Fiscal Stimulus, Agricultural Growth and Poverty in Asia and the Pacific Region: Evidence from Panel Data

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Fiscal Stimulus, Agricultural Growth and Poverty in Asia and the Pacific Region: Evidence from Panel Data[1]

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Abstract

Recent debates on a sustainable recovery of the global economy have tended to overemphasise the "saving glut" hypothesis and the unavoidable imperative of higher consumption in China and other emerging Asian countries. That oversaving and not underinvestment is coming in the way of a quicker and more durable recovery is not just simplistic but misleading from a medium- term growth perspective for emerging Asian countries and other developing countries in this region. The present study makes a case for a bold and coordinated fiscal stimulus, directed to stimulating agricultural and overall growth, and mitigation of poverty and hunger. Indeed, if our simulations of fiscal impacts have any validity, the dire predictions of millions getting trapped in poverty and hunger may turn out to be exaggerated. The prospects of a strong recovery led by fiscal stimulus are thus *real* and *achievable*.

Key words: Government Expenditure, Fiscal Policy, Economic Growth, Agricultural Growth, Poverty, Asia.

JEL codes: E26, O40, Q19

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Introduction

The seeds of the present recession were sown in the underpricing of risk and the resulting excessive leverage. Defaults on subprime mortgages led to repricing of risk. As a result, there were sharp falls in the prices of mortgage-backed securities, share prices and home values. Destruction of wealth in turn caused cuts in consumer spending, business investment and in commercial real estate values.

Continuing declines in the values of mortgaged-based securities and of the derivatives based on them fed fears of further mortgage defaults. Erosion of capital of financial institutions weakened their willingness to make loans. Thus a dysfunctional credit market emerged that no longer gave loans or responded to changes in the interest rates Feldstein, 2009, Krugman, 2009a)

Total capitalisation of world stock markets almost halved in 2008 (i.e. nearly $30 trillion of wealth disappeared). Market recovery so far is about $2 trillion (Lin, 2009). Losses of this magnitude have significant wealth effects on consumption and saving

Although governments in USA and Europe acted promptly and decisively, they failed to prevent the financial crisis from spreading to the real sector. Globally, industrial production declined by 28 per cent in the first quarter of 2009 before easing to a pace of contraction of 19 per cent in April (on a rolling quarterly basis). During the first quarter of 2009, exports in East Asia (e.g. China and Japan) declined by 50 percent or more, and in Korea by 43 per cent, presaging the largest trade contraction since 1929 (Lin, 2009). Other transmission channels through which the contagion spread include sharp reductions in investment, and remittances[2].

The GDP growth rate in developing countries in 2009 is forecast to drop to 1.2 per cent, a precipitous decline from 8.1 per cent in 2007 and 5.9 per cent in 2008. Recent World Bank estimates show that the sharp deceleration of growth would trap 53 million more in poverty (living on less than $1.25 a day), and 65 million on the higher cut-off of $2 per day. If the recession persists, much larger numbers are likely to get trapped in poverty. Another dire forecast is that an average of 200, 000 to 400, 000 more children per year, a total of 1.4 to 2.8 million, may die during 2009 to 2015 if the crisis persists.

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[2] Total FDI and private capital flows to developing countries are estimated to decline from $1.2 trillion in 2007 to $363 billion in 2009. Remittances are likely to fall from $328 to $305 billion (Lin, 2009).

While the gravity of the concerns raised cannot be disputed, the present study makes a strong case for the strategic role of agriculture in breaking out of this recession, and in mitigating poverty and other associated hardships. In addressing these concerns, we seek to build on our earlier work (Imai et al. 2009 a, b).

Why Fiscal Stimulus?

Experience has shown that in general monetary policy is ineffective in stimulating investment and consumption in excess capacity situations.

Fiscal stimulus, on the other hand, has the potential of working by releasing bottlenecks to growth in developing countries[3]. It must, however, be bold, global, and generate an immediate and sustained increase in global demand and productivity.

There are two major limitations of current fiscal stimulus programmes. First, most developing countries are constrained by either fiscal space or/and foreign exchange reserves, and thus over a period of time will not be able to pursue counter-cyclical policies. Fiscal position was in large measure undermined by the fuel and food crises, resulting in expansion of subsidies. Moreover, an estimated one-third of developing countries have large current account deficits of 10 per cent of their GDP. Second, contrary to Keynesian theory, the so-called Ricardian equivalence theorem points to the possibility that households adjust their behaviour for consumption or saving on the basis of expectations about the future. Any fiscal stimulus package-spending or tax cuts- is then perceived as a liability which will need to be repaid in the future. In such a situation, the multiplier could be less than 1, with the GDP seen as given so that an increase in government spending does not lead to an equal rise in other parts of GDP. A case in point is Japan's experience during the "lost decade". The government was aggressive in implementing its fiscal stimulus. In 1991, public debt was 60 per cent of the country's GDP. By 2002, it had risen to 140 per cent, implying a large stimulus of 7 per cent of GDP per year. Yet, Japan did not get out of the crisis. This is because people chose to increase saving, which mitigated the effects of government spending. So the lesson is clear: even if governments around the world agree to implement coordinated fiscal stimulus packages, there is still the issue of whether these fiscal programmes will increase aggregate demand enough to offset the excess capacity that has been built up during the 2002-07 bubble (Lin, 2008, 2009).

If public spending delivers higher levels of investment and rational economic agents believe that their income will not be taxed for repayment in the future, the Ricardian equivalence effect will be weak, if any. If policymakers can design a system that allows projects/programmes to generate enough returns to repay themselves, the chance of success is high. So, if governments use fiscal stimulus to release bottlenecks to growth, economic growth will be accelerated and marginal returns to private investment will also be higher.

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[3] For an emphatic endorsement, see Krugman (2009b). He in fact argues that fiscal expansion does not crowd out private investment — on the contrary, there's crowding in, because a stronger economy leads to more investment. So, fiscal expansion increases future potential, rather than reducing it.

China's economic stimulus of 1998-2002 illustrates this view. In the midst of the Asian financial crisis, when sharp economic slumps in Indonesia, Korea, Malaysia, Philippines, and Thailand prompted all the neighbours to depreciate their currencies, China issued an estimated RMB 660 billion in bonds specifically to finance infrastructure, inducing four times more of bank loans, private and local government investment. As a result, China went through deflation but recorded an average growth rate of 7.8 per cent. An important feature of the stimulus was that it was targeted to the release of bottlenecks to growth. Examples include the highway system, port facilities, telecommunications and education. The Chinese economy got out of deflation in 2003, and growth of GDP accelerated to 10.8 per cent in 2003-08. This then resulted in an increase in revenue which brought about a reduction of public debt from 30 per cent of the GDP in the 1990s to 20 per cent in 2007 (Lin, 2009).

High return opportunities may be limited in developed countries where a high level of investment and consumption has already been realised under the market system. By contrast, such projects tend to abound in developing countries-especially in the rural areas. Clearly, some fraction of fiscal resources must be injected in developed countries that are the epicentre of the crisis, but the main objective must be to create demand quickly and efficiently. So channelling of investment to where it can be most effectively utilised –especially in the developing countries-is a high priority. Infrastructural investment –both domestically and regionally-can generate strong backward and forward linkages with other sectors and facilitate growth and further investment in traditionally poorer areas.

However, there is one important difference in the present situation. In the past crises, some countries could depreciate their currencies and increase exports to get out of the recession. But in the present global slowdown, currency depreciation and greater exports are not an option. This of course does not rule out greater trade *within* a region-for example, *within* Asia and/or *between* developing regions and/or *between* emerging economies. China's rapid expansion of trade with Japan is a case in point. But this is more a question of exploitation of intra-region or inter-region trade potential and not one of using "beggar thy neighbour policies". While erosion of trade of East Asian countries (e.g. China) with USA and Europe during the last two quarters may not be fully compensated, there are substantial possibilities of trade expansion within Asia and with other developing countries (Petri, 2006). Not only is this opportunity glossed over or sidetracked in recent debates but there is also an overemphatic endorsement of the "saving" glut hypothesis and consequently higher consumption in China, in particular, and India and other high saving emerging countries, in general, to prevent the global slowdown from turning into a deep recession[4]. In line with the pronouncements of US Treasury and a galaxy of development economists, various researchers from the Asian Development Bank (notably Park and Shin, 2009, Jha et al. 2009) have drawn attention to rebalancing of growth in emerging Asian countries- a euphemism for raising consumption. While recognising that both underinvestment and oversaving contribute to the current account surplus, Park and Shin (2009) emphasise that the contribution is predominantly from oversaving rather than underinvestment[5]. While as an empirical

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[4] See, for example, Prasad (2009).
[5] This is buttressed by decompositions of growth in Jha et al. 2009. A summary of the decomposition is given in Annex 2.

observation this is not false, it is not sufficient to shift the policy emphasis from raising investment to cutting down oversaving[6]. From a medium-term perspective, the impediments to agricultural growth are many and persistent. These include limited access to markets, weak financial intermediation, fragile extension systems, and high vulnerability to diverse market and non-market risks. As market failures are rampant, public expenditure has a vital role. Moreover, public investment multipliers-including not just infrastructure but also education and health- are generally found to be larger than public expenditure ones (net of investment). Indeed, as pointed out by Sachs (2009), the present crisis is an opportunity to *rebalance* the public and private sectors, and to link the short-term macro stimulus with the long-term sustainability agenda.

Further doubts arise about the rebalancing argument if account is taken of recent estimates of consumption growth in emerging Asia.

A recent issue of *The Economist* (June 25th, 2009) draws attention to Asia's emerging economies bouncing back. Their GDP grew by an annualised 7 per cent in the second quarter of 2009.

Figure 1 Consumption Growth in Asia
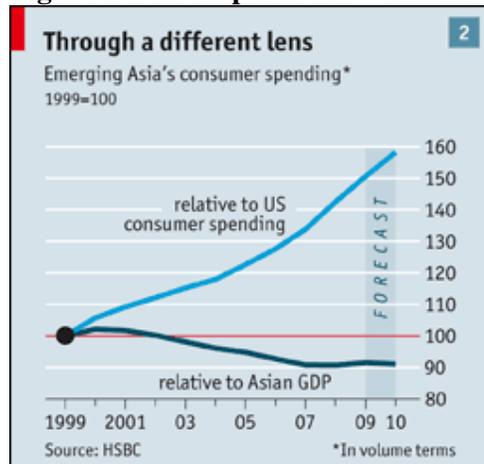
Source: *The Economist* (June 25th, 2009)

Consumers' appetite to spend varies hugely across this region. In China, India and Indonesia spending has increased by annual rates of more than 5 per cent during the global downturn In China, real spending has grown at an impressive rate of 9 per cent. Elsewhere in the region, however, spending has stumbled, squeezed by higher unemployment and lower wages.

During the past five years consumer spending in emerging Asia has grown by an annual average of 6.5 per cent, much faster than in any other part of the world. Consumption as a proportion of GDP has fallen but that is because investment and exports have grown even faster and not because spending has been weak. Relative to American consumer spending, Asian consumption has soared, as shown in Fig. 1.

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[6] In fact, the Park-Shin analysis (2009) is deeply problematic both methodologically and interpretationally. For details, see Gaiha et al. (2009).

Nonetheless China has done much to boost consumption-rural residents are given subsidies for buying vehicles, televisions and refrigerators-as there is huge potential for higher consumption in the rural areas when incomes rise. The government has also introduced social safety net measures-spending more on health care, pensions and payments to low income households. These could lead low income households to save less and spend more.

But a bigger test of Asian governments' resolve to shift the balance of growth from exports towards domestic spending is, as argued in different issues of *The Economist* and elsewhere, whether they will allow their exchange rate to appreciate. A revaluation would lift consumers' real purchasing power and allow firms to shift production towards domestic demand. That this is not just oversimple but also a short-sighted and potentially misleading view is elaborated below. Specifically, fiscal stimulus directed to investments in rural and other areas has considerable potential for expanding output and incomes in a sustainable way, through domestic and external demand, without drastic exchange rate adjustments[7].

Macro Policy Options

Recent assessments (IMF, 2009, Krugman, 2009a, b, Feldstein, 2009, ADB, 2009, Ilzetki et al. 2009, *The Economist*, 2009 a, b) of fiscal stimulus reflect a growing consensus on the continuing need for it until global recovery stabilises. While there is cautious endorsement of sustainability of fiscal expansion in emerging and other developing countries, depending on the fiscal space and debt burden, there is also awareness of the painful lessons learnt from an early withdrawal of fiscal stimulus during the Great Depression of the 1930s and the more recent experience of the recession in Japan in the 1990s. In fact, there are some-notably Krugman (2009 b) - who are emphatic in their endorsement of a second round of fiscal stimulus.

A general consensus is that all *major* actors need to respond quickly and in a more coordinated manner-endorsed also by the recently concluded G-20 Summit in Pittsburgh. These actors include developing countries that are now responsible for a large share of the global economy and trade flows.

In general, developing countries are in some respects better poised to deal with the shocks that have rippled through the global economy, relative to the earlier crises. Their macro-economic policies-including their fiscal and external positions-are designed to make them less vulnerable to such shocks. Sovereign debt is better managed than at the time of the East Asian financial crisis while flexible exchange rates allow external shocks to be absorbed less disruptively. The number of extremely poor has also declined appreciably-by more than 300 million since the East Asian Financial Crisis (Ravallion and Chen, 2008). Diminished inflationary expectations together with reduction of commodity prices (for net importers) have further eased macro-economic strains for some developing countries.

There are two main policy tools- monetary and fiscal policies- that developing countries must combine in a contextually appropriate manner. It may be imperative

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[7] On this, see Rodrik (2007, 2009).

for some to tighten monetary policy by raising interest rates to avoid excessive currency depreciation or capital outflows while others may have room to lower interest rates to stimulate investment in sectors in which they have comparative advantage.

There is a variety of fiscal options. Injection of domestic demand could help offset the loss of foreign demand. Public investment-especially in infrastructure- is a key option. Of particular importance is rural infrastructure, given the disparity between rural and urban areas. Another area of investment is social protection and human development. Examples include *conditional* cash transfers to keep disadvantaged children in school, public works employment (a case in point is National Rural Employment Guarantee Scheme in India) and subsidies on inferior food. Such fiscal stimulus is likely to work in countries with healthy reserves, current account surplus or small deficits, and fiscal balance. However, the policy dilemma that confronts governments in developing countries is whether they can respond in a countercyclical manner by increasing domestic demand without risking their fundamentals-fiscal position, debt level, domestic inflation and the banking sector. Few countries have scope to do this while others are constrained fiscally (India more than China, for example) or experiencing capital flight out to safer havens.

Fiscal Multipliers

While there is general consensus on the need for fiscal stimulus to enable the global economy to break out of the recession, there is a sharp divergence of views on the effectiveness of Keynesian fiscal multipliers (either tax cuts or increases in government spending). Two extreme views for USA, for example, are: peace time fiscal multipliers are 0 (Barro, 2009) and 1.6 (Romer and Bernstein, 2009)[8]. The uncertainty about these multipliers is even higher in emerging and developing countries. One reason is that the data are not just scarce but often of dubious quality. As discussed below, the magnitude also varies depending on the sustainability of fiscal expansion, exchange rate regime, debt burden and the degree of openness of the economy.

First, a few general observations are made[9].

- In an economy operating at full capacity, the fiscal multiplier should be 0 as any increase in government demand will replace other demand. Only when there is excess capacity, a fiscal expansion induces an increase in demand and output.
- The multiplier also varies depending on the type of fiscal stimulus. Construction of a bridge, for example, or a road may have a larger impact than a tax cut. Further, a tax cut targeted to the poor may be more expansionary as the poor tend to consume a larger share of their income.
- The multipliers are larger in closed economies, as compared with open economies, since there are no 'leakages" of demand.

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[8] The difference in jobs that will be created by the $787 billion stimulus package amounts to a staggering 3.7 million by the end of 2010.
[9] This draws upon *The Economist* (24th September, 2009).

- The size of the multiplier also depends on how people react to government borrowing. If the public confidence is bolstered and the "animal spirits" are revived, the multiplier may be larger as private investment is crowded in. But if interest rate rises some potential investment is likely to be crowded out. Further, if consumers expect higher taxes in the future, they may save to meet these liabilities.

So, one way to resolve the issue is to estimate the impact empirically. However, the range of estimated impacts is *frequently* large as implied by theory. Some important findings from two recent studies (Ilzetzki et al. 2009, Horton et al. 2009) illustrate. Let us first consider the results in Ilzetzki et al. (2009).

- In high income countries, the impact response of output to increases in government expenditure is larger than in developing countries, and considerably more persistent. The cumulative multiplier for high income countries rises from an initial value of 0.24 (the impact effect) to a long-run value of 1.04. By contrast, the cumulative long-run multiplier for developing countries is just 0.79.
- Economies operating under fixed /predetermined exchange rate regimes have long –run multipliers of about 1.5 but those under flexible exchange rates have essentially zero multipliers. The initial effect of a fiscal expansion is to increase output and raise interest rates, which in turn appreciates the exchange rate. Under predetermined exchange rates, the money supply expands to prevent this appreciation. Monetary accommodation further boosts output. Under flexible exchange rates, however, money supply does not increase and cuts short further output expansion.
- Relatively closed economies have long-run multipliers of around 1.6 but relatively open ones have small or 0 multipliers.
- While the short-run response of highly indebted countries (external debt to GDP ratio >50 per cent) is larger than for low-debt countries, it is also short-lived in the former. This is consistent with the view that an increase in government spending fuels market fears. Thus not just financing costs of fiscal expansion rise but also the output effects of fiscal expansion are dampened.

A more detailed and comprehensive assessment of fiscal stimulus, focusing on the G-20, is carried out by three IMF researchers (Horton et al. 2009).

The main findings together with a selection of projections are reviewed below.

- Overall deficits in the G-20 countries are likely to increase by 5.5 percentage points of GDP in 2009 and 2010, relative to the 2007 pre-crisis level. In advanced G-20 economies, fiscal deficits in 2009 are estimated to be somewhat larger. By contrast, changes in fiscal balances are expected to be smaller in other G-20 countries, particularly those where commodity revenues are important, as shown below in Table 1, and Fig.2.
- Crisis-related discretionary measures are estimated to be 2 per cent of GDP in 2009 and 1.6 per cent of GDP in 2010. Emerging G-20 countries have announced larger stimulus packages for 2009, on average, than advanced G-20 countries. This is presumably a result of smaller automatic stabilisers and

consequently greater need as well as substantial fiscal space in key emerging market economies. Emerging market discretionary measures are also more heavily weighted towards infrastructure investment and less focused on income tax cuts.

- In all countries, the pace of spending has been constrained by budgetary procedures, transfers to subnational governments, procurement, and payment to contractors.

- Estimates of growth impacts range from 1.2 to 4.7 percentage points in 2009, and from 0.1 to 1.0 percentage point in 2010, relative to the previous year. These estimates take into account spillover effects across borders and coordinated global action. The details are given in Table 2. However, a caveat to be borne in mind is that these are the impacts of the full fiscal expansion and not just the fiscal stimulus[10].

Table 1
G-20 Countries: Fiscal Expansion

| | 2009 Of which | | | 2010 Of which | | |
	Overall balance	Crisis – related Discretionary Measures	Other Factors	Overall balance	Crisis – related Discretionary Measures	Other Factors
PPP GDP- weighted average	-5.5	-2.0	-3.5	-5.5	-1.6	-3.8
Advanced countries	-5.9	-1.9	-4.0	-6.2	-1.6	-4.5
Emerging and Developing G-20	-5.0	-2.2	-2.8	-4.4	-1.6	-2.8

Source: Horton et al. (2009)

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[10] For details of the range of multipliers, see Annex 1.

**Figure 2: Overall Fiscal Balances Worldwide
(in percent of GDP, PPP-weighted average)**
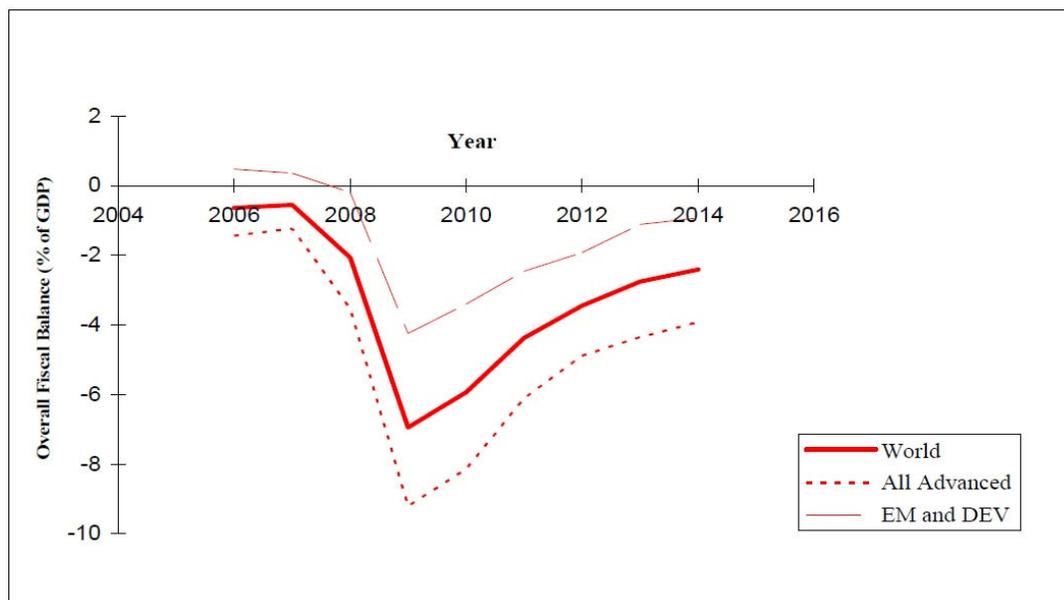
Source: Horton et al. (2009)

**Table 2
G-20 Countries: Impact of Fiscal Expansion on Growth
(Change in percentage points)[1]**

	2009	2010	Average
Low-high range impact [2]			
G-20 total	1.2-4.7	0.1-1.0	0.7-2.8
Advanced G-20 countries	1.3-4.4	0.1-1.1	0.7-2.7
Emerging market G-20 countries	1.1-5.0	0.0-0.8	0.6-2.9

Source: Horton et al. (2009)

1. Fiscal expansion and growth are calculated with respect to the previous year. Fiscal expansion is measured as the change in the real overall fiscal balance between the two years in relation to real GDP of the previous year.
2. The range of growth estimates reflects different assumptions on fiscal multipliers. The low set included a multiplier of 0.3 on revenues, 0.5 on capital spending, and 0.3 on other spending. The high set included a multiplier of 0.6 on revenues, 1.8 on capital spending and 1 on other spending. For calculation of the growth impact of total fiscal expansion, a weighted average of current and capital expenditure multipliers was used.

Figure 3: G-20 Countries—Outlook for Public Finances (in percent of GDP)
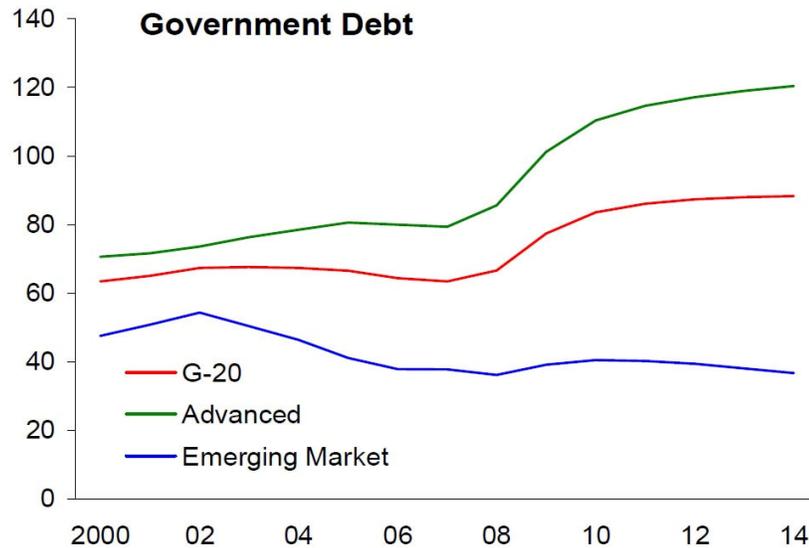
Source: Horton et al. (2009).

- Debt ratios in the G-20 countries as a whole are expected to stabilise at around 85 per cent of the GDP between 2010-2014, about 23 percentage points above the pre-crisis level. In the advanced countries, debt levels are likely to rise to about 120 per cent of GDP, up from about 80 per cent of the GDP before the crisis. In the emerging G-20 countries, by contrast, debt levels are expected to decline slightly after the initial post-crisis peak. These changes are illustrated in Fig: 2.

A major concern is to anchor the stimulus to medium-term fiscal consolidation with flexibility in the event of output shocks and full disclosure of the overall fiscal position. However, the policies consistent with these objectives are far from fully articulated. If we go by the details given in Horton et al. (2009), the strategies appear thin on the ground. While China and India are inclined to non-renewal of the stimulus, Indonesia combines it with debt reduction (below 30 per cent of GDP).

In brief, *The Economist* (24 September, 2009) is guilty of 'overkill' in its sceptical assessment of the likely impact of the fiscal stimulus: " …the truth is that economists are flying blind. They can make relative judgments with some confidence. Temporary tax cuts pack less punch than permanent ones, for instance. Fiscal multipliers will probably be lower in heavily indebted economies than in prudent ones. But policymakers looking for precise estimates are deluding themselves" (**p. ?).** If our summary is anything to go by, the differences are of course not small but frequently robust and similar[11]. Our own results further corroborate this assessment.

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[11] In a forthright defence of Keynesian fiscal policy, Krugman (2009 a) makes the pertinent observation "….it certainly won't be neat; but we can hope that it will have the virtue of being at least partly right" (p.29).

Evidence on Asia

Given the focus of our study on Asia, a review of this region's experience is given below. Here we draw upon Jongwanich et al. (2009).

Inadequacy of Fiscal Stimulus

Overall the fiscal stimulus has been too small to achieve potential output, as shown in Table 3. Even the relatively strong package in China covers only half the output gap. Most stimulus efforts cover much less. In South Asia, the problem has been lack of fiscal space. In others, failure to manage the stimulus (e.g. absorptive and institutional capacity) has been a constraint.

Table 3
Fiscal Stimulus Plans of Selected Developing Asian Countries

Fiscal stimulus	Countries
More than 5 per cent of GDP	China, Kazakhstan, Papua New Guinea, Vietnam
Between 2 per cent and 5 per cent of GDP	India, Philippines, Vietnam
Between 0.5 per cent and 2 per cent of GDP	Bangladesh, Cambodia, Indonesia, Pakistan
Less than 0.5 per cent of GDP	Sri Lanka

Source: ADB (2009)

The results given in Table 4 show the effects of fiscal stimulus of 4 countries/regions (Japan, China, North America OECD, and European OECD).

- The impacts of the stimulus packages add between 0.2 per cent and 6 per cent to GDP growth in 2009, and between 0.9 per cent and 5.5 per cent in 2010.
- Even though the stimulus packages are large, and the impacts on growth positive, the stimulus packages will not reverse the impacts of the crisis in 2009. China is an exception as it benefits from its own large stimulus package.
- All countries and regions, except Other Developing Asia, will experience positive growth at the end of 2010 *despite* the financial crisis.
- Most countries/regions are projected to experience a significant boost in their exports, especially for manufactured products. Services and agricultural exports are also projected to increase. Somewhat surprisingly, China is projected to see a significant rise in agriculture and processed food exports but a reduction in services exports.
- In general, protectionism has a negative impact on the countries/regions that follow that route. India and Southeast Asia stand out as they could impact other regions in case they raise their tariffs to binding levels. China, on the other hand, lacks protectionist potential from raising applied tariff rates to binding rates in the Asia region.
- Although few countries/regions experience a rise in exports, resulting from trade diversion created by accentuating tariff preferences for regional trade

partners, the overwhelming effect is to reduce trade. Southeast Asia's exports decrease the most, followed by East Asia.

Table 4
Impacts of Stimulus Packages on Asian GDP Growth, 2009 and 2010
(Percent of Real GDP)

Country/Region	Projected GDP Impacts from Slowdown in OECD		Projected Fiscal Stimulus Impacts [a]		Gap [b]		
	2009	2010	2009	2010	2009	2010	Cumulative Gap in GDP (%) [c]
China	-3.9	1.4	6.0	5.5	2.1	6.9	9.1
Other Developing Asia	-2.8	0.9	0.2	1.5	-2.6	2.4	-0.3
East Asia	-3.8	1.4	3.5	3.0	-0.3	4.4	4.1
India	-4.1	1.3	3.2	2.4	-0.9	3.7	2.8
South Asia	-3.6	1.2	2.3	2.2	-2.0	3.3	1.2
South East Asia	-3.4	1.2	1.6	2.1	-1.2	3.4	2.2

Source: Jongwanich et al. (2009)

a Projected GDP is the static impact on the Asian countries of fiscal stimulus packages where actual growth may be greater or smaller depending on the policies of individual countries, such as fiscal stimulus or protectionism.
b The potential gap is the difference between the impacts from the economic slowdown and the impacts from the projected fiscal stimulus packages.
c Cumulative numbers are not the simple addition of the two years but are compound growth rates.

Rural and Agricultural Impacts

Here a distillation of rural and agricultural impacts of public expenditure in specific Asian countries is given.

India

The analysis in Fan and Rao (2008), based on state-level data from 1970 to 1993, focuses on both productivity and poverty impacts.

Main Findings

- Additional government expenditure on roads has the highest impact on poverty reduction as well as a significant effect on agricultural productivity. For every million rupees spent, 124 people are lifted out of poverty. Every rupee spent on rural roads yields more than Rs 5 in agricultural output.
- Additional government expenditure on agricultural research and development has the highest impact on agricultural output, with a cost-benefit ratio of 13, and a large poverty reduction effect (85 persons are enabled to get out of poverty).

- Additional government spending on education has the third highest impact on poverty reduction, largely as a result of the increase in non-farm employment and rural wages that it induces.
- Additional irrigation investment has an impact similar to that of education investment on growth in agricultural productivity but only a small impact on rural poverty reduction, even after the "trickle down" benefits are allowed for.
- Additional government spending on soil and water conservation and health have no effect on agricultural productivity, and their effects on poverty through employment generation and increased wages are also small.

Smallholders and Market Access

Recent strands of development literature underscore that rural transportation network has a key role in determining the efficiency of agricultural marketing system. In a recent contribution, Shilpi and Umali Deininger (2008) focus on not just distance but also facilities available at the market. A market access index is formulated (similar to a widely used 'gravity' model) which is the sum of facilities available at the market (parking area, bus station, post office, banks, weighing and grading machines, cold storage) divided by the square of the distance from village to market. The empirical specification allows for separate influences of the market access index, wealth of a farmer (land owned) and their interaction. This specification (and several variants) are estimated using a survey of farmers, traders, markets and villages in Tamil Nadu (India) during 2005. Broadly, the results show that (i) an improvement in market facilities implied by a higher value of the market access index is associated with an increase in the farmer's propensity to sell; and (ii) the impact of the market access index also depends on the wealth of a farmer. So, although wealthy farmers are able to take greater advantage of cheaper modes of transportation to reduce waiting time, this advantage reduces with higher land owned groups. Simulations with a 20 per cent improvement in market facilities show that additional investments in market facilities are pro-poor as sales of the poorer farmers increase more than proportionately than those of wealthy farmers. In other words, while the latter capture the benefits of existing facilities better than the former, the marginal benefit from an improvement of market facilities is substantially greater for smallholders.

So investment in rural transportation and other facilities (e.g. banking, communication, storage) is likely to make agricultural markets more efficient as well as benefit the poor more.

China

Fan and Rao (2008) also report their findings based on provincial data for China during 1970-2000.

Main Findings

- Government expenditure had the largest impact in reducing rural poverty and regional inequality, and a significant effect on agricultural output. Increased rural non-farm employment accounted for much of this poverty and inequality reducing effect.

- Government expenditure on agricultural R&D substantially improved agricultural production. The poverty reduction effect was high too, second after that of rural education.
- Government spending on rural infrastructure (roads, electricity, and telecommunications) had a substantial effect on reducing poverty and inequality, due mainly to improved opportunities for non-farm employment and increased rural wages.
- Expenditure on irrigation had a modest impact on agricultural output and even lower impact on rural poverty and inequality.
- Disaggregating into regions, returns to poverty reduction were highest in the (less-developed) west region, while returns in agricultural production were the highest in the central (more developed) region for most types of spending.
- Expenditure in the western region led to the greatest reductions in regional inequality for all types of government spending, while those in either coastal or central regions worsened existing large regional inequality.
- Disaggregation of road infrastructure into different classes of roads in terms of quality yields surprising results. Low-quality (mostly rural) roads have benefit-cost ratios for national product that are about four times larger than those for high-quality roads. Spending on low quality roads also yields high returns in terms of rural non –farm GDP.

Nepal

In an innovative methodology, Jacoby (2000) assesses the benefits of rural roads in Nepal. The analysis is based on the 1995-96 *Nepal Living Standards Survey*. A stratified random sample of around 3400 households was drawn from four zones: Mountains, urban Hills, rural Hills, and Terai. In addition, a special survey of 1200 households was conducted in Arun valley (rural Hills) which is included in this analysis.

- If proximity to markets influences land values through the effective prices of agricultural inputs and outputs, purchases of modern inputs and sales of output should decline with distance from the market centre. Fertiliser purchase declines over most of the range of travel times in the sample. Crop sales also decline over most of the range of travel times.
- A 10 per cent increase in travel time reduces the value of land by 2.2 per cent.
- A 10 per cent increase in travel time reduces agricultural wages by about 0.5 per cent.
- Extending road access to all households in the sample raises real income by an average of 10 per cent, so the potential benefits of rural roads are large. Interestingly, at high values of inequality aversion, building a short road actually increases income inequality. For any value of inequality aversion, the contribution of inequality reduction to the increase in social welfare rises with the length of the road, because of the strong tendency of the poor to live in remote areas. However, even for large values of inequality aversion, the increase in social welfare is due overwhelmingly to higher mean income. Rural road construction is thus like a tide

that lifts all boats rather than a highly effective means of reducing income inequality.

Bangladesh

Khandker et al. (2009) offer a comprehensive assessment of two World Bank financed road development and maintenance projects in Bangladesh. These are the Rural Development Project (RDP) and the Rural Roads and Markets Improvement and Maintenance Project (RRMIMP). Their main objective was to improve rural road and infrastructure quality, with secondary infrastructural improvements of local markets as well. The results confirm that households benefit in diverse ways from road investment by paving earthen roads.

Main Findings

- The project impact on household transport expenses is substantial, especially production-related transport savings.
- There is also a significant positive impact on aggregate crop output and price indices.
- There were many similarities in impact of the two projects but some differences as well. Agricultural wage growth and employment appear to have increased in RDP project areas, for example, whereas non-agricultural wages and employment have risen in RRMIMP project areas.
- Secondary school enrolment of boys and girls increased in both project samples, while primary school enrolment was not affected to the same degree.
- The overall effect of road improvement on household per capita annual consumption was about 8-10 per cent across the project areas.
- The distribution of benefits is not, however, independent of household resource endowments and location-specific factors. While distance to the project-road did not change the overall returns households received from road improvement, RDP project returns for per capita consumption average about 6 per cent. The poorest also benefited disproportionately in the RRMIMP sample.
- The overall poverty effect of road improvement was significant. The poverty reduction was small but non-negligible-4 per cent in RDP villages and 5-6 per cent in RRMIMP villages, over a period of about 5 years**.** Thus, had the duration of road pavement taken about 5 years, it could be argued that each year, extreme poverty attributable to the road project fell by about 1 per cent, solely due to road improvements.

Vietnam

Mu and van de Walle (2008) offer an insightful analysis of the impact of investment in rural roads on the rural economy of Vietnam. The analysis assesses the impact of a World Bank –financed rural road rehabilitation project implemented between 1997 - 2001. The objective of this project was to link commune centres to markets, and reduce rural poverty through the rehabilitation of 5000 km of rural roads. It was implemented in 18 provinces scattered around Vietnam.

- There are significant impacts of roads on the development of markets and commercialisation.
- Some outcomes, such as food availability, responded rapidly to the new and improved roads. Others, such as the presence and frequency of markets and non-food goods and services availability, took two or more years on average to emerge.
- The road project enabled households to switch from agriculture to non-agriculture, mostly service-based, activities.
- Most notably, there were significant impacts on primary school completion rates.
- However, there was considerable heterogeneity in project impacts. Poorer communities tended to benefit more, reflecting a tendency for decreasing returns. But there were also features of such communities that lessened the impact. For example, location in mountain areas boosts road impacts on some aspects of local development. But many communes comprise high shares of ethnic minorities and illiterates which weaken the impact.
- But it is not the case that positive impacts across multiple outcomes are particularly concentrated in some communities, as might occur if there were a set of key commune attributes that need to be in place to interact with better road conditions to yield impacts on diverse outcomes. A corollary is that a particular commune attribute can interact with roads to have diverse impacts on local development outcomes-sometimes acting as a substitute and at others as a substitute. Thus, the project tended to encourage local development in some communes and displace in others.

In brief, simple aid allocation formula seems elusive, given the complexity of the way some initial conditions interact with road improvements.

Papua New Guinea

PNG offers a unique opportunity to examine the effects of access to infrastructure on poverty. Because of its mountainous and rugged terrain, it suffers from a fragmented system of transportation. In cities and some better-off rural areas, residents have access to multiple modes of transportation. In poorer areas, however, a high proportion of PNG's rural residents live many hours from the nearest basic social services.

- The lowest consumption quartile must travel over twice as long to gain access to the closest mode of transport than the richest quartile. The poor travel 75 per cent longer than the non-poor to the closest mode of transportation and over three times longer to reach the closest road.
- Consumption is negatively related with access to transportation. A 1 hour increase in travelling time to the nearest transport facility reduces real consumption by almost 10 per cent. This suggests that improving the access of rural communities to transport infrastructure could be an important aspect of poverty alleviation in PNG.

- While there are a number of ways in which infrastructure affects consumption, the sample data in Gibson and Rozelle (2003) illustrate two. (i) Access to a road affects the price farmers receive for their crops and the prices that households must pay for their purchased food. Sweet potato price is, for example, lower in communities that are further from roads and other transport points. Specifically, the rate of price decline is about 7 per cent for each extra hour to the nearest transport facility. This could also be interpreted as the rate at which the net returns to marketing food and other crops produced by rural households decline as infrastructure becomes less accessible. (ii) Roads and other transport infrastructure enable households to engage in a wider range of income earning activities. Each one-hour increase in travelling time to the nearest road reduces the number of income-earning activities by an average of 0.15, which is a 2.6 per cent reduction in the number of activities per extra hour to the road.
- Increasing access to roads has an independent effect on decreasing poverty. The head-count ratio falls by 5.36 per cent if the travelling time to the nearest road were cut to 3 hours for those communities where the road is currently on average more than 3 hours away. Cutting the travel time to 2 hours drops the head-count marginally more (by 5.77 per cent). The poverty gap and severity indices drop more.

In sum, infrastructure spending, whether on new assets or maintenance of existing facilities, can provide a form of targeted intervention that favours the poor. This is especially relevant for PNG, in part because the existing infrastructure is so poorly developed and the returns to such projects are high. But, more importantly, infrastructure spending may be one of the feasible means for poverty interventions to reach the poor in PNG.

Objectives

The objective of our analysis is to focus on the potential of public expenditure on growth in a sample of developing countries. Our points of departure from the extant literature are the following: first, an attempt is made to analyse the effects of public expenditure and its two components: infrastructure and net of infrastructure, on agricultural and overall growth in several different specifications. In other variants, we examine the separate effects of agriculture and different components of public expenditure on overall growth. Second, combining these results with a range of poverty-growth elasticities computed under different assumptions in Imai et al. (2009), we offer an assessment of the impact of fiscal stimulus and its components-through overall and agricultural growth- on poverty in Asia and the Pacific Region. A limitation of our analysis, however, is that it is confined to the contemporaneous impact of fiscal stimulus.

Econometric Analysis

Specification

The objective of the econometric analysis is to assess the impacts of government expenditure on the growth rates of per capita GDP and agricultural value added, after

controlling for the effects of other variables. Total public expenditure as an aggregate, and its disaggregation into infrastructure and non-infrastructure spending are considered separately. This analysis is supplemented by counterfactual simulations, focusing on their poverty impacts.

To focus on GDP per capita growth, we estimate the following model:

$$\Delta(GP_{i,t}) = \beta_0 + \beta_1\Delta(INF_{i,t}) + \beta_2\Delta(NetINF_{i,t}) + \beta_3\Delta(AGP_{i,t}) + \beta_4 initialGP$$
$$+ \beta_5 Trade + \beta_6 Crisis*Asia + Yeardummy + Countrydummy + u_{i,t} \qquad (1)$$

where $\Delta(GP_{i,t}) = GP_{i,t} - GDP_{i,t-1}$; $\Delta(INF_{i,t}) = INF_{i,t} - INF_{i,t-1}$;
$\Delta(NetINF_{i,t}) = NetINF_{i,t} - NetINF_{i,t-1}$ and $\Delta(AGP_{i,t}) = AGP_{i,t} - AGP_{i,t-1}$

Note that β_1, β_2 and β_3 are central to our purpose. As the variables are in log, the coefficient estimates of β_1, β_2 and β_3 represent the elasticity of per capita GDP growth with respect to (i) growth of government infrastructure expenditure, (ii) growth of government expenditure net of infrastructure or growth of non-infrastructure spending, and (iii) agricultural growth per capita. We also test whether high debt-GDP ratio has an adverse effect on growth. The fiscal multipliers in the long-run may also be lower as fiscal expansion is not sustainable when the debt-GDP ratio is high. The effect of per capita agricultural growth on per capita GDP growth is estimated to test whether per capita agricultural growth affects per capita GDP growth.

Similarly, we estimate the determinants of per capital agricultural growth as specified below:

$$\Delta(AGP_{i,t}) = \alpha_0 + \alpha_1\Delta(INF_{i,t}) + \alpha_2\Delta(NetINF_f) + \alpha_3 initialAGP + \alpha_4 Trade$$
$$+ \alpha_5 Landpc_{i,t} + \alpha_6 Crisis*Asia + Yeardummy + Countrydummy + \varepsilon_{i,t} \qquad (2)$$

Three stage least square (3SLS) estimator is applied here to estimate equations (1) and (2) to circumvent possible reverse causality between GDP per capita growth (or agricultural value added growth per capita) and government expenditure. Total public expenditure, infrastructure spending and government expenditure net of infrastructure were instrumented by their lagged values, and country and time effects in separate equations, respectively, while they are used as right side variables in overall growth equations. In addition, we also allow for contemporaneous correlation between $u_{i,t}$ and $\varepsilon_{i,t}$.

Data

The data for the present study are taken from IMF's Government Financial Statistics (GFS), Asian Development Bank's key indicators and World Development Indicators (WDI). The total sample consists of 23 countries of Asia, Latin America and Africa[12].

The period covered is from 1993 to 2006. Because of missing observations in government expenditure data, it was difficult to construct annual time-series for most of the countries. While realising it is not an ideal solution, we have divided the entire period into 7 sub-periods by taking 2 year average for all variables (that is, 1993-4, 1995-6, and so on up to 2005-6).

We have modified the IMF and ADB data on government expenditure classified by its functional outlay into two components of expenditure categories[13]: (a) expenditure on infrastructure; (b) total expenditure minus infrastructure expenditure. Expenditure on infrastructure is the sum of expenditures on electricity, gas and fuel, and transport and communication.

The variables used in the present study are listed below[14].
- GP: Log of GDP per capita (constant US$ in 2000)
- AGP: Log of per capita agricultural value added (constant US$ in 2000)
- TE: Log of total government expenditure in value (constant US$ in 2000)
- INF: Log of government expenditure on infrastructure (constant US$ in 2000)
- NetINF: Log of total government expenditure minus infrastructure expenditure (constant ` US$ in 2000)
- Trade: Log of share of trade in GDP
- Debt ratio: Log of share of central government debt to GDP
- Working population ratio: Log of share of population aged 16-64 to total population
- Land per capita.: Log of arable land (hectare) per person
- Initial GP: Log of initial value of per capita GDP (constant US$ in 2000)
- Initial AGP: Log of initial value of per capita agricultural value added (constant US$ in 2000)
- Crisis*Asia: A dummy variable for whether a country belongs to Asia region and the period is 1997-8
- Crisis*Sea: A dummy variable for whether a country belongs to Southeast Asia region and the period is 1997-8.

Some key macroeconomic indicators for selected Asian countries are given in Annex 3. These are designed to help assess the feasibility and efficacy of fiscal expansion.

Saharan African countries. These countries are selected only based on the availability of relatively complete data of government expenditure.

[13] Public expenditure refers to central government expenditure only for all countries except India. We have used state-level government expenditure for India as a large share of expenditure on agriculture and rural areas is undertaken by state governments (Fan, Hazell and Thorat, 1999).

14 See Annex 4 for graphical illustrations of the relationship between growth of GDP per capita and agricultural value added per capita, and between growth of expenditure net of infrastructure (NetEX) and growth of infrastructure expenditure (INF).

Results

Public Expenditure Impact

Table 5 shows a significant positive contribution of government expenditure to overall economic growth: the elasticity of per capita GDP growth with respect to the growth of total expenditure is 0.669. On the other hand, agricultural growth appears to be negatively associated with overall growth in our sample countries and marginally significant at the 10% level. The negative coefficient of the interaction term of Asian Financial Crisis and Asian countries (Crisis*Asia) confirms that Asian countries were more affected from the crisis in 1997.

Turning to agricultural growth, government expenditure has a positive role. The growth elasticity of per capita agriculture value added with respect to government total expenditure growth is 0.655 and significant at the 1% level. The positive and significant coefficient of initial agriculture GDP per capita implies divergence (i.e. the difference in agricultural value added between sample countries is expected to widen). Although trade share, as a proxy for openness, is negatively associated with agricultural growth, its impact is small and marginally significant. As shown in Gaiha and Imai (2006), this effect persists even after instrumenting this measure by quality of institutions. This of course is at best a partial test of openness and does not entirely negate the benefits of trade liberalisation.

Table 5
Change of Log GDP Per Capita [D(GP)] and Log Agriculture VA Per Capita [D(AGP)] – Total Sample

	D(GP)	D(AGP)	D(TE)
D(TE)	**0.669**	**0.655**	-
	(3.01)*	**(3.00)***	
D(AGP)	**-0.32**	-	-
	(1.72)*		
initial GP	0.026	-	-
	(0.31)		
initial AGP	-	**0.216**	-
		(2.32)**	
Trade share	-0.055	**-0.073**	-
	(1.63)	**(1.73)***	
Land p.c.	-	-0.116	-
		(1.17)	
Working ratio	-	-0.158	-
		(0.32)	
Working ratio*Land p.c.	-	-0.152	-
		(0.88)	
Crisis*Asia	**-0.041**	0.001	-
	(2.74)*	(0.07)	
lDlogte	-	-	**-0.11**
			(2.11)**
yr95	-0.056	**-0.241**	-0.129
	(0.58)	**(2.77)***	(1.11)
yr97	-0.062	**-0.272**	-0.087
	(0.66)	**(3.28)***	(0.75)
yr99	-0.08	**-0.273**	-0.08
	(0.85)	**(3.35)***	(0.72)

	D(GP)	D(AGP)	D(TE)
yr01	-0.081	**-0.279**	-0.093
	(0.85)	**(3.43)***	(0.84)
yr03	-0.037	**-0.247**	-0.108
	(0.39)	**(2.93)***	(0.94)
yr05	-0.033	**-0.272**	-0.101
	(0.34)	**(3.20)***	(0.87)
Bangladesh	-0.039	0.132	-0.066
	(0.24)	(0.84)	(0.98)
Cambodia	0.069	0.209	-0.025
	(0.40)	(1.09)	(0.36)
India	-0.038	0.096	-0.048
	(0.26)	(0.51)	(0.71)
Indonesia	-0.074	0.077	-0.074
	(0.84)	(0.50)	(1.02)
Philippines	-0.011	0.083	-0.108
	(0.16)	(0.79)	(1.60)
Sri Lanka	0.023	0.034	-0.127
	(0.29)	(0.28)	(1.87)*
Brunei	-0.016	0.121	**-0.26**
	(0.07)	(1.33)	**(3.83)***
Nepal	-0.002	0.203	**-0.121**
	(0.01)	(1.31)	**(1.78)***
Malaysia	-0.017	-0.082	-0.073
	(0.27)	(0.87)	(1.08)
Thailand	-0.012	0.114	-0.098
	(0.33)	(0.63)	(1.45)
Mongolia	-0.009	0.161	-0.032
	(0.06)	(0.76)	(0.40)
Burundi	-0.004	**0.422**	**-0.384**
	(0.02)	**(1.95)***	**(4.78)***
Cameroon	-0.048	0.202	-0.11
	(0.44)	(1.02)	(1.38)
Costa Rica	-0.079	-0.133	-0.055
	(1.20)	(1.53)	(0.82)
Egypt	-0.042	-0.047	**-0.13**
	(0.79)	(0.61)	**(1.91)***
Ethiopia	-0.098	0.187	0.022
	(0.38)	(0.89)	(0.31)
Guatemala	**-0.122**	-0.158	-0.069
	(2.19)**	(1.41)	(1.02)
Kenya	-0.05	0.157	**-0.128**
	(0.37)	(1.04)	**(1.88)***
Mexico	-0.098	0.002	-0.101
	(0.96)	(0.01)	(1.28)
Panama	-0.021	0.078	-0.104
	(0.31)	(0.58)	(1.42)
Tunisia	-0.012	0.052	-0.099
	(0.34)	(0.32)	(1.46)
Zambia	-0.024	0.343	**-0.15**
	(0.15)	(1.39)	**(2.19)****
Constant	-0.11	-1.134	0.293
	(0.18)	(1.43)	(2.36)
Observations	117	117	117

Absolute value of z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 gives the results based on the sub-sample of Asian countries. We observe a strong positive effect of government expenditure on agricultural growth: if public expenditure rises by one percent, agricultural output grows by 1.254 percent. However, other than the country and year dummies, none of the other variables possess significant coefficients.

Table 6
Change of Log Agriculture VA Per Capita [D(AGP)] – Asia Region

	D(AGP)	D(TE)
D(TE)	**1.254**	-
	(2.19)**	
initial AGP	-0.023	-
	(0.14)	
Trade share	-0.141	-
	(0.96)	
Land p.c.	-0.04	-
	(0.29)	
Working ratio	0.313	-
	(0.39)	
Working ratio*Land p.c.	-0.046	-
	(0.18)	
Crisis*Sea	-0.01	-
	(0.30)	
Lag D(TE)	-	-0.107
		(1.02)
yr95	**-0.352**	-0.076
	(2.34)**	(0.67)
yr97	**-0.322**	-0.083
	(2.08)**	(0.74)
yr99	**-0.327**	-0.083
	(2.07)**	(0.78)
yr01	**-0.333**	-0.073
	(2.18)**	(0.71)
yr03	-0.244	-0.128
	(1.36)	(1.17)
yr05	-0.282	-0.116
	(1.56)	(1.06)
Bangladesh	-0.191	-0.074
	(0.71)	(1.17)
Cambodia	-0.01	-0.023
	(0.03)	(0.35)
India	-0.227	-0.055
	(0.69)	(0.87)
Indonesia	-0.125	-0.075
	(0.56)	(1.12)
Philippines	0.021	**-0.115**
	(0.14)	**(1.81)***
Sri Lanka	-0.064	**-0.134**
	(0.38)	**(2.09)****
Brunei	0.196	**-0.267**
	(1.19)	**(4.16)*****
Nepal	-0.04	**-0.128**
	(0.16)	**(2.00)****
Malaysia	0.057	-0.08

	D(AGP)	D(TE)
	(0.43)	(1.27)
	D(AGP)	D(TE)
Thailand	0.009	**-0.105**
	(0.04)	**(1.67)***
Mongolia	0.018	-0.05
	(0.06)	(0.67)
Constant	0.451	0.293
	(0.35)	(2.54)
Observations	64	64

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The significant role of expenditure on overall growth is also evident in the sample of Asian countries, and even larger. As shown in Table 7, a 1 percent higher expenditure growth increases GDP per capita growth by approximately 1.29 percent. On the other hand, agricultural growth has a negative effect on overall growth, presumably due to omitted variable bias. Although expenditure growth has a smaller coefficient, compared to that in Table 6, it still shows a strong association with agricultural growth. Contrary to an earlier result, the negative coefficient of initial agricultural GDP per capita implies convergence in the sample but it is marginally significant at the 10%. In part, the difference in the results may be attributable to different samples used.

Table 7
Change of Log GDP Per Capita [D(GP)] and Log Agriculture VA Per Capita [D(AGP)] – Asia Region

	D(GP)	D(AGP)	D(TE)
D(TE)	**1.288**	**0.716**	-
	(2.47)	**(3.90)***	
D(AGP)	**-1.27**	-	-
	(2.84)*		
initial GP	0.161	-	-
	(0.77)		
initial AGP	-	**-0.165**	-
		(1.82)*	
Trade share	-0.156	-0.097	-
	(1.48)	(1.60)	
Land p.c.	-	0.027	-
		(0.34)	
Working ratio	-	0.491	-
		(0.91)	
Working ratio*Land p.c.	-	0.024	-
		(0.16)	
Crisis*Sea	**-0.078**	-0.008	-
	(2.16)	(0.34)	
Lag D(TE)	-	-	**-0.195**
			(2.45)
yr95	**-0.393**	**-0.462**	-0.069
	(1.94)*	**(5.68)***	(0.61)
yr97	**-0.381**	**-0.435**	-0.074
	(1.98)	**(5.23)***	(0.66)
yr99	**-0.409**	**-0.439**	-0.076
	(2.23)	**(5.49)***	(0.72)

	D(GP)	D(AGP)	D(TE)
yr01	**-0.408**	**-0.435**	-0.066
	(2.30)**	**(5.53)*****	(0.64)
yr03	**-0.288**	**-0.37**	-0.12
	(1.80)*	**(4.28)*****	(1.10)
yr05	**-0.334**	**-0.397**	-0.114
	(2.00)**	**(4.53)*****	(1.04)
Bangladesh	0.068	**-0.337**	-0.077
	(0.14)	**(2.29)****	(1.23)
Cambodia	0.309	-0.186	-0.02
	(0.68)	(1.14)	(0.31)
India	-0.003	**-0.358**	-0.059
	(0.01)	**(2.17)****	(0.95)
Indonesia	-0.02	**-0.252**	-0.081
	(0.08)	**(1.94)***	(1.20)
Philippines	0.083	-0.1	**-0.124**
	(0.45)	(1.15)	**(1.96)****
Sri Lanka	0.111	**-0.176**	**-0.145**
	(0.49)	**(1.65)***	**(2.28)****
Brunei	-0.172	0.052	**-0.278**
	(0.33)	(0.57)	**(4.38)*****
Nepal	0.231	**-0.231**	**-0.137**
	(0.44)	**(1.66)***	**(2.17)****
Malaysia	-0.071	0.028	-0.086
	(0.48)	(0.35)	(1.36)
Thailand	0.005	-0.146	**-0.111**
	(0.10)	(1.02)	**(1.77)***
Mongolia	0.188	-0.14	-0.063
	(0.54)	(0.86)	(0.84)
Constant	-0.857	1.621	0.302
	(0.52)	(2.20)	(2.62)
Observations	64	64	64

Absolute value of z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Impacts of Infrastructure and Non-Infrastructure Expenditure

Table 8 confirms that per capita GDP growth is positively and significantly influenced by *both* public infrastructure spending and net infrastructure expenditure: a 1 percent increase in the growth of non- infrastructure expenditure increases GDP per capita growth by 0.31 percent whilst a 1 percent change in infrastructure expenditure is associated with 0.047 percent change in GDP growth. While this may seem intriguing in view of the evidence cited earlier, it is not so since infrastructure is defined somewhat narrowly (education and health, for example are excluded). In sharp contrast to our earlier results, and as expected, agricultural growth has a significant positive effect on overall growth even after allowing for the effects of infrastructure and non-infrastructure spending. Specifically, the elasticity of per capita GDP growth with respect to per capita agricultural growth is 0.134. There was no evidence of convergence in our sample countries during the period 1993- 2006. As reported earlier, the debt-GDP ratio is negatively associated with economic growth. The negative coefficient estimate of the interaction term of *Crisis* and *Asia* (i.e.

Crisis*Asia) implies that per capita GDP growth rates of Asian countries were more negatively affected by the Asian Financial Crisis.

Table 8
Change of Log GDP Per Capita [D(GP)] – Total Sample

	D(GP)	D(INF)	D(NetINF)
D(INF)	**0.047**	-	-
	(2.99)***		
D(NetINF)	**0.31**	-	-
	(1.87)*		
D(AGP)	**0.134**	-	-
	(1.68)*		
initial GP	0.034	-	-
	(0.32)		
Trade share	0.024	-	-
	(0.63)		
Debt	**-0.04**	-	-
	(2.02)**		
Crisis*Asia	**-0.032**	-	-
	(1.72)*		
Lag D(INF)	-	**-0.346**	-
		(3.06)***	
Lag D(NetINF)	-	-	-0.131
			(1.11)
yr95	**0.142**	**1.055**	**-0.477**
	(1.77)*	**(2.28)****	**(3.66)*****
yr97	**0.181**	**0.974**	**-0.416**
	(2.34)**	**(2.06)****	**(3.23)*****
yr99	**0.146**	**1.059**	**-0.42**
	(1.99)**	**(2.36)****	**(3.42)*****
yr01	**0.142**	**1.101**	**-0.441**
	(1.85)*	**(2.54)****	**(3.72)*****
yr03	**0.18**	**1.221**	**-0.499**
	(2.10)**	**(2.61)*****	**(3.90)*****
yr05	**0.158**	**1.184**	**-0.434**
	(1.97)**	**(2.45)****	**(3.20)*****
Bangladesh	0.072	**-0.451**	-0.026
	(0.41)	**(1.79)***	(0.37)
India	0.128	-0.048	-0.057
	(0.84)	(0.20)	(0.87)
Indonesia	-0.007	**-0.431**	-0.064
	(0.08)	**(1.70)***	(0.91)
Philippines	0.04	-0.21	-0.094
	(0.47)	(0.87)	(1.36)
Sri Lanka	0.096	-0.106	**-0.143**
	(0.97)	(0.45)	**(2.12)****
Nepal	0.11	-0.327	-0.104
	(0.47)	(1.39)	(1.55)
Thailand	-0.004	**-0.583**	**-0.129**
	(0.12)	**(2.18)****	**(1.69)***
Mongolia	0.015	**-0.746**	0.128
	(0.09)	**(2.31)****	(1.43)
Burundi	0.14	**-1.326**	**-0.364**
	(0.51)	**(4.39)*****	**(4.28)*****
Cameroon	0.055	-0.391	-0.12
	(0.46)	(1.36)	(1.49)
Costa Rica	-0.057	-0.034	-0.102
	(0.68)	(0.13)	(1.28)
Egypt	0.053	-0.113	**-0.201**

	D(GP)	D(INF)	D(NetINF)
	(1.10)	(0.41)	**(2.50)****
Guatemala	-0.031	-0.215	**-0.148**
	(0.64)	(0.69)	**(1.68)***
Kenya	0.06	-0.058	**-0.202**
	(0.38)	(0.21)	**(2.47)****
Mexico	-0.049	-0.345	-0.091
	(0.38)	(1.25)	(1.16)
Tunisia	0.039	-0.188	-0.1
	(1.33)	(0.80)	(1.50)
Zambia	0.005	-0.258	**-0.192**
	(0.03)	(0.79)	**(1.84)***
Constant	-0.381	-0.899	0.655
	(0.47)	(1.88)	(4.67)
Observations	68	68	68

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

In Table 9, there is a strong influence of non-infrastructure expenditure on per capita agricultural growth: 1 percent increase in spending increases per capita agricultural value added growth by 1.11 percent. The coefficient estimate is significant at the 5% level. The growth elasticity of agricultural value added with respect to infrastructure expenditure is positive and significant at the 10% level. These results further confirm the important role of increased government spending in promoting agricultural growth. The positive elasticity of per capita agricultural value added growth with respect to initial per capita agriculture value added suggests divergence in our sample countries during the period.

Table 9
Change of Log Agriculture VA Per Capita [D(AGP)] – Total Sample

	D(AGP)	D(INF)	D(NetINF)
D(INF)	**0.081**	-	-
	(1.65)*		
D(NetINF)	**1.107**	-	-
	(2.56)**		
initial AGP	**0.219**	-	-
	(1.98)**		
Trade share	-0.049	-	-
	(0.57)		
Land p.c.	-0.117	-	-
	(0.93)		
Working ratio	-0.195		-
	(0.31)		
Working ratio*Land p.c.	-0.065	-	-
	(0.32)		
Crisis*Asia	0.005	-	-
	(0.21)		
Lag D(INF)	-	**-0.253**	-
		(2.93)***	
Lag D(NetINF)	-	-	-0.098
			(1.44)
yr95	0.093	**1.188**	**-0.472**
	(0.37)	**(2.91)*****	**(4.12)*****

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	D(AGP)	D(INF)	D(NetINF)
yr97	0.061	**1.133**	**-0.433**
	(0.25)	**(2.79)***	**(3.81)***
yr99	0.052	**1.211**	**-0.427**
	(0.22)	**(3.09)***	**(3.89)***
yr01	0.041	**1.106**	**-0.416**
	(0.18)	**(2.89)***	**(3.87)***
yr03	0.109	**1.231**	**-0.467**
	(0.44)	**(3.06)***	**(4.15)***
yr05	0.09	**1.121**	**-0.459**
	(0.37)	**(2.77)***	**(4.05)***
Bangladesh	0.252	**-0.387**	-0.012
	(1.13)	**(1.68)***	(0.18)
Cambodia	0.376	-0.14	-0.017
	(1.60)	(0.59)	(0.26)
India	0.286	-0.061	-0.04
	(1.03)	(0.27)	(0.61)
Indonesia	0.263	**-0.426**	-0.054
	(1.22)	**(1.71)***	(0.77)
Philippines	0.225	-0.254	-0.087
	(1.62)	(1.10)	(1.32)
Sri Lanka	0.216	-0.115	-0.124
	(1.32)	(0.50)	(1.87)*
Brunei	**0.332**	-0.286	**-0.249**
	(2.56)*	(1.24)	**(3.76)***
Nepal	**0.357**	-0.323	-0.086
	(1.81)*	(1.40)	(1.30)
Malaysia	0.047	-0.073	-0.067
	(0.36)	(0.32)	(1.02)
Thailand	**0.422**	**-0.564**	-0.124
	(1.77)*	**(2.14)***	(1.64)
Mongolia	0.258	**-0.889**	**0.129**
	(0.84)	**(3.28)***	**(1.67)***
Burundi	**0.752**	**-1.319**	**-0.33**
	(2.96)*	**(4.61)***	**(4.18)***
Cameroon	**0.442**	-0.418	-0.09
	(1.66)*	(1.51)	(1.16)
Costa Rica	-0.005	-0.125	-0.056
	(0.03)	(0.53)	(0.83)
Egypt	0.113	-0.249	**-0.119**
	(0.82)	(1.08)	**(1.80)***
Ethiopia	0.315	-0.035	0.034
	(1.12)	(0.14)	(0.47)
Guatemala	0.047	-0.131	-0.13
	(0.27)	(0.44)	(1.51)
Kenya	**0.347**	-0.049	**-0.129**
	(1.80)*	(0.22)	**(1.94)***
Mexico	0.219	-0.43	-0.064
	(0.91)	(1.60)	(0.83)
Panama	0.277	-0.165	-0.099
	(1.54)	(0.66)	(1.39)
Tunisia	0.269	-0.193	-0.082
	(1.16)	(0.84)	(1.25)
Zambia	**0.667**	0.007	**-0.214**
	(2.32)*	(0.03)	**(2.69)***

Constant	-1.816	-0.96	0.632	
	(1.93)	(2.24)	(5.20)	
Observations	106	106	106	

Absolute value of z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10 gives 3SLS results which allow for correlation between error terms of GDP per capita and agricultural value added per capita growth equations. The strong influence of government expenditure on per capita agriculture value added growth is also confirmed in Table 10. The coefficient estimate of non-infrastructure expenditure in the agricultural growth equation is significant at the 1% level, and the growth elasticity is high. That is, one percent change in non- infrastructure spending is associated with 1.10 percent change in agricultural value added per capita. The coefficient estimate of infrastructure expenditure is also positive but significant at the 10% level. These variables, however, are not significant in the overall growth equation. We find divergence in agricultural growth given the positive coefficient estimate of initial agricultural value added per capita: the coefficient is significant at the 5% level while its magnitude is almost same as in Table 9. The coefficient estimate of Crisis*Asia in the per capita GDP growth equations is negative and significant at the 1% level, indicating significantly slower growth for Asian countries in the crisis period.

Table 10
Change of Log GDP Per Capita [D(GP)] and Log Agriculture VA Per Capita [D(AGP)] – Total Sample

	D(GP)	D(AGP)	D(INF)	D(NetINF)
D(INF)	0.031	**0.064**	-	-
	(1.42)	**(1.65)***		
D(NetINF)	0.033	**1.066**	-	-
	(0.18)	**(2.90)*****		
D(AGP)	0.146	-	-	-
	(0.76)			
initial GP	0.057	-	-	-
	(0.99)			
initial AGP	-	**0.222**	-	-
		(2.09)**		
Trade share	-0.01	-0.059	-	-
	(0.25)	(0.78)		
Land p.c.	-	-0.098	-	-
		(0.83)		
Working ratio	-	-0.151	-	-
		(0.25)		
Working ratio*Land p.c.	-	-0.048	-	-
		(0.24)		
Crisis*Asia	**-0.042**	0.005	-	-
	(3.22)***	(0.22)		
Lag D(INF)	-	-	**-0.267**	-
			(3.17)***	
Lag D(NetINF)	-	-	-	-0.101
				(1.49)
yr95	0.046	0.092	**1.202**	**-0.472**
	(0.68)	(0.42)	**(2.94)*****	**(4.12)*****

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	D(GP)	D(AGP)	D(INF)	D(NetINF)
yr97	0.07	0.061	**1.147**	**-0.433**
	(1.05)	(0.29)	**(2.83)***	**(3.81)***
yr99	0.043	0.053	**1.224**	**-0.427**
	(0.66)	(0.26)	**(3.13)***	**(3.89)***
yr01	0.032	0.041	**1.118**	**-0.416**
	(0.49)	(0.21)	**(2.92)***	**(3.87)***
yr03	0.05	0.11	**1.245**	**-0.467**
	(0.73)	(0.51)	**(3.10)***	**(4.15)***
yr05	0.064	0.09	**1.134**	**-0.459**
	(0.91)	(0.41)	**(2.80)***	**(4.05)***
Bangladesh	0.076	0.22	**-0.39**	-0.012
	(0.64)	(1.07)	**(1.69)***	(0.18)
Cambodia	0.147	0.344	-0.141	-0.017
	(1.26)	(1.57)	(0.59)	(0.26)
India	0.082	0.246	-0.061	-0.041
	(0.76)	(0.98)	(0.27)	(0.62)
Indonesia	-0.015	0.229	**-0.43**	-0.054
	(0.24)	(1.15)	**(1.73)***	(0.77)
Philippines	0.004	0.199	-0.256	-0.088
	(0.09)	(1.53)	(1.11)	(1.33)
Sri Lanka	0.042	0.193	-0.116	**-0.124**
	(0.74)	(1.26)	(0.50)	**(1.87)***
Brunei	-0.209	**0.311**	-0.287	**-0.25**
	(1.51)	**(2.56)****	(1.25)	**(3.76)***
Nepal	0.078	**0.323**	-0.326	-0.086
	(0.60)	**(1.75)***	(1.41)	(1.30)
Malaysia	-0.052	0.029	-0.073	-0.067
	(1.38)	(0.24)	(0.32)	(1.02)
Thailand	-0.022	**0.376**	**-0.567**	**-0.125**
	(0.79)	**(1.69)***	**(2.15)****	**(1.65)***
Mongolia	0.065	0.213	**-0.895**	**0.129**
	(0.65)	(0.77)	**(3.30)***	**(1.67)***
Burundi	0.023	**0.69**	**-1.335**	**-0.331**
	(0.16)	**(2.82)***	**(4.68)***	**(4.19)***
Cameroon	-0.01	0.395	-0.429	-0.091
	(0.14)	(1.61)	(1.55)	(1.17)
Costa Rica	**-0.08**	-0.028	-0.126	-0.057
	(1.71)*	(0.21)	(0.53)	(0.83)
Egypt	-0.023	0.081	-0.249	**-0.12**
	(0.52)	(0.65)	(1.08)	**(1.80)***
Ethiopia	0.099	0.282	-0.032	0.034
	(0.56)	(1.09)	(0.13)	(0.47)
Guatemala	-0.084	0.006	-0.132	-0.131
	(1.59)	(0.04)	(0.44)	(1.51)
Kenya	0.002	**0.311**	-0.05	**-0.129**
	(0.02)	**(1.73)***	(0.22)	**(1.94)***
Mexico	-0.108	0.172	-0.432	-0.064
	(1.47)	(0.79)	(1.61)	(0.84)
Panama	**-0.089**	0.244	-0.164	-0.1
	(2.05)**	(1.46)	(0.66)	(1.39)
Tunisia	-0.021	0.226	-0.194	-0.082
	(0.85)	(1.07)	(0.84)	(1.25)
Zambia	-0.029	**0.627**	0.001	**-0.215**
	(0.28)	**(2.29)****		**(2.70)***

Constant	-0.402	-1.756	-0.972	0.633
	(0.94)	(1.94)	(2.27)	(5.21)
Observations	106	106	106	106

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Turning to the results in Table 11, obtained from the sub-sample of Asian countries, we find that both components of government expenditure are positively associated with per capita GDP growth: the elasticity of per capita GDP growth with respect to infrastructure expenditure growth and to net expenditure growth are 0.087 (significant at the 10 % level) and 0.465 (significant at the 1% level), respectively. The positive influence of non- infrastructure expenditure is also observed in the agricultural value added per capita growth equation in Table 12: a 1 percent increase in this expenditure is associated with 0.85 percent increase in growth of agricultural value added per capita. The effect of infrastructure spending on agriculture growth is positive but not significant. The coefficient estimate of trade share is negative and significant at the 10% level, and subject to the caveat stated earlier.

Table 11
Change of Log GDP Per Capita [D(GP)] – Asia Region

Dep. Variable	D(GP)	D(INF)	D(NetINF)
D(INF)	**0.087**	-	-
	(1.87)*		
D(NetINF)	**0.465**	-	-
	(2.75)*		
D(AGP)	-0.003	-	-
	(0.02)		
initial GP	0.095	-	-
	(1.06)		
Trade share	-0.014	-	-
	(0.30)		
Crisis*Sea	-0.048	-	-
	(1.55)		
Lag D(INF)	-	**-0.237**	-
		(2.16)**	
Lag D(NetINF)	-	-	-0.129
			(1.57)
yr95	0.103	**1.05**	**-0.326**
	(1.51)	**(3.16)***	**(2.90)***
yr97	0.096	**0.945**	**-0.326**
	(1.45)	**(2.96)***	**(2.95)***
yr99	0.071	**0.973**	**-0.335**
	(1.03)	**(3.09)***	**(3.07)***
yr01	0.067	**1.055**	**-0.336**
	(0.98)	**(3.59)***	**(3.32)***
yr03	0.116	**1.061**	**-0.391**
	(1.57)	**(3.56)***	**(3.87)***
yr05	0.115	**1.004**	**-0.393**
	(1.48)	**(3.18)***	**(3.61)***
Bangladesh	0.159	**-0.388**	-0.025
	(0.87)	**(2.30)****	(0.41)
Cambodia	0.241	-0.14	-0.019
	(1.28)	(0.82)	(0.31)
India	0.146	-0.064	-0.055

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Dep. Variable	D(GP)	D(INF)	D(NetINF)
	(0.96)	(0.38)	(0.90)
Indonesia	0.06	**-0.411**	-0.062
	(0.58)	**(2.26)****	(0.96)
Philippines	0.078	-0.256	**-0.103**
	(1.00)	(1.53)	**(1.70)***
Sri Lanka	0.121	-0.117	**-0.141**
	(1.42)	(0.70)	**(2.30)****
Brunei	-0.169	**-0.287**	**-0.266**
	(0.81)	**(1.72)***	**(4.35)*****
Nepal	0.203	**-0.324**	**-0.101**
	(0.99)	**(1.92)***	**(1.66)***
Malaysia	-0.046	-0.076	-0.082
	(0.86)	(0.46)	(1.35)
Thailand	0.056	**-0.561**	**-0.129**
	(1.56)	**(2.94)*****	**(1.86)***
Mongolia	0.105	**-0.849**	0.093
	(0.62)	**(4.21)*****	(1.30)
Constant	-0.819	-0.807	0.556
	(1.21)	(2.49)	(4.90)
Observations	61	61	61

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 12
Change of Log Agriculture VA Per Capita [D(AGP)] – Asia Region

	D(AGP)	D(INF)	D(NetINF)
D(INF)	0.058	-	-
	(0.93)		
D(NetINF)	**0.846**	-	-
	(4.87)***		
initial AGP	-0.049	-	-
	(0.35)		
Trade share	**-0.14**	-	-
	(2.02)**		
Land p.c.	0.052	-	-
	(0.43)		
Working ratio	1.001	-	-
	(1.41)		
Working ratio*Land p.c.	0.12	-	-
	(0.58)		
Crisis*Asia	0.011	-	-
	(0.29)		
Lag D(INF)	-	**-0.237**	-
		(2.16)**	
Lag D(NetINF)	-	-	-0.129
			(1.57)
yr95	-0.222	**1.139**	**-0.382**
	(1.55)	**(3.43)*****	**(3.48)*****
yr97	-0.189	**1.034**	**-0.382**
	(1.41)	**(3.25)*****	**(3.54)*****
yr99	-0.193	**1.061**	**-0.391**
	(1.34)	**(3.56)*****	**(3.87)*****
yr01	-0.194	**1.144**	**-0.392**
	(1.33)	**(3.92)*****	**(3.97)*****

	D(AGP)	D(INF)	D(NetINF)
yr03	-0.13	**1.149**	**-0.448**
	(0.88)	**(3.67)***	**(4.27)***
yr05	-0.146	**1.092**	**-0.45**
	(0.99)	**(3.48)***	**(4.21)***
Bangladesh	-0.272	**-0.388**	-0.025
	(1.31)	**(2.30)**	(0.41)
Cambodia	-0.025	-0.14	-0.019
	(0.11)	(0.82)	(0.31)
India	-0.286	-0.064	-0.055
	(1.18)	(0.38)	(0.90)
Indonesia	-0.202	**-0.411**	-0.062
	(1.04)	**(2.26)**	(0.96)
Philippines	-0.038	-0.256	**-0.103**
	(0.30)	(1.53)	**(1.70)***
Sri Lanka	-0.143	-0.117	**-0.141**
	(0.94)	(0.70)	**(2.30)**
Brunei	0.083	**-0.287**	**-0.266**
	(0.79)	**(1.72)***	**(4.35)***
Nepal	-0.109	-0.324	**-0.101**
	(0.54)	(1.92)*	**(1.66)***
Malaysia	0.016	-0.076	-0.082
	(0.16)	(0.46)	(1.35)
Thailand	-0.055	**-0.561**	**-0.129**
	(0.26)	**(2.94)***	**(1.86)***
Mongolia	-0.103	**-0.849**	0.093
	(0.43)	**(4.21)***	(1.30)
Constant	0.908	-0.896	0.612
	(0.77)	(2.78)	(5.48)
Observations	61	61	61

 Absolute value of z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

The results in Table 13, based on 3SLS estimation of equations (1) and (2), confirm once again that both components of government expenditure have significant effects on per capita GDP growth. Increase in non-infrastructure expenditure is also positively and significantly associated with increase in per capita agricultural value added growth in the sample of Asian countries whereas the effect of infrastructure spending is positive but not significant. These findings are consistent with those in Tables 11 and 12. The estimated coefficient of initial GDP per capita is positive and marginally significant, implying the possibility of divergence in overall growth.

Table 13
Change of Log GDP Per Capita [D(GP)] and Log Agriculture VA Per Capita [D(AGP)] – Asia Region

	D(GP)	D(AGP)	D(INF)	D(NetINF)
D(INF)	**0.074**	0.074	-	-
	(1.98)**	(1.38)		
D(NetINF)	**0.511**	**0.627**	-	-
	(3.39)***	**(4.86)*****		
D(AGP)	-0.427	-	-	-
	(1.57)			
initial GP	**0.147**	-	-	-
	(1.84)*			
initial AGP	-	-0.18	-	-
		(1.52)		
Trade share	-0.058	**-0.097**	-	-
	(1.19)	**(1.69)***		
Land p.c.	-	0.028	-	-
		(0.27)		
Working ratio	-	0.737	-	-
		(1.17)		
Working ratio*Land p.c.	-	0.042	-	-
		(0.23)		
Crisis*Asia	**-0.054**	-0.003	-	-
	(2.10)**	(0.10)		
Lag D(INF)	-	-	**-0.262**	-
			(2.41)**	
Lag D(NetINF)	-	-	-	**-0.193**
				(2.49)**
yr95	-0.008	**-0.362**	**1.167**	**-0.386**
	(0.08)	**(3.20)*****	**(3.52)*****	**(3.52)*****
yr97	-0.004	**-0.323**	**1.057**	**-0.379**
	(0.05)	**(3.04)*****	**(3.33)*****	**(3.51)*****
yr99	-0.033	**-0.333**	**1.083**	**-0.39**
	(0.34)	**(2.96)*****	**(3.64)*****	**(3.86)*****
yr01	-0.034	**-0.331**	**1.166**	**-0.391**
	(0.36)	**(2.90)*****	**(4.00)*****	**(3.96)*****
yr03	0.024	**-0.272**	**1.174**	**-0.448**
	(0.26)	**(2.33)****	**(3.76)*****	**(4.27)*****
yr05	0.016	**-0.282**	**1.115**	**-0.454**
	(0.17)	**(2.44)****	**(3.55)*****	**(4.25)*****
Bangladesh	0.173	**-0.36**	**-0.392**	-0.025
	(1.13)	**(1.99)****	**(2.33)****	(0.42)
Cambodia	**0.32**	-0.165	-0.14	-0.018
	(1.95)*	(0.79)	(0.82)	(0.29)
India	0.141	-0.366	-0.064	-0.058
	(1.09)	(1.74)*	(0.39)	(0.96)
Indonesia	0.052	-0.263	**-0.42**	-0.066
	(0.59)	(1.56)	**(2.30)****	(1.03)
Philippines	0.083	-0.101	-0.259	**-0.109**
	(1.22)	(0.91)	(1.54)	**(1.80)***
Sri Lanka	**0.126**	-0.206	-0.119	**-0.149**
	(1.67)*	(1.55)	(0.71)	**(2.44)****
Brunei	-0.286	0.019	**-0.29**	**-0.274**
	(1.57)	(0.20)	**(1.73)***	**(4.50)*****
Nepal	0.26	-0.233	**-0.328**	**-0.106**

	(1.47)	(1.32)	(1.95)*	(1.76)*
	D(GP)	D(AGP)	D(INF)	D(NetINF)
Malaysia	**-0.087**	0.026	-0.076	-0.086
	(1.97)**	(0.31)	(0.46)	(1.42)
Thailand	0.046	-0.103	**-0.566**	**-0.138**
	(1.46)	(0.55)	**(2.97)*****	**(2.00)****
Mongolia	0.157	-0.165	**-0.859**	0.086
	(1.11)	(0.79)	**(4.26)*****	(1.21)
Constant	-1.082	1.703	-0.918	0.624
	(1.80)	(1.71)	(2.85)	(5.59)
Observations	61	61	61	61

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Simulations of Growth and Poverty Reduction

A selection of results is given in Table 14 and 15, based on counterfactual simulations of increases in public expenditure, and its components, on agricultural and overall growth. Combining these with poverty elasticities of overall growth and agricultural growth, we obtain likely impacts of fiscal stimulus on the head-count ratio[15]. Efficacy of different routes of fiscal and agricultural expansion are examined. The important role of fiscal stimulus in reviving the Asian economy and in maintaining the progress in the MDG of halving of the head-count index of poverty is illustrated – in both *relative* and *absolute* terms.

Let us consider the results in Table 14.

Table 14
Effect of Total Public Expenditure on Growth and Poverty

		D(TE)		
Asia sub-sample		**No change**	**10%**	**20%**
Overall growth	(1) Growth rate	5.42	6.55	7.65
Based on Table 7	(2) Percent decline in poverty ratio	-6.79	-8.26	-9.70
	(3) Actual/Predicted Poverty ratio	31.95	31.45	30.96
	(4) Difference in the number of the poor (base in no change)		10.30	20.44
Agricultural growth	(1) Growth rate	2.10	3.23	4.35
Based on Table 6	(2) Percent decline in poverty ratio	-1.10	-1.71	-2.31
	(3) Actual/Predicted Poverty ratio	33.90	33.69	33.49
	(4)Difference in the number of the poor (base in no change)		4.25	8.50
Aggregate sample				
Overall growth	(1) Growth rate	4.30	4.86	5.41
Based on Table 5	(2) Percent decline in poverty ratio	-5.36	-6.08	-6.78
	(3) Actual/Predicted Poverty ratio	26.69	26.49	26.29
	(4) Difference in the number of the poor (base in no change)		8.36	16.62

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[15] For computational details of poverty elasticities with respect to GDP per capita and agricultural value added per capita, see Imai et al. (2009).

Asia sub-sample		D(TE)		
		No change	10%	20%
Agricultural growth	(1) Growth rate	1.56	2.11	2.66
Based on Table 5	(2) Percent decline in poverty ratio	-0.82	-1.11	-1.40
	(3)Actual/ Predicted Poverty ratio	27.97	27.89	27.80
	(4) Difference in the number of the poor (base in no change)		3.41	6.83

The reference case is an overall growth rate of 5.42 per cent in the Asian sample (i.e. assuming no change in growth of public expenditure). With a 10 per cent higher growth of public expenditure, the growth rate of GDP per capita is 6.55 per cent, and with a doubling of the growth of public expenditure, the GDP growth rate accelerates to 7.65 per cent. Although the reduction estimated in the poverty ratio rises from 6.80 per cent in the reference case to 8.26 per cent and 9.70 per cent in the two counterfactual scenarios of higher growth of public expenditure seem small, the number of poor (on the $1.25 per day criterion) are large: 10.30 and 20.44 million.

In the lower panel of this table, we assess the impact through a higher growth rate of Agricultural value added per capita. Note that the poverty elasticity with respect to Agricultural value added is less than half that of GDP per capita (-0.52 as against -1.22)[16]. So, while agricultural growth rate accelerates and there are small reductions in the poverty head-count ratios, the reductions in the number of the poor are still substantial (4.25 million and 8.50 million, respectively). It follows therefore that fiscal stimulus operating through agricultural growth continues to have considerable potential for poverty reduction[17].

If the simulations are based on the larger sample, not only the growth impacts but also the poverty impacts are considerably lower. These results, however, cannot be accepted at face value as the representation of Africa is small in this sample. Nevertheless it is plausible to assert that fiscal stimulus is likely to have larger growth and poverty impacts in Asia.

A disaggregated analysis of fiscal stimulus is given in Table 15. To avoid cluttering the text, a selection of results is given.

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[16] For estimation details, see Imai et al. (2009).
[17] Note that these simulations exclude China.

Table 15
Effect of Disaggregated Public Expenditure on Growth and Poverty

Asia sub-sample		No change	D(INF)		D(NetINF)	
			10%	20%	10%	20%
Overall growth	(1) Growth rate	5.36	5.39	5.42	5.89	6.41
Based on Table 13	(2) Percent decline in poverty ratio	-6.72	-6.76	-6.79	-7.40	-8.08
	(3) Actual/Predicted Poverty ratio	31.98	31.96	31.95	31.74	31.51
	(4) Difference in the number of the poor (base in no change)		0.27	0.54	4.81	9.56
Overall growth	(1) Growth rate	5.47	5.50	5.54	5.95	6.43
Based on Table 11	(2) Percent decline in poverty ratio	-6.86	-6.90	-6.95	-7.48	-8.10
	(3) Actual/Predicted Poverty ratio	31.93	31.92	31.90	31.72	31.50
	(4) Difference in the number of the poor (base in no change)		0.27	0.64	4.36	8.75
Agricultural growth	(1) Growth rate	2.30			3.18	4.05
Based on Table 12	(2) Percent decline in poverty ratio	-1.21			-1.68	-2.15
	(3) Actual/Predicted Poverty ratio	33.87			33.70	33.54
	(4) Difference in the number of the poor (base in no change)				3.31	6.61

Given the narrow definition of infrastructure, as also the fact that our analysis is confined to the contemporaneous impacts, it is not surprising that a more rapid growth of infrastructure spending has small growth and poverty impacts while those of non-infrastructure spending are substantially larger, operating through acceleration of GDP and agricultural growth. With a 20 per cent faster growth of non-infrastructure spending, for example, agricultural growth accelerates from 2.30 per cent in the reference case to 4.05 per cent, and the number of poor drops by just under 7 million.

Juxtaposed against the trapping of 53 million in poverty in the developing world, as noted by Lin (2009), our simulation results are reassuring. Whether a bold and coordinated fiscal stimulus directed to agriculture and rural areas in Asia and the Pacific region is feasible time alone will confirm.

Conclusions

To put the analysis in perspective, we reject the saving glut hypothesis as sufficient to shift the emphasis from investment to cutting oversaving in emerging Asian countries as a way out of the global slowdown. Arguing that underinvestment must remain the focus of macro policies, a case is made for a bold and coordinated fiscal stimulus.

Drawing upon country panel data for developing countries and a sub-sample of Asian countries during the period 1991 to 2007, we have analysed the effects of government expenditure on GDP and agricultural value added growth, and their implications for poverty reduction. One of our main findings is that, *despite* the decline in the share of agriculture in GDP, it has a pivotal role in growth acceleration. But, more importantly, in the context of the global slowdown and faltering signs of recovery, the case for a bold fiscal stimulus is corroborated. Although impacts of public expenditure in the aggregate as well as of its components-especially infrastructure spending- vary depending on the specification and sample used, their growth impacts are positive and in more than a few cases *large* and *robust*. While the impact of infrastructure spending is small relative to that of non-infrastructure spending, this is not surprising given the narrow definition of infrastructure used. If it is broadened to include health and education, the growth impact is likely to be larger. The poverty impacts are substantial. If accepted at face value, and conditional on the feasibility of a bold and coordinated fiscal stimulus, the dire predictions of more than 50 million getting trapped in poverty because of the global slowdown appear exaggerated. Besides, if mechanisms are evolved to direct the fiscal stimulus to the rural areas where both physical and social infrastructure are far from adequate to sustain the growth impulse, the payoff in terms of poverty reduction may surpass seemingly optimistic predictions.

In conclusion, the prospects of a strong recovery led by fiscal stimulus are real and achievable.

Annex 1

This summarises the details given in Horton et al. (2009).

Fiscal multipliers are estimated using (i) structural models (based on household and firm optimising behaviour) or (ii) estimation based on real events. The estimates vary. Structural estimates, for example vary from 3.9 to -1.3. Those based on investigation of real events vary from 3.8-5 to -1.5.

The fiscal multipliers for cuts in labour taxes and lump-sum transfers are low (0.2-0.5); high for government expenditure (1.6-3.9) and targeted transfers (0.5-1.7); also high for infrastructure spending (1.7).

Multipliers are larger when monetary policy is accommodative - in fact, they are 2 to 3 times larger with accommodative monetary policy than without.

Fiscal policy action is more effective when coordinated across countries. The value for USA is 3.7 under coordinated fiscal policy, as compared with 2.4 without coordination.

Higher public spending or tax cuts can have a negative impact on output by inducing more- than- offsetting increases in private saving.

Annex 2

Decomposition of Growth in Selected Asian Countries

Following Jha et al. (2009), the strongest boost to growth is through consumption. On average, it contributes about three quarters of the median GDP growth in this region. However, there is wide variation. At one end of the spectrum is China where consumption contributes less than half of GDP growth. At the other end is Sri Lanka where it contributes about 90 per cent of overall growth.

- Private consumption dominates in all countries, with the notable exception of China where its relative importance to government expenditure is less marked. On average, private consumption growth accounts for about three quarters of the total growth contribution of consumption.

- The average contribution of investment growth at about 1.2 percentage points of 5.3 per cent per annum GDP growth pales in comparison with that of consumption. However, it accounts for much larger shares in China and Vietnam (4.5 percentage points each) and India (3.4 percentage points). Indeed, it is only in China that investment is the main source of growth. Moreover, this investment is largely domestically financed, supported by a large current account surplus.

- Considering the dependence on foreign trade, its contribution is barely 0.3 percentage point of overall GDP growth in the region. But again there is considerable diversity in the region. While net exports in 6 of the 15 countries 1 percentage point or more per annum to GDP growth, their contribution in Cambodia, India, Sri Lanka and Vietnam was negative. Even in China-often held up as a model of export-led growth-the direct effects of net exports on GDP growth were barely 1.2 percentage points per year, accounting for one eighth of overall GDP growth. It must, however, be borne in mind that even if a country has a high level of exports relative to GDP, it could have a balanced trade account (or low net exports) and limited contribution to overall GDP growth.

Table A.2.1
Contributions to Growth and Employment, 200-2007

Country	GDP Growth Contributions [1]						
	Consumption						
	GDP Growth	Total	Private	Govt.	Investment	Net Exports	Employment Growth
Bangladesh	5.8	3.4	3.0	0.4	2.0	0.3	-1.4
Cambodia	9.0	6.9	6.6	0.3	2.3	-0.4	5.7
China	9.8	4.3	2.9	1.3	4.5	1.2	0.9
India	7.0	4.0	3.5	0.5	3.4	-0.2	1.9
Indonesia	5.1	3.0	2.4	0.6	1.2	0.3	1.5
Pakistan	5.3	3.8	2.1	0.6	1.2	0.3	3.0
Philippines	5.1	4.0	3.2	0.2	0.7	1.4	2.5
Sri Lanka	5.0	4.5	3.8	0.4	1.5	-1.0	1.9
Vietnam	7.6	5.0	4.0	0.5	4.4	-2.1	2.6
All Countries	5.3	3.08	4.5	0.5	1.2	0.3	1.9
All excluding China	5.3	3.6	3.1	0.5	1.2	0.3	2.0

Source: Jha et al. (2009)

1. Growth rates (in per cent) are annual averages over the period 2000-2007. GDP growth contributions (in percentage points) are averages over the same period. Employment growth refers to employment in the organized sector.

- That this is in fact the case in several countries in the sample is revealed by the fact that average ratio of exports to GDP was about 45 percent in 2007, implying a high level of dependence on exports. However, the average ratio of the trade balance (or net exports) is barely half a percent of GDP. Again, there is wide disparity. On average the trade balance during the 2000s was negative for Bangladesh, Cambodia, and India, LAO PDR, Pakistan, Sri Lanka and Vietnam. By contrast China, among others, recorded a large trade surplus.

In sum, while these reaffirm the importance of consumption growth as a source of growth, its analytical significance is limited by the fact that this is merely an accounting exercise that apportions in additive way. The multiplier effect of public expenditure or of investment or any autonomous component of aggregate demand on output goes through a series of adjustments of induced demand to establish a new equilibrium income. Moreover, for policy purposes, a further distinction between contemporaneous or immediate impact and the long-run impact (depending on the lagged structure posited) is of considerable significance, as discussed elsewhere in the present study.

Annex 3
Key Macroeconomic Indicators for Selected Asian Countries

As sustainability of fiscal expansion and its growth impacts vary depending on a country's macroeconomic conditions, an overview of selected Asian countries is given below.

Although share of agriculture in GDP has consistently fallen over the period analysed, in Cambodia and Nepal it still accounts for about one- third of the GDP. In striking contrast, the shares are relatively low in Sri Lanka, Indonesia and the Philippines.

Table A.3.1
Share of Agriculture in GDP

	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06
Bangladesh	25.94	26.03	25.62	25.85	23.41	21.40	19.88
Cambodia	46.97	48.08	46.29	40.68	34.76	32.38	32.03
India	28.73	26.93	26.07	24.17	22.04	20.09	18.57
Indonesia	17.58	16.91	17.09	17.61	15.55	14.76	12.98
Nepal	40.20	38.73	37.79	37.96	36.99	36.21	34.39
Philippines	21.80	21.13	17.91	16.46	15.11	14.86	14.22
Sri Lanka	21.36	19.24	17.58	16.22	14.62	12.89	11.58

Table A.3.2
Share of Public Expenditure in GDP

	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06
Bangladesh	14.00	14.18	13.12	14.04	14.84	14.68	14.85
Cambodia	11.51	14.57	12.92	14.21	16.91	14.88	13.75
India	14.29	13.68	13.90	15.18	15.15	14.79	14.69
Indonesia	14.19	13.71	17.01	20.39	18.83	18.58	N/A
Nepal	16.20	16.99	17.11	16.20	17.76	14.72	14.72
Philippines	18.42	18.20	19.22	19.46	19.67	19.10	17.71
Sri Lanka	28.92	29.53	26.02	25.31	25.79	22.86	24.06

Shares of public expenditure have remained relatively stable with small fluctuations. Sri Lanka has the highest share, followed by the Philippines, while the remaining are clustered within a small range.

The share of infrastructure spending displays a mixed pattern-a more than moderate reduction in Sri Lanka, a small reduction in Nepal, a small increase in Indonesia, and Cambodia, and a near constancy in India and Bangladesh.

Table A.3.3
Share of Infrastructure in Public Expenditure

	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06
Bangladesh	14.37	13.91	13.18	14.34	14.78	14.80	14.67
Cambodia	12.97	13.99	13.22	14.84	16.84	14.22	14.28
India	14.20	13.67	14.23	15.31	14.97	14.76	N/A
Indonesia	14.12	14.28	18.06	20.36	18.42	18.52	N/A
Nepal	16.16	17.06	16.93	16.69	17.02	14.66	14.96
Philippines	18.28	18.53	19.33	19.40	19.71	18.68	17.53
Sri Lanka	29.51	28.45	25.55	25.91	24.78	23.09	23.98

The public debt-GDP ratios have risen in India and the Philippines, fluctuated around a high value in Sri Lanka, declined in Nepal and Indonesia. The important point is that, except for Sri Lanka and the Philippines, the debt burden is not alarming.

Table A.3.4
Public Debt-GDP Ratio

	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06
Bangladesh	N/A	N/A	36.15	36.32	36.32	36.16	N/A
Cambodia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
India	49.56	49.70	54.02	58.75	63.07	62.97	60.75
Indonesia	40.26	45.52	57.63	35.72	30.23	29.24	
Nepal	64.30	64.34	62.77	62.83	59.34	56.01	51.02
Philippines	58.69	59.19	58.85	61.97	68.81	74.55	
Sri Lanka	92.95	91.48	94.11	101.32	102.79	99.56	93.49

Table A.3.5
Share of Revenue-Expenditure Gap in GDP

	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06
Bangladesh	-2.50	-2.65	-2.05	-3.88	-3.89	-3.38	-3.51
Cambodia	-5.21	-6.69	-1.66	-1.66	-3.29	-2.99	-0.65
India	-1.70	-2.05	-3.03	-3.74	-3.54	-2.44	-1.53
Indonesia	2.82	1.85	-0.27	-3.68	-1.71	-1.38	N/A
Nepal	-5.95	-4.82	-5.14	-4.60	-5.24	-1.17	-1.19
Philippines	-0.60	0.00	-1.05	-3.89	-4.74	-4.39	-2.13
Sri Lanka	-8.06	-8.58	-7.63	-8.00	-9.21	-7.40	-7.02

As revenue-expenditure gaps are likely to underestimate fiscal imbalances (i.e. fiscal deficit), we have refrained from commenting in detail on the estimates in Table A.3.5. While Sri Lanka has the highest gap, in other countries the gaps are relatively small. While Bangladesh displays a widening gap, others (e.g. Nepal, Indonesia) show a narrowing of the gap.

Table A.3.6
Share of Trade/GDP Ratio

	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06
Bangladesh	22.9	28.9	30.81	32.53	35.10	35.26	41.92
Cambodia	56.6	73.4	77.28	102.8	116.6	129.1	140.8
India	20.10	22.66	23.44	26.33	28.15	34.50	46.20
Indonesia	51.20	53.11	76.09	67.19	64.44	56.69	59.93
Nepal	48.81	58.97	60.37	54.14	51.02	45.20	44.68
Philippines	72.56	85.17	109.5	105.8	101.21	105.35	96.71
Sri Lanka	78.29	80.25	79.32	83.69	79.90	79.89	75.53

The share of trade in GDP is a partial but widely used measure of openness. On this criterion, all countries other than Nepal and Sri Lanka show greater openness over time. In these two countries, however, there are small reductions. By contrast, Bangladesh, Cambodia, India and the Philippines show a rapid rise in trade liberalisation.

Figure 1. Growth of GDP Per Capita and Agriculture GDP Per Capita during 1993 – 2006

Burundi

0.1
0
-0.1
-0.2

1993   1995   1997   1999   2001   2003   2005

Cameroon

0.2
0.1
0
-0.1
-0.2

1993   1995   1997   1999   2001   2003   2005

Costa Rica

0.1
0.05
0
-0.05

1993   1995   1997   1999   2001   2003   2005

Egypt

0.075
0.05
0.025
0

1993   1995   1997   1999   2001   2003   2005

Ethiopia

0.3
0.2
0.1
0
-0.1
-0.2

1993   1995   1997   1999   2001   2003   2005

Guatemala

0.05
0.025
0
-0.025

1993   1995   1997   1999   2001   2003   2005

Keyna

0.1
0.05
0
-0.05
-0.1
-0.15

1993   1995   1997   1999   2001   2003   2005

Mexico

0.1
0.05
0
-0.05
-0.1

1993   1995   1997   1999   2001   2003   2005

Panama

0.15
0.1
0.05
0
-0.05

1993   1995   1997   1999   2001   2003   2005

Tunisia

0.2
0.1
0
-0.1
-0.2

1993   1995   1997   1999   2001   2003   2005

Zambia

0.2
0.1
0
-0.1
-0.2

1993   1995   1997   1999   2001   2003   2005

Figure 2. Growth of Non-Infrastructure and Infrastructure (NetINF) Expenditure (INF)

Bangladesh

Cambodia

India

Indonesia

Nepal

Philippines

Sri Lanka

Brunei

Malaysia

Maldives

Thailand

Mongolia

D(INF)   D(NetINF)

48
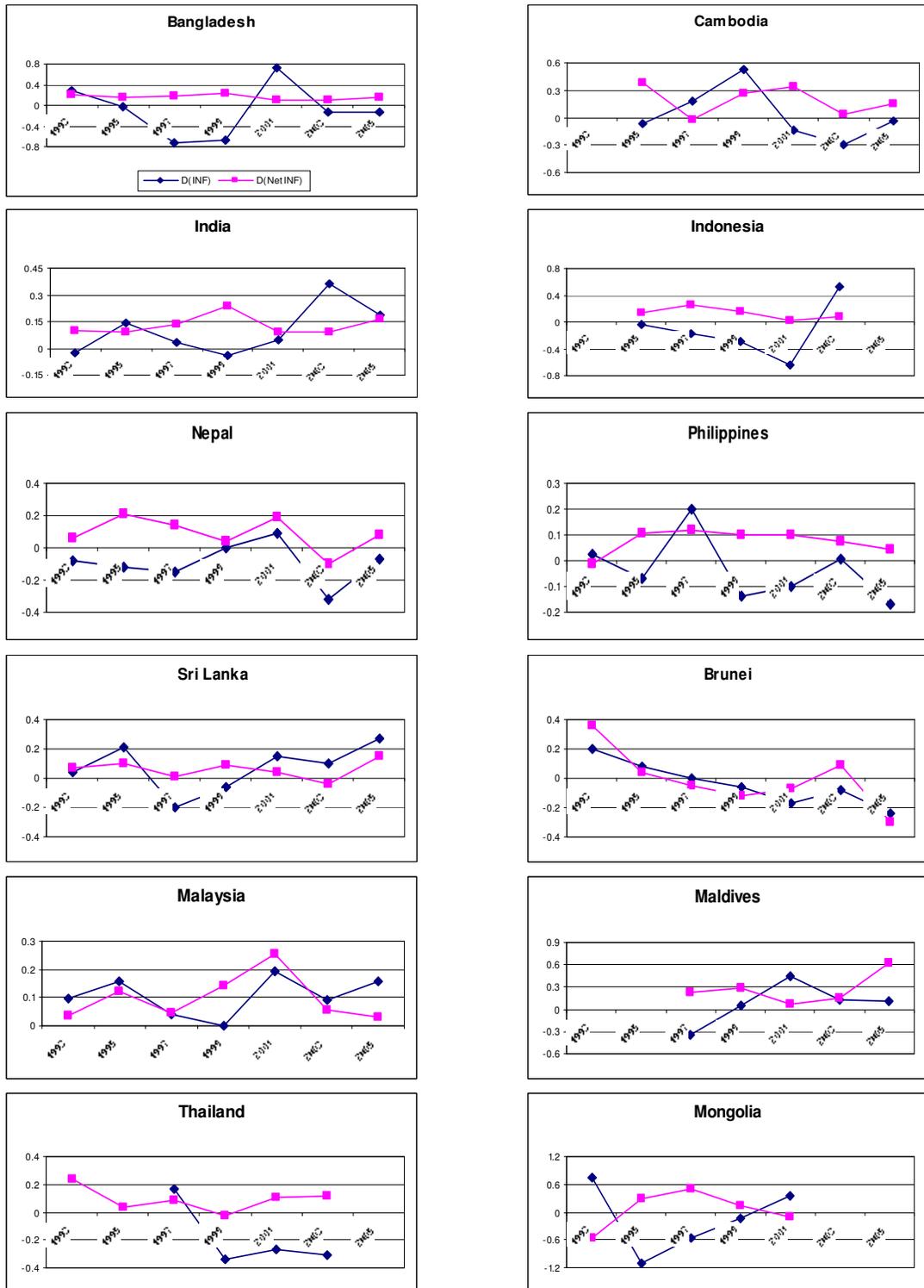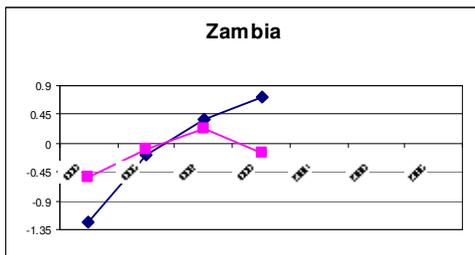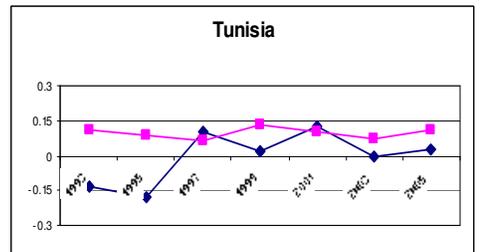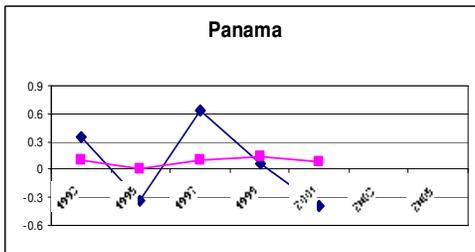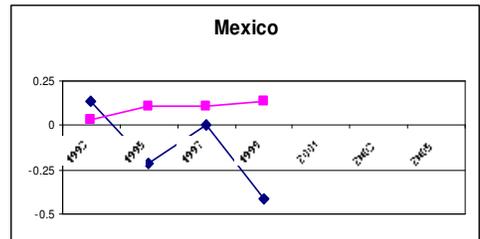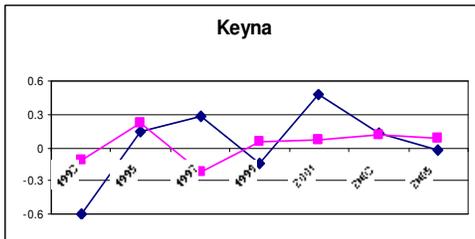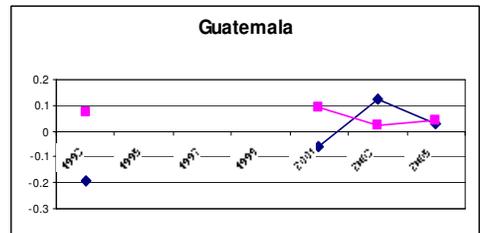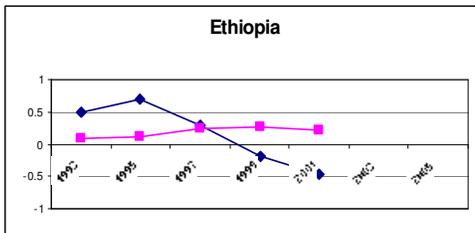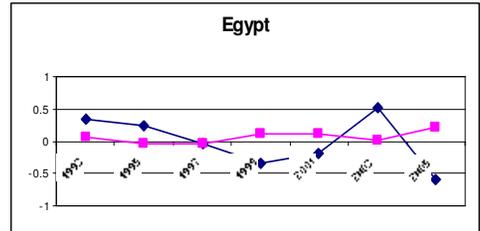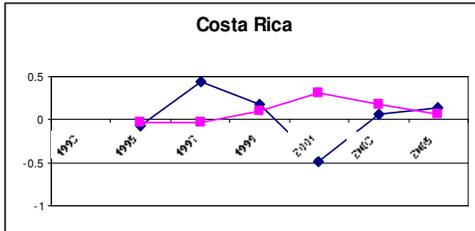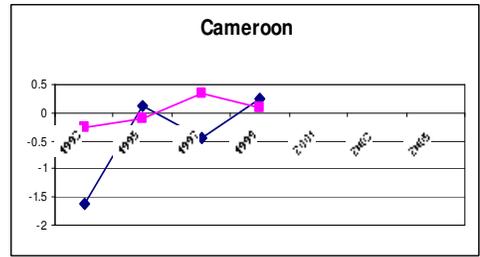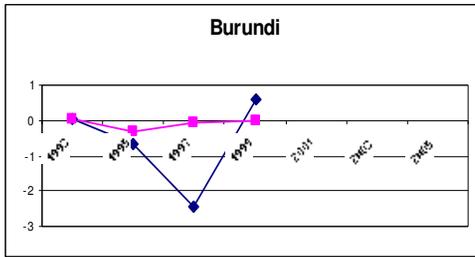
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