which is the output of the economy) after allowing for the amount of capital required to service depreciation, δk , and after providing the existing amount of capital per worker to new workers joining the labor force, nk (Todaro and Smith 2009). If $sf(k^*) = (\delta+n)k^*$ then the capital intensity remains unchanged and the economy grows without any change in its structure. This, according to the model, is the path of balanced growth (Niehans 1990).

The notation k^* denotes the level of capital per worker when the economy is in steady state. Solow deemed this equilibrium level of capital to be stable. If $k < k^*$ then $(n+\delta)k < sf(k)$. But from equation (2) we see that when $(n+\delta)k < sf(k)$ then $Dk > 0$. As a result, k in the economy will grow towards the equilibrium level k^* (Todaro and Smith 2009). Similar reasoning applies when $k > k^*$.

production function $Y=f(K,L,t)$, where K = capital, L = labor, and t represents technical change over time, Solow found that technical change accounted for approximately 50% of the increase in output per capital, which corresponded to a contribution to GNP growth of the non-farm sector of about 1.5% a year (Todaro and Smith 2009). Solow's finding underlined the importance and provided a means of including technical change explicitly (even though only as a residual) in the mathematical modeling of economic growth.

2.2.5 New Growth Theory: Romer's Model

The New or Endogenous Growth Theory was developed during the late 1980s by Paul Romer, but many of its basic elements and intuitions were already present in the work of Joseph Schumpeter. The motivation behind the introduction of this new theory originated from the limitations of the neoclassical theories in illuminating the sources of long-term economic growth (Todaro and Smith 2009). In these models, technological change is treated as mostly exogenous. In contrast, Romer's (1990) model treats technical change as endogenous.

Endogenous growth simply means technological change generated from within a system, versus technological change that was treated as a "black box" in the case of exogenous growth models. In the 1990s, output was much higher than what it was in the 1890s. Economics needed some economic theory to account for that level of growth. In 1990, output per hour worked in the US was calculated as 10 times as valuable as output per hour worked 100 years before (Romer 1990). Technological progress provided a good quality explanation for that level of growth, along with the growth in human capital, or the development of an effective labor force.

Romer's (1986) and (1990) papers, which some regard as the centerpieces of the new growth theory, emanated from a main contradiction laying at the heart of economic theory since Adam Smith's "Wealth of Nations" was released in 1776 (See Box 2.1). As described earlier, Smith's central point lay in the increases in productivity that could be achieved through both competition among economic actors and through the division of labor, which was illustrated by the now famous example of the pin factory. The pin factory involves a factory whose employees, by focusing on narrow tasks, end up producing more output than what they could if each worked independently. This point, however, hid a contradiction. The example of the pin factory describes the reality of an increasing return to scale: more workers produce a bigger factory and consequently more pins. Moreover, increasing returns to scale are associated with the emergence of natural monopolies, because larger business can achieve lower costs through the advantages of scale. This is the opposite of Adam Smith's description of the "invisible hand" which requires a large number of competitors and the absence of monopoly power. In the theory of perfect competition, the idea that free markets operate smoothly and optimally largely depends on the assumption of diminishing returns to scale. Even if the emergence of a natural monopoly were possible, scale advantages of a natural monopoly could be offset by greater incentives for profit-seeking competitors who try harder, assuming there are low barriers to entry. Also, neoclassical economics predicts that competitive prices are generally lower and output greater than under monopoly conditions. The most important

fact assumed by the new endogenous growth theory is the expectation of increasing returns on capital because of technological change (Warsh 2006).

This model fills the gap unexplained by the neoclassical theory that considers technological progress as being independent from decisions of economic agents. Neoclassical theory also fails to explain big differences between growth in countries with similar technologies. Furthermore, at the core of endogenous growth theory lies a criticism for globalized trade. In traditional neoclassical models, growth emanates from trade. Neoliberal economists have interpreted the association between higher growth rates and a larger volume of trade as one where causality flows from the second to the first rather than the other way around (Gill and Law 1988). However, as the criticisms made for Ricardo's theory of comparative advantage (see Box 2.2) suggest, an increasing volume of trade does not necessarily lead to sustainable growth. What the endogenous growth theory did was to show how countries can work in the context of a globalizing economy to focus on complementary activities, such as education and retraining, and coherent regulatory frameworks, which can facilitate their economic development.

In his 1986 paper, "Increasing Returns and Long-Run Growth," Paul Romer essentially set the foundations for the endogenous growth theory. In that paper, he proposed a model where economic growth is driven by the accumulation of knowledge, which is the really important form of capital (Romer 1990). Romer essentially tried to discard the neoclassical hypothesis of diminishing marginal returns in capital investments, permitting for increasing returns in aggregate production and focusing on the role of externalities (specifically knowledge spillover effects) in determining the rate of return on capital investments (Todaro and Smith 2009). According to Romer, investment in knowledge leads to *increasing* returns in marginal products, since technological innovation can lead to the deployment of new technologies, which can reduce the cost of production and put one company ahead of its competition. Romer's last point in his 1986 paper was that knowledge has what he described as a "natural externality," since it cannot be perfectly patented or kept secret. Hence, new knowledge has a spillover on the production possibilities of other firms as well.

In his 1990 paper, "Endogenous Technological Change," Romer set out the preconditions for the deployment of endogenous growth. His model has four basic inputs: capital, labor, human capital (education, training) and an index of the level of technology. Romer's key intuition is that the most important precondition of growth lies not in the population dynamics but in the human capital dynamics. Hence, it is investments in new research, education and human capital rather than investments in physical capital accumulation that should be fostered.

In general, the endogenous growth theory, by focusing on knowledge and externalities, provides a way for countries to enter the new knowledge economy by making the best use out of their available resources. The main weakness of this model, however, is that it overlooks inefficiencies that arise in developing countries (poor infrastructure, poor capital and goods markets) that can significantly affect one country's growth prospects.

BOX 2.1: ADAM SMITH (1723-1790)

Adam Smith is regarded as the patriarch of classical economic growth theory. In his magnum opus, “An Inquiry into the Nature and Causes of the Wealth of Nations,” which is considered the founding document of the science of economics, Smith linked the division of labor and the pursuit of self-interest to the general welfare of society and outlined the guiding behind the allocation of resources in a growing economy.

Perhaps the most famous phrase emerging from his work the “Wealth of Nations” is Smith’s “Invisible Hand,” a term that describes a process that advances the interests of a society through the individual’s search of self-interest and self-advantage. Thus, what Smith essentially argued was that greed will drive actors to socially beneficial behavior. This is nothing different than the process of “competition,” working though the interdependent system of prices and quantities that is known today as the price system.

Smith’s central message with respect to growth was that the division of labor increases labor productivity. In his analysis, Smith used the examples of workers in several different disciplines to make the case that, under an optimal division of labor, they would end up producing more output than what they would produce if they worked independently to satisfy their various needs. In Smith’s view, this was the locomotive behind increasing productivity and improving standards of living.

At its core, Smith’s growth model is an optimistic one. In Smith’s viewpoint, an increased division of labor will lead to increases in productivity, incomes and consequent increases in demand which will increase the size of markets and, through this virtuous spiral, cause further increases in the division of labor, productivity etc. However, this process was neither automatic, nor inevitable. “Good government” was necessary in order to maintain a competitive environment and avoid the emergence of monopolies, that would restrict output in order to increase prices and, consequently, their profits. Even though the role of the government was not needed for the functioning of the market for Smith, except to maintain a competitive economy and avoid monopoly, it played a central role in other areas such as defense, administration of justice and the consolidation of public institutions. He also made a forceful case for the mutual benefits of free trade among nations introducing the principle of comparative advantage. For him, it was better to buy a cheaper commodity from another country and pay for it with the resources obtained from a local industry with some advantage in comparison to other countries. The concept of comparative advantage was, however, later further developed by David Ricardo.

BOX 2.2: DAVID RICARDO (1772-1823)

Ricardo's most famous contribution to economics lies in the 'theory of comparative advantage.'* Ricardo's theory argues that a nation is economically best off for doing whatever it is best at, even if others are better at it (We 1994). According to that perspective, when countries specialize in the production of those goods for which they have a comparative advantage, and trade ensues, there is an absolute gain in welfare for both economies (Gill and Law 1988).

This theory, however, appears to have significant limitations. In globalization, foreign direct investment is the rule, rather than the exception. Hence, the export sector of one nation can be owned by capitalists from another, and nothing prevents these foreign owners from repatriating most of their profits (Gill and Law 1988). This was exactly the case for countries like India, most of whose resources were depleted by England. In general, relying on trade for economic growth can be problematic, especially in the case of developing countries. This does not mean that growth cannot be achieved in that scenario. However it can only be achieved at the cost of escalating international, North-South and internal inequalities, along with increasing dependence on transnational firms (Gill and Law 1988).

Unlike Smith, Ricardo did not offer a new model of economic growth. While Smith had tried to explain the growth of wealth, Ricardo deemed the proper task of an economist is to study the distribution of wealth among the three major classes of the society: the workers, the landowners, and the capitalists (Warsh 2006). However, Ricardo did modify Smith's existing model of economic growth to include diminishing returns to land.

According to his analysis, unlike labor, the output of which could be increased through increases in productivity, Ricardo deemed land to be "variable in quality and fixed in supply." Hence, as growth increases, more land is necessary, but land cannot be just created, since it already exists in limited supply. This significantly affects growth. First, the limited supply of land will lead to increases in rents and consequently decrease entrepreneurial profits. Furthermore, the prices of agricultural goods will increase over time and this will lead to workers requiring wage increases. This leads to a quicker barrier to growth than what Smith allowed for, but Ricardo also claimed that this decline can be happily checked by technological improvements in machinery and the specialization brought by trade.

Chapter 3: Innovation & Economic Growth

3.1 Technological Change

For almost three centuries societies have experienced the transformative power of technological innovation. This chapter looks at why technological innovation has been and is such an important driver of economic progress, especially during the last 100 years which has been an era of unprecedented technological change. Technology – defined here as the application of science for the achievement of practical purposes (Dorf 2001) – is considered in the context of society, the economy, employment, the environment, and national governance.

The characteristics and capabilities of modern technology far surpass any forms of technology that supported earlier societies. One major point of distinction between the technologies of the industrial revolution and those used by hunter-and-gatherer and agricultural societies concern the energy sources which technologies depend upon. Modern technology is predominantly dependant on fossil fuels and other sources of nonrenewable energy (oil, coal, gas, and nuclear), whereas the more primitive technologies were powered by the *three Ws* – wind, water, and wood (Wetlesen 1999).¹⁵ In this regard, the first industrial revolution was primarily an *energy* revolution. Perhaps, a future industrial transformation will be characterized by a shift to renewable energy sources away from a reliance on nonrenewable supplies (Jänicke and Jacob 2008).

3.2 The Long Waves¹⁶

The first person to identify the occurrence of major technological transitions during the nineteenth and twentieth century was the Russian economist Nikolai Kondratieff (Kondratieff 1935 [1925]). Kondratieff's notion of a long wave cycle (known as a Kondratieff-wave, or K-wave) was originally used to describe long wave economic cycles, or structural changes in the world economy.¹⁷ By observing the behavior of prices and interest rates in the UK and U.S. between 1789 to 1926, Kondratieff identified long wave cycles of S-shaped growth (i.e., initial slow growth that is followed by a period of rapid growth towards saturation) that occurred over a period of 50-60 years. His ideas were later adopted and further elaborated by the Austrian economist Joseph Schumpeter (1939) who argued that K-waves were caused by the clustering of innovations that led to rapid technology-based economic growth, which either opened up new markets or disrupted existing ones.¹⁸

¹⁵ However, the muscle power of humans and domestic animals also played an important role in helping these societies achieve their objectives (Wetlesen 1999).

¹⁶ Drawn heavily from Ashford and Hall (2010).

¹⁷ Source: Modelski, G., The Evolutionary World of Politics, *Kondratieff Waves*, <http://faculty.washington.edu/modelski/IPEKWAVE.html> (accessed on 11/10/08).

¹⁸ Schumpeter (1934) was the first person to distinguish diffusion from invention and innovation by describing technological innovation as the linear process of *invention-innovation-diffusion*. His theory was that entrepreneurs not only innovate by taking an invention to market, but by creating new manufacturing

Within the modern era of technological development, there have been four distinct 60 to 70-year K-waves (or periods) of technologically-driven economic development (Grubler and Nowotny 1990). Each of these waves can be characterized by growth sectors, emerging technologies, and by new concepts of management and industrial organization (Table 3.1). In each case, the emergence of new technologies resulted in a technological transition that tended to follow a sigmoid curve (S-curve) (Figure 3.1). While the fifth technological cycle of development (1985 - 2050) is still in the process of being defined, the characteristics identified are those emerging in many industrial societies today, with the possible exception of the nuclear sector being a growth sector.¹⁹ A potential growth sector that has been added to Table 3.1 is *NBIC convergence* (i.e., the convergence of nanotechnology, biotechnology, information and communication technology, and cognitive sciences into major new areas of research and development). Important emerging technologies that have been added to the list in Table 3.1 are nanotechnology and ubiquitous computing (i.e., computers/technologies that are embedded and networked into all aspects of our lives to such an extent that we are not fully aware of their existence or simply take them for granted)²⁰.

Perhaps what is the most striking about the waves of economic development (represented by the pace of innovation) is how the scientific and technological breakthroughs that fueled them have also shaped the modern era by improving public health and changing the fabric of modern society (Langford 2004). From the steam engine to the combustion engine and from the telegraph to satellite and laser communications, each transition has provided new opportunities to improve our quality of life. These transitions in technology have been paralleled by major scientific advances in areas such as medicine and genetic engineering, which have improved the health of those societies with access to the new medicines or knowledge.

processes (e.g., Eli Whitney's 'American System' of manufacture of interchangeable parts), identifying products for new consumer markets, and developing new forms of industrial organization. However, a limitation of Schumpeter's theories is that he was preoccupied "*with the individual entrepreneur and the individual innovation*" and was reluctant to "*conceptualize invention, innovation, and technology accumulation as a social process*" (Freeman 1990, p. 24). Schumpeter (1934, p. 228) explained clustering by stating that "*the appearance of one or a few entrepreneurs facilitates the appearance of others,*" and provided no real explanation for what caused clustering or why Kondratieff's long wave cycles occurred in non-uniform but necessarily periodic intervals (Ruttan 1959). Today, it is widely recognized that the institutional or legislative framework within which businesses operate (what might be called 'institutional capital') play an influential role in the formation of innovation clusters (Kingston 2004; Freeman 1990).

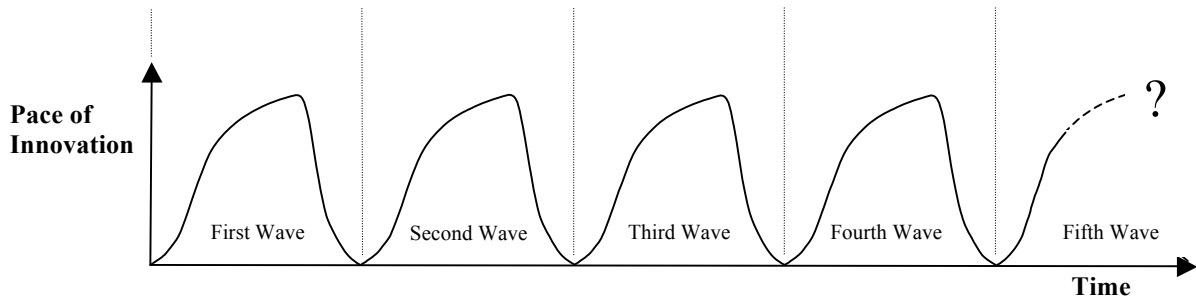
¹⁹ Ashford and Hall (2010) state that public unease with the safety of nuclear technology, nuclear proliferation, long-term waste management requirements, and life cycle costs are four important factors limiting the growth of the nuclear sector. However, if a greater emphasis is placed on electricity production that does not produce CO₂ and the four factors above are adequately addressed, the nuclear sector might experience a resurgence (Deutch et al. 2003; Nuttall 2004). However, nuclear power is likely to remain a highly controversial energy option.

²⁰ This is an approach adopted by Ashford and Hall (2010).

Table 3.1: Characteristics of Major Technological Complexes

	1770-1830	1820-1890	1880-1945	1935-1995	1985-2050
Growth sectors	Water power Ships Canals	Coal Railroads Steam power Mechanical equipment	Cars Trucks Trolleys Chemical industry Metallurgical processes	Electric power Oil Airplanes Radio and TV Instruments and controls	Gas Nuclear Information Telecommunications Satellite and laser communications [NBIC]
Emerging technologies	Mechanical equipment Coal Stationary power	Electricity Internal combustion Telegraph Steam shipping	Electronics Jet engines Air transport	Nuclear Computers Gas Telecommunications	Biotechnology Artificial intelligence Space communication and transport [Nanotechnology Ubiquitous computing]
Management		Economy of scale Interchangeable parts	Administrative management	Professional management	Participatory and interconnected systems management
Industrial organization	Concept of the industrial firm Division of labor	Concept of mass production Interchangeable parts	Concept of management structure and delegation	Concept of decentralization	Concept of systems structure

Source: Grubler and Nowotny (1990), from NRC (2002, p. 73).



Source: Ashford and Hall (2010)

Figure 3.1: Stylized Graph of Schumpeter's Waves of Technology-based Economic Development

With each transition, the complexity of new technological systems is increasing, placing greater demands on our ability to understand how these new systems interact and behave. The task of defining and understanding the dynamic and evolving nature of technological systems will be a major undertaking of the 21st century. One might argue that our inability to understand or predict, and then counteract or respond to the behavior of these systems is the main reason why there exists so much concern about the future prospects of developed societies.²¹ We need not look far to see the numerous events that have devastated communities and the natural world as a result of technological and scientific advances.²²

²¹ See the discussion in the next section of the Information Revolution raising the question of whether its advances can be measured by the metrics developed for the first and second industrial revolutions.

²² Ashford and Hall (2010) note a few salient examples which include the 1969 oil spills on the Cuyahoga River in Ohio and off the coast of Santa Barbara, U.S.; the 1979 Three Mile Island nuclear accident in

At the turn of the millennium, the National Academy of Engineering (NAE) undertook a study to identify the twenty greatest engineering achievements of the twentieth century (Table 3.2).²³ A look at how these achievements (shown below) relate to Table 3.1 is instructive. For example, several of the achievements identified by the Academy have been *emerging technologies* during one wave of economic development that later became one of several technologies supporting *growth sectors*. The internal combustion engine (ICE) and electronics were emerging technologies during the second (1820-1890) and third (1880-1945) waves of economic development, respectively. Both technologies subsequently supported the growth sectors in the following waves of economic development. The ICE played a critical role in the car and truck growth sectors (1880-1945) and electronics (transistors in particular) were crucial in the development of radio and TV (1935-1995). The chemical industry was part of the third wave and could almost be considered a revolution of its own. The first and second wave, and the third and fourth wave, are often known as the first and second industrial revolution, respectively (Hagemann 2008).

These trends provide an indication of how individual technologies can follow an S-shaped curve of growth. Their rate of growth is slow during the emergent state, but rapid when part of a growth sector. Once market saturation occurs the pace of innovation (and economic growth) falls as new growth sectors begin to emerge.

Table 3.2: The NAE’s Twenty Greatest Engineering Achievements of the 20th Century

1. Electrification	11. Highways
2. Automobile	12. Spacecraft
3. Airplane	13. Internet
4. Water Supply and Distribution	14. Imaging
5. Electronics	15. Household Appliances
6. Radio and Television	16. Health Technologies
7. Agricultural Mechanization	17. Petroleum and Petrochemical Technologies
8. Computers	18. Laser and Fiber Optics
9. Telephone	19. Nuclear Technologies
10. Air Conditioning and Refrigeration	20. High-performance Materials

It is hard to imagine what the modern world would be like without the above list of technologies. For example, in industrialized nations the computer has infiltrated almost all aspects of contemporary life. Even those members of society who do not directly use

Pennsylvania, U.S.; the 1984 Bhopal incident where a leak of deadly methyl isocyanate at a Union Carbide pesticide plant in Bhopal, India killed some 3,800 people; the 1986 nuclear reactor meltdown at Chernobyl power station which released radioactive material throughout the Northern Hemisphere; and the 1989 Exxon Valdez oil spill which released 11 million gallons of oil into Alaska’s Prince William sound. While preventing such disasters is a primary objective of systems engineering, some argue that no matter how many warnings and safeguards are designed into our modern large scale technological systems (such as a nuclear power or petrochemical plant), growing systems complexity means that failures are inevitable (Perrow 1999). Ashford and Hall (2010) also note that what is missing from the above list are incidents that occurred through the intentional use of nuclear, chemical, biological, and conventional weapons.

²³ Source: National Academy of Engineering, *The Greatest Engineering Achievements of the 20th Century*, <http://www.greatachievements.org/greatachievements/index.html> (accessed on 04/08/06).

computers are required to interact with them indirectly (Marx and Smith 1994). Supermarkets, banks, libraries, schools, hospitals, trains, buses, automobiles, and airlines all rely on or use computers. Hence, individuals are required to interact with computers on a daily basis whether they are aware of it or not.

Implicit in the above discussion is the idea that technology has played, and will continue to play, an influential role in shaping modern industrial societies. This idea of *technological determinism* - a *technology-led* theory of social change - can be traced back to the early stages of the industrial revolution.

Largely due to the early technocratic views of America's forefathers, who believed that economic and political independence could be achieved by developing machine-based manufacturing, and big business advertising, the American technological culture was firmly established by the mid twentieth century (Pursell 1996; Smith 1994). Tables 3.3 and 3.4 provide some evidence of the emergence of this culture by highlighting the rates of adoption and ownership levels of several major technologies in the U.S.

Table 3.3: Speed of Adoption of Technology in the U.S.

Technology	Year Invented	Years until 25% of the U.S. population adopted it
Electricity	1873	46
Telephone	1875	35
Auto	1885	55
Television	1925	26
Microwave oven	1953	30
Personal computer	1975	15
Cellular phone	1983	13

Source: Dorf (2001, p. 72).

Table 3.4: Percent of U.S. Households with the Technology in 1999

Television	98%
Cordless phone	72%
Personal computer	46%

Source: Dorf (2001, p. 72).

3.3 The Information or Post-Industrial Revolution

It is now apparent, at the turn of the 21st Century, that developed economies are transitioning towards a post-industrial, or information-based, society (Castells 1999). Bell (1999) describes a post-industrial society as one which relies on the economics of information (or intellectual capital) as opposed to the economics of goods (from manufacturing) or reliance on the services sector of production versus the manufacturing sector of production. Where the steam engine was argued to be the catalyst for the industrial revolution, global information technology is argued to be the catalyst for the information revolution. Therefore, the signs of an emerging post-industrial society are a

growing services sector and an increasing reliance on information technology. However, the post-industrial society will not displace the older one; instead it will overlay some of the previous layers in a similar way that the industrial society did not eliminate the agricultural sectors of society (Bell 1999). People will still rely on agriculture and manufacturing to survive. The development of new technological forms for the post-industrial society will need to respond to this new era of human development, where information and products and services become intertwined.

In the insightful article *The Age of Social Transformations*, Drucker (1994) charts the major changes that have occurred in the structure of society from the early agricultural to the new knowledge-based societies. In particular, he describes how two technology-based shifts in the nature of employment have occurred.

It is evident that before War World I, the single largest group in every country was comprised of traditional farmers, followed in developed nations by live-in domestic servants (Drucker 1994, p. 54). By the 1950s, the industrial revolution - triggered by emerging technologies such as the steam engine - had gathered full momentum and industrial workers now formed the single largest group in developed nations (ibid, p. 56). The core tasks of these workers were manufacturing and serving the products of manufacturing (such as car and appliance repair). However, around the turn of the millennium, the traditional industrial worker was being replaced by the technologist - "*someone who works both with hands and with theoretical knowledge*" (ibid, p. 56). Good examples of technologists are dentists and computer and x-ray technicians. More generally, Drucker (ibid, p. 62) refers to the newly emerging dominant group as "*knowledge workers.*" He argues that although the foundation of the knowledge worker is a formal education, this is only the beginning. If the new comparative advantage lies in the application of knowledge, this means that the knowledge worker must be able to learn continuously to bring value to his/her firm or business (ibid, pp. 62-63). Modern day knowledge-based workers form what is now termed the *service industry*, which includes health care services (such as dentistry and medicine), knowledge-based services (such as banking, information management, etc.), and food and retail services. However, it should be recognized that the first two job categories are likely to require higher levels of educational achievement than the two categories.

Drucker (1994) argues that the problem with this latest transition is that displaced industrial workers cannot simply move into knowledge-based or service employment since they lack the education necessary to do such a task. Hence, if industrial workers are to succeed in knowledge-based employment, they must "*change their basic attitudes, values, and beliefs*" (ibid, p. 62). It also means that good education becomes paramount.

What Drucker fails to acknowledge, though, is that displaced industrial workers may have no choice but to accept low-wage employment in the service sector. While working in a fast food establishment, for instance, will bring in a certain income, it is debatable whether such employment is fulfilling to the worker given his training and preferences. Hence, the future does not look particularly promising for those industrial workers caught in the transition between the industrial and the service economy.

Productivity growth in the US in the second half of the 1990s had been attributed to the information revolution and Europe adopted its famous “Lisbon Strategy” in 2000 to emulate the ICT-driven knowledge-based economy as explaining the apparent cause of the US economic success (Hagemann 2008).

There have been many disappointments associated with the performance of the Information Revolution. The tech bubble burst in 2001 and the ICT productivity “miracle” may have imploded at the same time. As early as 1987, Solow famously said, “you can see the computer age everywhere, but in the productivity statistics” giving rise to the productivity or Solow Paradox. In 1997 in the Financial Times, Stephen Roach, chief economist for Morgan Stanley, opined: “[t]he productivity gains of the Information Age are just a myth” (Griffith 1997). Acknowledging the greater productivity growth in the U.S. compared to Europe, Roach attributes greater output to longer working hours in the U.S.

Lynch (2008) argues that investments in human capital, information technology, R&D, and physical capital appear to be complementary with investments in organizational innovation. She observes “even after accounting for capital deepening, total productivity growth has been a very important determinant of the growth of average labor productivity.” Citing her earlier work (Black and Lynch 2004; 2005), she repeats her argument that during the 1990s changes in organizational innovation may have accounted for as much as 30 percent of output growth in U.S. manufacturing.

In examining the relationship between ICT and trends in labor productivity and employment in the 1990s in Europe and the US, van Ark et al. (2003, p. 86) found:

“The inverse relationship between employment and productivity growth has been much more prominent in manufacturing industries than in service industries. Secondly, during the 1990’s, the relationship has turned positive in many industries, in particular ICT-using industries in the service sector. Finally, the employment-reducing effects of productivity growth have remained considerably stronger in Europe than in the US.”

Commenting on the sources of economic growth in the 90’s, in 2003 the OECD nonetheless voiced optimism about the New Economy, saying “the use of ICT may be increasing the efficiency of innovation, further contributing to long-term growth potential” (OECD 2003, p. 14).

ICT is identified as a general purpose technology (GPT) which may take a long time to become manifest in macro-economic growth and productivity data. Alan Greenspan’s characterization of the large price-to-earnings ratio in the late 1990s as “irrational exuberance” following Robert J. Shiller’s analysis in his *Homonymous Book*, published at

the end of the 1999 just before the 2000 stock market crash,²⁴ represented further doubt about ICT as a source of significant economic growth, as did a failure to find rises in multifactor productivity (MFP) that varied across countries and could have been attributed to increases in R&D and organizational innovations, rather than directly to ICT (Hagemann 2008).

Hagemann (2008, p. 61) offers three possible explanations for the Solow Paradox:

1. some of the benefits of ICT may not be picked up by the productivity statistics, such as improvements in the quality and diversity of services;
2. the benefits of ICT such as organizational change and the upskilling of workers, may be slow to emerge; and
3. creation and expansion of networks takes time to occur and may not show up in the statistics.

Liagouras (2005) on the other hand, raises more fundamental questions about the usefulness of metrics of progress in ‘post-industrial capitalism’ that had been developed for industrial societies:

“[P]erhaps the most serious difficulty is to find convenient indicators in order to measure what is intangible or invisible. ... [T]his is a more general problem, which concerns not only investment but also all basic concepts, such as product, productivity, growth, etc., which we inherited from the industrial era” (p. 24).

“The essentials of business organization in industrial capitalism can ... be found in the writings of classical economists: the long-term performance of the enterprise is identified with productivity. And productivity is obtained in three correlated ways: the deepening of the (technical) division of labour, the mechanization of the labour process, and economies of scale” (p. 23).

“The notion of productivity no longer makes sense in an economic context where quality and variety take precedence over quantity. Investment in intangible capital (R&D, training, software, and long-term marketing positioning) becomes more important than the mechanization of labour processes. Last, but not least, the secular tendencies towards specialization and de-qualification of labour – and the vertical-horizontal expansion of the firm – are clearly reversed” (p. 23).

In commenting on the currency of the need to resolve the Solow Paradox, Liagouras (2005) asks:

“If the inventions in ICTs and in biotechnologies are so revolutionary as it is said, why after two decades of unprecedented technical progress is this not reflected in output and productivity statistics?” (p. 29).

“The first explanation concerns the incapacity of national account systems, constructed within and for industrial capitalism, to measure the economic performance of post-industrial societies. In industrial societies, the wealth of individuals and nations takes the form of an accumulation of standardized commodity goods. The production of the latter is achieved through the use of other goods like machines and materials. In this schema of ‘production of

²⁴ The 2008 global stock market crash and financial crisis are generally acknowledged to have stemmed from excessive borrowing driven by unjustifiable optimism in continual high growth of both housing and financial markets.

commodities by means of commodities’, even work is reduced to unqualified (simple) labour and then to the goods required for its reproduction. Thus, increases in the wealth of individuals and nations are identified with increases in the quantities of goods that they produce and sell. However, given that the value of the total product also depends on the evolution of prices of different goods, the elaboration of cost-of-living indexes – like the Consumer Price Index (CPI) – permits the isolation of the quantity-effect from the price-effect, and thus the measurement of the real growth of output. Still, the above framework becomes problematic when (a) there are important and/or continuous changes in the quality, variety, and convenience of the goods, (b) new goods are introduced very often, (c) investment in different forms of intangible capital becomes important, and (d) service relationships become dominant in the whole economy (and not only in the service sector). This means that what exactly characterizes postindustrial capitalism cannot be easily measured, and by consequence, contemporary national accounts overstate inflation and understate growth in output and in productivity” (p. 29).

“In activities like healthcare, education, culture, insurance, knowledge-intensive business services and environmental services, the objective is not to accumulate commodities, but to maintain and ameliorate the state of a human or a natural system in the long run. This implies first of all that long-run outcomes cannot be reduced to a measurable immediate output – as is the case with manufacturing and agricultural goods” (p. 30).

“In conclusion, the more we move towards post-industrial society, the more the notions of growth, output, and productivity that we inherited from industrial capitalism will become obsolete. This means also that, with time, it will be necessary to invent a new national accounts system, and not simply improve on the existing one. Note however that the elaboration of new conventions for post-industrial economic performance go far beyond measurement issues. The ultimate question is what kind of (post-materialist) development do we want, and in what kind of (post-industrial) society do we want to live?” (p. 30).

3.4 Joseph Schumpeter’s “creative destruction”

The now renowned term “creative destruction” was coined by the famous Austrian economist Joseph A. Schumpeter, to describe how innovative products and processes displace old ones in the context of a dynamic market economy (McCraw 2007). Contrary to the Smithian/Marshallian description of the economy as being in a state of equilibrium, Schumpeter described capitalism as being “by nature a form or method of economic change (that) not only never is but never can be stationary” (Schumpeter 1962).

Schumpeter’s description of the process of creative destruction challenged the fundamental premise of neoclassical economics with respect to the notion of price competition at the epicenter of the capitalist process. In “Capitalism, Socialism and Democracy,” Schumpeter argued that that the new products and processes that result from technological competition and product and process innovation are more important in understanding the essence of capitalism than the standard model of price competition that places emphasis on decentralized markets as the means to lowering prices, for a given set of goods and technologies (Diamond 2006). Capitalism, according to Schumpeter, could be better understood as an evolutionary rather than a static process, whose basic drivers of change were not social and natural transformations, but the

introduction of new goods, new methods of production and processes, new markets and new forms of industrial organization inherent to the capitalist process.

Schumpeter considered the forces of creative destruction to be the locomotive of the capitalist process and the driving force behind economic growth. To disregard creative destruction, would be, in the words of Joseph Schumpeter, similar to having “Hamlet without the Danish prince.” An increasing number of economists are arguing that it is conceivable that policies that would make a national economy more open to creative destruction would entail a higher rate of economic growth (Diamond 2006).



Source: Clark (2007)

Figure 3.2: World Economic History in One Picture

Figure 3.2 is constitutes what perhaps is the most convincing proof of Schumpeter’s conceptual framework of the economy. As Clark (2007) notes:

“Before 1800, income per person – the food, clothing, heat, light, and housing available per head – varied across societies and epochs. But there was no upward trend. A simple but powerful mechanism, [...] the Malthusian Trap, ensured that short-term gains in income through technological advances were inevitably lost in population growth.”

What Clark (2007) argues is that the average person of 1800 was essentially as well off as the average person of 100,000 BC. While this assumption might initially seem to be mistaken, it is corroborated by the facts. In essence, the median citizen of the 1800 world was actually worse off than her remote ancestors. Life expectancy in the 1800s was as high as it was for hunter-gatherers (30 to 35 years), while average stature, a measure of health, was actually higher in the stone age (Clark 2007).

Clark (2007) notes that this lack of progress was due to a mechanism he calls “The Malthusian Trap”, named after the person who first described this economic logic, the Reverend Thomas Robert Malthus (see Box 3.1). The Malthusian model had three main assumptions about the economy (Clark 2007):

1. The birth rate of each society is determined by customs regulating fertility, and increases with material living standards
2. The death rate of each society declines as living standards increase
3. Material living standards decline as population increases

Hence, the main intuition of the model is that any benefits from technological increases before the 1800s were absorbed by population increases, and were thus not reflected in the per capita standard of living analytics. However, at some point between 1770 and 1860 something occurred. The English population tripled, however real incomes, instead of collapsing, increased (Clark 2007). There exist many competing explanations on why the Industrial revolution occurred, why it took place in the given time frame or why it began in England. However, all explanations contain a central element of technological innovation, and justify Schumpeter’s perspective that technology and innovation lie at the epicenter of economic growth.

BOX 3.1: ROBERT THOMAS MALTHUS (1766-1834)

Malthus central contribution to the early discussions behind the causes and effects of economic growth lied in the publication of his much debated 1798 work “An Essay on the Principle of Population, As it affect the Future Improvement of Society, with Remarks on the Speculations of Mr. Goodwin, M. Condorcet, and Other Writers”. The historical context sheds significant light to Malthus’ insights. In the 1800s, the population of London had increased from 200,000 to 900,000 people, with most of the new residents being underprivileged (Warsh 2006).

Both Malthus and Ricardo focused on the principle of diminishing returns. The central argument of Malthus’ analysis, however, lied in a single comparison between arithmetic and geometric growth rates. Malthus argued that population increases could only, be stopped by misery and vice in the long-run. He based his arguments on two variables: Population and Food. The claim central to his theory was, however, that these two variables had two fundamentally different potential growth rates: geometric and arithmetic.

Malthus declared that there was empirical evidence for populations to grow with a fixed amount of time to double. He noted, especially, the resource-rich United States, where he claimed that the population doubled every twenty-five years. This fixed doubling time is what is called geometric growth. In contrast to population growth, he asserted that food resources could, at best, exhibit arithmetic growth, which means food increasing by a fixed absolute amount in a fixed amount of time.

In general, Malthus's analysis made the case that the actual population has the propensity to push above the food supply. Because of this propensity, any effort to improve the quality of life of the lower classes by increasing their incomes or improving agricultural productivity would be futile, as the extra resources would be entirely absorbed by an induced increase in population.

Malthus later proposed a series of practical policies commensurate with his analysis of demographics. His goal was to instill middle-class virtues to the lower classes, which were responsible for boosting the birth rate. His proposed policies included the introduction of universal voting rights, state-run education for the poor. the abolition of the Poor Laws and the creation of an free nation-wide labor market. In his view, once the poor would develop a taste for comfort, then they would require a better standard of living for themselves before starting a family. Hence Malthus suggested that sufficiently high incomes may be enough by themselves to reduce the average national birth rate.

3.5 Market Structure and Innovation

Innovation, and, consequently, the forces of creative destruction, appear to indeed be the locomotive not only of economic growth, but also, if we adopt Clark's (2007) perspective, the forces responsible of taking most of the world out of the Malthusian Trap, towards increasing levels of prosperity and affluence. From a policy perspective, thus, it is significant to focus on what forces, or what market structures, could lead to increasing levels of innovation in a society.

In "Capitalism, Socialism and Democracy" (1962, first published in 1942), Joseph A. Schumpeter outlined that large firms operating in concentrated markets, often enjoying monopoly power, are the main engine of technological progress and innovation. Very important in the Schumpeterian paradigm was the monopolist's ability to bear risks, attract the best workforce, and enjoy a superior financial position (Scherer 1992). Schumpeter argued that giant firms could afford to gamble on new techniques and were being willing to absorb losses in some of their new ventures because they could be confident of profits in others (McCraw 2007). This position contrasted the one that he previously outlined in his "Theory of Economic Development" (1934, first published in 1912) in which he insisted that innovations emanate from new and characteristically small firms. These firms would eventually grow large; however, they would start as "outsiders" in Schumpeter's analysis.

Schumpeter, partially influenced by the German Historical School's approach to economics, which consisted of detailed histories of various industries and institutions, was not trying to devise elaborate mathematical theories on paper, but rather to observe his surroundings in order to derive tangible conclusions. He cites the United States as his most favored example. Indeed, at the beginning of the twentieth century firms such as General Electric, Eastman Kodak, and DuPont founded research departments explicitly for the purpose of developing new technologies and products. In that way, innovation was made part of their normal business routine, which constituted a profound change in business structures. However, at the same time new companies continued to bud and innovate alongside the large-scale establishments, which lent support to what Schumpeter had predicted in 1912, but it did contradict his stated thesis in *Capitalism, Socialism and Democracy* published in 1942.

This latter view was particularly radical given the mainstream economic thought of the era, which was encapsulated in Adam Smith's treatise on the merits of competitive markets and of the invisible hand as heralds of affluence and prosperity. The Schumpeterian hypothesis was making the exactly opposite assumption: that innovation which was the cornerstone of economic progress and prosperity directly relied on the expectation of a monopoly position or the possession of it.

Economists appear to be split on the issue. Arrow and Fellner have argued that the incentives to innovate are greater in a framework of competitive market pricing (Scherer 1992). On the other hand, John Kenneth Galbraith suggested that it is in a strategic interactions environment among few oligopolists that innovation is optimally fostered (ibid). Moreover, some found evidence for the original Schumpeterian assumption of a

linear relationship between firm size and R&D, while others, such as F.M. Scherer, Morton Kamien, and Nancy Schwartz found an inverted U relationship, with diseconomies of scale after a certain point (ibid).

On the whole, there is little empirical support for the view that large firm size or concentration is directly associated with a higher degree of innovative activity. Even when such a correlation is present we are not in the position to be sure about the direction of causality. In specific industries that are research-intensive, such as pharmaceuticals, a high degree of concentration or monopoly power may be unavoidable because of the significant fixed costs and indivisibility of research that are associated with the characteristics of the specific industries in question. In the pharmaceutical industry's case, monopoly power is provided through comprehensive patent rights. Finally, as Rodrik (2007) argues, the results may be context specific, reflecting differences in the entirety of governmental policies in different countries. See also the work of van Ark et al. (2003) where the growth experience in the 'new economy' vis-à-vis large versus small firms is different in the U.S. and the EU.

The Schumpeterian "more is better" hypothesis, as a "one-size-fits-all" approach does not display a significant level of descriptive capacity in the case of industries such as computer software and semiconductors. Industry behavior is better explained in that case by the following scenario: firms with dominant market positions maximize their profit margins by choosing a "leisurely" and inexpensive level of R&D. Then, if smaller rivals or potential entrants threaten profit-making through innovation, dominant firms are then provided with incentives to further innovate and accelerate their development efforts (Scherer 1992). The theory of "the fast second" relies on this logic. In that theory, dominant incumbents permit smaller rivals to be the technological pioneers at the beginning. IBM exploited this strategy by repeatedly announcing a new product in advance on actual deliveries. This allowed IBM, as the dominant incumbent, to retain its existing customers despite the fact that it marginally lagged behind rivals in product deliveries. Another example of this is the extensive leapfrogging activity on behalf of industry leaders such as IBM and Microsoft. The "browser wars" between Microsoft and Netscape or the operating system competition between Microsoft and Apple easily come to mind as cases where Microsoft's rivals had the initial technological advantage but where Microsoft managed to effectively emulate them by "leapfrogging" the first mover's technology.²⁵

On the other hand, the Schumpeterian hypothesis seems to have increasing explanatory power in the case of the Japanese and European industries. Japan's national industrial strategy appears to be very close to the Schumpeterian paradigm, through the formation of large enterprises which undertake collaborative R&D efforts. At the same time, Japan's high technology start-up sector was limited by the beginning of the 1990s. However, the European and particularly the Japanese case could be attributed to a series of reasons, like the increasing scale pressure from globalization, the possible increases in the cost of conducting R&D, the existence of cultural differences which facilitate such

²⁵ See also the discussion of the computer hard-drive industry by Christensen (1997) where there was constant displacement of the dominant technological firm by a new entrant.

industry structures, and the technical problem in question which the specific organizational structures aim to address (Scherer 1992).

It is useful to note, however, that while Schumpeter wrote about innovation in general, not all innovations are qualitatively the same. Christensen (1997) distinguishes between two types of innovative activities: a) sustaining innovations and b) disruptive innovations. Sustaining innovations are innovations that will be generally valued by the incumbent firm's customer base (Diamond 2006). This is the sort of innovations that the incumbent firm is expected to generally pursue. On the other hand, disruptive innovations are generally discontinuous and possibly involve the displacement of dominant firms and institutions, rather than their evolutionary transformation (Ashford et al. 2002; Luiten 2001; Moors 2000; Partidario 2003).

The most recent body of literature has focused on modeling the desire of firms to innovate. Philippe Aghion and Peter Howitt (2005) studied the relation between innovation and competition, trying to address the issue of whether or not increased competition stimulates innovation. This analysis concludes that the effect of competition on innovation decisively depends on where firms are relative to the technological frontier. In sectors, for instance, where competition is significant for firms that are close to the technological frontier, an increase in competition will induce firms with additional incentives to innovate in order to move ahead and reap some monopoly profits. However, if firms are far behind from the technological frontier, competition discourages innovation because there is little profit to be made from catching up with the frontrunners.

Finally, empirical evidence on the correlation between market size and innovative activity has provided us with mixed results so far, and thus, at the bottom line the question of the validity of the Schumpeterian hypothesis will need to be questioned empirically.

3.6 Creative Destruction: The Case of Green Jobs

While creative destruction appears to indeed be the locomotive of economic growth, it is useful and important to examine it not only from the perspective of the state or the private sector, but also from the perspective of the labor force. The case of "Green Jobs" provides a particularly interesting case study of certain aspects of innovation and sustainability.

In general, green energy is considered to be highly labor-intensive, at least initially. The Obama administration has promised a cumulative \$150 billion investment in green energy technologies and infrastructure, which is projected to create 5 million jobs in the US. Green jobs at this moment are estimated at 2.3 million worldwide, a rather conservative estimate, with half of that number employed at the biofuel industry (UNEP 2008). Along similar lines, in a report published by the influential Center for American Progress, Pollin et al. (2008) made a calculation of how many jobs would be created with a \$100 billion green stimulus program. According to their model, \$100 billion green

stimulus is projected to create 2 million jobs in the US, while a “traditional” stimulus in household consumption would create 1.7 million jobs. Notably, spending \$100 billion within the US oil industry would create only around 542,000 jobs (Pollin et al. 2008). Needless to say, apart from the elevated performance of a green stimulus in terms of jobs creation, it also entails a series of long-term benefits. These benefits include increased consumer savings through the reduction of energy bills, the stabilization of oil, gas and coal prices through reduced demand and increased energy diversity and, obviously, a cleaner, low-carbon environment (Pollin et al. 2008).

The green stimulus would create three kinds of jobs: (Pollin et al. 2008)

- Direct jobs. Construction jobs created by retrofitting buildings to make them more energy efficient or manufacturing jobs created to build energy turbines.
- Indirect jobs. Manufacturing and service jobs in associated industries that supply intermediate goods for building retrofits or wind turbine manufacturing, such as lumber, steel and transportation.
- Induced jobs. Retail and wholesale jobs created by workers in these construction, manufacturing and service industries when they spend the money they earn on other products of the economy.

The first two categories are straightforward, while the third category is an attempt of the model to capture the “Keynesian multiplier” effect. In terms of the breakdown of the 2 million jobs, the model predicts that 935,200 jobs will be direct, 586,000 jobs will be indirect, while 496,000 jobs will be the multiplier effect, through increased spending.

However, different models of green jobs lead to different conclusions. Getzner (2002) reaches a conclusion that, while the qualitative impact of green technologies is significant, its quantitative impact in terms of job creation is marginal. Furthermore, Pollin et al. (2008) have essentially conducted a classical economic “*ceteris paribus*” analysis. It sees investment and job creation as a one-step policy, and disregards significant economic processes outside the focus of the model. There are two main criticisms to be made:

- The model disregards the 3.5 million workers in the traditional energy industry in the US, many of which could be displaced.
- The model calculates the jobs that will be created in the immediate short-run.

The first criticism is fairly straightforward. Green technologies constitute a clear-cut case of innovation in the Schumpeterian sense. However, as Schumpeter elaborated, innovation unleashes powers of creative destruction, and while the creation of “green” jobs is indeed “creative”, there is also an element of “destruction”, which is typically expressed by the dislocation of competitive industries that were deemed to be technologically inferior. In the case of green energy, the potentially disrupted industries are the traditional energy industries (i.e. oil, gas, coal). Hence, a truly comprehensive calculation, useful for state policy, would actually focus on the “net” amount of jobs

created, and would include a calculation of the amount of jobs that will actually be lost in the process.

In the European Union (EU), the broader impact of environmental protection measures on employment is now an emerging issue. The European Trade Union Confederation (ETUC) et al. (2007) recently completed a study on the link between both climate change and the EU's policies to reduce CO₂ emissions and employment. The study focused specifically on four key sectors: [1] energy-intensive industries (iron and steel, and cement); [2] transportation; [3] energy production; and [4] building/construction. The impacts on employment were found to vary by region and sector. Under an optimistic scenario of moderate climate change (i.e., +2°C at the planetary level), the impacts on employment were found to be more negative in southern Europe than in northern Europe and more severe in sectors such as agriculture, forestry, and fisheries than others.

Furthermore, an introduction of green energy technologies will most certainly have to be assorted with a series of regulations and policies, which will seek to correct the externalities of pollution in energy prices. Hence, these policies should be expected to increase traditional energy prices (such as CO₂ taxes or cap-and-trade). Thus, an additional and equally important consideration lies in the fact that higher energy costs could have an adverse effect on the payrolls of energy-intensive companies, such as manufacturers (Wolgemuth 2009).

An additional issue is the question of average compensation. In general, not all green jobs are equally green, both in terms of compensation, but also in terms of how environmentally friendly they are (UNEP 2008). In general, it is very important that a significant amount of new jobs will be created through a green stimulus program, however the nature, quality and compensation of these jobs are of equal importance. In general, the \$100 billion green stimulus program is projected to generate significant numbers of well-paying jobs, but also a relatively high proportion of lower, entry-level jobs (Pollin et al. 2008). According to Pollin et al. (2008), the average compensation of employees associated with green investment areas is about 20% less than the average of those in the oil industry. Pollin et al. (2008) claim that this number is deceptive, since the true comparison should be made not with already existing jobs in the oil industry, but with the jobs that would be created if the stimulus were not spent in green technologies but in alternative ways. This is a valid statement to make, however the fact that green jobs are paid less remains, and cannot be disregarded, especially given the displacement of jobs in the traditional oil industry, which will also occur and has not been calculated.

A key criticism lies in the fact that the model assumes a certain labor-intensity for green jobs, which, while realistic in the short-run, is certainly unrealistic in the long- and perhaps even the medium-run. In general, as new innovations appear in the market place, the form in which they are introduced originally tends to be the most labor-intensive. However, as new process innovations take place, labor tends to be increasingly replaced by capital, and many jobs are lost in the process. This paradigm is particularly relevant in the case of ICT, for instance. Hence, while green jobs are accurately considered to be labor-intensive, more light needs to be shed on the duration of their labor-intensiveness.

For instance, what fraction of the jobs created will involve the initial installation of the facilities, versus the operation of the facilities or green service jobs?

There is no objective answer to such questions a priori. Nonetheless, such questions are key for policy planners, and the considerations that they entail should not be disregarded.

4. The Effects of Economic Growth on Sustainability

While the need for sustainable growth is increasingly being discussed, and environmental concerns have started becoming prevalent in the priorities of the global citizenry, a significant shift in the policy priorities of orthodox economic growth hasn't been witnessed as of yet. At the same time, the financial crisis of 2008 has helped shed light to a series of unsustainable components of the GDP-based growth model. This chapter attempts to identify the consequences of the existing growth dogma for the developed and developing world, while codifying its limitations.

4.1 The GDP Growth Paradigm

The above discussion conceptualizes why a different growth model appears to be not only necessary, but also possible. Of course Kerala and Costa Rica (which are examined in Section 7.3) do not constitute absolute development ideals. They do, however, underline that the GDP growth paradigm fails to capture many aspects central to the wellbeing of the citizens of a country, such as life expectancy, education, income distribution, environmental quality, quality of the health system etc.

As a measure, GDP tries to examine the economy from a macro perspective. The acronym GDP stands for Gross Domestic Product, and measures the total output produced by a country. GDP is the value of all final goods and services²⁶ produced in a particular country in a one-year period.

GDP's fundamental equation is:

$$\text{GDP} = C + I + G + (X - M)$$

Where C stands for consumption, I for investment, G for government expenditure, X for exports and M for imports.

In very broad terms, output can be divided into two basic forms of production. The first one includes the vast spectrum of goods and services that will be bought by households and individuals for private use. This list includes books, haircuts, clothing, health services etc. This part of output is what we understand as consumption, while the various goods and services included are consumer goods (Heilbroner and Thurow 1998). However, there are also certain goods and services that do not end up in the possession of consumers. This category includes roads, machinery, airports, ports, bridges, but also smaller objects such as office furniture and typewriters (Heilbroner and Thurow 1998). These goods are investment or capital goods.

²⁶ Statisticians only count final products in GDP calculations, not intermediate ones. Counting intermediate products would lead the GDP statistics to account for the "same" output more than once, which would not capture the true production taking place in the economy.

However, the breakdown of GDP is not only limited to consumption and investment. It also includes government spending and the trade balance. Depending on whether consumption is private or public, that is depending on whether the final good is consumed by private households or the government, a certain purchase is accounted as Consumption or Government spending. The same holds true for investment. While the GDP equation does not distinguish between government consumption and government investment, and counts everything under government expenditure, GDP statistics in some countries actually do use that classification (Heilbroner and Thurow 1998). It is interesting to note here that not all government spending is included in the GDP calculation. Specifically, transfer payments (such as social security payments, health care, unemployment protection, various subsidies and measures of social protection), while they account for a significant portion of government spending, are not considered an “output-producing” activity, since “no direct production takes place in exchange for a transfer payment” (Heilbroner and Thurow 1998)²⁷.

Finally, the GDP metric includes the trade balance. By that, the GDP accounts for all domestic production that is sold abroad minus all foreign production purchased domestically. A negative trade balance, for instance, signifies a “net stream of purchasing power that wends its way abroad” and which should be subtracted from the GDP analytics (Heilbroner and Thurow 1998).

Furthermore, GDP is a useful tool in the realm of international politics, as, apart from being an economic measure, it also constitutes a useful measure of state power.

Overall, GDP displays a series of limitations as a measure of economic success:

- It does not effectively capture the distribution of wealth in an economy. GDP per capita simply divides GDP by the population of the country. The information that this metric conveys, however, for a country with significant income disparities, however, is rather limited. Saudi Arabia and South Korea, for instance, have similar GDPs per capita. Nevertheless, Saudi Arabia is a particularly unequal country, whose growth has been fueled by its vast oil reserves, while South Korea’s growth model is primarily based on technological innovation and income dispersion is significantly lower.
- Environmental quality is not included in the GDP metric. Environmental issues, however, are central to any measure of quality of life. Broadly, economists classify such issues as “externalities”, which are altogether neglected in GDP calculations.
- GDP does not take into account the “black” sectors of the economy. Nevertheless, “underground” economic transactions can significantly affect the quality of life of the citizens of a country, both positively and negatively.

²⁷ This exclusion perhaps creates the first criticism of GDP, since transfer payments increasingly augment the quality of life of the citizenry.

- GDP does not capture non-monetary activities, such as unpaid or volunteer work. However, as Putnam et al. (1993) have prominently described, social capital is central to development and economic success.
- Many economic activities included in GDP calculations do not advance “real” economic development. For instance increasing costs associated with healthcare, or costs of dealing with a natural disaster or war can significantly boost GDP.
- GDP fails to capture any measure of the quality of goods sold. A higher volume of low quality products sold can perhaps boost GDP, however low quality products are typically less durable, and can thus create more waste and inefficiency.
- GDP growth also fails to capture whether a country’s growth path can be sustained in the long-run. For instance, according to a series of studies, Russia required a \$70 per barrel price for oil in order to balance its budget. Russia is one of the key examples of an “imbalanced” growth model, which can be easily disrupted by fluctuations in energy prices.
- GDP includes no measure of societal opportunity costs. For instance, costs associated with the improvement of harm (such as natural disasters) divert funding from wealth-generating activities and investments.
- GDP does not directly capture the essence of product innovation. It only does so indirectly, through the monetary value of products sold. However, pharmaceutical and technological innovations have increased quality of goods – and perhaps life - - drastically. For instance, a person can be reached at almost any part of the globe at minimal cost, and many diseases considered incurable 30 or 40 years ago are now treatable. GDP does not convey any information for such advancements, even though they constitute main pillars of development.
- It is also possible that GDP may similarly not reflect improvements in processes, for example by ICT increasing the overall quality in services.

It is useful to note how these limitations are met in practice. Ponting (2007) notes that in the 1990s, the GDP per capita of the United States was 40% higher than that of Italy. However, life expectancy was lower by almost two years, possibly due to the poor US health system. Moreover, as noted above, averages tend to hide distributional realities. The life expectancy for African-Americans is lower than the Chinese average, infant mortality in cities such as Washington DC and Baltimore is higher than Bangkok and Cairo (Ponting 2007). Furthermore, Ponting (2007) underlines that while Sri Lanka had a GDP per capita equal to 20% of that of Malaysia, it had a comparable mortality rate, food intake and number of doctors per capita, while its literacy rate appeared to be significantly better.

Additionally, there is evidence that economic growth beyond a certain point does not improve well-being for developed country, due to the external costs of that growth including climate impacts (Costanza 2009). For instance, an oil spill increases GDP, since the cost of cleaning it up is accounted for in the GDP metrics. However, such an activity diminishes well-being. As Costanza (2009) points out, increased crime, sickness,

war, pollution, fires, storms and pestilence are all positive for GDP because they boost economic activity.

Ashford and Hall (2010) provide a systematic critique to the GDP growth paradigm, and try to examine a series of alternative measures of economic development. Specifically, they began by examining the Index of Sustainable Economic Welfare (ISEW), the Genuine Progress Indicator (GPI), the System of Integrated Environmental and Economic Accounting (SEEA), and Genuine Savings (GS). In general, these measures attempt to adjust (or 'green') the calculations of GNP/GDP (such as ISEW, GPI, and SEEA) or present an alternative way of measuring the stock of 'national wealth' (GS).

None of these measures has managed to become a viable alternative to GDP. The usefulness of GDP is obviously significant, and this is after all why it is the most widely employed economic indicator, used for the last decades and advanced by some of the brightest economic minds the world has produced. The rationale for this critique, however, is to make the point that while GDP is useful and perhaps the least incomplete economic indicator, policy-makers should not consider GDP growth a panacea. GDP was never designed as a measure of well-being. Nonetheless, its prevalence entails that a global consensus will be necessary for alternative indicators to move forward.

In general, it is obvious that ideally a different sustainable economic indicator should be created, that will have the measurement advantages of GDP while incorporating its main criticisms, especially in what concerns its lack of any discussion on environmental externalities and the quality and nature of what is considered as "growth".

4.2 The End of Sustainable Growth?

Perpetual economic growth does not constitute a law of nature, but rather an extrapolation of past trends. However, Robert Ayres (2006) notes that while "the economy has a lot of inertia, whence the future is more likely to be a continuation of past trends than otherwise," a continuation of exponential growth until 2100 is not to be taken for granted.

This point of view is vastly different than that of the economic "optimists" who make the case that the pace of technological growth in a series of industries, especially those relevant to converging technologies. Converging technologies represent a movement focused on the unification of science and technology, and can be defined by interactions between nanotechnology, biotechnology, information technology, and pharmaceutical technologies. In general, converging technologies hold tremendous potential for improvements in health care, the production of clean water and energy and increasing advances in information technology and telecommunications. The convergence of these profoundly transformative technologies and technology-enabling scientific fields can potentially constitute one of the central research initiatives of the 21st century.

According to Ayres, a series of drivers of past growth in industrialized countries are now indicating signals of saturation or exhaustion. These drivers are (Ayres 2006):

1. Division of labor (job specialization);
2. International trade (globalization);
3. Monetization of formerly unpaid domestic and agricultural labor, as a consequence of urbanization;
4. Saving and investing;
5. Borrowing from the future also tends to increase consumption in the present without added value;
6. Extraction of high quality and irreplaceable natural resources and destruction of the waste assimilation capacity of nature; and
7. Increasing technological efficiency of converting resource (especially fossil fuel) inputs to useful work and power.

Ayres deems the first four trends to have largely completed their full effect in the industrial world, even though they have just started making their impact in the developing world. According to Ayres, the benefits of scale from division of labor and international trade have already probably peaked, while the monetization of formerly unpaid domestic labor is now fulfilled in the OECD countries (Ayres 2006). Perhaps the most interesting case in point lies in the question of saving and investing. According to Ayres, the US essentially stopped saving in the 1990s and actually started living on capital and on money borrowed from others, or even by borrowing from the future. In the same manner, exploiting non-renewable natural resources resembles borrowing from nature. This form of converting long-term assets into current income is also meeting its limits (Ayres 2006).

Hence, this leaves only technological efficiency of converting resource inputs to useful work and power, along with unrealized technological progress from newer technologies as the sole determinants of economic growth. Technological efficiency emanating from the conversion of raw materials into useful work boomed during the end of the 19th century and the first half of the 20th century, resulting to the substitution of labor by machines powered by fossil fuels. This led to significant increases in efficiency. In the past, increases in efficiency led to lower costs, which in their turn led to lower prices and higher demand. The increase in demand was a driver for increases in investment and, ultimately, increases in supply and even lower costs. This “positive feedback cycle” is none other than the engine of economic growth, and has been the primary driver of productivity gains in the last two centuries (Ayres 2006). Nevertheless, sources of primary energy are getting more expensive instead of getting cheaper, and the rate of increase in the efficiency in energy conversion in industrial societies has decreased.

In the words of Robert Ayres (2006), “all of these (seven) phenomena taken together (...) suggest that US economic growth is almost certainly decelerating and could soon cease altogether,” a pattern already visible for a series of other countries in the developed world.

Others are not so pessimistic and argue that (1) technological advance has not reached any kind of natural limit and (2) a future shift to ecologically-sustainable technologies will loosen nascent creativity and that the basis of (post)industrial activity will change.

Still others have challenged how growth and development are measured and argue that the metrics we use are not measuring the development which is occurring.

4.3 Growth in Developing Economies and the Washington Consensus

Challenging economic orthodoxy, Seers (1997) questions some of its fundamental precepts in single-mindedly promoting economic growth in developing countries:

“We can, after all, fall back on the supposition that increases in national income, if they are faster than population growth, sooner or later lead to the solution of social and political problems ... [E]conomic growth may not merely fail to solve social and political difficulties; certain types of growth can actually cause them” (Seers 1997) . [Seers argues that increases in per capita income may occur with adverse distributional inequities.]

“Inequality can not really be reduced so long as property ownership is concentrated” (Seers 1997).

“[I]n a highly unequal society, personal savings often flow abroad or go into luxury housing and other investment projects of low or zero priority for development” (Seers 1997).

Further, he notes that “[n]ational income measures published for most developing countries have very little meaning” (Seers 1997).

According to Seers (1997) the purpose of economic development lies in the reduction of poverty, inequality, and unemployment. According to Nafziger (2006), Amartya Sen (1999) adopts a different definition, stating that freedom of choice to determine one’s future and pathways to that future, instead of development, is the ultimate goal of economic life and the most efficient means of realizing general welfare.

Actually, Seers (1997) is close to Sen when he states:

“[What are the necessary conditions for a universally acceptable aim [of development?] – the realization of the human personality” (Seers 1997).

Sen’s definition of freedom is far different than that of neoclassical economics. For Sen, “unfreedoms” include hunger, famine, ignorance, unsustainable economic life, unemployment and underemployment, barriers to economic fulfillment by women of minority communities, premature death, violation of political freedom and basic liberty, threats to the environment, little access to health, sanitation or clean water, etc. (Nafziger 2006). According to this analysis, freedom of exchange, labor contract, social opportunities, and protective security are not just ends of development but also the means to it. In general, economic development constitutes the most powerful instrument for reducing poverty. This issue, while highly important for every society, is of course more relevant for the developing world.

The characteristics of development policy have changed drastically in the last decades. During the 1950s and 1960s, it was “big-push, planning and import-substitution” policies that dominated the development agenda of reformers in poor nations (Rodrik 2007). These ideas started losing prominence in the 1970s, when more market oriented

approaches started being adopted. By the late 1980s views had converged around a vector of policies that John Williamson dubbed “The Washington Consensus.” As Rodrik notes, these policies (a list of which can be found in Table 4.1) remain at the heart of conventional understanding of a desirable policy framework, even though they have been augmented and expanded in the last years.

Table 4.1: Rules of Good Behavior for Promoting Economic Growth

Original Washington Consensus	Augmented Washington Consensus
1. Fiscal Discipline	11. Corporate Governance
2. Reorientation of public expenditures	12. Anticorruption
3. Tax reform	13. Flexible labor markets
4. Interest rate liberalization	14. Adherence to WTO disciplines
5. Unified and competitive exchange rates	15. Adherence to international financial codes and standards
6. Trade Liberalization	16. “Prudent” capital account opening
7. Openness to Foreign Direct Investment	17. Non-intermediate exchange rate regimes
8. Privatization	18. Independent central banks/inflation targeting
9. Deregulation	19. Social safety nets
10. Secure property rights	20. Targeted poverty reduction

Source: Rodrik (2007).

The original list of Williamson was augmented by a series of second-generation reform policies of a more institutional nature that those targeted on good governance. As Rodrik notes, these second-generation reforms arose from the growing recognition that market-oriented policies might be inadequate without a more fundamental institutional transformation.

Nevertheless, contemporary growth experiences do not justify a widespread adoption of the Washington Consensus as the orthodox growth paradigm. The region that made the most determined attempt at remaking itself through the adoption of the Washington Consensus was none other than Latin America, which reaped minimal growth benefits out of these policy choices. In fact, countries such as Mexico, Brazil, Argentina, etc. did more liberalization, deregulation, and privatization in a few years than what the East Asian countries did in four decades (Rodrik 2007). A similar case could be made for Africa, where even though “Washington Consensus” policies have been adopted in different states, decline persists. South Korea’s and Taiwan’s growth policies were significantly different from the Washington paradigm. Instead of privatizations, both countries invested on public enterprises. It is interesting to note that South Korea did not permit FDI inflows as well (Rodrik 2007).

China and India, the two locomotives of Asian growth, also constitute interesting cases in that respect. It is true, of course, that both countries during their growth path departed from previous policy choices and decided to adopt policy frameworks based on markets and private enterprise. However, China never adopted a private property rights regime

and “merely appended a market system to the scaffolding of a planned economy” (Rodrik 2007). At the same time, India deregulated with a particularly slow pace, had significant trade restrictions until recently and undertook minimal privatization (Rodrik 2007).

The picture that emerges from this analysis is rather clear. While some key elements of success are the same in all growth strategies (sustainable government finances and sound money, healthy institutional environment, some degree of market orientation), different regions require a different set of policies. Key to this claim is the central message of Hernando de Soto’s “The mystery of Capital” (2000) that most of the world’s potential capital assets outside the western world and Japan are unusable under the legal property system and inaccessible as collateral for loans or to secure bonds. For Seers (1997) the greatest error of neoclassical economics was the universalization of the West’s development experience. The Washington Consensus, in particular has been catastrophic for the developing world. It is not accidental that only those that decided to embark on different growth strategies were the ones that showed the highest growth rates and the most significant poverty reduction.

As Ashford and Hall (2010) note, we are in the aftermath of the 2008 stock market crash and the unraveling of the global financial system. In a provocative essay in *The Guardian* entitled: “*The Death of the Washington Consensus? Paul Krugman’s Nobel Prize for Economics Signals the Intellectual Tide is Turning Against Unrestricted Free Trade,*” Kevin Gallagher (2008) recites Krugman’s and others’ argument that “tariffs and subsidies to domestic industries can divert profits away from foreign firms and increase a nation’s income,” challenging the orthodoxy of market fundamentalism in the context of the benefits of trade to developing countries. While this is certainly not the last word on the debate, the 2008 financial crisis compels a re-examination of neoliberal doctrine.

4.4 Growth in the Developed World and its Impact on Employment

While there has been much discussion about the link between increases in productivity and economic growth, far less has been discussed about the effects of innovation and economic growth on employment. In fact, perhaps the most central question behind the consequences of economic growth from a societal perspective lies in the issue of increasing unemployment and underemployment.

Rifkin (2004) states that the old logic that technology gains and advances in productivity destroy old jobs but create new ones does not appear to be true anymore. Productivity has traditionally been considered as an engine of job creation and economic prosperity. The economic intuition behind that is that productivity allows firms to produce goods at declining costs, which lead to cheaper goods. These cheaper goods increase demand in the market, which leads to even more production and productivity, which further stimulates demand, etc. According to Schumpeter’s specification, innovation and specifically the process of creative destruction constitute the locomotive of capitalist economic growth, through the introduction of new technologies, processes, and ideas that displace old ones. Thus, it is argued that even if creative destruction displaces labor in the short-run, the increase in demand for cheaper products along with the new industries

created through technological innovation will ensure that additional people will be hired in the medium- to long-run. However, this is only theory. In reality, productivity increases, at least in the U.S., have been associated with increasing numbers of unemployed workers and/or lower wages, especially in the manufacturing industries.

A case in point in the positive feedback cycle of economic growth lies in information and communication technologies (ICT). In fact, the acceleration of productivity growth in the U.S. during the 1990s has been widely attributed to the rapid increases in investment in the ICT industry. Advances in information and communication technologies allegedly have led to decreasing costs, falling prices and increasing demand.²⁸ However, according to Robert Ayres (2006) the applications of information technology outside its own sector seem to have led to the elimination of more jobs than the ones created, without corresponding impacts on consumer demand on products and service that would end up creating more jobs.

In their study of the employment effects of the new economy, van Ark et al. (2003) found that this inverse relationship between productivity and employment growth was much stronger in manufacturing than in services. This result is intuitive, and it largely depends on the whether the labor force of a specific industry has skills transferrable to other industries. However, this analysis does not mean to say that productivity is something “bad” that should be avoided. To a large degree, the process of creative destruction is actually inevitable. The point is to first acknowledge the effects of increases in productivity on the average worker of the economy, and implement such policies which will alleviate those effects, either by social safety nets or labor re-training policies etc.

Commenting on the “digital divide” Liagouras (2005) notes:

“[I]f the vicious cycle of social exclusion is not stopped in the near future, social polarization risks becoming a structural feature of post-industrial economy and society...

[I]nequality depends above all on what organizational and institutional innovations are linked to digital technologies. On the one hand, the capacities required in order to cope with ICTs at a basic level are rather overestimated. As the objective of producers is to sell more and more, most of the new software hardware combinations have become so user-friendly that what is primarily required for basic applications is non-computer-specific skills like reading, writing, counting, communicating and, first of all, motivation. The above skills, on the other hand, are clearly underestimated by digital divide analysts. Indeed, the 21st century risks being characterized by the expansion of illiteracy in the middle of knowledge abundance. Of course this is a complex social phenomenon, which defeats monocausal approaches. From an economic point of view, the main responsible agent for social exclusion has been national and international neoliberal economic policies. That is why the digital divide discourse proposed by prestigious international organizations sounds like a nice excuse for the economic policies they have applied for two decades. If it is an inherent characteristic of digital technologies to divide societies, neoliberal policies are then beyond doubt, and the only solution for governments is to spend a bit more on education and training.”

²⁸ Much has been written on the ‘ICT Productivity Paradox’ in which little productivity growth has actually occurred from the adoption of the computer, see Griffith in *The Financial Times*, 13 August 1997.

4.5 Ecology and Collapse

Diamond (2005) in his work “Collapse” examined a series of old civilizations and societies, and attempted to identify why they collapsed or survived in a significantly reduced form. This work came after the publication of his previous work, where he attributed historical differences in economic and social development to environmental and ecological variations (Diamond 1997). While considering the collapse of a society, Diamond (2005) employs a framework that consists of five sets of factors that may affect what happens to a society:

- Environmental damage.
- Climactic change.
- Hostile neighbors
- Loss of trading partners.
- Society’s responses to environmental problems.

Under this prism, Diamond (2005) manages to explain the collapse of societies as diverse as the Maya of Central America (environmental damage, climate change and hostile neighbors), the Rapa Nui of Polynesia (Environmental damage) and the Greenland Norse (climate change, environmental damage, loss of trading partners, hostile neighbors and unwillingness to adapt). Scholars have also cited the case of Easter Island, which he singles-out as the best historical example of societal collapse in isolation (Ponting 2007, Diamond 2005).

Expanding on the above list, Diamond lists eight specific factors that have historically contributed to the collapse of past social structures (Diamond 2005):

- Deforestation and habitat destruction.
- Soil erosion/salinization/fertility losses.
- Water management problems.
- Overhunting.
- Overfishing.
- Effects of introduced species on native species.
- Population Growth.
- Increased per-capita impact of people.

However, apart from these “historical factors”, Diamond (2005) also identifies a series of new factors, which are highly probable to contribute to the reduction or collapse of contemporary or future societies:

- Global climate change.
- Buildup of toxins in the environment.
- Energy shortages.
- Full human utilization of the Earth’s photosynthetic capacity.

Most, if not all of these factors, however, constitute main consequences of contemporary economic growth and the northern growth model. Furthermore, there is an additional

elements that makes Diamond's (2005) analysis all the more worrisome. In the distant past, societies were significantly isolated, and societal collapses appeared to be rather isolated, without systemic spillover effects to other societies. Today's societies, however, are significantly interconnected and the international economy reaches even the most distant regions of the world. As the economic crises of the last decades have shown, a simple economic crisis that occurs in some regional financial markets can spillover to other nations with unimaginable speed. And while this is a consequence that could potentially be mitigated by returning to a more highly regulated international financial regime, ecological collapse will need far more effort than a new "Bretton Woods" – it would require unprecedented international cooperation despite a significant rift between the interests of developed and developing nations.

Unfortunately global ecological collapse is not an unimaginable scenario. As Ponting (2007) notes:

"The increase in the amount of carbon dioxide in the atmosphere in the last 250 years reflects the second great transition in human history – the exploitation of fossil fuels and the development of societies dependent on high energy use. Coal production is now 350 times higher than in 1800 and oil production is 350 times higher than in 1900. The number of vehicles in the world rose from almost nil in 1900 to 775 million in 2000. In parallel, forests – particularly tropical forests – have been destroyed on an unprecedented scale in the last two hundred years. All these forces have had an impact on the earth's atmosphere. Since 1750 about 300 billion tonnes of carbon dioxide has been added to the atmosphere through human actions – but half of that total has been added since 1975. The result has been a rise in the amount of carbon dioxide in the atmosphere. Concentrations are measured in parts per million (ppm) and in 1750, before the widespread use of fossil fuels, there were about 270 ppm of carbon dioxide in the atmosphere. This is the baseline against which additions are measured. The slow pace of industrialization in the nineteenth century can be judged from the fact that concentrations had only risen to 280 ppm by 1850 and 295 ppm by 1900. By 1950 this had still only risen to 310 ppm – a roughly 15 per cent rise in 200 years. [Furthermore,] in 1959 the figure was 316 ppm, by 1985 it was 345 ppm and by 2005 it was 381 ppm – a 20 per cent rise in forty-five years, reflecting the huge increase in carbon dioxide output in the second half of the twentieth century. [...] the rate of increase is also rising – it was about 1.5 ppm a year in the mid-twentieth century but reached a record 2.6 ppm in 2005."

In general, carbon dioxide is not the most powerful of greenhouse gases, however due to the huge volumes that have been released, it accounts for about two thirds of the total effect of greenhouse gas emissions (Ponting 2007). However, other gases such as methane and nitrous oxide have also been released in the atmosphere in significant volumes, thus exacerbating the ecological disequilibrium. Finally, the air pollutants black carbon and ozone constitute 30% of the sources of global warming, linking concerns of public health with global climate change (Moore 2009).

Table 4.2 captures the part of the picture of our ecological situation.

Table 4.2: Sustainability and the World in the 20th Century

	Increase 1900-2000
World Population	x 3.8
World Urban Population	x 12.8
World Industrial Output	x 35
World Energy Use	x 12.5
World Oil Production	x 300
World Water Use	x 9
World Irrigated Area	x 6.8
World Fertilizer Use	x 342
World Fish Catch	x 65
World Organic Chemical Production	x 1000
World Car Ownership	x 7750
Carbon Dioxide in Atmosphere	30% up

Source: Ponting (2007).

Finally, the fact that a collapse or “breakdown” has not occurred so far does not signify that it will not happen in the years to come. Many of the societies that collapsed in the past also believed that they were in a sustainable societal equilibrium, only to discover later that they were mistaken. As Ponting (2007) notes:

“by the time they had to face the crisis, they were unable to make the social, economic and political changes necessary for survival. The problem for all human societies has been to find a way of extracting from the environment their food, clothing, shelter and other goods in a way that does not render it incapable of supporting them”.

In their highly influential and much discussed work, *Limits to Growth*, Meadows et al. (1972) listed out three conclusions:

- If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.
- It is possible to alter these trends and to establish a condition of ecological and economic stability that is sustainable far into the future.
- The sooner the world’s people decide to strive for this stability, the greater will be their chance for success.

In a 2007 article, Meadows underlined an important change that had occurred since the publication of *Limits to Growth* (Meadows 2007):

“In 1972 we concluded that global population and industrial activity were still below the levels that could be supported indefinitely on earth. By 2004, it was clear to us that they had grown

above sustainable levels. So in 1972 the main objective seemed to us to be finding ways of slowing down physical expansion on the planet. In 2004 the main objective had become getting physical flows that are propelled by population and industry back down below the carrying capacity of the planet.”

This point is corroborated by the Millennium Ecosystem Assessment Synthesis Report (MEA 2005), which summarized the work of approximately 1,360 experts from 95 countries, who tried to assess the consequences of ecosystem change for human well-being and to establish the scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems (Meadows 2007).

As Meadows (2007) notes, in the MEA, among the five drivers of change in ecosystems and their services, population change and change in economic activity were the first two to be mentioned. Furthermore, the notion of collapse was also put forward as a possible, or even likely scenario (Meadows 2007, MEA 2005):

“Approximately 60% (15 out of 24) of the ecosystem services examined during the Millennium Ecosystem Assessment are being degraded or used unsustainably, including fresh water, capture fisheries, air and water purification, and the regulation of regional and local climate, natural hazards, and pests...The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met under some scenarios that the MA has considered but these involve significant changes in policies, institutions and practices that are not currently under way.”

The goal, thus, of modern societies should be none other than to anticipate the point at which the environment is being harmed by contemporary societal demands and to find the optimal systemic (economic, social, political) measures to respond accordingly (Ponting 2007).

5. Trade and Economic Development

5.1 Free Trade: Winners and Losers

Trade consists of the flow of goods and services between nations. These flows are heavily mediated by the international division of labor (i.e., the location of production versus consumption) and by the institutional organization of that labor (e.g., MNEs, which conduct significant inter-firm transfers of goods and services.) But the international trading system is also founded on *theoretical beliefs* about the gains from trade, and the international agreements which codify and regulate the conduct of trade reflect both this *belief* or *ideology* and a process of historical evolution. This chapter is therefore designed to provide an introduction to trade theory and its relationship to development/economic prosperity, and to the practice of trade as embodied in trade agreements.

Although modern development theory emphasizes technological innovation as the ‘engine of economic growth,’ trade also contributed to advancing industrializing nations during the nineteenth and twentieth centuries. Now, trade is increasingly described as a major engine of economic growth, both for advanced economies with ‘excess productive capacity’ and saturated domestic markets, and for less-industrialized countries with unutilized natural resources increasingly needed by the industrialized economies. For both, outward-looking strategies are being fashioned for more participation in world markets.²⁹ The purpose of this section is to articulate why trade is seen as an important driver of development.

Since the time of Adam Smith, most economists have considered free trade to be a beneficial activity towards which societies should strive. The most fundamental argument for free trade lies in the existence of efficiency losses associated with the enforcement of protectionist policies, such as tariffs, quotas, and subsidies, which do not take advantage of lower factor costs elsewhere and which could be avoided through the imposition of a free trade policy regime.

It is becoming increasingly apparent that developed nations (the U.S. in particular) believe that trade is critical to achieving sustainable development. It is seen as the mechanism through which poverty will be reduced, human well-being will increase, and environmental problems will be addressed. However, focusing on trade as a driver of sustainable development has its supporters and critics.

²⁹ See Schmidheiny (1992, pp. 69-81) for an insightful discussion on ‘trade and sustainable development.’ Schmidheiny (1992, p. 79) makes the observation that “[t]raditionally, the industrial nations of North America and Europe have championed free trade, against the resistance of most developing nations and centrally planned economies. Today, it is the former that tend to question the benefits of liberalized trade, while developing nations and the newly emerged democracies of Eastern Europe see it as their main hope for economic development.” To address the inherent conflicts associated with the expansion of trade and environmental protection, Schmidheiny (1992) calls for the harmonization of environmental regulations throughout the world.

Economists have identified a series of additional gains associated with free trade. One such gain involves the emergence of so-called spillover effects. By providing entrepreneurs with an incentive to devise new ways to export or to compete with imports, free trade results in innovation and increased learning opportunities. An additional gain involves the surfacing of economies of scale in production (Krugman and Obstfeld 2003). An obvious consequence of protected markets is that they decrease production internationally; however, they also lead to a reduction in competition and an increase in profits for industry in the protected economy. On the other hand, low barriers to entry can lead too many firms to enter the protected industry, making the scale of production of each firm become inefficient. A good case-in-point is that of the Argentine automobile industry, which owes its emergence to import restrictions. While an efficient assembly plant should be making 80,000 to 200,000 automobiles per year, in 1964 the Argentine industry was producing only 166,000 cars per year, in a market of 13 firms (Krugman and Obstfeld 2003).

The proponents of trade generally ground their arguments in the notion that *free* trade will enhance the welfare of humans by increasing prosperity. The justification for this from basic economic theory is that international trade that is free from protectionist barriers will reduce prices and increase the amount of goods and services available (Driesen 2001). Since free trade enables corporations (predominately based in developed nations) to become global in their operations, proponents argue that less developed nations will benefit from job creation and the spread of advanced technology, health, safety, and environmental standards, and environmental management techniques (OECD 1997). In addition, as individual prosperity increases, so too does the tax base for environmental and social programs that governments can implement in response to increasing demands for a healthier environment (Bhagwati 1993; Speth 2003).³⁰ In effect, proponents argue that international trade is opening up new opportunities to protect and enhance the environment through the reorientation of economic policies (OECD 1997). Further, as governments' ability to manage their economic affairs is enhanced, there are likely to be spillover effects that will enable them to address environmental concerns (Speth 2003).

Free trade, while a preferred policy measure in theory, does not uniformly advance all social interests. It is important to ask who wins from free trade and who loses.

David Ricardo's theory of competitive advantage remains the most central formulation of the theory of the benefits of international trade. The idea of comparative advantage states that countries can better their financial position by specializing in what they do best.³¹ In

³⁰ This type of argument is often put forward by those who believe in the inverted U-shape or Kuznets relationships – i.e., environmental quality falls during the initial stages of economic growth/industrial expansion, but later improves with increasing GDP.

³¹ A very elucidating example of this is included in Ashford & Hall (2010). In a self-contained economy, an example of this theory is exemplified by bartering between a dentist and a carpenter. The carpenter needs his teeth fixed and the dentist needs shelves in his study. They agree freely on an exchange of services and it sounds like a marriage made in heaven. Both are made better off by the exchange. The dentist fixes 2 teeth and the carpenter builds 3 shelves. Five years later, the carpenter needs 4 teeth fixed, but the dentist has enough shelves and wants a tool shed built in his garden. At that particular moment in time, the

the 1920s, the Swedes Eli Heckscher and Bertil Ohlin, showed that even when technologies could be copied, as in manufacturing, countries' differing endowments of factors of production could explain different countries' gains from trade. Capital-rich countries would specialize in goods whose production required an abundance of capital, while labor-rich countries would specialize in labor-intensive goods and land-rich countries in land-intensive (i.e., agricultural) goods. Instead of making goods that would primarily require the factors they possessed the least, countries could trade for them and acquire more goods overall. The Heckscher-Olin theory recognizes that trade would not benefit everyone uniformly. For instance, capital in labor-rich countries would lose from imports of capital-intensive goods. This helps explain why capitalists in low-wage countries, such as Brazil, opposed trade with capital-rich countries for capital-intensive goods, since this threatened their scarce premium. On the other hand, capitalists in the capital-intensive Britain were amongst the primary proponents of free trade. Symmetrically, labor in capital-rich countries would lose from imports of labor-intensive goods, which explains why labor unions in rich countries are usually anti-trade and also why the U.S. and Europe have been reluctant to reduce subsidies in agricultural production.

Furthermore, by understanding which productive factors are required to manufacture commodities and relating this information to the relative endowments and factors of production of each country, factor endowment trade theory encourages countries to *specialize* in commodities in which they have a comparative advantage. Hence, the most efficient (worldwide) allocation of resources will be achieved if all countries specialize in their relative strengths and trade their surplus for needed commodities that are more easily produced by others. This view on trade ultimately leads to the integration of regional and national markets, increasing the importance of transnational corporations and the need to transport resources and commodities between nations (Korten 2001).

In an article published in 1941, twenty years after the Heckscher-Ohlin contribution, the Harvard classmates Wolfgang Stolper and Paul Samuelson explored who benefits and who loses from trade. The authors began with the assumption that trade is beneficial for producers of exports and harmful for producers that compete with imports, with Heckscher-Ohlin predicting that export producers have the factor that is abundant in their country (Frieden 2006). In accordance with this analysis, an increase in exports will lead to an increase in demand for the factors employed in their production. For instance, as a labor-rich country exports labor-intensive products, the demand for labor increases, which leads to a corresponding increase in wages – at least in theory. At the same time, the demand for the products of import-competing producers will decrease, thus pushing them out of the market. In summary, the Stolper-Samuelson scheme constitutes a central theory of the politics of trade, making the case that trade makes the national owners of an

exchange still looks like a marriage made in heaven. Both are benefiting from the exchange. Ten years later, the exchange is 6 teeth fixed in exchange for a garage. It is still a mutually advantageous exchange, but note that one party to the bargain (the carpenter) is increasingly impoverished relative to the other (the dentist). The dentist is further advantaged by the greater technological advances in dentistry compared to carpentry. While at any point in time welfare is maximized, examination over time reveals a problem. The analogy to first world economies (providing advanced goods) trading with third world countries (providing basic commodities) is obvious.

abundant factor of production better off and the owners of a scarce factor of production worse off.

Indeed, in the late 19th and early 20th centuries, farmers in land-rich countries were free traders in almost all cases, no matter if they were cattle ranchers in Australia or wheat farmers in Canada (Frieden 2006). The same held true for owners of capital in capital-rich countries, such as Britain and other countries of northwestern Europe. Stolper-Samuelson also appeared to hold for the enemies of free trade as well. In labor-poor Australia, Canada and the U.S., labor was protectionist, while in capital-poor Russia and Brazil it was the owners of capital that primarily opposed free trade (Frieden 2006). Finally, farmers in land-poor Europe are still protectionist today, with countries such as France and Greece known for the subsidization of their respective national agricultural activities.

Nevertheless, while international differences in factor costs and endowments have been important in the determination of the international division of labor and the patterns of international trade, Ricardo's comparative advantage does not suffice in terms of its explanatory power (Coffey 1996). In fact, most of world trade seemed to be taking place between countries with similar factor endowments and costs. According to Porter (1990), the notion of *competitive* advantage constitutes a much more elaborate scheme for understanding international trade. Competitive advantage is a much broader concept than comparative advantage. Four attributes or interacting factors comprise Porter's Diamond of Competitive Advantage (Porter 1990):

- Factor conditions (such as resources, labor, infrastructure, etc.);³²
- Demand conditions (characteristics of consumers in domestic markets);
- Related and supporting industries (suppliers, collaborators, competitors); and
- Firm strategy, structure and rivalry (market conditions, competitive structure, company organization, i.e., the factors that influence an industry's/firm's attitude towards competition and innovation).

These factors can combine to generate new advanced factor endowments (such as a high-technology sector or a large pool of skilled labor) that determine a nation's comparative advantage. A clear omission from Porter's (1990) theory, however, is the failure to include government as a factor (Dicken 1994). Instead, government is described as having a proactive 'influence' on the four core endowment factors³³.

Daly (1993), in a comprehensive critique of free trade, underlines that even the term "free trade" is fallacious, because it creates the wrong impression that people who are for some set of trade restrictions are against "freedom." In that context, the real debate is not over being for and against "free trade" (since there is no such thing as purely free trade), but

³² Even though this may sound similar to Ricardo's notion of comparative advantage, Porter does not limit his analysis to factor endowments. Porter believes that the key factors of production are actually created (i.e. skilled labor, capital, and infrastructure).

³³ Ashford and Hall (2010) suggest a much longer list of relevant factor endowments, addressed in Section 2.1

over what sets of regulations and restrictions should be put in place and what goals are legitimate. Hence, according to Daly, a more accurate name instead of “free trade” would be that of “deregulated international trade.”³⁴

Greider (1997) agrees with that analysis. A passage from his 1997 book “One World, Ready or Not” is particularly elucidating:

Lawrence B. Krause, international relations professor at the University of California at San Diego, aggregated all of the different ways in which trade was managed – openly and covertly – and concluded that only about 15 per cent of global trade was genuinely conducted in free-market circumstances. Other scholars have calculated that governments directly managed 25 to 30 per cent of trade through their various non-tariff [trade] barriers. Multinational corporations themselves managed about 40 percent of global trade through the intrafirm trade among their own subsidiaries. Further, Krause noted that the top ten trade sectors, from aircraft to petroleum, were managed by governments or concentrated firms, with the single exception of paper. These accounted for 22 percent of world trade.

More than 10 years have passed since the publication of Greider’s book, however, these observations remain relevant today.

Expanding Daly’s and Greider’s analysis, a key intuition of Porter’s model of competitive advantage is that government has an important regulatory role to play. Governments can affect all four elements of Porter’s diamond through subsidies, the creation of infrastructure, tax policy, education policy, standardization, regulations, etc.

Daly (1993) however, makes an additional observation, often disregarded by some economic theorists. According to Ricardo’s specification, following trade liberalization, countries can specialize on the basis of comparative advantage, with the possibility of investing all of a country’s capital on a singular product. However, the hidden assumption of the theory of comparative advantage, according to Daly, is that capital earned from trade cannot cross borders, as was the case in the pre-1970 Bretton Woods world, and would be invested in the country in which the product was produced. If capital is mobile as well, then it can follow absolute advantage rather than comparative advantage, and one country could conceptually end up producing everything, since it could have lower costs, better infrastructure, larger or better markets, etc., and attract foreign capital.

Morris (1996) extends Daly’s critique, by offering a reassessment of some of free trade’s assumptions. In his view, prices do not provide accurate measures of real efficiency,

³⁴A term that has been frequently used in juxtaposition to free trade is that of fair trade. According to its most accepted definition Fair Trade is a trading partnership, based on dialogue, transparency and respect, that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers – especially in the South. Fair Trade Organizations, backed by consumers, are engaged actively in supporting producers, awareness raising and in campaigning for changes in the rules and practice of conventional international trade. Fair Trade products are produced and traded in accordance with these principles — wherever possible verified by credible, independent assurance systems.” (EFTA 2006)

since they are the outcome of a series of variables, such as market structure and subsidization. Furthermore, Morris (1996) cites Howard Wachtel, who notes that “differences in product cost that are due to totalitarian political institutions or restrictions on economic rights reflect no natural or entrepreneurial advantage. Free trade has nothing to do with incomparable political economic institutions that protect individual rights in one country and deny them in another.”

Furthermore, there is a significant set of additional arguments against free trade that need to be examined. For instance, labor used in a sector that would be harmed by import competition might otherwise be unemployed or underemployed. Also, the assertion that labor and capital markets perfectly clear is not corroborated by the evidence in most cases. In fact, defects often exist in the capital and labor markets that prevent resources from being transferred as rapidly as they should be to sectors that yield high returns. There is also a significant argument to be made about the protection of nascent domestic industries that can be particularly innovative and produce technological spillover effects.³⁵

In general, the proponents of free trade claim that it lowers import prices, a case which becomes all the more clear when thinking of cheap Wal-Mart products. However, this is not what theory claims to be the case. In fact, comparative advantage theory states that free trade affects relative rather than absolute prices. Absolute prices are actually determined by monetary and macroeconomic policies. The effect of a country liberalizing its trade regime is that the relative price of imports decreases relative to exports, or, conversely, that the relative price of exports increases relative to imports. The determinant of whether consumers will be better or worse off will be the extent to which their consumption basket is dominated by imports, after accounting for the net change in the amount of jobs. However, one cannot argue from first principles that this relationship will always be positive, especially in countries that seem to be running significant trade surpluses.

Nevertheless, in many occasions, trade restrictions, such as tariffs and import quotas, are undertaken not in the context of an elaborate and well-planned industrial policy, but in order to protect the income of particular interest groups. Given the fact that trade restrictions are associated with efficiency losses, one would automatically make the case that such trade restrictions would reduce national welfare. However, there are theoretical grounds to believe that activist trade policies can, in some occasions, apart from protecting the income of certain segments of the society, increase the welfare of a nation as a whole.

A particularly interesting observation pertaining to the above involves the “Olsonian” nature of the debate of free trade. The term “Olsonian” connotes the presence of concentrated losses from trade in specific societal segments and diffused benefits from lower consumer prices from import competition. Olson’s (1982) “logic of collective action” has long been invoked by economists, in order to explain seemingly irrational

³⁵ See Amsden (1994) for an explanation of the success of the so-called Asian Tigers as being the result of promoting national champions under a cloak of protectionism.

trade policies as a result of small concentrated groups capturing the political process. This is highly relevant for countries where the harmed interests groups can closely influence the policy-making process through their linkages to specific party interests. Organized labor was the natural base of British Labor party in the 1970s and 1980s, while the policies of the Tories in the late 1970s and early 1980s reflected their proximity to capital-owners and City financiers.

5.2 The Effects of Trade in the Developed World

In general, the established consensus among most members of the economic profession appears to be that trade constitutes “an important stimulator of economic growth” (Todaro and Smith 2009). Trade increases a country’s consumption capacities, expands world output and provides access to scarce resources and global markets for products, without which poor countries would not have been able to develop (Todaro and Smith 2009).

However, while agreements such as NAFTA are generally considered by economists to have been beneficial for the United States, the population of the U.S. appears to be particularly divided on the issue Warf and Kull (2002). How can Americans be that divided when NAFTA has purportedly been beneficial for the majority of the population through lower consumer prices? One answer attractive to the proponents of the mainstream view has to do with the relative visibility of NAFTA’s effects. In general, job losses are more obvious and concentrated than lower prices, and more easily attributable to trade. Hence, even though one might have personally gained from free trade, the adverse effects of trade liberalization, through the associated job losses in sectors like manufacturing, can increase insecurity in the working population and create hostility towards free trade.

Nevertheless, other commentators seem to disagree with this “established” view. Scott (2002) states that NAFTA was eventually harmful for the U.S. economy, costing 766,030 jobs and job opportunities in the period 1993-2002, while the total U.S. trade deficit cost approximately 3 million jobs in the period 1994-2002. Furthermore, according to Berger (2005) “more than two million jobs disappeared from the U.S. workforce between 2001 and 2004. By one calculation, a half-million of them were in high-tech industries like electronics, components, and telecoms. The layoff rate has risen, and while many of those who lose jobs get hired again fairly soon, two-thirds of the jobs they get pay less than the jobs lost.”

Hence, apart from the impact of trade on the employment statistics, trade has also significantly impacted wages. According to Scott (2002), trade’s indirect effects on wages, through the elimination of good job opportunities and the possibility of relocation as a threat in wage negotiations has led to a series of effects on wages:

- Real production worker wages have decreased by 5.4% between 1978 and 2000;
- Growing wage inequality since late 1970s;
- Increasing income inequality since 1979; and

- Flat incomes for the bottom 60% despite 7.6% increase in working hours.

Scott (2002) notes that trade explains at least 15%-25% of the increase in income inequality with other factors including deregulation, liberalization and weak macroeconomic policies. Furthermore, Charles and Lehner (1998) argue that trade might actually facilitate rigidity and lack of innovation and actually contribute to long-term decline.

Faux's (2007) analysis moves along similar lines, even though the picture that he paints is even more bleak. While he deems globalization to be a force that can potentially be beneficial and enhance living standards for workers around the world, he considers it to have been "tragically mismanaged," entailing an accumulation of international trade and investment agreements which are "increasingly unaccountable to any country's citizens." Faux's calculations are dire, and according to his analysis, in the period between 1979-2007, 7 million jobs have been displaced in the U.S. due to the expansion of trade. According to his analysis, real wages have not declined – in fact the wages of nonsupervisory employees (accounting for 80% of U.S. workers) increased by a marginal 4%; however, this increase did not remotely match the corresponding 71% increase in the productivity of the U.S. economy, as traditional economic theory would have us believe. In order to make the picture clearer, the 4% increase also includes the increasing participation of female workers in the workspace. In fact, among working males, real hourly wages have remained at the 1973 level (Faux 2007).

The proponents of free trade underline that these costs are inflated. However, they also note that even if inflated, such costs should be up to some degree expected, given the lack of skills of the unskilled workers of the manufacturing sector. According to mainstream economic thinking, these workers, as they obtain portable skills and become better trained, will be channeled to other productive activities. Scott (2002) seems to agree that college-educated workers, who account for 20-40% of U.S. households, constitute the second category of winners from globalization in the U.S., apart from MNEs. Nevertheless, Faux (2007) does not come to the same conclusion. Americans are working longer hours, and are increasingly educated. The percentage of workers with college degrees has doubled from 15% in 1973 to 30% today, while the share of high school dropouts has fallen from 29% to 10%. Nevertheless, the U.S. economy, in this process of Schumpeterian Creative Destruction, does not seem to be fulfilling the "creative" part. Faux (2007) cites projections from the Bureau of Labor Statistics, that concludes that by 2014, the number of occupations filled by people with college degrees will rise by only 1% – from 28% to 29% – while the share of jobs for which a college degree is required is projected to be only 21%.

However, acknowledging that some level of costs does emanate from increasing trade openness is to be expected even from the most pro-trade advocate. The point is whether these costs, as accounted from the above analysis, are less than the projected benefits. In theory, free trade creates losers in the domestic economy in those industries that are not able to compete in the international spectrum; however, it also entails cheaper imports

and products, which can drastically increase the standard of living of the domestic population.

But is this the case? Are lower prices that prevalent? Faux (2007) again offers compelling evidence to the contrary. As he notes: “Comparing the price change of domestic and imported goods ... yields a savings from imports to the average American of about \$36 a year. A gain, but hardly substantial enough to justify any costs.” In fact, Faux does note that other authors are led to conclude there are higher benefits, however, most of these studies seem to be based on unrealistic assumptions and simulation, rather than being grounded on facts. The reality of the benefits of free trade for the U.S., thus, seems unclear.

5.3 The Effects of Trade in the Developing World

While there appears to be a consensus among many economists that free trade produces net gains for developing societies, and that countries should unambiguously adopt trade liberalization policies, reality paints a more complex picture. Rodrik (2007) cites the particularly elucidating case of two different countries, Vietnam and Haiti. Vietnam still engages in state trading maintains import monopolies, retains quotas and tariffs (in the range of 30%-50%) in imports of agricultural and industrial products and is not a member of the WTO. On the other hand, Haiti undertook significant trade liberalization in 1994-1995, joined the WTO, diminished import tariffs to a maximum of 15% and removed all quotas. The result? Vietnam experienced annual GDP growth rates in the area of 8%, reduced poverty, expanded trade significantly and attracted significant foreign direct investment. On the other hand, Haiti has stagnated and suffered from significant poverty and unemployment rates, having made little progress in integrating with the world economy.

Rodrik (2007) is right to note that trade should not be viewed as a goal in itself but rather as a means towards the goal of increasing economic welfare. As he notes “a leadership committed to development and standing behind a coherent growth strategy counts for a lot more than trade liberalization, even when the strategy departs sharply from the enlightened view of reform.” His view is corroborated by the facts. The cross-national evidence on the relationship between open trade policies and higher economic growth and poverty reduction has shown no systematic relationship between a country’s average level of tariff and nontariff restrictions and its subsequent economic growth rate. In fact, if anything, the evidence from the 1990s suggests a positive (but statistically insignificant) relationship between tariffs and economic growth, with the only systematic relationship being that as countries get richer they tend to liberalize trade.

Hence, integration to the world economy through trade liberalization should be viewed as an outcome, rather than a prerequisite of a successful growth strategy. As Stiglitz (2002) and Rodrik (2007) note, the fact that all of today’s advanced countries embarked on their growth with trade restrictions and gradually reduced protection, should be viewed as a lesson. Finally, almost all of the outstanding developing country success stories, such as China, India, the East Asian countries, involved partial and gradual trade and capital

liberalization. A country's trade policy should be eclectic, and take into account a series of national and external variables, such as the industries that will be harmed from trade openness and the capacity of the domestic market to reallocate workers.

While international trade has some positive effects on developing regions and can potentially help protect/enhance the environment, it is also seen to have negative environmental (OECD 1994) and social (welfare) impacts (Rees and Westra 2003). Among the main arguments against the international integration of economies are that free trade:

- is accompanied by environmental degradation and growing economic inequality (Borghesi and Vercelli 2003; Held and McGrew 2002);
- weakens the democratic accountability of governments through the transfer of power from people (and society in general) to global financial institutions and corporations (Korten 2001). Such a transfer of power is mirrored by "*a corresponding shift in economic priorities from the production of goods and services to meet human needs to a wholly different agenda centered on extracting wealth from the larger society to increase the financial assets and power of the wealthiest among us*,"³⁶
- is not proceeding in a fair and equitable manner. A main contention is that industrialized nations have pressured developing nations to eliminate their trade barriers while keeping their own intact. This has the effect of opening up the markets of developing nations to capital-intensive products from developed nations, but has prevented them from exporting their labor-intensive products, depriving them of vital export income (Stiglitz 2002);
- encourages economically rational corporations to invest capital in countries with the lowest environmental and health and safety standards. Such action reduces the cost of producing commodities and might also lead countries to specialize in those sectors where regulations are weakest (Cole 2000). Alternatively, the pressure to produce commodities at or below the price dictated by the international market creates a perverse incentive to lower health and safety and environmental standards to improve the competitiveness of national sectors (Daly 1993);
- creates a situation in which capital from developed nations is only invested in nations that offer the potential for a high rate of return. This means it is more profitable to invest in the inefficient and polluting industries of Eastern Europe, for example, than to invest in the less attractive markets of developing nations (Reid 1995). Hence, economic 'logic' is reducing the already limited financial flows reaching developing nations; and
- leads to the "*spatial and temporal separation of action and impact from responsibility*" (Speth 2003). As commodity chains grow in length, become more complex and more international, the spatial and social distance between production and consumption is widened (Conca 2002; Princen 2002). The result of this *distancing effect* is that consumers lack the information and incentives to behave in a more sustainable manner even if they wished to do so. To put it another way, as trade increases and countries continue to specialize, the transaction costs (linked to

³⁶ Source: People-Centered Development Forum, *History*, http://www.pcdf.org/About_PCDF/history.htm (accessed on 04/09/06).

externalities) become hidden by the distancing effect. Therefore, it becomes increasingly difficult for communities in different nations to communicate and agree on collective solutions to externality problems (Costanza et al. 1997). Further, the growing movement of resources between nations in response to *market demands* is reducing the effectiveness of traditional local controls over resource use (Speth 2003). This loss of indigenous control can lead to the exploitation of resources as a result of unsustainable rates of extraction.

The above concerns have led a series of scholars to move their point of reference, asking for trade to become part of a larger development scheme. Najam and Robins (2001) note that it is in the interest of the developing world (“the South”) to shift the terms of the debate from “trade and environment” to “trade and sustainable development.” Furthermore, in their view, “if sustainable development is to become the organizing focus of the international trade regime, then at some point, “sustainable trade” will have to replace “free trade” as the grand rationale for our efforts. For the early advocates of GATT, the ultimate and non-negotiable goal – to be reached through small steps – was to create a world in which all trade was “free”. The new goal, equally non-negotiable at its core, must be the creation of a world where all trade is seen as a part of the larger sustainable development enterprise” (Najam and Robins 2001).

5.4 The Effects of Trade on the Environment³⁷

As elaborated in section 5.1-5.3, free trade is far from being a panacea. According to Ashford and Hall (2010), this view is enhanced by the perceived negative impacts of free trade on the environment, effects which are strongly contested by free trade advocates. What, however, are the potential environmental impacts of free trade?

A series of authors argue that trade by itself does not have a negative impact³⁸ on the environment. Environmental harm is caused by (Cole 2000):

- Market failures: the market fails to internalize externalities or “*to properly value and allocate environmental goods, with the result that prices do not cover the full social costs of production*” (Cole 2000). Cole recalls the three reasons for market failure that were first outlined by the OECD (1994). These are: [1] the costs of environmental harm are not being included in the price of goods and services; [2] the market fails to take into account the full value that society places on an environmental asset; and [3] there is a lack of property rights for certain environmental assets (the resource is considered as ‘free of charge’).
- Intervention failures and distortions: these “*occur when government policy creates, exacerbates or fails to remove market failures*” (Cole 2000).

³⁷ Drawn heavily from Ashford and Hall (2010).

³⁸ Ashford and Hall (2010) note that this perspective reflects the view that some environmental harm is acceptable so long as the marginal benefits of an economic activity are equal or greater than its environmental costs.

Free trade advocates generally argue that the net effects of liberalized international exchange on the environment are globally positive (Ashford and Hall 2010). Their arguments are:

- Free trade favors economic growth and the growth of income has positive effects on the environment due to the increased demands for a clean environment and the ability to pay for them;
- Free trade favors the international exchange of technology and environmentally-sound products and services; and
- Free trade induces the removal of trade-distorting and environmentally-harming policies.

In general, free trade advocates reject the claim that economic growth, as accelerated by free trade, harms the environment. Bhagwati (1993) argues that economic growth enables governments to raise taxes to protect the environment and increases the demand for higher environmental quality. Similarly, according to Cole (2000), the expansion of the scale of economic activity, through liberalized trade, increases the financial resources available to improve environmental quality. In developing countries, he states that growth in income is essential if developing countries are to improve the quality of their environment. He recalls the example of Mexico, given by Voigt (1993), whereby the lack of financial resources has limited the ability of the government to control the environmental affects of development.

A second argument employed by free trade advocates emphasizes the benefits of the free trade of environmentally cleaner technologies, products, and services (Ashford and Hall 2010). For Bhagwati (1993), freer trade and rising income enhance the exchange of pollution-fighting and resource-efficient technologies: trade liberalization plays a role in expanding the potential market for environmentally cleaner products, services, and technologies and, in turn, this market expansion boosts technological innovation and trade (OECD 1994). Cole (2000) agrees that free trade can be beneficial to the environment through the *technique* effect: by allowing the expansion of markets, free trade increases access of countries to cleaner technologies, products, and services, but also to more efficient production methods. Therefore, output might be produced in a much cleaner and more efficient way following trade liberalization (Ashford and Hall 2010).

Finally, Ashford and Hall (2010) conclude that:

“it appears that proponents of free trade consider a kind of natural vicious circle between trade liberalization – market expansion – and technological innovation, so that environmental quality eventually benefits from increased international exchanges.”

Rather than restricting liberalized international exchanges, free trade advocates believe that externalities should be tackled directly (Ashford and Hall 2010). They also urge environmentalists to use methods such as lobbying countries with poor standards, and boycotting certain commodities, rather than attacking free trade (Bhagwati 1993).

Finally, they believe in the potential of voluntary approaches to promote both free trade and the quality of the environment.

However, this picture is considered to be rather optimistic by a series of scholars and policy-makers who view free trade as significantly harmful for the environment, and consider opinions such as Bhagwati's (1993) as highly theoretical, without any practical application. In the absence of internalization of externalities, it appears that trade is rather conducted on the 'back of the environment' (Ashford and Hall 2010). By encouraging trade with nations which do not internalize their externalities, free trade leads to inefficient allocation of resources and harms the environment (Daly 1993). Similarly, Daly (1993) argues that the environmental costs of growth increase faster than its potential benefits, thus refuting the argument that growth generates wealth that can be used to protect the environment.

A second reason for questioning the supposedly more efficient allocation of resources and better environmental quality brought by free trade relates to the different environmental standards and regulations among nations (Ashford and Hall 2010). First, if comparative advantage occurs due to differences in environmental standards, countries are likely to specialize in those sectors where their country has the weakest environmental regulation, and, as a result, the *composition* effect of trade liberalization will lead to a decrease of environmental quality (Cole 2000). Secondly, international competition arising from free trade can lower costs by keeping environmental standards low in developing countries and providing pressure to lower, or at least not to raise, those standards in the industrialized nations, rather than through increasing efficiency (Daly 1993). The idea that free trade and increased competition among nations will lead to a lowering of environmental standards is usually referred to as the 'Race to The Bottom' (Ashford and Hall 2010).

Moreover, the question of free trade and transportation is also particularly significant. Daly (1993) notes that the gains from free trade would be highly reduced if the subsidies for the energy-intensive transportation costs associated with increased global trade were to be deducted. Furthermore, Cole (2000) argues that trade liberalization – and the subsequent expansion in the total volume of trade – directly affects the environment by favoring increased transportation, because fuel prices do not fully internalize environmental costs associated with transportation. Thus, an unsustainable transportation system is linked to unsustainable consumption (Hall 2006, Ashford and Hall 2010).

6. The Evolution of International Financial Institutions

6.1 International Financial Institutions: Bretton Woods and Its Aftermath

In the aftermath of World War Two, a new system of financial architecture was created. The pillars of this system were initially put in place in 1944 during a conference in Bretton Woods, New Hampshire. The then head of the State Department's delegation at Bretton Woods, and subsequent Secretary of State, Dean Acheson described his participation at the 1944 conference as none other than "being present at the creation." It was in Bretton Woods that the International Monetary Fund (IMF) and the World Bank were created in the context of a new international financial system, where "never again" would a Great Depression occur.

Relevant to this discussion is the notion of Mundell's "unholy" trinity (Obstfeld and Taylor 2002). Of the "unholy" trinity – fixed exchange rates, capital mobility, and monetary independence – a country can choose to have any two of these attributes, but cannot choose all three. The financial architecture of Bretton Woods constructed a world of fixed exchange rates and low capital mobility. In that era, the IMF sanctioned capital controls as a means to prevent currency crises and bank runs, which lent some level of autonomy to governments by providing more power to monetary policy (Obstfeld and Taylor 2002). Nonetheless, by the late 1960s, global capital was difficult to contain in the confines of the nation-state.

Key countries in the Bretton Woods system, such as the US and Germany, fearful of sluggish growth and increased inflation respectively, proved unwilling to accept the domestic policy implications of maintaining a fixed exchange rate regime. Even in the pre-1970s world of low capital mobility, furious speculative attacks on the major currencies led to the collapse of fixed exchange rates. The "adjustable peg" system of fixed exchange rates was, to a large extent, unstable in itself. If a specific country faced economic difficulties and it started to look as if the country would consider a devaluation of its currency, speculators would start selling its currency in anticipation. This would force the hand of the central bank of the country to raise interest rates – which would worsen the slump – to devalue the currency, or to impose capital controls (Krugman 2009). After the system of fixed exchange rates was abandoned in March 1973, several major countries no longer needed the capital controls that had been put in place in order to protect their monetary policy independence. That, along with the emergence of enhanced communication technologies, made the removal of capital controls imminent.

In general, we can distinguish between two broad types of capital controls. One category aims to control capital inflows, while the other aims to control capital outflows. In West Germany, the controls in place by the early 1970s were designed to discourage the acquisition of assets by foreign residents. The German government prohibited the payment of interest from large bank deposits to nonresidents, taxed new credits by nonresidents to German banks, and prohibited nonresidents from buying German bonds (Caves et al. 2006). The German government was essentially trying to limit the flow of

capital from the United States to Germany, which was putting upward pressure on the mark as it put downward pressure on the dollar. The other reason behind the imposition of such controls was that in the fixed exchange rate world of Bretton Woods, foreign capital inflow could result in the possible loss of control of the money supply, since if a large volume of foreign reserves flowed in, the Central bank of the capital-receiving country might not be able to counter the effects on the money supply, leading to inflation.

6.2 The Benefits and Perils of Increased Capital Mobility

In general, for a rapidly growing economy with a high return to domestic capital, investment can be financed more cheaply by borrowing from abroad than from domestic savings alone. This is, perhaps, the most significant argument for financial integration and increased capital mobility. Symmetrically, investors in wealthier countries can sometimes earn higher rates of return (for a variety of reasons) by investing in emerging markets rather than investing domestically. Arguably, this process of openness can further lead to everyone benefiting from the opportunity to diversify risks and dampen volatility.

An additional argument in favor of capital inflows is that letting foreign financial institutions into a country with an underdeveloped financial system improves the efficiency of domestic financial markets. Internationalized financial markets foster a competitive environment, making it more difficult for overregulated and potentially inefficient domestic institutions to operate as they did previously. Finally, governments face the discipline of international capital markets in the event they make substantial policy missteps, i.e. in their domestic regulatory duties.

Nevertheless, the occurrences of recent crises underline that financial markets do not work as perfectly as economic theorists seem to believe. Practice does not corroborate the argument that investors have punished countries only when governments are following mistaken macroeconomic policies. In many cases, large capital inflows are succeeded by large capital outflows, with no significant reasons appearing in the interim that could justify such a shift (Caves et al. 2006). In addition, if international capital controls are removed prematurely, massive capital inflows might occur internally. For instance, liberalization in Chile resulted in a large trade deficit financed by a large increase in domestic borrowing, thus leaving the country with an excessive level of debt throughout the 1980s.

As with free trade, capital mobility has clear winners and losers. Investors are generally better off since they are faced with an expanded portfolio of investment options. On the other hand, increasing options for capital reduce those of labor, making it less costly for capital to move than to comply with labor demands (Frieden 1991). Furthermore, according to Heckscher-Ohlin, increased capital mobility will benefit capital where it is abundant, and hurt capital where it is scarce. As a rule, capital flows out of capital-rich countries, raising the return to (now scarcer) local capital, and flows toward capital-poor countries, lowering the return to local capital there. Hence, capitalists in capital-rich

countries in the developed world have arguably gained from increased capital mobility, while the opposite probably holds true for capitalists in capital-poor countries.

However, despite the theoretical prediction of capital moving from the more to the least developed counterpart, empirical observation suggests the opposite. According to Raja (2008):

The capital-poor developing world is lately exporting more capital to developed countries than it receives. ... In its Trade and Development Report 2008, UNCTAD said that the puzzle is all the more intriguing because many of these capital-exporting countries have been achieving higher rates of investment and growth than those that rely on the standard economic model of net capital imports. ... The beginning of the Millennium saw the shift of developing countries as a group from net capital importers to net capital exporters. Indeed, since the Asian financial crisis in 1997-1998, capital has increasingly been flowing “uphill” – from poor to rich countries. The magnitude of this new phenomenon has caused some observers to conclude that some developing countries have been creating a global savings glut. The emergence of developing countries as net capital exporters contrasts with expectations derived from standard growth theories. These theories postulate that with open capital markets, capital will flow from rich to poor countries in order to exploit the higher expected rates of return on capital and bridge the “savings gap” in capital-scarce countries. The theories also predict that capital inflows will spur economic growth. However ..., these predictions are not supported by developments over the past few years. Not only is capital flowing “uphill”, but net capital-exporting developing countries also tend to grow faster and invest more than those developing countries that receive net capital inflows. Thus, higher rates of investment for diversification and structural change do not always require current-account deficits or net capital inflows, as suggested by standard economic models. Indeed, many developing countries, particularly in Latin America, failed to achieve higher productive investment under the mainstream approach because the monetary and financial policies that attracted waves of capital inflows also led to high domestic financing costs and to currency appreciation. [Finally], these developments also call into question another hypothesis of standard economic theory, namely that there is a close and positive relationship between capital account liberalization and economic growth.

A similar theoretical assertion as the one made about capital in capital-rich countries could be made for labor in capital-poor countries – that in fact capital mobility empowers them by increasing investment in labor-intensive activities – but Frieden (1991) argues that this argument is not really clear-cut. While the Heckscher-Ohlin model might be useful with respect to identifying long-term economic trends, it might not be the best tool for analyzing the near-term distributional effects of international capital movements. Frieden (1991) identifies a different conceptual model for analyzing the winners and losers of financial integration. His model follows a sectoral approach to political economy rather than a class-based approach like that of Heckscher-Ohlin. The model predicts that in the developed world, winners (and thus supporters) of financial openness include the owners and managers of financial assets and multinational firms with internationally diversified investments. On the other hand, participants of “specific” industries, especially those tied to a particular national market, are amongst the losers of increased capital mobility. In broad terms the model indeed predicts the patterns of political activity on the issues in question. In the United States, for instance, the country’s

financial centers and its internationally-oriented nonfinancial corporations were among the major proponents of financial deregulation. On the contrary, domestic manufacturing and farm interests have either been ambivalent or even hostile (Frieden 1991).

6.3 Towards a New Bretton Woods?

However, the situation appears to be different today. The 2008 Financial Crisis has led to an increasing number of voices demanding for a more “fair” and “stable” international financial system. We have reached a certain point where, as Wolf (2008a) notes, “ambitious leaders call for a new Bretton Woods.” However, is a new Bretton Woods attainable? Perhaps it is, but probably not under the “fierce urgency of now.” The original Bretton Woods agreement, despite having taken place during a period when the outcome of World War Two was far from certain, was a product of two years of extensive preparation. It is not clear that an agreement could actually be reached today with respect to the exact nature of a novel financial architecture. The Europeans, through the statements of their national governments, are pushing for the creation of new global regulators for the international financial system. The Americans and the Chinese, however, despite a change in administration in the first case, should still be expected to be cautious of such a development (Rachman 2008). In addition, it is very unclear if a country like China would accept changing its reserve accumulation policy to fit the needs of the US or the UK.

Another point that should be made is that multilateral institutions such as the IMF, the World Bank, and the UN were the product of America’s strength in 1944-45. Gideon Rachman (2008) suggests that “one of the reasons Bretton Woods worked was that the US was clearly the most powerful country at the table, and so ultimately was able to impose its will on others, including an often-dismayed Britain.” Contrary to Rachman’s view that unlike 1944, the US “lacks the power and the inclination to impose a new set of arrangements on the rest of the world,” the election of the incoming administration represents, perhaps, a defining moment, where the realm of possibility appears significantly expanded, and the “soft power” of the US seems augmented. If the Obama administration comes to the table with increased authority, it could perhaps forge a politically difficult agreement.

What could a Bretton Woods II agreement consist of? First, one needs to approach the subject with a certain degree of humility. As the Economist magazine readily points out, “international finance cannot just be “fixed,” because the system is a tug-of-war between the global capital markets and national sovereignty.”³⁹ In general, the most “globalized” component of the international economy, finance, appears to be its weakest link. Some have argued that the crisis we are facing is essentially the outcome of the mismatch of international financial markets and national regulation and control measures (Frieden 2006). Hence, if a new comprehensive architecture were to be proposed, some version of a global financial regulator, or a global lender of last resort, would be vital.

³⁹ The Economist, (2008). Redesigning Global Finance, November 15 2008

Today, non-coordinated national supervisors, in some cases even state-based, oversee regulated financial firms, while the “shadow” financial system⁴⁰ is largely unregulated. International differences in regulation led to what *The Economist* (2008) calls “regulatory arbitrage.” The big lesson of the 2008 Financial Crisis is that policy-makers did not understand the nature of the financial system when they were engaging in extensive deregulation. Hence, instead of just re-regulating domestically, the new administration should propose reforms of financial structure and regulation at both the domestic and the international level, with less speculation and more real investment.

⁴⁰ This is a term coined by/borrowed from Krugman (2009).

7. Policy Options for a Transition to Sustainability

The financial crisis of 2008 has increased the number of voices calling for a comprehensive transformation of the economic system. At the same time, however, there is lack of a clear vision of what such a transformation could entail.

As elaborated earlier, the world's population has, on average, achieved a higher standard of living that would have been inconceivable for earlier generations. However, this vast improvement has been achieved at a significant price: a huge increase in the consumption of energy and raw materials, elevated levels of pollution and a wide spectrum of social problems (Ponting 2007) as well as unjustified borrowing from the future. Furthermore, as Clark (2007) has explained, this increase in the average standard of living hides the fact that many nations and citizens, especially in the sub-Saharan Africa, actually saw a decrease in their standards of living (Clark, 2007).

In broad terms, the opportunity before societies right now is to make a historic shift in their carbon dependence, that would characterize a transition away from a “low entropy” economy based on consumption, to a “high-entropy” economy based on sustainability. Further, consumption of both energy and material resources is not sustainable on a global scale.

7.1 Crisis and Opportunity

While this work is being written, the consensus is that the world is experiencing the worst economic crisis since the 1930s. In essence, what the world is facing today is what many would describe as a “Minsky” moment. The late-economist Hyman Minsky asserted in his 1986 work “Stabilizing an Unstable Economy” that an extended period of rapid growth, low inflation, low interest rates and macroeconomic stability did not constitute an equilibrium but bred complacency and an increased willingness to bear risks (Minsky 1986). Instability, in his view, was a hidden element of stability – and an undue faith in unregulated markets, along with securitization, off-balance-sheet financing and other financial innovations would create a particularly dangerous and disruptive mix.

Galbraith observed in “A Short History of Financial Euphoria” that “the more obvious features of the speculative episode are manifestly clear to anyone open to understanding (and) especially so after the fact” (Galbraith 1990). After all, it was only back on July 19 2007, that the Dow Jones Industrial Average had risen above 14,000 points for the first time in its history (Krugman 2009). Less than a month later, however, the French bank BNP Paribas suspended withdrawals from three of its funds. According to Krugman, this was the moment “ the first great financial crisis of the twenty-first century had began” (Krugman 2009).

The exact characteristics of the 2008 crisis can potentially tempt one to observe that this crisis is like nothing we've ever seen before. This is, after all, what expert figures such as George Soros seem to assert (Soros 2008). A perhaps more accurate observation,

however, would lead us to the conclusion that this crisis is exactly like everything we have seen before, only simultaneously: a real estate bubble, reminiscent of Japan at the end of the 1980s; a wave of bank runs similar to those of the Great Depression in the early 1930s (but which mainly involved the “shadow” banking system of derivatives hedge funds etc. rather than conventional banking organizations); a liquidity trap in the US, again similar to what happened in Japan; and finally a disruption of international capital flows and a wave of currency crises, comparable to what happened to East Asia in the late 1990s (Krugman 2009).

It is important to underline however that more than anything else, the 2008 crisis is the outcome of a culmination of problems inherent to the unsustainable nature of the economic system. Some facts are particularly elucidating. As Walker (2009) notes, between 1951 and 1983, consumption remained within the range of 60-64 per cent as a proportion of GDP. However, since 1983, consumption grew to 66 per cent in 1990, 68 per cent in 1998, 70 per cent in 2001 and 71 per cent by the end of 2007 (Walker 2009). It is particularly interesting to observe the evolution of the savings rate and the trade deficit as consumption was increasing. Walker (2009) cites an analysis by Wen and Shimek (2007) which states that the trade deficit was at a maximum of 1 percent of GDP until 1983, and then moved to 3 per cent in 1986, decreased again during the recession of 1991-1992 and then rose up to 5 per cent in 2004 where it has remained. At the same time, savings fell from 10 percent of GDP in 1980 to 0.4 percent in 2006, household consumption’s share of disposable income grew from 87.5 per cent to 95.8 percent and revolving credit (mainly credit cards) grew from about 2.7 percent of personal income to 9.8 percent of personal income (Walker 2009, Wen and Shimek 2007).

These numbers seem to match significantly. As Wen and Shimek note, the increase in the trade deficit (\$762 billion), the increase in consumption’s share of personal income (\$802 billion) and the increase in revolving credit outstanding (\$800 billion) are strikingly similar (Wen and Shimek 2007). The 2008 crisis has of course had its effect on these figures and consumption has declined by 3.7 percent in the third quarter of 2008, while savings have started moving upwards (Walker 2009)⁴¹. However, contrary to Walker’s (2009) interpretation, it’s not necessary for this short-term response to the crisis to constitute a significant cultural shift, which will be essential for a transition to a more sustainable economic model.

Apart from the structural shift in consumption, savings and trade, the US economy has also experienced a growing imbalance in the relationship between business and government, especially during the last 30 years. In the 1950s, Galbraith (1952) coined up the term “countervailing power” to describe the idea that in market economies, both government and organized labor must be strong in order to balance the power of large corporations. Galbraith’s analysis dictated that economic life was not governed by small

⁴¹ This element corroborates the fears of those commentators who have a structural preference for infrastructure spending instead of tax cuts. A central irony of the crisis is that the consumption vice becomes a virtue in the Keynesian space, since more spending is necessary to come out of the crisis. Increased savings, on the other hand, will be a sine-qua-non of sustainable development, but this is an “equilibrium” condition, under a different growth regime.

firms battling one another through price competition to serve consumers, but by large corporations in oligopolistic markets, that had the power to dictate the terms of their engagement with both buyers and suppliers (Auerswald and Acks 2009). Galbraith believed that the dominance of large corporations in the economy would lead to a countervailing response from workers and consumers that would decrease their influence. At the same time, government would be the force responsible for balancing interests in markets and moderating the adverse effects of business cycles (Auerswald and Acks 2009).

This balance was termed by many as the “Iron Triangle”, however it was not meant to last, as the organizational realities of mid-twentieth century were going to change in the coming decades. In the mid-1970s, rising inflation and unemployment, high energy prices, increasing international competition, and the fall in innovation and productivity were forces that undermined the profitability of large corporations and started changing the balance of the “Iron Triangle” (Auerswald and Acks 2009). The deregulatory measures of the Reagan administration were the beginning of the end for countervailing power. In the financial industry, deregulation along with the emergence information technologies drove new innovative business models. While these models had certain positive effects in the short-run, their complexity increased while government supervision eroded. The consequences of that have never been more pronounced than in today’s financial crisis⁴².

7.2 An Alternative International Financial Architecture

The financial crisis of 2008 has exemplified in the minds of even the most fervent defenders of the existing international financial order that changes in the international financial architecture are essential.

In general, it is difficult to distinguish between the purely domestic and the purely international in terms of the policies that will need to be adopted on behalf nation states. In fact, in a world of free trade and low or nonexistent- capital controls, a domestic fiscal expansion can, among other things, increase demand for imports, which can significantly help the prospects of other economies. According to Frankel, it was the 1967-1972 US fiscal expansion that led to, or at least accelerated, the crash of the Bretton Woods system in 1973 (Frankel 2007). If monetary policy is essentially non-coordinated, then investors and speculators can move their capital to the countries with the highest interest rates, for a given level of risk. Hence, a certain level of coordination, especially during times of crisis, needs to characterize both fiscal and monetary policies.

⁴² Of course the “Iron Triangle” was probably destined to collapse despite government policy. Galbraith’s observation was particularly valid in the 1950s, where large corporations were indeed dominant. However, despite the fact that some corporations are still large today, the economy of the 21st century is highly networked and distributed. In most cases, large corporations are not any more economically dominant to dictate the terms of engagement with buyers and suppliers (Auerswald and Acks 2009). As Auerswald and Acks (2009) point out, this is all the most obvious by the fact that government’s greatest challenge at the moment is not restraining the biggest firms, but keeping them afloat.

Pertaining to this discussion, one needs to shed some more light to specifics. The world, indeed, appears to have run out of creditworthy private borrowers. Governments, through increased fiscal deficits, can play this role in the short-run by replacing private sector borrowers. However, this does not constitute a sustainable policy prescription. As Martin Wolf (2008b) notes, “if (current account) surplus countries do not expand domestic demand relative to potential output, the open world economy may even break down.”

The emergence of significant current account imbalances constitutes an important variable of the crisis, which needs to be taken into account in any policy prescription. In 2008, according to forecasts from the IMF, the aggregate excess of savings over investment in surplus countries will be over \$2,000 billion. The countries with the highest savings are China (\$399 billion), Germany (\$279 billion), and Japan (\$194 billion), along with oil exporting countries (Wolf 2008c). At the same time, the big current account deficit countries are the US, Spain, the UK, France, Italy, and Australia, with the US being by far the biggest borrower among them (Wolf 2008b). In fact, these six countries represent almost 70 per cent of the world’s deficits (Wolf 2008a).

The sum of net foreign lending (gross savings less domestic investment) and the government and private sector financial balances must be zero. In the case of the US, the counterparts of net foreign lending were mainly fiscal deficits, along with government and household deficits (Wolf 2008b). During recessions, the government deficit increases and the private sector deficit retracts, with the existence of a housing boom making huge household deficits possible in many of the deficit countries mentioned (US, UK, Spain, Australia, etc.). However, at this point of crisis, with households and businesses cutting back, government deficits are expected to explode. So, as Wolf underlines, “this is the endgame for the global imbalances” since deficits aimed at sustaining aggregate demand at time of crisis will be added on top of the fiscal costs of rescuing bankrupt banking systems (Wolf 2008a).

Sooner or later, the willingness of surplus countries to absorb government paper and the liabilities of central banks will reach a plateau. The probability of facing a crisis will be particularly elevated. For crisis to be averted the private sector of the deficit countries will need to be able and willing to borrow, or the economy must be rebalanced with stronger external balances and smaller domestic deficits (Wolf 2008b). Given the characteristics of the current crisis at hand, an increase in private debt seems not only unrealistic but also lethal. Hence, a **US expansion in net exports**, which took place during recent years, must continue, a scenario that is not overly realistic given the recent dollar appreciation and the nature of the global financial downturn.

The above analysis makes the case that the current financial crisis is, to some extent, a byproduct of increasing current account deficits on behalf of the US. Hence, this significant imbalance will need to be in some way alleviated in order to avert further global financial turmoil. Unfortunately, the probability that a country like the U.S. will significantly rebalance its current account does not seem particularly realistic. Hence, attention needs to shift on the other side of the equation. In normal times, current account surpluses of countries that follow mercantilist policies (China – which keeps its currency

artificially low through foreign currency intervention policies) or that are structurally mercantilist (Germany and Japan – which have a chronic excess of output over spending) can perhaps even be useful (Wolf 2008a). However, in times of recession and insufficient aggregate demand, these policies are perilous and contractionary.

It becomes more obvious, therefore, that **surplus countries must expand domestic demand relative to potential output**, or – in other words – **spend more at home** in order to stabilize the global economy. Global imbalances are hurting the international financial system, and it is in the interest of the surplus countries to be accommodating in their policy approach. After all, if the surplus countries do not act, they should not be surprised if the deficit countries resort to protectionist measures in order to alleviate their troubles. The expansion program announced by the Chinese government in early November 2008 is exactly in that spirit (Wolf 2008c). Hence, the immediate way to deal with this challenge is to demand and coordinate a global fiscal stimulus in which the surplus countries will implement the biggest packages (Wolf 2008c).

In addition to the aforementioned remedies, the fundamental reform of additional elements that made this crisis possible is essential. Krugman (2008) notes that “growing international capital flows set the stage for devastating currency crises in the 1990s and for a globalized financial crisis in 2008. The growth of the shadow banking system, without any corresponding extension of regulation, set the stage for latter-day bank runs on a massive scale. These runs involved frantic mouse clicks rather than frantic mobs outside locked bank doors, but they were no less devastating.”

Therefore, a **higher level of transparency in the financial sector, and specifically in the “shadow” banking sector**, should be amongst the first steps. Transparency should be understood as the better provision of financial information, in a similar manner that corporations in the United States are required to provide accurate public reports of their financial positions. Increased transparency has the potential to reduce the tendency of very elevated levels of capital rushing into a country under favorable financial conditions and flowing out in times of stress.

Stronger banking systems are also essential. The severity of the Asian financial crisis of the 1990s was due to the fact that the currency crisis was associated with bank runs (Krugman and Obstfeld 2003). Had the banking institutions been stronger, it is quite possible that the situation could have been milder. A stronger banking system denotes a more closely regulated banking system with increased capital requirements in order to alleviate moral hazard on behalf of the bank owners. As Gao Xiqing, President of the China Investment Corporation underlines, “Thirty years ago, the leverage of investment banks was like 4-to-1, 5-to-1. Today it’s 30-to-1. This is not just a change of numbers. It’s a change of fundamental thinking” (Fallows 2008). The same point has been made by Solow (2009), who argues that a shift from 10-to-1 to 30-to-1 has occurred, a level reached by Bear Sterns and Lehman Brothers. Since the 1930s, commercial banks in the US have been required to possess adequate capital, hold reserves of liquid assets that can be quickly converted into cash, and limit the types of investments they make, all in return

for federal guarantees in the occasion of a crisis (Krugman 2008). Comparable regulation will need to be put in place for the “shadow” banking system as well.

This point is also made by Soros (2008), who makes the case that **variable margin requirements** and **minimal capital requirements** that are meant to control the amount of leverage market participants can employ should also be instituted. As he notes, “Central banks even used to issue guidance to banks about how they should allocate loans to specific sectors of the economy. Such directives may be preferable to the blunt instruments of monetary policy in combating irrational exuberance in particular sectors, such as information technology or real estate” (Soros 2008). However, in order to employ such requirements, financial engineering⁴³ should also be regulated, and new products should be registered and approved by the appropriate authorities before they can be used.

Moving along the same lines of securing the stability of the financial system, **what is fragile should break early**, while it is still small. No corporation or economic entity should ever become too big to fail. As Taleb (2009) notes, evolution in economic life helps those with the maximum amount of hidden risks, and thus the most fragile, become the biggest. This of course a long-term goal for an international financial system, away from its present state of socialization of losses and privatization of gains. At this point, nationalization seems like the most prudent option for the entities that are too big to fail, while the entities that do not need a bail-out should be “free, small and risk-bearing” (Taleb 2009).

Finally, **enhanced credit lines** that nations could draw from in the event of a credit crisis, adding to their foreign exchange reserves, would also help moderate the likelihood of having a credit crisis, along with diminishing its potential effects in case such a crisis becomes unavoidable.

Returning to a world of low capital mobility neither constitutes a political reality, nor is a development that nations should seek. The most realistic and effective option would be the adoption of **coordinated policies that would modify the composition of capital inflows**, rather than completely discouraging them. In general, the higher the reliance on foreign-currency borrowing that is short-term or intermediated through banks, the higher the probability of having a crisis, since short-term flows are prone to moral hazard and asset mismatch (Krugman and Obstfeld 2003). On the other hand, policies that would seek to shift the composition of capital inflows, instead of affecting their total level, would be significantly beneficial. These policies would include taxes or restrictions on short-term inflows, along with a set of measures that would place incentives for foreign direct investment and longer maturities.

A success story, in this regard, is Chile. Chile imposed a tax on inflows in 1991. This tax took the form of a requirement that a percentage of any foreign borrowing be left in a non-interest-bearing deposit maintained at the central bank for up to one year. Additionally, a requirement was put in place that all FDI must remain in the country for at least one year. These controls were successful in changing the composition of the

⁴³ Financial engineering refers to the creation of new financial instruments, such as derivatives.

capital inflows to Chile in the 1990s in the direction of longer-term maturities while having a minimal effect on the total magnitude of capital inflows (Edwards 2000). Hence, countries should aim for increased foreign direct investment and long-term inflows relative to debt and portfolio capital inflows. Nevertheless, if such a policy is implemented on a country-by-country basis, then this will do little to avert a future crisis – it will only better protect the set of countries that adopt such measures and only up to a certain degree. Policy coordination again appears to be at the epicenter.

Another possibility that should be explored is the adoption of a measure similar to what is now called the “**Tobin Tax.**” The Tobin Tax, which was proposed by the late Nobel-laureate James Tobin, essentially entailed a very low tax imposed on each individual currency transaction. This measure would have two fundamental effects: first, it would reduce currency speculation by “throwing sand in the wheels” of the financial system, and perhaps make it easier for governments to pursue their own monetary and fiscal policies without excessive concern about the exchange rate; second, it would also raise significant amounts of revenue, which could be used for activities such as financing development assistance or alleviating the debt of the developing world (Wolf 2004). Whether such a measure would indeed be beneficial is still debatable. Economists such as Martin Wolf think that it would actually be a bad idea, since in his view, the tax would not prevent big jumps in the exchange rates, and by reducing hedging activity, might eventually increase volatility (Wolf 2004). Others, such as investor George Soros do not share this view and believe that some variation of tax would actually be significantly beneficial (Soros 2001). In any case, “throwing sand in the wheels” is exactly one of the things that the financial system seems to need right now, so any measure that proposes to do so should be thoroughly examined.

7.3 Sustainability in Practice: The Cases of Kerala and Costa Rica

The Indian state of Kerala, on the southern Indian coast, has been one of the most widely cited cases successfully practicing sustainable development (Parayil 1996). Kerala is one of the 25 constituent states of India, with a population of 32 million people, occupying about 1% of the total land area of the country. A series of statistics make Kerala one of the most interesting case studies in sustainable development and of alternative paths to social and economic development. Life expectancy for the average Keralite is 74 years, 11 years more than the average Indian life expectancy of 63 years, and approaching the average US life expectancy of 77 years (Deparle 2007). Furthermore, Kerala has a literacy rate of 91% compared to an Indian average of 65% (Deparle 2007). This number is not too far from the US, where 99% of the population is literate.

According to Parayil (1996) “[t]hough Kerala has a low throughput, the indicator of social progress have not suffered because of sustained efforts to limit population growth and social inequality, to conserve resources frugally and to use them on a shared basis.”

A particularly interesting fact of Kerala’s development lies in the fact that it is completely hidden from the GDP per capita statistics. As Parayil (1996) notes, states with per capital income higher than that of Kerala fared much worse than Kerala in social indicators of development. In 1991-92, Punjab which had a GDP per capita twice that of Kerala, had

33 PQLI (Physical Quality of Life) points less than that of Kerala, underscoring the limitations of the GDP and the GDP per capita statistics with respect to economic and social development (Parayil 1996).

None of these outcomes occurred by chance. On the contrary, these are the direct result of a set of policy choices by Kerala's liberal administrations, which have a policy priority of investing in a welfare state. Kerala spends 46% more on health and 36% more on education than the average Indian state (DeParle 2007). Hence, if there is one first point to be made about the Kerala model, is that it constitutes a clear example of how the quality of life of the citizenry can be improved through government intervention in the economy, without a primary focus on encouraging economic growth.

The model, however, appears to have limitations. Kerala has been suffering by elevated rates of sustained unemployment, with many Keralites preferring to work in jobs at the Persian Gulf, where salaries are understandably higher. Unemployment is presently 20%, with one out of six working abroad and who mostly work in the Arab emirates and augment the state's economic output by 25%. With all its achievements with respect to the welfare state, Kerala has a per capita income of \$675, while India's nationwide per capita income is \$730 (DeParle 2007). But more importantly, the dispersion of income (and wealth) is much less than in other Indian states.

While Kerala appears to be poor from an Indian comparison, the average income statistics do not take into account the socially important non-monetizables: average life expectancy, education, healthcare, etc. Nor do the average figures reveal the dispersion of wages or wealth in other Indian states. A more complete set of criteria of success should include not only environmental stewardship, but also political, social and economic justice, along with the improvement in the quality of life of the most vulnerable section of the population and the improvement of women's rights in the society (Parayil 1996).

In light of Kerala's huge successes in education and healthcare, one must be reserved in criticizing the model, and draw the appropriate lessons from Kerala for sustainable development. If there exists one conclusion which seems indisputable, it is that widespread poverty does not exist, giving one pause to think about whether concentrated wealth can exist without pockets of manifest poverty in a growth-oriented economy. Parayil (1996) observes "the 'Kerala model' is not based on any one of the existing theories or models of development and modernization" and that it "should be studied earnestly for improvements and possible replication." The view that perhaps best encapsulates the success of Kerala is that of Samir Amin (1991), who notes that "Kerala's achievements are the best way to prepare for the next stage, if only because they result in strong popular organization, and give reasons for hope, and something to guard." While otherwise positive about Kerala, Parayil (1996) is realistic in noting that "[t]he fact that industrial and agricultural growth has to be achieved to improve the material standards of living for all Keralans is undeniable; [b]ut the high indicators of social development and a high literate populace are conducive to rapid industrialization of the state which is essential for creating more jobs and material outputs to meet local needs."

Costa Rica has been increasingly gaining publicity for the sustainable character of its policies. More than 25 per cent of the country's landscape is a protected area, due to a set of policies meant to preserve and protect its cornucopia (Friedman 2009). Friedman (2009) notes the following with respect to the Costa Rican Model of Development:

“[Costa Rica] has created a holistic strategy to think about growth, one that demands that everything gets counted. So if a chemical factory sells tons of fertilizer but pollutes a river — or a farm sells bananas but destroys a carbon-absorbing and species-preserving forest — this is not honest growth. You have to pay for using nature. It is called “payment for environmental services” — nobody gets to treat climate, water, coral, fish and forests as free anymore.

The process began in the 1990s when Costa Rica, which sits at the intersection of two continents and two oceans, came to fully appreciate its incredible bounty of biodiversity — and that its economic future lay in protecting it. So it did something no country has ever done: It put energy, environment, mines and water all under one minister.

“In Costa Rica, the minister of environment sets the policy for energy, mines, water and natural resources,” explained Carlos M. Rodríguez, who served in that post from 2002 to 2006. In most countries, he noted, “ministers of environment are marginalized.” They are viewed as people who try to lock things away, not as people who create value. Their job is to fight energy ministers who just want to drill for cheap oil.

But when Costa Rica put one minister in charge of energy and environment, “it created a very different way of thinking about how to solve problems,” said Rodríguez, now a regional vice president for Conservation International. “The environment sector was able to influence the energy choices by saying: ‘Look, if you want cheap energy, the cheapest energy in the long-run is renewable energy. So let’s not think just about the next six months; let’s think out 25 years.’”

As a result, Costa Rica hugely invested in hydro-electric power, wind and geo-thermal, and today it gets more than 95 percent of its energy from these renewables. In 1985, it was 50 percent hydro, 50 percent oil. More interesting, Costa Rica discovered its own oil five years ago but decided to ban drilling — so as not to pollute its politics or environment! What country bans oil drilling?

Rodríguez also helped to pioneer the idea that in a country like Costa Rica, dependent on tourism and agriculture, the services provided by ecosystems were important drivers of growth and had to be paid for. Right now, most countries fail to account for the “externalities” of various economic activities. So when a factory, farmer or power plant pollutes the air or the river, destroys a wetland, depletes a fish stock or silts a river — making the water no longer usable — that cost is never added to your electric bill or to the price of your shoes.

Costa Rica took the view that landowners who keep their forests intact and their rivers clean should be paid, because the forests maintained the watersheds and kept the rivers free of silt — and that benefited dam owners, fishermen, farmers and eco-tour companies downstream. The forests also absorbed carbon.

To pay for these environmental services, in 1997 Costa Rica imposed a tax on carbon emissions — 3.5 percent of the market value of fossil fuels — which goes into a national forest fund to pay indigenous communities for protecting the forests around them. And the country imposed a water tax whereby major water users — hydro-electric dams, farmers and drinking water providers — had to pay villagers upstream to keep their rivers pristine. “We now have 7,000 beneficiaries of water and carbon taxes,” said Rodríguez. “It has become a major source of income for poor people. It has also enabled Costa Rica to actually reverse deforestation. We now have twice the

amount of forest as 20 years ago.”

As we debate a new energy future, we need to remember that nature provides this incredible range of economic services — from carbon-fixation to water filtration to natural beauty for tourism. If government policies don’t recognize those services and pay the people who sustain nature’s ability to provide them, things go haywire. We end up impoverishing both nature and people. Worse, we start racking up a bill in the form of climate-changing greenhouse gases, petro-dictatorships and bio-diversity loss that gets charged on our kids’ Visa cards to be paid by them later. Well, later is over. Later is when it will be too late.”

While the two models presented here have significant differences, both have important characteristics of sustainability in the policies that they have chosen to pursue. The Kerala model focuses on a series of parameters aside GDP growth, such as literacy rates, education, health. At the same time, the Costa Rican model places any growth considerations inside the context of environmental protection and preservation. In general, could a growth model that would combine the positive aspects of Kerala and Costa Rica, without the increased unemployment of Kerala, and which would be applicable for states with less biodiversity than Costa Rica, be realistic? Whatever the case might be, both Kerala and Costa Rica deserve to be closely studied and monitored.

7.4 Reconceptualization of the Economy: An Ecological Paradigm

In tandem with the significant economic and financial imbalances, the ecological situation, as elaborated in section 4.5 is also particularly problematic, and is a direct consequence of our industrial systems. Kallis et al. (2009) put forward an alternative framework for studying the financial crisis of 2008. According to their analysis the economy must be analyzed at three levels (from top to bottom):

- The Financial Level
- The Real Economy
- The “Real-Real” Economy

As Kallis et al. (2009) note:

“At the top there is the financial level that can grow by loans made to the private sector or to the state, sometimes without any assurance of repayment as in the present crisis. The financial system borrows against the future, on the expectation that indefinite economic growth will give the means to repay the interests and the debts. Then there is what the economists describe as the real economy, the GDP at constant prices. When it grows, it indeed allows for paying back on some or all the debt, when it does not grow enough, debts are defaulted. Increasing the debts forces the economy to grow, up to some limits. Then, down below underneath the economists’ real economy, there is what the ecological economists call the “real-real” economy, the flows of energy and materials whose growth depends partly on economic factors (types of markets, prices) and in part from physical and biological limits. The “real-real” economy also includes land and capacity of humans to do work.”

The ecological approach to the present crisis states that the level of finance grew too large and too fast for the real economy to adapt. The financial system also increased the debts too much, in the absence of coherent regulation, and this expansion of credit lines was mistaken for real wealth (Kallis et al. 2009). At the same time, , the economy is not a

closed system, but operates within certain ecological limits and biophysical constraints, which condition the rate at which real wealth can increase. This analysis reminds that of Polanyi (1944) who placed markets within social systems, rather than independent “value-neutral” entities.

In general, energy resources appear to be having an increasingly pivotal importance around the world. As Klare (2001) notes, ever since the end of the Cold War, political analysts of different persuasions have attempted to identify the “defining principle of the new international environment”. While there have been many competing theories about this new defining paradigm, such as Samuel Huntington’s “Clash of Civilizations”, Robert Kaplan’s return of Malthusian dynamics and Tom Friedman’s “flat world”, Klare is correct to note that “the fervent pursuit of resource plenty in total disregard of any civilizational loyalties” appears to have a much more significant explanatory power with regards to contemporary international dynamics (Klare 2001).

The dominant neoclassical economic paradigm, assumes the existence of utility functions, which constitute the foundation of production and consumption functions. These functions act as simplified abstractions of economic decisions. In the consumption-production framework, every material product in the system is produced by other products made within the system, plus exogenous capital and labor (Ayres 2009). A particularly interesting observation, made by Ayres and Warr (2009) but also by Georgescu-Roegen (1971) is that this model of the economy displays a characteristic neglect of energy and material flows.

As Daly (1991) notes, standard economics does not ask the question of what the size of an economy relative to the ecosystem should be. In fact, standard economics is actually indifferent to the scale of aggregate resource use, focusing instead on the optimal allocation of resources among alternative uses (Daly 1991).

One of the earliest, fundamentally intuitive approaches to understanding environmental problems came from the “**I = PAT**” formula (Ehrlich and Holdren 1971).

$$\text{Impact (environmental)} = \text{Population} \times \text{Affluence (GDP per capita)} \times \text{Technology (environmental impact per dollar of GDP)}$$

Ashford and Hall (2010) note that since the publication of the I = PAT formula, a number of revisions have been proposed. For example, Holdren et al. (1995) adjusted the formula to disaggregate affluence from resource use and to separate measures of the ‘stress’ that technology imposes on the environment from measures of actual damage, which depend upon stress and ‘susceptibility.’ The measurement of susceptibility is predominantly a function of cumulative damage from previous environmental stress. Thus, the revised formula is:

$$\text{Damage (environmental)} = \text{Population} \times \text{Economic activity per person (affluence)} \times \text{Resource use per economic activity (resources)} \times \text{Stress on the environment per resource use (technology)} \times \text{Damage per stress (susceptibility)}$$

It is important to acknowledge that formulae such as these constitute simple representations of complex systems. They are informative and can help stimulate discussions about the causes of environmental degradation, but to argue whether or not they are ‘right’ is unwise (Holdren et al. 1995). What they indicate is that the magnitudes of all the factors need to be considered since these are multiplicative in their effects on environmental damage (Ashford and Hall 2010). However, we should also recognize the limitations of these formulae. They do not take into account the interdependencies or non-linearity that might exist between the factors, there is no explicit consideration of societal factors and how they can influence each variable, and they do not consider how each of the variables can change over time – which is especially critical for technological change (Holdren et al. 1995).

Given the inherent political difficulty in developing measures to curtail population growth or limit/reduce affluence and the associated levels of consumption, it seems that the easiest way to achieve a less environmentally destructive society is to focus on technological innovation. Indeed, the ‘technological fix’ has become a major or integral aspect of many theories put forward on how society can live within its ecological means (Ashford and Hall 2010).

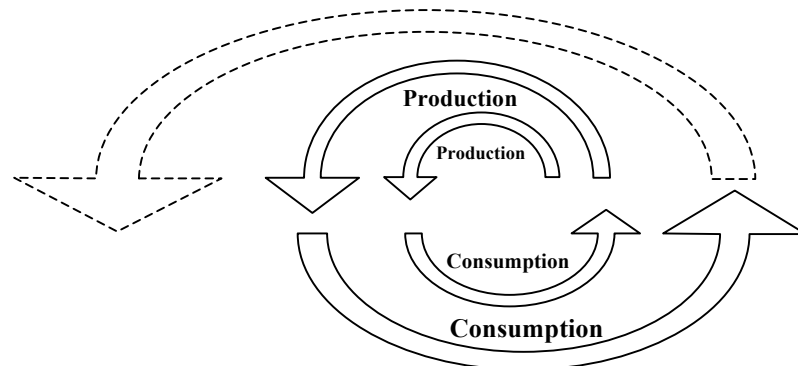
Two interesting developments in economics that treat technology differently are the idea of *substitutability* (Solow 1993) and the *steady-state economy* (Czech and Daly 2004; Daly 1991; 1996), which is part of the much broader view of *ecological/green/natural economics* (Costanza 1991; Lawson 2006; Ruth 2006).⁴⁴

Solow’s (1993) approach to sustainability is rooted in the idea that technology can create high degrees of substitutability between one resource and another and, implicitly, that natural and man-made capital are in some sense ‘fungible.’ This is what Ayres (2006)

⁴⁴ As Ashford and Hall (2010) note, the emerging field of *ecological economics*, which combines both the economy and technology with ecology, provides a holistic perspective of sustainable development (Costanza 1991). It studies the relationships between ecosystems and economic systems, encompassing both biological and cultural change. The human economy is seen as being part of a larger whole. Its domain is the entire web of interactions between economic and ecological sectors. Ecological economics defines sustainability in terms of natural capital - the ability of natural systems to provide goods and services, including clean air and water and climatic stability. Ecological economists propose that the vital role of natural capital (e.g., mineral deposits, aquifers, stratospheric ozone, etc.) should be made explicit in commodity production (Ayres 1996; Daly 1994). Thus, consumption should not deplete natural capital at a faster rate than it can be replaced by human capital. Daly’s notion of the steady-state economy views natural ecosystems as being finite and, therefore, focuses on the scale of human activity (i.e., the economy) that can be supported. Living (and producing) within ecological limits is the major focus of ecological economics. *Green economics* (Lawson 2006) and *natural economics* (Ruth 2006) build upon ecological economics, but focus more explicitly on informing/shaping political views and policy for sustainable economic development.

describes as the “weak” sustainability position, which essentially argues that all kinds of natural capital can be substituted by man-made capital. If resources are fungible, this means that society has no obligation to save a resource for future generations as long as an alternative resource is made available. Solow (1993, p. 182) argues that “*what we are obligated to leave behind is a generalized capacity to create well-being, not any particular thing or any particular resource.*” It follows that resources should be assessed as if they were savings and investments (i.e., we have a choice between current consumption and providing for the future through the investment of non-renewable resource rents).⁴⁵

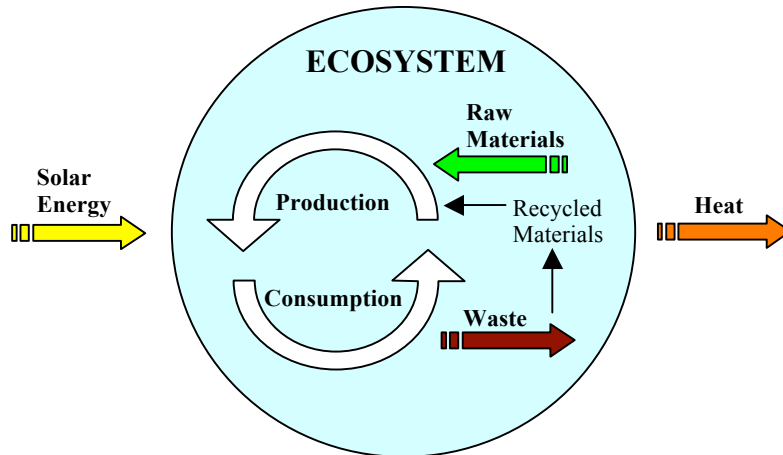
In contrast, Daly (1991) holds what Ayres (2006) calls a “strong” sustainability position, which entails that many of the most fundamental services provided by nature cannot be replaced by services produced by humans or man-made capital. Daly (1991) provides what is probably the most well-developed vision of an economy which functions within ecological limits. Arguing from the first principle of thermodynamics, Daly describes a steady-state economy (SSE) as one in which births replace deaths and production replaces depreciation. The objective of the SSE is to keep the throughput of raw materials (low entropy) and waste (high entropy) to levels within the regenerative and assimilative capacity of the ecosystem. Whereas neo-classical economics views the growth economy as a continual expansion of production and consumption (Figure 7.1), the SSE considers these cycles to be in equilibrium with the ecosystem (Figure 7.2).



Source: Ashford and Hall (2010).

Figure 7.1: Classical Economics View of Growing Cycles of Production and Consumption

⁴⁵ Ashford and Hall (2010) note that Solow (1993) describes resource rents as the investment of the pure return on a non-renewable resource. For example, in using up a natural resource such as oil in the North Sea oil field, the revenues that are intrinsic to the oil itself should be invested into new technologies that will eventually replace oil. Hence, investing the ‘rent’ from the non-renewable resource is seen as being an effective way to continue the current levels of consumption while providing for future generations.



Source: Ashford and Hall (2010).

Figure 7.2: Steady-State Economics View of Production and Consumption Cycles in Equilibrium with the Ecosystem

Within the SSE, technology, knowledge, the distribution of income, and the allocation of resources are fluid.⁴⁶ Since a fixed amount of resources will yield constant flows of goods and services (all else being equal), technological progress is one way in which more (or more highly valued) goods and services can be produced (Czech 2003; Czech and Daly 2004). However, given the laws of thermodynamics there are limits to what is technological feasible. Thus, there is a theoretical maximum size (an ecological carrying capacity) at which a steady-state economy may exist. This constraint implies that high-quality, long-lasting, and repairable goods are preferable to low-quality, short-lived, and disposal goods (Ashford and Hall 2010).⁴⁷

To help describe the SSE, Daly (1991) compares it to a steady-state library, where the addition of a new book would mean the removal of an old book. Thus, while the quantitative physical scale remains constant, the library would continue to improve in a qualitative sense. In this regard, Daly's view of the necessary technological fixes to environmental degradation is more conservative than Solow's (Ashford and Hall 2010). Rather than continuing business as usual and investing in future alternatives, Daly's focus is to develop new science/technology that reduces the environmental burden to rates within ecosystem limits and also extends human lives. Both viewpoints are quite different and represent contrasting views of the role that technology plays in development.

⁴⁶ In general, ecological economists, especially those focusing on steady-state economics, are concerned with the size of the economy relative to the ecosystem. The efficient allocation of resources is a concern, but it is not the primary focus as in neoclassical economics.

⁴⁷ While one could argue that an effective recycling process reduces the need to extend the lifespan goods, such as argument is weakened by the fact that [1] recycling processes use energy that reduce the available stock of terrestrial resources (assuming that the recycling process is not powered by solar energy) and [2] most recycling involves the degradation of material, which means it is only suitable for poorer quality goods. The latter point is often referred to as 'down-cycling.'

Ayres (2006) offers a critique to both “strong” and “weak” sustainability proponents. In his view, while the mathematics of Solow’s argument are “impeccable”, the underlying assumptions, or what Ayres calls “the physics”, are not. Ayres (2006) believe that “strong” sustainability proponents are right to point out the relevance of entropy law, the second law of thermodynamics and the impossibility of perpetual motion machines, however they are wrong to assert that human civilization is totally dependent on a finite stock of high quality (low entropy) resources stored in the earth’s crust. As Ayres (2006) points out, “the fact that much of our industrial base currently utilizes fossil fuels and high quality metal ores is merely due to the ready availability of these resources at low cost. It does not follow from the entropy law that there are not substitutes.” Nonetheless, Ayres (2006) concludes by saying that:

“[...] I have to reiterate that, while there is plenty of room for substitution and some possibility of major breakthroughs (e.g., in manufacturing room temperature super-conductors or carbon nanotubes) the pessimists – those who espouse the notion of “strong sustainability” appear to be closet to the truth than the optimists who believe in more or less unlimited substitution possibilities. “

In general, in this time of growing ecological and economic crisis, it becomes increasingly apparent that questions of ecology cannot be separated from questions of economics, and that building a truly sustainable future will necessarily involve new theories, new paradigms, new policies. Ecological and steady-state economics provide a first step in thinking about the economy and the environment in different terms. As old theories become obsolete in light of events with real consequences and a political economy both unsustainable and immoral, new paradigms will emerge.

7.5 Sustainable Policies for a Sustainable Future

Policy-making does not operate independently from a given economic and social context. As this work is being completed, the world is witnessing the biggest financial crisis since the great depression. However, each crisis encapsulates elements of opportunity, and a failed growth economy is perhaps the first step for a transition to a sustainable economy. Thus, Section 7.1 sets the context in which policy will have to operate in the near-term, by discussing the main elements of the Financial Crisis of 2008, along with the long-term trends that led to the crisis. Section 7.2 provided a set of options for an alternative international financial architecture. Focusing on responses to international finance and regulation, given the present situation is unavoidable. The international economy is highly globalized, and significant changes in the international financial system towards more stability and less speculation will be essential for a transition to sustainability.

Sections 7.3 and 7.4 shift the focus from the short to the long-term. Kerala and Costa Rica are two case studies of regional sustainability, which, while imperfect and incomplete, offer significant insights to how elements of sustainable development can work in practice. The point, however, is whether sustainability “can also work in theory”, -- to persuade economic development advisors. The different frameworks of ecological economics conceptualize the unsustainable nature of the international economy and provide the foundation for an alternative economic paradigm that does not just treat

environmental problems as externalities, but considers the physical limits of the ecosystem.

The question now turns to the set of policies that could enhance a transition to a more sustainable economy.

The transition to sustainability can either be evolutionary, or it can be revolutionary. Beddoe et al. (2008) advocate for an “evolutionary redesign of worldviews, institutions and technologies”. However, Kuhn (1962) in “The Structure of Scientific Revolutions” makes an opposite case. In his view, the evolution of scientific theory does not emerge from the straightforward accumulation of facts, but rather from a set of changing intellectual circumstances and possibilities (Kuhn 1962). Ashford and Hall (2010) have outlined a series of policies, programs, and initiatives influencing technological, organizational, institutional, and social innovation that could affect the *determinants* of the willingness, opportunity/motivation, and capacity of the relevant actors and institutions to change *in an evolutionary way*:

- Willingness
 - towards changes in production or services, in general (flexibility)
 - influenced by an understanding of the problem
 - influenced by knowledge of options or solutions (to encourage diffusion)
 - influenced by the ability to evaluate alternatives
- Opportunity/Motivation
 - gaps in technological/scientific capability (in existing markets)
 - possibility of economic cost savings in existing markets or new/expanded market potential (competitiveness)
 - regulatory requirements (making new markets)
 - consumer/worker/societal demand (making new markets)
- Capacity
 - influenced by an understanding of the problem
 - influenced by knowledge of options (to encourage diffusion)
 - influenced by the ability to evaluate alternatives
 - resident/available skills and capabilities (necessary for innovation)
 - role of outsiders (and the tolerance of deviants from the mainstream)

Encouragement of *revolutionary change* adds important determinants to an evolutionary approach (Ashford and Hall 2010):

- Willingness
 - **Crises/Tipping points/Visionary leadership**
 - towards changes in production or services (flexibility)
 - influenced by an understanding of the problem
 - influenced by knowledge of options or solutions (to encourage diffusion)
 - influenced by the ability to evaluate alternatives

- Opportunity/Motivation
 - **Crises/Tipping points/Visionary leadership**
 - gaps in technological/scientific capability (in existing markets)
 - possibility of economic cost savings in existing markets or new/expanded market potential (industrial competitiveness)
 - regulatory requirements (making new markets) ← **Changing the rules**
 - consumer/worker/societal demand (making new markets)

- Capacity
 - influenced by an understanding of the problem
 - influenced by knowledge of options (to encourage diffusion)
 - influenced by the ability to evaluate alternatives
 - resident/available skills and capabilities (innovation) ← **Building New Capacity**
 - role of outsiders ← **New actors, innovators, institutions, political agendas**

Crises (or tipping points) offer an opportunity for government, industry, firms, and society involving their planners, scientists, engineers, economists, lawyers, and others to promote new solutions. With regard to the 2008 financial crisis, there is currently a call for new (or re-) regulation, institutional arrangements, actors, technical capacity, and economic and political agendas. The old assumptions, rules, and arrangements are no longer deemed to be adequate. Similar realizations are needed regarding global climate change; other environment, health and safety challenges; and production, consumption and employment concerns. Crises -- or tipping point/overshoots (in the limits to growth context) – are system discontinuities. They may thus require revolutionary policy medicine.

While all stakeholders are important, government (with other stakeholder input) will have to play the leading role in setting an agenda for transformations to a more sustainable industrial system. A major and obvious reason for this is that the incentives faced by the private sector – some have even argued its primary legal obligation to stockholders – is to maximize profit, and in the process of doing that, the private sector tends to externalize the social costs of its activities, or at least does not engage in activity that does not improve its revenues or reputation (Ashford and Hall 2010). Only government has the potential to represent *all* the interests of the various stakeholders – and future generations – in the sense of both effective and fair intervention. Until the recent financial crisis and the impending global climate imperative, government intervention fell into disfavor, spawned by the Reagan and Thatcher revolutions and their aftermaths. Today, things seem to have changed dramatically.

In general, successful sustainability transformations require (Ashford and Hall 2010):

- transdisciplinary⁴⁸ expertise for their design and implementation;
- reconceptualizing the basis of the economy;
- the avoidance of agenda and pathway capture or 'lock-in' by incumbent actors and ideology;
- technological displacement and substitution of new for old technology. This could include (1) new products, (2) shifts to product services, (3) new production processes, (4) new or altered services, and (5) new systems;⁴⁹
- in some cases, displacement of not only the dominant products and technologies, but also the incumbent firms, and public institutions;
- co-evolution of technological and social systems – and institutions – complementary technological, organizational, institutional, and social innovations;⁵⁰
- the emergence of new ways to meet the basic needs of the society; and
- system changes that cut across problem areas – competitiveness, environment, and employment – and therefore also cut across sectors and firm divisions, as well as government departments and missions.

These are basic demands on transformations that are needed to achieve significant improvements in sustainability. These demands should, in turn will translate to successful policies, if the goal of sustainability is to be fulfilled.

The discussions on economic growth (Chapter 2) and on innovation, creative destruction and green jobs (Chapter 3) raise a series of points for domestic government policy, highly relevant for sustainable development. In particular⁵¹:

- Remove disincentives to hire labor.
- Promote incentives to utilize labor.
- Support research on mechanisms for job creation (i.e., including job design) that go beyond the usual fiscal and tax incentives.
- Deliberate enhancement of the desirable aspects of employment and job creation through labor standards and protections (e.g., for health and safety), continuing education and upskilling, tax incentives to employers, unemployment adjustment policies – including re-education, and unemployment and income guarantees.
- Stabilize the population.
- Introduce more stringent environmental regulations, which allow for the internalization of environmental costs.

⁴⁸ Costanza and Daly (1991), in advocating the approaches fundamental to ecological economics, argue that sustainability requires a trans-disciplinary approach, as does Jansen (2003). See Ashford (2004) for a clear distinction between multi-disciplinary thinking and trans-disciplinary thinking.

⁴⁹ According to Ashford and Hall (2010), system innovations may be evolutionary; quasi-evolutionary (niche developments nurtured/guided by government); co-evolutionary with changes in societal demand; or revolutionary (involving the setting of demanding targets, anticipating nascent future needs, and changing the rules of the game).

⁵⁰ See Butter (2002) and Butter and Montalvo (2002).

⁵¹ List partially adapted by Ashford and Hall (2010).

- Increase state investment in Green jobs, products and processes.

Some proposals with regards to the disincentives to hire labor have been around for decades, namely (1) not to finance health care on a per capita basis, but rather as a function of sales and (2) not to finance similar reforms of payroll taxes that act as an disincentive to hire additional workers (Ashford and Hall 2010). Furthermore, a series of incentives could be instituted for the increasing utilization of labor. Examples include tax credits for new hires, tax credits for providing training and upskilling, and tax credits/accelerated scheduled deductions for the employment of labor to improve the firm's health, safety, and environment (Ashford and Hall 2010). Standardizing a shorter work week while maintaining full wages could also be considered.

Stabilizing the population, in a state where births plus immigrants equals deaths plus out-migrants, is a key variable of sustainability (Daly 1998). Figure 3.1 has shown that the average GDP per capita had remained almost the same until the industrial revolution. In lack of any disruptive changes in technological innovation, any increases in economic welfare were absorbed by analogous increases in population. Some measures to control population growth would be necessary for a transition to sustainable development. Of course, as Sachs (2008) notes, fertility rates are a function of many variables, such as cultural norms, the availability of contraception methods, the educational opportunities and costs for children, the availability of social security etc. Policies to curb population growth include many possibilities and they range from the coercive Chinese system to complete *laissez faire* (Daly 1991). However, public policies designed to promote a *voluntary* reduction of fertility rates, according to Sachs (2008) can have an enormous effect to the wellbeing of present and future generations.

A series of different points were raised in the analysis of Green jobs. In general, a significant state investment in green jobs, technologies and processes will be a key element for a transition to a sustainable economy. However, as discussed in Section 3.6, most of the studies focus on the amount of jobs that will be created in the short-run (or during the transition) instead of a "steady-state" amount of jobs, especially after accounting for the jobs that will be displaced in the various fossil fuels industries. Nonetheless, if matched with employment protection measures and safety nets for the displaced workers, Green jobs will have a significant qualitative impact to society and to the economy. The introduction of Green products⁵² will create a significant amount of jobs during the transition, have a positive impact on workers' skills, decrease domestic and foreign consumption and be more environmentally and resource friendly. The displacement of Processes by Green processes⁵³ will have similar effects as those of Green products, but will be more environmentally friendly and require fewer resources. Additionally, a series of system changes in which Green jobs are involved will also be instrumental for such a transition. The decentralization of food production and agriculture, the modular construction of houses, the partial shift from manufacturing to

⁵² Green products are defined as more resilient and environmentally friendly products.

⁵³ A Green Process is any process with a) less worker, health and safety consequences and b) lower energy-intensity

re-manufacturing all constitute possibilities of systemic change that can have significant technology and policy consequences for sustainability.

Furthermore, the effects of growth (Chapter 4) and trade (Chapter 5) to sustainability were also examined in detail. The analysis conducted can lead to series of additional policy proposals:

- Reform or replace the GDP Growth Paradigm⁵⁴.
- Institute significant employment protection measures, such as the minimum wage, social safety nets and employment protection legislation.
- Propose an ecological tax reform (Daly 2008).
- Adopt an eclectic approach in national trade policy, in line with the country's specificities, comparative advantages and disadvantages and national interests.
- Move away from the Washington Consensus paradigm.

The institution of employment protection measures is key according to Ashford's conceptualization of sustainability (Ashford and Hall 2010). Equitable and meaningful jobs that create adequate purchasing power are a central element of a sustainable society. Furthermore, employment protection measures guarantee the wellbeing of the citizenry by removing some power from the hands of corporate actors, which has dramatically increased after the erosion of countervailing power and the collapse of Galbraith's "Iron Triangle" (Galbraith 1952).

The ecological tax reform is a notion advanced by Daly (2008), and which could prove highly beneficial for a transition to sustainability. Specifically, it would require a shift in the tax base "from value added (labor and capital) [...] "to that to which value is added", namely the entropic throughput of resources extracted from nature (depletion, through the economy, and back to nature (pollution)". Such a policy shift would internalize the external costs of pollution and ecological harm, but it would also raise revenue in a more equitable fashion, since it would price the "scarce, but previously unpriced contribution of nature" (Daly 2008).

National trade policy is also central from a sustainability perspective. International trade should not be considered a goal in itself, but as a means towards the goal of increasing the welfare of the citizenry. As noted in Chapter 5, almost all of the developing country success stories (China, India, the East Asian countries etc.) involved partial and gradual trade and capital liberalization. On the contrary, the regions that blindly followed the prescriptions of the Washington Consensus were the ones that faced the most severe consequences (Latin America, Africa). A country's trade policy should be eclectic, and take into account a series of national and external variables, such as the industries that will be harmed from trade openness and the capacity of the domestic market to reallocate/redeploy workers.

⁵⁴ Apart from the GDP alternatives explored in Section 4.1, Daly (2008) makes a different proposal: to separate the GDP into a cost account and a benefits account. These accounts should be compared at the margin and growth should stop when marginal costs equal marginal benefits.

Finally, a more stable international financial system (Chapter 6, Section 7.2) constitutes a sine-qua-non of a sustainable economy, and is, given the present situation, the first set of policies that will need to be adopted⁵⁵:

- Current Account Surplus countries need to spend more at home.
- Increase the transparency and regulation of the “shadow” banking sector.
- Fragile economic entities (“too big to fail”) should break early.
- Increase minimum capital requirements.
- Alter the composition of capital inflows on a coordinated basis.
- Institute enhanced credit lines that nations could draw from in the event of a credit crisis, adding to their foreign exchange reserves.
- Examine instituting a measure similar to the Tobin tax.

On a final note, the elements of the ecological crisis at hand dictate that governments need to act quickly and in a coordinated fashion. The failure to integrate initiatives in a comprehensive manner has caused many good ideas to fail to meet their potential in the past. Failure in the present situation, however, is destined to become a synonym of collapse. Thus, what would translate these policies into necessary *and sufficient* action is that they need to be applied in an *integrated* approach, such that industrial, environmental, employment, and trade policies are co-designed and co-implemented. The complexity and inter-relatedness of the many forces and interests in modern society requires this.

⁵⁵ These policies are elaborated in Section 7.2

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