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HNP DISCUSSION PAPER

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Are Countries Graduating from the Procyclical Trap or Falling Back?

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Health, Nutrition, and Population (HNP) Discussion Paper

Cyclical Patterns in Government Health Expenditures between 1995 and 2010: *Are Countries Graduating from the Procyclical Trap or Falling Back?*

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Abstract:

The 2008–09 global economic crisis has shown that no country is immune to external challenges. When policy controls are missing or not used efficiently, crises can reverse progress even in advanced economies. This unexpected outcome has increased concerns about the ability of governments in developing countries to manage downturns. The question is whether current and future crises will reinforce the procyclical responses or whether these governments will be able to escape the procyclical trap. In the fiscal domain, countercyclical trends in developing countries are promising. Over the last decade, about a third of the developing world has been able to escape the procyclicality trap. Yet, little is known about the evidence on the cyclical patterns of government health spending.

This descriptive analysis, which covers 183 countries between 1995 and 2010, provides empirical evidence on the cyclicality of government health expenditures, using panel data from a global macro database, the Fiscal Health Database. The objective is to propose user-friendly diagnostic approaches in this area that can be easily replicated and updated to inform technical discussions and policy making. Our findings are as follows:

First, applying various descriptive methods and diagnostic modeling, in health expenditures we have no robust evidence to claim that developing countries have been escaping the procyclical trap across the periods 1995–2002 and 2003–10. This is in contrast with the improvement in countercyclical fiscal responses witnessed in developing countries. While there are developing countries that engage in countercyclical government health spending, the evidence on increased countercyclical behavior is only robust in the upper-middle-income group. Further, although government health expenditure patterns during downturns are more predominantly countercyclical for high-income countries, the 2008–09 economic crisis has shown that advanced economies with robust social safety nets can fall back into procyclical responses, especially if the crisis is deep and protracted. Second, we find that cyclicality patterns are more nuanced in the by-country descriptive analyses and, hence, event and case study approaches would be valuable in shedding more light on the drivers of patterns and changes over time. Third, consistent with

earlier findings regarding the asymmetry of cyclicality, at the global and aggregate level we have weak evidence that cyclical responses during "bad" and "good" times differ. Countercyclical responses are more likely during deep negative output gaps. Fourth, results from radar plot analysis imply that there are a number of dimensions that can help in understanding the variation in country performance in cyclical responses. Fifth, from diagnostic regressions we conclude that the impact of business cycles is larger in developing countries than in advanced economies, and that the fiscal pathway is critical in determining government health expenditures. This means that although economic growth trajectories do matter, fiscal response from governments can outweigh or at least attenuate income effects. There are three notable macro effects that make countries more vulnerable in terms of government health expenditures: deterioration in terms of trade, deterioration of debt-to-GDP ratios for all income groups, and unpredictable official development assistance in developing countries. Apart from the macrofiscal dimensions, research should drill deeper into social sensitivity and preferences, political economy, and governance to understand their effects on cyclical behavior. Finally, we noted the methodological limitations of descriptive and diagnostic linear modeling approaches and concluded that advanced multivariate panel data analysis is essential in understanding the role and weight of the various dimensions in shaping cyclical responses.

Keywords: Cyclical patterns, government health expenditures, procyclical trap, business cycles, economic policy.

Disclaimer: The findings, interpretations, and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

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I. INTRODUCTION: GLOBAL PATTERNS OF CYCLICAL RESPONSES DURING THE 2008–09 GLOBAL ECONOMIC CRISIS

1.1. THE EFFECT OF THE CRISIS ON CYCLICAL RESPONSES IN ADVANCED AND DEVELOPING ECONOMIES

The recent global economic crisis, which started as early as 2007, has shown that no country is immune to external challenges. When policy controls are missing or not used efficiently, crises can reverse progress and positive performance even in advanced economies with a AAA rating. This crisis has been unique. It emanated from advanced economies and led to prolonged stagnation and, in some cases, contraction. The depth and length of the crisis have led to fiscal turbulence that affected health sectors across a number of developed countries, requiring strategic consolidation[1] and efficiency gains to fit the declining health sector budget.

When the crisis hit, it was expected that Europe, a relatively stable and economically robust region, would have the means and tools to tackle the downturn. However, many countries did not cope well (Hou et al. 2013). In the hardest hit countries and in countries where preparedness was low, deteriorating fiscal positions have resulted in reduced fiscal space for health and, hence, procyclical policy responses (Heller 2013; Hou et al. 2013; WHO 2013). Such fallback into a procyclical policy-making mode has raised concerns because, in principle, fiscal policy should avoid sudden and excessive cuts in health budgets, especially at times when population health needs and demand for health care rapidly increase. When demand for services increases, population coverage — particularly for essential care and vulnerable groups — should not decline. Therefore, countercyclical spending during crises is critical to protecting population health and mitigating ill-health–related household financial risk. Yet, in a number of countries, obligations to meet short-term fiscal targets have been compromising the government's ability to afford countercyclical responses in health.

This unexpected outcome — that advanced economies have been seriously challenged by the crisis — has increased concerns about the ability of governments and health sectors in low- and middle-income countries to manage the current crisis and prepare for future economic downturns. Will crises reinforce the procyclical responses in developing countries or will they be able to cope better and escape the procyclical trap?

In sharp contrast with the literature that covers cyclical patterns of fiscal policy prior to the global economic crisis, evidence is now emerging that developing countries can graduate from procyclicality. For example, the Regional Economic Outlook for Sub-Saharan Africa (IMF 2009), which focuses on the risk and opportunities presented by the global economic crisis, highlights some new perspectives:

> … After nearly a decade of strong economic performance, the GEC [global economic crisis] has slashed the exports of many sub-Saharan African countries and disrupted capital flows. Oil exporters and middle-income countries have been particularly hard hit;

Notes

1. High overall tax ratios in Europe put pressure for fiscal austerity on the need for spending cutbacks (Heller 2013).

low-income countries somewhat less so. Nevertheless, relatively prudent policies during the upswing have provided space for domestic economies to absorb some of the shocks, supported on occasion by specific countercyclical measures.

However, the report cautions that countercyclical fiscal policy in Sub-Saharan Africa in the past has achieved mixed results, so increasing its effectiveness will depend on reinforcing automatic stabilizers, enhancing fiscal institutions, relaxing financing constraints, and improving data and analytical capacity.

Still in this regional context, Brahmbhatt and Canuto (2012) summarize that in most African low-income countries (LICs), where automatic fiscal stabilizers are limited, the principal fiscal impact of the crisis was a drop in government revenue. Governments had a number of fiscal policy options[2] available: adjustment, accommodation, and stimulus. The bulk of countries undertook full or partial accommodation of revenue declines, and — defying priors — some even undertook countercyclical stimulus. Only a small number undertook full adjustment in the face of revenue declines. The more fiscal space a country had built up before the crisis, the less it had to undertake full adjustment and the more options it had to accommodate the revenue shock or even undertake stimulus.

In the global context, Frankel, Végh, and Vuletin (2011) show that over the last decade about a third of the developing world has been able to escape the procyclicality trap and actually become countercyclical. They trace this critical shift in social policy to the quality of institutions.

These countercyclical trends in the fiscal domain of developing countries are promising. Little is known, however, about the evidence on the cyclical patterns of social — and more specifically, government — health spending.

1.2. COUNTERCYCLICAL POLICIES ARE GOOD, BUT WHERE IS THE EVIDENCE ON THE CYCLICALITY OF SOCIAL EXPENDITURES?

Countercyclical government spending has been found to be essential in fostering long-term economic and human development objectives (Brahmbhatt and Canuto 2012; Braun and Di Gresia 2003; Darby and Melitz 2008; Doytch, Hu, and Mendoza 2010). Indeed, standard neoclassical and Keynesian theories suggest that fiscal policy should be countercyclical, with fiscal deficits declining when the economy is expanding and increasing during downturns (Akitoby et al. 2004).

One component of countercyclical fiscal policy is countercyclical social policy, which includes unemployment benefits and other social transfers, as well as public expenditures on health and education (Darby and Melitz 2008; Del Granado, Gupta, and Hajdenberg 2013; Doytch, Hu, and Mendoza 2010; Thornton 2008). Because procyclical behavior amplifies economic fluctuations — with adverse effects on government revenues, poverty levels, long-term growth, and human capital formation (Thornton 2008) — the issue of undertaking social policies as part of the countercyclical response to crises has become urgent in the context of the recent global economic slowdown and food price volatility (Doytch, Hu, and Mendoza 2010).

2. Adjustment is defined as a cut in spending in response to the revenue drop; accommodation is defined as maintaining spending unchanged; and stimulus is defined as increasing spending notwithstanding the revenue decline.

Despite these principles, evidence shows that in low- and lower-middle-income countries protecting and maintaining public investments in health has not necessarily been the norm (Abbas and Hiemenz 2011; Brahmbhatt and Canuto 2012; Del Granado, Gupta, and Hajdenberg 2013; Doytch, Hu, and Mendoza 2010; Lewis and Verhoeven 2010). Although Lewis and Verhoeven (2010) conclude that countercyclical spending has taken root, and countries are (temporarily) expanding safety nets, this improvement is not uniform within regions or income groups and, hence, there is space for improvement.

It has been a vexing question for experts and policy makers, especially in developing and emerging country contexts, to understand what the binding constraints are to attaining countercyclical policy making and, consequently, what policy options are available to break procyclical fiscal and social spending reflexes.

Notwithstanding the increased drive to understand the nature and drivers of social sector responses to economic cycles and the trend of cyclical responses over time, the empirical evidence on the relationship between business cycles and government expenditures on health is very thin. There are only a handful of papers that explore the relationship between business cycles and social spending, and only the most recent ones have global coverage to allow for comparison across regions and income groups. From this already thin set, only a few specifically discuss the relationship between business cycles and health spending (Del Granado, Gupta, and Hajdenberg 2013; Doytch, Hu, and Mendoza 2010).

II. OBJECTIVES OF THE PAPER

In light of the described evidence gap, this paper proposes to contribute to the empirical literature on business cycles and their effect on the cyclicality of government expenditures on health.

In terms of policy relevance, Lewis and Verhoeven (2010) highlight the importance of research — echoed by others (WHO 2009) — to inform the design of social programs and sector policies that aim to reduce vulnerability to crises. For example, at the high-level consultations on "The Financial Crisis and Global Health" organized by the World Health Organization (WHO), the Director General suggested three objectives for the development community in this area (WHO 2009): (a) building awareness of the ways in which an economic downturn may affect health spending, health services, health-seeking behavior, and health outcomes; (b) making the case for sustaining investments in health; and (c) identifying actions — including monitoring of early warning signs — that can help mitigate the negative impact of economic downturns. This research focuses on the financing aspect of the first objective — building awareness of the effect of downturns on government health expenditures.

The main contribution of this primarily descriptive analysis is the empirical evidence on fiscal and health sector cyclicality using panel data from the newly constructed "Fiscal Health Database" (World Bank 2012), which covers 183 countries and 16 consecutive years between 1995 and 2010. Compared to relevant empirical papers (for example, Braun and Di Gresia 2003; Del Granado, Gupta, and Hajdenberg 2013; Doytch, Hu, and Mendoza 2010), this analysis adds recent data points and also expands the analytical sample to provide as global an overview as the data sources allow.

We explore how business cycles — via the intermediary link of fiscal transmissions — affect government expenditures on health. The investigation includes (a) country-specific, income-group-based, and regional trend analyses of macro performance, fiscal responses, and changes in government health expenditures for the study period 1995–2010; (b) differences in these indicators and their bivariate correlations between their cyclical components across two time windows (1995–2002 and 2003–10); and (c) diagnostic analyses to identify control variables for future econometric modeling, such as testing the role of institutional strength and political and economic risk on cyclical behavior.

The analysis is designed to provide benchmarks for countries regarding their cyclical performance over time and in comparison to their regional and income group peers. Given the macro nature of the data that this analysis draws on, the paper is most useful for assessing aggregate changes at the global, regional, and income group levels and to draw attention to good and bad performers relative to their past performance or the defined group benchmarks.

While the paper will provide insights on the relationship between business cycles and general government and government health sector expenditures, it does not aim to discuss in depth the observed policy responses and mitigation strategies, or offer options and solutions to how specifically governments can move from procyclical to more countercyclical policies. Specific policy formulation and tailored options would require either country-level event analysis or more disaggregated data at higher frequencies.

The rest of the paper is organized as follows. To guide the empirical analysis, section 3 provides a review of the literature on the intersection of business cycles and the cyclicality of fiscal and social policies. Given the focus of the empirical analysis, section 4 offers definitions for business cycle and pro- and countercyclical policies, and discusses crisis typology. Section 5 outlines a schematic framework that guides the analysis. Sections 6 and 7 provide background for the empirical work, with a discussion of the data and the empirical methodology to be applied. Section 8 discusses the empirical results, including descriptive statistics and diagnostic modeling results from analytical work carried out using panel data from the "Fiscal Health Database." This empirical section includes exploration of global, regional, and income-group–based patterns of cyclical responses, and uses regional and country-specific illustrations to discuss findings and limitations. Section 9 concludes with, among other things, a discussion on the study's limitations and thoughts on the policy and research agendas that lie ahead.

The overarching goal of the paper is to help policy makers and practitioners better understand the relationship between business cycles and fiscal and health sector policy making, particularly, by isolating whether the policy intervention should be targeting constraints in general fiscal policy or whether it is sufficient to enter at the level of health sector policy making to address population-level health risks. It is hoped that this global-level analysis will trigger more region- or country-specific investigations that rely on more disaggregated data and, thus, can better inform policy responses.

III. LITERATURE REVIEW

3.1. WHY IS COUNTERCYCLICAL POLICY IMPORTANT?

As has been established, as economic crises threaten the growth potential, poverty reduction, and human capital investment efforts of countries, designing effective shock mitigation policies and ensuring their implementation are critical to equitable growth. In the face of crises, countercyclical government spending (see definition in section 4) — including on social sectors (Darby and Melitz 2008; Doytch, Hu, and Mendoza 2010; Del Granado, Gupta, and Hajdenberg 2013; Thornton 2008) — has been found to be essential in fostering long-term economic and human development objectives (Braun and Di Gresia 2003; Brahmbhatt and Canuto 2012; Darby and Melitz 2008; Doytch, Hu, and Mendoza 2010).

However, evidence shows that, especially in developing countries,[3] several factors might lead to procyclical responses of fiscal policy to the business cycle (Akitoby et al. 2004; Braun 2001; Gavin and Perotti 1997). Among these, the most cited drivers of procyclical policy are political economy and constraints to accessing credit markets (Akitoby et al. 2004; Calderon and Schmidt-Hebbel 2008; Doytch, Hu, and Mendoza 2010; Thornton 2008). The consequence of procyclical behavior is that rather than mitigating economic fluctuations, they amplify them, with adverse effect on government revenues, poverty levels, long-term growth, and human capital formation (Thornton 2008).

Because of this vicious circle of procyclical fiscal behavior, procyclical social spending, and the consequent reduced potential for long-term equitable growth, a growing body of evidence is emerging on the importance of effective fiscal and social policies, including strategic documents[4] that focus on risk management to leverage countries' development potential. For example, the World Bank's social sector strategy emphasizes that at a macroeconomic level, well-functioning social protection programs are central to growth-promoting reforms (World Bank 2012) and supports this with a quote by the Growth Commission (2008): "…if governments cannot provide much social protection, they may have to tread more carefully with their [growth-promoting] economic reforms."[5]

To understand the difference between theory and practice, this section reviews the empirical evidence on cyclical responses. The remainder of the section discusses the evidence on the cyclicality of social expenditures, with a focus on the relationship between business cycles and government spending on health; it broadens the scope of, and summarizes the evidence on, the cyclicality of fiscal policy.

3. For more, see Thornton (2008) and references within.

4. To highlight two recent additions in this domain by the World Bank, both the Bank's Social Protection and Labor Strategy (World Bank 2012) and the *World Development Report* 2014 (World Bank, forthcoming) focus on risk, resilience, opportunity, and equitable growth.

5. See Growth Commission (2008) and more references on the evidence of social policy facilitating the transition in Eastern Europe in World Bank (2012).

3.2. COUNTERCYCLICAL SOCIAL EXPENDITURES – MYTH OR REALITY?

Socially sensitive development voices say that the challenge facing the world now, since the global crisis, is to prevent an economic crisis from becoming a social and health crisis. The challenges in some of the crisis countries have become dual: meeting cost containment objectives while ensuring that commitments to universal health coverage and population health targets are not falling behind.

A common challenge for development has been that social outlays and fiscal contractions happen in concert during crises (Alderman and Haque 2006), straining the ability of governments to operate critical programs, let alone expand them when the number of vulnerable populations increases.

What is the evidence at the global level to date? Have governments been doing enough to mitigate crisis effects? To what extent have they been engaging in countercyclical social policies?

The literature has been thin in the area of business cycles and social policy responses, especially with respect to public expenditure responses to business cycle fluctuations. While investigations are far from exhaustive and conclusive, they are consistent on the income gradient, specifically, on the general procyclical tendencies in low-income countries. There is also evidence that the political and governance contexts are important determinants of cyclical dynamics. However, there is conflicting evidence on cyclical responses in the lower- and upper-middle-income groups. Papers also differ in their broad conclusions as to the policy options that could help countries break the procyclical patterns.

To offer a few examples, following the crises that hit Latin America in the early 2000s, Braun and Di Gresia (2003) analyzed the importance of countercyclical fiscal policy to effective social insurance. They contrast the cyclicality of social expenditures in Latin America and the Caribbean with that in Organisation for Economic Co-operation and Development (OECD) countries. Examining the period prior to 2003, they find that although social spending as a percentage of total spending tends to increase during crises, the depth of fiscal adjustment in bad times results in a decline in real social spending. This implies that, during the time under review, the effectiveness of compensatory social policies designed to protect those vulnerable to crises was constrained by adjustments during recessions. Given that the binding constraints to prudent countercyclical social policy were found to be largely fiscal and political in nature, in their discussion they focus on policy choices including fiscal stabilization, numerical fiscal rules, and increases in the proportion of automatic stabilizers to total spending. They argue in favor of integrated policy proposals based on more country-specific analysis.

In a paper on the impact of the 2008–09 financial crisis, Lewis and Verhoeven (2010) find that crises have a strong effect on government and household spending, but effects are highly variable depending on the severity of the downturn and the cyclicality of government spending. Countercyclical spending is positively related to income. As countries become richer, they are more protective toward social spending. It is the lowest-income countries, however, that are most likely to curtail spending in a crisis. Comparing sectoral outlays, they find that during crises, health expenditures suffer more compared to education spending. Although the authors conclude

that countercyclical spending has taken root, and countries are (temporarily) expanding safety nets (for example, by borrowing to protect social sector spending and redirecting fiscal resources to retain social services), this improvement is not uniform within regions or income groups, and hence, there is space for improvement.

Other papers[6] that discuss social policies in the context of cyclical fluctuations fall into the batch that was catalyzed by the 2008–09 global economic crisis. Among these, two studies apply cross-country regressions to substantiate their case — an analysis of the relationship among social spending, fiscal space, and governance across 100 countries by Doytch, Hu, and Mendoza (2010); and a paper by Del Granado, Gupta, and Hajdenberg (2013) that focuses on the procyclicality of social spending in developing countries.

Doytch, Hu, and Mendoza (2010) analyze the cyclicality of social spending using data for about 100 industrial and developing countries between 1980 and 2008. They examine the empirical link between indicators of the business cycle (that is, the output gap and economic growth) and social spending with a focus on education and health. The empirical results suggest that public education spending appears acyclical, and health spending procyclical, in middle-income countries. This pattern appears reversed in low-income countries. High-income countries appear to have acyclical[7] or countercyclical public education and health spending. The authors conclude that the challenge for developing-country policy makers is to manage and channel the necessary spending and investments in the social sectors in a much more effective way over the business cycle, which will require a combination of policy and institutional innovations at the national level, and innovative financing mechanisms at the international level.

Del Granado, Gupta, and Hajdenberg (2013) study the cyclical behavior of public spending on health and education in 145 countries during 1987–2007. They find that spending on education and health is acyclical in developed countries and procyclical in developing countries, and that the degree of cyclicality is higher the lower the level of economic development. Their regression results also show that education and health expenditures follow an asymmetric pattern in developing countries; they are procyclical during "good" times (periods of positive output gap) and acyclical during "bad" times (periods of negative output gap). Thus, their results do not support the view that the growth of real outlays on health and education fall during negative output gap. They infer that the absence of cyclicality in social spending during bad times could be the result of discretionary policy to protect these outlays, or could be attributable to formal institutions and safeguards.

6. In addition to the reviews in this section, see more in the literature review section of a paper that focuses on health sector vulnerability to crises by Velenyi, Yazbeck, and Smitz (2013). Among others, this paper provides references to work on crises and health presented by Chawla (2009); by Barros, Thomas, and Yfantopoulos at ECHE (2012); and the journal *Health Policy* (*Health Policy* 106 (1) 2012), (see http://www.sciencedirect.com/science/journal/01688510/106/1), which published a series of studies on the impact of the financial crises on health sector reform in Europe, including impact on some of the most battered countries of the European Union in terms of fiscal and macro effects, Italy (Ferre, Cuccurullo, and Lega 2012; de Belvis et al. 2012), Portugal (Barros 2012), and Spain (Gené-Badia et al. 2012).

7. An acyclical policy captures the case of zero correlation (i.e., no systematic relation between the response variable of interest and the business cycle).

3.3. CYCLICALITY OF GOVERNMENT EXPENDITURES

All papers that explore the cyclicality of social expenditures discuss, to different degrees, the role of underlying fiscal policies. Hence, we cannot ignore this aspect, because some of the findings are relevant for the analytical framework and policy implications (see example from Latin America in box 1.1).

Box 1.1 Fiscal Adjustment Constraints to Countercyclical Social Spending during Downturns in Latin America

In the context of Latin America, Braun and Di Gresia (2003) conclude that, for the period prior to 2003, procyclical behavior in health was not necessarily the result of lack of interest and prioritization, but that fiscal constraints could have bound health sector responses. Such a finding could lead to policy implications in that if health sector spending is to be better preserved during crises, policy makers could focus on the indirect channel — that is, on improving fiscal policy, transparency, and governance to enable more countercyclical health policy responses.

A number of authors have investigated why fiscal policy was, and in certain cases still is, procyclical in Latin America. The "1997 Economic and Social Progress Report" (IDB 1997) presented evidence that fiscal policy was particularly procyclical in Latin America.

First, responses were more procyclical because Latin American governments had a smaller proportion of automatic stabilizers, such as unemployment insurance, in their mix. Second, discretionary responses were more procyclical because volatility, political constraints, and weak institutions made saving difficult during good times (Gavin et al. 1996; Gavin and Perotti 1997; Talvi and Végh 2000; Lane and Tornell 1999). Third, limited creditworthiness made borrowing during recessions close to impossible. Consequently, governments that were unable to save during good times were forced to adjust spending. In fact, targeted social spending was often the victim of cuts, due to the rigidity of other budget items such as public sector wages, pensions, and debt payments.

Source: Authors

To better understand the implications of fiscal policy on health sector responses and whether these underlying forces could be the binding constraints for social policy making, we have reviewed the literature that focuses on business cycles and fiscal policies with a special interest in the dynamics between these in developing countries. The evidence so far is inconclusive and evolving. Papers prior to the current global economic crisis largely conclude that countercyclical behavior is characteristic of advanced economies. The literature following the global economic crisis, however, provides evidence on "graduation" from procyclicality in developing countries and "fallback" by more advanced economies.

Compared to the vast literature on the determinants of economic growth, there has been less research on the cyclical behavior of macroeconomic aggregates and the cyclicality of fiscal policies in developing countries (Akitoby et al. 2004). One reason for this is the relatively weak

quality of data and low data frequency in many developing countries.[8] Despite the data challenges, the evidence base has been slowly growing. This strand is comparatively richer than the evidence base on the cyclicality of social expenditures.

3.3.1. Evidence on the cyclicality of fiscal policy prior to the global economic crisis

In general, there is a consensus across the papers prior to the global economic crisis that fiscal policy in developing countries is procyclical, in contrast with high-income countries, where it is countercyclical. A number of papers emphasize the role of institutions as determinants of cyclical responses. Some highlights from the literature prior to the global economic crisis, below, illustrate these statements.

Drawing on a data set of 51 developing countries, Akitoby et al. (2012) examine the short- and long-term behavior of government spending with respect to output using an error-correction model. They find that the main components of government spending are procyclical in about half of the countries, the degree of which varies across spending categories. In another study, to explore the nature and drivers of procyclical fiscal policy in Africa, Thornton (2008) carries out a time series regression for 37 low-income African countries during 1960–2004. His results show that government consumption is highly procyclical, with consumption responding more than proportionately to fluctuations in output in many cases. Cross-country specifications suggest that government consumption is more procyclical in countries that are more reliant on foreign aid inflows, and less procyclical in countries that are more democratic. In an effort to understand whether procyclical fiscal policy in developing countries is truth or fiction, Ilzetzki and Végh (2008) set out to settle the issue of causality. They build a quarterly data set for 49 countries covering 1960–2006, and subject the data to a battery of econometric tests (for example, instrumental variables, simultaneous equations, and time-series methods). They find overwhelming evidence to support the conventional wisdom that procyclical fiscal policy in developing countries is in fact truth and not fiction.

A number of authors exploring this area refer to the importance of political and institutional context as potential determinants of cyclical responses. Using a global data set that spans 1970 to 2005, Calderon and Schmidt-Hebbel (2008) empirically evaluate whether the ability of countries to conduct countercyclical fiscal policy is affected by the quality of their institutions, by the availability of financial resources, or by both. Their evaluation yields a nuanced interpretation to the existing evidence regarding the (relative) role of institutions and access to financial markets. Their findings corroborate earlier evidence that countries are unable to conduct countercyclical fiscal policies if they have poor institutions or lack wide access to credit markets at home and abroad. In addition, they provide evidence that institutional factors have a larger weight than financial variables in explaining the differences in cyclical behavior of fiscal policy between industrial and developing countries.

8. For example, Akitoby et al. (2012) note as limitations that quarterly gross domestic product (GDP) data are available for only a limited number of countries, and even when they are available, they are usually of significantly lower quality and reliability than annual estimates. Another constraining factor is that developing countries often experience abrupt economic changes, making it particularly difficult to separate cyclical influences from structural breaks. A number of papers discussed data comparability and quality issues as a challenge (for example, Del Granado et al. 2012; Doytch et al. 2010).

3.3.2. Evidence on the cyclicality of fiscal policy following the global economic crisis

As stated in the introduction, in sharp contrast with the literature that covers cyclical patterns of fiscal policy prior to the global economic crisis, evidence is emerging that developing countries can graduate from procyclicality.

In Africa, the good news is that "relatively prudent policies during the upswing have provided space for domestic economies to absorb some of the shocks, supported on occasion by specific countercyclical measures" (IMF 2009). Brahmbhatt and Canuto (2012) also provide evidence in an overview paper that in most African low-income countries, where automatic fiscal stabilizers are limited, the principal fiscal impact of the crisis was a drop in government revenue. They highlight that the bulk of countries undertook full or partial accommodation of revenue declines, and — defying priors — some even undertook countercyclical stimulus. Only a small number undertook full adjustment in the face of revenue declines. However, since the countercyclical trends are still fragile, special vehicles such as fiscal rules and commodity stabilization funds can be most effective if they are underpinned by sound institutions and a commitment to good governance.

Globally, Frankel, Végh, and Vuletin (2011) show that over the last decade about a third of the developing world has been able to escape the procyclicality trap and actually become countercyclical. They trace this critical shift in social policy to the quality of institutions. Thus, now there is evidence that developing countries can graduate and, at the same time, developed economies can fall back into the procyclical mode.

Across the two waves of evidence discussed above — prior to and after the global economic crisis — there is a shift that suggests that countercyclical responses may not be the privilege of the rich. However, the studies also emphasize that institutions and governance are essential companions to plain fiscal instruments, such as numerical fiscal rules or commodity stabilization funds. Hence, we conjecture that the success of countercyclical response in the health sector will also be closely related to institutional strength and governance, in general, and to the dynamics between the ministries of finance and health.

IV. BUSINESS CYCLES, CYCLICAL ECONOMIC POLICY, AND CRISIS TYPOLOGY

A number of empirical studies and policy papers that focus on policy responses to business cycles find that cyclical patterns are asymmetric across "good" and "bad" times (that is, expansion and contraction), and also emphasize that the magnitude of the economic downturn matters in terms of its expected effect on the outcome variable of interest.

For any empirical analysis, it is important to propose operational definitions and measures of what is under investigation. In our context, and before we turn to the empirical work, we will define what is meant by cyclical, procyclical, and countercyclical economic policy, and offer a brief overview of crisis typology and measurement.

4.1. DEFINITION OF THE BUSINESS CYCLE AND PROCYCLICAL AND COUNTERCYCLICAL ECONOMIC POLICIES

Business cycle (or economic cycle) refers to the economy-wide fluctuation in production, trade, and economic activity in general over several months or years (Burns and Mitchell 1946). The term "cycle" is a misnomer, because business cycle fluctuations are neither regular nor predictable. Upward and downward movements in the cycle (expansions and contractions) can be measured by the level of gross domestic product (GDP).[9] These fluctuations are measured relative to the economy's long-term growth trend (Madhani 2010). A variable that is positively correlated with the overall state of the economy is said to be procyclical, and a variable that is negatively correlated with the overall state of the economy is said to be countercyclical.

In the context of economic policy, procyclical (countercyclical) refers to any aspect of economic policy that can magnify (attenuate) economic or financial fluctuations. Countercyclical policies cool the economy when it overheats and stimulate it when there is a downturn. Keynesian economics advocates the use of automatic and discretionary countercyclical polices to lessen the impact of the business cycle.

4.2. CRISIS TYPOLOGY AND MEASUREMENT

- *Defining Crisis:* There is no consensus on the definitions of different types of crises despite their frequency in development economics. One of the most important common features of crises is an "abrupt" change in economic indicators. Operational definitions require an indicator and a threshold.

- *Crisis Typology and Indicators:* In a crisis typology, Ishihara (2005) identifies seven types of crises.[10] Crisis classification matters because different types[11] of crises affect systems and population outcomes through different pathways (see figure 1A.1 in annex 1). For example, the effect of a deep recession (characterized by continuous negative growth rates over consecutive periods), which directly affects revenues and budgets, is different from currency deflation, which can exert its effect through changes in relative prices, including food and medical inputs. Differences in the pathways, scope, and expected magnitudes have implications for the choice of response mechanisms and overall strategy for reform. Crisis heterogeneity can be complex and, therefore, in our analysis we will focus on one selected measure (GDP growth) and will only tangentially discuss other pathways. The indicator selection is based on empirical evidence from the crisis and health literature, which will be discussed in greater depth under the section that presents data and methods.

9. In the United States, the National Bureau of Economic Research's (NBER's) seven-member Business Cycle Dating Committee examines monthly economic indicators that provide a good industry-wide economic perspective to date business cycles. They use monthly economic indicators (such as employment, real personal income, manufacturing sales, and industrial production), rather than quarterly real GDP. The monthly data allow the NBER to be more precise in setting business cycle turning points; the monthly data also typically are not subject to the same magnitude of revisions as are the quarterly GDP data (Romer 2008).
10. The seven types of crisis are liquidity, solvency, balance of payment, currency, external debt, growth rate, and financial.
11. For example, Laeven and Valencia (2012) provide an update on systemic banking crises, which also explores the relationship between banking crises, currency crises, and sovereign debt crises and the likelihood and pattern of the co-occurrence of twin or triple crises.

- *Measuring Crisis Depth and Length:* With respect to the magnitude of crises, the literature discusses two dimensions that are relevant for quantification — depth and length. In simplified terms, a country experiences a crisis as soon as the selected crisis indicator exceeds an agreed threshold value.[12] The deviation from the defined threshold, or with respect to a trend if the measurement is longitudinal, is the depth of the crisis. The start of the crisis is when the variable exceeds the threshold value, and the end of the crisis is when the indicator returns to the normal zone relative to the defined threshold. The length of the crisis is defined by the beginning and the end. In reality, it is difficult to be precise regarding the length of the crisis; hence, the need for crisis preparedness. In general, the longer the crisis is and the further away it is from the normal zone, the more severe it is. Severity can be measured, for example, in deviation from the filtered trend line in terms of standard deviation or relative to past or reference group performance in standardized *Z* scores. These are standard metrics in the business cycle and crisis literature and will be discussed in more depth under the section on data and methodology.

- *Policy Implications of Crisis Typology and Measurement:* Regarding policy implications, timely and accurate crisis identification is critical in facilitating optimal policy formulation efforts, including countercyclical policies. By responding to early warning signals, governments can preempt twin or multiple crises and persistent negative output gap, thereby reducing the aggregate impact of the shock over the short, medium, and long terms. With respect to health system and population vulnerability to shocks, intuitively, shorter crises may be easier to absorb, but they leave little time for adjustment, and the political will to implement reforms during shorter and shallower crisis spells may be lower. Conversely, longer and deeper crises provide ample time and political momentum for policy makers and system reform (that is, structural or "transformative" change) (for example, see box 1.7 on Europe and Central Asia). The more buffers governments and systems have, the more populations can withstand shocks and the less they suffer from the negative implications of crises on health- and illness-related financial protection. To mention a few response options, better understanding of the dimensions and pathways of a given crisis can lead policy makers and system designers to focus on building reserves, increasing system efficiency, devising automatic stabilizers, and improving targeting mechanisms.

12. For example, negative year-on-year GDP growth; a debt-to-GDP ratio over 60 percent; a decrease in the value of the local currency equal to or greater than 25 percent, using the nominal exchange rate against the US dollar (http://www.hks.harvard.edu/fs/jfrankel/CURRCRSH-WB1.PDF).

V. ANALYTICAL FRAMEWORK

As background to the empirical work, we present a schematic analytical framework that summarizes the focus of this investigation. In addition, we discuss the rationale for focusing on government expenditures on health to explore the nature of cyclical response in the sector.

5.1. SCHEMATIC OF ANALYTICAL FRAMEWORK AND TRANSMISSION PATHWAYS

Figure 1.1 provides a simplified schematic of a complex line of transmission that underlies the relationship between the macroeconomic environment (GDP[13]); fiscal policy making (measured by general government expenditure, [GGE][14]); and sectoral allocation of resources, in our case, government health expenditures [GHE][15]).

From a broad perspective, increased national income is reflected in an expanded government revenue base and, by extension, increased general government budgets and expenditures. As countries get richer, total[16] and public health spending increase as a share of the economy.[17] Beyond the clear income gradient observed in expenditure patterns (see public and private health expenditure trends for our study period in the following section), spending is not independent of the economic cycle. It tends to increase more during good times than bad times (that is, it is procyclical). However, cyclical responses by governments in the fiscal domain and the health sector are not random. They depend on political preferences and social sensitivity, and on institutional strength to carry out countercyclical policies. For example, government spending on health may decline more if the political environment is not conducive to conducting countercyclical policies and if social sensitivity is low.

13. This is a simplified measurement reduced to a single dimension. For our purpose, GDP, and specifically its growth rate, is an appropriate proxy measure for the overall performance of the economy because it allows us to capture deviations from the growth trend over time.

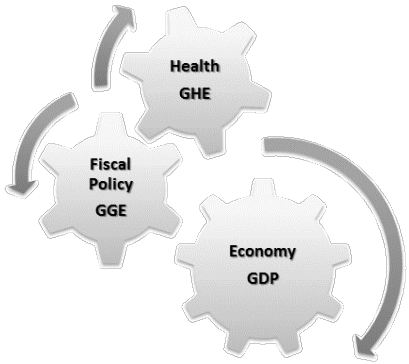
14. The variable GGE is in per capita terms to adjust for population size, and is measured in international dollars (i.e., purchasing power parity– adjusted, using constant international dollars anchored to 2005 as the reference year).

15. The variable GHE is based on the National Health Accounts (NHA) database maintained by WHO. Public health expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds.

16. Based on the variable definition from the NHA database, maintained by WHO, total health expenditure is the sum of public and private health expenditure. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health, but does not include provision of water and sanitation.

17. For more on health expenditure trends and regarding the drivers of health expenditures, see more in the Health & Economy Program series produced by the Health, Nutrition, and Population Anchor of the World Bank in the papers by Fleisher, Leive, and Schieber (2013); Liang and Mirelman (2013); and Tandon et al. (2013). Further literature includes a global overview by Xu, Skasena, and Holly (2011). A number of studies, including Hartwig (2005), Hartwig (2008), OECD (2006), OECD (2010), and IMF (2010), aim to disaggregate the drivers of health expenditures.

Figure 1.1 Schematic of Transmissions from Macroeconomy to Fiscal Policy and Government Expenditures on Health



Source: Authors

Figure 1.1, which illustrates the transmission pathway from the economy to health, is greatly simplified. In reality, numerous pathways materialize the effect of the crisis on fiscal policy and health spending. Studies of crises have recorded various pathways from macro shock to health.[18] Frameworks, such as the one suggested by Musgrove (1987) (see figure 1A.1 in annex 1) and Waters, Saadah, and Pradhan (2003), capture the complex pathways from crisis through governments — which affect supply-side constraints, and households — which alter their behavior and lifestyle and demand for care during downturns. The consequent decline in the level and quality of care contributes to the decline of population health outcomes.

Today, as a consequence of the financial crisis in OECD countries, the world risks the most serious economic downturn since the 1930s (WHO 2009). The pathways through which a recession in rich economies can affect many low- and middle-income countries are becoming evident. Many high-income and upper middle-income countries experience negative real income growth and substantial increases in unemployment, with consequent impact on health. In those countries where the financial crisis has required emergency assistance from the International Monetary Fund (IMF) and, the European Central Bank (ECB), or both, the situation is particularly serious for health service financing because spending restrictions are imposed during loan repayment.[19] As a result of the contraction in advanced economies, in low- and middle-income countries private financial flows can fall, foreign direct investment and remittances can decrease, and exports from developing countries may fall in terms of price and volume, potentially accompanied by (sudden and dramatic) falls in exchange rates (WHO 2009). The consequent effects of unemployment and decreasing revenues would affect household income, government spending, and the capacity of other actors in the private and voluntary sector, curbing contributions to health care financing. The financial squeeze on the sector during crises, thus, takes place at a time of greater health need.

18. See further references on this in a review by Brenzel (2013) and the literature review section of Velenyi, Yazbeck, and Smitz (2013).

19. See selected EU country cases in chapter 5 of Hou et al. (2013), including Barros (2013); Burke, Barry and Thomas (2013); and Yfantopoulos (2013). Other cases are also presented in the *Journal of Health Policy*, July 2012 special edition on EU countries, including Italy, Portugal, and Spain.

What happens in the transmission pipeline during shocks is a critical question, since inefficient fiscal and sectoral policies may have detrimental impacts on the population. Thus, understanding the nature of transmission from the macro economy to fiscal policy responses and health sector allocation decisions is important in improving countries' long-term growth trajectories, including the human capital aspect of growth. So the questions are the following: *Can the government protect spending, especially for social expenditures that serve as a safety net (for example, automatic stabilizers)? Are fiscal and social policies synergistic or antagonistic?* We will explore these relationships through basic statistical analysis that draws on global macro data to provide an overview of patterns and trends over 16 years, from 1995 through 2010.

5.2. THE ROLE OF PUBLIC AND PRIVATE EXPENDITURES DURING CRISES

The general concern during crises is the impact of the economic shock on population health outcomes. However, in this paper we chose to focus on expenditure patterns and not on final health outcomes. Although the relationship between health spending and health outcomes is weak, changes in health financing during downturns are known to affect health status.[20] Since we aim to explore the role of countercyclical policy making, in this study we specifically focus on government expenditures on health care[21] as an automatic stabilizer-type policy tool that can be mobilized to absorb the shock on households.

Nevertheless, we recognize that many would argue that private sector health expenditures cannot be ignored during any analysis, since in the majority of countries with large vulnerable populations, private payments predominate. Thus, a central question is what is neglected by focusing solely on government responses during crises. This depends on the public and private shares of total health expenditures, and the dynamics between public and private expenditures over time, particularly during economic shocks.

To understand what our analytical focus on government health expenditures means, we take a cursory look at health care financing patterns[22] between 1995 and 2010 — both public and private expenditure trends — across income groups.

As one example, in 2009, when the group average of GDP growth for low-income countries was down to 1.2 percent (see first column in table 1.1; for more details on public-private health expenditure trends, see annex 2), the average growth rate of real per capita public expenditures on health was 7.0 percent, and the real per capita private expenditure growth rate was approximately 3.0 percent. Based on the real expenditure values, the group average of the shares of public and private expenditures on health in low-income countries is, respectively, 72 and 28 percent. This proportion suggests that — particularly in a global overview study such as this — exploring the cyclical responses of government health financing is relevant even in the low-income context, where the public share is the smallest compared to the other income groups. Nonetheless, given the variation in public expenditure shares within income groups, country-

20. See an overview of effects by income group in Velenyi, Yazbeck, and Smitz (2013) in Hou et al. (2013).
21. In the analysis for GHE we draw on data from the NHA, maintained by the WHO. This variable for GHE includes official development assistance for health (DAH), at least its on-budget portion.
22. See a global analysis on health expenditure patterns for 183 countries between 1995 and 2010 by Fleisher, Leive, and Schieber (2013) in the Health & Economy Program series produced by the HNP Anchor of the World Bank.

specific event analyses can shed more light on the particular effects of a crisis on health care financing; hence, such explorations are encouraged in future research.

Table 1.1 Growth Rates for GDP and Expenditure on Health, and Public Share of Health Expenditures

	2009				2010			
World Bank Income Groups	**LIC**	**LMIC**	**UMIC**	**HIC**	**LIC**	**LMIC**	**UMIC**	**HIC**
GDP growth rate (%)	1.2	-1.5	-4	-5	4	3	2	2
Real private expenditure PC growth rate (%)	3.0	5.0	4.9	2.5	-1.0	0.0	3.0	1.0
Real public expenditure PC growth rate (%)	7.0	7.5	12.2	9.9	3.6	1.3	1.5	-2.4
Public share of health expenditures (%)	72	82	80	81	72	83	81	81

Source: *Fiscal Health Database 2012*

Note: LICs = low-income countries; LMICs = lower-middle-income countries; UMICs = upper-middle-income countries; HIC = high-income countries.

We now turn to the context for empirical analysis, starting with the description of the data source, followed by the methodology.

VI. DATA

A number of papers note data limitations as a constraint to research in this area (for example, Akitoby et al. 2004; Del Granado, Gupta, and Hajdenberg 2013; Doytch, Hu, and Mendoza 2010). Indeed, data constraints are driven by three main factors.

First, while there is an abundant series of macro data released by various organizations; often definitions and data construction methods across the macro series are not consistent. Second, data quality has been questioned in some instances, especially for low-income countries where data availability can be a challenge (for example, data are extrapolated to fill gaps). Third, some macro series have a shorter time horizon, which is important for time series analysis. In this case, analysts would prefer higher data frequency, such as quarterly, to obtain sufficient data points for the analysis of business cycles.

In the context of investigating the cyclicality of health expenditures, a major constraint has been that variables required for the analysis are scattered across a number of major databases maintained by various organizations and, hence, analysis across the macrofiscal and health domains has required the analyst to merge variables across databases and go through consistency checks for the relevant variables. This is unfortunate, since the process of database construction is time consuming, and subjective decisions of variable construction affect the comparability of findings across papers and the time horizon.

To facilitate analysis in this area, we have compiled a new synthetic database, referred to as the *Fiscal Health Database* (see table 3A.1 in annex 3), which includes, among other things, data on health expenditures, health outcomes, government revenue, spending and debt, and other

measures of fiscal and financial sustainability related to the health sector and the overall macroeconomy. This macro database combines several sources of data produced by different organizations and authors, including National Health Account (NHA) data from WHO; the World Development Indicators (WDI), health, nutrition, and population statistics (HNP Stats), and health equity and financial protection (HEFPro) data from the World Bank; macro data, including Article IV and other data sets from the IMF; labor statistics from the International Labour Organization (ILO); data on official development assistance (ODA) and development assistance for health (DAH) from the Institute for Health Metrics and Evaluation (IHME); and data on political economy from the Polity Project, and the Inter-Country Risk Guide (ICRG) data published by the Political Risk Group. Expectedly, the Fiscal Health Database (World Bank 2012), which was created not only for this analysis but also to provide open data to enable analyses that span across the domains of macroeconomy and the health sector, is a valuable contribution to analytical efforts in this area.

The subsequent analyses use this rich new synthetic data set, which compiles diverse pieces of information found in multiple databases. From the macro panel, which covers 2,500 variables and 193 countries, our investigation covers 183 countries over 16 years (between 1995 and 2010), for which period the key variables of interest for the proposed analyses are available. The primary data sources for the analyses are the WDI (for example, for GDP), the IMF Fiscal Statistics (for example, for debt-to-GDP ratio), WHO's NHA series data (for example, for health expenditures), and the Political Risk Groups series for the ICRG index. A brief overview of the key variables will be presented in the section that discusses empirical application and results.

VII. METHODOLOGY

To investigate the relationship between business cycles, fiscal policy, and the cyclicality of government expenditures on health, we perform statistical analyses using the Fiscal Health Database. As the literature review showed, the evidence base in this area has been thin due to data limitations. However, with the recent surge in interest in cyclical behavior, the latest papers have increased geographic coverage and applied more robust methodology in terms of estimating the relationship between business cycles and social and health policy, trends over time, and differences across regions and income groups.

The methodology applied here draws on earlier literature in this domain, including standard macro procedures, to analyze trends, descriptive statistics to obtain cyclical components of the key variables interest, and diagnostic econometric models to test priors on the drivers of cyclical responses.

The main contributions of the proposed empirical work to the current literature are (a) inclusion of recent data points compared to earlier empirical papers,[23] (b) expansion of the analytical sample to provide as global an overview as the available data sources allow, and (c) shifting the

23. These papers cover 1972 to 1997 for OECD and Latin America and the Caribbean countries (Braun and Di Gresia 2003), 1980 to 2008 for 100 industrial and developing countries (Doytch, Hu, and Mendoza 2008), and 1897 to 2007 for 145 countries (Del Granado, Gupta, and Hajdenberg 2013).

primary focus from the relationship between the business cycle and fiscal responses to the dynamics between the business cycle and government health expenditures.

There are two main approaches applied in this paper, which will be discussed in more depth in sections 7.1 through 7.5.

(1) Descriptive Analysis (sections 7.1–7.4): This will (a) provide a global overview of cycle trends for the three central variables of interest presented in the analytical framework (GDP, GGE, and GHE; see definitions in section 5.1) between 1995 and 2010 by income group, region, and across "good" and "bad" times; (b) present the bivariate contemporaneous cyclical correlations between these variables (GDP-GGE, GDP-GHE, and GGE-GHE) for the study period (1995–2010) and also for two windows (1995–2002 and 2003–10), which were defined to compare the changes in the correlation coefficients over time and to study these changes by income group to test the hypothesis of whether developing countries have been escaping the procyclical trap; (c) test priors regarding the relationship between correlation coefficients for fiscal responses (GDP-GGE) and government health expenditure responses (GDP-GHE) and political and economic risk, captured by the ICRG index; and (d) present variables in radar plots, which, based on theory and earlier empirical work, are expected to be relevant determinants of cyclical responses.

(2) Diagnostic Modeling (section 7.5.): Although descriptive analysis can be used as a rapid diagnostic tool to provide insights on statistical relationships, this approach is limited because it can only offer information on a reduced set of dimensions, such as bivariate relationships between variables of interest. There are no controls for a number of observable and unobservable characteristics, which leave the policy maker blindfolded to what explains and drive the observed dynamics, and about the direction of causality. Econometric modeling is an approach that enables the use of control variables to go beyond the constraints of a bivariate context, and it aims to enable estimating causal relations to ascertain that the change in the outcome variable of interest is indeed the effect of the independent variables and not some unobserved characteristics. Because of the descriptive nature of this paper and the intention to keep the methods easily replicable by noneconomists, here we only attempt diagnostic modeling, the primary objective of which will be to test our priors regarding the relevance of variables discussed in the descriptive part. This diagnostic modeling will be in a static framework. More advanced econometric modeling, which involves testing for causality, and dynamic panel data methods, will be done in a separate paper.

7.1. FIVE-STEP DESCRIPTIVE ANALYSIS FOR CYCLE IDENTIFICATION AND CALCULATING CYCLE CORRELATIONS

Using standard methods from the empirical macro literature, the first descriptive analysis aims to identify trends and isolate the cyclical components of the three central variables of interest (GDP, GGE, and GHE). The isolated cyclical components are used to calculate the cyclical correlations between the economic cycle and fiscal responses, and the economic cycle and government health expenditures. These correlations are then applied in subsequent analyses,

such as comparison of the correlation coefficients over time, and testing the relationship between cycle correlations and variables of interest that are expected to be determinants of cyclical responses.

This descriptive method is chosen since one of the objectives of the paper is to provide user-friendly and replicable approaches that produce results that can be updated using newer waves of the publicly available and, at the least, annually updated Fiscal Health Database. The method should be accessible to noneconomists who are interested in understanding and measuring cyclical patterns, for example, delving further in a region or country.

Drawing on the methods applied in Braun and Di Gresia (2003), the descriptive analysis of cyclicality consists of five steps:

- *Step 1 — Log Transformation of the Variable:* First, we transform the selected outcome variables of interest in per capita terms into logarithmic form. This is standard procedure with data that have outliers and skewed or exponential distribution, such as income and health expenditures, to compact the dispersion of the variable.[24] The convenience of log-transformed variables is that their difference can be interpreted in percentage change terms.[25]

- *Step 2 — Apply a Filter to the Series:* Next, using a common practice in the business cycle literature, we apply a linear filter to the log-transformed variables of interest to detrend the series. This is necessary because, following Lucas (1977), the business cycle component of the variable is defined as its deviation from the trend. We apply the Hodrick-Prescott (HP) filter to extract the stationary (cyclical) component and the nonstationary (trend) component. Practically, the HP filter decomposes the variable, for example, GDP, into an additive cyclical and trend component.[26] Extracting the trend component yields a stationary cyclical component, which enables the analysis of the cycle, in our case, the business, fiscal response, and government health spending cycles and the relationship between these cycle components. In the empirical analysis, we use 6.25 as the smoothing parameter (λ), which is in line with the proposed value in a technical review by Baum (2006), and is based on a technical paper

24. On log transformation see, for example, http://www.ats.ucla.edu/stat/sas/faq/sas_interpret_log.htm. Logarithmic transformation variable is used to pull outlying data from a positively skewed distribution closer to the bulk of the data in a quest to have the variable be normally distributed. In regression analysis, the logs of variables are routinely taken, not necessarily for achieving a normal distribution of the predictors and/or the dependent variable, but for interpretability. The standard interpretation of coefficients in a regression analysis is that a one-unit change in the independent variable results in the respective regression coefficient change in the expected value of the dependent variable while all the predictors are held constant. Interpreting a log-transformed variable can be done in such a manner; however, such coefficients are routinely interpreted in terms of percent change.

25. In regression analysis, elasticity is calculated by regressing a log-transformed variable on another log-transformed variable. To illustrate with an example, income elasticity of government spending can be calculated by regressing the log of GGE on the log of GDP. The obtained coefficient estimate shows the percentage change in government spending as a result of a 1 percentage change in the output.

26. The methodology consists of adjusting a tendency to the evolution of the logarithm of the variable *y* (for example, GDP, health expenditure). The difference between the logarithm of the observed value and the estimated tendency (*g*) yields the cyclical component (*c*). The objective is to minimize the variance of *y* around *g* (subject to the restrictions of penalization of the second difference of *g*). The penalization parameter λ controls the form of tendency. With higher λ, the tendency will be smoother and result in more recurrent variations. While Braun and Di Gresia (2003) use λ = 100 as the smoothing parameter, in a methods overview presentation Baum (2006) proposes λ = 6.25, based on a technical paper by Ravn and Uhlig (2002). Calculating the difference between the original value of the variable's logarithm and the logarithmic tendency estimated by the HP Filter, the cyclical component is obtained.

by Ravn and Uhlig (2002), (see more on the choice of filter and robustness tests between HP and BK filters in box 1.2).

Box 1.2 Choosing the Linear Filtering Method

Since the application of a linear filter affects the cyclical component, the results are sensitive to the filtering method.[a] To validate the robustness of our findings, we tested two filters: the Hodrick-Prescott (HP)[b] and the Baxter–King (BK)[c] filters. We performed visual checks of the difference between the filtered trend line and the observed values for the selected variables of interest (GDP, GGE, and GHE to capture, respectively, the business, fiscal, and health financing cycles) using the HP or BK filter. Overlaid graphs that depict the filtered trend line and the observed values were prepared for all income groups, regions, and the 183 countries in our sample. Based on this comparison, we chose the HP filter because the BK filter exaggerates the cycles at the end of the series in the breakdowns by income group and region. For some countries, the BK filter follows the observed values too closely, and, hence, compared to the smoothed results using the HP filter, it does not capture the cycles adequately.

Our choice of filter is consistent with a number of relevant papers reviewed in this area, including the analysis by Frankel, Végh, and Vuletin (2011), which we extend to the area of government health expenditures. In general, an overview presentation (Baum 2006) provides testimonies for the use of HP filter[d] and recapitulates the conclusion in this debate that while the use of the filter has been subject to heavy criticism, it "has withstood the test of time and the fire of discussion relatively well." Based on the results from the tests and in line with the arguments above, the results presented in this paper, for example, the correlation coefficients between business and government health expenditure cycles, will be based on the cyclical components derived using the HP filter.

Source: Authors

Note: a. A number of technical papers (for example, Ravn and Uhlig 2002; Baum 2006) that focus on filtering methodology discuss the pros and cons of the various filter types and how to optimize the parameter(s) for the applied filter to obtain the cyclical component that best captures the cycles for the variable of interest.

b. As Male (2010) summarizes, the HP filter is a liner filter designed to optimally extract a nonstationary trend component, which changes smoothly over time, from an observed nonstationary time series. For more on the HP filter and other filtering techniques, see, for example, the methods sections in Braun and Di Gresia (2003), and Male (2010). For more technical discussions, see Schlicht (2004) and Baum (2006).

c. In contrast with the HP filter — a highpass filter — the Baxter-King filter (Baxter and King 1999) is a bandpass filter, which allows suppression of both the low-frequency trend components and the high-frequency components in an economic series. The approximation in BK improves with a longer moving average, but a longer moving average will drop additional observations at each end of the filtered series. Hence, Baxter and King (1999) conclude that three years of data (at either annual or quarterly frequencies) should be used to construct the filter.

d. "For better or worse, the filter best known to most economics is the 'HP' filter" (Hodrick and Prescott 1997). As Ravn and Uhlig (2002) state, "...the HP filter has become a standard method for removing trend movements in the business cycle literature."

- *Step 3 — Calculate the Cyclical Component of the Time Series:* From the first two steps, we calculate the cyclical component of the time series, which is the difference between the observed value (log of the variable in step 1) and the corresponding value on the filtered trend line (step 2). The figures obtained this way describe the cyclical behavior of the variable of interest. For example, in case of economic output (GDP), if the calculated cyclical component is positive, this means that the cycle is above the expected trend line, and if the calculated cyclical component is negative, this means that the cycle is below the expected trend line (that is, the boom/bust cycle).

- *Step 4 — Calculate the Bivariate Contemporaneous Correlations:* Drawing on the calculated cyclical components for output (GDP), general government expenditures[27] (GGE), and government health expenditures (GHE), we calculate the cross-correlations between the various cyclical components, specifically between the business and fiscal cycles (GDP and GGE), the business and government health spending cycles (GDP and GHE), and between the fiscal and government health spending cycles (GGE and GHE). These cross-correlations allow us to establish whether the relationship between business cycles, fiscal responses, and health sector responses are countercyclical or procyclical, that is, whether the cycles move in opposite directions, protecting budgets and health spending during bad times, or in the same direction, signaling increasing expenditure pressures during bad times (see definitions in section 4.1). A correlation coefficient above zero (+) implies a procyclical relationship. The higher the value[28] is between 0 and 1, the more correlated the cycles are. Conversely, a correlation coefficient below zero (−) signals a countercyclical relationship. In this fourth step, we provide a visual overview of cyclical relationships through graphs of overlaid cycles.

- *Step 5 — Present Results by Region, Income Group, and Good/Bad Times:* Finally, we will illustrate through a series of correlation tables and corresponding graphs the findings with respect to the cyclicality between business cycles and overall fiscal responses, and behavior on health spending, breaking these down by region, income group, and by the state of the business cycle — "good" and "bad times" — to explore whether cyclical responses are asymmetric (see box 1.3 for more on exploring asymmetry).

27. Ilzetzki and Végh (2008) provide a discussion on the alternative definitions of government spending measures and the trade-off between them. While the use of a general government measure is more inclusive, including both central and local governments, the use of central government spending is more in accordance with the principle of looking at social policy instruments that are directly under the control of a single social agent. Total central government spending includes more spending categories, such as government consumption, public investment, and transfers, but also interest payments, which makes this measure noisier. Much of the literature on the cyclicality of social policy has used real central government spending (for example, Kaminsky, Reinhart, and Végh [2004]; Alesina, Campante, and Tabellini [2008]), while much of the literature on the effectiveness of social policy in high-income countries has looked at government consumption or a combination of government consumption and investment (for example, Blanchard and Perotti [2002], and Perotti [2004]).

28. The standard threshold values for correlation coefficients are (a) Weak positive (negative) linear relationship via a shaky linear rule, values between 0 and 0.3 (0 and -0.3); (b) Moderate positive (negative) linear relationship via a fuzzy-firm linear rule, values between 0.3 and 0.7 (0.3 and -0.7); and (c) Strong positive (negative) linear relationship via a firm linear rule, values between 0.7 and 1.0 (-0.7 and -1.0).

Box 1.3 Cyclicality across "Good" and "Bad" Times

As discussed earlier, Del Granado, Gupta, and Hajdenberg (2013) find that the cyclicality of spending is asymmetric across "good" and "bad" times, defined in terms of output gap relative to potential output. To validate this finding, we construct the variable "output gap," which measures the difference between the observed value for the variable of interest and the value on the filtered trend for the given year in terms of standard deviation from the trends. Good/bad times are defined as a positive /negative output gap relative to the trend line.

In terms of the measurement approach, output gap is not equivalent to growth crises measures that are provided in terms of negative GDP growth.[a] The difference is that while growth crises are defined in terms of negative year-on-year GDP growth rate, a negative output gap does not necessarily mean that the country has a negative growth rate. For example, in the case of a slowdown of economic output in countries with high growth rates, a negative output gap simply means that relative to the expected trend the country's economic performance is lower but not necessarily negative. Since these are different concepts, in the descriptive analyses we compute statistics for cycles both by output gap, which is a relative measure of the country's performance on industrial output, and by GDP growth rate, which is an absolute measure of industrial output. In the discussions we focus more on the results based on output gap, since this is the common practice in the literature.

Source: Authors

Note: a. The National Bureau of Economic Research defines a recession in the United States as when seasonally adjusted quarterly growth rates are negative for two straight quarters. Bruno (1996) defines growth crises as at least three consecutive years of negative growth, cumulating in a drop of growth of at least 9 percent.

7.2. EXPLORING CYCLICAL RESPONSES IN GOVERNMENT HEALTH EXPENDITURES OVER TIME BY INCOME GROUP — GRADUATION OR FALLBACK?

The literature review has shown that while countercyclical behavior has been primarily the privilege of advanced economies, the behavioral patterns are now slowly changing. Countercyclical responses are possible, and indeed, have been observed in lower-income countries, both with respect to fiscal (Brahmbhatt and Canuto 2012; Frankel, Végh, and Vuletin 2011) and health policies (Lewis and Verhoeven 2010).

To our knowledge, there has been no descriptive investigation at the global level of how the cyclical behavior of government health expenditures has been changing by income group, nor now, studies including the period that covers the global economic crisis. We draw on the paper by Frankel, Végh, and Vuletin (2011), which examines cyclical patterns of government expenditures for 94 countries (21 developed and 73 developing) between 1960 and 2009. To explore changes in the cyclical responses over time, they compare the correlations between the cyclical components of real government expenditure and real GDP calculated for each country for two time frames: 1960 to 1999 (window 1) and 2000 to 2009 (window 2). The change in the correlation coefficients shows how a country's fiscal policy has transformed between the first and second period, including the direction and magnitude of the change. Based on the combination of cyclical responses observed in the first and second period, they classify countries into four categories of fiscal behavior, which are captured in table 1.2.

Table 1.2 Categories of Fiscal Behavior Based on Cyclical Behavior Over Time

Cyclical Behavior in Window 1 1960 to 1999	Cyclical Behavior in Window 2 2000 to 2009	Category of Fiscal Behavior
+ Procyclical	+ Procyclical	Procyclical School
- Countercyclical	- Countercyclical	Established Countercyclical School
+ Procyclical	- Countercyclical	Recent Countercyclical Graduate
- Countercyclical	+ Procyclical	Back to Procyclical School

Source: Adapted from Frankel, Végh, and Vuletin 2011. Some category names have been slightly modified.

The question for us is whether the intriguing results found by Frankel, Végh, and Vuletin (2011) in the fiscal context — that about a third of the developing world has been able to escape the procyclical trap — apply to the trend in cyclical responses of government health expenditures to business cycles.

To answer this question, we apply the described methodology to our sample of 183 countries and extend the analysis to explore the trends over time in the cyclical pattern of government health expenditures. Compared to the analysis by Frankel, Végh, and Vuletin (2011), a limitation here is that the data set spans 16 years (1995 and 2010), and hence, in this shorter panel, the data points are constrained to eight years (1995 to 2002) and seven years (2003 to 2010) in the two time frames.[29] The results are illustrated through quadrant charts, which visually capture the change in the correlation coefficient between the two windows (see more in section 8.2.1.3, figure 1.13, and annex 7). The quadrants correspond to the four categories presented in table 1.2.

7.3. EXPLORING THE ROLE OF POLITICAL AND ECONOMIC RISK IN SHAPING CYCLICAL RESPONSES

The correlation coefficients offer some insights into the dynamics between business cycles and fiscal and government health financing policies. Yet, these simple bivariate relationships have limitations. They show associations and not causation, and they mask a number of causal pathways that result in the observed correlation.

In an overview paper, Tandon et al. (2013) discuss the theory and limited empirical evidence behind prioritizing government spending on health, measured as the health share of aggregate government expenditure. Among the driving factors, they mention democratization and lower

29. Although the data is for 16 years, since differences are used, the analysis is based on 15 data points. Hence, the choice of the two windows is somewhat limited. The windows are required to have a comparable number of data points for better statistical balance. The second window contains the current global economic crisis, and hence we expect to see some effects, particularly in higher-income countries where the downturn has affected both fiscal and health financing policies and responses.

levels of corruption. Indeed, the majority of empirical papers that explore the relationship between business cycles and fiscal or health care financing response argue for controlling for political economy (Braun and Di Gresia 2003; Calderon and Schmidt-Hebbel 2008; Doytch, Hu, and Mendoza 2010; IDB 2009), and government quality and social risk (Liang and Mirelman 2013).

Hence, we add the political and economic risk dimension to our analysis to explore the empirical evidence on the relationship between these risks and cyclical responses, both with respect to fiscal and government health expenditure responses to the business cycle.

Scatter plots are used to examine the relationship between the correlation coefficients — calculated for GDP and fiscal response (GDP-GGE) or GDP and health care financing response (GDP-GHE) — and an index of political, financial, and economic risk, the Inter-Country Risk Guide (ICRG), published by the Political Risk Group (see more in section 8.3.). High values of the ICRG[30] indicate low risk, while low values indicate high risk. The scatter plots[31] are run for two periods (window 1: 1995–2002; window 2: 2003–10) to be able to distinguish performance over time.

7.4. RADAR PLOTS — A VISUAL ANALYSIS TO EXPLORE DETERMINANTS OF CYCLICAL RESPONSES

The descriptive analyses proposed so far included bivariate correlation analysis to explore the cyclical patterns during the 16-year study period, and introduce only one control variable, the ICRG index, to start isolating the effect of factors that are likely important in shaping cyclical responses.

7.4.1 Increasing the dimensions of the exploration

However, based on theory and earlier empirical results, we know that these complex dynamics are driven by a number of observable and unobservable factors. As such, it is necessary to consider other variables that are expected to drive cyclical responses. Hence, we propose another, although still descriptive, approach, which will help in the review and identification of control variables, which can later be incorporated in diagnostic modeling and more advanced econometric analysis.

We construct radar plots to increase the dimensionality of the exploration. Despite the limitations associated with descriptive approaches, radar plots are useful in comparisons undertaken for a small group of countries, since they provide a quick visual overview of the statistical features

30. The political risk rating contributes 50 percent of the composite rating, while the financial and economic risk ratings each contribute 25 percent. The following formula is used to calculate the aggregate political, financial, and economic risk: *CPFER (country X) = 0.5 (PR + FR + ER)* where *CPFER* = composite political, financial, and economic risk ratings; *PR* = total political risk indicators*; FR* = total financial risk indicators*;* and *ER* = total economic risk indicators*.* The highest overall rating (theoretically 100) indicates the lowest risk, and the lowest rating (theoretically 0) indicates the highest risk. The broad categories of Composite Risk are (a) Very High Risk: 0 to 49.9 points, (b) High Risk: 50 to 59.9 points, (c) Moderate Risk (60 to 69.9 points, (d) Low Risk: 70 to 79.9. points, and (e) Very Low Risk: 80 to 100 points. http://www.prsgroup.com/ICRG_methodology.aspx#PolRiskRating.

31. In the scatter plots, the risk ratings are scaled between 0 and 1.

that explain the variability in cyclical responses across countries and over time, as well as across "good" and "bad" states.

7.4.2 Construction and use of the radar plots

The radar plots are implemented using an adaptation of the method for scoring called range standardization,[32] which uses a simple formula[33] to standardize numerical values to fall between the range of 0 and 1 (Kaly et al. 1999). Since range-standardized scoring constrains the data to fall into a specific band, the scores can be plotted for comparison on a standardized scale.

To construct the radar plots, based on theory and empirical findings, we have selected variables that fall into three groups: (a) observed cycle patterns (outcomes), (b) macro context and fiscal space (control variables), and (c) political economy (control variable). The variables (or dimensions) in these groups contain outlier values that skew the distribution in such a way that would mislead the interpretation of results. To address this problem, we censored extreme outliers so that the plots can more representatively capture the statistical characteristics of the majority of countries. The selected proxy variables are standardized not only in terms of the range of the variable to constrain it between 0 and 100,[34] but also in terms of the interpretation of each variable so that the center of the radar plot (0) means that the country's performance on the given variable is low; as the value approaches the outside ring (100),[35] its performance improves. The proposed empirical application of the radar plot for cyclicality analysis is captured through the schematic graph presented in figure 1.2.

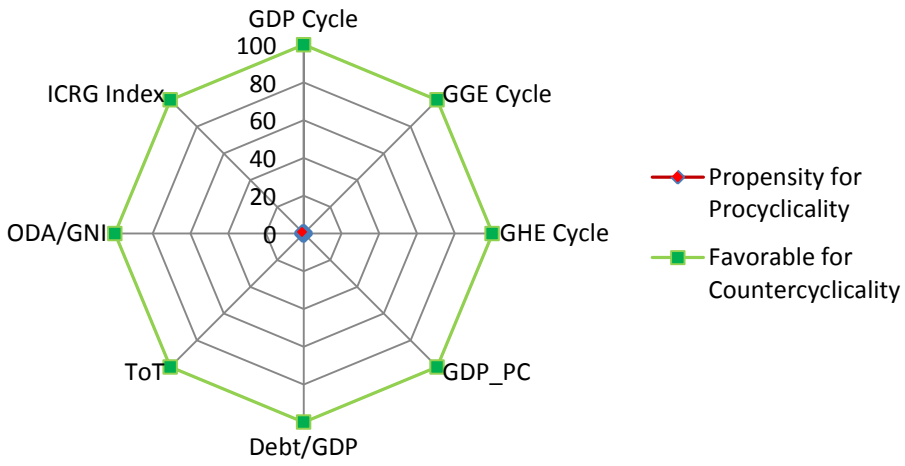
32. In range standardization, the minimum value for the indicator for the range of interest (*Min Xi*) is subtracted from the numerical value of the selected indicator for the country under assessment (*Xi*); then this value (*Xi – Min Xi*) is divided by the range of interest of the variable (*Max Xi – Min Xi*). The term "range of interest" is emphasized since, for a number of variables, the distributions contain extreme outliers; hence, we chose to censor the range to make the distribution of the value more meaningful.

33. *Vi = (Xi – Min Xi) / (Max Xi – Min Xi)*. This range is adapted to our needs since we define the range for censored values that make interpretation meaningful.

34. This range is obtained by multiplying the calculated range standardized variable, which falls between 0 and 1, by 100 to make the visual illustration easier to discuss.

35. While 0 to 100 standardized scaling is used in the plots, the variable labels for each dimension on the plot indicate the corresponding original range of the variable. For example, the 0 to 100 scale in the context of the GDP cycle spans the range of minus 12 to plus 12 percent deviation from the trend line. See more under the empirical section that presents the applied cases.

Figure 1.2 Radar Plot Illustrating Cyclicality Analysis and Its Interpretation



Source: Authors

The plots are designed to illustrate difference in performance between countries relative to a common benchmark. For this, to make the radar plots tractable and visually interpretable, we select a few countries from each region. Further, since the results are more interesting across "good" and "bad" states, we select target time frames specific to each region with respect to business cycle volatility. The plots between precrisis and postcrisis years can illustrate whether and how the shock changes cyclical behavior, whether the fiscal or health spending cycle is more affected (that is, change in the outcomes), and which of the selected control variables show significant change over time.

7.4.3. Rationale for variable selection for the radar plot

The number of dimensions in the radar plot is limited to keep the interpretation tractable. A brief description of the main categories and the selected dimensions that are expected to explain some of the variation in cyclical behavior is provided below.

- *Dimensions in Group 1*: *Observed Cyclical Components*. This first group of variables aims to visually capture the cycles for the three key variables of interest for this analysis. The plot captures the contemporaneous values of the cyclical components of the three variables.[36] These dimensions offer an insight into the country's performance on each of the three cycles across time, and on the relative performance among the countries selected for the comparative analysis.
    - *Cycle of GDP:* This is the cyclical component of log GDP per capita relative to the filtered trend line. The interpretation is, as discussed earlier, that a cycle above the filtered trend line implies a boom cycle, and a cycle below the filtered trend line implies a bust cycle. To censor extreme outliers, this variable is constrained between

36. In other words, the radar plot is not designed to capture lagged effects, for example, the effect of the observed GDP cycle at the baseline (*t0*) on the GGE or GHE cycle in the following period (*t+1*).

minus 12 and plus 12 percent deviation from the filtered trend line. To construct the standardized score, this range is mapped to between 0 and 100 on the standardized scale of the radar plot. Reading the GDP cycle variable together with the GGE or GHE cycle implies whether, in the same year, the cycles move in the same (procyclical) or opposing (countercyclical) direction, or whether there is no significant change (acyclical relationship). If the value is above the 50 percent mark on the plot, then the country is doing better compared to the trend; if it is below, then the country is underperforming.

- *Cycle of GGE:* This is the cyclical component of log GGE per capita relative to the filtered trend line of the variable. This variable is similarly constructed to the GDP cycle variable, with the exception that the base range before standardization is minus 25 to plus 25 percent, which is then converted into the 0 to 100 scale. The interpretation of the variable and the relationship between this and the other cycle variables is as explained above.

- *Cycle of GHE:* This is the cyclical component of log GGE per capita relative to the filtered trend line of GHE. The construction, range, and interpretation are the same as for the GGE cycle variable discussed above.

- *Dimensions in Group 2*: *Proxy Variables for Macro Context and Fiscal Space*. The second group of dimensions includes a limited set of variables to capture the macroeconomic context of the country, including some measures of fiscal space.

  - *GDP Per Capita:* GDP per capita is based on international dollars, with the base year of 2005, to be able to compare per capita output across countries and over time. As described, the variable is log transformed to constraint outliers. The literature suggests that income level is correlated with cyclical behavior, so we propose including this variable as a basic control variable to enable the comparison of country performance on the selected proxy measures with an understanding of the overall level of economic development.

  - *Debt-to-GDP Ratio:*[37] Debt-to-GDP ratio is used as a proxy for fiscal space.[38] Unlike the other variables, for which interpretation is straightforward — higher values

37. See the theoretical underpinning of fiscal space and government spending on health, as explained by Tandon and Cashin (2010, p. 15). "Fiscal space can be understood using the algebra of a government's inter-temporal budget constraint. The left-hand side of the following represents the uses of budgetary resources whereas the right-hand side reflects sources of budgetary resources: $Gt + rtBt\text{-}1 = Tt + Bt + At + Ot;$ where Gt is government noninterest expenditure in time t; rBt is nondiscretionary debt interest payments; Tt is taxes, fees, and other government revenues, including those arising from seigniorage (inflationary finance); Bt is total government borrowing (domestic and foreign net of use of deposits); At is grants; and Ot is other sources of funds, such as sale of assets. In other terms, the right-hand side represents the aggregate sources of government revenue, and the left-hand side represents total spending. Fiscal space for health depends not only on the overall government budget constraint, but also on the priority assigned to health. Government health spending, Ht, is a proportion kt of the overall government budget, or: $Ht = kt\ Gt$. Whether the priority for health (kt) is a constant or variable parameter is a key policy question. For example, if G increases as a result of increases in overall fiscal space, health spending would increase by a fixed proportion k if spending priorities remain unchanged."

38. While there are other possible proxy measures for fiscal space — including net external-debt-to-export ratio, which is less volatile than debt-to-GDP ratio if the exchange fluctuates, or primary surplus/deficit, tax revenues as share of GDP, net foreign

correspond to better performance — the debt-to-GDP ratio requires rescaling because higher values correspond to worse performance.[39] Consistent with the economic risk and crisis literature, the threshold value for bad performance differs by income level; we use a cutoff point of 40 percent for developing countries and 60 percent for advanced economies.

- *Official Development Assistance (ODA) as Share of Gross National Income (GNI):* ODA as a share of GNI is another proxy measure of fiscal space (Doytch, Hu, and Mendoza 2010). This dimension is especially relevant for low-income countries, which can be highly aid-dependent. This variable is of interest since in some instances, where crises are deep and protracted, the inflow of development assistance can enable countercyclical responses. While empirical evidence holds that countercyclical behavior is a characteristic primarily of advanced economies, we can explore the relationship between aid and cyclicality. The ODA/GNI ratio is on a positive scale in our radar plot, between the values of 0 and 50 percent. This choice can be debated since a higher ODA/GNI ratio means increased risk because the country's fiscal position is more exposed to external fluctuations. Although we agree with this, and the discourse regarding the concerns of aid volatility, for these snapshots we chose a positive scale; that is, higher values are outside on the radar plot and not inverted, unlike for the debt-to-GDP ratio. The rationale behind keeping the positive scale is that from the perspective of countercyclical spending, donor aid contributes to the financing envelope and thus can facilitate countercyclical behavior during downturns.

  However, as a cautionary note, this simple analysis assumes away a number of complex issues that are related to the impact of development assistance on government expenditures. First, one would need to control for aid volatility to see the consistency of these flows and better understand the role of ODA on expenditures. Second, the fungibility of ODA — that is, whether it replaces domestic budget, hence creating a zero-sum effect — is a much studied and debated topic (see more in box 1.4). Third, also related to the fungibility debate, international development assistance is not a homogenous product; grants and loans have different effects on government (health) spending (see, for example, Benedek et al. 2012; Clements et al. 2004). For the radar plots, we relax these complications since these issues can only be addressed and controlled for using more advanced techniques.

- *Terms of Trade (ToT):* The ratio between the prices of exports and imports is called the net barter terms of trade. ToT is said to be favorable when the prices of exports of a country are higher relative to the prices of its import. ToT has been found to be significant, especially for developing countries with high export shares and a high

transfers, portfolio investment, as discussed by a number of papers (Baldacci, McHugh, and Petrova 2011; Doytch, Hu, and Mendoza 2010; Ishihara 2005; Schaechter et al. 2012) — we use this proxy primarily because of data availability. However, in iterations of the radar plot approach, the performance of other variables for fiscal space can be tested. For example, tax base as share of GDP is interesting because this also captures informality and changes in fiscal constraints during downturns in advanced economies.

39. To keep the interpretation of all variables in the radar plot consistent, data of the rescaled debt-to-GDP ratio variable that are closer to the center of the plot represent higher debt-to-GDP ratios, i.e., reduced fiscal space.

share of revenues from trade (Del Granado, Gupta, and Hajdenberg 2013; Mendoza 1995). Mendoza (1995) finds that terms of trade are strongly procyclical, suggesting that much of the fluctuation in output in developing countries can be explained by ToT shocks. Given the definition, ToT improves if the ratio is higher. We use ToT in the analysis as difference in ToT relative to the previous year. In terms of the interpretation of this proxy measure in our context, improving ToT would increase fiscal space; however, if not used wisely, a windfall from a ToT improvement can lead to more procyclical behavior.

Box 1.4 The Impact of Development Assistance on Government Expenditures

The impact of development assistance on government expenditures is a hot topic, since it is critical to understand how international finance and development institutions can get more bang for their buck; that is, how their investments or financial support can leverage government efforts to raise and spend domestic resources. This question merits a brief discussion since the government health expenditure variable used in this paper by definition[a] includes elements of official development assistance (ODA) — but not its off-budget component. Because of this definition, our aggregate numbers on cyclical behavior include effects that are the joint product of external and domestic responses. If one would like to better understand the driver of cyclical responses, one ought to pose the question: What is the share of government funds relative to donor funds?

Development assistance for health (DAH) has more than quadrupled since 1990 (Ravishankar et al. 2009). However, the rate of increase in DAH appears to have slowed in recent years (IHME 2010). With respect to vulnerability and sustainability, a common concern is that DAH may crowd out public budget allocations. Until recently, the literature has been limited on the crowd-out effect of DAH on government health expenditures and to what extent such resources are spent outside the health sector (fungibility) (Gottret and Schieber 2006). However, given the 2008–09 economic crisis and the consequent increased interest in changes in the pattern of aid flows, a number of papers have contributed to better understanding the dynamics of DAH on domestic spending. For example, using panel data of low-income countries for 1995–2006, Lu et al. (2010) find that for every US$1 of DAH given to the government, health expenditure falls between US$0.43 and US$1.14. However, they find that assistance given to nongovernmental organizations increases domestic resources for health from US$0.56 to US$1.72. Consistent results are found by IHME (2010).

Variations in methodological rigor may be behind some of the inconsistencies in findings. For example, Ooms et al. (2010) advises against relying too heavily on the findings by Lu et al. (2010) given its methodological limitations, and concludes that donor policy decisions should not rely on cross-country regressions but on case-by-case analysis. A case study by Fairbank (2013)[40] provides country-level insights on donor fund fungibility in the context of Liberia, a highly aid-dependent country.

In a macro analysis, Benedek et al. (2012) investigate the broader question of the effect of foreign

40. This study was commissioned by the Health & Economy Program of the HNP Anchor as part of a series of papers that focus on the relationship between macroeconomic conditions and health care financing.

aid on government revenues. Their findings confirm that the effect of aid on the domestic budget (tax revenues) is heterogeneous, with grants creating a negative effect and loans creating a positive effect. The conclusion from these studies is that aid cannot be treated homogenously, and project-specific or budget support, grants, or loans should be treated separately.

Source: Authors

Note: a. The variable of the Fiscal Health Database has been incorporated from the National Health Accounts maintained by the WHO. The database is accompanied by a codebook that provides the definition for each variable.

- *Dimension in Group 3*: *Political Economy*. This last dimension aims to capture the role of political economy, which is considered to be a significant explanatory variable that often drives policy decisions. In fact, the majority of papers in the literature plug in some type of variable to control for political economy (Braun and Di Gresia 2003; Calderon and Schmidt-Hebbel 2008; Doytch, Hu, and Mendoza 2010; IDB 2009; see also Tandon et al. 2013).
    - *Polity 2 or ICRG Political Risk Rating Index:* To control for political economy and the quality of governance, most authors use the revised polity index (Polity 2), developed by the Polity Project, or the Inter-Country Risk Guide published by the Political Risk Group. We chose ICRG,[41] which is a composite index of political, financial, and economic risk, and covers a longer time horizon. In terms of scaling, and interpretation, the highest overall rating (theoretically 100) indicates the lowest risk, and the lowest rating (theoretically zero) indicates the highest risk.

7.5. DIAGNOSTIC MODELING

Following the above-proposed methods, we reach the limits of descriptive analysis. Both theory and empirical evidence prompts us to go further and explore multivariate relationships. The rudimentary modeling laid out here is inspired by the challenges discussed so far, and it builds on the variable identification efforts conducted in the descriptive part. The modeling is used to test the relevance of the variables proposed as expected drivers of cyclical responses. The modeling is done in a static framework; that is, we only explore contemporaneous relations. Finally, since this is a diagnostic attempt, the interpretation of the estimates will not necessarily be causal. However, it will enable us to assess multivariate associations, and the sign and magnitude of effects of the control variables on cyclicality of government health expenditures.

Given its simplicity, we apply an ordinary least squares (OLS) linear regression for initial model specification, estimation, diagnostic checks, and model re-specification. We apply a step-wise

41. http://www.prsgroup.com/ICRG_methodology.aspx#PolRiskRating. The political risk rating contributes 50 percent of the composite rating, while the financial and economic risk ratings each contribute 25 percent. The following formula is used to calculate the aggregate political, financial, and economic risk: *CPFER (country X) = 0.5 (PR + FR + ER), where CPFER = composite political, financial, and economic risk ratings; PR = total political risk indicators; FR = total financial risk indicators; and ER = total economic risk indicators.* The highest overall rating (theoretically 100) indicates the lowest risk, and the lowest rating (theoretically 0) indicates the highest risk. The broad categories of Composite Risk are (a) Very High Risk: 0 to 49.9 points, (b) High Risk: 50 to 59.9 points, (c) Moderate Risk: 60 to 69.9 points, (d) Low Risk: 70 to 79.9 points, and (e) Very Low Risk: 80 to 100 points.

modeling approach,[42] gradually adding covariates to the specification to explore the relationship between the outcome variable of interest, which is the cyclical component for government health expenditures, and selected explanatory variables, based on the foregoing discussions.

Specifying the Dependent and Independent Variables

- Dependent Variable: As discussed earlier, the cyclical component is defined in terms of standard deviations from the smoothed trend line. The higher the deviation, the bigger the cycle. A positive cycle means increased government health expenditures relative to the expected trend, and a negative cycle means decreased government health expenditures relative to expected trend. The HP filter was used to de-trend all series for the diagnostic modeling.

- Control Variables: The choice of the covariate set partially draws on the rationale for selecting the variables for the radar plot, presented under the previous section. Additional variables are also considered based on theory and earlier evidence (see more on the proposed variables under the empirical section, section 8.5). As discussed, to understand the cyclical response during downturns, in the regression we must control for negative GDP cycle, which can be done by introducing variables for negative and positive cycles in the regression or by running separate regressions for the negative and positive GDP cycle scenarios.

Nonparametric Diagnostic and Linear Modeling

- First, still in a bivariate context, we explore the relationship between the cyclical component of government health expenditures and economic growth, measured in terms of GDP cycle. Given priors that a linear relationship may not fully capture the dynamics between the cyclicality of government health expenditures and growth cycles, we apply a nonparametric approach to visually explore the nature of the relationship.

- Second, we turn to multivariate linear modeling, using the pooled data for the full sample over 16 years, to test the relevance of the control variables discussed previously and estimate the sign and magnitude of the relationship between the covariates and the government health expenditure cycle. To test for the cyclical response during downturns, in addition to fitting the regressions for the pooled data across bad and good times, we also run models separately for economic downturns and boom, using GDP cycle to distinguish these periods. The model equation of the multiple linear regression is shown below, where β_0 is the constant and the B_1, B_2, … are the coefficient estimates for the explanatory variables introduced, and ε_i is the error term:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{1i} + \ldots + \beta_{K-1} x_{K-1,i} + \varepsilon_i.$$

42. This is in contrast to the standard general-to-specific modeling approach, where insignificant variables are dropped from the model in iterations until a parsimonious fit is identified. The modeling ambition is to balance goodness of fit and parsimony. While adding a variable may increase the explanatory power of the model, overloading regressoor terrors penalizes the model for loss of parsimony. In overspecified models, the interaction between covariates (collinearity) reduces or cancels out significant variables.

- Finally, as a subset of the previous point, because earlier empirical evidence has shown that cyclical responses systematically vary by income groups, we run separate regressions by income level, using the World Bank's income group classification. These income-group–specific models are also run for "good" and "bad" times separately to test for responses across states.

VIII. RESULTS FROM THE EMPIRICAL ANALYSES

8.1. FIVE-STEP DESCRIPTIVE ANALYSIS FOR CYCLE IDENTIFICATION AND CALCULATING CYCLE CORRELATIONS

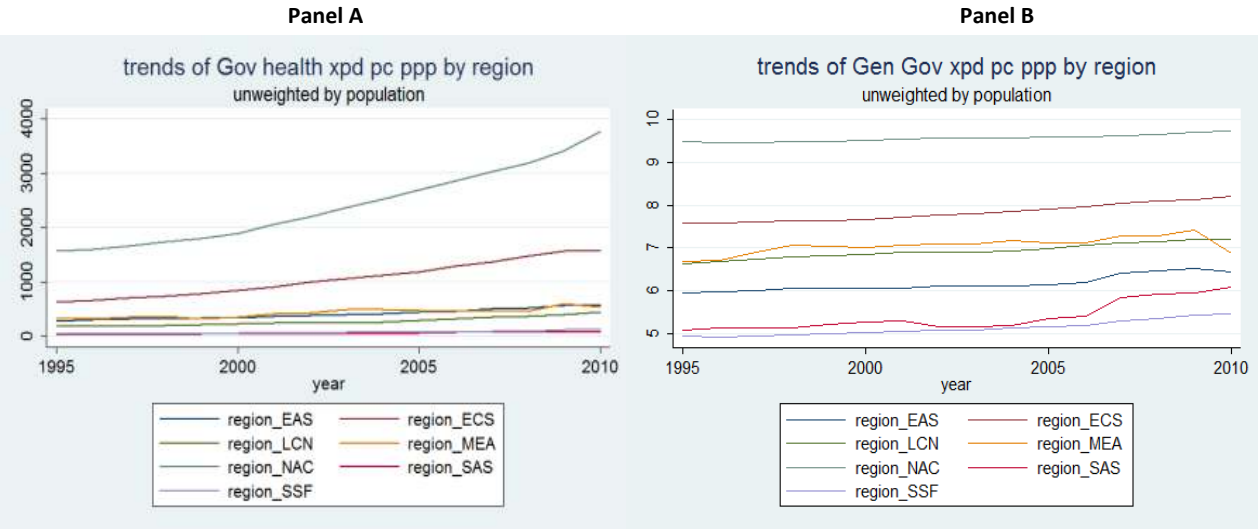
This section summarizes the main findings of the proposed five-stage process, including the overarching patterns, and illustrates the findings through country examples.[43]

8.1.1 A five-step process to analyze cyclical patterns

Step 1: Construction of log-transformed values

As described in the methods sections, to compact the distribution of the variables (GDP, GGE, and GHE), the first step is log transformation. For example, panel A of figure 1.3 shows the trend for the original variable, government health expenditures per capita in constant 2005 international dollars by region, and panel B shows the log-transformed variable.

Figure 1.3 Trend for GGE Per Capita and Log GGE by Region, 1995–2010



Source: Authors, based on data from the Fiscal Health Database 2012

Although the log-transformed variable makes the distribution more compact, the original series shows that health expenditures have been rising faster in advanced economies, particularly in

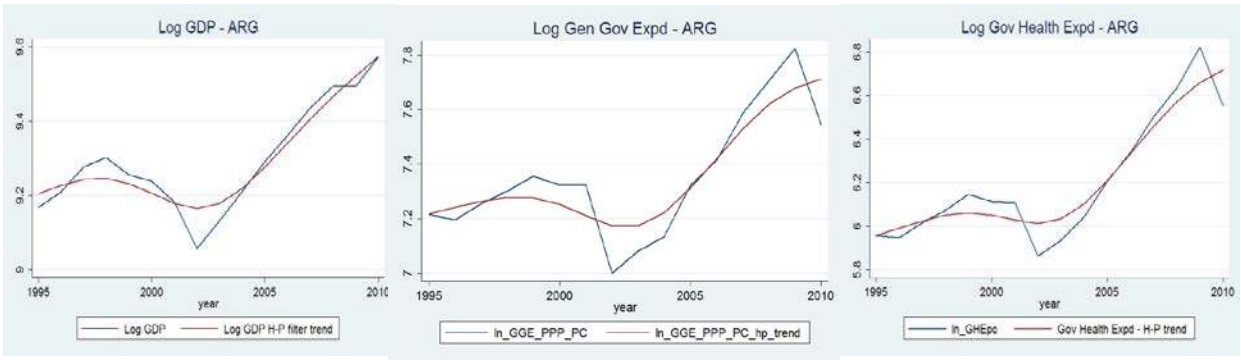
43. Given the volume of the data, detailed statistical results (e.g. descriptive results for the key variables of interest, such as log-transformed variables, their cycles, and correlations between the cycles by country, income group, and region over 1995 and 2010) are not published here. They are available upon request.

North America (NAC) and the Europe and Central Asia (ECS) region. Demography and technology have been among the drivers, as shown by a number of empirical papers. Relative to the trends for GDP and general government spending, government spending on health has been increasing faster, implying that the health sector's share in the budget has been increasing over time.

Step 2: Filtering the time series to extract the cyclical and trend components

In the second step, the Hodrick-Prescott (HP) filter is applied to the log-transformed variables to extract the cyclical component and the trend component (see more on filter choice in box 1.2). We used 6.25 for the smoothing parameter, as suggested in the technical literature for annual data (Baum 2006; Ravn and Uhlig 2002). Panels A, B, and C of figure 1.4 illustrate the results of HP filtering GDP, GGE, and GHE in the case of Argentina for 1995 to 2010. This analysis was performed for all countries to obtain the cyclical component in the next step. The blue line shows the observed values of the given variable and the red line shows its filtered version. For all three variables, the applied smoothing parameter seems to perform well since the trend lines follow the observed values but smooth it out by penalizing extreme values. The gap between the observed and filtered values (that is, between the blue and red lines) shows higher volatility for GGE than for GDP and GHE. Figure 1.4 suggests that the fiscal response is more sensitive to changes in business cycles; that is, it displays relatively more procyclical behavior compared to government health expenditures.

Figure 1.4 Log GDP, GGE, and GHE and Their HP Filtered Trend Lines for Argentina, 1995 to 2010



Source: Authors' calculations based on data from the Fiscal Health Database 2012

Step 3: Calculating the cyclical component

Following filtering, the cyclical component of the time series —the difference between the observed and smoothed values — can be calculated. Panels A, B, and C in figure 1.5 show the deviation of the observed values from the HP filtered trend line for the three variables — GDP, GGE, and GHE — by region, using unweighted mean values. Given this, caution must be practiced with generalizing the findings, since the statistics are irrespective of the population size of the countries within regions; hence, the presented regional effect may be under- or overvalued. For a more detailed overview, the values for the cyclical components for the regions can be found in table 5A.1 in annex 5.

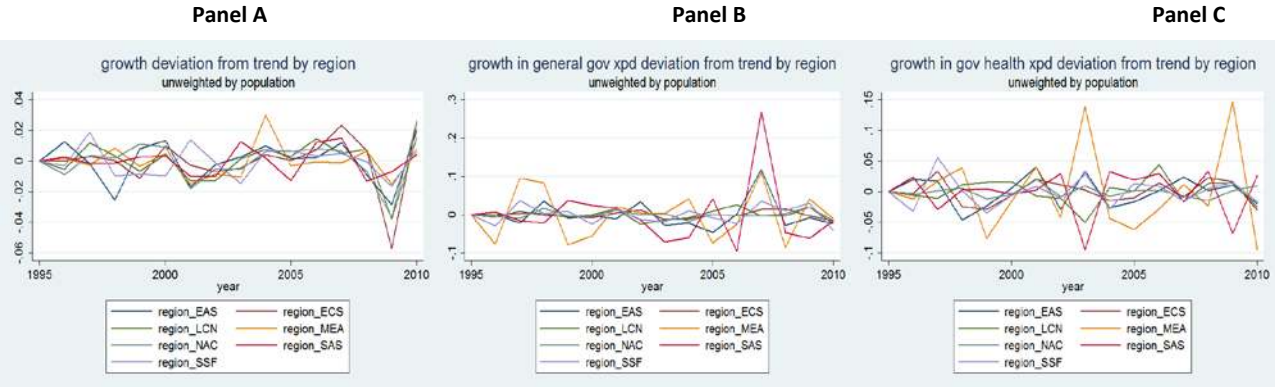
- GDP Cycle: The y axis in panel A of figure 1.5 is scaled between .04 and -.06, that is, a range in the cyclical deviation from the trend line between 4 and -6 percent. The highest

positive deviation from the GDP trend is performed by the Middle East and North Africa region, as shown by the yellow line that peaks around 2004. The highest negative deviation from the growth trend is observed for the Europe and Central Asia region (dark red line) in 2009, followed by North America and Latin America and the Caribbean.

- GGE Cycle: The deviation range of the cycle for GGE is wider (between -.1 and .3, that is, -10 to 30 percent) compared to the GDP series, which suggests high variability in fiscal responses at the global level (panel B of figure 1.5). The fiscal expansion is the most marked for the South Asia region (bright red), with a peak around 2007.
- GHE Cycle: The dispersion of the GHE cycle is more compact (between -.1 and .15, that is, -10 to 15 percent) relative to GGE, suggesting that, on average for the 16-year time period, government health spending cycles are less sensitive to the underlying changes in the business cycle than fiscal responses are. However, some regions are more susceptible to wider swings in GHE responses. For example, there are large spikes for the South Asia (SAS, bright red) and Middle East and North Africa (MEA, yellow) regions, especially in 2003 and 2009; the direction of these cycles are opposite, showing contraction in the South Asia region and expansion in Middle East and North Africa.

These graphs illustrate how GGE and GHE responses to the business cycle vary depending on the region and time frame. As noted, however, these averages mask wide variations in responses by countries within the region. As country-specific results are beyond the scope of this paper, statistical findings are not presented here.

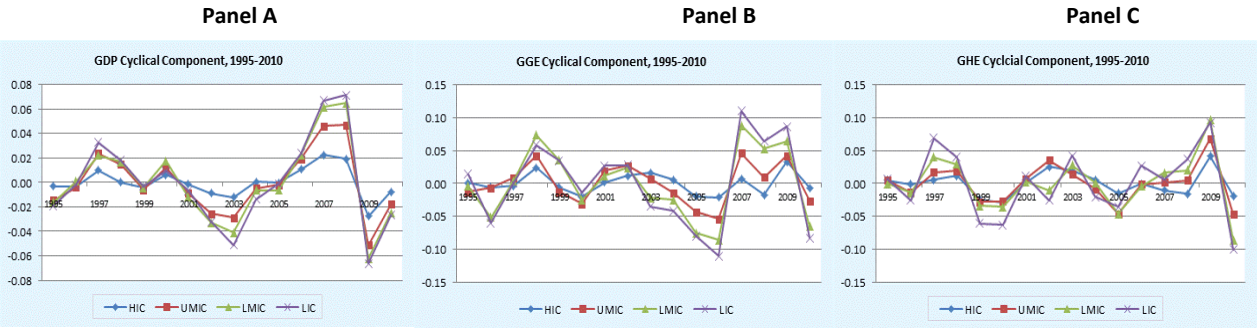
Figure 1.5 Deviation from the Filtered Trend Line for GDP, GGE, and GHE Cycles by Region



Source: Authors' calculations based on data from the Fiscal Health Database 2012

In terms of the volatility of fiscal and government health expenditures by income group, figure 1.6 shows that the cycles are wider in developing countries (low-income countries and lower-middle-income countries, respectively; the purple and green line in panels A, B, and C), and that fiscal volatility, on average, is higher, especially, between 2005 and 2009. While government health expenditure cycles are somewhat more stable on average, there is a clear spike in 2009, at the peak of the current global economic crisis in all income groups, followed by a plunge in 2010. Although the observed cyclical behavior in high-income countries confirms more stability, the amplitude of the cycles increases with the onset of the crisis.

Figure 1.6 Deviation from the Filtered Trend Line for GDP, GGE, and GHE Cycles by Income Group



Source: Authors' calculations based on data from the Fiscal Health Database 2012

Step 4: (Co)movement of cycles — A visual analysis of cross-correlations between cycles

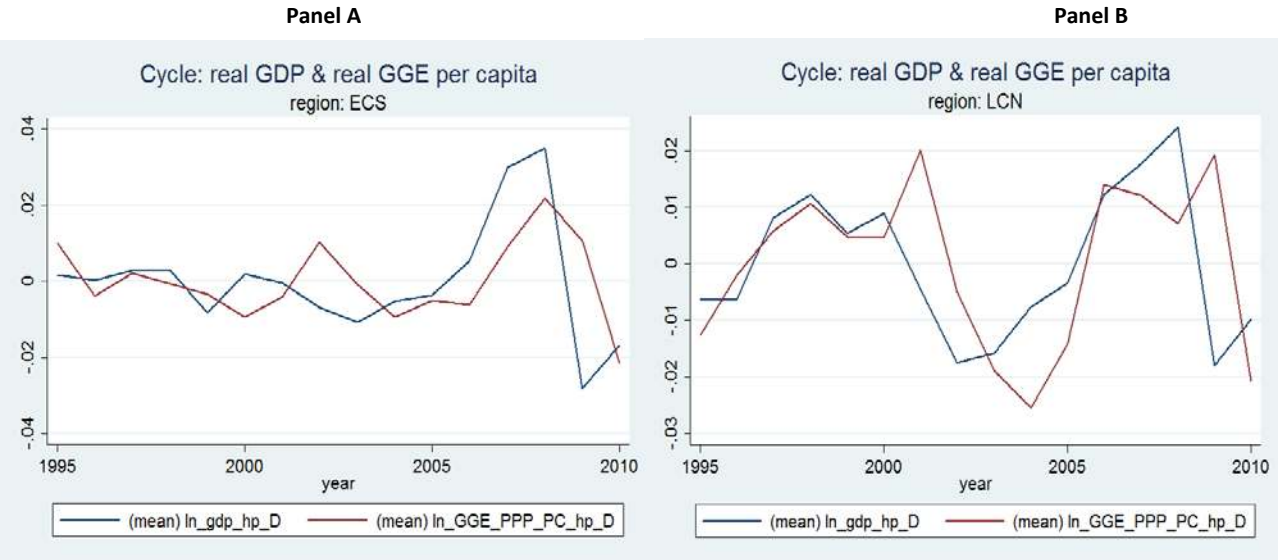
At the center of this five-step process is the calculation of the bivariate correlation coefficient, which captures the relationship between the cycles. This helps explain how the fiscal and government health expenditure responses are related to changes in economic output.

In this section, we offer a visual illustration of cycle movements. Figures 1.7 and 1.8 summarize the cycle movements observed in the Europe and Central Asia (ECS) and the Latin America and the Caribbean (LCN) regions, and show whether there are procyclical, acyclical, or countercyclical tendencies, and how these change over time. The choice of the two regions is purely deductive to illustrate the interpretation of cycle movements. These graphs are produced for all regions and countries but not presented here.

Because a complex set of relationships guide cyclical dynamics, and the macro trends do not reveal what specifically drives these, expectations must be tempered. This is an inherent limitation of simple bivariate analysis, which only shows the association between the two variables. Hence, to understand the true nature of these relationships, more advanced statistical methods are required, such as multivariate and causal analyses.

Bearing these limitations in mind, we can interpret the contents of the figures that capture the relationship between the three pairs of cycles: (a) the GDP and GGE pair sheds some light on the effect of fluctuations in economic output on government spending; (b) the GDP and GHE cycles show how government health spending is affected by the business cycle; and (c) the GGE and GHE cycles help understand whether these two variables move in the same or opposite direction, and whether government health expenditures are more or less volatile than fiscal cycles; that is, what is the level of commitment to the health sector within the budget.

Figure 1.7 Cycles of GDP and GGE for ECS and LCN Regions, 1995–2010



Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: GDP = gross domestic product; GGE = general government expenditures; ECS = Europe and Central Asia; LCN = Latin America and the Caribbean.

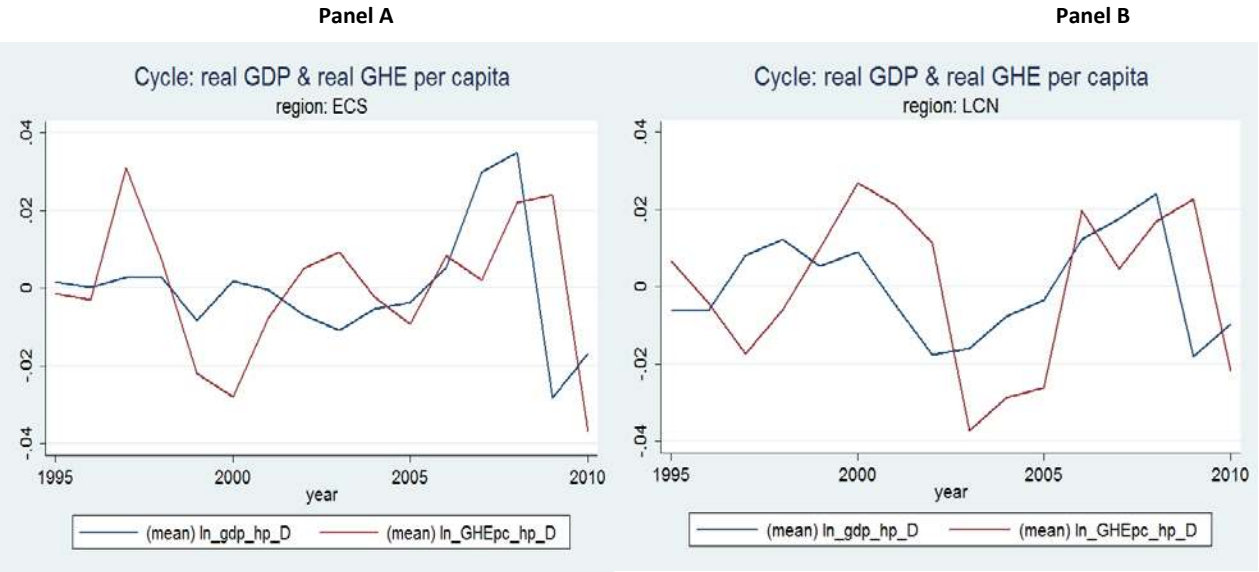
Cycle movements between GDP and GGE show more countercyclical behavior for the Europe and Central Asia (ECS) region compared to Latin America (LCN) between 1995 and 2001 and also in 2008 and 2009, during the years of the global economic crisis, which has heavily affected the region (figure 1.7). However, in Latin America, the crisis in 2001 triggered a countercyclical fiscal response (red line), which later dropped as the continued decline in growth (blue line) placed downward pressure on government spending between 2001 and 2004. As an example of countercyclical trends in the region, according to Frankel, Végh, and Vuletin (2011), Chile is undoubtedly the poster child of the graduation movement. As discussed in Frankel (2010), since 2001 Chile has followed a fiscal rule that has a structural (that is, cyclically-adjusted) fiscal balance as its target.[44] By design, such a rule ensures that temporarily high fiscal revenues are saved rather than spent. But Chile is not the only country that seems to have escaped the procyclicality trap. The author concludes that the quality of institutions seems to be a key determinant of a country's ability to graduate.

Cyclical movements for GDP and GHE (figure 1.8) show a countercyclical pattern for ECS between 2000 and 2007, with government health expenditure (red line) declining — relative to the expected trend — when growth (blue line) accelerates, and expanding when growth declines. Toward the start and end points of the data series, the relationship is procyclical, especially during the global crisis — with the GDP and GHE cycles moving in the same direction. This implies that the depth and persistence of the crisis have reduced the resilience and stability of countries to an extent that government health expenditures have declined. These patterns are

44. As pointed out in Frankel, Végh, and Vuletin (2011), the original target was a structural surplus of 1 percent, reflecting the need to repay Central Bank debt associated with the bailout of private banks in the 1980s. Since this debt was paid off over time, the targeted structural balance was reduced to 0.5 percent in 2008 and 0 percent in 2009.

empirically supported by a number of papers, including a few with regional coverage (Koettl and Schneider 2010; WHO 2013), as well as country case studies (Barros 2013; Burke, Barry, and Thomas 2013; Yfantopoulos 2013; see more in box 1.7). Similarly, GDP and GHE cycles are procyclical in LCN during the deep and protracted crisis, which started in 2001, and did not emerge from the negative trends before 2005. However, there are some countercyclical responses,[45] such as at the peak of the crisis before the next year's budget allocation, when the increasingly constrained fiscal position bounded the health spending frontier as well. These patterns are consistent with some of the observations in Braun and Di Gresia (2003). Their paper provides more insights into the drivers of differences in cyclical responses across countries and over time. For example, they highlight prudent fiscal policies and increased fiscal transparency in Chile as possible contributors to countercyclical behavior.

Figure 1.8 Cycles of GDP and GHE for ECS and LCN Regions, 1995–2010



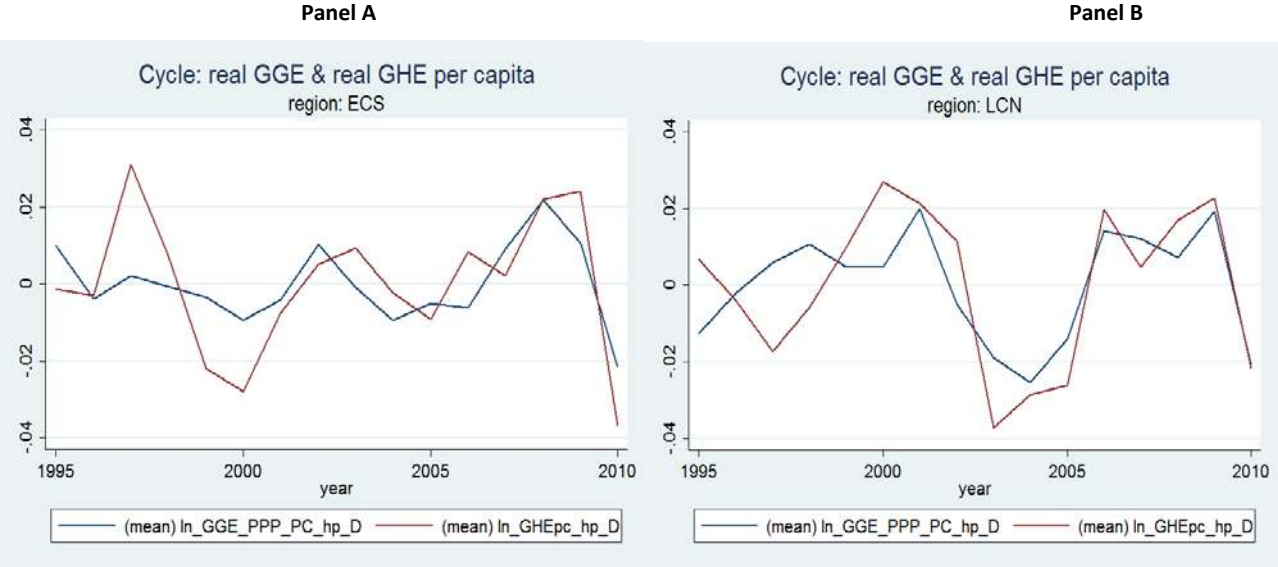
Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: GDP = gross domestic product; GHE = government health expenditures; ECS = Europe and Central Asia; LCN = Latin America and the Caribbean.

Finally, the cyclical dynamics between GGE (blue line) and GHE (red line) show closer correlation and comovement in general, although for these two regions health expenditure cycles display more volatility since they have larger deviations from the trend relative to the variance of the fiscal cycle. While health spending tends to increase during milder downturns, it drops in priority during deep and protracted crises, as in 2001 in LCN and after 2009 in both regions. Automatic stabilization, hence, is a challenge during austerity. Since these trend lines for the cycles are aggregates for the region, these rudimentary descriptive statistics do not indicate which countries drive these changes and whether there are systematic differences by country

45. Besides the cyclical patterns for regions discussed in the text, these statistics are available by country. As an example from Latin America, figure 5A.1 in annex 5 contrasts the cyclicality tendencies for Argentina, which is largely procyclical, and Mexico, which shows elements of countercyclicality to offset the negative effect of downward cycles on population health. Understanding what specific policy responses have been shaping these trend lines would require case and event analyses, which is not the focus of this paper.

subgroups in the region and by their income status (see more detailed analysis for the Europe and Central Asia region in section 8.2 and in box 1.7).

Figure 1.9 Cycles of GGE and GHE for ECS and LCN Regions, 1995–2010



Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: GGE = general government expenditures; GHE = government health expenditures; ECS = Europe and Central Asia; LCN = Latin America and the Caribbean.

Step 5: Correlation coefficients for the pooled data, disaggregated by income group and region

This last step directly builds on the cycle correlations discussed in step 4, which described the interpretation of cycle dynamics using graphs that overlay the cyclical trends of the pairs of variables (GDP-GGE, GDP-GHE, and GGE-GHE). This section presents correlation matrixes for these three pairs, including for (a) the global pooled data for 16 years; (b) contemporaneous correlations by "bad" and "good" states defined in terms of output gap (Del Granado, Gupta, and Hajdenberg 2013), (see more in box 1.5); (c) contemporaneous correlations by GDP growth rate brackets; (d) contemporaneous correlations by region; and (e) correlation coefficients for a one-year lag between GDP and fiscal response and GDP and health financing.

Box 1.5 Measuring the Output Gap

As discussed under the methods section (see section 7 and box 1.2), the "good" and "bad" states of economic performance are defined in terms of standard deviations of the observed GDP from the filtered trend line. We set the threshold for significant deviation from the trend at or above (below) 1.5 standard deviations, which is consistent with the choice of threshold in a number of empirical papers. The output gap is positive if the observed value is above the filtered trend value, and negative if the observed value is below the filtered trend value. Tables 1.5B.1 and 1.5B.2 offer an overview of the output gap by income group and region. In the color coding, the green cells correspond to positive output gap, and the red cells to negative output gap. The shade of green is deeper if the value is 1.5 standard deviations above the trend value, and the shade of red is deeper if the value is 1.5 standard deviations below the trend value.

For example, the output gap is -1.55 standard deviations from the filtered trend (that is, economic output potentials) for the high-income group in 2009, at the height of the current global economic crisis. The by-region breakdown shows that the negative deviation from the trend is the largest for North America, with a standard deviation value of -2.31. In general, the OECD group performs below the -1.5 benchmark for significant output gap in 2009. The output gaps are also calculated by country but not presented here.

Table 1.5B.1 Output Gap for GDP by Income Group , 1995–2010

Income Group	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mean for HICs	-0.13	0.09	-0.17	-0.12	0.62	0.00	-0.39	-0.65	-0.16	-0.12	0.56	1.28	1.09	-1.55	-0.38
Mean for UMICs	-0.07	0.47	0.52	-0.09	0.26	-0.35	-0.69	-0.62	-0.08	-0.09	0.32	0.93	1.12	-0.97	-0.37
Mean for LMICs	0.24	0.10	0.14	-0.07	0.19	-0.16	-0.40	-0.33	-0.08	-0.33	0.09	0.80	0.81	-0.55	-0.30
Mean for LICs	-0.01	0.34	0.07	0.20	-0.24	0.20	-0.28	-0.40	-0.32	0.04	0.14	0.28	0.42	-0.23	-0.08
Global	**0.01**	**0.25**	**0.14**	**-0.02**	**0.21**	**-0.08**	**-0.44**	**-0.50**	**-0.16**	**-0.12**	**0.28**	**0.82**	**0.86**	**-0.82**	**-0.28**

Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: The Income Group classification is for 2010, the most recent year used in the analysis.

Table 1.5B.2 Output Gap for GDP by Region and for OECD and Non-OECD Countries, 1995–2010

Region	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EAS	0.62	0.56	-0.66	-0.19	0.38	-0.34	-0.40	-0.33	0.02	0.04	0.27	0.88	0.46	-0.97	0.02
ECS	-0.16	0.02	0.06	-0.22	0.32	0.11	-0.30	-0.63	-0.29	-0.26	0.31	1.37	1.50	-1.30	-0.68
LCN	-0.28	0.44	0.55	0.18	0.37	-0.25	-0.71	-0.66	-0.35	-0.27	0.50	0.92	1.17	-0.88	-0.44
MEA	0.20	-0.13	0.27	-0.10	0.35	-0.22	-0.64	-0.44	0.28	0.22	0.11	0.25	0.49	-0.46	-0.11
NAC	-0.71	-0.55	-0.44	0.59	1.46	-0.09	-0.51	-0.95	-0.40	0.15	0.88	1.45	0.88	-2.31	0.08
SAS	0.15	0.14	-0.07	0.05	0.78	0.14	-1.04	-0.54	-0.26	-0.32	0.19	1.16	0.07	-0.26	-0.09
SSF	-0.01	0.34	0.38	0.12	-0.27	0.00	-0.21	-0.33	-0.15	-0.17	0.17	0.40	0.56	-0.47	-0.08
Global	**-0.03**	**0.12**	**0.01**	**0.06**	**0.48**	**-0.09**	**-0.55**	**-0.55**	**-0.16**	**-0.09**	**0.35**	**0.92**	**0.73**	**-0.95**	**-0.19**
Non-OECD	0.07	0.27	0.18	-0.04	0.10	-0.13	-0.46	-0.41	-0.10	-0.11	0.22	0.67	0.77	-0.64	-0.25
OECD	-0.23	0.05	-0.11	0.00	0.78	0.12	-0.36	-0.88	-0.40	-0.26	0.53	1.62	1.32	-1.74	-0.43

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Source: Authors

8.1.2. Cycle correlations for the global sample

The contemporaneous correlations for the cycle pairs (GDP-GGE, GDP-GHE, and GGE-GHE) presented in table 1.3 suggest that for the global, pooled data for the 16 years, there is mild[46] procyclicality across the three pairs, except for the GDP-GHE pair when the output gap is negative. From the three pairs, the comovement is strongest between the general government expenditure and government health expenditure cycles (GGE and GHE: average = 0.25). This is expected, since when fiscal space contracts, government spending on health is also likely to decline. The correlation coefficients for the GDP-GGE and GDP-GHE pairs suggest that fiscal responses are more procyclical. In other words, health spending is less related to the economic cycle, and it is relatively more protected during downturns. This can be seen when comparing the correlation coefficients for GDP-GHE across "bad" (output gap < 0) and "good" (output gap ≥ 0) times, which are, respectively, -0.03 and 0.04. Although the negative sign of the correlation coefficient for GDP-GHE during bad times indicates that there is a countercyclical response during downturns at the global level for the study period, the magnitude of the coefficient shows a weak relationship, and its statistical significance is below any standard value. [47]

Table 1.3 Average Contemporaneous Correlation Coefficients for Global Set by Output Gap, 1995–2010

Contemporaneous correlation between series: Average						Contemporaneous correlation between series when output gap < 0						Contemporaneous correlation between series when output gap ≥ 0					
	GDP		GHE		GGE		GDP		GHE		GGE		GDP		GHE		GGE
GDP	1.00					GDP	1.00					GDP	1.00				
GHE	0.06	***	1.00			GHE	-0.03		1.00			GHE	0.04	***	1.00		
GGE	0.19	***	0.25	***	1	GGE	0.17	***	0.18	***	1	GGE	0.15	***	0.29	***	1

Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Continuing the exploration at the global level by GDP growth rates, the results in table 1.4 suggest that deep contractions (defined for this analysis as GDP growth between minus 5 and 10) are associated with weak countercyclical reflexes both in terms of fiscal and health financing responses. However, the magnitudes and statistical significance levels leave these relationships tenuous. More advanced statistical analyses are required to understand the effects of crises of various depth and length on fiscal and health financing policies.

46. Threshold Values for Correlation Coefficients: (a) Weak positive (negative) linear relationship via a shaky linear rule, values between 0 and 0.3 (0 and -0.3); (b) Moderate positive (negative) linear relationship via a fuzzy-firm linear rule, values between 0.3 and 0.7 (0.3 and -0.7); (c) Strong positive (negative) linear relationship via a firm linear rule, values between 0.7 and 1.0 (-0.7 and -1.0).
47. The *p* values are indicated in the table, where * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 1.4 Average Contemporaneous Correlation Coefficients for Global Set by Growth Brackets, 1995–2010

	Contraction				Stagnation		Growth			
GDP growth bracket	**-10-5**		**-5-1.5**		**-1.5 +1.5**		**1.5 to 5**		**5 to 10**	
GDP-GGE (Corr. Coeff., sig)	-0.09		0.20	***	0.10	***	0.16	***	0.15	***
GDP-GHE (Corr. Coeff., sig)	-0.13		0.12	*	0.18	***	0.16	***	0.11	***

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: * p < 0.05; ** p < 0.01; *** p < 0.001

8.1.3. Cyclical patterns by income group

Table 1.5 moves beyond the global-level data and presents the correlation coefficients for the study period by income group. The negative signs of the correlations in the green cells are consistent with the earlier wave of the cyclicality literature, which claims that countercyclical behavior has been primarily the privilege of advanced economies. In fact, while the results suggest countercyclical fiscal responses for both the upper-middle and high-income groups during negative output gap (respectively, -0.01 and -0.13), countercyclical response in health expenditures is only observed in the high-income context (-0.1).

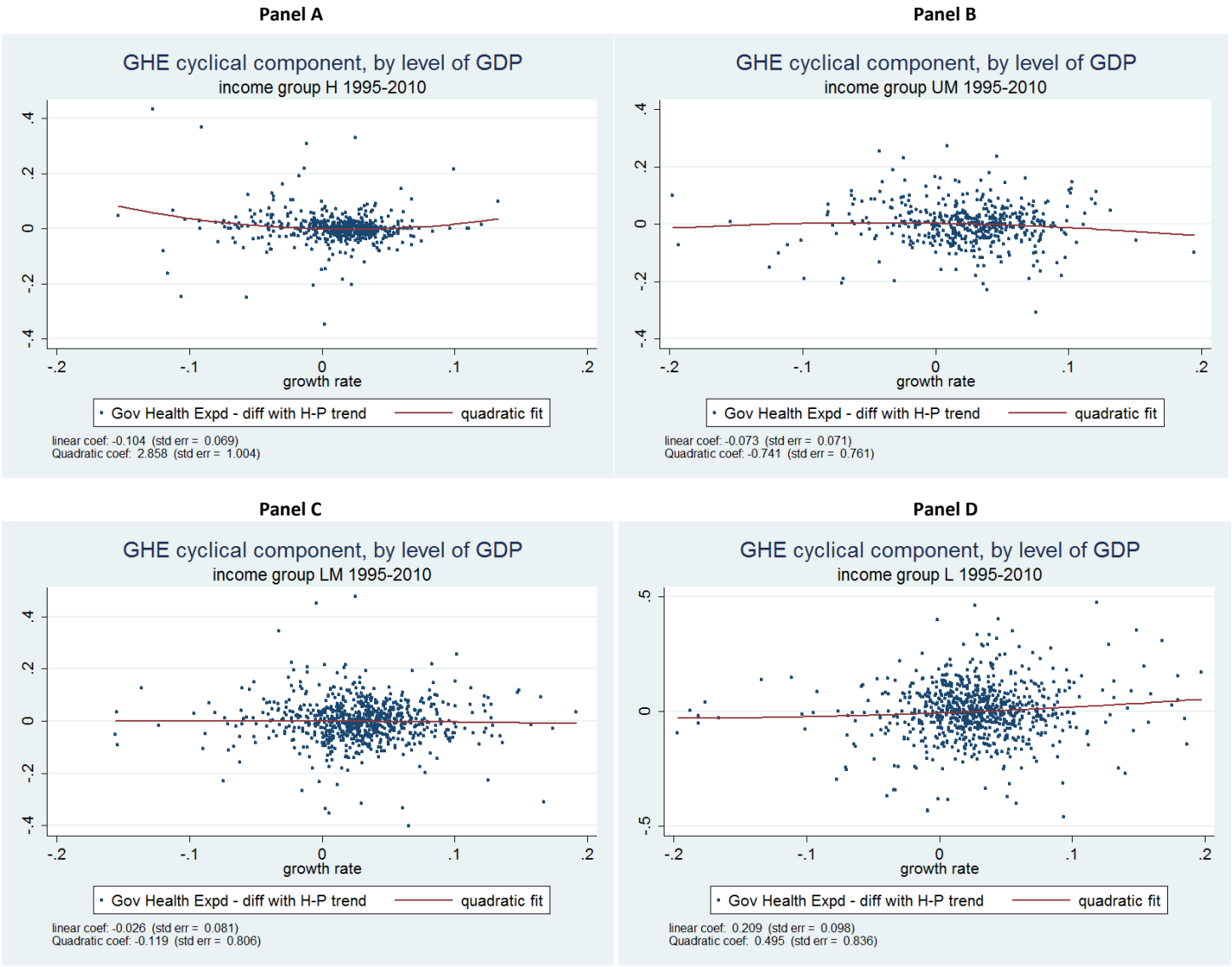
Table 1.5 Contemporaneous Correlation Coefficients by Income Group, 1995–2010

Correlation between cycles				Cycle correlation when output gap < 0			Cycle correlation when output gap ≥ 0		
Income Group	**GDP-GGE**	**GDP-GHE**	**GGE-GHE**	**GDP-GGE**	**GDP-GHE**	**GGE-GHE**	**GDP-GGE**	**GDP-GHE**	**GGE-GHE**
HIC	-0.07	0.04	0.29	-0.13	-0.10	0.32	-0.09	0.11	0.27
UMIC	0.15	0.20	0.29	-0.01	0.06	0.22	0.13	0.15	0.30
LMIC	0.19	0.22	0.33	0.06	0.11	0.30	0.20	0.15	0.34
LIC	0.18	0.17	0.29	0.07	0.09	0.31	0.10	0.17	0.28
Average	0.11	0.16	0.30	0.00	0.04	0.29	0.08	0.15	0.30

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 1.10 illustrates these average behavioral responses by scatter plotting the cyclical component of government health expenditures (y axis) and the GDP growth rate (x axis) for each income group (HICs, UMICs, LMICs, and LICs). Panel A shows that countercyclical behavior in GHE is more likely for HICs in the two extreme cases, during deep crises or high growth rates. When growth rates are negative (shown on the left side of the x axis), the GHE cycle is above the trend line, that is, above the zero value on the y axis. At the other end of the income distribution, for the low-income group (LIC), the trend line in the scatter plot shows that the behavior is procyclical (panel D). That is, the GHE cycle is below the zero value on the y axis when GDP growth is negative, and the GHE cycle is above the zero value on the y axis when growth is positive. However, despite the trend line's fit, the scatter plots capture a number of observations in the lower-income context that show the GHE cycle above zero during contractions, that is, countercyclical responses in developing countries.

Figure 1.10 Scatter Plot of the Cyclical Component of GHE and GDP Growth Rate by Income Group, 1995–2010



Source: Authors' calculations based on data from the Fiscal Health Database 2012

Further statistical analysis suggests more within-group variation,, showing a number of country cases where countercyclical responses have been observed. Among the drivers, we suspect social sensitivity of the government and governance, both of which would have a positive effect and signal a greater propensity for countercyclical responses. These priors are to be tested in the proposed econometric modeling to be implemented in an extended version of this paper, as part of our future research agenda to improve the robustness and credibility of these findings.

8.1.4. Regional patterns of cyclical responses

The regional breakdown in table 1.6 shows countercyclical fiscal and government expenditure responses in the North America (NAC) region, with the regional average for countercyclicality in health spending driven by Canada. As expected, countercyclical responses are more prevalent

during bad times, with a number of regions (EAS, LCN, NAC, and SAS) prioritizing fiscal stimuli, and Europe and Central Asia (ECS) and the Middle East and North Africa (MEA) showing weak countercyclical behavior in health spending. Again, these aggregate figures mask within-group differences. Although the by-country statistics unveil further variation in responses, it is not clear whether and how that within-group difference changes over time and what enables or disables countercyclical responses. To further explore the within-group variation, in the radar plot analysis (see section 8.4) a limited number of countries are selected from each region and from across income groups to demonstrate that countercyclical behavior is not only income-related but also influenced by a number of other factors, such as governance, political risk, and fiscal space, including reliance on foreign aid. These are potential control variables to be tested in multivariate analysis.

Table 1.6 Correlation Coefficients for GDP-GGE, GDP-GHE, and GGE-GHE by Region, 1995–2010

Correlation between cycles				Cycle correlation when output gap < 0			Cycle correlation when output gap ≥ 0		
Region	GDP-GGE	GDP-GHE	GGE-GHE	GDP-GGE	GDP-GHE	GGE-GHE	GDP-GGE	GDP-GHE	GGE-GHE
EAS	0.09	0.12	0.24	-0.10	0.02	0.28	0.19	0.16	0.26
ECS	0.09	0.17	0.35	0.01	-0.01	0.33	0.01	0.19	0.32
LCN	0.12	0.16	0.22	-0.01	0.05	0.18	0.13	0.07	0.23
MEA	0.05	0.03	0.46	0.02	-0.02	0.41	-0.02	0.06	0.45
NAC	-0.43	-0.03	0.37	-0.52	0.13	0.40	-0.45	-0.26	0.25
SAS	0.09	0.30	0.19	-0.27	0.09	0.01	0.29	0.32	0.39
SSF	0.20	0.21	0.30	0.10	0.10	0.31	0.13	0.16	0.27
Average	**0.03**	**0.14**	**0.30**	**-0.11**	**0.05**	**0.28**	**0.04**	**0.10**	**0.31**

Source: Authors' calculations based on data from the Fiscal Health Database 2012

8.1.5 Lagged correlations between the cycles

A number of empirical studies emphasize that contemporaneous relationships are not sufficient to understand the fiscal and health care financing dynamics in the face of shocks. This is intuitive, since planning and budgeting processes are not affected by downturns contemporaneously, but with a lag, at least a one-year transmission from the shock to next year's budget. In advanced economies where countercyclical responses are more likely and shock effects are typically absorbed in the first year thanks to automatic stabilizers, the negative effects of a downturn may not be apparent for a few years. In this study, we only explored the one-year lagged effect, broken down by time periods, to see whether the coefficients change over time. Table 1.7 shows a statistically significant, however weak, negative relationship between GDP and next year's health budget for the first time period (1995–2002) (-0.07). In the second period (2003–10), the sign of correlation reverses, the magnitude of which suggests a weakly positive procyclical tendency (0.06) compared to the first period. As for the lagged fiscal response, the magnitudes are small and the results are not statistically significant. While it is not possible to draw a robust conclusion regarding the change in fiscal response over time, health financing moved into a slightly more procyclical direction during the second window, which includes the current global economic crisis. Such results may cause some concern regarding the prioritization of the health sector in general government expenditures. The empirical literature on the crisis shows that some of the reduction in health expenditures can be offset, for example, by efficiency

gains or reduced costs due to structural reforms. But not all expenditure reduction is neutral regarding system and population-level effects.

Table 1.7 Correlation Coefficients for One-Year Lag between GDP and Fiscal Response and GDP and Health Financing

Window 1: 1995–2002						Window 2: 2003–09					
***N* obs = 1,464**	**GDP *y***		**GHE *y*+1**		**GGE *y*+1**	***N* obs =1,281**	**GDP *y***		**GHE *y*+1**		**GGE *y*+1**
GDP	1.00					**GDP**	1.00				
GHE *y*+1[48]	-0.07	***	1.00			**GHE *y*+1**	0.06	***	1.00		
GGE *y*+1[49]	0.03		0.20	***	1	**GGE *y*+1**	0.00		0.33	***	1

Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

8.2. CHANGING GLOBAL PATTERNS OF CYCLICAL RESPONSES — DOES HEALTH FOLLOW THE STORY IN FISCAL RESPONSE?

While countercyclicality has been primarily the privilege of advanced economies, the behavioral patterns are now slowly changing. Countercyclical responses are possible, and indeed, have been observed in lower-income countries. The question is whether the results found by Frankel, Végh, and Vuletin (2011) in the fiscal context — that about a third of the developing world has been able to escape the procyclical trap — apply to the trend in cyclical responses of government health expenditures to business cycles. To address this question, we explore the change in the correlation coefficient for the business cycle and government health expenditures between 1995–2002 and 2003–10.

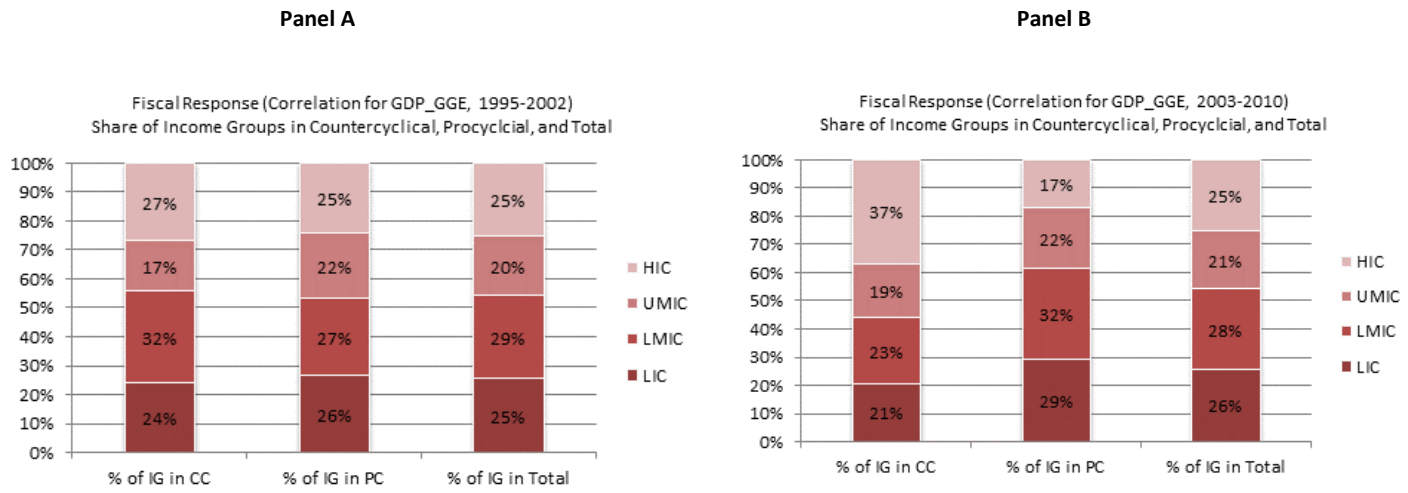
8.2.1. Global patterns in cyclical responses between 1995–2002 and 2003–10

8.2.1.1. Advanced economies are standing their ground in countercyclical responses

To compare the cyclical responses between the fiscal and health domains, first we calculate the correlation of the cyclical components of GDP and GGE for the two time frames defined above, 1995–2002 and 2003–10. Figure 1.11 summarizes the changes in the income group shares of counter- and procyclical responses between these two windows.

48. This is the correlation coefficient for one-year lagged government health expenditures; i.e., we explore the relationship between GDP in time 0 and the response variable, GHE in time +1 (i.e., lagged health financing response). Empirically, lagged relationships are relevant since budget decisions likely have at least a one-year lag. There is evidence that budgets are not immediately affected during crises, but given the budgeting and planning process, these will affect the following year's policy and budget.
49. This is the correlation coefficient for one-year lagged general government expenditures; i.e., we explore the relationship between GDP in time 0 and the response variable, GGE in time +1 (i.e., lagged fiscal response).

Figure 1.11 Fiscal Response by Income Groups for Window 1 (1995–2002) and Window 2 (2003–10)



Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: X axis labels: CC = countercyclical; PC = procyclical; IG = income group. Y axis labels: HIC = high-income country; UMIC = upper-middle income county; LMIC = lower-middle-income country; LIC = low-income country.

For example, the first bar in panel A shows that for 1995–2002, low-income countries had a 24 percent share of countercyclical responses, which is 1 percent below their share among all income groups. The respective shares of the other income groups in the countercyclical set are 32 percent for LMICs, 17 percent for UMICs, and 27 percent for HICs. During 2003–10, the shares change to 21 percent for LICs, 23 percent for LMICs, 19 percent for UMICs, and 37 percent for HICs. In contrast with the findings by Frankel, Végh, and Vuletin (2011), this implies that for the time frames defined, countercyclical fiscal responses increased in advanced economies (UMICs and HICs) during the second window, which includes the current global economic crisis. As discussed, this crisis has had a deeper effect on advanced economies, which triggered automatic stabilizers in a number of countries. Where the crisis has been protracted and deep, structural adjustments were required. On the other hand, the shares of developing countries (LICs and LMICs) in the countercyclical pool have declined compared to the values in the first window.

Table 1.8 provides the calculated difference between window 2 and window 1 in the income group shares of countercyclical fiscal responses. The table shows that the low-income groups lost 12 percent of its total share of the countercyclical pie, with LICs losing 3 percent and LMICs 9 percent. The biggest change is in the HIC group, the share of which grew by 10 percent.

Table 1.8 Difference in Income Group Shares with Countercyclical Fiscal Response

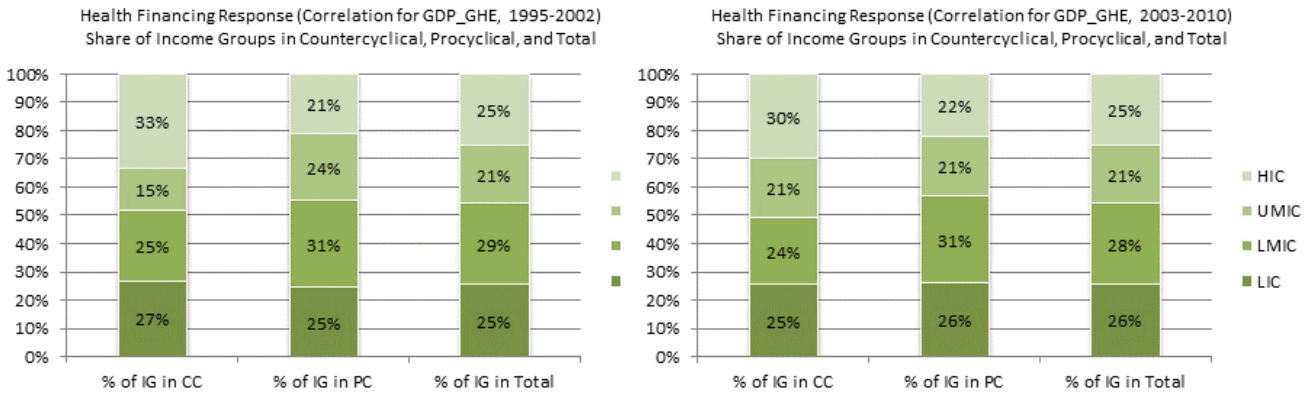
GDP-GGE	LIC (%)	LMIC (%)	UMIC (%)	HIC (%)
Window 1: 1995–2002	24	32	17	27
Window 2: 2003–10	21	23	19	37
Difference: W2–W1	-3	-9	2	10

Source: Authors' calculations based on data from the Fiscal Health Database 2012

8.2.1.2. Upper-middle-income countries gain in countercyclical responses in health financing

The story on government health expenditures is different. From window 1 to window 2, HICs lose 3 percent of their share of countercyclical government expenditures on health (figure 1.12 and table 1.9). This implies that in some high-income countries, automatic stabilizers or reserves were not sufficient, and the health sector budget had to go through consolidation (see box 1.6). The UMIC group, however, experienced a gain in its countercyclical share over time, growing by 6 percent. However, the data do not support the hypothesis that developing countries, in general as a group, have increased their countercyclical presence in government health expenditures.

Figure 1.12 Health Financing Response by Income Groups for Window 1 (1995–2002) and Window 2 (2003–10)



Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: X axis labels: CC = countercyclical; PC = procyclical; IG = income group. Y axis labels: HIC = high-income country; UMIC = upper-middle income county; LMIC = lower-middle-income country; LIC = low-income country.

Table 1.9 Difference in Income Group Share of Countries with Countercyclical Health Financing Response

GDP-GHE	LIC (%)	LMIC (%)	UMIC (%)	HIC (%)
Window 1: 1995–2002	27	25	15	33
Window 2: 2003–10	25	24	21	30
Difference: W2-W1	-1	-1	6	-3

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Box 1.6 Managing the Dual Objectives of Meeting Fiscal Targets and Health Sector Objectives

Managing the dynamics or tension between fiscal discipline and consolidation and health sector objectives during crises has been a central topic for ministries of finance and health. For example, one concern expressed by Estache and Muñoz (2009) is that IMF conditionalities that aim at fiscal consolidation could undermine sector objectives if the focus is on short-term fiscal balance and does not include medium- to long-term growth aspects. Many analysts express concerns regarding the role of financial institutions, such as the International Monetary Fund and the European Central Bank, in determining public health expenditure. In their view, conditionalities from financial institutions could lead to dismantling health systems (Baker 2010) or to chronically insufficient health budgets (Rowden 2010). Stuckler, Basu, and McKee (2011) find that DAH is much less likely to lead to an increase in health

spending in IMF-borrowing countries (US$0.01 versus US$0.45 compared to nonborrowing countries). In addition, the Center for Global Development (CGD) Working Group criticizes the IMF and its programs for being too conservative by, for example, overusing wage ceilings, which could hamper sector-specific objectives.

Despite these claims and blames, the jury is still out because insufficient evidence and heterogeneity in methods precludes an authoritative conclusion on this matter. There is one message that comes through systematically: governments must be cautious with reform actions and go beyond planning responses for the short term. Although short-term measures to mitigate negative consequences of the crisis are urgent, taking a longer-term perspective that will make the health sector more resilient in the future is critical (Heller 2013; WHO 2009). For example, a two-wave survey of health systems in Europe (Mladovsky et al. 2013; WHO 2013) finds that while the majority of reforms focused on efficiency enhancement, there have been cases that lead to a reduction in the depth, breadth, or scope of health coverage, which causes concerns not only for health outcomes but — through the human capital channel — possibly for growth. In the context of the current crisis, case studies on Greece, Ireland, and Portugal (Barros 2013; Burke, Barry, and Thomas 2013; Yfantopoulos 2013) offer a good illustration of the dynamics between fiscal consolidation and health sector objectives, representing variations in country responses to the Troika's (EU–ECB–IMF) conditionalities.

Source: Authors

There are some contextual factors worth noting to enhance or qualify the interpretation of these numbers.

- First, the impact of the global economic crisis has been heterogeneous. It has affected advanced economies more, as witnessed in countries of the European Union and the United States, requiring substantive responses not only in the short term, but also structural changes. Aging and technological-advancement–driven cost pressures are some well-known forces behind the structural reforms. The global economic crisis has played a catalytic role in undertaking long due reforms in the health sector of many advanced economies, which may have been too politically sensitive to tackle. Responses by countries have varied with the depth and length of the crisis, and with differences in government and sectoral preparedness to manage and mitigate crisis effects (see box 1.7 on experiences in Europe and Central Asia). Since the correlation coefficients are averaged for each country and country group for the defined time periods, these aggregate numbers do not tell us specifically how countries responded during and after the crisis. Case studies can shed more light on the direct fiscal and health financing policy implications of the crisis.[50]
- Second, in general, responses to crises have been more successful and efficient in countries where social safety nets have been well established and targeting mechanisms were clear. Safety nets are not well developed in the lower-income context because of structural challenges, such as a large informal sector or inadequate linkages between social protection and health safety nets. Thus, in LICs and LMICs, significant investment in systems and institutions is required to make the best use of countercyclical efforts. In

50. See, for example, two cases from the EU in chapter 5 of Hou et al. (2013).

upper-middle-income countries, where systems and institutions are typically more advanced, we see a higher increase in countercyclical responses.

Box 1.7 Effects of the Global Economic Crisis on Europe and Central Asia — Fiscal Austerity and Health Sector Reforms

Prior to the recent global economic crisis, which started in 2007, the Europe and Central Asia (ECA) region had robust economic performance. When the crisis hit, it was expected that such a fast-growing region would have the means and tools to tackle the downturn. However, many countries in the ECA did not cope well (see chapter 5 in Hou et al. 2013). The crisis has shown that no country is immune to external challenges. When policy controls are missing or not used efficiently, crises can reverse progress and positive performance even in advanced economies with AAA ratings.

Given the diversity of the ECA region, the global economic crisis did not affect all countries to the same extent. During 2003–10, subregional breakdowns of average growth rates of economic growth (GDP) (figure 6A.1 in annex 6), and the consequent fiscal (GGE) and health (GHE) responses (figures 6A.2 and 6A.3 in annex 6) show significant variation across the region. While in all subregions the average GDP growth rate for this period is positive, there is wide disparity between the high of 8.5 percent in the ECCU3[a] group and the low of 0.3 percent in Southern Europe (ECCU10). The story line is similar for the growth rates in general government expenditures (GGE) and government health expenditures (GHE). Comparatively, for most subregions — except for Russia and ECCU3 — the rate of growth in GHE is higher than fiscal growth, implying an increasing share of the health sector in the government budget during this period.

However, since these statistics are averaged for the 2003–10 time frame, they mask the cyclical responses during the crisis. By the peak of the crisis in 2009, all but the Central Asia subregion was in a growth contraction mode, with Central Eastern Europe undergoing the deepest GDP reduction at negative 8.7 percent (figure 6A.4 in annex 6). In 2010, most subregions had procyclical fiscal responses, except for Turkey and Northern and Western Europe, where — due to automatic stabilizers and/or fiscal stimuli — countercyclical responses are observed (figure 6A.5 in annex 6).

With respect to government health expenditures, all subregions undergoing growth contraction in 2009 had a procyclical response in 2010, except for Turkey and Western Europe. As a result of the crisis, a number of countries in Europe stood on the fiscal brink. Rising debt levels, threats to fiscal sustainability, and pressures from fiscal austerity have reduced fiscal space for health. In many European countries, spending on health (Heller 2013; WHO 2013) and growth rates of government health expenditures have fallen significantly (figure 6A.4 in annex 6). Reduced nominal spending occurred as early as 2008–09 in Estonia, Hungary, and Ireland (Burke, Barry, and Thomas 2013; Habicht 2012; Heller 2013). In 2009–10, spending fell in the Czech Republic, Denmark, Estonia, Greece, Ireland, Portugal, Slovenia, and Spain (Burke, Barry, and Thomas 2013; Habicht 2012; Heller 2013; Yfantopoulos 2013; Barros 2013).

Concerns about sustainability of health systems in advanced economies are not new. In fact, structural or system-level aspects — such as aging, rigidities in social security systems, and technological advancements — have increasingly pressed the fiscal envelope (Heller 2013; Hou et al. 2013). The crisis has served as a catalyst for change since it has further raised the level of alert and created a more conducive environment for reforms. Crisis is an opportunity for efficiency gains. But the challenge is that

where system reforms have already squeezed efficiency, essential services can suffer (for example, loss of breadth, scope, or depth of coverage in a way that jeopardizes vulnerable groups). When system vulnerability is increasing, coordination between macro stabilization and sectoral needs also becomes more important because what might be penny-wise may well end up being pound-foolish[b] by undermining long-term investments in human capital (see more in Hou et al. 2013).

An overview paper on the impact and policy implications of the crisis in Europe (WHO 2013) presents a number of illustrative examples of good and bad practices in health sector responses to the crisis and fiscal pressure. The main policy response options are summarized in table 6A.1 in annex 6 and are adapted to fit the health systems vulnerability assessment framework proposed in Velenyi, Yazbeck, and Smitz (2013). Country cases on Greece, Ireland, and Portugal provide details on the triggers, fiscal impact, and health sector responses by these governments during the recent crisis (see chapter 5 in Hou et al. 2013). Overall, there have been clear efficiency gains across Greece, Ireland, and Portugal. However, as with all complex reforms, it is difficult to find cases of absolute success. Conflicting objectives have led some countries to backtrack on the depth, scope, or breadth of coverage.

Two main conclusions can be drawn from the country cases. First, the political and economic dynamics of reform processes between the health sector and the ministry of finance, as well as within the sector, are critical. Political economy is especially important if there is not enough time for evidence-based priority setting. Second, further developing and applying country-level monitoring tools and early warning systems could help evidence-based responses (Hou et al. 2013).

Source: Authors based on chapter 5 in Hou et al. 2013

Note: a. ECA subregions are ECCU1: Russia; ECCU2: Ukraine, Belarus, Moldova; ECCU3: Azerbaijan, Armenia, Georgia; ECCU4: Balkan; ECCU5: Central and Eastern Europe; ECCU6: Turkey; ECCU7: Central Asian 'Stans'; ECCU8: Northern Europe; ECCU9: Western Europe; and ECCU10: Southern Europe.

b. The Spanish crisis has raised concerns related to this very issue. Recent reforms have achieved the immediate goal of balancing annual budgets, but may prove to have negative long-term effects that may adversely impact the system (Gené-Badia et al. 2012).

8.2.1.3. Group aggregates mask some variations within groups

The global overview above renders a mixed picture. The data suggest some progress in escaping the procyclical trap, but not at the lowest level of development. However, the data show group-level aggregates, which cannot capture country-level variation. To overcome this limitation, quadrant charts were prepared to see the distribution of countries in each income group on these two-period countercyclical versus procyclical maps.

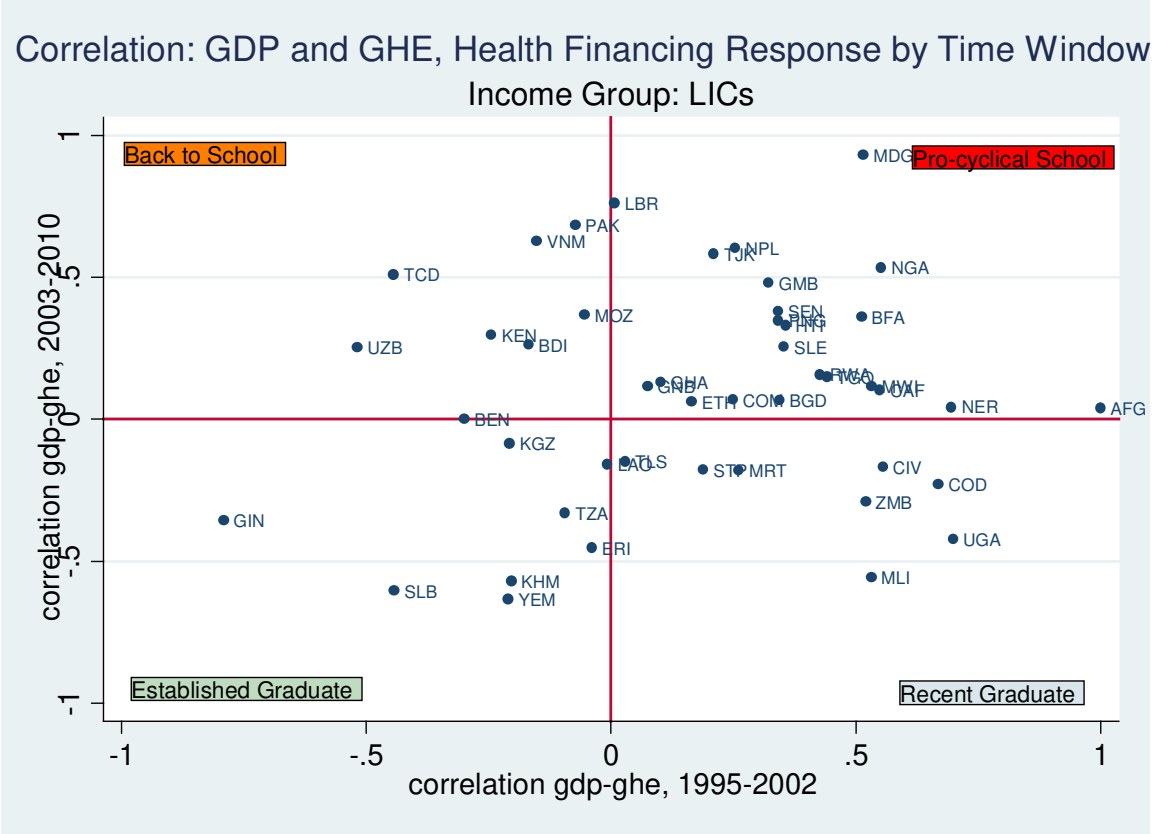
Our focus is on the relationship between government expenditure on health (GHE) and GDP growth.[51] The quadrant chart captures the correlations of the cyclical components of GHE and GDP for each country in the given income group (see figure 1.13, below, for LICs and the graphs for the other income groups in figures 7A.1–7A.3 in annex 7). The scattered data points are grouped into four quadrants, depending on the sign of the correlation coefficient in the first and

51. Quadrant graphs were also prepared to visualize the relationship between GGE and GDP. However, since our focus is on the health aspect, these graphs are not discussed in this paper. To offer a comparison with the quadrants on the cyclicality GGE, please see figures 7A.4–7A.7 of annex 7 for the results on fiscal cyclicality.

second period. The quadrants are labeled in the graphs — clockwise, starting from the top left quadrant — as "Back to School," "Procyclical School," "Established Graduate," and "Recent Graduate"(see also table 1.2).[52]

Figure 1.13 shows the classification for low-income countries (LICs).[53] The majority of countries (n = 22) fall into the procyclical school. The lowest number (n = 7) of countries is in the "established graduate[54]" quadrant. There are an equal number of countries (n = 8) in the "back to school" and "recent graduate"[55] quadrants.

Figure 1.13 Quadrants for Cyclical Behavior of Government Health Expenditures for LICs, 1995–2002 and 2003–10



Source: Authors' calculations based on data from the Fiscal Health Database 2012

In general, for all income groups, the question is what distinguishes the countries in the "established graduate" and "recent graduate" quadrants from the rest of the group.

52. Following the same order, the signs of the correlation coefficients in period 1 and 2 are, respectively, (- +) (+ +) (+ -) and (- -).
53. See the country codes in annex 7, table 7A.1
54. Established Graduates in LICs are Cambodia, Eritrea, Guinea, the Kyrgyz Republic, the Solomon Islands, Tanzania, and Yemen.
55. Recent Graduates in LICs are Cote d'Ivoire, Lao People's Democratic Republic, Mali, Mauritania, Republic of Congo, Timor Leste, Uganda, and Zambia.

- What makes, for example, Algeria, Iraq, Paraguay, or Turkmenistan an established graduate among lower-middle-income countries (figure 7A.1 in annex 7)? How have countries like Djibouti, Ecuador, Honduras, Georgia, Guyana, or the Philippines become recent graduates in this group?

- And why are Botswana, Chile, and Libya established graduates in the upper-middle-income group (figure 7A.2 in annex 7)? What policies got Dominica, Gabon, Kazakhstan, Malaysia, or Panama to graduation in this group?

- What measures got the Czech Republic and Japan to graduation among high-income countries (figure 7A.3 in annex 7)? And how did Finland, the Netherlands, Norway, Spain, Switzerland, and the United States fall back into the procyclical camp?

Since the level of income is more or less controlled for, other characteristics such as political regime type, government preferences and sensitivity to social sectors, institutional strength and governance, system strength and type, and, for developing countries, the availability of external resources for health, must play a role in driving such differences in cyclical responses. In a descriptive analysis it is not possible to control for all these observable factors simultaneously. Hence, we select one dimension to examine further — the relationship between political and economic risk and cyclical behavior. This will be discussed in the following section.

8.3. Relationship between government cyclical response and political and economic risk

Empirical papers argue that political economy and government quality and social risk play an important role in determining cyclical responses. Hence, we add the political and economic risk dimension to our analysis to explore the empirical evidence on the relationship between these risks and cyclical responses, with respect to both fiscal and government health expenditure responses to the business cycle. Scatter plots are used to examine the relationship between the correlation coefficients and an index of political, financial, and economic risk, the Inter-Country Risk Guide (ICRG).

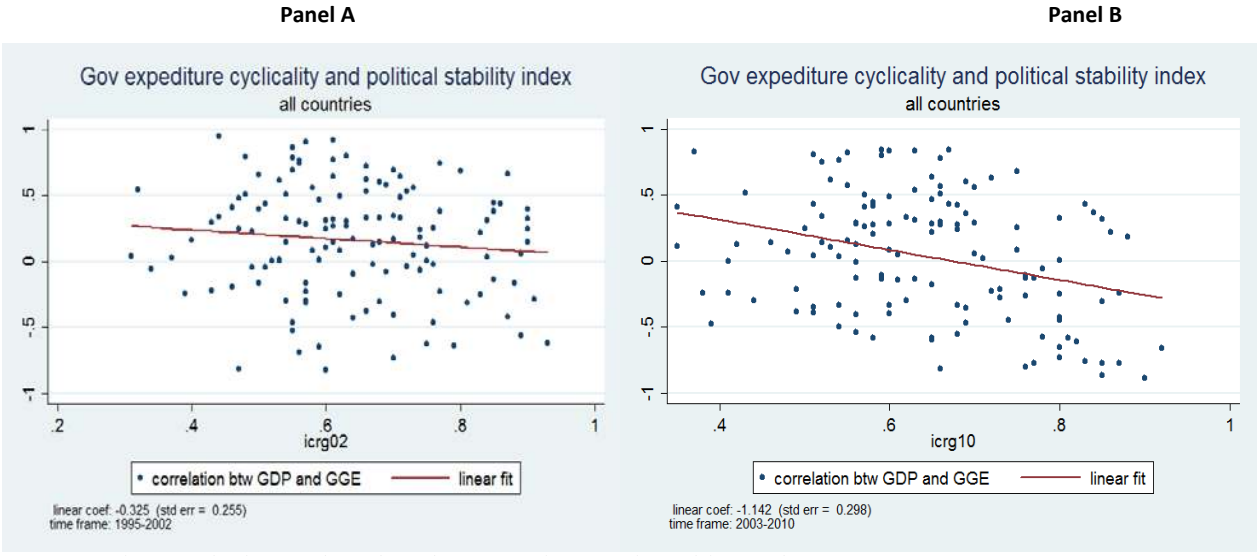
8.3.1. Fiscal response and political and economic risk

This first set of scatter plots (figure 1.14) shows the relationship between the average correlation coefficient for fiscal response (y axis: GDP-GGE) and the ICRG index (x axis) for the two time frames:

- Window 1 (1995–2002): The fit line of the scatter plot for window 1 (panel A of figure 1.14) has a negative slope (-0.325), which means that for the sample of 183 countries between 1995 and 2002, there is a negative relationship between political and economic risk and countercyclical response. Specifically, we see that countries with higher ICRG ratings (that is, closer to 1, which means lower risk) are more likely to have countercyclical policies, as shown by the negative sign of the correlation coefficient. On the other hand, countries with low ICRG rating (below 0.6, that is, higher risk) are more likely to engage in procyclical responses.

⇨ Window 2 (2003–10): The fit line of the scatter plot for window 2 (panel B of figure 1.14) has a steeper negative slope (-1.142), which means that, compared to the results in window 1, there is a more pronounced association between higher political and economic risk and more procyclical behavior or its inverse, low political and economic risk and more countercyclical behavior. Based on these aggregate values across the two time frames, the second period is more fiscally responsible. These results imply that during the period that includes the recent global economic crisis, which started in 2007, countercyclical fiscal policies to stimulate and stabilize economies played an important role for many countries that have been affected by the downturn. Since the correlation coefficient is averaged for between 2003 and 2010, we are not able to identify changes in fiscal policies within this time frame.

Figure 1.14 Scatter Plot of Cyclicality of Fiscal Response (GGE) and Political Risk Rating Index (ICRG), 1995–2002 and 2003–10



Source: Authors' calculations based on data from the Fiscal Health Database 2012

8.3.2. Health financing response and political and economic risk

This second set of scatter plots (panels A and B of figure 1.15) show the relationship between the average correlation coefficient for health care financing response (y axis: GDP-GHE) and the ICRG index (x axis) for the same two time periods as defined above:

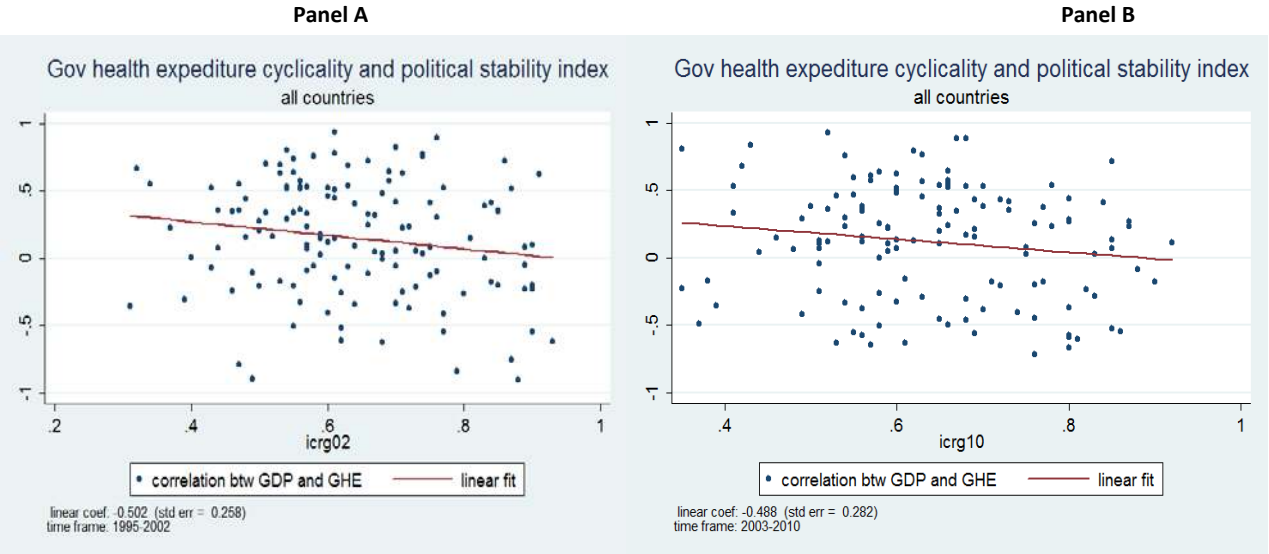
⇨ Window 1 (1995–2002): The relationship between the cyclicality of health financing response (y axis: GDP-GHE) and political and economic risk (x axis: ICRG) is also negative. This means that countries with higher ICRG values (that is, lower risk) are associated more with countercyclical responses (that is, correlation coefficients below zero). However, compared to the fiscal response (where the linear coefficient for the fit line is -0.325[56]), the lower linear coefficient of -0.502 suggests that at the global level (*n*

56. The slope line of the linear coefficient can be interpreted as the unit change in the variable on the y axis for a unit change on the x axis. In this case, the coefficient shows that for a 10-point change in the ICRG rating (using the original scale of 0–100 points), the value for cyclical response changes by -0.325, i.e., becomes more countercyclical.

= 183) there has been a stronger countercyclical response in health financing by countries with relatively lower levels of political risk. That is, countries have been protecting their health financing positions relatively more.

⇨ Window 2 (1995–2002): However, in the second period, which includes the global economic crisis, the liner coefficient of the fit line is lower (-0.488) relative to window 1, and relative to the fiscal response. In fact, in the second period, on average, government prioritization changes with fiscal responses becoming more countercyclical (linear coefficient -1.142), while health sector financing falls back on the agenda in relative terms.

Figure 1.15 Scatter Plot of Cyclicality of Health Financing (GHE) and Political Risk Rating (ICRG), 1995–2002 and 2003–10

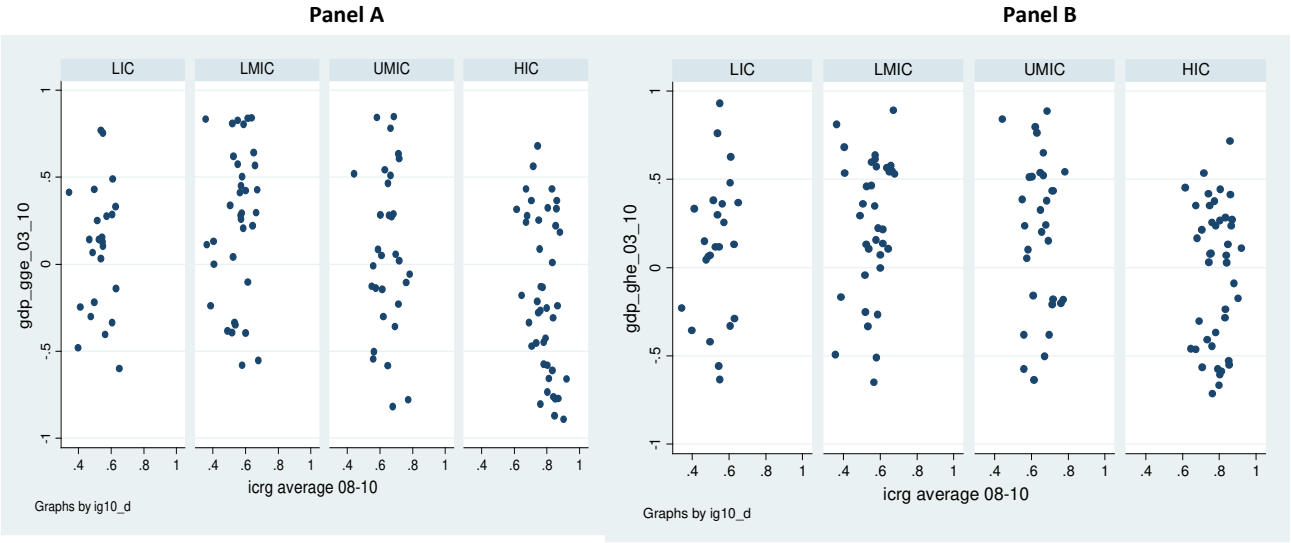


Source: Authors' calculations based on data from the Fiscal Health Database 2012

8.3.3 Cyclical response and political and economic risk by income group

The scatter plots in figure 1.15 mask considerable variation in the relationship between cyclical responses and political and economic risk by income group. These are illustrated in figure 1.16, which captures the heterogeneity of responses in the second time period (2003–10), and recapitulates the finding discussed above that countercyclical fiscal responses (figure 1.15) were more pronounced compared to health financing responses (figure 1.16) during this period, which includes the recent economic crisis.

Figure 1.16 Fiscal and Health Financing Responses and ICRG by Income Groups, 2003–10



Source: Authors' calculations based on data from the Fiscal Health Database 2012

The findings between cyclical responses and political and economic risk, however, are not always intuitive in every income group. While the relationship between cyclical responses and risk rating is negative (that is, higher ICRG, which means lower risk, is associated with more countercyclical responses) for high- and upper-middle-income countries, the relationship for low- and lower-middle-income countries is less clear. It varies between negative, positive, and neutral. This raises concerns regarding the predictive power of the ICRG rating for cyclical responses by governments in the fiscal and health domains. One solution could be to decompose the index and find the principal components that explain the most variation in cyclical patterns. However, this fine-tuning is beyond the scope of this paper.

For example, figures 8A.1 and 8A.2 in annex 8 illustrate this unclear relationship in low-income countries (LICs) in the fiscal and health financing areas for the two time frames.

- ⇨ The fiscal responses have a positive linear coefficient in both time frames (0.599 and 0.136) but large standard errors, which makes this relationship fuzzy. Why would politically and economically less stable, high-risk countries engage in more countercyclical responses compared to more accountable and responsible governments? Among the possible explanations are pressures from international financial institutions to better manage reserves, for example, by establishing rainy day funds in resource-rich countries. Official development assistance (ODA) with conditionalities on fiscal behavior and rules could also contribute to this phenomenon.

- ⇨ The health financing response changes over time, from a negative relationship (-0.397) for 1995–2002 to a positive one (1.062) in 2003–10. However, since the standard errors are large, in the context of low-income countries, the ICRG rating is less helpful in throwing light on the behavioral responses of governments. The hypothesis for what biases these results are, as discussed above, external factors that can influence government responses, such as conditions by international institutions tied to aid or other forms of support. Consequently, in further analyses and modeling, it is important to

control for aid effects to isolate this pathway from general policy responses. Indeed, data on development assistance for health (DAH) show that a number of countries in the high-risk and countercyclical category have been recipients of above-average DAH per capita (IHME 2010).

8.4. DESCRIPTIVE ANALYSIS USING RADAR PLOTS TO EXPLORE THE DRIVERS OF CYCLICAL RESPONSES

The radar plot is a simple visual tool that uses a reduced set of dimensions to enable performance assessment and tracking regarding the environment for cyclical responses, including macrofiscal and political variables. The radar plot can offer insights on the performance of a country or selected countries against a common benchmark (for example, global, income group, regional peers). Using radar plot pairs or series for selected target years can help track changes for a country or sets of countries over time. The proposed tool can be applied in country briefs, case studies, and regional overviews as a comparative or longitudinal context setter. Using the Fiscal Health Database, radar plots can be easily constructed for customized reports, for a country or selected countries.

On a cautionary note, "the devil is in the details" idiom applies to this approach for three reasons. First, this simple tool can only offer insights on associations, and not on causation. Second, macro data often have missing data points that limit comparability. Third, cross-country or cross-year comparisons must go beyond assessing the quantitative differences between the observations. To inform policy making, analysts must drill down on the qualitative aspects, such as the nature of the underlying policies, changes to policy approaches, institutions, and the political context. Applying mixed methods — quantitative and qualitative jointly — can shed more light on what lies behind cyclical dynamics.

The remainder of this section illustrates the use and interpretation of radar plot design for the assessment and tracking of the environment for cyclical performance. To make the illustration focused, a sample of 38 countries was selected. Section 8.4.1 discusses the criteria for the sample selection and describes the sample. Section 8.4.2 illustrates the use and interpretation of radar plots through a discussion of the results for the selected countries in Sub-Saharan Africa. Section 8.4.3 applies broad brushstrokes to summarize the main patterns for each income group using regional examples.

Since the tool can be applied to any country and reference period, the main point here is to illustrate the tool's use without going into details. The discussion will touch on (a) the applied interpretation of the dimensions of the radar plot; and (b) findings regarding cyclical correlations (table 9A.3 in annex 9).[57]

57. By-country cycle patterns for the target time frames, which vary by region, are also calculated but not presented here because the objective of this paper is to provide a global overview and not country-specific explorations.

8.4.1. Description of the sample selected to illustrate the use of the radar plot approach

To make the radar plot analysis tractable, a sample of 38 countries was selected from a total of 183 countries across the seven regions, using the World Bank's regional classification.[58] The selection criteria were specified to illustrate the potential of the tool in this brief overview of empirical application. The sample selection criteria include the following conditions: (a) the time frame for each region shall be customized to include both a crisis and a growth period so that responses across these states can be identified; consequently, the target windows vary by region; (b) in each region the subset shall include a mix of development levels, as much as possible, to explore effects across income groups.

To meet the first condition, output gap was used as an objective quantitative measure to identify the target window that has a crisis spell with significant depth and at least two years of consecutive negative output gap, as well as a spell of positive output gap. The overview table (table 9A.1 in annex 9) applies a color scheme[59] of six performance brackets for output gap, which are based on the distance of the observed value from the trend in terms of standard deviations and the sign of the output gap. The table lists the selected countries by region and income group and provides the time frames for the analysis for each region. Since the time frame varies by region, a general heading is used for time (t, $t + 1$, $t + 2$, $t + 3$), so the values are relative to the base year (t). The summary statistics for log GDP and output gap for the three variables of interest (GDP, GGE, and GHE) are presented by country. Table 9A.2 in annex 9 provides the cyclical components for GDP, GHE, and GHE, and table 9A.3 summarizes the correlation coefficients calculated for the full study period for GDP-GGE, GDP-GHE, and GGE-GHE.

8.4.2. Illustration of the interpretation of radar plots

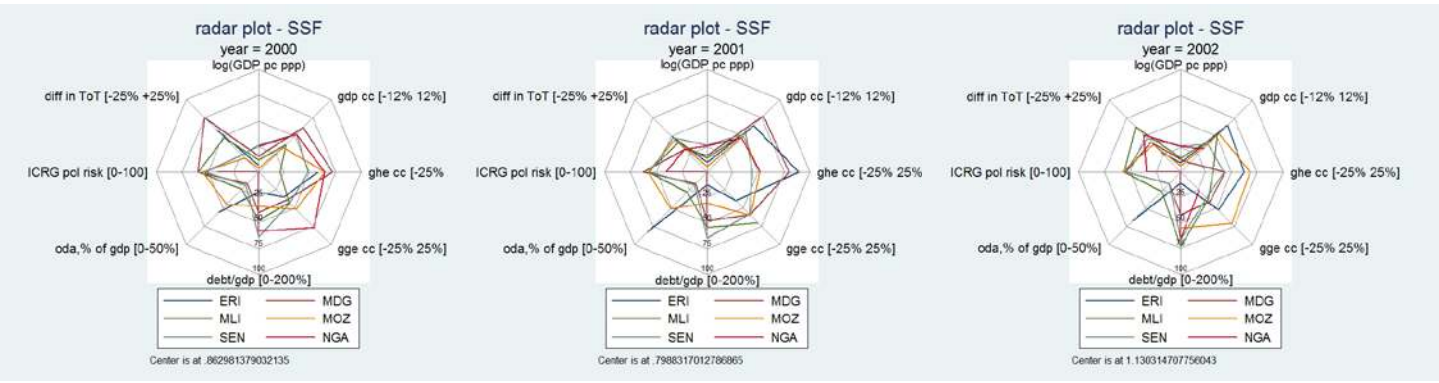
In general, the purpose of radar plots is to offer a visual of the relative performance of selected countries against a common benchmark on defined dimensions that capture some aspects of the enabling environment for cyclical responses. As discussed under the methods section, the dimensions proposed for the radar plot were selected on the basis of theory and empirical evidence. Each dimension is expected to explain some of the variation in the propensity to engage in countercyclical behavior. Beyond cross-country comparison based on a single year, constructing radar plots for each year of the target time frame enables tracking changes over time.

This section explains how to interpret the proposed dimensions of the radar plot in an applied context, focusing on six countries in Sub-Saharan Africa — including countries from the low- and lower-middle-income groups — for 2000 to 2002 (figure 1.17).

58. The regions and related region codes are East Asia and Pacific (EAS), Europe and Central Asia (ECS), Latin America and the Caribbean (LCN), Middle East and North Africa (MEA), North America (NAC), South Asia (SAS), and Sub-Saharan Africa (SSF).
59. The color scheme used in the overview table is Dark Red: -2 > Output Gap. Medium Red: -2 < Output Gap < -1.5. Light Red: -1.5 < Output Gap < 0. Same thresholds apply for the brackets for positive output gap, with a positive sign. That is Dark Green: 2 < + Output Gap. Medium Green: 2 < + Output Gap > 1.5. Light Green: 1.5 > + Output Gap > 0.

Figure 1.17 Radar Plots for Selected Countries in Sub-Saharan Africa (SSF) for 2000, 2001, and 2002

Panel A **Panel B** **Panel C**



Source: Authors' calculations based on data from the Fiscal Health Database 2012

The detailed discussion of the rationale behind each dimension is discussed in the methodology section (section 7). Here, the focus is on applied interpretation. With respect to the reading of the radar plot, the standardized scale is between 0 in the center of the radar and 100 on the outside ring; lower values mean lower performance on the given variable. The 50 mark, which represents the group average, means average performance. In addition to the standardized scale, for each dimension, the respective original range is indicated on the variable label. For example, the cyclical component for GDP ranges between minus and plus 12 percent. These dimension-specific labels provide a more specific interpretation for each variable.

The dimensions are grouped into three categories (see data availability summary in table 10A.1 in annex 10). The interpretation of these is presented below in the context of the selected African countries.

Group 1 – Cyclical Patterns:

- *GDP Cycle:* The GDP cycle shows whether the country's economy has a growth driver or a shock effect to manage. Over the three-year time frame, the economic output is the lowest for 2000, with negative cycles for Eritrea, Mali, and Mozambique, as indicated by the values below the 50 mark on the radar plot.

- *GHE Cycle:* The GHE cycle shows whether health expenditures have been in the "green" or "red" (above/below the 50 mark grid line on the radar plot). For example, in 2001 Eritrea (dark blue) puts more emphasis on government health expenditures (above the 75 percent mark on the grid line for GHE CC) relative to fiscal stimulus (below the 50 percent mark on GGE CC). This is also the case for 2000, which is the year of the downturn, although the patterns are attenuated. In 2003, however, fiscal policy changes, slightly surpassing the 50 percent mark, which suggests a slight fiscal stimulus. Mozambique (yellow line) shows similar preference patterns in 2000, during a mild relative downturn, since its health spending cycle is relatively more countercyclical (GHE CC at approximately 70 percent) compared to the neutral fiscal policy (GGE CC at approximately 50). Thus, comparing responses between the fiscal and health cycles can

offer an insight on health sector prioritization. See the discussion in box 1.8 on factors that can contribute to countercyclical health sector policies.

- *GGE Cycle:* The GGE cycle shows whether government expenditures expand or contract. However, from a single dimension, one cannot tell whether the economic policy is procyclical or countercyclical. That requires an understanding of the relationship between GGE and GDP and, hence, joint interpretation. For example, a positive GGE cycle can be either a pro- or countercyclical response, depending on whether the GDP cycle is positive or negative. Using a country example, we observe expansionary fiscal behavior during a positive GDP cycle (that is, procyclical) in Nigeria in 2000, a fiscal stimulus during a negative cycle (that is, countercyclical) in 2001, and fiscal adjustment during a negative GDP cycle (that is, procyclical) in 2002 (panel C of figure 1.17). The radar plot also enables comparison of the GGE and GHE cycle components. Since these cycles are affected by the same underlying economic performance, the responses can be interpreted in a relative manner. For example, in 2000, both general government spending and government health spending increased. However, the increase in health spending was proportionately less relative to its trend line (at 65 percent for the GHE dimension on the plot compared to 75 percent for GGE). The response is also disproportionate during the negative GDP cycle in 2002, which triggered adjustment in both the fiscal and health domains but more so in government health spending. Such results could be indicative of the status of the sector with respect to overall government priorities.

Box 1.8 Poor but Socially Sensitive — Possible Drivers of Countercyclical Health Policy in Low-Income Context

Among the selected countries in Sub-Sahara Africa, two countries stand out compared to the group mean with respect to their countercyclical health spending behavior — Eritrea and Mozambique. Knowing the political and historic context of these countries, one hypothesis is that greater social sensitivity could partially drive behavioral responses with respect to health spending. One measure of the role of the state in providing the health safety net is the size of government funds as a share of total health expenditures. For Eritrea and Mozambique, these shares hovered at around 50 and 70 percent between 2008 and 2012 (World Bank 2013). We also know from global statistics on aid flows that some of these countries among the selected ones in Sub-Saharan Arica have been recipients of significant ODA during the time concerned. For example, World Bank statistics (Index Mundi 2013; World Bank 2013) show that aid flows in Eritrea in 2000 reached a net ODA to gross capital formation of above 100 percent, and similarly in Mozambique in 2001. Consequently, we expect that during econometric analysis it is important to control for the share of government expenditures in the health sector, and for the share of development assistance for health in total spending to isolate domestic and externally driven countercyclical responses.

Notwithstanding these results, from system performance indicators we can conjecture that countercyclical behavior, if short term, is not enough to make a dent in human capital formation, especially not in countries where poverty is deep or inequity marked, and systems are in general not in good condition. For example, although Mozambique's GDP growth has been among the world's top 10 since 2001, it has some of the lowest GDP per capita and the lowest life

expectancy, Human Development Index, and inequality ratings. The story line from the perspective of cyclical responses is favorable. Yet, we believe that to have an enhanced understanding of how countercyclical responses could be harnessed, modeling is essential to better control for observable and unobservable characteristics that drive cyclical responses, as is engaging in country-specific event analysis to be able to draw on micro-level data and drill down on the qualitative context, which helps in the interpretation of findings.

Source: Authors

Group 2 — Macrofiscal Dimensions:

- *Log GDP:* Log GDP is included to anchor the countries with respect to where they fall in the global per capita income distribution. This is informative because cyclical patterns display a clear income gradient. All countries in this selection fall into the low-income category, except for Nigeria (red line), which, based on the most recent income classification used by the World Bank, is in the lower-middle group.

The next three variables in this group are proxy measures of fiscal space, which are important regarding current and future fiscal and health spending responses.

- *Debt-to-GDP Ratio:* The debt-to-GDP ratio is a measure of the health of the economy. Higher debt relative to GDP puts a burden on the economy because of the need to finance debt repayments. Such a burden decreases the fiscal leverage of the country. As discussed in the methodology section, all variables have been scaled so that the interpretation on the radar is consistent. That is, all values toward the outside perimeter of the radar plot indicate better performance, and values toward the center show lower performance. The dimension-specific range is between 0 and 200 percent. Values above the 50 percent mark indicate that the country's risk exposure is high since this corresponds to a debt-to-GDP ratio above unity, which certainly causes concern for long-term fiscal sustainability of spending, including for health, unless aid flows are guaranteed, which is hardly the case. The graphs show that debt-related sovereign risk increased by 2002, except for Eritrea, which limited its financial risk exposure in terms of foreign debt.

- *ODA/GNI:* The official development assistance (ODA) to gross national income (GNI) ratio is another measure of fiscal space, which is most relevant in the developing context. Heavy aid dependency means that external factors play an important role in cyclical responses and, hence, highly volatile flows can be detrimental for safety nets, including for health. The ODA/GNI ratio is on a positive scale in our radar plot, and the dimension-specific range is between 0 and 50 percent. The rationale behind keeping the values in their original scale is that from the perspective of countercyclical spending, donor aid contributes to the financing envelope, and thus, serves as an enabler to engage in countercyclical behavior during economic shocks. As discussed under the method section, given the data limitations, and since this is not the main focus of the study, for the radar plot analysis we assume away complicating factors, such as fungibility or the heterogeneity of the effect of ODA on government spending (see more in section 7 and in box 1.4). The graphs show that by 2001, development assistance significantly increased in Mozambique and Eritrea to, respectively, above 50 and 75 percent. On the dimension-

specific range, this translates to reaching ODA/GNI ratios of approximately 25.0 and 37.5 percent.

- *Terms of Trade (ToT):* Terms of trade captures the difference in the ratio between the prices of exports and imports relative to the ratio for the previous year, which shows whether there has been deterioration or improvement in the country's ToT position. The dimension-specific range is between minus and plus 25 percent. The rationale behind this variable is that if a country is export-dependent and its ToT improves, this would lead to increased revenues. From the graphs we see that ToT conditions deteriorated from 2000 to 2001, which would reduce the revenue base and, hence, lead to downward pressure on expenditures, including social and health expenditures.

Group 3 — Political and Institutional Risk

Although there is a single dimension for political and institutional risk, this group could be expanded by decomposing the index and using specific components that are the most relevant for cyclical behavior.

- *ICRG:* The Inter-Country Risk Guide (ICRG) is a political risk-rating index. The dimension-specific range is between 0 and 100. High values of the ICRG[60] indicate low risk, while low ratings indicate high risk. The majority of the subset falls at the borderline or barely above the 50 percent mark on the plot, which means that these countries are very high or high risk. This index does not show big volatility over the time period. There is one clear case of rate deterioration for Nigeria by 2002, which already started from a lower baseline value compared to the group mean. This variable is relevant because complex political economy has been shown to be associated with worse performance on fiscal management (Braun and Di Gresia 2003; Calderon and Schmidt-Hebbel 2008; Doytch, Hu, and Mendoza 2010; IDB 2009; IMF 2009), specifically, with more propensity for fiscal profligacy. Some of the policy options recommended in the literature have been, for example, establishment of natural resource funds in resource-rich countries (Brahmbhatt and Canuto 2012) and fiscal targets (Braun and Di Gresia 2003). Since cyclicality patterns have been claimed to be systematically different for resource-rich countries, this is another factor that could be explicitly controlled for in econometric modeling.

8.4.3. Broad brushstroke findings from radar plots by income group

Since the previous section used selected countries from Sub-Saharan Africa (which represent mostly the low-income group) to illustrate the interpretation of the dimensions of the radar plot, in this section we discuss only examples from the three other income groups. For the low-income context, we provide only a brief summary of messages.

60. http://www.prsgroup.com/ICRG_methodology.aspx#PolRiskRating. The broad categories of composite risk are (a) Very High Risk: 0 to 49.9 points; (b) High Risk: 50 to 59.9 points; (c) Moderate Risk: 60 to 69.9 points; (d) Low Risk: 70 to 79.9. points; and (e) Very Low Risk: 80 to 100 points.

8.4.3.1. Low-income countries

For the selected countries in the low-income context, the correlation coefficients predominantly show procyclical responses for both fiscal and government health expenditures during the 16-year study period (table 9A.3 in annex 9). However, there is evidence that low-income countries do engage in countercyclical policies during downturns. For example, correlation coefficients in the fiscal domain show consistent tendencies for fiscal stimulus in Bangladesh, Nepal, and Eritrea (respectively, the values are -0.34, mild correlation; -.74, strong correlation; and -0.28, weak correlation, by standard thresholds). Based on our sample, however, fewer low-income countries engage in countercyclical government health spending, namely, Eritrea and Mozambique (respectively, with correlation coefficients of -0.58, mild correlation; and -0.23, weak correlation). We hypothesized social sensitivity and preferences, as well as official development assistance for health to be among the drivers of countercyclical polices.

8.4.3.2. Lower-middle-income countries

The figures show the radar plots for the Middle East and North Africa (MEA) (figure 11A.1 in annex 11) and South Asia (SAS) (figure 11A.2 in annex 11) regions. In these plots, we focus on the lower-middle-income subset.[61] The time frames for the analysis are 2001–04 for the Middle East and 2000–03 for South Asia.

Comparing the plots for the two regions, the overall impression is that, on average, performance in the South Asia region is lower in all dimensions. The main message for the countries selected from South Asia is that, based on the observed cyclical correlations during the 16 years, both India and Sri Lanka show a higher propensity to practice countercyclical fiscal policy, but health prioritization has not been similarly demonstrated between 1995 and 2010. This finding is confirmed for Sri Lanka by the results shown in the radar plot between 2000 and 2004. However, for India we observe some countercyclical responses. In 2001, there is a positive cycle for health expenditures, showing a 4 percent expansion. In 2003, there is a positive cycle for general government spending, showing a 5 percent stimulus. However, during this year of fiscal stimulus, health prioritization falls behind since the GHE cycle is negative.

As for the Middle East and North Africa region, the results for the correlation coefficients between 1995 and 2010 show countercyclical tendencies only for Iraq in government health expenditures (table 9A.3 in annex 9). The results for all other lower-middle-income MEA countries reported in the table are procyclical.

However, when the statistics are disaggregated — as shown in the table and the radar plots (table 9A.1 in annex 9 and figure 11A.1 in annex 11), which capture the annual responses — countercyclical spells are observed for other countries, as well. This illustrates that using average measures, which mask crisis-specific responses, can be misleading.

To offer some examples, during a negative GDP cycle in Egypt (green line) in 2002, countercyclical responses are observed in both the fiscal and health dimensions. The expansion, measured in terms of standard deviation of the output gap, is higher for health (table 9A.1 in

61. In the MEA region, the LMICs include Egypt (EGY – green line), Iran (IRN – yellow line), Iraq (IRQ – grey line), and Tunisia (TUN – red line). In the SAS region, India (IND – green line) and Sri Lanka (LKA – yellow line) fall into the LMIC group.

annex 9). However, while in 2003 the countercyclical behavior continues in fiscal response, the health response reverses and becomes procyclical. Iran (yellow line) also shows a tendency for countercyclical responses in health spending in the target period, with a health stimulus in both 2001 and 2002 during negative GDP cycles. For Iraq (grey line), the GDP cycle shows significant negative deviation in 2003, during which there is fiscal adjustment (-0.87 negative output gap). However, this does not affect the health sector, where we see a stimulus (1.54). The contrast between fiscal and health spending could imply a foreign aid effect that was targeted toward the health sector. Unfortunately, official development assistance (ODA) or development assistance for health (DAH) observations are missing for Iraq for the time period and, thus, we must rely on alternative data sources, which may not be fully consistent with our database.

8.4.3.3. Upper-middle-income countries

Within the upper-middle-income group, we focus on selected countries[62] from Latin America (figure 11A.3 in annex 11). The target window is 2000–02.

Reviewing the average correlation coefficients for the full period of this study (1995–2010) (table 9A.3 in annex 9), countercyclical behavior is observed in the fiscal domain during a negative output gap in Chile, Colombia, Mexico, and Peru. The health response is also countercyclical, on average, for Chile, Colombia, and Peru, while the result for Mexico suggests an overall procyclical pattern.

The annual statistics on cycle trends (table 9A.2 in annex 9) largely support these observed generalized patterns. However, we see that the 2001 crisis crowded out resources from health; for example, in Colombia, Mexico, and Peru the government health expenditure cycles are negative. The 2001 crisis showed the need to channel more of the fiscal stimuli toward the health sector during downturns; hence, it has been instrumental in catalyzing the improvement of social safety nets (see more in box 1.9).

Box 1.9 Pioneering Countercyclical Social Policies in Latin America — Lessons for the Health Sector

While the cycle statistics show mixed results, there have been a number of successful social responses in this region, as described by Braun and Di Gresia (2003), and also by more recent studies by Quiroga (2012), Hernandez (2012), and Perez (2012).[a]

Undoubtedly, the crises during the selected time frame and recently have catalyzed efficiency enhancements and played a role in simulating more socially sensitive government responses. The witnessed countercyclical responses in social protection and education have improved social safety and contributed to human capital formation. The region has been a pioneer in conditional cash transfer programs, including the first nationwide social safety net in the region, *Oportunidades*, founded in Mexico in 2002 based on the earlier program *Progresa.* Other programs are *Familias en Acción*, established in 2002 in Colombia; *Jefes de Hogar*, launched in Argentina in 2002; *Juntos*, established in Peru in 2005; *Bolsa Familia* in Brazil, which played an important role in the 2006 presidential elections and which today is the largest nationwide scheme; and *Asignacion Universal pro Hijo*, a universal child

62. The selected countries are Argentina (ARG), Chile (CHL), Colombia (COL), Mexico (MEX), and Peru (PER).

allowance program for children of workers in the informal sector or unemployed, started in 2009 in Argentina.

These pioneering efforts and success stories in strengthening social safety nets are welcome and exemplary. Yet, as noted by Darby and Melitz (2008) and Doytch, Hu, and Mendoza (2010), a sector-specific countercyclical strategy is not equivalent to the aggregate cyclical patterns of social sectors. Therefore, understanding which sectors benefit from fiscal stimuli and where the health sector stands in the overall prioritization are important. As an example, in the Europe and Central Asia region, there have been claims that the health sector did not harness the upgrades to the general social protection platforms, so even if targeting and access improved for some programs, the health dimensions may not have improved proportionately. This suggests that it is important to have health sector–specific countercyclical strategies, and to improve the synergies and coordination between social protection and health sectors (see more on this in chapters 1 and 4 of Hou et al. 2013).

Source: Authors
Note: a. These experiences were presented among a series of case studies prepared for the workshop by the World Bank Institute, "The Health Sector and Economic Crises: How to Assess, Track and Mitigate the Impact." Chapter 3 of Hou et al. (2013) presents the mitigation experience for Colombia.

8.4.3.4. High-income countries

The summary statistics on correlation coefficients for the study period paint a flattering performance for many countries, such as Estonia, Finland, Ireland, and Sweden, showing a countercyclical relationship between GDP and fiscal spending and GDP and health spending during negative output gap (table 9A.3 in annex 9). However, examining annual responses during the target period (2008–10), we observe that, for example, Estonia, Finland, and Greece engaged in fiscal adjustment in 2010. With respect to health spending, Estonia,[63] Finland, Greece,[64] Ireland,[65] Sweden, and Canada engaged in health spending adjustment in 2010 (figure 11A.4 in annex 11). Portugal's[66] performance is countercyclical based both on the aggregate statistic and the performance during the recent economic crisis. In North America, while the United States shows more persistence in countercyclical fiscal spending, Canada has countercyclical responses in both fiscal and health expenditures. But countercyclical responses in Europe and North America are the product of more than just the recent economic crisis. On the other hand, despite the common expectations of general propensity for countercyclical responses during crises, we observe procyclical adjustment responses in 1998, following the 1997 Asian financial crisis, in Japan and the Republic of Korea.

Overall, these broad brushstroke facts suggest that even the most advanced and some of the most socially sensitive countries are not immune to crises. The empirical analyses have provided evidence that countries with good track records can fall back. Vulnerability to shocks is more likely in high-income countries that face structural and system-level challenges to social and

63. See case study on Estonia's responses by the government and the health sector during the recent global economic crisis by Habicht (2012) and in Hou et al. (2013).
64. See case study on Greece by Yfantopoulos (2013) in Hou et al. (2013).
65. See case study on Ireland by Burke, Barry, and Thomas (2013) in Hou et al. (2013).
66. See case study on Portugal by Barros (2013) in Hou et al. (2013).

health financing (for example, aging, rigidities in social security systems, and presence of technology-induced cost drivers). When these challenges to health financing are coupled with tightening fiscal space (for example, measured by increased debt-to-GDP ratios and fiscal deficit), countries are forced into addressing more complex structural issues, which require longer-term planning and skillful management of politically sensitive reforms. More contextual interpretation for the effects of the crisis in Europe and its implications for health sector responses are discussed in box 1.7, above. The final message is that while advanced economies have relied more on automatic stabilizers and have more developed social safety nets, the global crisis has shown that even the most advanced economies cannot afford top to be complacent.

8.5. DIAGNOSTIC MODELING

Using multivariate analysis, we aim to explore the relevance of a number of variables that are expected to be significant drivers of cyclical responses, based on theory, earlier empirical evidence, and the descriptive results presented so far. As laid out under the methods section, this diagnostic analysis first includes an exploration of the nonparametric relationship between the business and government health expenditure cycles and then turns to the multivariate specification, fitting the models both to the pooled data and to subsets by income to isolate effects related to the level of economic development.

8.5.1. Bivariate nonparametric relationship between the business and government health expenditure cycles

Given the focus of the modeling, prior to applying the multivariate approach we explored the simple bivariate relationship between the business cycle (GDP growth cyclical component) and the government health expenditure cycle (GHE growth cyclical component) using nonparametric regression. The results, which are graphically illustrated through fit lines, show the unconditional relationship between these two cycles.

The key finding is that income-group–based results (panels A–D of figure 12A.2. in annex 12) differ markedly from the results for the pooled global sample (figure 12A.1 in annex 12). The patterns are consistent with the findings in the broader literature and the take-away messages from the discussion of the radar plots presented above.

However, the graphs offer a more granular picture of the nature of the relationship between the explanatory (GDP cycle) and response (GHE cycle) variables, showing the average country response in government health spending at a given GDP growth cycle. Briefly, the story line for the income groups is that countercyclical responses are more marked in the upper-middle and high-income groups (panels C and D of figure 12A.2 in annex 12). For developed economies, there is a clear and sharp upward kink that brings the curve above zero on the y axis, which signals a positive GHE cycle at low levels of the GDP cycle (significant contraction). This kink is the most pronounced for high-income countries, where around minus 4.5 percent on the x axis (GDP) the GHE cycle approaches 6 percent on the y axis. In the developing context, for lower-middle-income countries we can hardly detect a countercyclical response, except for very close to the point that represents economic stagnation (zero on the x axis), where the GHE cycle is at approximately 1 percent (y axis). For low-income countries, it takes a large negative cycle to trigger a very weak countercyclical response, which barely surpasses the zero point on the y axis.

This implies that even with official development aid, which is expected to play a role in contexts with deeply negative GDP cycles, there is little response in GHE. For lower-middle-income countries, and even more so for upper-middle-income countries, it is during periods of high growth (5 percent above the trend line) that there are large-scale expansions in the health sector.

8.5.2. Diagnostic multivariate linear modeling

Although the nonparametric results show that the relation between economic performance and health spending is best fit by a cubic polynomial, we decided, for ease of interpretation, to apply the linear relationship as the coefficient of interest.

8.5.2.1. Model specification

- Dependent Variable: For the dependent variable, we test the cyclical component of government health expenditures (GHE cycle[67]) to explore how cycles change, conditional on a set of covariates.

- Independent Variables: The covariates include the business cycle (GDP cycle); fiscal policy (GGE cycle); the interaction of economic growth and fiscal policy (GDP-GGE); political regime (polity 2); political and economic risk and governance (ICRG); changes in the terms of trade (TOT); the extent of official development assistance (ODA/GNI per capita); debt-to-GDP ratio (debt/GDP); tax revenues as share of GDP (tax/GDP), and the indicator variables for income group and region to isolate the effect of development level and regional variations. The rationale for selecting these variables was provided under the section that discusses the dimensions of the radar plot (see section 8.4).

- Interpretation of Coefficient Estimates: As to the interpretation, for example, when the beta coefficient for the business cycle (GDP cycle) is negative, this stands for countercyclical government health expenditure responses, while a positive coefficient indicates a procyclical relation. The cycles are measured in terms of the deviation from the smoothed trend line, and the metric used here is deviation in percentage term — specifically, the change in percentage terms in the dependent variable as a result of a one-unit change in the independent variable.

8.5.2.2. Modeling approach

Starting with the proposed basic model specification, we apply step-wise modeling; that is, we systematically expand the model with additional covariates or sets of covariates. The main model types tested are as follows (see table 1.10 for overview):

⇨ **Model 1:** Bivariate Base Model: Explores the relationship between the triggering GDP cycle and the observed GHE cycle, which is the response variable.

67. We also considered using the cyclical correlation as the dependent variable. However, because there are only 183 data points, and these are calculated for the 15-year study period, this was not practical given the limitations on degrees of freedom and adding covariates to test complex multivariate relationships.

- ⇨ **Model 2:** Multivariate Model-1: Compared to the Bivariate Base Model above, this adds the fiscal cycle as a control variable to explore how the observed effect on the GHE cycle is channeled through; whether growth (GDP) or fiscal response (GGE) has a relatively bigger role.

- ⇨ **Model 3:** Multivariate Model-2: This model specification includes an interaction term between the business and fiscal cycles (GDP and GGE cycles). Essentially, this captures the extent to which the business cycle and fiscal response are intertwined and reinforce each other (comovement) or, for example, in the case of automatic stabilizers, if there is some attenuation of the effect of the business cycle (opposite movement).

- ⇨ **Model 4:** Multivariate Model-3: Building on the previous model, this specification includes a number of additional covariates that were selected as potential explanatory factors of cyclical responses, including political regime, political and economic risk, debt-to-GDP ratio, tax revenue base as a share of GDP, and terms of trade.

- ⇨ **Model 5:** Multivariate Model-4: This variation includes the indicator variables for region to isolate any region-specific effect.

- ⇨ **Model 6:** Multivariate Model-5: This specification includes the indicator variables for the World Bank income groups to isolate any systematic variation in cyclical responses by the level of economic development.

In addition to this basic, step-wise expanding model specification for the pooled sample, we also ran regressions by income groups. The model types applied to the subsets are identical. To distinguish in the summary tables, the code for the income group is included in the model name (for example, Model-3_LIC). In this set, there is one additional model, which includes official development assistance as a covariate. Since this variable is meaningful only for developing countries, it is included in the regressions for the low-and lower-middle-income groups. For these models, in addition to the model number and income group code, the model labeling includes the term "ODA":

- ⇨ **Model #_IG_ODA:** This model includes ODA as an additional control variable, and given the relevance, it is only included in the models for the low- and lower-middle-income groups (LIC and LMIC).

Table 1.10 Overview of Dependent Variable and Covariates for Linear Model Specification

	Bivariate Model 1	Multivariate Model 2	Model 3	Model 4	Model 5	Model 6	Model #_IG_ODA for LIC and LMIC
Dependent variable	GHE cycle						
Business cycle (GDP)	☑	☑	☑	☑	☑	☑	☑
Fiscal cycle (GGE)		☑	☑	☑	☑	☑	☑
GDP*GGE cycle interaction			☑	☑	☑	☑	☑
ICRG				☑	☑	☑	☑
Polity 2				☑	☑	☑	☑
Tax revenue / GDP				☑	☑	☑	☑
Terms of trade				☑	☑	☑	☑

(TOT)							
Official development aid (ODA/GNI)							☑
Region					☑		
Income group						☑	

Source: Authors

Finally, as discussed, to explore the cyclical responses during bad and good times, these models were run for the pooled data and also separately when the GPD cycle is negative (downturn) and positive (boom).

8.5.2.3. Main findings from the diagnostic models

The model statistics and coefficient estimates for the specifications discussed above are presented in summary tables in annex 13. Below is an overview of the main findings and limitations, starting with the results for the pooled data.

First, the results in table 13A.1 in annex 13 for Model 1 suggest that while the coefficient estimate for the business cycle (GDP cycle) is statistically highly significant and the magnitude of the effect of the economic cycle on government health expenditures is large (0.427), as the adjusted *R*-squared statistics show, the business cycle alone explains only roughly 1 percent of the variation in government health expenditure behavior. Given this low explanatory power, multivariate exploration is essential. In Model 2, the addition of the fiscal cycle (GGE cycle) increases the adjusted *R*-squared statistics to 7.8 percent, meaning that, in general, the fiscal cycle is a better predictor for government health expenditure cycles. As observed between the business and government health expenditure cycles, there is also a positive relationship between the fiscal and government health expenditure cycles. This means that economic growth is associated with fiscal expansion, which in turn is associated with increased government health expenditures.

In Model 2, both beta coefficients are highly statistically significant and their magnitude is comparable, although the coefficient estimate for the fiscal cycle is slightly higher (0.278), implying that an improvement in the fiscal cycle has a bigger effect on government health expenditures than the effect of GDP growth on health expenditures. In fact, Model 3 confirms this, and the magnitude on the beta coefficient for the interaction term between the economic and fiscal cycles (GDP-GGE) suggests that when it rains, it pours.

In Model 4 — which includes the control variables for political regimes, political and economic risk, and fiscal space — we see a small improvement in the explanatory power of the regression, which now explains approximately 11 percent of the variation in government health expenditure cycles. However, among the additional covariates, only terms of trade is statistically significant. Its sign is, as expected, negative, meaning that an improvement in the terms of trade (that is, an increase in export prices or decline in import prices) puts negative pressure on government health expenditures. Notably, in this model, which includes more of the expectedly relevant covariates, although we do not see statistically significant effects, the relative magnitude of the effect of the business and fiscal cycles changes, economic fluctuation now being more important in determining the government health expenditure cycle.

In Model 5 and Model 6, which control for regional and income group effects, we see no statistically significant coefficient for any of these indicator variables, meaning that in this current specification it is not possible to isolate regional and development-level–specific response behavior. This is likely because, as discussed during the descriptive analyses, both regional and income-group–based averages mask significant variation in cyclical responses.

Although the coefficients for income group are not significant in this diagnostic model for the pooled data, based on the results from the nonparametric regression, we expect that income-level–specific behavioral responses can be detected if we run separate regressions by income group. Hence, we test these specifications for the subsamples and present the results for both "bad" and "good" times (see table 13A.2 in annex 13). Since we concluded that some of the basic specifications, such as the bivariate case (Model 1), have low explanatory power and, hence, merit no further discussion, not all models are presented in the overview tables.

From the two sets of model specifications (Models 3 and 4) presented for the negative GDP cycle scenario, we focus on the variants of Model 4 (table 13A.3 in annex 13), because this set includes more covariates and, hence, allows for a richer discussion of the findings.

First, the coefficient estimates for the business cycle show significant variation across the models, comparing the beta estimates for the pooled data (Model 4-P) and the subspecifications for each income group (Models 4 LIC-HIC). Importantly, the change in the slope of the coefficient estimate shows a systematic trend, reducing from 1.258 for LICs to -0.355 for HICs. Although not all of these coefficients are statistically significant, the change in the slope suggests that economic growth is more important in determining government health expenditure cycles in developing countries (beta coefficients for LICs and LMICs are, respectively, 1.258 and 0.726). For the upper-middle-income group we see that the fiscal cycle becomes more important (the beta estimate for GDP cycle is 0.104 while for the GGE cycle it is 0.259). For the high-income group, the sign reverses to negative, which indicates a countercyclical response in government health expenditures.

The magnitude of the coefficient estimates for the interaction term for the business and fiscal cycles suggests that comoving macrofiscal dynamics puts heavier pressure on government health expenditures, while relatively more stability at the high-income level helps smooth out health expenditures. In addition to the terms of trade variable, which we noted earlier to be significant with the expected sign in the model for low-income countries that includes ODA as a covariate, we see that ODA is not only statistically significant, but once it is included (beta = 0.364), the magnitude of the coefficient estimate for the GDP cycles reduces (from 1.258 in Model 4 LIC to 0.549 in Model 4 LIC_ODA), implying that development assistance does enable expenditure smoothing in health.

There are two further variables that are statistically significant in the models for the lower-middle-income group (Model 4 LMIC and Model 4 LMIC_ODA). One is the proxy for political regime, which captures the extent of democratization on a scale of minus 10 to plus 10. The result is not consistent with our expectation, since the sign is negative, which would imply that a higher level of democracy score is associated with lower government health expenditures during negative GDP cycles. Although the magnitude of the estimate is low (-0.003), this result requires further fine-tuning in the specification and definition of variables that aim to capture political and

economic aspects. The other significant variable is debt-to-GDP ratio, with the expected negative sign, which means that a higher level of indebtedness is associated with bigger downward pressures on government health expenditures. Overall, in the developing context, the model specifications that include ODA seem to perform best, with an explanatory power at 16 percent for LICs and 14 percent for LMICs. For high-income countries, the business and fiscal cycles play a less determining role compared to their developing peers, reflecting more stability and smoothing, thanks to automatic stabilizers and safety nets. However, we see a negative terms of trade effect, which suggests vulnerability as a result of fluctuations in relative prices.

The results for positive GDP cycle presented in table 13A.5 in annex 13 are less robust and intuitive, since the relationships are less systematic and there are fewer covariates overall that are statistically significant. The only pattern worth mentioning is that while during the negative GDP cycle we only observed positive relationships between the business and fiscal cycles, here the signs of the coefficient estimates for fiscal cycle are negative for the upper-middle-income and high-income groups, suggesting countercyclical tendencies.

Overall, these rudimentary diagnostic models support the claim that government health expenditure cycles are driven by complex underlying dynamics; hence, more advanced multivariate specifications, including nonlinear and dynamic modeling, are required to isolate effects and understand the causal pathways. From the diagnostic runs we conclude that the impact of business cycles is larger in developing countries than in advanced economies, and that the fiscal pathway is critical in determining government health expenditures. This means that although economic growth trajectories do matter, fiscal response from governments can outweigh or at least attenuate income effects. There are three notable macro effects that make countries more vulnerable in terms of government health expenditures: deterioration in terms of trade and debt-to-GDP ratios for all income groups, and unpredictable ODA in developing countries. With respect to political economy, governance, and risk, since neither proxy variables performed as expected, these variables require improved specification and testing. Besides these effects, while we expected to isolate income-group–specific and regional variation, in the pooled models neither of these dimensions was statistically proven.

Given the limitations of linear and static modeling, and since there is evidence that responses are not necessarily linear and most likely are dynamic, given the policy response lags, in an extension of this paper we will explore panel data methods using both lagged and fixed effects to account for effects that are not contemporaneous but spill over to the next year, and to wipe out country-level characteristics that do not change over time. Causal analysis will require careful identification of the pathways and application of instruments to solve for endogeneity, namely, that the same underlying dynamics that move government health expenditure cycles also affect GDP and GGE cycles.

9. CONCLUSIONS AND FUTURE RESEARCH

Based on the foregoing review of literature and empirical analyses, we conclude and offer some thoughts regarding the limitations of this study, and the macro data and approach in general.

In this paper, we set out to explore the relationship between business cycles and government health expenditures. The analysis in the paper also considers the intermediating channel, the cyclical patterns in fiscal responses. The motivation for the study was twofold.

First, with respect to the policy trigger, the recent global economic crisis has resulted in surprising trends in cyclical responses in health. It has demonstrated that formerly stable and socially sensitive advanced economies can fall back into the procyclical trap. However, the crisis had relatively less impact in developing and emerging economies, and in these cases there are positive examples of graduation from procyclical behavior. Second, with respect to the research aspect, the recent wave of literature, particularly in the fiscal domain, has provided empirical evidence on developing countries escaping the procyclical trap, while some advanced economies have fallen back. Hence, the central question: Do we see the same patterns in the health context?

The objective of the study was to propose a user-friendly diagnostic analysis in this area. This draws on a now publicly available synthetic macro database, the Fiscal Health Database, which was constructed to facilitate research in this field. Since this macro database is open, annually updated, and standardized, it can be used to replicate and update findings. Since the intended target audience of this paper is project teams and policy units in the health sector, the methods were chosen to enable replication and update by noneconomists. Beyond the database, the literature review, the global overview of patterns in cyclical responses in health, and a few descriptive analytic tools that cut across the macro and health sectors, we hope that the paper also catalyzes more country-specific analyses to enable the identification of policy options and responses that help countries cope with crises, specifically in the health domain.

The conclusions draw on a number of methods, including (a) a five-step process to calculate the cyclical correlations between GDP and the two response variables of interest, general government expenditures, and government health expenditures; (b) quadrant analysis to explore how cyclical patterns change over time to gather evidence on graduation from and fall back into procyclical policy making; (c) testing the role of institutional and political risk with respect to cyclical responses; (d) a radar plot approach to increase the dimensions in the analysis that can explain cyclical responses, and apply such radar plots to compare performance for a small set of countries on the selected explanatory dimensions, and track the changes over time; and (e) diagnostic multivariate modeling to create the foundations for more advanced econometric analysis that can provide causal estimates on the drivers of cyclical responses.

9.1 Conclusions

First, in contrast to the recent wave of the literature on fiscal cyclicality, which shows that an increasing share of developing countries have now become countercyclical (Brahmbhatt and Canuto 2012; IMF 2009; Frankel, Végh, and Vuletin 2011), in health expenditures we have no robust evidence to claim that developing countries have been escaping the procyclical trap across the periods 1995–2002 and 2003–10. While there are developing countries (LICs and LMICs) that do engage in countercyclical government health spending, the evidence on increased countercyclical behavior is robust only in the upper-middle-income group. Although government health expenditure patterns during downturns are more predominantly countercyclical at the higher end of the income distribution (HICs), the recent global economic crisis has shown that even advanced economies that have robust social safety nets can fall back into the procyclical

school, especially if the crisis is deep and protracted. Going forward, if slowing growth in HICs couples with structural challenges (for example, demographic pressures) and rigidities of social security systems, this would put increasingly more stress on fiscal and health sector policy makers. With respect to the policy implications of such trends, to avoid negative social consequences, in many countries beyond efficiency gains, structural reforms are required; coordination between the fiscal and social policy camps will become even more important to devise long-term economic development strategies that also take into account sector-specific needs.[68]

Second, we find that cyclicality patterns are more nuanced in the by-country descriptive analyses and, hence, event and case study approaches would be valuable in shedding more light on the drivers of patterns and changes over time. For example, comparing the correlation coefficients for the 16 years of the analysis (1995–2010) with annual statistics on cycles and by countries, we see that aggregates mask significant variation both within country groups and between years; hence, generalizations are not particularly useful.

Third, consistent with earlier findings regarding the asymmetry of cyclicality, at the global and aggregate levels we have weak evidence that cyclical responses during "bad" and "good" times differ. Countercyclical responses are more likely during deep negative output gaps. In the income group breakdown, the averages show countercyclical coefficients between GDP and GGE (general government expenditures) for both high-income countries and middle-income countries. However, the relationship between GDP and GHE (government health expenditures) is only countercyclical for higher-income countries. As to regional variation, we obtain countercyclical correlation coefficients for fiscal policy during negative output gaps in East Asia and Pacific, Latin America and the Caribbean, North America, and South Asia. Yet, only two regions show consistent countercyclical patterns in government health spending during negative output gaps — Europe and Central Asia, and the Middle East and North Africa. These results imply that health sector prioritization, on average during this 16-year period, has not been successful in most regions. However, caution must be exercised when interpreting averages, since these can mask diverse responses over time. And, as a last advisory note, the regional means are un-weighted; hence, the true impact of cyclical policies is not captured with respect to the population-level effects of changes in cyclical policies.

Fourth, results from the radar plot analysis imply that there are a number of dimensions that can help in understanding the variation in country performance in cyclical responses. Among the drivers that were expected to explain the variation in cyclicality, apart from the macrofiscal dimensions, research should drill deeper into social sensitivity, preferences, political economy, and governance. To control for political and institutional risks, which are proved to be relevant determinants of cyclical responses in the fiscal context, we tested the performance of the Inter-Country Risk Guide (ICRG) index. The findings between cyclical responses and political and economic risk, however, are not always intuitive in every income group. While the relationship between cyclical responses and risk rating is negative (that is, higher ICRG, which means lower risk, which is associated with more countercyclical responses) for high- and upper-middle-

68. For example, during the drafting and negotiation of the Memorandum of Understanding for countries that engage in stabilization talks with the Troika, which consists of the European Central Bank, the European Commission, and the International Momentary Fund.

income countries, the relationship for low- and lower-middle-income countries is less clear. This raises concerns regarding the predictive power of the ICRG rating for cyclical responses by governments in the fiscal and health domains. We conclude that decomposing the index and finding the principal components that explain the most variation in cyclical patterns is superior and, hence, should be tested and applied in future research.

Fifth, the results from linear modeling support these findings. From diagnostic runs, we conclude that the impact of business cycles is larger in developing countries than in advanced economies, and that the fiscal pathway is critical in determining government health expenditures. This means that although economic growth trajectories do matter, fiscal response from governments can outweigh or at least attenuate income effects. There are three notable macro effects that make countries more vulnerable in terms of government health expenditures: deterioration in terms of trade and debt-to-GDP ratios for all income groups, and unpredictable ODA in developing countries. With respect to political economy, governance, and risk — since neither proxy variables performed as expected — these variables require improved specification and testing.

Finally, with respect to applicability and policy implications, we noted the methodological limitations of descriptive approaches and, thus, conclude that advanced multivariate panel data analysis is essential to understand the role and weight of the various dimensions in shaping cyclical responses. We proposed that descriptive diagnostic tools, such as the tools for cyclicality analysis presented here and the global tool developed for health system vulnerability assessment (Velenyi, Yazbeck, and Smitz 2013) could be applied so that policy makers and practitioners are equipped with information on the macrofiscal aspects of the possibility frontier and not only on system capacity and constraints. This would help in developing resilience to shocks through sectoral as well as fiscal channels. One important objective of basic diagnostic assessment would be to inform discussions on the binding constraints to countercyclical health spending during negative output gaps, to understand whether the main constraints lie within the sector or in fiscal behavior. This could then inform policy options. For example, if the binding constraint is found to be procyclical fiscal policy, then the government could improve fiscal accountability and transparency to benefit the health sector. The application of standardized tools — applied in country briefs and region overviews — would facilitate comparative efforts by drawing on a common framework, measures, and definitions.

9.2. LIMITATIONS AND FUTURE RESEARCH

Among the limitations, we discussed concerns regarding data. Specifically, given that the paper is based on a macro dataset that merges various sources, consistent with the findings by other empirical researchers in this area, the main problems are consistency of variables across sources, missing data, and continued availability and management of data to maintain an open database.

Because of data consistency, reliability, and frequency issues, country-specific applied analyses and country briefs would be a welcome complement and validation to some of the broad brushstroke–type stylized facts.

Finally, applying descriptive analysis is not sufficiently robust and compelling to convince the macro camp and economists in general; hence, the health camp must advance its methods in this area. To start addressing these limitations, in an extended and upgraded version of this paper, we

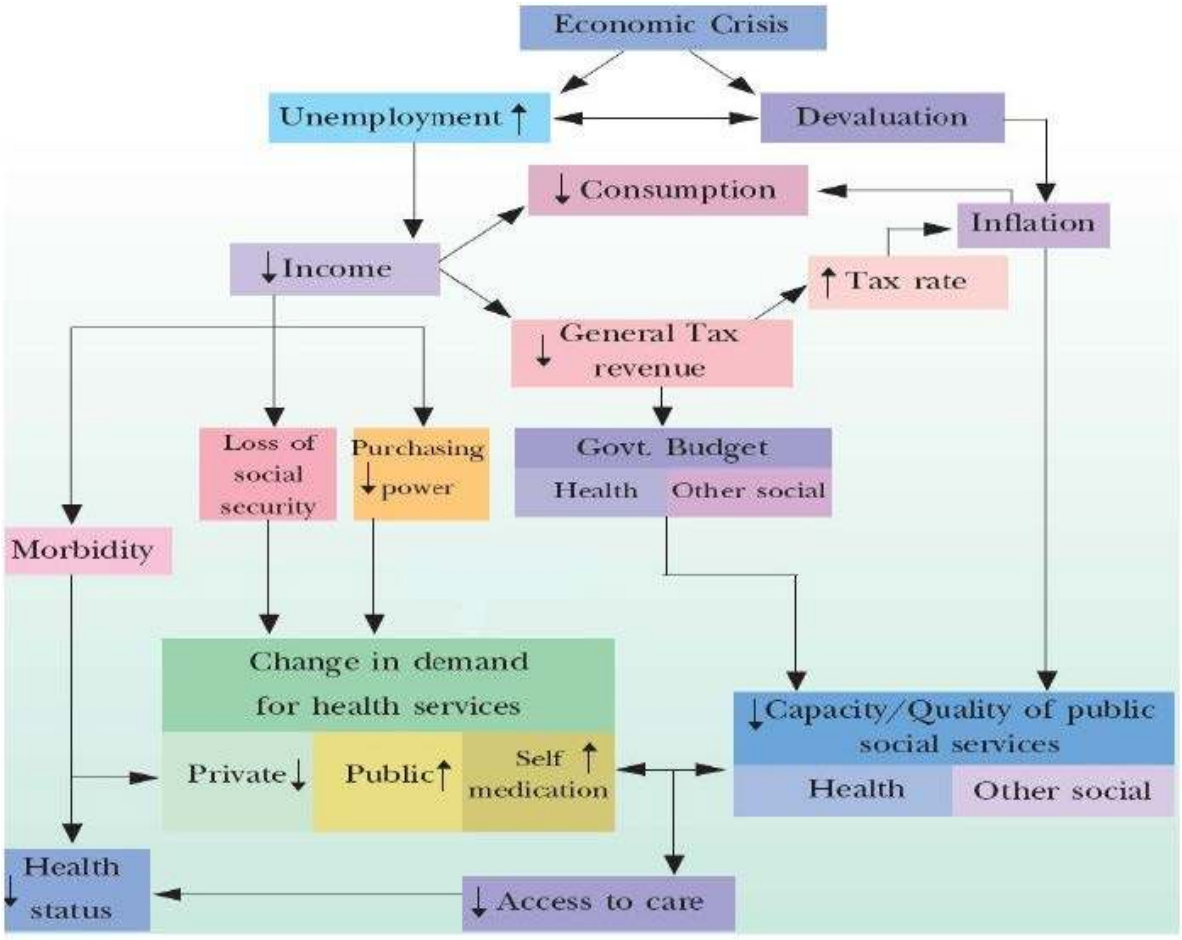
pursue econometric analysis to control for observable and unobservable characteristics that are expected to explain the variation in cyclical responses, and aim to obtain estimates that can be interpreted in a causal manner.

For future research, publicly available, annually updated, standardized, and reliable data; cross-country empirical modeling using such macro data, possibly for longer time frames; and event analyses that use more qualitative country and policy context and fine-grained data are essential to the evidence base evolving in this area.

ANNEXES

ANNEX 1: CRISIS PATHWAYS

Figure 1A.1 Pathways between Crises and Health



Source: Musgrove 1987.

ANNEX 2: PUBLIC AND PRIVATE EXPENDITURES ON HEALTH BY INCOME GROUP, 1995–2010

To complement the overview in the text (section 5.2), this annex presents more discussion and graphic illustration[69] of the cursory analysis of public and private health expenditure trends during 1995–2010 by income group.

(1) Responses in public and private health expenditures at the peak of the crisis

As text table 1.1 and figures 2A.1–2A.4 (below) show, in 2009, during the peak year of the current global economic crisis, in all income groups the growth rate of real per capita public expenditure on health was higher than the growth in real per capita private expenditures. This signals the presence of automatic stabilization in the health sector at every level of economic development, although to varying degrees.

As one example, in 2009, when the group average of GDP growth for low-income countries was down to 1.2 percent (see the first column in table 1 and the blue line in figures 2A.1–2A.4), the average growth rate of real per capita public expenditures on health was 7 percent, and the real per capita private expenditure growth rate was approximately 3 percent (red line in the graphs). Based on the real expenditure values (green line in the graphs), the group averages of the shares of public and private expenditures on health in low-income countries were, respectively, 72 and 28 percent. This proportion suggests that — particularly in a global overview study such as this — exploring the cyclical responses of government health financing is relevant even in the low-income context, where the public share is the smallest compared to other groups. Nonetheless, given the variation in public expenditure shares within income groups, country-specific event analyses can shed more light on the specific effects of a crisis on health care financing; hence, such explorations are encouraged in future research.

(2) Lagged responses in public and private health expenditures

In contrast with the sharp increases in the growth rates of public and private expenditures in 2009, at the peak of the crisis, in 2010, there was a decline in the growth of health expenditures, both public and private. In the case of low-income countries, this led to a reduction in real per capita total expenditures on health between 2009 and 2010, from US$81 to US$78.

There are some well-known forces in play that typically explain the changes in private health expenditures during shocks, although these are merely speculative in our context given the aggregate level of the data. The decline in the growth rate of private health expenditures (and in real terms in all income groups except the higher-income countries) can be due to households switching to the public sector given that care becomes relatively cheaper[70] there. The price differential is particularly important during downturns, when many households have reduced income due to loss of employment or employment with lower wages.

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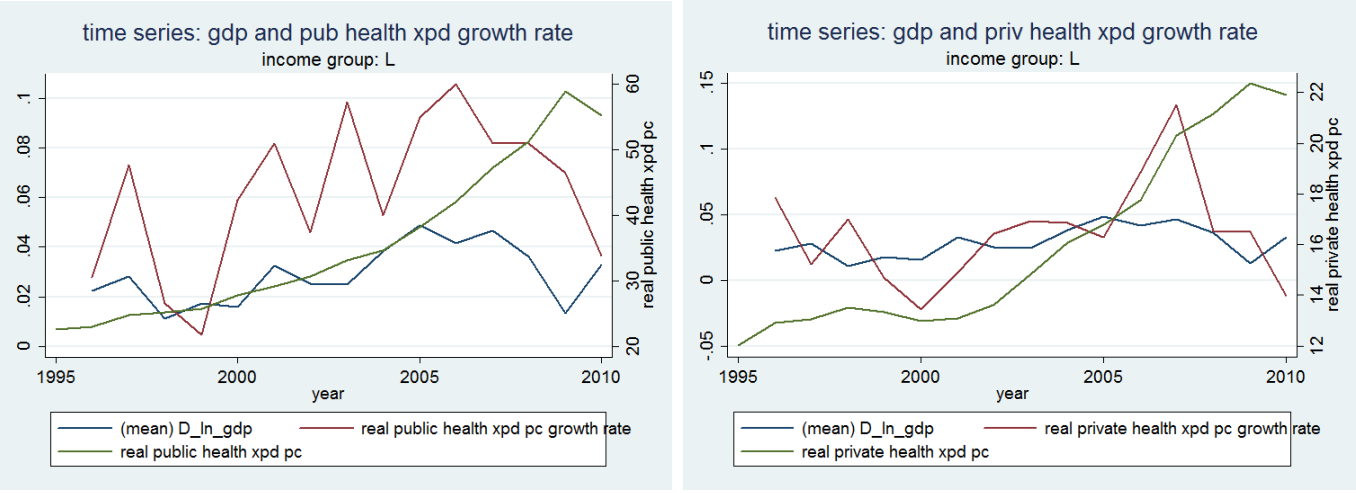
69. The figures are presented by public and private breakdown for each income group. The variables in the graphs on government expenditures on health include GDP growth rate, government health expenditure growth rate, and per capita government health expenditure in constant international dollars. For the graphs on private health expenditures the variables are GDP growth rate, private health expenditure growth rate, and per capita private health expenditure in international dollars.

70. This assumes that there are no under-the-table payments, or at least that these are below what would be paid in the private sector, and that waiting times do not significantly increase, maintaining the shadow price of opportunity cost constant.

72. The *Fiscal Health Database* was compiled by Aaka Pande and Marc Smitz with input from Cesar Calderon, John Langenbrunner, Adam Leive, Ece Ozcelik, and Edit V. Velenyi.

Regarding the pattern of public expenditures on health, growth rates in all income groups are reduced in 2010. In fact, countries in the high-income group engage in downward adjustment of health care budgets, on average, leading to a reduction of 2.4 percent. The downward adjustment of health sector budgets has been a hotly debated topic in the context of Europe. For example, both policy overview papers (for example, WHO 2013) and case studies on countries hard-hit by the global economic crisis, such as Greece (Yfantopoulos 2013), Ireland (Burke, Barry, and Thomas 2013), and Portugal (Barros 2013), discuss the health care financing, system, and population-level implications of the recent crisis and related mitigation efforts (see more in box 1.7, which draws on chapter 5 in Hou et al. 2013).

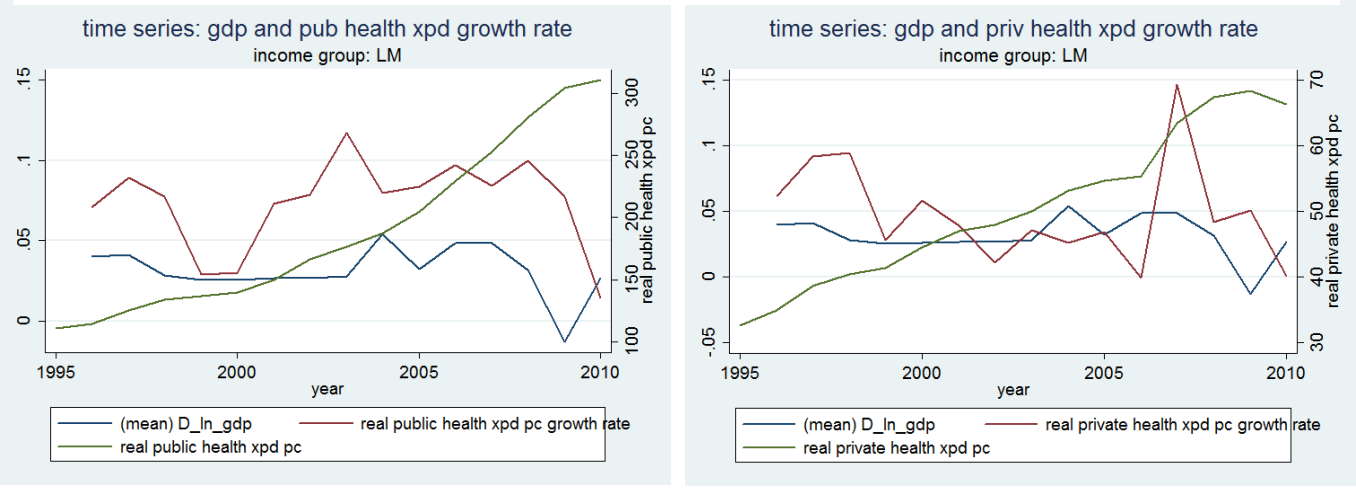
Figure 2A.1 GDP Growth Rate and Public and Private Health Expenditures (Per Capita and Real Growth) for LICs, 1995–2010



Panel A **Panel B**

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 2A.2 GDP Growth Rate and Public and Private Health Expenditures (Per Capita and Real Growth) for LMICs, 1995–2010



Panel A **Panel B**

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 2A.3 GDP Growth Rate and Public and Private Health Expenditures (Per Capita and Real Growth) for UMICs, 1995–2010

Panel A **Panel B**

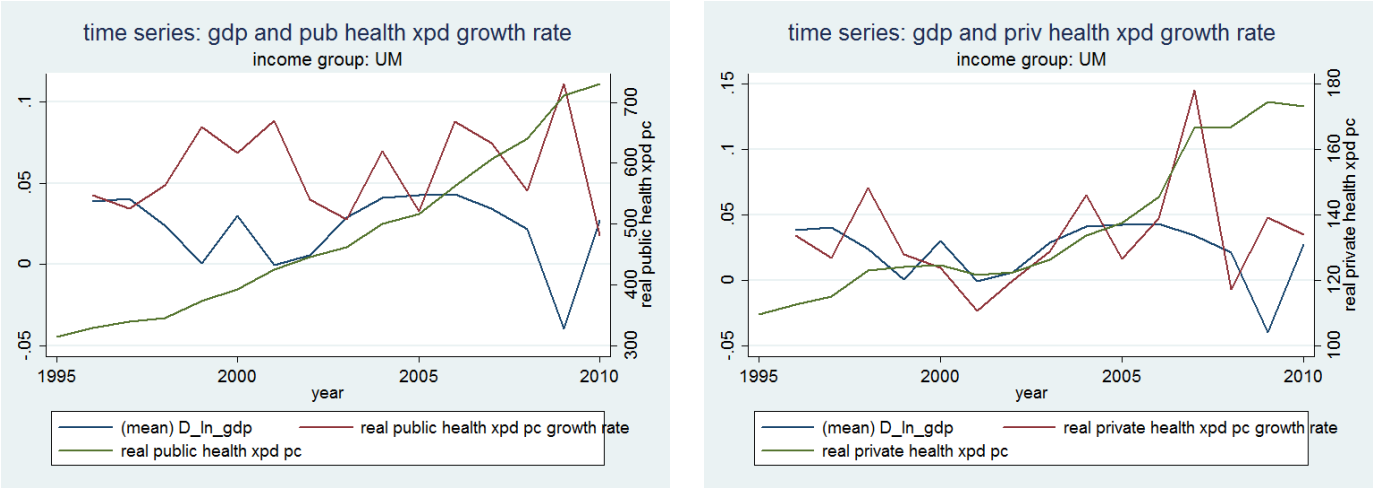
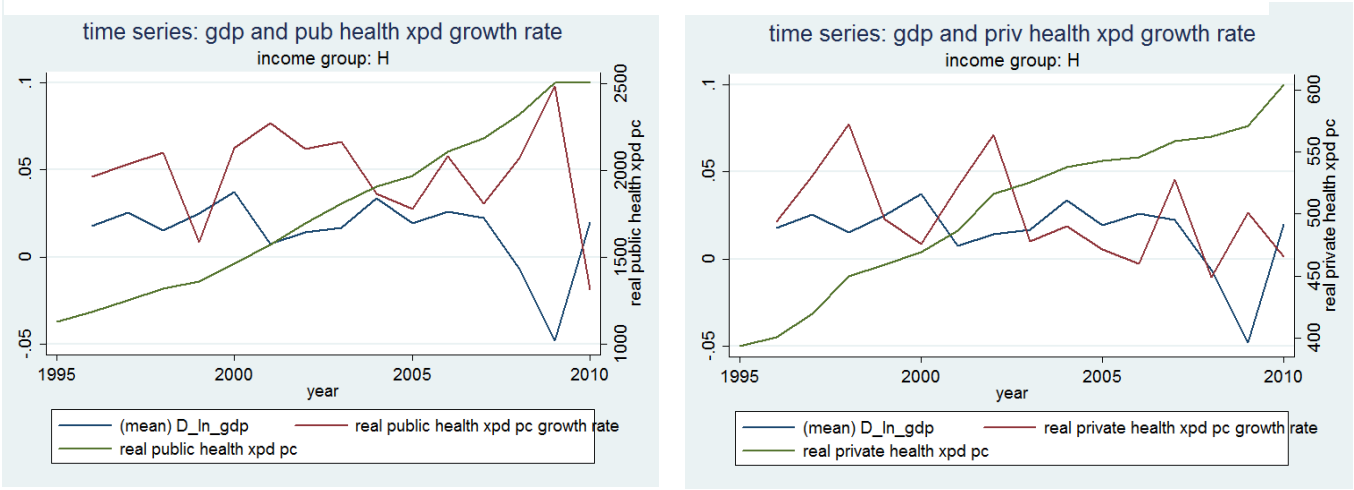


Figure 2A.4 GDP Growth Rate and Public and Private Health Expenditures (Per Capita and Real Growth) for HICs, 1995–2010



Panel A **Panel B**

Source: Authors' calculations based on data from the Fiscal Health Database 2012

ANNEX 3: THE FISCAL HEALTH DATABASE

The *Fiscal Health Database*[71] is a macro panel database containing information on 193 countries for 2,500 variables related to macroeconomics and fiscal space. The data are organized by country (using the World Bank's three-letter code nomenclature) and year, and include all data available on publicly available databases as of November 1, 2012. It was created to assist with empirical analyses linked to the Health Sector Fiscal Capacity and Sustainability Economic and Sector Work.

The database combines information from seven publicly available databases that have country-level data on a broad range of determinants of health spending including revenues, health outcomes, development outcomes, equity outcomes, political climate, and labor force participation.

Table 3A.1 Overview of the Fiscal Health Database

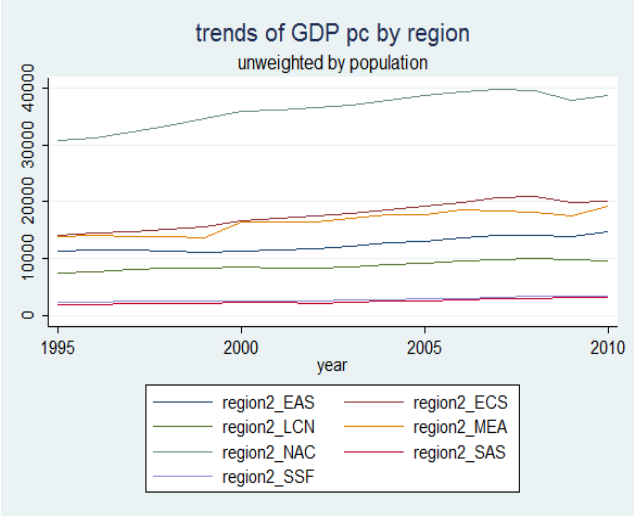
Number of Variables		*2,581*		
Number of Observations		*14, 684*	Time Horizon	
Organization	**Data Set**	**Type of Data**	**Year Start**	**Year End**
1. World Health Organization	WHO NHA	Health expenditure, services	1995	2011
2. World Bank	HNP Stats	Health outcomes, equity outcomes	1990	2009
3. World Bank	World Development Indicators (WDI)	Health outcomes	1960	2011
4. World Bank	Health Equity & Financial Protection (HEFPro)	Health outcomes data by income quintiles	1995	2010
5. International Monetary Fund	World Economic Outlook (WEO)	Revenue data	1980	2017
6. International Labour Organization	LaborStats	Labor force participation	1990	2020
7. Polity Project	Polity Project	Political regime	1950	2010

Source: *World Bank 2012*

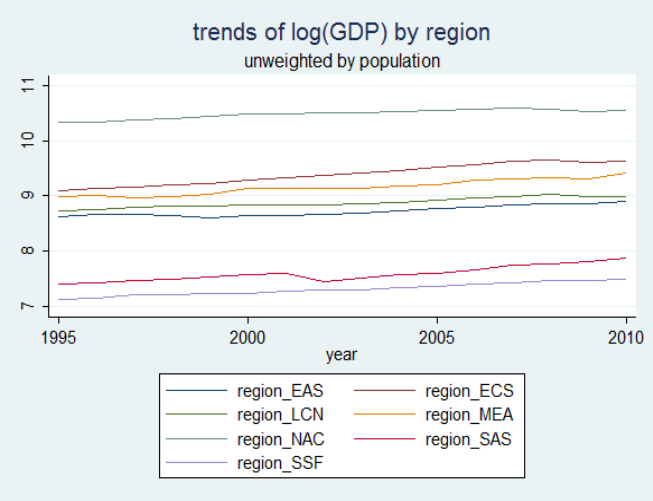
ANNEX 4: TRENDS FOR LOG TRANSFORMED SERIES

Figure 4A.1 Trends for GDP Per Capita in Constant International Dollars 2005 and Log GDP by Region, 1995–2010

Panel A



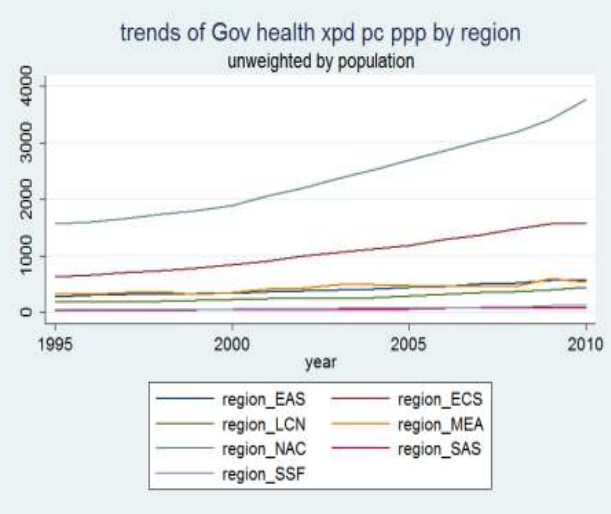
Panel B



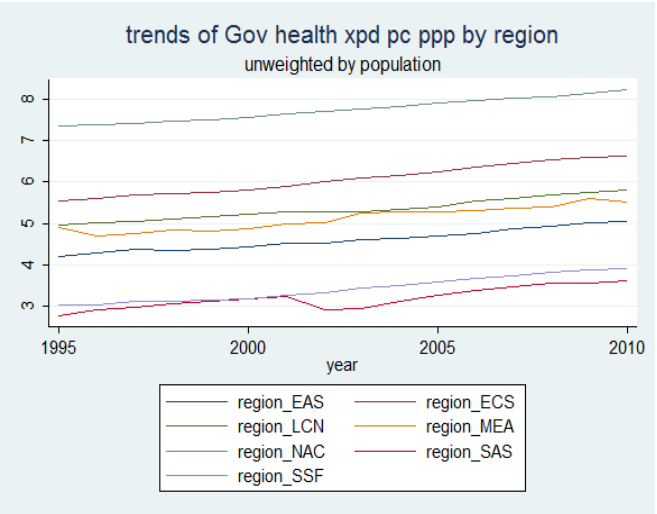
Source: Authors, based on data from the Fiscal Health Database 2012

Figure 4A.2 Trends for GHE Per Capita and Log GHE by Region, 1995–2010

Panel A



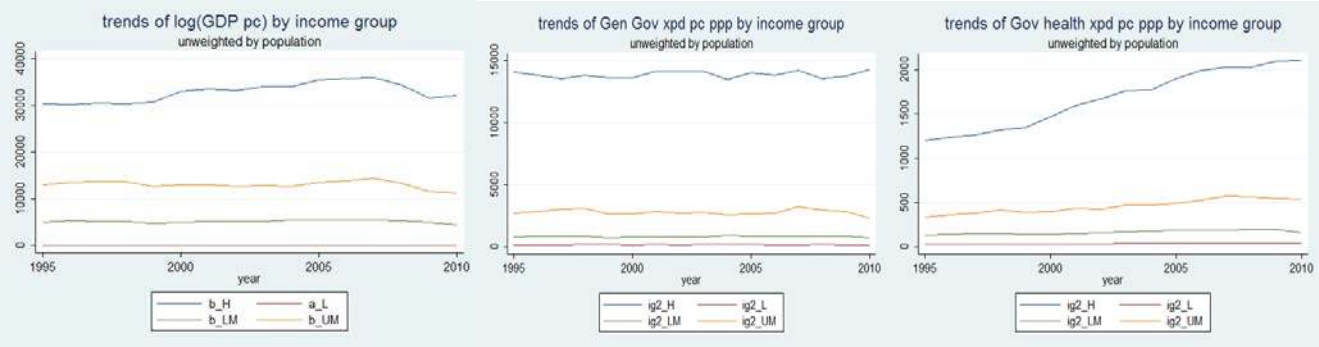
Panel B



Source: Authors, based on data from the Fiscal Health Database 2012

Figure 4A.3 Trends for GDP, GGE, and GHE Per Capita by Income Group, 1995–2010

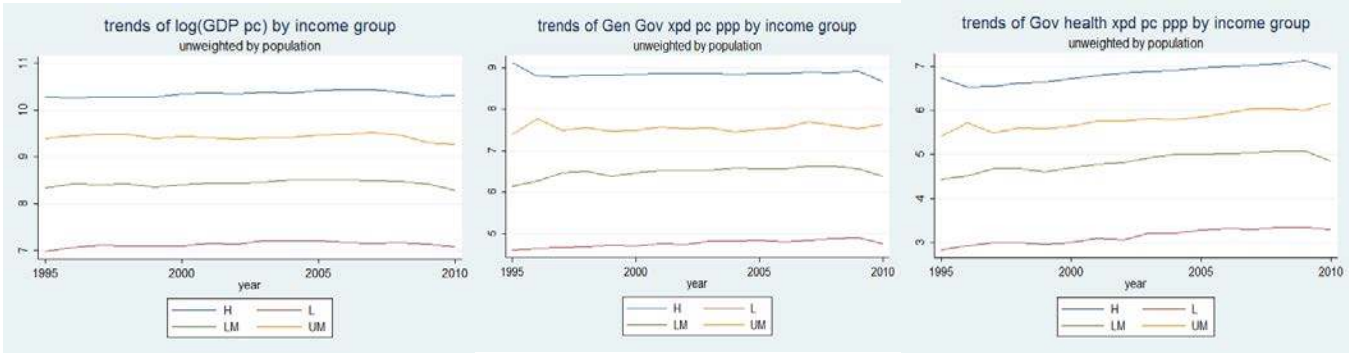
Panel A **Panel B** **Panel C**



Source: Authors, based on data from the Fiscal Health Database 2012

Figure 4A.4 Trends for Log GDP, GGE, and GHE Per Capita by Income Group, 1995–2010

Panel A **Panel B** **Panel C**



Source: Authors, based on data from the Fiscal Health Database 2012

ANNEX 5: CYCLICAL COMPONENTS

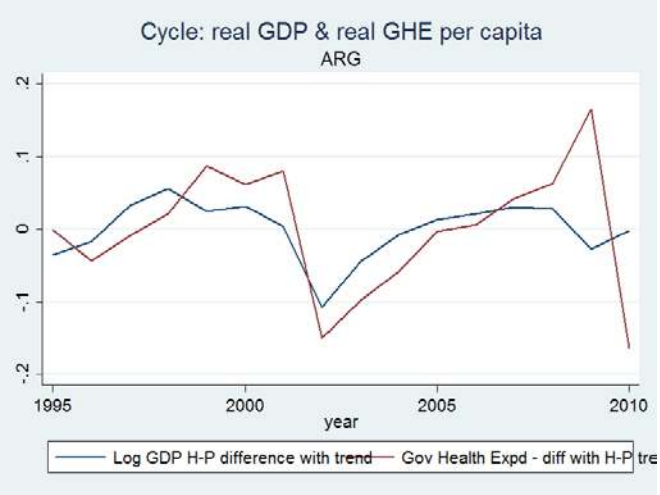
Table 5A.1 Cyclical Component of GDP Per Capita by Region and for OECD and Non-OECD Countries, 1995–2010

Region	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EAS	-0.007	0.012	0.013	-0.012	-0.005	0.009	-0.008	-0.010	-0.008	0.002	0.003	0.005	0.017	0.008	-0.020	0.002
ECS	0.002	0.000	0.003	0.003	-0.008	0.002	0.000	-0.007	-0.011	-0.005	-0.004	0.005	0.030	0.035	-0.028	-0.017
LCN	-0.006	-0.006	0.008	0.012	0.005	0.009	-0.005	-0.017	-0.016	-0.008	-0.003	0.012	0.018	0.024	-0.018	-0.010
MEA	-0.003	0.002	-0.008	0.008	0.008	0.013	-0.003	-0.013	-0.023	0.008	0.007	0.004	0.003	0.009	-0.008	-0.002
NAC	0.005	-0.008	-0.006	-0.005	0.007	0.016	-0.001	-0.006	-0.011	-0.005	0.002	0.010	0.016	0.010	-0.026	0.001
SAS	-0.003	0.002	0.002	0.001	0.004	0.007	-0.003	-0.014	-0.001	0.002	-0.011	0.002	0.017	0.004	-0.005	-0.004
SSF	-0.010	-0.005	0.018	0.009	0.000	-0.010	0.002	0.001	-0.013	-0.006	0.000	0.004	0.010	0.009	-0.008	-0.003
Global	**-0.003**	**0.000**	**0.004**	**0.002**	**0.002**	**0.007**	**-0.003**	**-0.009**	**-0.012**	**-0.002**	**-0.001**	**0.006**	**0.016**	**0.014**	**-0.016**	**-0.005**
Non-OECD	-0.005	0.000	0.009	0.005	-0.001	0.001	-0.003	-0.009	-0.013	-0.002	0.000	0.005	0.015	0.017	-0.014	-0.007
OECD	-0.001	-0.003	0.003	0.000	-0.002	0.011	0.001	-0.006	-0.013	-0.007	-0.004	0.009	0.026	0.021	-0.028	-0.007

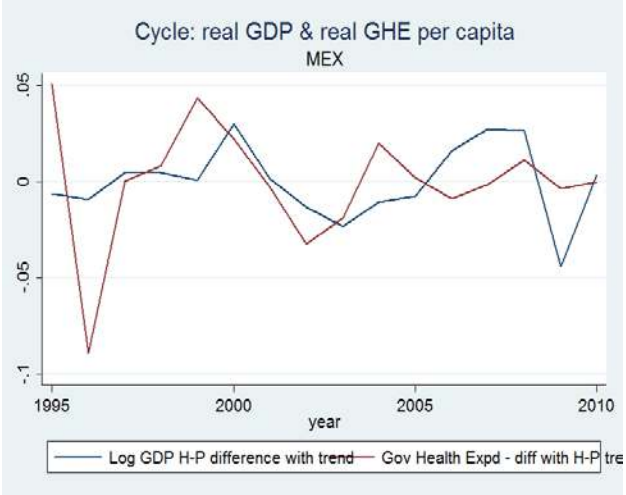
Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 5A.1 Cycles of GDP and GHE for Argentina and Mexico — Country Examples for Latin America

Panel A



Panel B

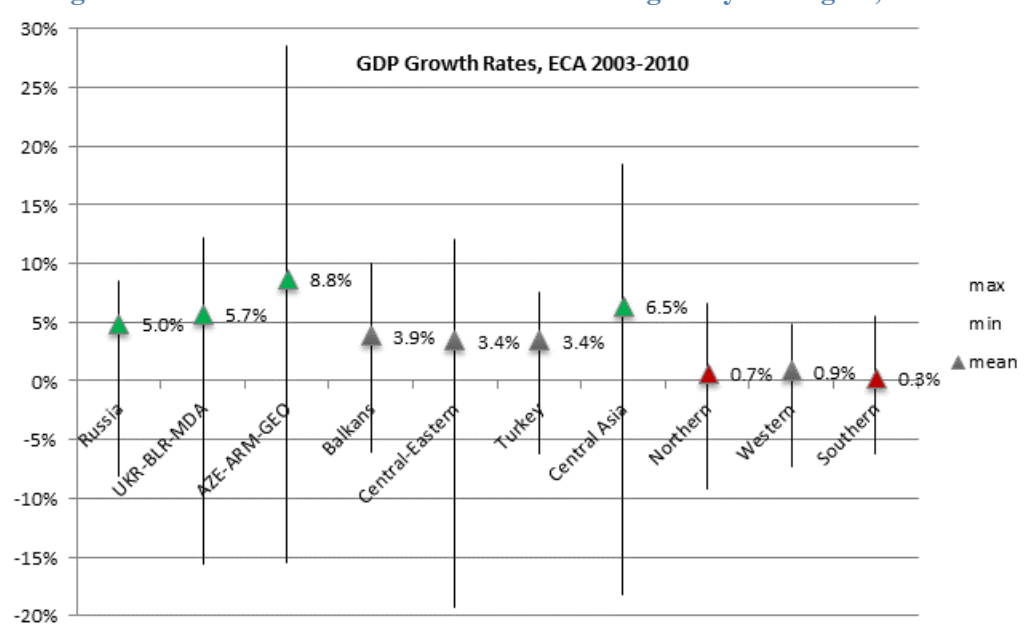


Source: Authors, based on data from the Fiscal Health Database 2012

ANNEX 6: EFFECTS OF THE GLOBAL ECONOMIC CRISIS ON EUROPE AND CENTRAL ASIA

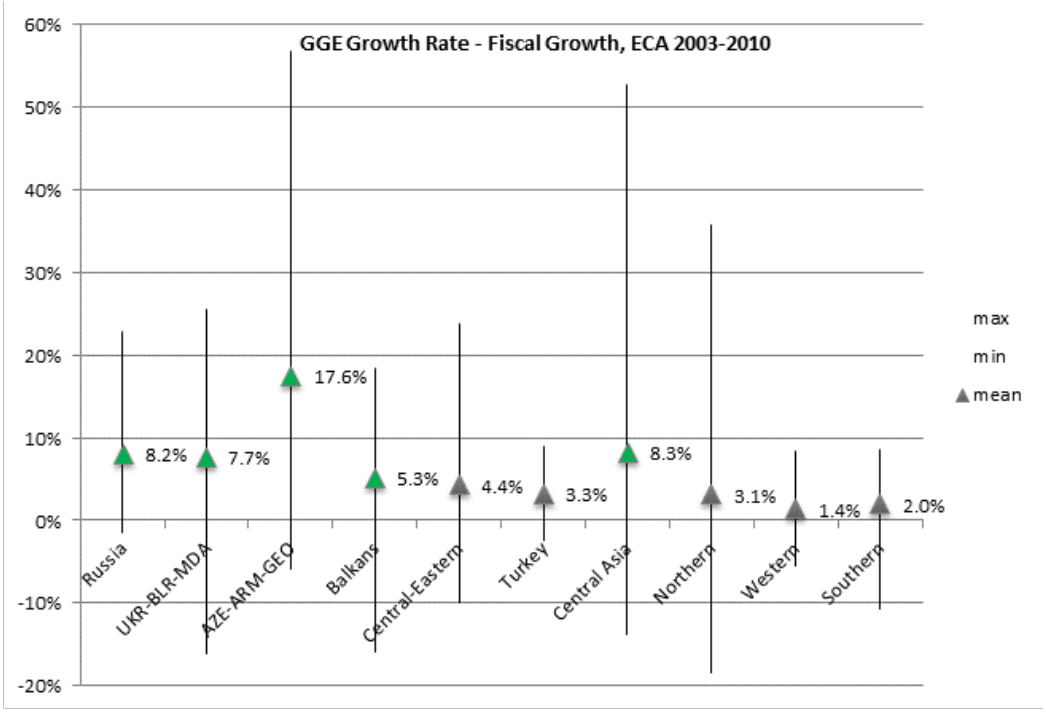
A. Effects of the Global Economic Crisis on Europe and Central Asia, 2003–10 Average

Figure 6A.1 GDP Growth Rates for the ECA Region by Subregion, 2003–10



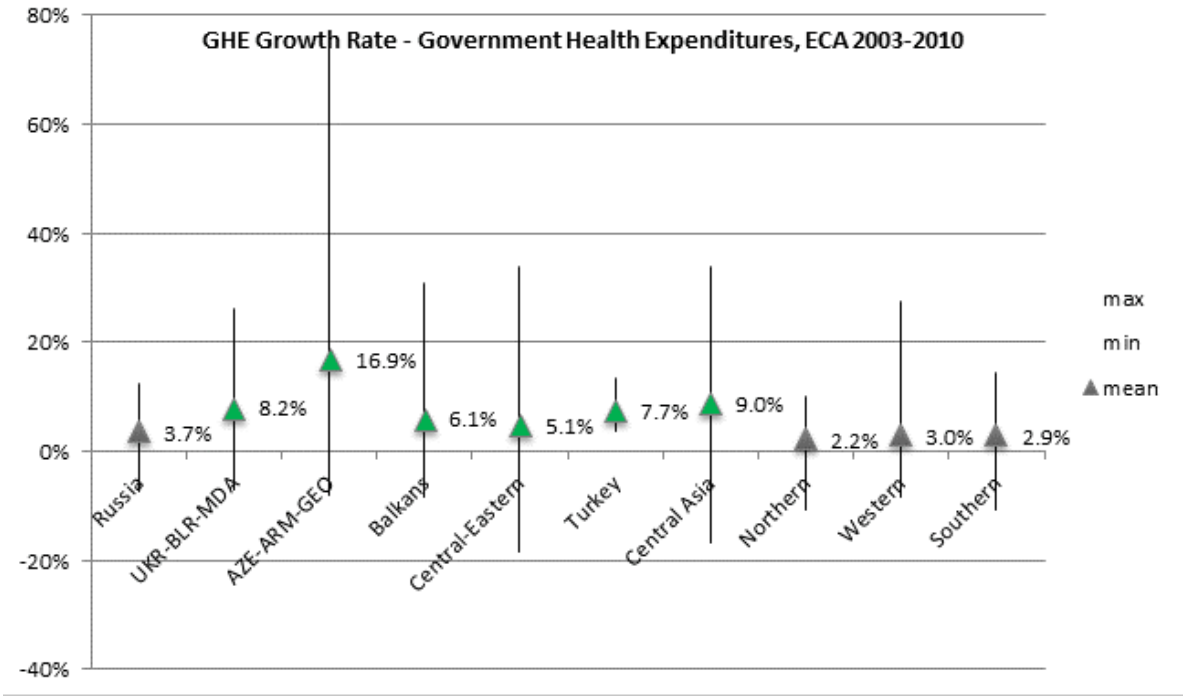
Source: Authors, based on data from the Fiscal Health Database 2012

Figure 6A.2 General Government Expenditure (GGE) Growth Rates for the ECA Region by Subregion, 2003–10



Source: Authors, based on data from the Fiscal Health Database 2012

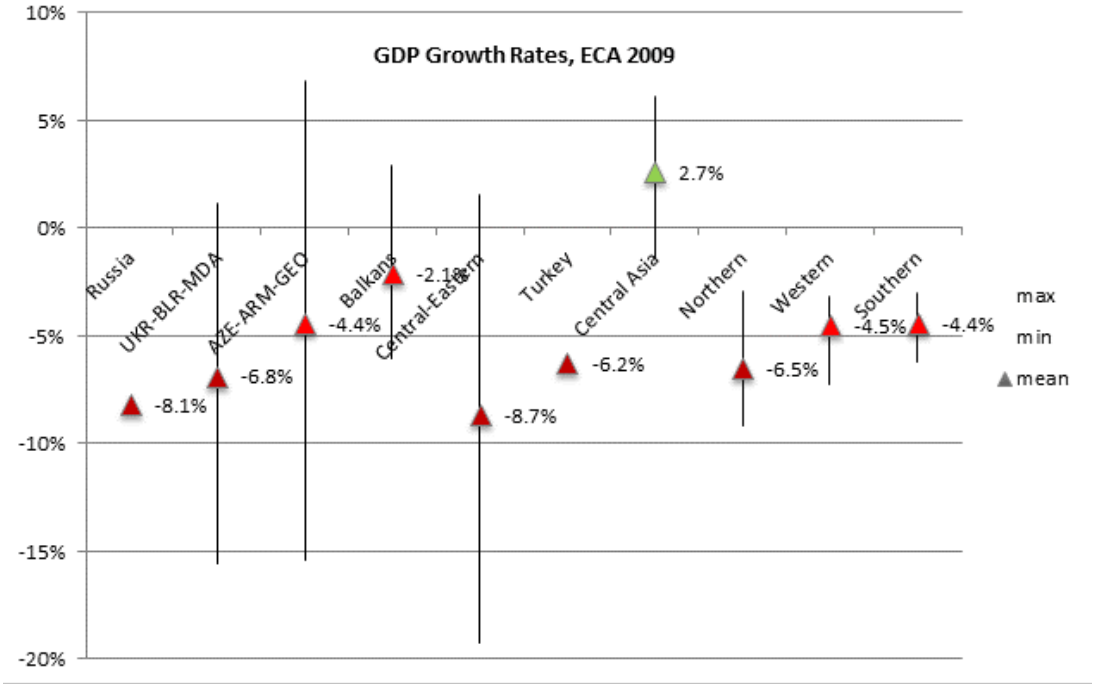
Figure 6A.3 Government Health Expenditure (GHE) Growth Rates for the ECA Region by Subregion, 2003–10



Source: Authors, based on data from the Fiscal Health Database 2012

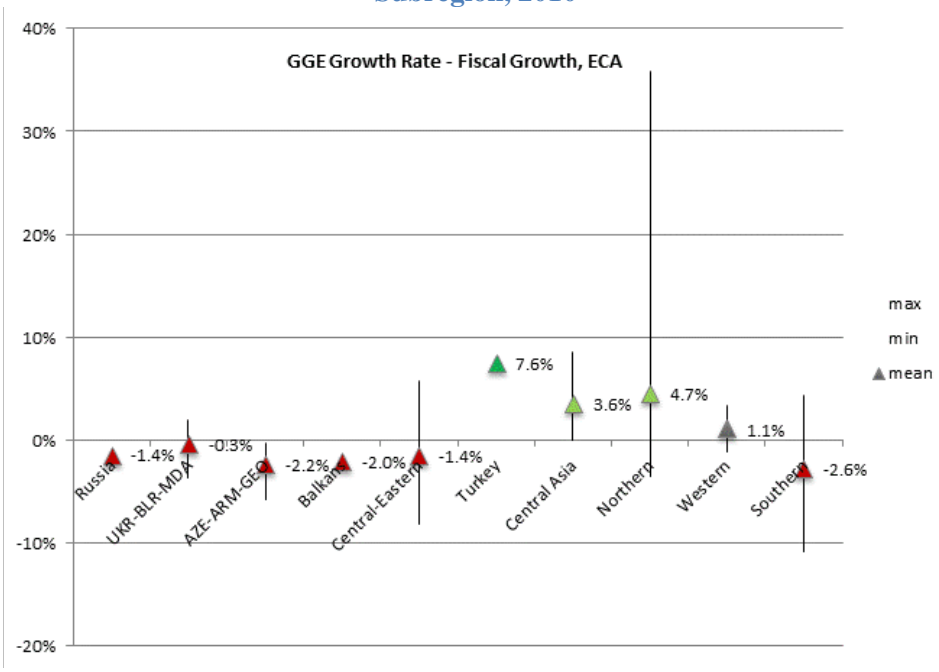
B. Effects of the Global Economic Crisis on Europe and Central Asia — Peak of the Crisis

Figure 6A.4 GDP Growth Rates for the ECA Region by Subregion, 2009



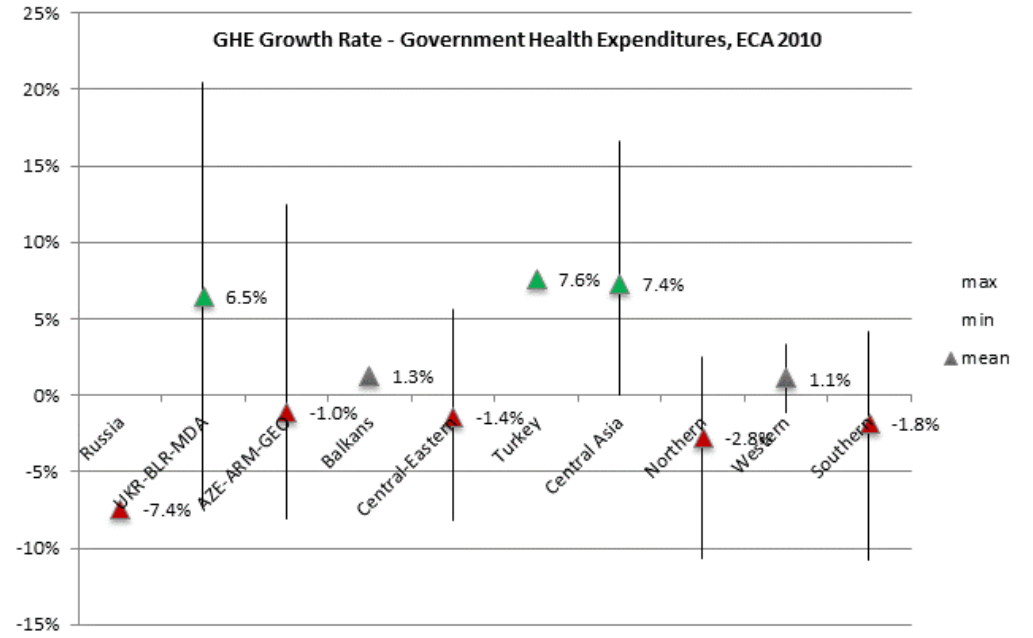
Source: Authors, based on data from the Fiscal Health Database 2012

Figure 6A.5 General Government Expenditure (GGE) Growth Rates for the ECA Region by Subregion, 2010



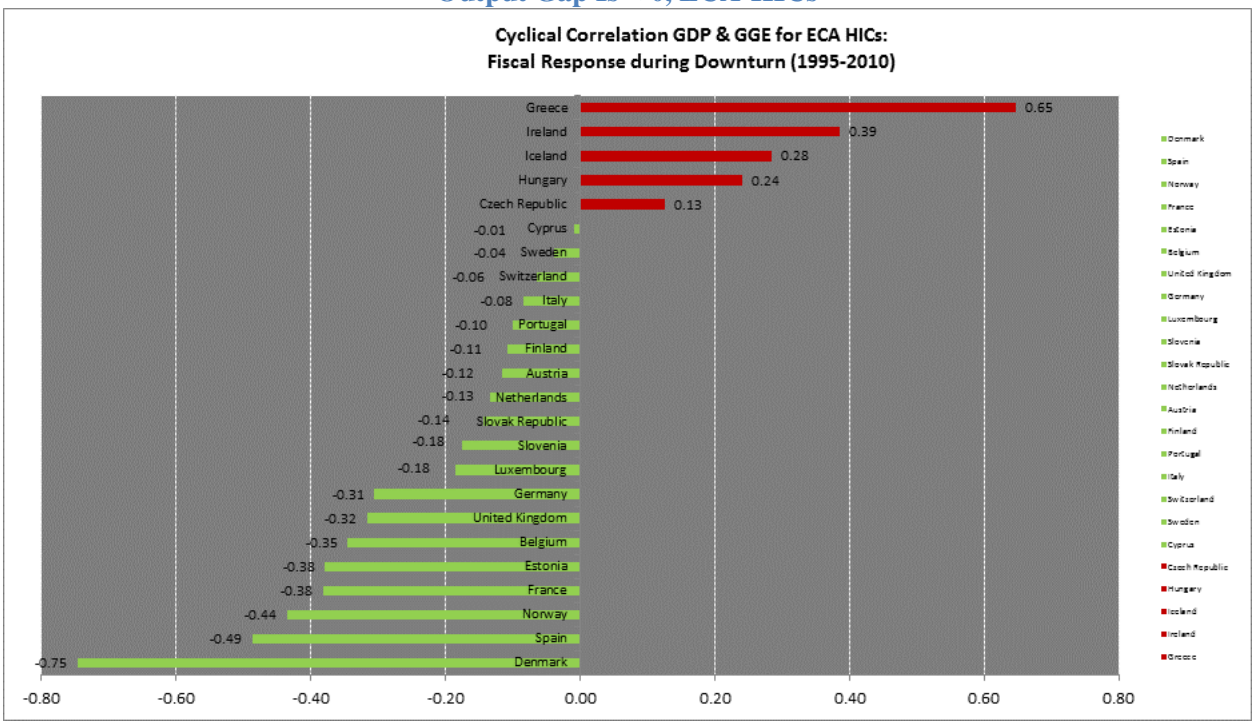
Source: Authors, based on data from the Fiscal Health Database 2012

Figure 6A.6 Government Health Expenditure (GHE) Growth Rates for the ECA Region by Subregion, 2010



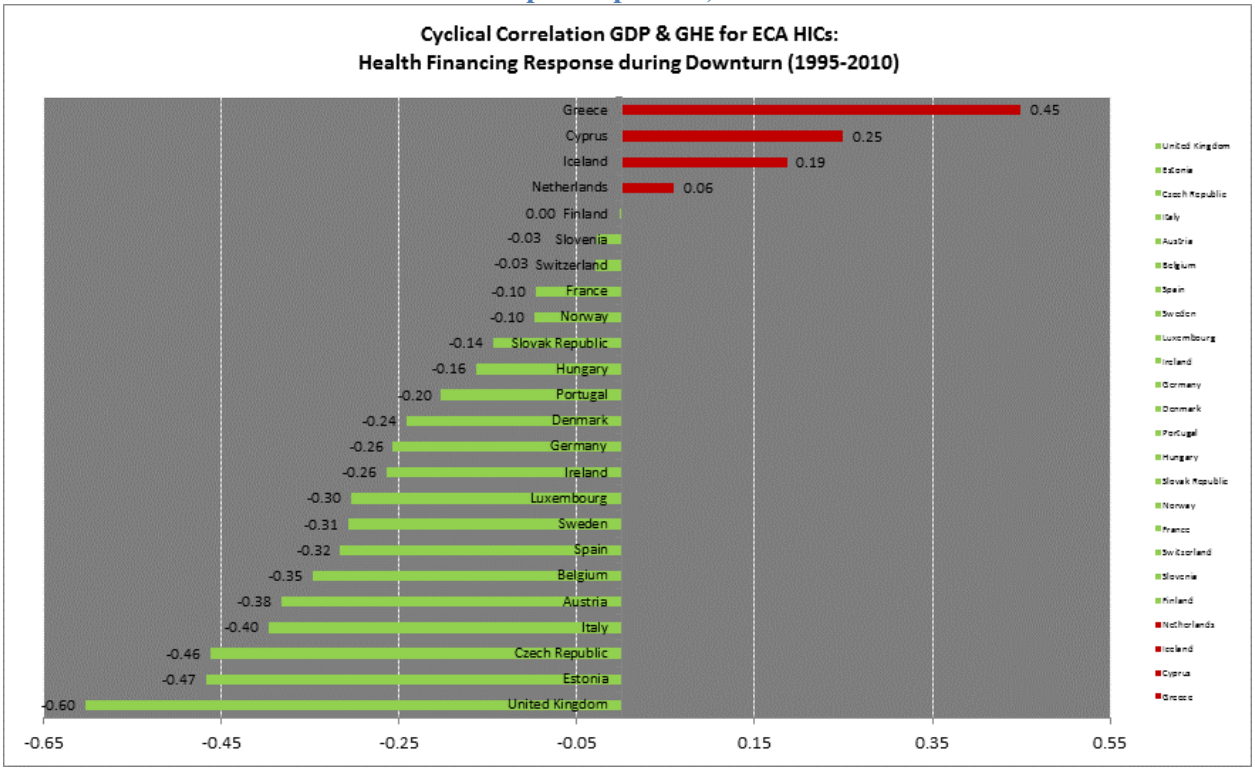
Source: Authors, based on data from the Fiscal Health Database 2012

Figure 6A.7 Fiscal Response during Downturn — Cyclical Correlation for GDP-GGE When Output Gap Is < 0, ECA-HICs



Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 6A.8 Health Financing Response During Downturn — Cyclical Correlation for GDP-GHE When Output Gap Is < 0, ECA-HICs



Source: Authors' calculations based on data from the Fiscal Health Database 2012

C: Effects of the Global Economic Crisis on Europe and Central Asia – Mitigation Options

Table 6A.1 Mitigation Policy Options Corresponding to the Vulnerability Assessment Framework

External factors	System-level factors	Household-level factors
CORRESPONDING POLICY RESPONSES		
1. ***Fiscal responses: maintaining public funding for the health system*** a. Raising contributions and broadening the revenue base b. Increasing transfers from government budgets c. Automatic stabilizers: reserves and countercyclical formulas d. Introducing new taxes (including sin taxes) ***2. Demography*** a. Changing cutoff age for pension (affects revenue base and social expenditures)	***1. Health system financing*** a. Increasing user charges b. Greater role for voluntary insurance c. Targeting to protect people with low incomes d. Implications for adequacy, stability, and equity ***2. Health coverage*** a. Reducing population coverage ("breadth" of coverage) b. Streamlining the benefits package ("scope" of coverage) ***3. Savings and structural changes*** a. Adapting more efficient provider payment systems b. Strengthening pharmaceutical policy c. Strengthening primary care access d. Restructuring or reorganizing the health system e. Cost-effective investments in health goods, services, technologies — more use of Health Technology Assessment for improved and evidence-based decisions	1. Impact on access and equity of access 2. Effect on health care expenditures; progressivity and equity of health expenditures 3. Improving population health and inducing behavioral change

Source: Authors based on WHO 2013 and Velenyi, Yazbeck, and Smitz 2013

Note: This table combines the health system vulnerability assessment framework proposed by Velenyi, Yazbeck, and Smitz (2013) with observed policy responses that were documented, based on key informant interviews and surveys conducted by the WHO. The mitigation options are discussed in detail in an overview paper prepared by the WHO (2013) as background material for the conference "Health Systems in Times of Global Economic Crisis: An Update of the Situation in the WHO European Region." The table includes minor modifications.

ANNEX 7: CYCLICAL RESPONSES IN GOVERNMENT HEALTH EXPENDITURES AND GOVERNMENT EXPENDITURES, 1995–2002, 2003–10 BY INCOME GROUP

A. Cyclical Responses in Government Health Expenditures, 1995–2002, 2003–10 by Income Group

Figure 7A.1 Performance Quadrants for Cyclical Responses in GHE between 1995–2002 and 2003–10 for LMICs

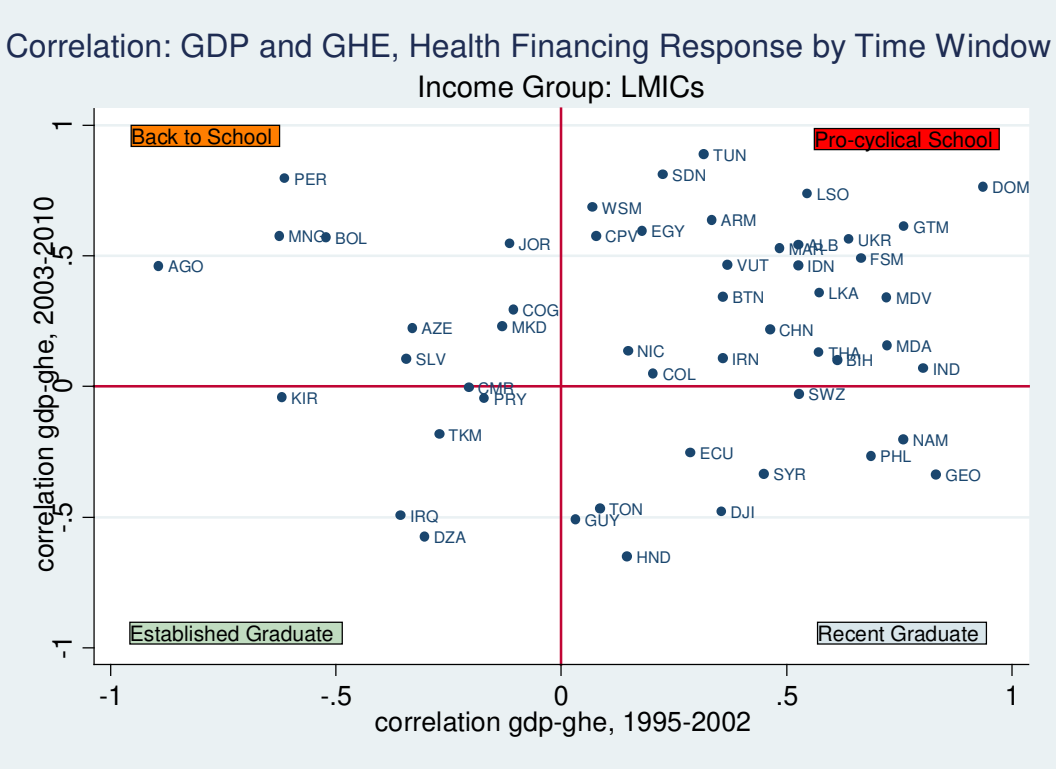


Figure 7A.2 Performance Quadrants for Cyclical Responses in GHE between 1995–2002 and 2003–10 for UMICs

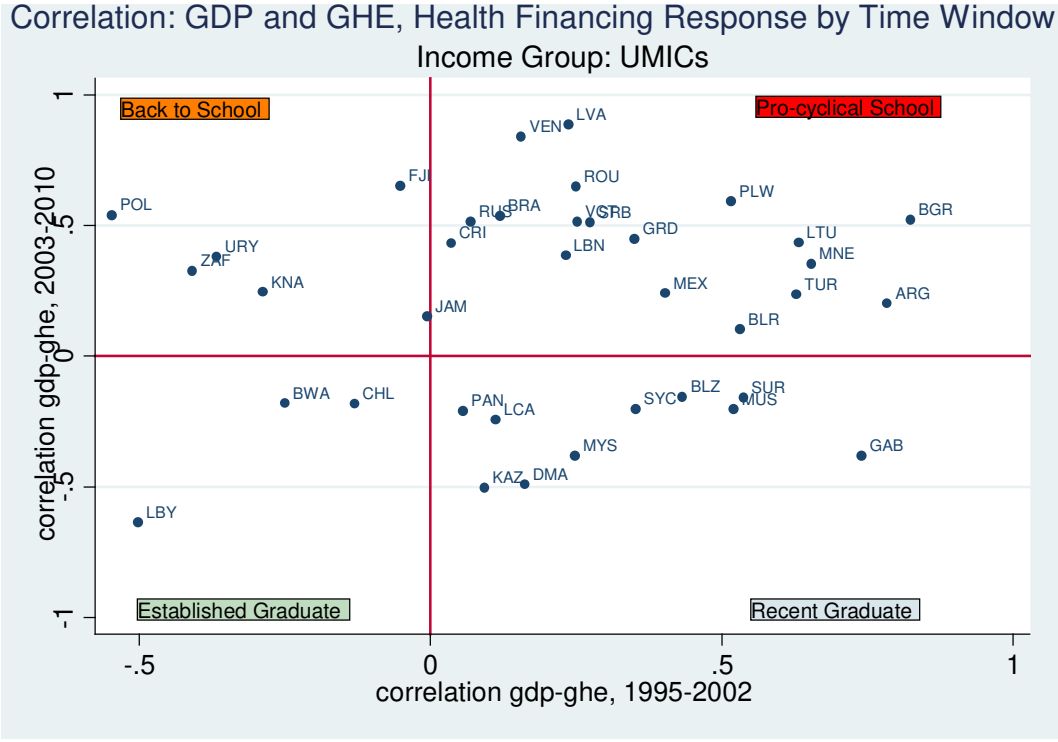
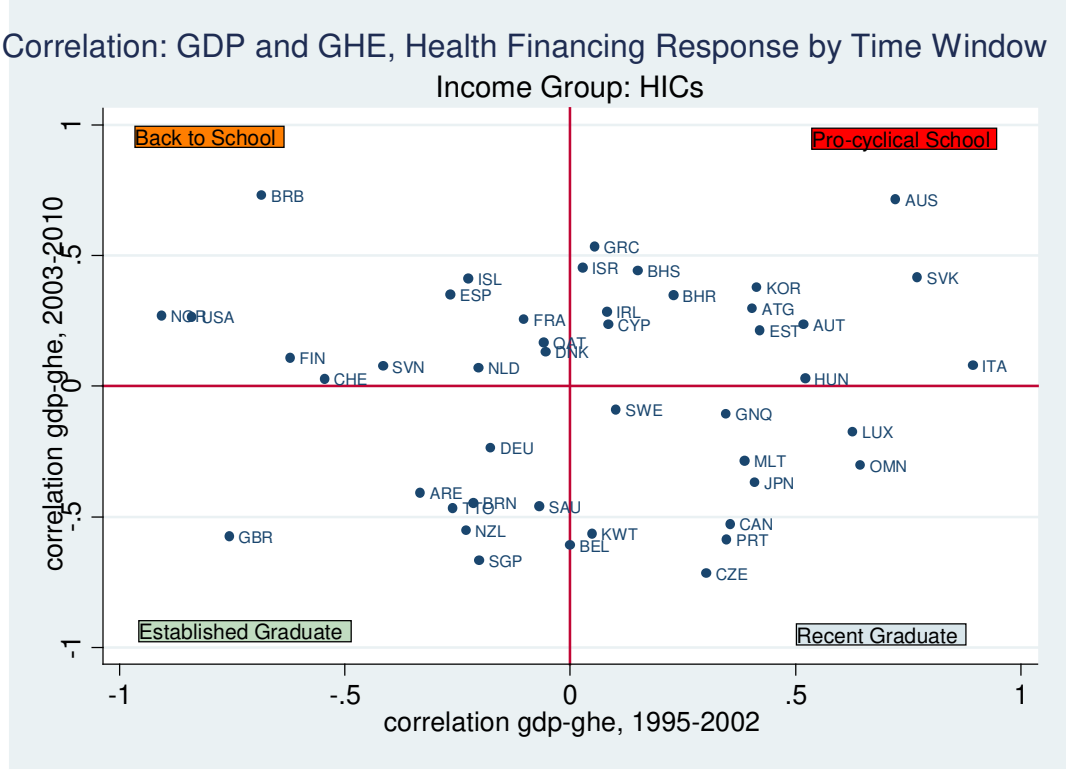


Figure 7A.3 Performance Quadrants for Cyclical Responses in GHE between 1995–2002 and 2003–10 for HICs



B. Cyclical Responses in Government Expenditures, 1995–2002, 2003–10 by Income Group

Figure 7A.4 Performance Quadrants for Cyclical Responses in GGE between 1995–2002 and 2003–10 for LICs

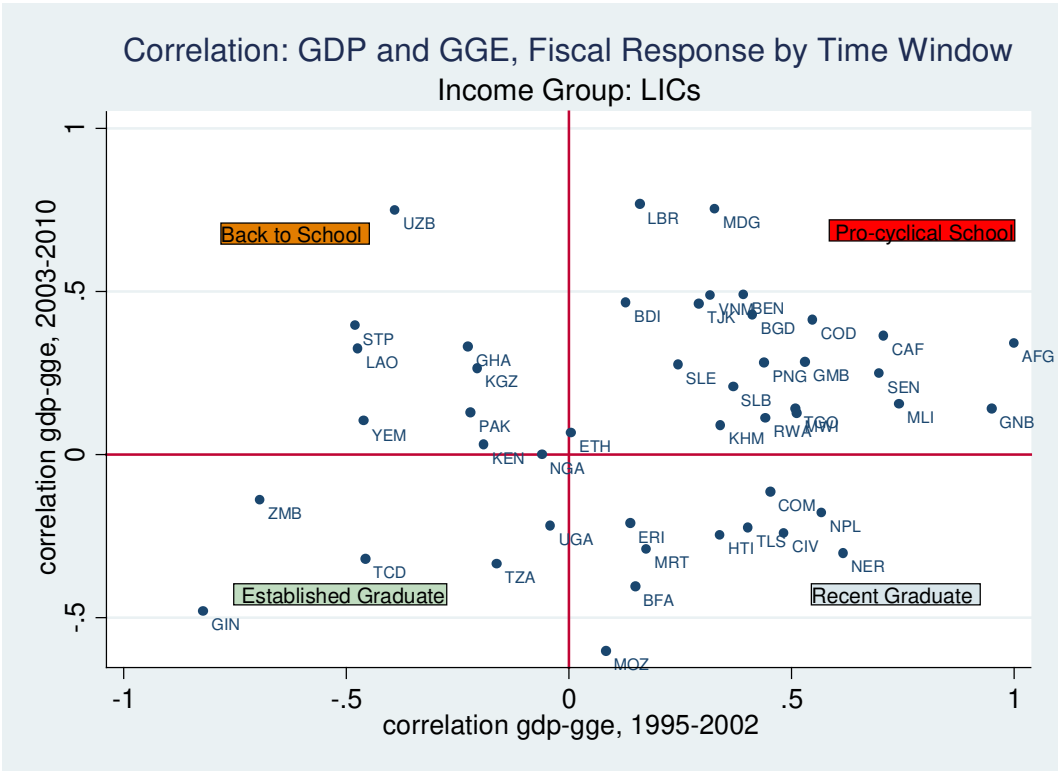


Figure 7A.5 Performance Quadrants for Cyclical Responses in GGE between 1995–2002 and 2003–10 for LMICs

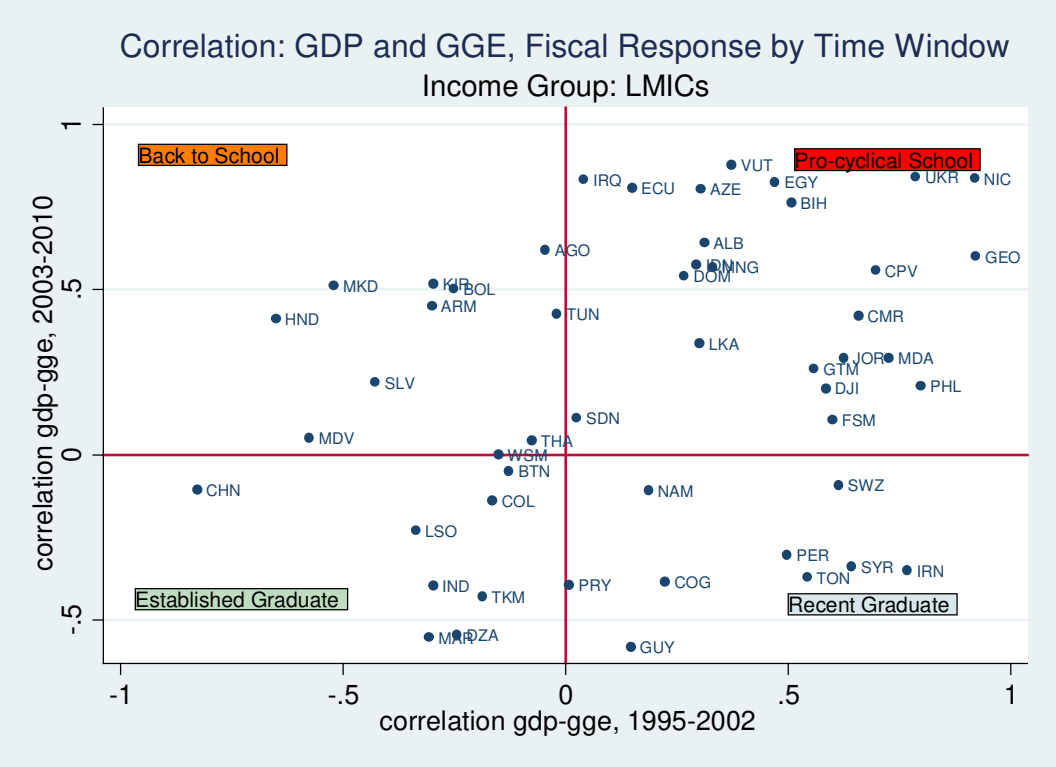


Figure 7A.6 Performance Quadrants for Cyclical Responses in GGE between 1995–2002 and 2003–10 for UMICs

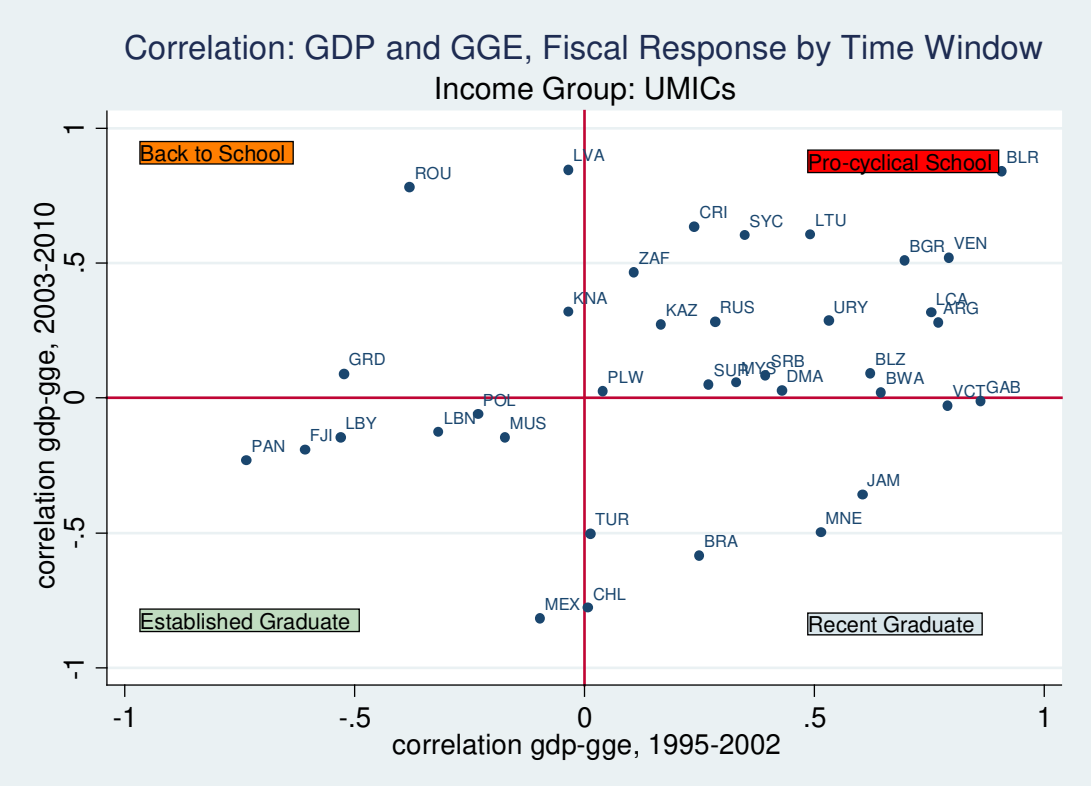


Figure 7A.7 Performance Quadrants for Cyclical Responses in GGE between 1995–2002 and 2003–10 for LMICs

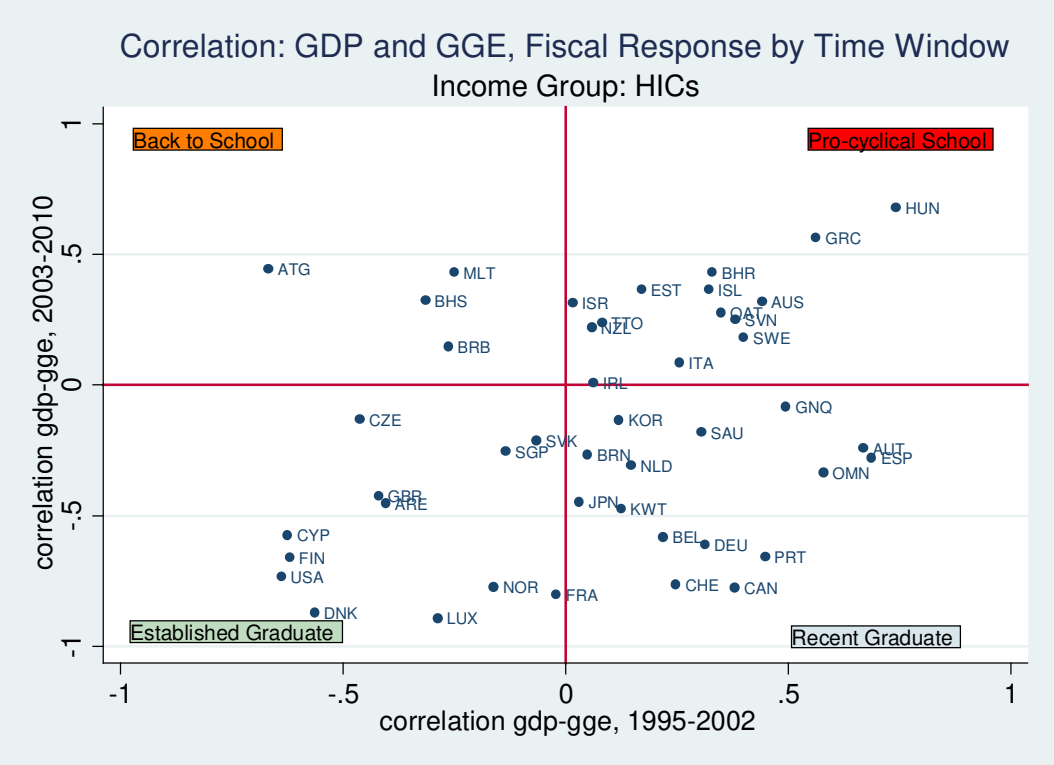


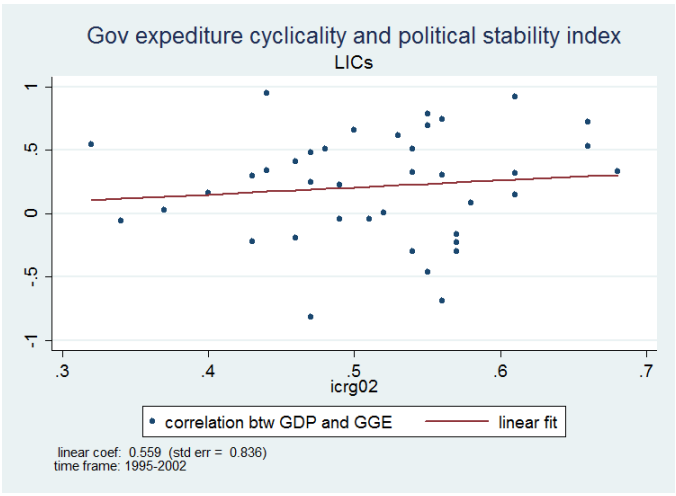
Table 7A.1 World Bank Country Codes and Country Names

Code	Country	Code	Country	Code	Country	Code	Country
AFG	Afghanistan	**DOM**	Dominican Republic	**KOR**	Korea, Rep.	**PSE**	West Bank and Gaza
AGO	Angola	**DZA**	Algeria	**KWT**	Kuwait	**QAT**	Qatar
ALB	Albania	**ECU**	Ecuador	**LAO**	Lao PDR	**ROU**	Romania
ARE	United Arab Emirates	**EGY**	Egypt, Arab Rep.	**LBN**	Lebanon	**RUS**	Russian Federation
ARG	Argentina	**ERI**	Eritrea	**LBR**	Liberia	**RWA**	Rwanda
ARM	Armenia	**ESP**	Spain	**LBY**	Libya	**SAU**	Saudi Arabia
ATG	Antigua and Barbuda	**EST**	Estonia	**LCA**	St. Lucia	**SDN**	Sudan
AUS	Australia	**ETH**	Ethiopia	**LKA**	Sri Lanka	**SEN**	Senegal
AUT	Austria	**FIN**	Finland	**LSO**	Lesotho	**SGP**	Singapore
AZE	Azerbaijan	**FJI**	Fiji	**LTU**	Lithuania	**SLB**	Solomon Islands
BDI	Burundi	**FRA**	France	**LUX**	Luxembourg	**SLE**	Sierra Leone
BEL	Belgium	**FSM**	Micronesia, Fed. Sts.	**LVA**	Latvia	**SLV**	El Salvador
BEN	Benin	**GAB**	Gabon	**MAC**	Macao SAR, China	**SRB**	Serbia
BFA	Burkina Faso	**GBR**	United Kingdom	**MAR**	Morocco	**STP**	Sao Tome and Principe
BGD	Bangladesh	**GEO**	Georgia	**MDA**	Moldova	**SUR**	Suriname
BGR	Bulgaria	**GHA**	Ghana	**MDG**	Madagascar	**SVK**	Slovak Republic
BHR	Bahrain	**GIN**	Guinea	**MDV**	Maldives	**SVN**	Slovenia
BHS	Bahamas, The	**GMB**	Gambia, The	**MEX**	Mexico	**SWE**	Sweden
BIH	Bosnia and Herzegovina	**GNB**	Guinea-Bissau	**MKD**	Macedonia, FYR	**SWZ**	Swaziland
BLR	Belarus	**GNQ**	Equatorial Guinea	**MLI**	Mali	**SYC**	Seychelles
BLZ	Belize	**GRC**	Greece	**MLT**	Malta	**SYR**	Syrian Arab Republic
BOL	Bolivia	**GRD**	Grenada	**MNE**	Montenegro	**TCD**	Chad
BRA	Brazil	**GTM**	Guatemala	**MNG**	Mongolia	**TGO**	Togo
BRB	Barbados	**GUY**	Guyana	**MOZ**	Mozambique	**THA**	Thailand
BRN	Brunei Darussalam	**HKG**	Hong Kong SAR, China	**MRT**	Mauritania	**TJK**	Tajikistan
BTN	Bhutan	**HND**	Honduras	**MUS**	Mauritius	**TKM**	Turkmenistan
BWA	Botswana	**HRV**	Croatia	**MWI**	Malawi	**TLS**	Timor-Leste
CAF	Central African Republic	**HTI**	Haiti	**MYS**	Malaysia	**TON**	Tonga
CAN	Canada	**HUN**	Hungary	**NAM**	Namibia	**TTO**	Trinidad and Tobago
CHE	Switzerland	**IDN**	Indonesia	**NER**	Niger	**TUN**	Tunisia
CHL	Chile	**IND**	India	**NGA**	Nigeria	**TUR**	Turkey
CHN	China	**IRL**	Ireland	**NIC**	Nicaragua	**TZA**	Tanzania
CIV	Cote d'Ivoire	**IRN**	Iran, Islamic Rep.	**NLD**	Netherlands	**UGA**	Uganda
CMR	Cameroon	**IRQ**	Iraq	**NOR**	Norway	**UKR**	Ukraine
COD	Congo, Dem. Rep.	**ISL**	Iceland	**NPL**	Nepal	**URY**	Uruguay
COG	Congo, Rep.	**ISR**	Israel	**NZL**	New Zealand	**USA**	United States
COL	Colombia	**ITA**	Italy	**OMN**	Oman	**UZB**	Uzbekistan
COM	Comoros	**JAM**	Jamaica	**PAK**	Pakistan	**VCT**	St. Vincent and the Grenadines
CPV	Cape Verde	**JOR**	Jordan	**PAN**	Panama	**VEN**	Venezuela, RB
CRI	Costa Rica	**JPN**	Japan	**PER**	Peru	**VNM**	Vietnam
CYP	Cyprus	**KAZ**	Kazakhstan	**PHL**	Philippines	**VUT**	Vanuatu
CZE	Czech Republic	**KEN**	Kenya	**PLW**	Palau	**WSM**	Samoa
DEU	Germany	**KGZ**	Kyrgyz Republic	**PNG**	Papua New Guinea	**YEM**	Yemen, Rep.
DJI	Djibouti	**KHM**	Cambodia	**POL**	Poland	**ZAF**	South Africa
DMA	Dominica	**KIR**	Kiribati	**PRT**	Portugal	**ZMB**	Zambia
DNK	Denmark	**KNA**	St. Kitts and Nevis	**PRY**	Paraguay		

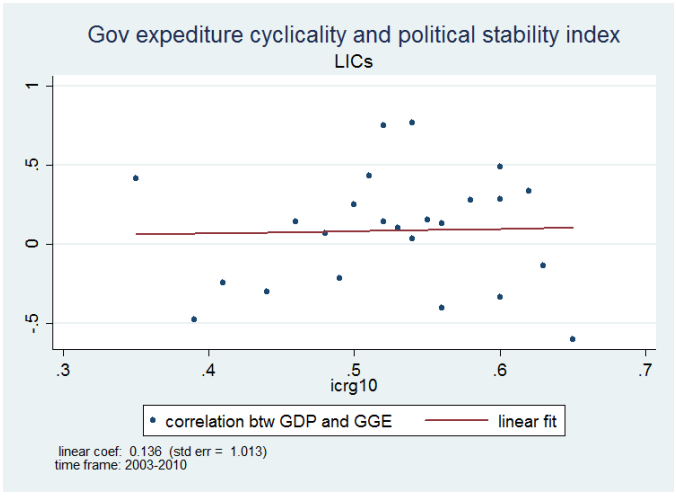
ANNEX 8: CYCLICAL RESPONSE AND POLITICAL AND ECONOMIC RISK BY INCOME GROUP

Figure 8A.1 Fiscal Responses and ICRG for Low-Income Countries (LICs), 1995–2002 and 2003–10

Panel A



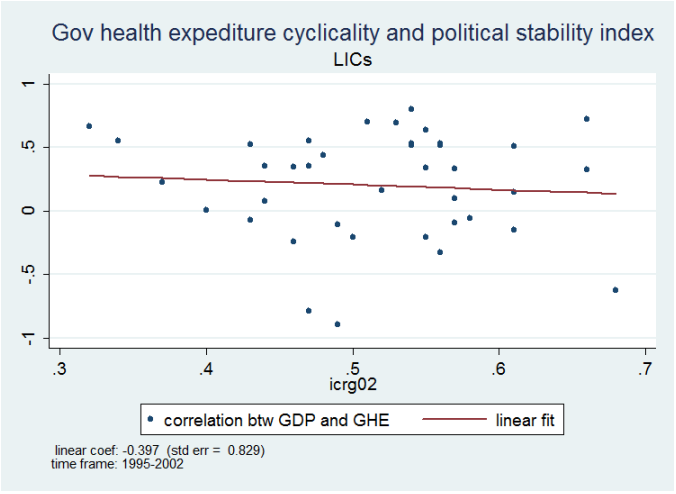
Panel B



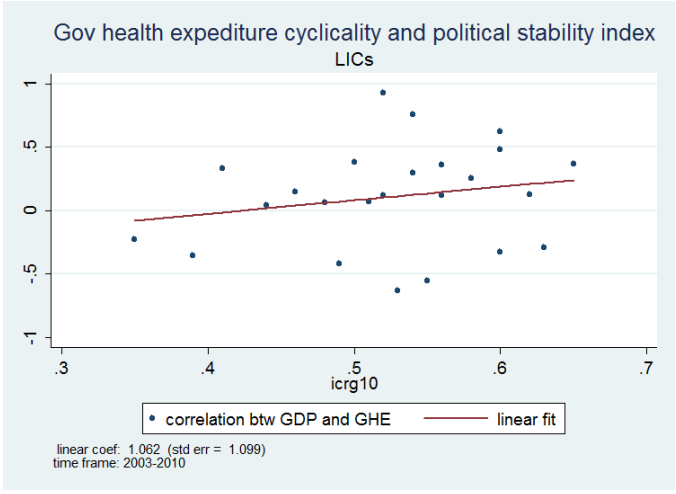
Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 8A.2 Health Expenditure Responses and ICRG for Low-Income Countries (LICs), 1995–2002 and 2003–10

Panel A



Panel B



Source: Authors' calculations based on data from the Fiscal Health Database 2012

ANNEX 9: SUMMARY STATISTICS BY COUNTRY FOR THE SAMPLE SELECTED FOR RADAR PLOT ANALYSIS

Table 9A.1 Summary Statistics of Key Variables of Interest for the Countries Selected for Radar Plot Analysis

#	R	IG	Country	Time Frame	Log GDPpc t	Log GDPpc t+1	Log GDPpc t+2	Log GDPpc t+3	GDP O Gap t	GDP O Gap t+1	GDP O Gap t+2	GDP O Gap t+3	GGE O Gap t	GGE O Gap t+1	GGE O Gap t+2	GGE O Gap t+3	GHE Output Gap t	GHE Output Gap t+1	GHE Output Gap	GHE Output Gap t+3
1	EAS	H	Japan	1996-1998	10.3	10.3	10.3	10.3	0.57	1.26	-0.40	-0.82	1.00	-1.01	-1.04	0.20	1.77	-0.27	-1.77	-1.19
2	EAS	H	Korea, Rep.	1996-1998	9.7	9.8	9.7	9.8	1.05	1.59	-2.83	-0.73	0.45	0.76	-0.02	-0.22	0.81	0.34	-1.16	-0.27
3	EAS	H	New Zealand	1996-1998	9.9	10.0	9.9	10.0	1.04	-0.06	-2.46	0.12	-0.21	0.88	-0.31	1.49	-1.30	-0.23	0.45	0.30
4	EAS	LM	Indonesia	1996-1998	8.0	8.0	7.8	7.8	1.17	2.75	-1.63	-1.40	0.00	0.45	-0.09	0.47	0.98	0.74	-1.16	-0.14
5	EAS	LM	Thailand	1996-1998	8.7	8.7	8.5	8.6	1.72	1.57	-2.21	-0.88	-0.29	1.00	0.51	1.39	0.41	2.41	-0.25	-0.90
6	EAS	UM	Malaysia	1996-1998	9.2	9.2	9.1	9.2	0.97	2.28	-1.77	-0.82	0.61	0.20	-0.90	-0.50	1.06	-0.32	-0.88	-0.69
7	ECS	H	Estonia	2008-2010	9.8	9.7	9.7	.	1.30	-2.05	-0.72	.	2.10	0.76	-2.04		2.10	0.84	-1.83	
8	ECS	H	Finland	2008-2010	10.4	10.3	10.4	.	1.80	-2.33	-0.31	.	0.05	0.58	-0.17		1.76	0.12	-1.55	
9	ECS	H	Greece	2008-2010	10.2	10.1	10.1	.	1.54	-0.48	-2.26	.	1.40	1.83	-2.17		0.83	1.16	-1.79	
10	ECS	H	Ireland	2008-2010	10.6	10.5	10.5	.	0.97	-2.17	-0.84	.	-0.30	-2.11	2.69		1.95	0.66	-2.34	
11	ECS	H	Portugal	2008-2010	10.0	10.0	10.0	.	1.25	-1.49	-0.01	.	-2.31	0.93	1.22		-1.40	0.62	0.27	
12	ECS	H	Sweden	2008-2010	10.4	10.4	10.4	.	0.76	-2.68	0.44	.	-0.44	-0.41	-0.16		1.48	0.48	-1.21	
13	LCN	UM	Argentina	2000-2002	9.2	9.2	9.1	9.1	0.79	0.09	-2.68	-1.13	0.76	1.18	-1.85	-1.00	0.71	0.91	-1.70	-1.12
14	LCN	UM	Chile	2000-2002	9.3	9.3	9.3	9.4	-0.15	-0.02	-0.86	-0.91	0.36	0.38	0.67	0.00	0.53	1.44	1.91	-1.75
15	LCN	UM	Colombia	2000-2002	8.8	8.8	8.8	8.8	-0.04	-0.34	-0.66	-0.62	-2.49	0.33	-0.10	-0.64	-1.58	-1.10	-0.78	0.08
16	LCN	UM	Mexico	2000-2002	9.4	9.4	9.4	9.4	1.55	0.08	-0.69	-1.21	0.24	0.30	1.50	0.17	0.70	-0.09	-1.02	-0.60
17	LCN	UM	Peru	2000-2002	8.6	8.6	8.6	8.7	0.29	-1.16	-0.21	-0.45	1.15	-0.90	-0.36	-0.15	0.48	-0.06	0.34	-0.36
18	MEA	H	Israel	2001-2004	10.0	10.0	10.0	10.0	0.71	-1.01	-1.63	-0.79	1.55	1.29	0.55	-1.10	1.41	1.71	-1.12	0.03
19	MEA	H	Kuwait	2001-2004	10.5	10.5	10.7	10.7	-1.35	-2.26	0.28	0.69	-1.13	0.61	0.43	0.28	0.47	0.30	0.61	0.17
20	MEA	LM	Egypt, Arab Rep.	2001-2004	8.3	8.4	8.4	8.4	1.26	-0.22	-0.95	-1.21	0.26	0.62	0.06	-0.73	0.92	1.40	-0.44	-1.20
21	MEA	LM	Iran, Islamic Rep.	2001-2004	8.9	9.0	9.1	9.1	-1.52	-0.07	0.88	0.37	-0.74	-0.13	0.00	-1.33	0.44	0.41	-0.06	-1.44
22	MEA	LM	Iraq	2001-2004	8.3	8.2	7.7	8.0	0.68	0.62	-3.04	0.17	-0.37	-0.67	-0.87	0.60	-1.16	-2.41	1.58	2.02
23	MEA	LM	Tunisia	2001-2004	8.7	8.8	8.8	8.8	0.91	-2.24	-0.84	0.39	-0.34	0.57	-2.30	1.68	0.46	-1.22	-0.97	0.28
24	MEA	UM	Algeria	2001-2004	8.7	8.8	8.8	8.8	-1.83	-1.55	0.54	1.06	-0.17	1.58	0.95	0.47	0.55	0.95	1.50	-0.77
25	MEA	UM	Lebanon	2001-2004	9.1	9.1	9.1	9.2	0.04	0.12	-0.14	1.85	-0.71	0.27	0.38	-0.21	0.46	1.49	-1.42	0.51
26	MEA	UM	Libya	2001-2004	9.4	9.3	9.5	9.5	-1.04	-2.85	0.24	-0.37	0.96	0.34	0.12	-0.03	0.92	1.50	1.18	-0.34
27	NAC	H	Canada	2008-2010	10.5	10.4	10.5	.	0.98	-2.16	0.03	.	-1.34	1.35	0.37		-0.71	1.39	-1.05	
28	NAC	H	United States	2008-2010	10.7	10.6	10.6	.	0.79	-2.46	0.13	.	0.82	1.39	-0.45		-1.10	-1.85	2.10	
29	SAS	L	Bangladesh	2000-2003	6.9	6.9	6.9	7.0	1.37	1.45	-1.15	-2.01	0.76	0.58	0.40	-0.12	0.17	-0.13	-0.79	-1.92
30	SAS	L	Nepal	2000-2003	6.8	6.8	6.8	6.8	1.33	2.37	-1.39	-0.87	0.13	0.78	0.14	-0.02	-1.19	2.15	0.64	-0.72
31	SAS	LM	India	2000-2003	7.5	7.5	7.5	7.6	0.47	-0.06	-1.70	-0.88	-0.09	-0.19	0.70	2.29	0.58	1.24	-1.36	-1.10
32	SAS	LM	Sri Lanka	2000-2003	8.0	8.0	8.0	8.1	2.24	-0.93	-1.09	-0.46	0.68	0.69	0.02	-0.41	1.19	-0.40	-1.42	-1.68
33	SSF	L	Eritrea	2000-2002	6.4	6.5	6.5	6.4	-2.87	0.73	0.81	-0.19	-0.45	-0.29	0.09	-0.62	0.39	1.94	0.61	-1.01
34	SSF	L	Madagascar	2000-2002	6.8	6.8	6.7	6.7	0.82	1.94	-2.55	-0.59	-0.93	0.75	-0.72	-0.68	1.16	1.57	-0.30	-1.17
35	SSF	L	Mali	2000-2002	6.6	6.7	6.7	6.8	-2.33	1.95	0.27	1.58	-0.70	1.87	-1.06	0.24	-1.40	2.70	-0.86	-0.25
36	SSF	L	Mozambique	2000-2002	6.2	6.3	6.4	6.4	-2.64	0.03	0.66	-0.52	0.12	0.70	1.52	0.42	0.80	0.08	0.97	-0.21
37	SSF	L	Senegal	2000-2002	7.3	7.3	7.3	7.4	0.51	0.80	-2.30	-0.59	-0.81	1.11	-1.73	-0.66	-0.11	-0.44	-0.59	-0.72
38	SSF	LM	Nigeria	2000-2002	7.3	7.3	7.3	7.4	0.42	-0.34	-2.82	-0.37	1.02	2.26	-0.91	-0.08	0.48	0.07	-2.83	0.01

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: 1. Variables include log GDP per capita and output gap statistics for GDP, GGE, and GHE for t_0, t_1, t_2, and t_3 of the selected time frame, which varies by region (column 5).

2. The color scheme is as follows: **Dark Red**: -2 > Output Gap. **Medium Red**: -2 < Output Gap < -1.5. **Light Red**: -1.5 < Output Gap < 0. Same thresholds apply for the brackets for positive output gap, with a positive sign. That is, **Dark Green**: 2 < + Output Gap. **Medium Green**: 2 < + Output Gap > 1.5. **Light Green**: 1.5 > + Output Gap > 0.

Table 9A.2 Summary Statistics of Key Variables of Interest for the Countries Selected for Radar Plot Analysis

#	R	IG	Country	Time Frame	GDP Cycle t	GDP Cylce t+1	GDP Cylce t+2	GDP Cylce t+3	GGE Cycle t	GGE Cycle t+1	GGE Cycle t+2	GGE Cycle t+3	GHE Cycle t	GHE Cycle t+1	GHE Cycle t+2	GHE Cycle t+3
1	EAS	H	Japan	1996-1998	0.01	0.02	-0.01	-0.01	0.01	-0.01	-0.02	0.00	0.02	0.00	-0.02	-0.02
2	EAS	H	Korea, Rep.	1996-1998	0.02	0.04	-0.07	-0.02	0.02	0.03	0.00	-0.01	0.03	0.01	-0.05	-0.01
3	EAS	H	New Zealand	1996-1998	0.01	0.00	-0.02	0.00	0.00	0.01	0.00	0.02	-0.02	0.00	0.01	0.01
4	EAS	LM	Indonesia	1996-1998	0.04	0.08	-0.05	-0.04	0.00	0.11	-0.02	0.12	0.08	0.06	-0.09	-0.01
5	EAS	LM	Thailand	1996-1998	0.05	0.04	-0.06	-0.02	-0.03	0.09	0.04	0.12	0.03	0.17	-0.02	-0.06
6	EAS	UM	Malaysia	1996-1998	0.03	0.06	-0.05	-0.02	0.05	0.02	-0.07	-0.04	0.07	-0.02	-0.06	-0.04
7	ECS	H	Estonia	2008-2010	0.05	-0.08	-0.03		0.08	0.03	-0.08		0.12	0.05	-0.10	
8	ECS	H	Finland	2008-2010	0.04	-0.05	-0.01		0.00	0.01	0.00		0.02	0.00	-0.02	
9	ECS	H	Greece	2008-2010	0.02	-0.01	-0.03		0.04	0.06	-0.07		0.04	0.05	-0.08	
10	ECS	H	Ireland	2008-2010	0.02	-0.04	-0.01		-0.01	-0.07	0.10		0.06	0.02	-0.08	
11	ECS	H	Portugal	2008-2010	0.01	-0.02	0.00		-0.03	0.01	0.02		-0.04	0.02	0.01	
12	ECS	H	Sweden	2008-2010	0.01	-0.05	0.01		0.00	0.00	0.00		0.03	0.01	-0.02	
13	LCN	UM	Argentina	2000-2002	0.03	0.00	-0.11	-0.04	0.07	0.11	-0.17	-0.09	0.06	0.08	-0.15	-0.10
14	LCN	UM	Chile	2000-2002	0.00	0.00	-0.01	-0.01	0.01	0.01	0.02	0.00	0.03	0.08	0.10	-0.09
15	LCN	UM	Colombia	2000-2002	0.00	0.00	-0.01	-0.01	-0.12	0.02	0.00	-0.03	-0.12	-0.08	-0.06	0.01
16	LCN	UM	Mexico	2000-2002	0.03	0.00	-0.01	-0.02	0.01	0.01	0.06	0.01	0.02	0.00	-0.03	-0.02
17	LCN	UM	Peru	2000-2002	0.00	-0.02	0.00	-0.01	0.03	-0.02	-0.01	0.00	0.03	0.00	0.02	-0.03
18	MEA	H	Israel	2001-2004	0.01	-0.02	-0.03	-0.01	0.02	0.02	0.01	-0.01	0.04	0.05	-0.03	0.00
19	MEA	H	Kuwait	2001-2004	-0.04	-0.07	0.01	0.02	-0.22	0.12	0.08	0.05	0.08	0.05	0.10	0.03
20	MEA	LM	Egypt, Arab Rep.	2001-2004	0.01	0.00	-0.01	-0.01	0.02	0.05	0.01	-0.06	0.03	0.05	-0.02	-0.04
21	MEA	LM	Iran, Islamic Rep.	2001-2004	-0.02	0.00	0.01	0.00	-0.04	-0.01	0.00	-0.07	0.02	0.02	0.00	-0.08
22	MEA	LM	Iraq	2001-2004	0.09	0.08	-0.38	0.02	-0.27	-0.50	-0.65	0.45	-0.73	-1.52	1.00	1.28
23	MEA	LM	Tunisia	2001-2004	0.01	-0.02	-0.01	0.00	-0.01	0.01	-0.06	0.04	0.01	-0.04	-0.03	0.01
24	MEA	UM	Algeria	2001-2004	-0.02	-0.01	0.01	0.01	-0.01	0.08	0.05	0.02	0.04	0.07	0.10	-0.05
25	MEA	UM	Lebanon	2001-2004	0.00	0.00	0.00	0.03	-0.05	0.02	0.02	-0.01	0.02	0.07	-0.07	0.02
26	MEA	UM	Libya	2001-2004	-0.03	-0.07	0.01	-0.01	0.24	0.08	0.03	-0.01	0.12	0.19	0.15	-0.04
27	NAC	H	Canada	2008-2010	0.01	-0.02	0.00		-0.02	0.02	0.00		-0.01	0.02	-0.01	
28	NAC	H	United States	2008-2010	0.01	-0.03	0.00		0.01	0.01	0.00		-0.02	-0.03	0.04	
29	SAS	L	Bangladesh	2000-2003	0.00	0.00	0.00	-0.01	0.05	0.04	0.03	-0.01	0.01	-0.01	-0.03	-0.07
30	SAS	L	Nepal	2000-2003	0.01	0.02	-0.01	-0.01	0.01	0.07	0.01	0.00	-0.12	0.21	0.06	-0.07
31	SAS	LM	India	2000-2003	0.01	0.00	-0.02	-0.01	0.00	0.00	0.02	0.05	0.02	0.04	-0.05	-0.04
32	SAS	LM	Sri Lanka	2000-2003	0.02	-0.01	-0.01	0.00	0.08	0.09	0.00	-0.05	0.07	-0.02	-0.09	-0.10
33	SSF	L	Eritrea	2000-2002	-0.13	0.03	0.04	-0.01	-0.07	-0.05	0.01	-0.10	0.04	0.20	0.06	-0.10
34	SSF	L	Madagascar	2000-2002	0.03	0.07	-0.09	-0.02	-0.05	0.04	-0.04	-0.04	0.11	0.15	-0.03	-0.11
35	SSF	L	Mali	2000-2002	-0.03	0.02	0.00	0.02	-0.04	0.10	-0.06	0.01	-0.14	0.27	-0.09	-0.03
36	SSF	L	Mozambique	2000-2002	-0.04	0.00	0.01	-0.01	0.01	0.05	0.11	0.03	0.08	0.01	0.09	-0.02
37	SSF	L	Senegal	2000-2002	0.01	0.01	-0.03	-0.01	-0.03	0.04	-0.07	-0.03	-0.01	-0.03	-0.04	-0.04
38	SSF	LM	Nigeria	2000-2002	0.01	0.00	-0.04	-0.01	0.13	0.30	-0.12	-0.01	0.07	0.01	-0.43	0.00

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: t = base year.

Table 9A.3 Correlations Coefficients for GDP-GGE, GDP-GHE, and GGE-GHE — Countries Selected for Radar Plot Analysis

					Correlation between Cycles			Cycle Correlation when Output Gap < 0			Cycle Correlation when Output Gap >= 0		
#	R	IG	Country	Time Frame	GDP_GGE	GDP_GHE	GGE_GHE	GDP_GGE	GDP_GHE	GGE_GHE	GDP_GGE	GDP_GHE	GGE_GHE
1	EAS	H	Japan	1996-1998	-0.29	0.00	0.68	-0.62	-0.19	0.64	-0.50	-0.35	0.83
2	EAS	H	Korea, Rep.	1996-1998	0.01	0.40	-0.05	0.13	0.20	0.09	0.44	-0.16	0.12
3	EAS	H	New Zealand	1996-1998	0.17	-0.43	-0.06	0.07	-0.35	0.41	0.15	-0.30	-0.30
4	EAS	LM	Indonesia	1996-1998	0.11	0.43	0.53	-0.38	0.28	0.27	0.10	0.32	0.65
5	EAS	LM	Thailand	1996-1998	-0.07	0.49	0.50	0.03	-0.04	0.71	0.55	0.68	0.67
6	EAS	UM	Malaysia	1996-1998	0.15	-0.03	0.42	0.06	0.05	0.81	0.46	-0.27	-0.23
7	ECS	H	Estonia	2008-2010	0.31	0.26	0.62	-0.38	-0.47	0.63	0.13	-0.03	0.33
8	ECS	H	Finland	2008-2010	-0.51	-0.04	0.59	-0.11	0.00	0.61	-0.31	0.22	0.57
9	ECS	H	Greece	2008-2010	0.55	0.38	0.42	0.65	0.45	0.56	0.23	0.39	-0.11
10	ECS	H	Ireland	2008-2010	0.00	0.25	-0.44	0.39	-0.26	-0.66	-0.49	0.31	-0.02
11	ECS	H	Portugal	2008-2010	-0.31	-0.05	0.55	-0.10	-0.20	0.58	-0.04	0.52	0.54
12	ECS	H	Sweden	2008-2010	0.21	-0.05	0.03	-0.04	-0.31	0.24	-0.43	0.39	-0.35
13	LCN	UM	Argentina	2000-2002	0.54	0.49	0.99	0.26	0.23	0.99	-0.32	-0.23	0.95
14	LCN	UM	Chile	2000-2002	-0.48	-0.15	0.50	-0.27	-0.02	0.59	-0.18	0.53	0.30
15	LCN	UM	Colombia	2000-2002	-0.15	0.17	0.80	-0.78	-0.72	0.81	-0.20	0.37	0.81
16	LCN	UM	Mexico	2000-2002	-0.60	0.24	-0.24	-0.81	0.04	-0.18	-0.43	-0.04	-0.15
17	LCN	UM	Peru	2000-2002	0.02	0.46	0.17	-0.24	-0.25	0.38	0.17	0.39	-0.04
18	MEA	H	Israel	2001-2004	0.16	0.20	0.77	-0.41	-0.05	0.72	-0.53	-0.13	0.88
19	MEA	H	Kuwait	2001-2004	-0.20	-0.20	0.33	-0.26	-0.52	0.56	-0.32	0.10	0.23
20	MEA	LM	Egypt, Arab Rep.	2001-2004	0.70	0.49	0.35	0.56	0.66	0.37	0.15	0.61	0.02
21	MEA	LM	Iran, Islamic Rep.	2001-2004	0.02	0.25	0.49	0.71	0.43	0.62	-0.28	-0.19	0.50
22	MEA	LM	Iraq	2001-2004	0.21	-0.50	0.15	0.53	-0.98	-0.64	0.20	-0.36	0.27
23	MEA	LM	Tunisia	2001-2004	0.21	0.58	0.39	-0.22	0.52	-0.05	-0.47	0.29	0.41
24	MEA	UM	Algeria	2001-2004	-0.37	-0.41	0.86	-0.29	-0.44	0.88	-0.38	-0.48	0.83
25	MEA	UM	Lebanon	2001-2004	-0.19	0.29	0.15	-0.10	-0.18	0.41	0.30	-0.18	0.29
26	MEA	UM	Libya	2001-2004	-0.24	-0.53	0.50	-0.26	-0.78	0.30	-0.22	-0.14	0.52
27	NAC	H	Canada	2008-2010	-0.16	-0.04	0.77	-0.37	-0.37	0.81	-0.42	0.04	0.73
28	NAC	H	United States	2008-2010	-0.70	-0.03	-0.02	-0.67	0.62	-0.01	-0.48	-0.56	-0.22
29	SAS	L	Bangladesh	2000-2003	0.41	0.10	-0.08	-0.34	0.73	-0.47	0.69	0.03	0.10
30	SAS	L	Nepal	2000-2003	0.07	0.36	-0.11	-0.74	0.25	-0.54	0.38	0.54	0.55
31	SAS	LM	India	2000-2003	-0.34	0.41	-0.09	-0.29	0.47	-0.13	0.50	0.51	0.21
32	SAS	LM	Sri Lanka	2000-2003	0.28	0.47	0.09	-0.47	0.08	-0.32	0.46	0.36	0.15
33	SSF	L	Eritrea	2000-2002	0.03	-0.12	0.25	-0.28	-0.58	0.85	-0.19	0.62	-0.05
34	SSF	L	Madagascar	2000-2002	0.47	0.64	0.47	0.52	0.07	0.27	0.68	0.88	0.64
35	SSF	L	Mali	2000-2002	0.48	0.38	0.41	0.14	0.30	0.13	0.56	0.68	0.72
36	SSF	L	Mozambique	2000-2002	-0.01	0.04	0.59	0.16	-0.23	0.78	-0.41	-0.04	0.45
37	SSF	L	Senegal	2000-2002	0.55	0.27	0.48	0.67	0.26	0.85	0.15	0.59	-0.10
38	SSF	LM	Nigeria	2000-2002	-0.08	0.57	0.30	0.54	0.89	0.54	-0.11	0.37	0.14

Source: Authors' calculations based on data from the Fiscal Health Database 2012

ANNEX 10: DATA AVAILABILITY FOR RADAR PLOTS BY DIMENSIONS BETWEEN 1995 AND 2010

Table 10A.1 Data Availability for the Dimensions of the Radar Plot by Region, 1995–2010

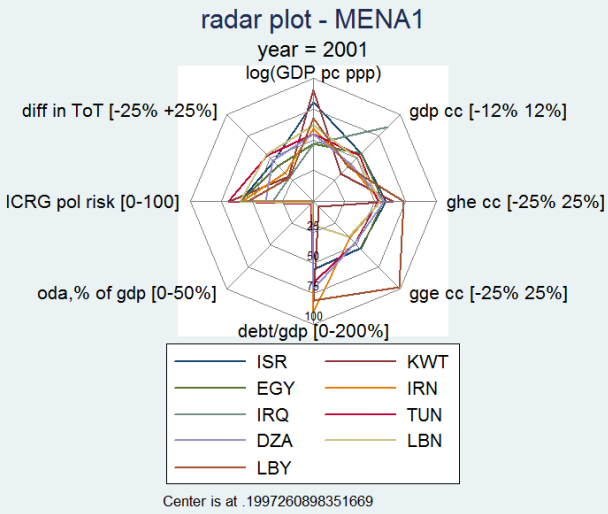
R	Var - Obs	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
East Asia & Pacific	GDP	26	26	26	26	27	27	27	27	27	27	27	27	27	27	27	27
	GDP CC	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
	GHE CC	26	25	24	25	25	27	27	27	26	27	27	27	25	26	27	27
	GGE CC	27	27	26	26	26	26	25	25	27	26	25	25	25	26	27	27
	Debt/GDP	9	11	11	11	11	12	15	15	16	16	16	16	16	16	15	15
	ODA	20	17	18	18	19	18	17	18	17	19	18	18	18	18	18	17
	ICRG	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	TOT	0	8	8	8	8	7	26	26	26	26	25	24	26	25	25	26
	Var - Obs	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Europe & Central Asia	GDP	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47
	GDP CC	47	48	47	48	48	48	48	48	48	48	48	47	48	48	48	48
	GHE CC	47	47	47	48	46	48	48	48	48	48	48	48	48	48	48	48
	GGE CC	47	48	47	48	48	48	48	48	48	48	48	48	48	48	48	48
	Debt/GDP	22	24	28	34	37	42	43	46	46	48	48	48	48	48	48	48
	ODA	14	15	16	16	16	16	16	16	16	16	18	18	18	18	18	18
	ICRG	28	28	28	39	39	40	40	40	40	40	40	40	40	40	40	40
	TOT	0	1	1	1	1	1	45	46	46	46	44	45	46	44	43	46
	Var - Obs	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Latin America & Carib	GDP	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	31
	GDP CC	32	32	32	32	32	32	32	32	31	32	32	32	32	32	32	32
	GHE CC	32	32	31	32	32	32	31	32	32	32	32	32	31	32	32	32
	GGE CC	32	32	32	31	32	32	31	32	32	32	32	31	31	32	31	31
	Debt/GDP	11	16	21	21	23	28	31	31	31	31	32	32	32	32	32	32
	ODA	30	29	29	30	27	28	28	27	29	29	29	30	30	31	31	29
	ICRG	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
	TOT	0	19	19	18	18	18	32	32	32	32	31	29	32	31	30	32
	Var - Obs	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Middle East & N.Africa	GDP	17	17	18	18	19	19	19	19	19	19	19	18	19	19	19	16
	GDP CC	21	21	20	21	20	21	21	20	20	21	21	21	21	21	21	21
	GHE CC	21	21	21	20	20	20	20	20	19	20	20	21	20	20	19	21
	GGE CC	20	19	20	20	20	21	20	20	20	20	20	19	19	20	21	21
	Debt/GDP	11	12	12	12	15	17	17	18	19	19	19	19	19	19	19	19
	ODA	18	16	15	15	15	15	15	15	14	15	14	14	13	13	13	9
	ICRG	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	TOT	0	5	5	4	5	4	20	20	20	20	12	20	20	15	12	17
	Var - Obs	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
North America	GDP	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	GDP CC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	GHE CC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	GGE CC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Debt/GDP	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ICRG	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	TOT	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
	Var - Obs	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
South Asia	GDP	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8
	GDP CC	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GHE CC	8	8	8	8	8	8	8	6	8	8	8	8	8	7	8	8
	GGE CC	8	8	8	8	8	8	8	8	8	7	8	7	6	8	8	8
	Debt/GDP	3	3	4	4	4	5	5	5	5	5	5	5	5	5	5	5
	ODA	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8
	ICRG	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	TOT	0	4	4	3	3	3	8	8	8	8	8	8	8	8	8	8
	Var - Obs	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Sub-Saharan Africa	GDP	41	42	42	42	42	42	44	44	43	43	43	43	43	44	44	44
	GDP CC	44	43	42	44	45	43	45	44	45	44	44	45	45	45	45	45
	GHE CC	43	43	43	42	43	42	39	39	42	44	42	44	43	44	42	44
	GGE CC	44	41	43	41	43	43	43	43	41	44	44	43	43	44	44	45
	Debt/GDP	12	12	15	17	19	33	33	37	39	41	42	42	44	44	45	45
	ODA	40	42	44	44	44	44	44	42	41	43	44	44	44	44	44	44
	ICRG	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	TOT	0	40	40	39	38	37	43	42	45	45	35	43	45	41	39	43

Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: Var = variables; Obs = observations.

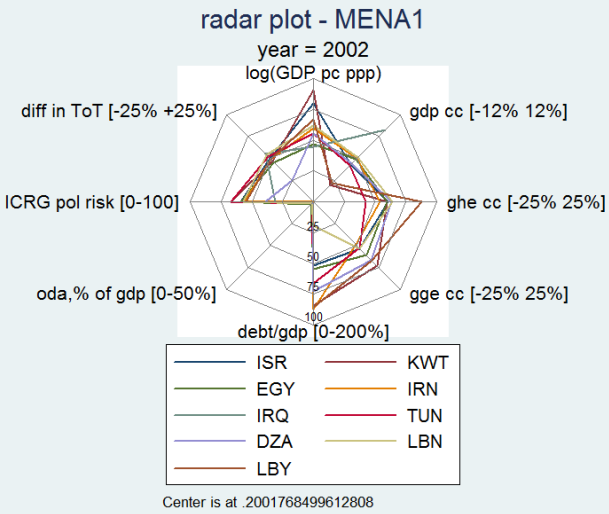
ANNEX 11: RADAR PLOTS BY REGION

Figure 11A.1 Radar Plots for Selected Countries in Middle East and North Africa (MENA) 2001, 2002, 2003, and 2004

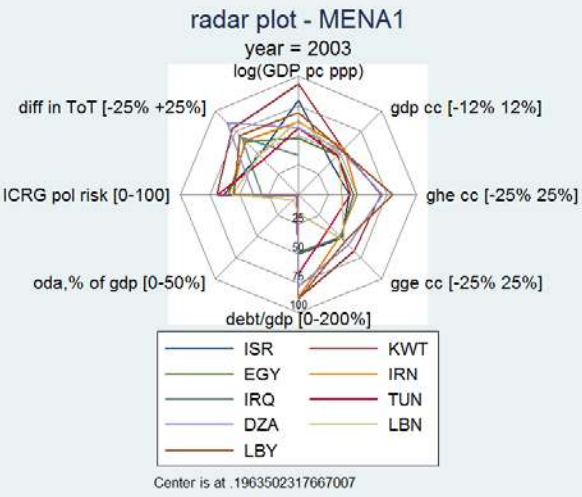
Panel A



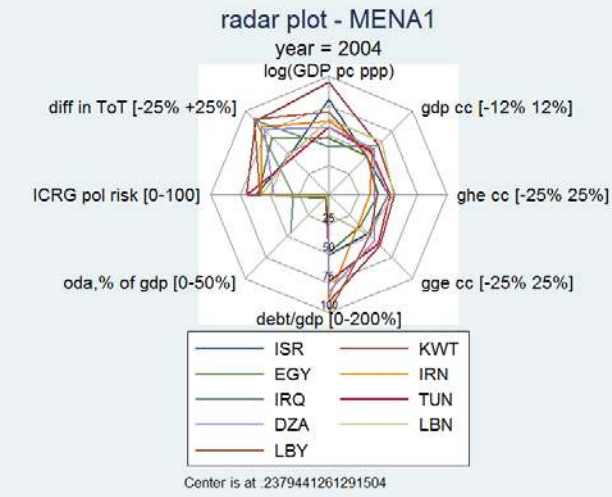
Panel B



Panel C



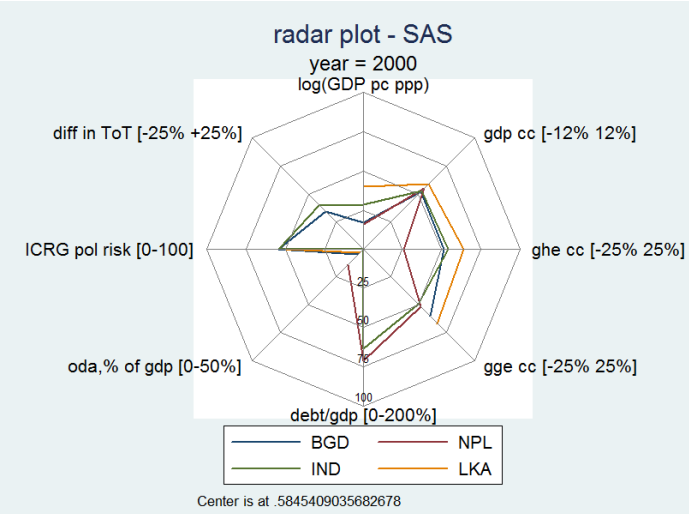
Panel D

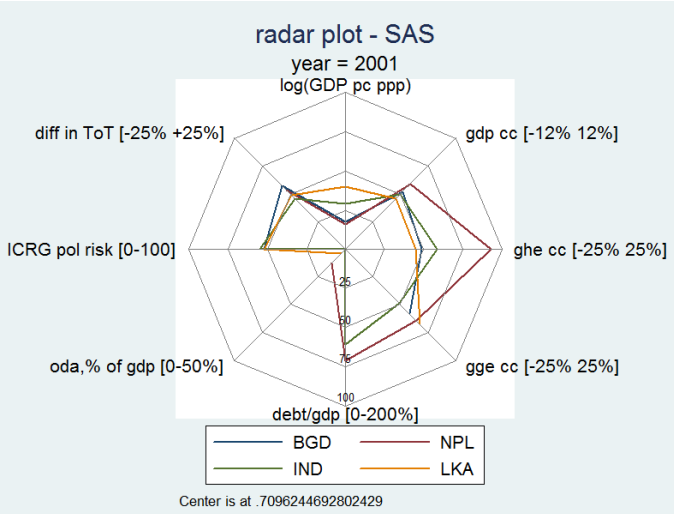


Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 11A.2 Radar Plots for Selected Countries in South Asia (SAS) 2000, 2001, 2002, and 2003

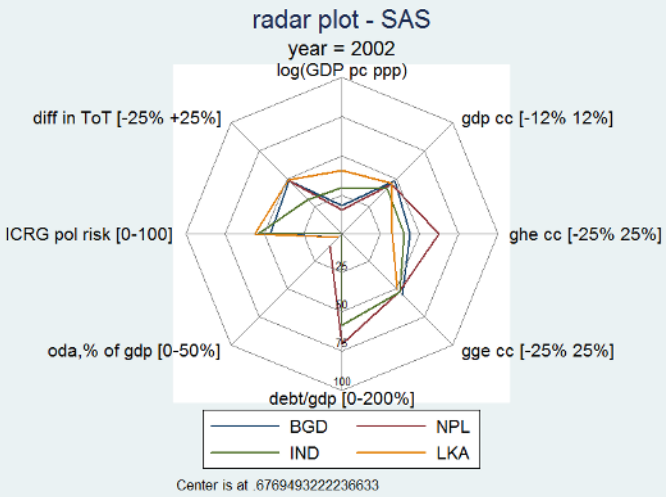
Panel A



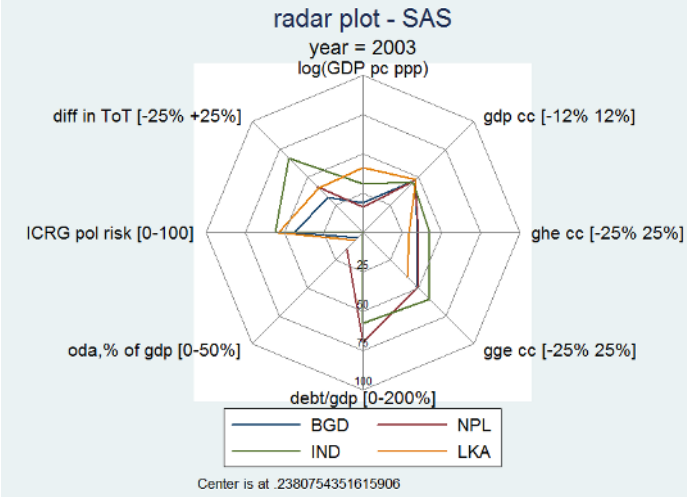


Panel B

Panel C



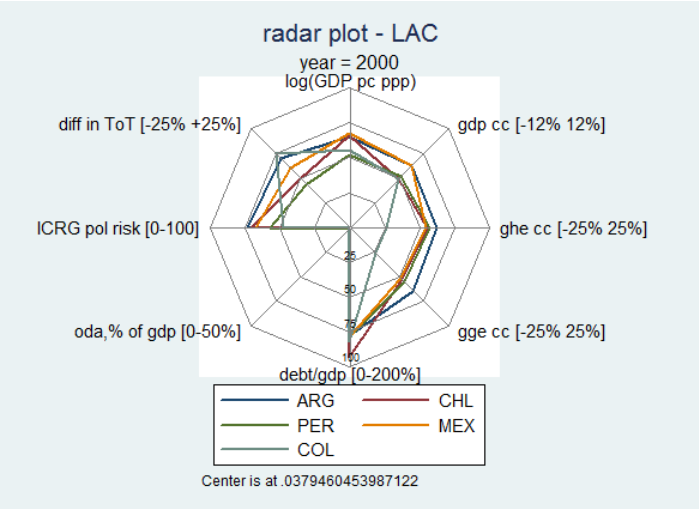
Panel D



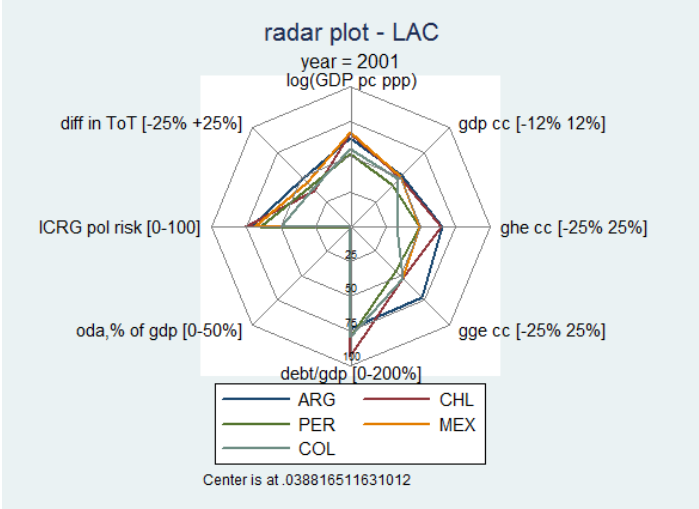
Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 11A.3 Radar Plots for Selected Countries in Latin America and the Caribbean (LAC) 2000, 2001, 2002, and 2003

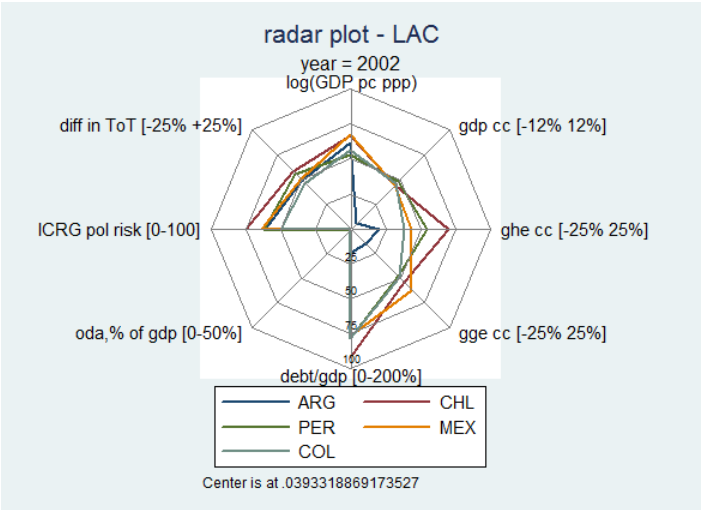
Panel A



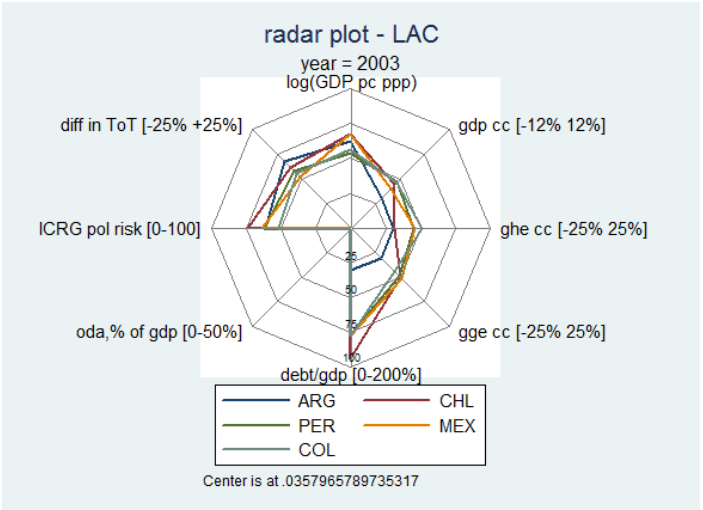
Panel B



Panel C



Panel D



Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 11A.4 Radar Plots for Selected Countries in Europe and Central Asia (ECS) for 2008, 2009, and 2010

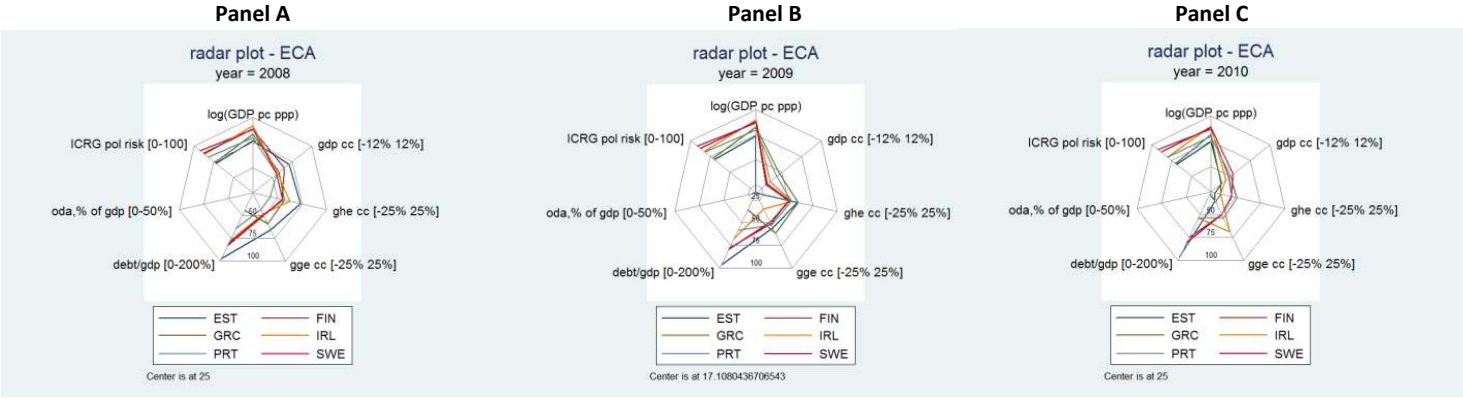
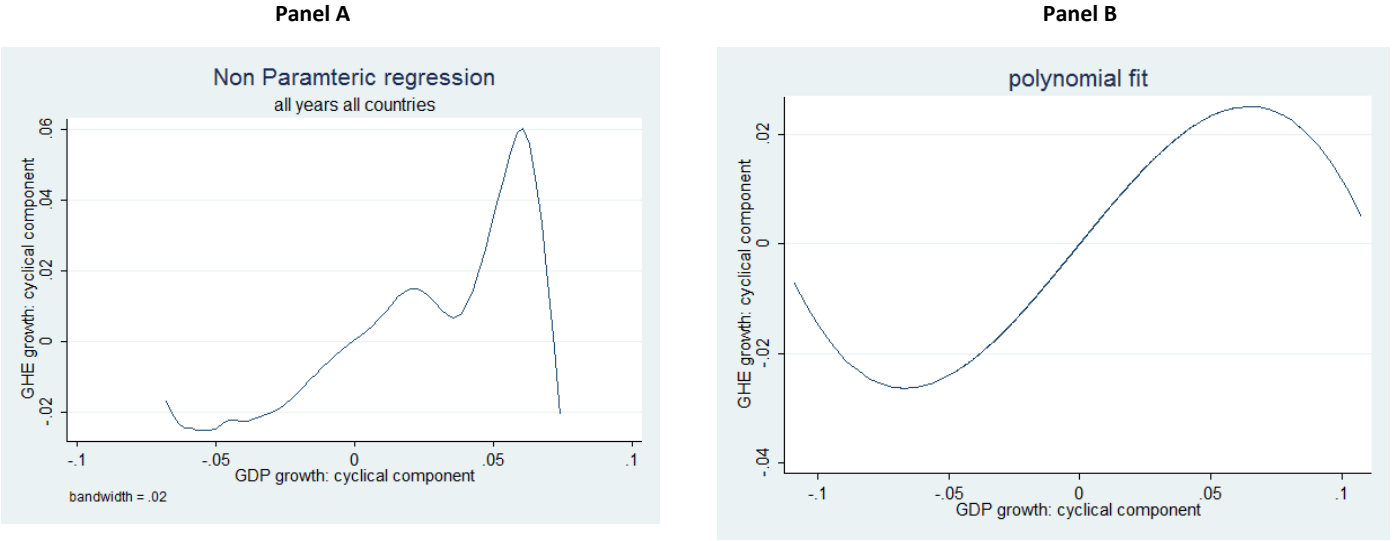


Figure 12A.1 GDP and GHE Cycle Relationship Using Nonparametric and Cubic Polynomial Fit

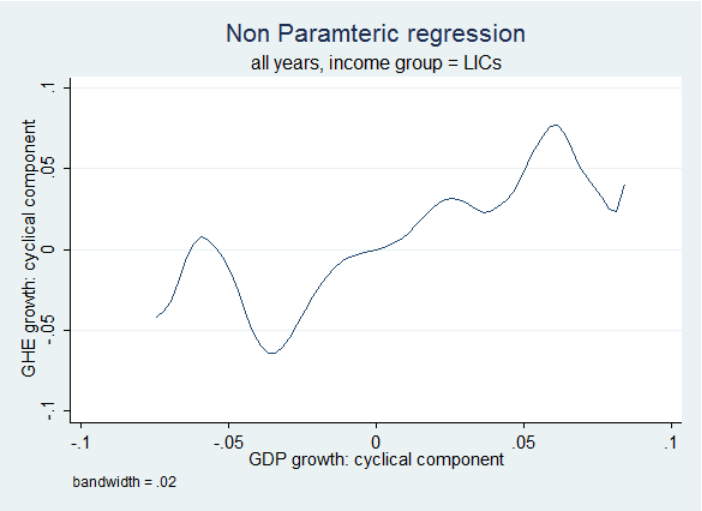
ANNEX 12: NONPARAMETRIC RESULTS — RELATIONSHIP BETWEEN GDP AND GHE



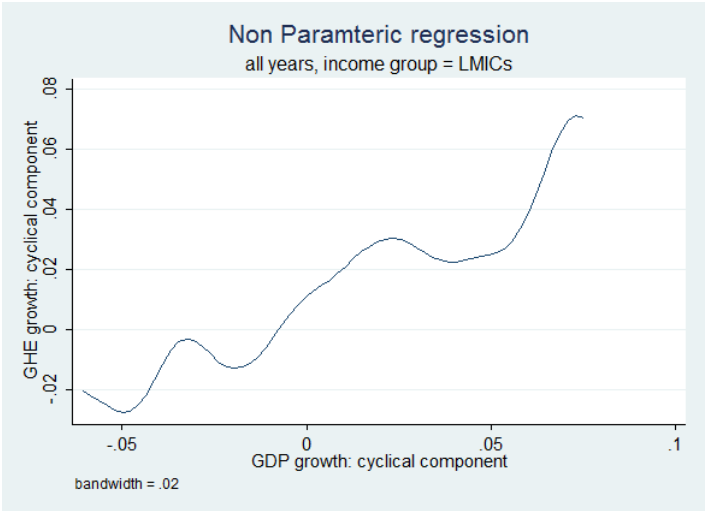
Source: Authors' calculations based on data from the Fiscal Health Database 2012

Figure 12A.2 GDP and GHE Cycle Relationship Using Nonparametric Regression Fit

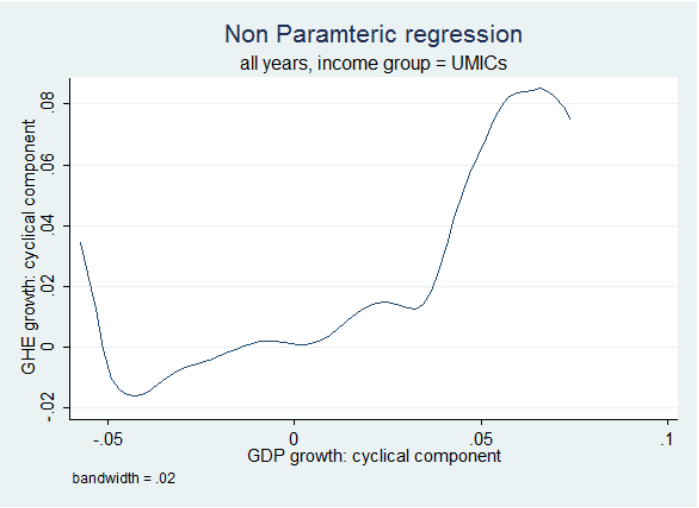
Panel A



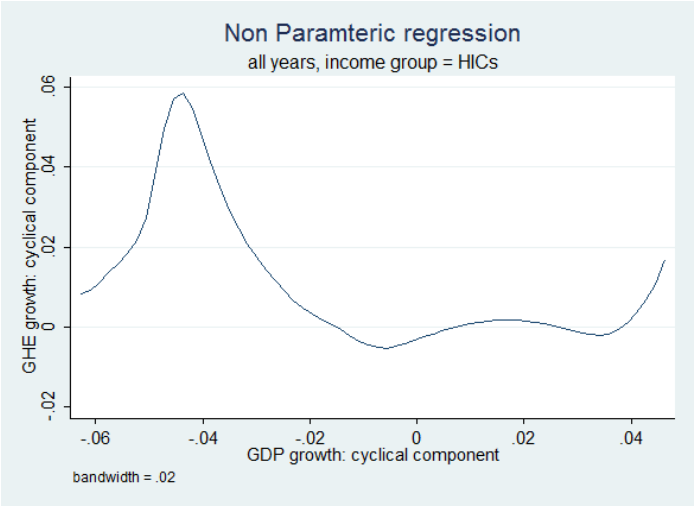
Panel B



Panel C



Panel D



Source: Authors' calculations based on data from the Fiscal Health Database 2012

ANNEX 13: DIAGNOSTIC MODEL RESULTS

Table 13A.1 Overview of Diagnostic Model Results from Pooled Regressions for the Full Sample

Diagnostic OLS	Bivariate - Model 1		Multivariate - Model 2		Model 3		Model 4		Model 5		Model 6	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.427***	0.082	0.266***	0.080	0.234***	0.080	0.600***	0.101	0.598***	0.102	0.591***	0.102
Fiscal Cycle (GGE)			0.278***	0.019	0.260***	0.019	0.222***	0.031	0.221***	0.031	0.220***	0.031
GDP*GGE					3.248***	0.665	-2.766**	1.311	-2.766**	1.326	-2.772**	1.327
ICRG							-0.023	0.021	-0.027	0.027	-0.012	0.032
Polity 2							0.000	0.001	0.001	0.001	-0.000	0.001
Debt/GDP							0.005	0.005	0.003	0.005	0.003	0.005
Tax/GDP							-0.000	0.000	-0.000	0.000	0.000	0.000
TOT							-0.001***	0.000	-0.001***	0.000	-0.001***	0.000
EAS									0.007	0.014		
ECS									0.009	0.013		
LCN									0.000	0.013		
MEA									0.013	0.015		
NAC									0.007	0.020		
SAR									(dropped)			
SSF									0.016	0.013		
LIC											0.005	0.009
LMIC											-0.006	0.007
UMIC											(dropped)	
HIC											-0.003	0.007
_cons	-0.000	0.002	-0.000	0.002	-0.001	0.002	0.017	0.013	0.010	0.017	0.012	0.022
Adjusted R2	0.009		0.078		0.085		0.111		0.110		0.111	
No. of Observations	2,904		2,904		2,904		904		904		904	

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.2 Overview of Model 3 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Negative

Model 3 - Neg. GDP, Pooled & IG	Model 3 Pooled		Model 3 LIC		Model 3 LIC_ODA		Model 3 LMIC		Model 3 LMIC_ODA		Model 3 UMIC		Model 3 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.198	0.148	0.510	0.350	0.400	0.344	0.456*	0.256	0.536*	0.275	0.044	0.250	-0.644***	0.227
Fiscal Cycle (GGE)	0.176***	0.042	0.177**	0.082	0.220***	0.080	0.160**	0.070	0.159**	0.074	0.089	0.081	0.407***	0.117
GDP*GGE	-4.829***	1.416	-2.635	2.754	-4.020	2.705	-6.609***	2.447	-7.133***	2.591	-8.337***	2.939	-2.671	3.806
ODA					0.107**	0.050			0.004	0.053				
_cons	-0.003	0.003	-0.003	0.008	-0.015	0.010	-0.003	0.005	-0.001	0.006	-0.001	0.005	-0.009**	0.004
Adjusted R2	0.061		0.039		0.062		0.069		0.070		0.104		0.149	
No. of Observations	1,483		426		421		456		400		284		317	

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.3 Overview of Model 4 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Negative

Model 4 - Neg. GDP, Pooled & IG	Model 4 - Pooled		Model 4 LIC		Model 4 LIC_ODA		Model 4 LMIC		Model 4 LMIC_ODA		Model 4 UMIC		Model 4 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.195	0.218	1.258	1.377	0.549	1.322	0.726*	0.381	0.754*	0.396	0.104	0.447	-0.355	0.262
Fiscal Cycle (GGE)	0.202***	0.063	0.326	0.212	0.564**	0.214	0.083	0.083	0.074	0.086	0.259*	0.148	0.198	0.161
GDP*GGE	-6.665**	2.597	-1.992	13.387	4.966	12.846	-11.919**	5.287	-12.730**	5.397	-2.047	4.504	-1.853	4.538
ICRG	0.008	0.032	-0.120	0.210	-0.186	0.200	-0.107	0.090	-0.153	0.101	0.032	0.122	0.042	0.049
Polity 2	-0.001	0.001	0.000	0.005	0.002	0.005	-0.003*	0.002	-0.004**	0.002	-0.001	0.003	-0.002	0.001
Debt/GDP	-0.002	0.007	0.012	0.020	-0.022	0.022	-0.039**	0.019	-0.042*	0.023	-0.021	0.019	0.012	0.011
Tax/GDP	0.000	0.001	0.006	0.004	0.006	0.004	0.000	0.001	0.001	0.001	0.003	0.002	0.000	0.000
TOT	-0.001***	0.000	0.000	0.001	0.000	0.001	-0.000	0.000	-0.000	0.000	-0.001	0.001	-0.002***	0.000
ODA					0.364***	0.112			0.103	0.207				
_cons	-0.005	0.019	-0.007	0.106	-0.002	0.100	0.090*	0.053	0.122**	0.060	-0.048	0.085	-0.028	0.041
Adjusted R2	0.128		0.044		0.161		0.133		0.143		0.111		0.359	
No. of Observations	470		78		76		140		125		91		161	

Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.4 Overview of Model 3 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Positive

Model 3 - Pos. GDP, Pooled & IG	Model 3 Pooled		Model 3 LIC		Model 3 LIC_ODA		Model 3 LMIC		Model 3 LMIC_ODA		Model 3 UMIC		Model 3 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	-0.412***	0.159	0.643*	0.356	0.701*	0.356	-1.415***	0.288	-0.410	0.315	0.408*	0.242	0.411*	0.218
Fiscal Cycle (GGE)	0.134***	0.036	0.334***	0.072	0.328***	0.072	-0.083	0.061	0.365***	0.070	0.066	0.071	0.174**	0.079
GDP*GGE	10.386***	1.206	-1.227	2.182	-1.417	2.168	23.748***	2.141	6.575**	3.058	7.419***	2.310	6.037	3.723
ODA					-0.008	0.033			0.133**	0.055				
_cons	0.010***	0.004	-0.002	0.007	-0.001	0.008	0.026***	0.007	0.007	0.007	-0.007	0.006	-0.004	0.004
Adjusted R2	0.167		0.078		0.075		0.364		0.191		0.181		0.156	
No. of Observations	1,377		442		429		419		384		248		268	

Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.5 Overview of Model 4 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Positive

Model 4 - Pos. GDP, Pooled & IG	Model 4 - Pooled		Model 4 LIC		Model 4 LIC_ODA		Model 4 LMIC		Model 4 LMIC_ODA		Model 4 UMIC		Model 4 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.587***	0.201	2.593***	0.948	2.713***	0.958	0.289	0.460	0.219	0.480	0.303	0.275	0.223	0.269
Fiscal Cycle (GGE)	0.035	0.053	0.160	0.165	0.159	0.165	0.235***	0.075	0.229***	0.077	-0.231**	0.102	-0.740***	0.142
GDP*GGE	6.863**	2.688	-3.263	8.383	-4.346	8.464	-9.114	6.211	-9.098	6.396	19.201***	4.759	36.606***	5.573
ICRG	-0.046*	0.028	0.023	0.118	-0.005	0.120	0.025	0.101	0.036	0.108	-0.021	0.080	-0.007	0.048
Polity 2	0.001	0.001	0.002	0.003	0.003	0.003	0.001	0.002	0.001	0.002	0.001	0.002	0.000	0.001
Debt/GDP	0.019***	0.006	0.013	0.013	-0.003	0.020	0.010	0.022	0.002	0.023	0.016	0.018	-0.003	0.009
Tax/GDP	-0.000	0.000	-0.005**	0.002	-0.004*	0.002	0.001	0.001	0.001	0.001	-0.003**	0.001	-0.000	0.000
TOT	-0.000	0.000	0.000	0.001	-0.000	0.001	-0.000	0.001	-0.000	0.001	0.000	0.000	0.000	0.000
ODA					0.065	0.059			0.129	0.250				
_cons	0.021	0.017	0.021	0.059	0.031	0.059	-0.032	0.057	-0.037	0.061	0.044	0.059	0.010	0.040
Adjusted R2	0.118		0.208		0.208		0.034		0.025		0.316		0.278	
No. of Observations	434		88		87		127		120		85		134	

Source: Authors' calculations based on data from the Fiscal Health Database 2012
Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

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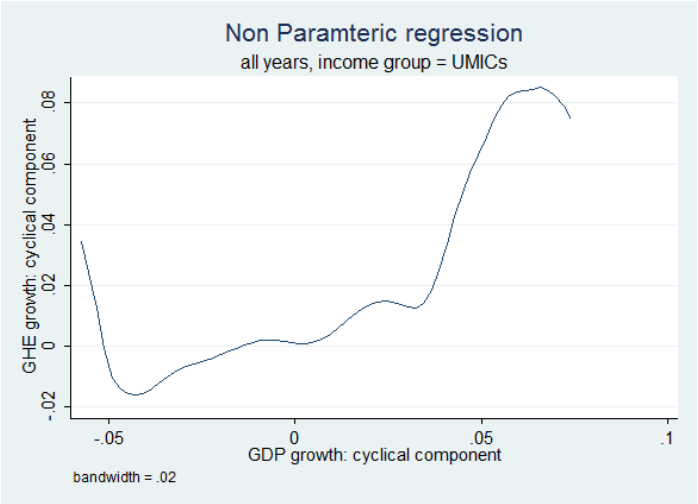
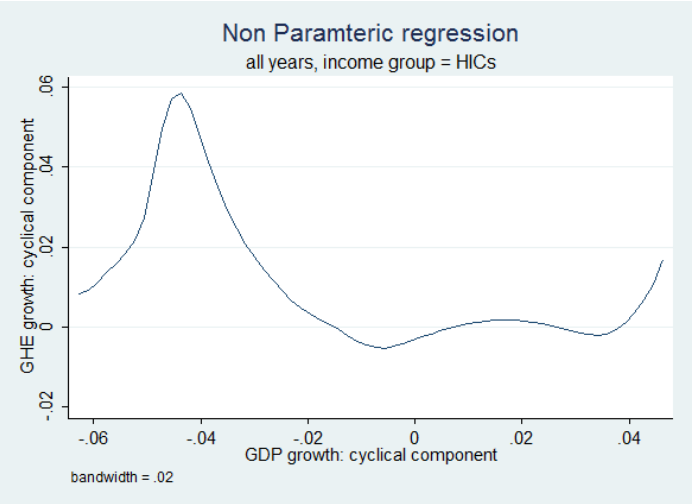
Panel C **Panel D**





Source: Authors' calculations based on data from the Fiscal Health Database 2012

ANNEX 13: DIAGNOSTIC MODEL RESULTS

Table 13A.1 Overview of Diagnostic Model Results from Pooled Regressions for the Full Sample

Diagnostic OLS	Bivariate - Model 1		Multivariate - Model 2		Model 3		Model 4		Model 5		Model 6	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.427***	0.082	0.266***	0.080	0.234***	0.080	0.600***	0.101	0.598***	0.102	0.591***	0.102
Fiscal Cycle (GGE)			0.278***	0.019	0.260***	0.019	0.222***	0.031	0.221***	0.031	0.220***	0.031
GDP*GGE					3.248***	0.665	-2.766**	1.311	-2.766**	1.326	-2.772**	1.327
ICRG							-0.023	0.021	-0.027	0.027	-0.012	0.032
Polity 2							0.000	0.001	0.001	0.001	-0.000	0.001
Debt/GDP							0.005	0.005	0.003	0.005	0.003	0.005
Tax/GDP							-0.000	0.000	-0.000	0.000	0.000	0.000
TOT							-0.001***	0.000	-0.001***	0.000	-0.001***	0.000
EAS									0.007	0.014		
ECS									0.009	0.013		
LCN									0.000	0.013		
MEA									0.013	0.015		
NAC									0.007	0.020		
SAR									(dropped)			
SSF									0.016	0.013		
LIC											0.005	0.009
LMIC											-0.006	0.007
UMIC											(dropped)	
HIC											-0.003	0.007
_cons	-0.000	0.002	-0.000	0.002	-0.001	0.002	0.017	0.013	0.010	0.017	0.012	0.022
Adjusted R2	0.009		0.078		0.085		0.111		0.110		0.111	
No. of Observations	2,904		2,904		2,904		904		904		904	

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.2 Overview of Model 3 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Negative

Model 3 - Neg. GDP, Pooled & IG	Model 3 Pooled		Model 3 LIC		Model 3 LIC_ODA		Model 3 LMIC		Model 3 LMIC_ODA		Model 3 UMIC		Model 3 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.198	0.148	0.510	0.350	0.400	0.344	0.456*	0.256	0.536*	0.275	0.044	0.250	-0.644***	0.227
Fiscal Cycle (GGE)	0.176***	0.042	0.177**	0.082	0.220***	0.080	0.160**	0.070	0.159**	0.074	0.089	0.081	0.407***	0.117
GDP*GGE	-4.829***	1.416	-2.635	2.754	-4.020	2.705	-6.609***	2.447	-7.133***	2.591	-8.337***	2.939	-2.671	3.806
ODA					0.107**	0.050			0.004	0.053				
_cons	-0.003	0.003	-0.003	0.008	-0.015	0.010	-0.003	0.005	-0.001	0.006	-0.001	0.005	-0.009**	0.004
Adjusted R2	0.061		0.039		0.062		0.069		0.070		0.104		0.149	
No. of Observations	1,483		426		421		456		400		284		317	

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.3 Overview of Model 4 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Negative

Model 4 - Neg. GDP, Pooled & IG	Model 4 - Pooled		Model 4 LIC		Model 4 LIC_ODA		Model 4 LMIC		Model 4 LMIC_ODA		Model 4 UMIC		Model 4 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.195	0.218	1.258	1.377	0.549	1.322	0.726*	0.381	0.754*	0.396	0.104	0.447	-0.355	0.262
Fiscal Cycle (GGE)	0.202***	0.063	0.326	0.212	0.564**	0.214	0.083	0.083	0.074	0.086	0.259*	0.148	0.198	0.161
GDP*GGE	-6.665**	2.597	-1.992	13.387	4.966	12.846	-11.919**	5.287	-12.730**	5.397	-2.047	4.504	-1.853	4.538
ICRG	0.008	0.032	-0.120	0.210	-0.186	0.200	-0.107	0.090	-0.153	0.101	0.032	0.122	0.042	0.049
Polity 2	-0.001	0.001	0.000	0.005	0.002	0.005	-0.003*	0.002	-0.004**	0.002	-0.001	0.003	-0.002	0.001
Debt/GDP	-0.002	0.007	0.012	0.020	-0.022	0.022	-0.039**	0.019	-0.042*	0.023	-0.021	0.019	0.012	0.011
Tax/GDP	0.000	0.001	0.006	0.004	0.006	0.004	0.000	0.001	0.001	0.001	0.003	0.002	0.000	0.000
TOT	-0.001***	0.000	0.000	0.001	0.000	0.001	-0.000	0.000	-0.000	0.000	-0.001	0.001	-0.002***	0.000
ODA					0.364***	0.112			0.103	0.207				
_cons	-0.005	0.019	-0.007	0.106	-0.002	0.100	0.090*	0.053	0.122**	0.060	-0.048	0.085	-0.028	0.041
Adjusted R2	0.128		0.044		0.161		0.133		0.143		0.111		0.359	
No. of Observations	470		78		76		140		125		91		161	

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.4 Overview of Model 3 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Positive

Model 3 - Pos. GDP, Pooled & IG	Model 3 Pooled		Model 3 LIC		Model 3 LIC_ODA		Model 3 LMIC		Model 3 LMIC_ODA		Model 3 UMIC		Model 3 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	-0.412***	0.159	0.643*	0.356	0.701*	0.356	-1.415***	0.288	-0.410	0.315	0.408*	0.242	0.411*	0.218
Fiscal Cycle (GGE)	0.134***	0.036	0.334***	0.072	0.328***	0.072	-0.083	0.061	0.365***	0.070	0.066	0.071	0.174**	0.079
GDP*GGE	10.386***	1.206	-1.227	2.182	-1.417	2.168	23.748***	2.141	6.575**	3.058	7.419***	2.310	6.037	3.723
ODA					-0.008	0.033			0.133**	0.055				
_cons	0.010***	0.004	-0.002	0.007	-0.001	0.008	0.026***	0.007	0.007	0.007	-0.007	0.006	-0.004	0.004
Adjusted R2	0.167		0.078		0.075		0.364		0.191		0.181		0.156	
No. of Observations	1,377		442		429		419		384		248		268	

Source: Authors' calculations based on data from the Fiscal Health Database 2012

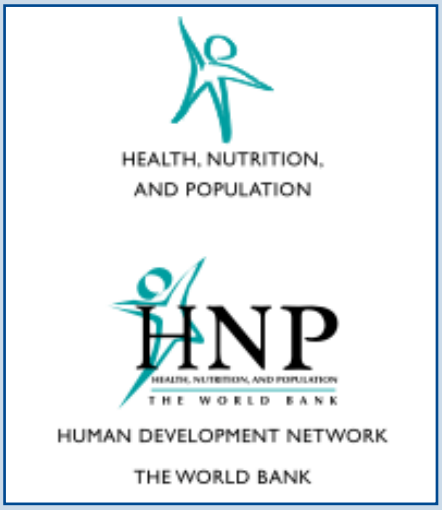
Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 13A.5 Overview of Model 4 Results for the Pooled Data and by Income Groups When the GDP Cycle Is Positive

Model 4 - Pos. GDP, Pooled & IG	Model 4 - Pooled		Model 4 LIC		Model 4 LIC_ODA		Model 4 LMIC		Model 4 LMIC_ODA		Model 4 UMIC		Model 4 HIC	
Covariates	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Business Cycle (GDP)	0.587***	0.201	2.593***	0.948	2.713***	0.958	0.289	0.460	0.219	0.480	0.303	0.275	0.223	0.269
Fiscal Cycle (GGE)	0.035	0.053	0.160	0.165	0.159	0.165	0.235***	0.075	0.229***	0.077	-0.231**	0.102	-0.740***	0.142
GDP*GGE	6.863**	2.688	-3.263	8.383	-4.346	8.464	-9.114	6.211	-9.098	6.396	19.201***	4.759	36.606***	5.573
ICRG	-0.046*	0.028	0.023	0.118	-0.005	0.120	0.025	0.101	0.036	0.108	-0.021	0.080	-0.007	0.048
Polity 2	0.001	0.001	0.002	0.003	0.003	0.003	0.001	0.002	0.001	0.002	0.001	0.002	0.000	0.001
Debt/GDP	0.019***	0.006	0.013	0.013	-0.003	0.020	0.010	0.022	0.002	0.023	0.016	0.018	-0.003	0.009
Tax/GDP	-0.000	0.000	-0.005**	0.002	-0.004*	0.002	0.001	0.001	0.001	0.001	-0.003**	0.001	-0.000	0.000
TOT	-0.000	0.000	0.000	0.001	-0.000	0.001	-0.000	0.001	-0.000	0.001	0.000	0.000	0.000	0.000
ODA					0.065	0.059			0.129	0.250				
_cons	0.021	0.017	0.021	0.059	0.031	0.059	-0.032	0.057	-0.037	0.061	0.044	0.059	0.010	0.040
Adjusted R2	0.118		0.208		0.208		0.034		0.025		0.316		0.278	
No. of Observations	434		88		87		127		120		85		134	

Source: Authors' calculations based on data from the Fiscal Health Database 2012

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.



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