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**Climate Change and Economic Development:
A Pragmatic Approach**

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Abstract

Two major problems promise to dominate economic policy during the twenty-first century. These are global climate change and the growing gap between rich and poor. Economists must face these issues at a time when the standard tool of economic analysis—computable general equilibrium and the theoretical system that supports it—has fallen into disfavor. This is both a challenge and an opportunity for development economics. This paper first examines the inadequacies of the standard model to deal with human development and climate change, drawing where possible on the situation in Pakistan. We then outline an approach to coping with climate change based on new perspectives in development economics and on the likely consequences of global warming for Pakistan.

Climate Change and Development: A Pragmatic Approach

Introduction

Two of the most pressing issues of our time are global climate change and the apparent inability of economic growth to close the gap between the rich and the poor. Both of these issues are particularly acute in Pakistan with its unique and fragile environment and its rich and varied cultural and economic situation. Dealing with these problems will require innovative approaches based on sound economic analysis and detailed knowledge of the specific environmental and social conditions at work. One advantage in Pakistan's favor is the country's many economists who have worked for decades to develop realistic alternatives to standard economic theory. The value of these alternative approaches has been confirmed by the current revolution in economic theory and policy. Former "heterodox" approaches to development are now becoming mainstream.

During the last quarter of the twentieth century, economic theory and policy was, for the most part, based on the "microfoundations" principle.¹ That is, the proper way to examine macroeconomic problems is to use the assumptions and concepts developed to study the behavior of individuals and firms. According to many observers, the microfoundations approach to economic theory has been in a state of crisis for some time now due to theoretical intractabilities within the standard model and empirical falsification of its basic assumptions regarding consumer and firm behavior (for surveys see Albert and Hahnel, 1990; Bowles and Gintis, 2000; and Davis, 2006) . The

¹ By "microfoundations" we mean macroeconomic models based on Walrasian assumptions of rational economic man and perfect competition. The contemporary microfoundations project also begins with individual behavior, but this behavior is based on realistic assumptions about decision making by consumers and firms (see Akerlof 2007 and Fehr, Fischbacher and Kosfeld 2005).

seriousness of the crisis in economics was highlighted in the Presidential Address to the 2007 American Economic Association in Chicago given by Nobel laureate George Akerlof (2007) who lamented the lack of correspondence between predictions made by macroeconomics models based on the “rational actor” model and actual human behavior: “If there is a difference between real behavior and behavior derived from abstract preferences, New Classical economics has no way to pick up those preferences.” He calls for a redirection of economics based on observed human behavior and the observed workings of actual markets.

Akerlof’s advice is relevant to achieving a workable economic program to deal with the issues of global climate change and the growing gap between the rich and the poor. The standard Walrasian approach, with its assumptions of independent actors and perfect foresight, offers an inadequate guide for public policy. The shortcomings of the standard model are apparent in the results of their application to the problems of economic development and climate change policy.

The New Development Economics

By the 1990s, the failure of standard development policies to deliver the benefits promised had become increasingly apparent, and economists and development experts began to call for new approaches. Sen (1999) suggested an approach to development emphasizing the ability to live an informed and full life rather than concentrating solely on increasing per capita income. Nussbaum (2000) called for a focus on “distributive justice”, that is, creating the conditions for the realization of a set of central human capabilities. Such policies promise to be more effective than simple income growth in making lives better for the world’s poorest. They also offer more flexibility in adapting to

environmental changes. With a focus on well-being, individual happiness and self-actualization, the developing world could improve its position relative to the North without emulating the consumption frenzy that drove past economic growth.

According to Haq et al. (1995) the Bretton Woods institutions have moved away from their original purpose and need to be restructured around their original mandates. Haq (1997) is particularly critical of the increased financial burden placed on South Asian nations through debt restructuring packages and structural adjustment programs. Siddiqui and Malik (2001) found that debt accumulation was a major factor in the decline of Pakistan's relative economic position in the 1990s. He supports increased investment in social capital, education, and health care as a means of increasing the labor productivity, and thus the wages, of low skilled workers. His work on the human development reports for South Asia emphasizes that while economic growth is necessary for poor countries, it does not automatically lead to human development. Haq et al. (1995) call for a pro-active role for the state to invest in human development to ensure that the benefits from economic growth are distributed evenly. A lack of labor rights for wage workers has given large landholders the benefits of agricultural development, while peasant farmers and workers have not seen significant wage increases for decades. In terms of governance, the acid test for development policy is that: "every governing institution, every policy action should be judged by one critical test: how does it meet the genuine aspirations of people" (Haq et al. 1995).

Khan (1999) argues that the positive effects of structural adjustment programs imposed on developing nations have been greatly exaggerated. Like Haq, he argues that the state must play a strong role in the development process. He argues that, in many

cases, development would have progressed much faster if multilateral organizations had not been involved (Khan, 2002). According to him the IMF-World Bank blueprint for poverty reduction in Pakistan has been accompanied by imposed conditions that have often made the country's economic and social problems worse. Furthermore, the imposed policies have frequently failed to meet the lending institutions' own targets. As a result of IMF and World Bank policies, unemployment within sectors employing less advantaged workers has risen relative to those sectors employing better off workers (Khan, 1999). Khan is of the opinion that governments in Pakistan have used the harsh steps imposed by the IMF and World bank to avoid tough decisions on land reform, agricultural taxes, and making tax administration more effective (Khan, 2002). He argues that regional governments are best equipped to avoid the mistakes of the past and implementing effective human development policies. A regional approach is also supported by Kardar (2002) who feels that this is the best way to increase public sector effectiveness and real human development.

Banuri et al. (2002) make a case for service provision under the leadership of NGOs, either through stand-alone service delivery or through a partnership with the public sector. There is evidence that at the grassroots level, "civic entrepreneurship" is capable of empowering local communities and contributing human development efforts (Banuri et al, 2002). Evidence from health care service delivery (Chowdhury and Bhuiya, 2004) and from partnerships between the public sector and NGOs (Mondal, 2001) suggests that growth strategies at the community level can enhance service delivery to the disenfranchised (Banuri et al, 2002). Based on the economic development experience of the past, a regional approach to development, tailored to the specific social

and economic characteristics of a particular area seems most appropriate, even though challenges exist for service coordination (Brinkerhoff, 2003).

Until recently such views of development would have been considered outside the mainstream, perhaps even heretical. Recent developments, however, have called into question the dominant orthodoxy. A major impetus to new approaches to development has been the work of Joseph Stiglitz whose stature as a Nobel Prize winner and former Chief Economist at the World Bank made his voice hard to ignore. In *Globalization and its Discontents* (Stiglitz, 2003) argued that there is no one “right” way to run an economy. Economic success depends on setting the right balance between government and the private sector, a balance that varies from country to country. In his most recent book *Making Globalization Work* (Stiglitz, 2007) he challenges the conservative notion that economics is about “efficiency” and that questions of equity and justice should be left to politicians (the Kaldor-Hicks “potential Pareto improvement”). In Stiglitz view, there is no reason why material values should trump other values such as the quality of life and the health of the environment.

Another impetus to re-examining the development economics orthodoxy is coming from the new fields of behavioral economics and the economics of well-being. Over three decades ago, Easterlin (1974) noticed that increased income levels in industrialized economies do not lead to higher levels of well-being (self-reported happiness). The ensuing decades have seen a blossoming of research into the causes of subjective well-being (Layard, 2005; Frey and Stutzer, 2002) and the public policy consequences of using well-being measure of social welfare rather than pure income measures such as GDP (Kahneman and Sugden, 2005). A focus on subjective well-being

holds the promise that economic objectives can be made compatible with environmental protection (Gowdy, 2005). Environmental conservation polices work best when local people are involved and their cultural heritage, as well as their economic interests, are respected (Khan and Naqvi, 2000).

Finally, and perhaps most importantly, the issue of global climate change has forced economists to re-think basic assumptions embedded in the Walrasian framework. Even the staunchest defenders of economic orthodoxy are now recognizing the limits of the standard approach. For example, Partha Dasgupta (2007) writes: “Climate change and biodiversity losses are two phenomena that are probably not amenable to formal, quantitative economic analysis. We economists should not have pressed for what I believe is misplaced concreteness.” Likewise, Weitzman (2007) in a commentary on the *Stern Review* writes: “But in lumping together objective and subjective uncertainties and thereby obscuring their distinction...I think that contemporary macroeconomics goes too far and leads to a mindset that too easily identifies probability (and “economic science”) with exercise in calibration to sample frequencies from past data.” Although he does not use the term, Weitzman calls for applying the “precautionary principle” to avoid the potentially catastrophic effects of global climate change. This change of attitude among economists who have written extensively about climate has important policy implications. And, although directed towards climate change models, the remarks of Dasgupta and Weitzman could easily be applied to formal models of economic development. Traditional economic development models are also an example of “misplaced concreteness.”

The Threat of Climate Change

A consensus has emerged among scientists and policy makers that global warming represents a major threat to the environment and to the well-being of humankind and the biosphere (Stern, 2007; IPCC, 2007). During the past century average global temperature has risen by about 1C with much of that increase due to fossil fuel burning and deforestation. The rate of increase has accelerated during the past 20 years or so as the human impact has begun to dominate natural processes. Global temperatures are projected to increase further by between 1.4C and 5.8C by 2100 and to continue to rise long after that (Dow and Downing, 2006). Scenarios of the likely consequences of such an increase differ substantially among regions, but include sea level rise, shortages of fresh water, increased droughts and floods, more frequent and intense forest fires, more intense storms, more extreme heat episodes, agricultural disruption, the spread of infectious diseases, and biodiversity loss. Less certain is the possibility of runaway positive feedback effects from, for example, the release of massive amounts of methane from permafrost and marine clathrates buried under the ocean floor (Flannery, 2005).

A cause for alarm is the increasing evidence of disruption to the earth's ecosystems from the relatively small 1C increase in temperature experienced so far. These effects include massive changes in arctic ecosystems to the detriment of keystone species such as polar bears, massive damage to the earth's coral reefs due to ocean warming and sea level rise, disruption of migration patterns of birds and megafauna (for example the wildebeest migration in the Serengeti), and disruptive changes to South American rainforests. If such profound changes can result from a 1C average warming

one can only imagine the effects of the projected increase of up to 6C over the next 100 years or so.

South Asia is particularly vulnerable to the effects of climate change. A substantial portion of the world's population lives in the three countries of Pakistan, India and Bangladesh, and much of the population of these countries will eventually be displaced by rising sea levels. Furthermore, the drinking water for much of India and Pakistan comes from the Himalayan, Karakoram, and HinduKush glaciers that are already beginning to melt from warmer temperatures. South Asian economies are heavily dependent on agriculture, the economic sector most vulnerable to climate change. Crop yields are already declining in the region, probably due to climate change. According to Rajendra Pachuri, chairman of the IPCC: "Wheat production in India is already in decline, for no other reason than climate change. Everyone thought we didn't have to worry about Indian agriculture for several decades. Now we know it's being affected now" (quoted in Worstall, 2007). In Pakistan, agricultural yields are also declining and climate change is the likely culprit (Salman, 2007). Changes in the timing of monsoons are already having a devastating effect on Pakistan and India. In recent months tens of thousands of families in India have been displaced by severe flooding. Chandrashekhar Dasgupta (2007) asks: "If a developing country is so vulnerable even to normal seasonal variations, how will it cope with the impacts of climate change—floods and droughts, sea level rise, changes in rainfall patterns, cyclones or typhoons?" It is the very poor in low income countries that are the most susceptible to the effects of climate change.

Economic Models of Climate Change

The most widely used economic models of climate change are based on Walrasian general equilibrium theory (Cline, 1992; Nordhaus and Yang, 1996; Stern 2007). These models start with the standard neoclassical assumptions of rational actors, perfect competition, and optimizing behavior in a computable general equilibrium (CGE) framework. We do not intend to go into a detailed critique of these CGE-based climate change models (for this see Laitner, DeCanio, and Peters, 2001 and Spash, 2002). We concentrate here on the fact that the results of these models are driven by assumptions about the rate of discounting the benefits of climate change mitigation (avoiding the costs of future climate damage to economic activity) and costs of mitigation efforts. The standard formula used in these models is based on the work of Ramsey (1928), Samuelson (1937), Arrow (1966) and Fellner (1967), among others:

$$R = \Delta + \eta * g$$

Where R is the discount rate, Δ is the rate of pure time preference, η is the elasticity of substitution for consumption, and g is the growth rate of per capita consumption. The “inherent discount rate” Δ is the part of the discount rate arising solely from myopia or impatience (Cline 1992, 249, Spash 2002, chapter 8). η reflects the extent to which marginal utility declines as income rises in the future. The effect of η can best be seen in a numerical example (from Quiggin 2007). If η is equal to 1 then 1% of income today has the same value as 1% of income at some point in the future. So if per capita income today is \$10,000 and income in the year 2100 is \$100,000, \$1,000 today has the same value as \$10,000 in 2100. Put another way, a \$1,000 sacrifice today would be justified only if it

added at least \$10,000 to the average income of people living in the year 2100. The higher the value of η , the higher the future payoff must be for a sacrifice today.

As the many critics of the Stern report have pointed out, the results of the report's modeling exercises are driven by (ultimately) arbitrary assumptions about the rate of time preference, the marginal elasticity of consumption, and estimates of future consumption growth rates. Not only is there no consensus on any of these numbers, there is no scientifically valid way to arrive at estimates of any of them. We are dealing with pure uncertainty in terms of the potential risks of climate change, the prospects for future economic growth, and the "proper" social discount rate (Weitzman, 2007). In response to the economic modeling in the Stern report, the consensus among economists seems to be that the standard economic model is of no use in dealing with the climate change issue (see the P. Dasgupta and Wietzman quotes above). So the bad news is that traditional tools of analysis are of little use when it comes to the economics of climate change. But the good news is that the door is open for a realistic approach to deal with climate change that combines sound science and contemporary approaches to economic theory and policy.

The New Development Economics and Climate Change Policy

The impact of climate change on Pakistan is likely to be severe. But how does a developing country like Pakistan cope with future changes that are generally known but only vaguely understood in terms of timing and severity? A logical way to begin is to consider the basic human needs of the Pakistani people, and how the provision of these basic needs will be affected by climate change.

Another example of “misplaced concreteness” in standard economics, in addition to an over-reliance on general equilibrium models, is the use of per capita GDP as the only indicator of social welfare. Frey and Stutzer (2002) point out that economic texts do not even discuss the meaning of utility but merely assume that utility is equivalent to income and that more income makes a person happier. Typical is a survey article on welfare measurement in the *Journal of Economic Literature* (Slesnick, 1998) which uses the terms “welfare”, “well-being of individuals”, and “household utility” interchangeably. A number of empirical measures of welfare are discussed, and each one “infers changes in welfare from the consumption behavior of households” (Slesnick, 1998). Survey – based measures of well-being are not even discussed on the grounds that they are “subjective” and “fundamentally different from welfare estimates based on households’ revealed preferences” (Slesnick 1998). In contrast to this view, a growing body of economic research uses subjective well-being measures. These measures show that the relationship between per capita income and well-being is not generally positive in real-world contexts, at least above some minimal income level (Frey and Stutzer, 2002). Ng (2001) has shown that economic growth may reduce welfare even within a standard optimization model.

Amartya Sen and Mahbub ul Haq in 1990 developed a more complete measure of human well-being, now widely used, called the Human Development Index (HDI). The HDI measures three basic dimensions of human development, health, education, and income. The HDI spawned a number of related indices that go deeper in measuring the notion of “human capabilities”. The “capability poverty measure” (CPM) looks at three basic capabilities—nourishment and health, the capability of healthy reproduction, and

female illiteracy (Womensaid International, 2007). The CPM measure shows that while 21 percent of the population in developing countries are below the income poverty line, 37 percent are below the minimum standard in terms of capability (Womensaid International, 2007). This measure shows clearly that economic growth by itself does not increase human development for the poor. The economy of Pakistan has been growing rapidly in recent years, yet its food poverty level (32 percent of the population) is worse than it was in 1988 (26 percent). Almost half of Pakistan's population is below the poverty line on the human poverty index (IUCN Pakistan, 2003). Clearly the almost exclusive emphasis by the World Bank and IMF on increasing per capita income has not worked. The work of IUCN Pakistan has also demonstrated that environmental quality and increasing economic opportunities are complementary, not competing goals.

Climate change and the environmental and social disruption almost certain to accompany it will very likely have a negative impact on human development indicators. 65 percent of Pakistan's population, and two-thirds of its poor, live in rural areas. These areas will be the ones most affected by climate change and they will also be the most difficult to assess, plan for and administer. Agricultural employment and income will likely be disrupted. Those with inadequate incomes will be most vulnerable to sea level rise and the intensification of storms. If history is any precedent, the water needs of the economically well off will be met first. In the decades to come much the coastal areas of Pakistan will be submerged, water shortages will result from disappearing glaciers, and agricultural production will almost certainly be severely disrupted. These changes will inevitably lead to political instability, security concerns, and conflicts with neighboring

countries. There is already a growing gap between rich and poor in Pakistan and climate change is likely to make this gap larger unless pre-emptive steps are taken.

These challenges are daunting, but the recommendations of the development economists discussed above at least give a sketch of the coming crises and what needs to be done by planning agencies. Problems will vary greatly by region and putting into place regional agencies to deal directly with the effects of climate change is a vital first step. Regional policies should include both adaptation and CO₂ mitigation to the greatest extent possible. Analysis of the possible effects of climate change should not be limited to the environmental and economic effects alone.

Conclusion

Given the dominance of the consumption-as-happiness ethic, and the current policy emphasis on purely economic measures of success, the task of moving to another, less materialistic, development path seems daunting. But climate change policy can learn much from behavioral economics (Gowdy 2007). Greed and material accumulation are only one part of the richness of human behavioral patterns. Types of behavior conducive to cooperation, doing with fewer material possessions, and recognizing the necessity of shared sacrifice, are also part of the human experience. It is this evolutionary heritage that holds promise for more humane development policies and for meeting the unprecedented challenges humankind will face in the coming decades.

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