



# ASIA-PACIFIC DEVELOPMENT JOURNAL

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**ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC**

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## Editorial Statement

The *Asia-Pacific Development Journal* is published twice a year by the Economic and Social Commission for Asia and the Pacific.

Its primary objective is to provide a medium for the exchange of knowledge, experience, ideas, information and data on all aspects of economic and social development in the Asian and Pacific region. The emphasis of the *Journal* is on the publication of empirically based, policy-oriented articles in the areas of poverty alleviation, emerging social issues and managing globalization.

The *Journal* welcomes original articles analysing issues and problems relevant to the region from the above perspective. The articles should have a strong emphasis on the policy implications flowing from the analysis. Analytical book reviews will also be considered for publication.

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## **A note from the Editor**

This issue of the *Asia-Pacific Development Journal* contains six papers, drawn from diverse fields. The first paper addresses the impact of road improvements in the Lao People's Democratic Republic on the incidence of poverty, primary school enrolment and the general health of the adjoining populations. The second paper demonstrates that agricultural diversification in some Asian countries has stagnated over recent decades. This is a rather disturbing finding, particularly for countries which rely mostly on their agricultural sector for growth and employment. The next paper explores household savings behaviour in Pakistan over several decades and uses the results to draw some important policy implications. Some interesting insights are presented in the paper on the impact of remittances in some rural communities in India, particularly the impact on rural poverty. The paper on the nexus between growth and foreign aid in Vanuatu presents some interesting results in the context of an island developing economy. The last paper explores the scope and prospects for regional cooperation in countries with economies in transition in Central Asia.

The paper by Peter Warr, "The impact of road development on poverty in the Lao People's Democratic Republic", summarizes evidence suggesting that road improvements in rural areas can contribute significantly to poverty reduction and improved participation of children in primary education, and contribute generally to reduced rates of illness. The case study was conducted in the Lao People's Democratic Republic, using household-level data from the Lao Expenditure and Consumption Survey (LECS) relating to the years 1997-98 and 2002-03. The quality and availability of rural roads in developing countries pose a major developmental problem. Improving these roads can yield significant benefits, particularly in terms of indicators that are relevant to the Millennium Development Goals. The paper examines three broadly conceived dimensions of poverty: consumption poverty (meaning expenditure on privately purchased goods and services), educational opportunity and health standards. The results of this analysis suggest that road improvement in the form of conversion of dry-season access roads to all-season access roads can lead to poverty reduction. This was the principal form of road improvement that occurred between 1997-98 and 2002-03. Over this same period, the incidence of poverty declined from 42.5 to 37.6 per cent of the rural population. One fourth of the poverty reduction that actually occurred can be directly attributed to this form of road improvement. The results also show that the improvement of roads benefits rural households positively in terms of educational participation and health standards. Intuitively appealing, the results show that simple, workable solutions can be found in making progress towards achieving the Millennium Development Goals.

The paper by Tomohide Sugino, "Prioritization of technological development goals for poverty alleviation through sustainable and diversified agriculture", offers some very interesting insights into the changing nature of agricultural diversification through technological development and diffusion. Diversified agriculture can have positive impacts on rural development, but statistical indicators have shown that agricultural diversification in Asian countries has stagnated over recent decades. This



would imply that rural development in Asia is not taking place at the pace it can potentially reach. It has been known for quite some time that technological development is a dominant factor in determining the extent of agricultural diversification. A natural starting point would be to see if lack of technological development is holding back agricultural diversification. In promoting the technological progress of their agricultural activities, developing countries face a range of difficulties, including lack of financial resources and limited investments in research and development (R&D). The author defines technological development as a combination of improved plant varieties, high-yielding varieties, and modern cultivation techniques, such as extensive use of chemical fertilizers, pesticides, irrigation, and the use of machinery. The author uses a questionnaire survey with 259 respondents in eight Asian countries to establish the priority that they accord to R&D activities that would potentially enhance agricultural diversification. The expected impacts of realizing these developments are also analysed. The results show that the respondents accord the highest priority to the development of pest-tolerant crop varieties as well as measures to improve soil fertility among the 15 R&D topics surveyed. Responses received from researchers, extension staff and farmers vary significantly, indicating that there are serious knowledge gaps regarding technological development and the diffusion process. If that is so, it is possible that such knowledge gaps are a major cause of stagnant agricultural diversification and any measures that remove such knowledge gaps can help realize the full potential of R&D activities in achieving agricultural diversification.

The country study by Mohsin Hasnain Ahmad and others, "The impact of demography, growth and public policy on household saving: a case study of Pakistan", investigates the behaviour of household saving in the country's economy. Domestic resources are a key variable in determining the extent and pace of economic growth in any country. Yet, at least in the case of Pakistan, the country has enjoyed high economic growth despite low domestic savings rates. It is entirely possible that Pakistan could have grown faster had it been able to mobilize more domestic resources. A natural line of investigation would be to see if there is a systematic relationship between the economic variables that influence household savings. In the affirmative, the policy implications would need to be determined. The authors use the Johansen-Juselius cointegration technique and error correction model to determine the long-run and short-run dynamics of the system over the period 1972-2003. They find the existence of one cointegrating vector, indicating a valid long-run economic relationship among the determinants of household saving. The study reports some standard results. Per capita income and the growth rate of per capita income have a positive impact on the savings rate. Inflation is seen to negatively affect savings behaviour, another standard result. The real rate of interest has a positive effect on savings behaviour, indicating that the substitution effect dominates the income effect in Pakistan. Furthermore, public saving has a proportionately less "crowding-out" effect than private saving in Pakistan compared with other developing countries. All these findings have their own individual policy implications. However, the interesting

finding to emerge from this paper is the relationship between demographic variables and savings behaviour in Pakistan. In conventional studies of savings behaviour, demographic variables are treated as being “outside” the system and therefore of less policy relevance to economists. The authors show that there is a valid, long-run inverse relationship between household saving and demographic variables. Two things seem to be happening to the demographics of Pakistan: first, it has a high population growth rate; second, the structure of the population is shifting, with an increase in dependency on the young. These would suggest that any policy to reduce the population growth rate and shift or reduce the dependency burden would help boost domestic savings, which in turn could add to the country’s growth momentum.

There has been an intense and sustained interest in international remittances in recent years as the quantum of global remittances received by developing countries has grown by leaps and bounds. Increasingly, such flows have been seen a new form of development resource with economy-wide consequences. Many countries have responded positively to such increased flows of international remittances with policy reforms and better coordination among institutions that help intermediate such flows. Chandan Samal’s paper, “Remittances and sustainable livelihoods in semi-arid areas”, adds a new dimension to the growing literature on remittances. Taking the migration pattern in selected villages of semi-arid and drought-prone districts of Andhra Pradesh, India, the paper shows that remittances do provide scope for accumulation of wealth and asset creation by households in addition to meeting basic consumption needs. The empirical results show that migration and associated remittances are strategic responses for establishing viable and sustainable livelihood solutions for households in semi-arid areas. The extent of the strategic response and the potential role of remittances in the creation of an asset base by poor migrant workers are constrained by several factors. Among these, an inadequate skills set and lack of access to critical services, such as water, sanitation, health and education, combine to limit the potential benefits of migration and remittances. Policies that contribute to enhance the capabilities of the poor can also enhance their income generation potential.

In “Economic growth in a vulnerable island nation: an empirical study of the aid-growth nexus in Vanuatu”, T.K. Jayaraman and B.D. Ward explore the impact of external flows on the economic growth of Vanuatu. The literature on the impact of foreign aid on growth in developing countries provides a mixed picture, with many studies showing no positive contribution. It has been argued that foreign aid reduces the incentives for domestic savings. It has also been argued that aid does not contribute positively to export growth. The authors look at the aid-growth-export nexus in Vanuatu, a small island nation in the South Pacific with a population of 220,000. It was once ranked as the most vulnerable economy as it was the least capable of withstanding the adverse impacts of external and internal shocks. Its export earnings are unstable, and it is highly dependent on imports and extremely prone to natural disasters. Its narrow human resources base has compounded its economic difficulties. As a result, the country has received generous aid from the

international community ever since its independence in 1980. In addition to Australia and New Zealand, multilateral funding agencies, including Asian Development Bank, have been assisting Vanuatu with concessional loans for projects and reform programmes. The impacts of such assistance have been rather mixed. Aid has not contributed positively to economic growth in Vanuatu. It has also failed to contribute positively to exports, although the latter has contributed to growth. The authors recommend that aid be redirected to the promotion of agricultural exports. This would benefit the rural communities since they are mostly engaged in producing agricultural exports. This policy shift would also help in increasing rural incomes.

In their paper, "Central Asia after fifteen years of transition: growth, regional cooperation and policy choices", Malcolm Dowling and Ganeshan Wignaraja make a significant contribution to our understanding of why the economies of the Central Asian republics collapsed in 1990 and how they have managed to recover since then. By focusing on the pattern of growth and structural changes during the cycle of decline and subsequent revival in the Central Asian republics, they make a valuable contribution to the literature on transition, much of which has so far dealt with Central and Eastern Europe and the Baltic States. Since 1990, the region has received much attention in terms of its potential as a major supplier of key resources to other countries. The region has also undergone important policy reform exercises. Many observers believed that these two factors alone would guarantee a quick recovery and possibly help the republics to surpass their pre-1990 production and consumption levels. Some also argued that a massive injection of external assistance would bring about a sustained pace of recovery and development in the region. These things did not happen, at least not during the early part of the 1990s. The authors provide a coherent and systematic explanation for the economic collapse of the republics and their subsequent recovery from 1995-1997 onwards. Several factors contributed to the collapse. Real output contracted sharply, by about 40 to 60 per cent. As part of an integrated production system, they supplied raw materials, energy and intermediate inputs to the Russian Federation, which in turn supplied finished manufactured goods to them. This mutual dependence obviously constrained the flexibility of the economies of the republics during the transition phase. However stressful the transition period might have been, the Central Asian Republics managed to recover by historical standards, within a relatively short period of time. Propelled by the expansion of the manufacturing sector and structural reforms, economic growth has been accelerating with a beneficial effect on the incidence of poverty. Some oil-exporting republics have benefited significantly from the recent surge in oil prices. The experience of the Central Asian republics suggests that the speed of reform and the nature of the policy mix are two crucial ingredients in any successful transition programme.

*Shamika Sirimanne*

## THE IMPACT OF ROAD DEVELOPMENT ON POVERTY IN THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

Peter Warr<sup>\*</sup>

*This paper summarizes evidence suggesting that road improvement in rural areas can contribute significantly to lowering the incidence of poverty, improving educational participation of primary school aged children, and reducing rates of illness. This is done in the context of rural areas of the Lao People's Democratic Republic. It is widely recognized that rural roads in the countries are a major developmental problem. It seems obvious, just by inspecting these roads, that improving them would produce benefits. But demonstrating and quantifying the effects on indicators relevant to the Millennium Development Goals, such as the incidence of poverty, educational participation and health standards, is another matter.*

*The case study uses household level data from the Lao Expenditure and Consumption Survey (LECS) relating to the years 1997-98 and 2002-03. These data indicate that rural areas of the Lao People's Democratic Republic account for 87 per cent of all poor people in that country. Reducing poverty in that country thus means, primarily, reducing rural poverty. But what works and what does not work in achieving the goal of poverty reduction? This paper is directed at that question and looks at three broadly conceived dimensions of poverty: consumption poverty (meaning expenditure on privately purchased goods and services), educational opportunity and health standards. Consumption poverty measures only the availability of goods and services which people can purchase with their own funds and makes no allowance for the availability of goods and services provided at a collective level, principally by the Government. For this reason, by allowing for such collectively provided items as educational and health services, it is possible to achieve a usefully broad definition of the concept of poverty reduction.*

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<sup>\*</sup> John Crawford Professor of Agricultural Economics and Director, Poverty Research Centre, Division of Economics Research School of Pacific and Asian Studies, Australian National University.

*The results of this analysis suggest that to effect poverty reduction the most important form of road improvement is the conversion of dry season access roads to all season access. This is in fact the principal form of road improvement that occurred between 1997-98 and 2002-03. Over this same period, the incidence of poverty declined from 42.5 to 37.6 per cent of the rural population. The results of this analysis suggest that about one fourth of the poverty reduction that actually occurred can be directly attributed to this form of road improvement: the conversion of roads which are accessible only in the dry season to roads which are accessible in all seasons. These results therefore suggest that the principal form of road improvement which has occurred in the Lao People's Democratic Republic in the past has been consistent with the goal of maximizing the rate of poverty reduction.*

*The data also indicate that the improvement of roads affects educational participation and health standards. The results are not as robust, statistically, as those for poverty, but an interesting difference emerges. Whereas the effect on the incidence of poverty are strongest for the upgrading of dry season access roads to all weather roads, educational and health benefits are derived mainly from the provision of dry season access roads to households which previously were accessible only by walking. Over the five year period examined in this paper, very little road improvement of this kind actually occurred in the Lao People's Democratic Republic. The results suggest that significant educational and health benefits would be derived by providing dry season road access to the 20 per cent of rural households which presently lack it.*

## I. INTRODUCTION

How do development projects affect the welfare of the population? This question is fundamental to the operation of many public agencies, including multilateral and bilateral development institutions. The tools of analysis employed to study such questions are various and all have limitations. The basic problem is that the social sciences generally lack the possibility of controlled experimentation, which has been so successful within the natural sciences for identifying causal relationships. This fact necessitates the use of imperfect

substitutes for properly controlled experiments as a method of determining the way interventions like public sector projects impact on social and economic variables of interest.

This paper seeks to determine the way that project interventions affect the achievement of basic social objectives such as the internationally adopted Millennium Development Goals (MDGs). These goals include poverty reduction and improvements in basic education, health, gender equity, environmental quality, and other objectives central to the agenda of development. If the activities of development institutions are to promote the achievement of these goals, it is necessary to know how project interventions affect them. That is not easy.

One approach is to use socio-economic surveys to study the statistical relationship between the incidence of poverty and the implementation of public projects of various types. The existence or non-existence of a project is treated as an exogenous (independent) variable whilst the impact variables (poverty, education, health, and so forth) are treated as the endogenous (dependent) variables. The relationships between the former and the latter may be studied with or without a project, in the case of cross-sectional data, or before and after a project, in the case of time series data. The fact that the 'experiments' concerned are not properly controlled is relevant, however. Suppose, for example, that areas with high levels of income per person had previously been chosen by the Government or another implementing institution for the location of a particular kind of project. If a study found that low incidence levels of poverty were statistically associated with the existence of the project this would not necessarily indicate that the project reduced poverty. It might simply reveal the way the government had decided about the location of the project. In this case, a better approach would be to study the changes in the variables concerned over time, using the change from one survey period to another. As with the cross-sectional approach, however, the problem is that many variables change over time, and not just the existence or non-existence of the project. The changes that occur over time might not be due to the project at all, but to some other variable which also changed over time.

Another approach is to use computerized models of the economy to study the way that economic changes, such as the existence or non-existence of a particular kind of project, affect variables of interest. The advantage of this approach is that it makes true experiments possible. The models facilitate the changing of one variable at a time and analysis of the effects that this change produces, holding everything else constant. The obvious disadvantage of this approach is that the results are only as good as the models that are used and it is often difficult for non-specialists to assess the quality of the models underlying the

results and hence the value of the results themselves. All such models rest heavily on assumptions about the qualitative functioning of the economy and the quantitative relationships between variables of interest. These assumptions are always open to doubt and dispute, producing uncertainty about the reliability of the results that emerge from them.

This paper reports on a case study that examined the effects of improved roads using the socio-economic surveys approach. An earlier study (Warr 2005) examined the effect of improved roads on consumption expenditures and measures of the incidence of poverty based on consumption. The present paper draws upon these results and also reports new results on the effect of improved roads on two other Millennium Development Goals: improved health and education.

## **II. SUMMARY DATA ON ROADS, POVERTY, EDUCATION AND HEALTH**

### **Background**

Since the late 1980s, a programme of market oriented economic reforms, translated from Lao as the New Economic Mechanism (NEM), has shifted the economy away from the rigidly socialist pattern instituted immediately after the declaration of the Lao People's Democratic Republic in 1975. Since the reforms began, overall economic growth has been impressive. From 1991 to 2002 annual growth of GDP averaged 6.2 per cent per annum, or around 3.8 per cent per person. The agricultural sector dominates employment, with 80 per cent of the workforce, and contributes about 50 per cent of GDP, down from just over 60 per cent in 1990. The country receives substantial external support. In 2002/3 external donors contributed 61 per cent of the Government's capital budget, representing 39 per cent of total public expenditure, and 7.6 per cent of GDP. Over the decade 1992-93 to 2002-03 estimates for the incidence of poverty in the country declined from 46 to 33.5 per cent of the population.

The reform process has been successful, but it is hardly surprising that many problems remain. One of the most serious, evident to any visitor to rural areas of the country, is the poor state of rural roads. Many villages have no road access at all, meaning that vehicles cannot reach them. They are accessible only by walking. Others have access only during the dry season, meaning that during the extended rainy season, vehicle access to their village is impossible. Poor roads impede the capacity to participate in the market economy. Reforms may remove prohibitions on participating in the market economy, but this might be of little help if roads are so bad that market participation is prevented by high transport

costs. It seems likely that improved rural roads will improve living conditions in rural areas, but can this effect be demonstrated and quantified? That is the focus of this paper. It asks whether improving rural roads is an effective instrument for reducing poverty and for improving health and educational outcomes for the rural population.

### **Indicators of socio-economic progress in the Lao People's Democratic Republic**

The most useful source of socio-economic data on the population is the Lao Expenditure and Consumption Survey (LECS). This survey has been conducted every five years since 1992-93. The number of households surveyed is around 8,900, about 1.2 per cent of the total number of households in the country, containing around 57,600 individuals.<sup>1</sup> The individual households sampled in each survey are seldom the same and, in any case, households are not identified individually and it is therefore not possible to compare the same households across time, using the LECS survey data.

Data from the LECS surveys indicate that in 2002-03, 77 per cent of the population resided in rural areas, but the incidence of poverty in rural areas (the proportion of the population with real expenditures below the poverty line) was almost double that of urban areas (figure 1). Most tellingly, rural areas accounted for 86.5 per cent of all poor people.<sup>2</sup> Poverty in the country is overwhelmingly a rural phenomenon and it follows that poverty reduction is primarily a matter of reducing rural poverty. We now turn to data which may help identify the determinants of poverty in rural areas and the ways it can be addressed, focusing on the contribution of roads.

"Distance to main road" is one of the variables listed in LECS, but this variable is known to be of unreliable quality, a point that is emphasized by LECS data enumerators. The variables "Rural with access to road" and "Rural without access to road" are considered more reliable and these are the data used in the present study. These variables reflect yes/no answers from households and are treated as dummy (0, 1) variables in the regression analysis.

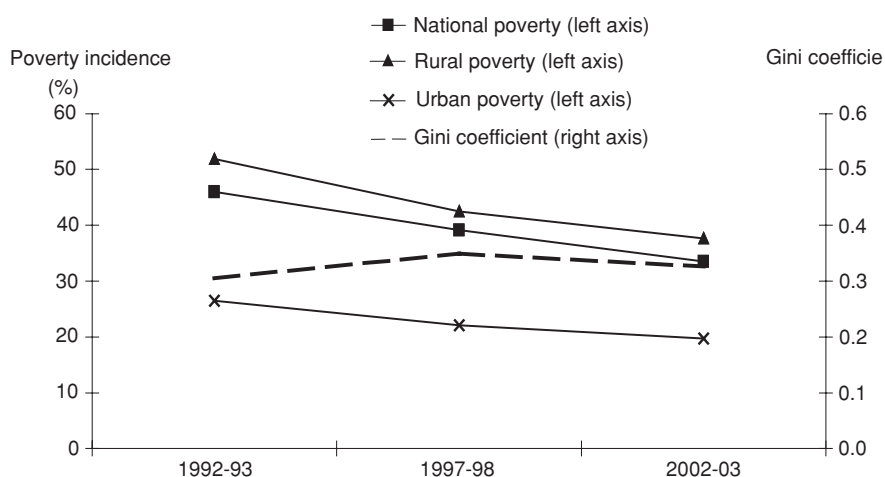
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<sup>1</sup> A fuller description of the survey and its variables is provided in Warr (2005).

<sup>2</sup> It can be shown that the share of rural areas in the total number of poor people is given by  $S_R^P = \alpha_R P_R / P$ , where  $\alpha_R$  is the share of the total population residing in rural areas,  $P_R$  is the share of the rural population that is poor (that is, the headcount measure of poverty incidence in rural areas) and  $P$  is the share of the total population that is poor.



**Figure 1. Lao People's Democratic Republic: The incidence of poverty and inequality, 1992-93 to 2002-03**



Source: Richter, van der Weide and Souksavath (2005), using data from LECS, National Statistical Center, Vientiane.

Table 1 summarizes data assembled by Richter and others (2005) and presents results drawn from the three LECS surveys conducted to date. Between the LECS I and LECS II surveys (1992-93 and 1997-98, respectively), both the format of the LECS survey and the sampling method used were changed. For this reason, accurate comparison of the results from these two surveys is difficult. The format and sampling method remained the same from LECS II to LECS III, so comparison between these two surveys (1997-98 and 2002-03) is more reliable and our discussion will emphasize these two surveys.

The LECS surveys make it possible to classify households into three categories of road access: All season access, meaning wet and dry seasons; dry season access only; and no road access. No road access means that the village can be reached only on foot. Of all the nation's households, 77 per cent were rural in 2002-03, 43.9 per cent (57 per cent of all rural households) had all season road access, 13.1 per cent (17 per cent of all rural households) had dry season access, leaving 20 per cent (26 per cent of all rural households) without any road access at all. This problem of lack of road access is a particular problem in rural areas of the northern region, which is also the poorest. There, 38 per cent of households lack road access. In some specific areas of the country this problem is even worse. Along the northern border with Viet Nam the proportion is 53 per cent and

**Table 1. Lao People's Democratic Republic:  
Socio-economic change and road access, 1997-98 to 2002-03**

|  | 1997-98 | 2002-03 |
|--|---------|---------|
| Population (million)                     | 5.087   | 5.519   |
| Population shares (%)                    |         |         |
| – Urban                                  | 16.7    | 23.0    |
| – Rural                                  | 83.3    | 77.0    |
| With all season road                     | 36.0    | 43.9    |
| Without all season road                  | 47.3    | 33.1    |
| – Dry season access only                 | 26.7    | 13.1    |
| – No road access                         | 20.6    | 20.0    |
| The incidence of poverty (%)             | 39.1    | 33.5    |
| – Urban                                  | 22.1    | 19.7    |
| – Rural                                  | 42.5    | 37.6    |
| With all season road                     | 31.7    | 31.3    |
| Without all season road                  | 50.8    | 46.2    |
| Poverty gap (%)                          | 10.3    | 8.0     |
| – Urban                                  | 4.9     | 4.1     |
| – Rural                                  | 11.4    | 9.2     |
| With all season road                     | 7.3     | 7.1     |
| Without all season road                  | 14.5    | 12.0    |
| Gini index of per capita consumption (%) | 34.9    | 32.6    |
| – Urban                                  | 39.7    | 34.8    |
| – Rural                                  | 32.1    | 30.3    |
| With all season road                     | 32.1    | 30.3    |
| Without all season road                  | 30.9    | 29.4    |
| Access to electricity (%)                | 31.1    | 47.6    |
| – Urban                                  | 91.1    | 97.1    |
| – Rural                                  | 19.0    | 32.0    |
| With all season road                     | 35.4    | 44.0    |
| Without all season road                  | 6.6     | 18.1    |

Source: Richter, van der Weide and Souksavath (2005), using data from LECS, National Statistical Center, Vientiane.

along the southern border with Cambodia 54 per cent of households lack any road access.

Table 1 shows that the proportion of the population residing in rural areas who had all season road access increased from 1997-98 to 2002-03 from 36 per cent to 44 per cent. This improvement in road access coincided with other dimensions of socio-economic improvement in rural areas. The headcount measure of the incidence of poverty in rural areas declined from 42.5 per cent to 37.6 per cent. Some part of this decline might be attributable to improved access to all season roads, but not all of it. Within the population having all season road access the incidence of poverty remained almost constant (declining from 31.7 per cent to 31.3 per cent), but it declined significantly within the population lacking any road access (from 50.8 per cent to 46.2 per cent). Events other than the improvement in roads must have caused the latter's change. The question that remains is to what extent, if any, can reduced poverty be attributed to improved roads? We return to this question in the following section.

Of course, the headcount measure is only one indicator of absolute poverty, but other indicators show a similar picture. The poverty gap measure (unlike the headcount measure) is sensitive to how far a household's consumption per capita falls below the poverty line, it is also shown in table 1 and behaved very similarly to the headcount measure. Measures of inequality, like the Gini coefficient shown in table 1, are quite different. Measured inequality increased slightly in virtually all areas of the Lao People's Democratic Republic over this decade. Access to electricity improved in all rural areas over this decade, including both those with all season road access and those without it.

The LECS surveys also include data on other socio-economic outcomes of interest. Table 2 focuses on educational participation. It looks at the proportion of children in the primary school age group 5 to 12 who attend school. These data relate to LECS III, covering the year 2002-03. Not surprisingly, school attendance is highest among rural households who have all season road access, and lowest among those without road access, among both males and females. The data indicate that the average time taken to reach school *per head of the school age population* is actually higher among those with all season access than those without road access. But this is a consequence of lower school participation rates in the latter group. The average time taken to reach school *among those actually attending school* is highest for those without road access. Expenditure on education per student is highest among those households for which road access is best. This reflects higher incomes and the higher priority placed on education by the latter group.

**Table 2. Lao People's Democratic Republic: Educational participation and road access, 2002-03**

|   | <i>All Season<br/>Access</i> | <i>Dry Season<br/>Access<br/>Only</i> | <i>No Road<br/>Access</i> | <i>All</i> |
|---|------------------------------|---------------------------------------|---------------------------|------------|
| School Attendance   | 80.67                        | 70.48                                 | 51.90                     | 69.41      |
| Females (%)   | 80.00                        | 67.82                                 | 47.54                     | 67.06      |
| Males (%)   | 81.37                        | 72.98                                 | 56.27                     | 71.72      |
| Average time traveling to school                                | 8.14                         | 9.02                                  | 6.24                      | 7.79       |
| Average expenditure on education<br>(kip per student per month) | 111 963                      | 86 973                                | 65 152                    | 96 209     |

Source: Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

Note: Expenditure on education is measured in kip per student per month.

Table 3 summarizes data from LECS relating to health. The survey includes questions on the proportion of people who became ill in the past 4 weeks. This proportion is somewhat higher in households with low levels of road access. Moreover, in areas with poor roads, those who did become ill were less likely to seek treatment. In these households, more days were missed from work than in households with better roads and, not surprisingly, less was spent on transport to hospital.

**Table 3. Lao People's Democratic Republic: Health status and road access, 2002-03**

|  | <i>All Season<br/>Access</i> | <i>Dry Season<br/>Access<br/>Only</i> | <i>No Road<br/>Access</i> | <i>All</i> |
|--|------------------------------|---------------------------------------|---------------------------|------------|
| Proportion of persons who became ill<br>in the last 4 weeks (%)              | 13.31                        | 13.37                                 | 15.63                     | 14.07      |
| Of those ill, those who did not<br>seek treatment (%)                        | 80.69                        | 83.16                                 | 89.80                     | 84.35      |
| No treatment because too difficult<br>to get there (%)                       | 11.83                        | 24.83                                 | 24.10                     | 18.55      |
| Average days missed due to poor health<br>(days per household, last 4 weeks) | 0.58                         | 0.58                                  | 0.76                      | 0.64       |
| Average expenditure on transport<br>to hospital (kip per household per year) | 102 958                      | 72 460                                | 50 564                    | 85 494     |

Source: Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

Two features of tables 1 to 3 are especially notable. Firstly, the final row of "Population shares" in table 1 makes it clear that the change in road access over the five year period 1997-98 to 2002-03 was heavily concentrated in the provision of all season road access to households which already had dry season access. The proportion of rural households with "All season access" increased and the proportion with "dry season access only" declined correspondingly. But the proportion with "no road access" barely changed.

Secondly, turning to tables 2 and 3, by comparing households that have all season access against those with dry season access only and then comparing households with dry season access against those without road access, one clear point emerges. The greatest differences in education and health outcomes are in the second comparison – those with dry season access only against those without road access. Those who attained dry season road access, having previously had none, showed a greater improvement in education and health than those who attained all season road access, having previously had only dry season access.

The above suggests that improved roads coincide with lower levels of the incidence of poverty, higher levels of school participation, more spending on education at the household level, better standards of health and better care for those who become ill. However, areas with roads and those without roads differed in many respects. Therefore it is not possible to infer directly from these data whether improved road access is alleviating poverty and raising educational and health levels, or whether some other factors are at work. The following section will examine this matter.

### III. ISOLATING THE EFFECTS OF ROADS ON POVERTY<sup>3</sup>

Multiple regression is a way of coping with the fact that more than one factor which potentially influences the dependent variable is changing across the sample. This occurs when the data are not generated by controlled experiments, changing only one independent variable at a time. The problem that this raises is how to sort out the respective causal influences of each of these independent variables. The LECS surveys make it possible to deal, imperfectly, with this point, by taking note of the variation in many independent variables using multiple regression methods. Results are reported in this section.

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<sup>3</sup> This section draws upon, but also updates, results presented in Warr (2005) reporting research supported by the Asian Development Bank Institute. The updating is based on the official 2002-03 poverty incidence estimates provided in Richter and others (2005).

Does road improvement reduce poverty, and if so, by how much? The LECS survey has data on consumption expenditures at the household level. Data were converted into a per capita form and deflated by regional consumer price indices from concurrent months. This method takes account of both the regional variation in consumer prices and the variation in prices over time. The analysis regresses real household expenditure per capita on the independent variables shown in table 4, including road access, using dummy variables  $D$  for dry season access roads and  $W$  for an season access. Then these regression results are used to simulate the change in the distribution of real consumption expenditures that results from hypothetical improvements in road access, as explained below. The incidence of poverty is then estimated from these projected levels of real expenditures at the household level.

The regression results for LECS 3 are reported in table 4. To allow for province-specific effects provincial dummy variables were used, but for brevity, these results are not presented in this or subsequent tables of results.<sup>4</sup> The estimated coefficients had the expected values, including the education variables and asset ownership variables. The variables “access dry season” and “access wet season” each had the expected positive signs, and each was significant at the 1 per cent level of significance. According to these results, having road access in both dry and wet seasons was associated with higher levels of real expenditure per person, after allowing for the impact of other relevant variables.

The implications of these results for the incidence of poverty are explored in table 5. The method of analysis is illustrated in figure 2. The figure shows the projected cumulative distribution of the logarithm of real consumption expenditures per person obtained from the LECS III data set combined with the regression results reported in table 4. These data were assembled by calculating real consumption expenditures per person for all rural households, taking the natural logarithm and then sorting them from the lowest to the highest. The diagram shows three estimated distributions:

**P1.** The predicted level of real expenditures using the actual values of the dummy variables  $D$  and  $W$  as observed in the data as well as actual values of all other independent variables. The difference between this prediction and the actual data is the error of the regression.

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<sup>4</sup> As is standard practice, dummy variables were used for all but one of the 18 provinces. The effect of the 18<sup>th</sup>, for which no dummy variable was used, is incorporated into the constant term. Of the 17 provinces shown in table 4, provinces 1 to 7 belong to the Northern region, province 8 and 10 to 13 belong to the Central region and 15 to 17 belong to the Southern region, along with the 18<sup>th</sup> province (not listed in the table), Attapeu. The capital region, Vientiane Municipality (Province 9), is in a separate regional category.

**Table 4. Lao People's Democratic Republic: Real per capita expenditure and road access, 2002-03, Regression results at household level**

| <b>Dependent variable: Log of real per capita expenditure</b> |                    |                    |                |
|---|--------------------|--------------------|----------------|
| <b>Independent variables:</b>                                 | <i>Coefficient</i> | <i>t-statistic</i> | <i>p-value</i> |
| <b>Constant</b>   | 10.911             | 87.710             | 0.000          |
| Age at last birthday  | 0.032              | 7.073              | 0.000          |
| Age at last birthday squared (household head)                 | 0.000              | -6.138             | 0.000          |
| Primary (1-5 years)   | 0.140              | 6.159              | 0.000          |
| Lower secondary (6-8 years)                                   | 0.330              | 10.439             | 0.000          |
| Upper secondary (9-11 years)                                  | 0.380              | 6.900              | 0.000          |
| Higher (vocational training or university/institute)          | 0.541              | 9.679              | 0.000          |
| Paid employment   | 0.257              | 4.623              | 0.000          |
| Farm employment   | 0.055              | 1.021              | 0.307          |
| Not in labour force   | 0.135              | 2.098              | 0.036          |
| Number of adults in household (18 <= AgeAdult < 65)           | 0.060              | 6.070              | 0.000          |
| Total number of members in household                          | -0.115             | -23.015            | 0.000          |
| Total number of cows and buffaloes                            | 0.021              | 11.543             | 0.000          |
| Electricity_n   | 0.194              | 8.408              | 0.000          |
| Daily market_n  | 0.084              | 1.381              | 0.167          |
| Bus stop_n  | 0.029              | 0.988              | 0.323          |
| Clean water_n   | 0.061              | 2.883              | 0.004          |
| Hospital in village   | 0.350              | 5.619              | 0.000          |
| Access dry season_n   | 0.102              | 3.403              | 0.001          |
| Access wet season_n   | 0.086              | 2.638              | 0.008          |

*Source:* Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

*Note:* For brevity, coefficients on provincial dummy variables have been deleted from the reported results.

*Summary diagnostics:*

$R^2 = 0.318$ ; adj.  $R^2 = 0.314$ ; s.e. of estimate = 0.729;  $F = 85.55$ ; significance level:  $p = 0.000$ .

**P2.** The predicted level of real expenditure when all households have the value of  $D = 1$  and  $W$  takes its values from the actual data, along with the actual values of all other independent variables.

**P3.** The predicted level of real expenditure when  $D = 1$  and  $W = 1$  for all households, along with the actual values of all other independent variables.

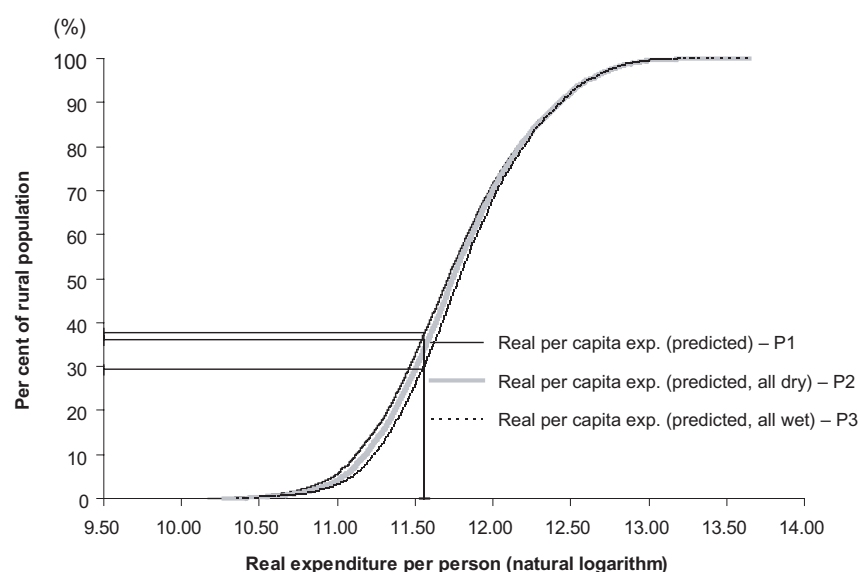
The difference between P1 and P2 is an estimate of the degree to which real consumption expenditures could be increased if all households had access to roads in the dry season, but wet season access remained as observed in the data.

**Table 5. Lao People's Democratic Republic: The incidence of poverty and road access, 2002-03, simulation results – estimated the incidence of poverty under alternative road conditions**

| <i>Dry season<br/>road access</i> | <i>Wet season<br/>road access</i> | <i>Code</i> | <i>Estimated the incidence<br/>of poverty (%)</i> |
|-----------------------------------|-----------------------------------|-------------|---|
| Observed levels in data           | Observed levels in data           | P1          | 37.60   |
| All households with access        | Observed levels in data           | P2          | 36.17   |
| All households with access        | All households with access        | P3          | 29.36   |

Source: Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

**Figure 2. Lao People's Democratic Republic: Predicted distribution of real expenditures per person in rural areas under alternative road conditions, 2002-03**



Source: Author's calculations based on LECS 3 household survey data from National Statistical Center, Vientiane, and regression results shown in table 4, above.

Note: Units on the horizontal axis are the natural logarithm of real household consumption expenditures per person expressed in December 1999 prices. "real per capita exp. (predicted)" refers to P1 in the text. "real per capita exp. (predicted, all dry)" refers to P2 in the text. "real per capita exp. (predicted, all wet)" refers to P3 in the text.



The difference between P2 and P3 is the degree to which real expenditures could be increased if all households had access to roads in the dry season and the wet season as well. Clearly, the difference between P1 and P3 indicates the overall potential for increasing real expenditures through road improvement.

Figure 2 then uses these calculations to project estimates of the incidence of poverty. The results of this exercise are summarized in table 5. In this exercise the poverty line is selected so that the predicted incidence of rural poverty (P1 above) replicates the incidence of rural poverty officially estimated from the LECS III data – 37.6 per cent – as shown in table 1. In figure 2, this is the uppermost of the three horizontal lines. The difference between the estimated incidence of poverty under condition P1 and P2 is 0.43 per cent of the rural population (the incidence of poverty under condition P2 is 36.17 per cent – the middle horizontal line in figure 2). The difference between P3 and P2 is a further 6.81 per cent of the rural population (the incidence of poverty under condition P3 is 29.36 per cent – the lowest of the three horizontal lines in figure 2). Combining the two, the incidence of rural poverty in the Lao People's Democratic Republic could be reduced by 7.24 per cent by providing all season weather roads to all rural people. This number of rural people is equivalent to about 5.6 per cent of the total population of the Lao People's Democratic Republic. This reduction in poverty would be permanent, assuming that the roads were properly maintained.

A surprising feature of these results is that the difference between the incidence of poverty under condition P1 and P2 is small. Holding other variables constant, providing dry season access, by itself, does little for poverty reduction. Other conditions also have to be met, particularly educational conditions, the availability of electricity supplies and the presence of productive assets such as buffaloes. Much larger gains, in terms of poverty reduction, are available from upgrading dry season access to all-weather access. As noted in relation to table 1 above, the investment in road improvement that has taken place has primarily been the provision of all weather roads to households which already had dry season road access. The results above suggest that this was a good strategy for poverty reduction.

Between the execution of LECS II and LECS III, access to wet weather roads was provided to an additional 7.9 per cent of the rural population. This may be compared with the 47.3 per cent of the same population that lacked it in 1997-98. This improvement was therefore about one sixth of the potential increase in wet season access. Our simulation exercise above indicates that providing all weather access to all rural households would reduce the incidence of poverty by 7.24 per cent. Interpolating linearly, the reduction in the incidence of

poverty may therefore be estimated at about 1.2 per cent of the rural population. The incidence of poverty in rural areas actually declined by 4.9 per cent over this same period (table 1). Therefore, these results imply that about 24 per cent, or one quarter, of the reduction in rural the incidence of poverty that occurred between LECS II and LECS III can be attributed to improved wet season road access.

A possible objection to the analysis performed above is that it ignores the possible implications of a phenomenon now known as the “endogenous placement” problem. Suppose that, in the past, improved roads had been provided *selectively* to better off areas. This would mean that, in part at least, the cross-sectional statistical relationship between better roads and higher real expenditures which is observed in the data would not indicate that better roads caused real expenditures to be higher, but rather the reverse. In this case, it would be invalid to interpret the statistical findings reviewed above as indicating that improving roads reduces poverty.

This possibility was tested by assembling data on road improvement that occurred between the undertaking of LECS II and LECS III.<sup>5</sup> These data were assembled at the district level of which there are 140 in the country. The data are not derived from LECS but from an independent compilation of data from regional government offices and from the Ministry of Roads in Vientiane. Some judgment is involved in assessing whether roads were or were not ‘all weather’ and whether they were maintained. These judgments reflect the assessments of regional level officers of the Ministry of Roads.

The change in average real expenditures per capita between LECS II and LECS III was then related to the improvement or non-improvement of roads as captured in this data set. The results are summarized in table 6. The base level of real per capita expenditures in LECS II (1997-98) was significant and had a negative coefficient, meaning that better off households did less well in proportional terms (the dependent variable is the change in the log of real expenditures) than poorer households. The base level of road access in 1997-98 was less important in explaining the improvement in average real consumption expenditures at the district level than the change in road access, where the coefficient was significant (at 7 per cent) and numerically of similar magnitude to the value obtained from the cross sectional results.

A further test of the endogenous placement problem was conducted by regressing the change in road access that occurred between LECS II and III on the level of initial real per capita expenditure in LECS II. If a positive relationship was

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<sup>5</sup> See Warr (2005) for a full description of these data.

**Table 6. Lao People's Democratic Republic:  
Change in real expenditure from 1997-98 to 2002-03,  
regression results at district level**

| <b>Dependent variable: Change in real per capita expenditure</b> |                    |                    |                |
|--|--------------------|--------------------|----------------|
| <b>Independent variables:</b>                                    | <i>Coefficient</i> | <i>t-statistic</i> | <i>p-value</i> |
| <b>Constant</b>  | 3.934              | 4.131              | 0.000          |
| Real per capita expenditure LECS2                                | -0.334             | -4.210             | 0.000          |
| Age at last birthday (household head)                            | 0.078              | 0.390              | 0.697          |
| Age at last birthday squared (household head)                    | -0.001             | -0.342             | 0.733          |
| Primary (1-5 years)  | 0.441              | 1.535              | 0.128          |
| Lower secondary (6-8 years)                                      | 0.537              | 1.006              | 0.317          |
| Upper secondary (9-11 years)                                     | -0.442             | -0.478             | 0.634          |
| Higher (12+ years)   | 2.536              | 2.847              | 0.005          |
| Working_Head1  | 0.330              | 0.855              | 0.395          |
| Farming_Head1  | 0.389              | 1.136              | 0.259          |
| NotLF_Head   | 0.162              | 0.471              | 0.638          |
| Adult (18 <= AgeAdult < 65)                                      | 0.080              | 0.425              | 0.672          |
| Total number of members in the household                         | -1.241             | -2.225             | 0.028          |
| Total number of members in the household squared                 | 0.075              | 1.780              | 0.078          |
| Cows or buffalo, owned and free access, no. of animals           | -0.001             | -0.030             | 0.976          |
| Market_n   | 0.128              | 0.421              | 0.675          |
| Transport_n  | 0.068              | 0.525              | 0.600          |
| Piped water_n  | 0.095              | 0.635              | 0.527          |
| Community health_n   | 0.075              | 0.537              | 0.593          |
| District has all weather road in 1997                            | 0.021              | 0.199              | 0.842          |
| District built road during 1997 and 2002                         | 0.188              | 1.821              | 0.071          |

Source: Author's calculations from LECS II and LECS III survey data, National Statistical Center, Vientiane.

Summary diagnostics:

$R^2 = 0.393$ ; adj.  $R^2 = 0.155$ ; s.e. of estimate = 0.1322;  $F = 6.944$ ; significance level:  $p = 0.000$ .

found, this would support the existence of an endogenous placement problem. The regression was done using provincial level observations. The means of the district level dummy variables for improved road access for each district within the province, as recorded between LECS II and LECS III, were regressed on the provincial means of the district level real per capita expenditure, as recorded in LECS II. If better off areas received preferential treatment in road improvement a significant and positive coefficient would be expected. The estimated coefficient was negative but insignificant. The existence of an endogenous placement problem was therefore rejected.

These results are supportive of the findings of the cross-sectional analysis reported above, confirming that improving road access is a powerful instrument for raising the real consumption expenditures of households, thereby reducing poverty.

#### **IV. ISOLATING THE EFFECTS OF ROADS ON EDUCATION AND HEALTH**

##### **Educational participation**

Does improving road access improve educational participation? Table 7 reports the results of regressing educational participation rates of children in the primary school age group on the same set of independent variables discussed above. Because participation at the household level is a binary variable (0, 1) for each child, participation was aggregated to the district level to obtain the average participation rate for the district, of children in the relevant age group. The independent variables were similarly aggregated to the district level. So far as road improvement is concerned, the results are not highly significant, but indicate tentatively that providing dry season access raises participation rates (which are significant at 13 per cent), but that providing wet season access has no additional impact.

These results are interesting in that they suggest that road access, by itself, is not the greatest determinant of school attendance. More important variables are the level of education of the head of the household (the variable "lower secondary") and the availability of clean water. Similar results apply to school participation of both female (table 8) and male children (table 9). Over longer periods, improved roads may raise school participation, but these results suggest that in the short term addressing the availability of clean water is more important than providing improved roads.

##### **Health standards**

Does improving roads contribute to raising health levels? The LECS surveys include questions which are relevant to this issue. Table 10 reports a regression similar to that described above for education, but for which the dependent variable is the share of people in the district who reported having been ill in the previous 4 weeks. The results are surprising. They suggest that providing dry season road access has a powerful effect in reducing the rate of illness (significant at 2 per cent). How could this be? The mechanism may be that road access, along with the availability of clean water, makes it possible for the household to attain higher levels of hygiene. The ability to obtain treatment for those who become ill may

**Table 7. Lao People's Democratic Republic: Primary school participation and road access, 2002-03, regression results at district level**

| <b>Dependent variable: Share of prime age children in school per district</b> |                    |                    |                |
|---|--------------------|--------------------|----------------|
| <b>Independent variables:</b>   | <i>Coefficient</i> | <i>t-statistic</i> | <i>p-value</i> |
| <b>Constant</b>   | 1.625              | 1.021075           | 0.310259       |
| Age at last birthday  | -0.063             | -0.83256           | 0.407543       |
| Age at last birthday squared (household head)                                 | 0.001              | 0.908241           | 0.366445       |
| Primary (1-5 years)   | 0.093              | 0.770173           | 0.443438       |
| Lower secondary (6-8 years)   | 0.762              | 3.204874           | 0.001934       |
| Upper secondary (9-11 years)  | -0.183             | -0.36678           | 0.714739       |
| Higher (vocational training or university/institute)                          | 0.436              | 0.801859           | 0.42498        |
| Paid employment   | 0.115              | 0.396726           | 0.692613       |
| Farm employment   | 0.394              | 1.381979           | 0.170777       |
| Not in labour force   | 0.164              | 0.44677            | 0.656234       |
| Number of adults in household (18 ≤ AgeAdult < 65)                            | 0.000              | -0.23967           | 0.811192       |
| Total number of members in household  | 0.000              | -0.22999           | 0.818677       |
| Total number of cows and buffaloes  | -0.004             | -0.42221           | 0.673989       |
| Electricity_n   | 0.060              | 0.920383           | 0.360106       |
| Daily market_n  | -0.173             | -1.1994            | 0.23387        |
| Bus stop_n  | 0.060              | 0.808697           | 0.421058       |
| Clean water_n   | 0.126              | 2.165333           | 0.033304       |
| Hospital in village   | -0.071             | -0.47954           | 0.632845       |
| Access dry season_n   | 0.003              | 1.531388           | 0.12957        |
| Access wet season_n   | 0.000              | -0.18556           | 0.853257       |

*Source:* Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

*Note:* For brevity, coefficients on provincial dummy variables have been deleted from the reported results.

*Summary diagnostics:*

$R^2 = 0.727$ ; adj.  $R^2 = 0.605$ ; s.e. of estimate = 0.1493;  $F = 5.987$ ; significance level:  $p = 0.000$ .

also reduce illness among other members of the household. The level of education of the head of the household is again important (the variable "lower secondary"). The results presented in table 11 are loosely supportive of the effect of dry season road access in raising the likelihood of seeking treatment. However, the level of significance is not strong.

**Table 8. Lao People's Democratic Republic: Primary school participation of females and road access, 2002-03, regression results at district level**

| <b>Dependent variable: Share of prime age female children in school per district</b> |                    |                    |                |
|--|--------------------|--------------------|----------------|
| <b>Independent variables:</b>  | <i>Coefficient</i> | <i>t-statistic</i> | <i>p-value</i> |
| <b>Constant</b>  | 2.214              | 1.044881           | 0.299186       |
| Age at last birthday   | -0.096             | -0.94732           | 0.346294       |
| Age at last birthday squared (household head)  | 0.001              | 1.026731           | 0.307604       |
| Primary (1-5 years)  | 0.245              | 1.530683           | 0.129744       |
| Lower secondary (6-8 years)  | 0.726              | 2.294988           | 0.024321       |
| Upper secondary (9-11 years)   | -0.149             | -0.22439           | 0.823015       |
| Higher (vocational training or university/institute)                                 | 0.816              | 1.127259           | 0.262961       |
| Paid employment  | 0.083              | 0.21374            | 0.831287       |
| Farm employment  | 0.358              | 0.943538           | 0.348212       |
| Not in labour force  | 0.059              | 0.120504           | 0.904382       |
| Number of adults in household (18 <= AgeAdult < 65)                                  | 0.000              | -0.17342           | 0.862757       |
| Total number of members in household   | 0.000              | -0.28628           | 0.775395       |
| Total number of cows and buffaloes   | 0.000              | 0.000829           | 0.999341       |
| Electricity_n  | 0.100              | 1.147392           | 0.254597       |
| Daily market_n   | -0.196             | -1.0177            | 0.311851       |
| Bus stop_n   | 0.000              | 0.00159            | 0.998735       |
| Clean water_n  | 0.120              | 1.554888           | 0.123872       |
| Hospital in village  | 0.057              | 0.29301            | 0.770264       |
| Access dry season_n  | 0.004              | 1.610362           | 0.111209       |
| Access wet season_n  | 0.000              | -0.18224           | 0.855853       |

Source: Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

Note: For brevity, coefficients on provincial dummy variables have been deleted from the reported results.

Summary diagnostics:

$R^2 = 0.664$ ; adj. 0.515; s.e. of estimate = 0.1988;  $F = 4.452$ ; significance level:  $p = 0.000$ .

## V. CONCLUSIONS

This paper summarizes evidence suggesting that road improvement in rural areas of the Lao People's Democratic Republic can contribute to lowering the incidence of poverty, improving educational participation of primary school aged children, and reducing the rates of illness. It is widely recognized that rural roads are a major developmental problem. It is obvious by just inspecting these roads, that improving them will generate benefits. But demonstrating and quantifying the effects on indicators relevant to the Millennium Development Goals, such as the incidence of poverty, educational participation and health standards, is another matter.

**Table 9. Lao People's Democratic Republic: Primary school participation of males and road access, 2002-03, regression results at district level**

| <b>Dependent variable: Share of prime age male children in school per district</b> |                    |                    |                |
|--|--------------------|--------------------|----------------|
| <b>Independent variables:</b>  | <i>Coefficient</i> | <i>t-statistic</i> | <i>p-value</i> |
| <b>Constant</b>  | 1.053              | 0.598558           | 0.551159       |
| Age at last birthday   | -0.037             | -0.43474           | 0.664922       |
| Age at last birthday squared (household head)                                      | 0.000              | 0.469283           | 0.640144       |
| Primary (1-5 years)  | 0.020              | 0.146775           | 0.883679       |
| Lower secondary (6-8 years)  | 0.798              | 3.021298           | 0.003379       |
| Upper secondary (9-11 years)   | 0.074              | 0.119113           | 0.905485       |
| Higher (vocational training or university/institute)                               | -0.067             | -0.10881           | 0.913623       |
| Paid employment  | 0.189              | 0.589999           | 0.556854       |
| Farm employment  | 0.489              | 1.551408           | 0.124751       |
| Not in labour force  | 0.466              | 1.150286           | 0.253453       |
| Number of adults in household (18 <= AgeAdult < 65)                                | -0.001             | -0.40397           | 0.687315       |
| Total number of members in household   | 0.000              | 0.081828           | 0.934988       |
| Total number of cows and buffaloes   | -0.008             | -0.78427           | 0.435197       |
| Electricity_n  | -0.002             | -0.02933           | 0.976671       |
| Daily market_n   | -0.139             | -0.85458           | 0.395337       |
| Bus stop_n   | 0.121              | 1.464071           | 0.147093       |
| Clean water_n  | 0.181              | 2.816381           | 0.006115       |
| Hospital in village  | -0.147             | -0.88072           | 0.381108       |
| Access dry season_n  | 0.002              | 0.972241           | 0.333861       |
| Access wet season_n  | -0.001             | -0.46407           | 0.643861       |

*Source:* Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

*Note:* For brevity, coefficients on provincial dummy variables have been deleted from the reported results.

*Summary diagnostics:*

$R^2 = 0.645$ ; adj.  $R^2 = 0.486$ ; s.e. of estimate = 0.1650;  $F = 4.042$ ; significance level:  $p = 0.000$ .

The results of this analysis suggest that for poverty reduction the important form of road improvement is the conversion of dry season access roads to all season access roads. This is in fact the principal form of road improvement that occurred in between 1997-98 and 2002-03. Over this same period, the incidence of poverty declined from 42.5 to 37.6 per cent of the rural population. The results of this analysis suggest that about one fourth of this amount of poverty reduction can be directly attributed to the conversion of roads which are accessible only in the dry season to roads which are accessible in all seasons.

**Table 10. Lao People's Democratic Republic: Determinants of incidence of illness, 2002-03, regression results at district level**

| <b>Dependent variable: Share of ill people per district</b> |                    |                    |                |
|---|--------------------|--------------------|----------------|
| <b>Independent variables:</b>                               | <i>Coefficient</i> | <i>t-statistic</i> | <i>p-value</i> |
| <b>Constant</b>   | -1.640             | -2.463             | 0.015917       |
| Age at last birthday  | 0.083              | 2.591              | 0.011351       |
| Age at last birthday squared (household head)               | -0.001             | -2.545             | 0.012822       |
| Primary (1-5 years)   | -0.010             | -0.186             | 0.85253        |
| Lower secondary (6-8 years)                                 | 0.212              | 2.076              | 0.041093       |
| Upper secondary (9-11 years)                                | -0.150             | -0.695             | 0.488971       |
| Higher (vocational training or university/institute)        | -0.523             | -2.297             | 0.024184       |
| Paid employment   | 0.065              | 0.517              | 0.606656       |
| Farm employment   | 0.088              | 0.713              | 0.477671       |
| Not in labour force   | 0.230              | 1.450              | 0.151007       |
| Number of adults in household (18 <= AgeAdult < 65)         | -0.014             | -0.420             | 0.675582       |
| Total number of members in household                        | -0.004             | -0.258             | 0.797167       |
| Total number of cows and buffaloes                          | -0.005             | -1.321             | 0.190145       |
| Electricity_n   | -0.023             | -0.846             | 0.399944       |
| Daily market_n  | 0.048              | 0.775              | 0.44077        |
| Bus stop_n  | 0.061              | 1.687              | 0.095458       |
| Clean water_n   | -0.036             | -1.460             | 0.148194       |
| Hospital in village   | -0.062             | -0.968             | 0.335788       |
| Access dry season_n   | -0.083             | -2.398             | 0.018775       |
| Access wet season_n   | 0.020              | 0.601              | 0.549419       |

Source: Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

Note: For brevity, coefficients on provincial dummy variables have been deleted from the reported results.

Summary diagnostics:

$R^2 = 0.602$ ; adj.  $R^2 = 0.425$ ; s.e. of estimate = 0.0634;  $F = 3.399$ ; significance level:  $p = 0.000$ .

The data also indicates that the improvement of roads has effects on educational participation and health standards. The results are not as robust, statistically, as those on poverty, but an interesting difference emerges. Whereas the positive effects are strongest for the upgrading of dry season access roads to all weather roads, educational and health benefits derive mainly from the provision of dry season access to households which previously had no road access, meaning that they were accessible only by walking. Over the five year period examined in a case study, very little road improvement of this kind actually occurred. The results suggest that substantial educational and health benefits could be derived by providing dry season road access to the 20 per cent of rural households which presently lack it.



**Table 11. Lao People's Democratic Republic: Determinants of decision to seek treatment when ill, 2002-03, regression results at district level**

| <b>Dependent variable: Share of ill people not seeking treatment per district</b> |                    |                    |                |
|---|--------------------|--------------------|----------------|
| <b>Independent variables:</b>   | <i>Coefficient</i> | <i>t-statistic</i> | <i>p-value</i> |
| <b>Constant</b>   | -2.049             | -1.09355           | 0.277392       |
| Age at last birthday  | 0.147              | 1.629321           | 0.107128       |
| Age at last birthday squared (household head)                                     | -0.002             | -1.52987           | 0.129944       |
| Primary (1-5 years)   | -0.003             | -0.01648           | 0.986894       |
| Lower secondary (6-8 years)   | 0.368              | 1.283208           | 0.203078       |
| Upper secondary (9-11 years)  | 0.036              | 0.05964            | 0.95259        |
| Higher (vocational training or university/institute)                              | -1.050             | -1.63933           | 0.105022       |
| Paid employment   | -0.712             | -2.02015           | 0.046674       |
| Farm employment   | -0.420             | -1.21859           | 0.226536       |
| Not in labour force   | 0.087              | 0.19432            | 0.846412       |
| Number of adults in household (18 <= AgeAdult < 65)                               | 0.084              | 0.864484           | 0.389875       |
| Total number of members in household  | -0.017             | -0.42956           | 0.66866        |
| Total number of cows and buffaloes  | 0.002              | 0.165343           | 0.869086       |
| Electricity_n   | -0.014             | -0.18438           | 0.854173       |
| Daily market_n  | -0.142             | -0.81892           | 0.415234       |
| Bus stop_n  | 0.026              | 0.253088           | 0.800841       |
| Clean water_n   | -0.024             | -0.34742           | 0.729176       |
| Hospital in village   | -0.098             | -0.54537           | 0.586997       |
| Access dry season_n   | -0.117             | -1.19857           | 0.234189       |
| Access wet season_n   | 0.019              | 0.202277           | 0.840207       |

*Source:* Author's calculations from LECS III survey data, National Statistical Center, Vientiane.

*Note:* For brevity, coefficients on provincial dummy variables have been deleted from the reported results.

*Summary diagnostics:*

$R^2 = 0.656$ ; adj.  $0.431$ ; s.e. of estimate =  $0.1774$ ;  $F = 1.701$ ; significance level:  $p = 0.025$ .

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## **PRIORITIZATION OF TECHNOLOGICAL DEVELOPMENT GOALS FOR POVERTY ALLEVIATION THROUGH SUSTAINABLE AND DIVERSIFIED AGRICULTURE**

*Tomohide Sugino\**

*Though positive impacts on rural development can be observed in diversified agriculture, statistical indicators have shown that agricultural diversification in Asian countries has stagnated over recent decades. Technological development is a dominant factor in determining the extent of diversification. A questionnaire survey was conducted with 259 respondents in eight Asian countries to establish the respondents priority of technological development goals that will potentially enhance agricultural diversification. The expected impacts of realizing these developments are also analyzed. The results showed that the development of pest tolerant crop varieties as well as economical measurements to improve soil fertility are given the highest priority among the 15 Research and Development (R&D) topics surveyed. Significant differences are observed among the responses received from researchers, extension staff and farmers, which indicate that awareness gaps regarding technological development exist among these stakeholders. Further efforts are necessary to formulate R&D activities to meet the demands of the farmers; the users of the technologies.*

### **I. INTRODUCTION**

The purpose of this article is to examine the priority of research and development topics as classified by respondents to a survey in order to achieve poverty alleviation through diversified agriculture in selected Asian countries.

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‘Agricultural diversification’ means: transforming agriculture from major cereal (rice/wheat) dominated cropping systems to more diversified systems, especially by promoting secondary crop production; or to integrate agricultural production with marketing or processing. Agricultural diversification has various positive impacts on development, including poverty alleviation, risk mitigation and enhanced sustainability. Among the avenues that lead to diversified agriculture, technological development represents one of the most important measurements. However, most of the Governments in the developing Asian region face financial difficulties and investment in R&D activities is very limited. While 22 high-income countries accounted for 44 per cent of global public agricultural R&D spending in 2000, 117 developing countries accounted for the remaining 56 per cent (ISNAR, 2005). This highlights the difficulty developing countries have in meeting all their technological development needs with their limited financial and human resources. Therefore, prioritization of R&D activities is important to foster technological development effectively. The study was conducted as part of a research project: “Identification of Pulling Factors for Enhancing the Sustainable Development of Diverse Agriculture in Selected Asian Countries (AGRIDIV)”, coordinated by ESCAP and CAPSA (Centre for Alleviation of Poverty through Secondary Crops’ Development in Asia and the Pacific). Eight countries (Bangladesh, India, Indonesia, Lao People’s Democratic Republic, Myanmar, Sri Lanka, Thailand and Viet Nam) participated in the project.

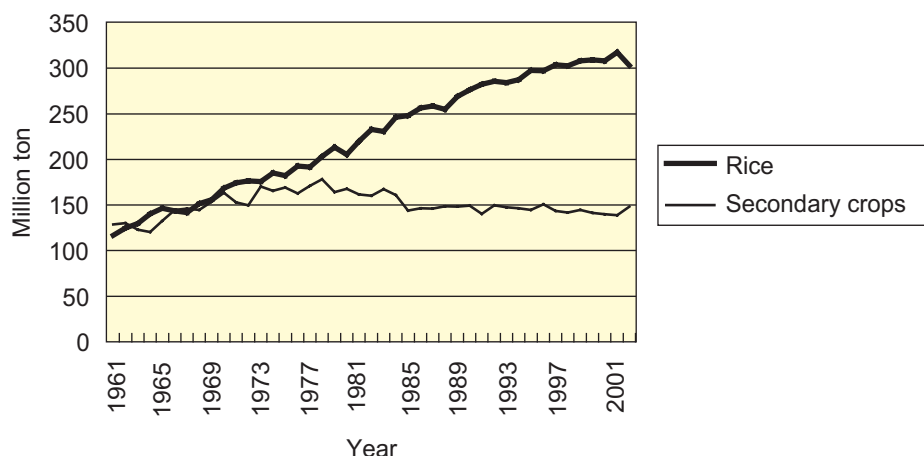
## **II. AGRICULTURAL DIVERSIFICATION AND ITS IMPLICATIONS ON POVERTY ALLEVIATION**

Whereas the diet of the populations of developing Asian countries formerly consisted of a diversified mix of coarse grains, pulses, and root and tuber crops, there has been a shift away from these foodstuffs. Major cereals, especially rice, have become the staple food in the consumption basket of Asia (figure 1). This trend was partially induced by two factors, namely technological development and policy intervention.

Technological development is a combination of improved plant varieties, high yielding varieties, and modern cultivation techniques, such as the extensive use of chemical fertilizers, pesticides, irrigation and machinery, known as the “green revolution”: it has achieved significant yield increases for rice and wheat. Furthermore, most countries have instituted supporting policies to expand major cereal production and stabilize prices to maintain food prices at lower levels to protect consumers.<sup>1</sup>

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<sup>1</sup> However, according to economic development, some Asian economies such as Indonesia, the Republic of Korea, Thailand and Taiwan Province of China revised their rice price policy of maintaining lower rice prices to decrease the income gap between the agricultural and industrial sectors (NRIAE, 1993).

**Figure 1. Food crop consumption in Asia**

Source: Calculated from FAOSTAT ([www.fao.org](http://www.fao.org)).

Note: Secondary crops include maize, millet, soybean, sweet potato and cassava.

There is no doubt that these “favoured-crop-biased policies” contributed to the improvement of access to food in the region. However, as financial sources became scarce, supporting policies centered on major cereals became a burden to the governments. Moreover, since the intensive efforts to improve rice yields have almost exploited the full potential yield, it is not surprising that producers have recently experienced a slowdown in the improvement of productivity (table 1).

Given these trends, initiatives at the decision and policymaking level must be taken and implemented to seek and provide ways and means to enhance agricultural diversification that enables sustainable development in developing Asian countries. Agricultural diversification is recognized as horizontal diversification or vertical diversification in relation to the direction in which the farm economy proceeds. Horizontal agricultural diversification involves diverse activities undertaken

**Table 1. Annual yield increase of rice production in the developing Asian region**

| (per cent per year) |           |           |           |           |
|---------------------|-----------|-----------|-----------|-----------|
| 1961-1969           | 1970-1979 | 1980-1989 | 1990-1999 | 2000-2005 |
| 2.90                | 2.12      | 3.29      | 0.99      | 0.88      |

Source: Calculated from FAOSTAT (<http://www.fao.org>).

within the farm production unit, whereas vertical diversification involves income-earning activities undertaken off-farm (Taylor, 1994).

Various positive impacts can be observed in diversified agriculture. Three major effects should be noted: poverty alleviation, stabilization and sustainability. The process of diversifying a rural economy can be a significant source of income growth for rural inhabitants. A well-diversified and flexible agricultural economy provides more stable incomes when commodity prices are unstable. Additionally a diversified cropping pattern may prove more sustainable in the long run than the intensive cultivation of a single crop (Timmer, 1992).

The term 'secondary crops' is usually used to indicate crops which are cultivated after rice harvested in the same fields (Sukartono and others, 2004). In this article, we define the term secondary crops as upland crops with a central focus on coarse grains, pulses and root and tuber crops. In the context of agricultural diversification, high-value commodities such as vegetables, fruits, animal husbandry and aquaculture usually receive more attention because farmers can expect higher returns. However, for small-scale farmers, especially in disadvantaged areas, they often cannot afford the initial investment to set up high-value commodity production. Though the value of coarse grains, pulses as well as root and tuber crops is not very high, the production costs of these crops are less and most of them can be grown even under unfavourable conditions such as in exclusively rain-fed areas. In addition, these crops have good potential to be used as raw materials for industrial uses, from traditional agro-processing like snacks to new materials such as biodegradable plastics. If these opportunities can be developed properly, farmers can expect higher incomes and also to improve their welfare.

### **III. CONSTRAINTS ON AGRICULTURAL DIVERSIFICATION IN ASIAN COUNTRIES**

#### ***Trends of agricultural diversification***

As mentioned in the previous chapter, agricultural diversification can have positive impacts on the welfare of rural poor people. However, well diversified agriculture has not yet been realized in many Asian countries. To overview the recent trend of agricultural diversification, the Simpson Index (SID) of East and South-East Asia, South Asia and eight Asian countries is shown in table 2. SID is one indicator that can quantify the degree of horizontal diversification. It is often used to quantify the biodiversity of a habitat in ecology but can also be used to illuminate the degree of diversity in cropping patterns. SID is defined as follows:

$$SID = 1 - \sum_{i=1}^n W_i^2, \quad W_i = X_i / (\sum_{i=1}^n X_i)$$

Where  $X_i$  is the value or area of the  $i^{th}$  commodity and  $W_i$  is the proportionate value or area of the  $i^{th}$  commodity in the total value or area. The minimum value of SID is 0 (the least diversified) whereas the maximum value is 1 (the most diversified).

SID in this article is calculated from the harvested area of ten crop groups; 1) rice; 2) wheat; 3) coarse grains; 4) roots and tubers; 5) pulses; 6) oil crops; 7) vegetables; 8) fruits and nuts; 9) spices and amenities of life (coffee, tea, tobacco, etc.); and 10) rubber and textiles.

**Table 2. Recent trends of SID in selected years**

| Group                    |                                  | Year |      |      |      |      |
|--------------------------|----------------------------------|------|------|------|------|------|
|                          |                                  | 1980 | 1985 | 1990 | 1995 | 2000 |
| High                     | India                            | 0.83 | 0.84 | 0.84 | 0.84 | 0.84 |
| SID                      | Indonesia                        | 0.77 | 0.77 | 0.78 | 0.79 | 0.78 |
|                          | Sri Lanka                        | 0.77 | 0.77 | 0.78 | 0.76 | 0.75 |
| Middle                   | Myanmar                          | 0.63 | 0.66 | 0.65 | 0.66 | 0.70 |
| SID                      | Thailand                         | 0.65 | 0.67 | 0.69 | 0.68 | 0.64 |
|                          | Viet Nam                         | 0.52 | 0.56 | 0.57 | 0.58 | 0.60 |
| Low                      | Bangladesh                       | 0.44 | 0.46 | 0.44 | 0.45 | 0.44 |
| SID                      | Lao People's Democratic Republic | 0.26 | 0.30 | 0.39 | 0.41 | 0.46 |
| East and South-East Asia |                                  | 0.74 | 0.75 | 0.76 | 0.76 | 0.75 |
| South Asia               |                                  | 0.83 | 0.83 | 0.84 | 0.84 | 0.84 |

Source: Calculated from FAOSTAT ([www.fao.org/](http://www.fao.org/)).

Note: Three year average of harvested area was used for SID calculations to avoid the affect of annual harvest change caused by crop failure.

Table 2 demonstrates that the eight countries can be classified into three groups according to their respective value of SID.

Group 1 (High SID countries): India, Indonesia, Sri Lanka

Group 2 (Middle SID countries): Myanmar, Thailand, Viet Nam

Group 3 (Low SID countries): Bangladesh, Lao People's Democratic Republic

During the period 1980-2000, the SID of Group 1 remained above 0.75, whereas the SID of Group 3 remained below 0.5. The most remarkable increase of a SID was observed in the Lao People's Democratic Republic. Meanwhile, the SID of Bangladesh remained low with small fluctuations. Among the high SID countries, Indonesia and Sri Lanka reduced their SID meanwhile the SID of India has been stable for the latest 15 years. As a region, SID in East and South-East Asia have dropped over the last 10 years, meanwhile, no change has been observed in South Asia.

### ***Constraints and driving factors to agricultural diversification***

Though a remarkable SID increase was observed in the Lao People's Democratic Republic, SID has stagnated in the other countries and the region as a whole. Taylor (1994) indicated eight critical areas requiring attention for agricultural diversification, which include technological development, input supply and delivery systems, physical infrastructure, dissemination of information, organizational structures, development of markets, human resource development and public policies. In this chapter, we would like to focus on several factors and consider how they constrain or enhance agricultural diversification.

#### ***(1) Technological development***

In the AGRIDIV project, we tried to identify the major constraints to agricultural diversification in the participating countries based on statistical data analysis and a rural survey. Out of the 80 factors suggested by the individual country studies, more than half relate to technological problems (table 3). Of course, the numbers assigned to the factors do not indicate their degree of seriousness. Moreover, previous experience has shown that technological development itself cannot necessarily solve the problem of poverty, unless the developed technologies are properly accepted by farmers and implemented concurrently with other supporting measurements. Even so, technological development should be the first priority, taking into consideration the amount of prior investment in R&D for secondary crops.

Technological development of secondary crops has been very low primarily due to the limited financial resources of each Government. It is difficult to estimate the extent of financial resources that have been allocated to R&D activities for secondary crops. However, some factors indicate how little attention is paid by Governments to secondary crop development. For example, in Myanmar, less than 1 per cent of the total expenditure of the Myanmar Agricultural Service (MAS), which is the main technical body of the Ministry of Agriculture and Irrigation, is allocated to the Central Agricultural Research Institute (CARI), which is chiefly



**Table 3. Constraints to agricultural diversification**

| (number of factors)       |           |
|---------------------------|-----------|
| <i>Field</i>              |           |
| Technological development | 43        |
| Marketing                 | 9         |
| Access to credit          | 7         |
| Processing                | 5         |
| Price and trade policy    | 3         |
| Infrastructure            | 2         |
| Input                     | 1         |
| Organizational structure  | 1         |
| Land policy               | 1         |
| Others                    | 8         |
| <b>Total</b>              | <b>80</b> |

Source: Compiled by author based on Alam, J. (2005a), Anh, D.T. (2005), Douangsavanh, L. and others (2006), Kyi, A. 2005, Mahrouf, A.R.M., 2005, Roonnaphai, N., 2006, Singh, R.P. and others 2005a, Siregar, M. 2006.

responsible for research on secondary crops (Kyi, 2005). However, thanks to the limited interest shown in secondary crops, they still have room to be developed, while the yield of rice has faced stagnation over the past several years, in spite of continuous research efforts.

If governments allocate more resources to agricultural diversification, higher returns can be expected. This is because secondary crops have good profitability and comparative advantage, especially in rainfed upland areas. For example, analysis of the Domestic Resource Cost Ratio (DRCR), which is the indicator to show comparative advantage of crop production (Pearson, S.R. and others, 1976) showed that in Indonesia most secondary crops, except soybean, have a comparative advantage in the international market (Siregar, 2006).

## (2) *Inputs*

Lack of effective marketing systems and the very limited access of farmers to credit with which to purchase inputs are the major impediments for securing adequate input supplies. Poor farmers in Bangladesh, for example, do not use the required material inputs for crops due to financial constraints (Alam, 2005a). In the Lao People's Democratic Republic, shortages of improved seeds and planting materials to foster crop diversification exist due to the absence of private input

suppliers and the high price of imported materials (Douangsavanh and others, 2006).

As countermeasures to these problems, subsidy schemes have been implemented in various countries. The average quantity of fertilizer applied in developing countries is still far below developed countries (table 4). Moreover, most fertilizer application in developing countries is concentrated on major cereals and limited number of commercial crops. Therefore, the level of input use for secondary crop production is estimated to be quite low. The marginal productivity growth of the secondary crops is greater than that at the major cereal crops per unit of fertilizer input. In addition to institutional improvements, technological improvements such as site-specific fertilizing to maximize efficiency and the promotion of organic material use through the establishment of farmers group (to conduct collective activities that produce green manure) are also effective and more economical ways of addressing the constraints.

**Table 4. Fertilizer consumption in selected Asian countries (2002)**

| <i>Country</i>                   | (ton/ha) |
|----------------------------------|----------|
| Developed Asia                   | 0.24     |
| Viet Nam                         | 0.21     |
| Bangladesh                       | 0.16     |
| Sri Lanka                        | 0.12     |
| Thailand                         | 0.09     |
| India                            | 0.09     |
| Indonesia                        | 0.07     |
| Myanmar                          | 0.01     |
| Lao People's Democratic Republic | 0.004    |

Source: Calculated from FAOSTAT ([www.fao.org/](http://www.fao.org/)).

### (3) *Marketing*

One common problem of secondary crop marketing in developing countries is the high costs attributable to inefficiency in the commodity chains. This is primarily because the marketing systems for secondary crops are yet to be well developed while major crops enjoy sufficient support from the government to improve the marketing systems, such as infrastructure and the dissemination of market information.

Contract farming between producers and consumers is one effective solution to improve market efficiency. Contract farming can provide mutual benefits to both producers and consumers, if effectively implemented. In Sri Lanka, maize farmers who began contract farming for feed millers earn higher prices than other farmers, while the feed millers can secure the raw material for feed processing (Mahrouf, 2006). However, partnerships between farmers and consumers are not easy to develop. For example, cassava farmers in Indonesia are sometimes suspicious about the way in which starch processors determine the quality of crops due to moisture and starch content, while the latter may insist on price cuts on the grounds of low crop quality, which is sometimes difficult to justify (Siregar and others, 2006). Though contract farming is a pure private commercial activity, coordination by a third party is required until the system matures. To foster mutual trust between the parties, intervention from the public sector will be necessary to make clear and fair rules for contract farming and to provide a monitoring system for the contract in its formative stage.

(4) *Infrastructure and information*

Irrigation systems in developing Asian countries have been constructed mainly for major cereal production and the irrigation coverage for secondary crops is lower than other (cash) crops. In India, while 65 per cent of the cropped area of major cereals is covered by irrigation, only 12 per cent of coarse cereals and 13 per cent of pulses are covered (Singh and others, 2005b). It is difficult to expect significant growth in irrigated areas in the future because: (i) the existing favourable land frontier in Asia has almost been exhausted; (ii) the exploitation of remaining irrigation potential is very costly, therefore, unbearable; (iii) large-scale irrigation projects have raised environmental concerns; and (iv) the maintenance of existing schemes has diverted public funds. Considering these constraints, we should focus on small-scale irrigation schemes using tube wells and small tanks, which can be developed and managed by resource poor farmers with proper financial and technological support from the government. Storage facilities are another focus of secondary crop marketing. Since most secondary crop farmers are poor and lack access to storage facilities, they are forced to sell their products immediately after harvest. This deprives the farmers of their liberty to decide when to sell their product, resulting in lower incomes. Dissemination of information regarding secondary crops is another concern. The urgent requirement is for price and market information be available in order to help farmers decide when to harvest their crops to maximize profit. Standards should also be established to help level the transactional playing field between farmers and consumers.

(5) *Processing*

The share of secondary crops consumed in the daily diet in Asia, has decreased continuously in recent decades (figure 1). Though the role of secondary crops is still important for people in disadvantaged areas who face difficulties in securing rice, the importance of secondary crops as staple foods has diminished due to the expansion of rice production and economic development in the region has made it easier for people to access major cereals.

In spite of this trend, the production of secondary crops is expanding due to the wide variety of uses as raw materials for industry. It is well-known that these crops are widely used for processed food, local snacks, starch and edible oil. 'Traditional processing' creates employment opportunities for rural people, particularly for women who are more vulnerable to poverty in rural areas. Though the scale of traditional processing units is small, their profitability is sometimes superior to that of more modern processing units. The income per production unit of traditional snack processors in Bangladesh is far better than the gross national income (GNI) per capita (table 5). Most secondary crops excel in nutrient value, compared to major cereals. Millet contains twice as much energy, four times as much protein, and nine times as much fat as rice. Mungbean contains three times more iron than spinach.<sup>2</sup>

In addition to "traditional" processing, "modern" processing using recently developed technologies enables a new dimension to secondary crop consumption. Biodegradable plastics and biofuels are typical product examples of modern processing. Biodegradable plastics can be used in the same way as conventional plastics but decompose in water and carbon dioxide with the action of naturally occurring microorganisms such as bacteria and fungi. One of the major biodegradable plastics is polylactic acid, which originates from crop starch. Biodegradable plastics have the potential to substitute 30 per cent of total world plastic production, which is approximately 100 million metric tons. (ARI, 1996).

Biofuels are liquid fuels for transportation, which are made from various kinds of biomass. The most common types of biofuels are ethanol made from carbohydrates and biodiesel made from vegetable oil. Food crops which are rich in carbohydrates or oil are used as raw materials for biofuel. The share of alcohol fuel in gasoline consumption in the United States of America was about 2.1 per cent in 2003 (EIA, 2003). If 2 per cent of gasoline consumption is substituted with

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<sup>2</sup> Calculated by the author based on information from the Japan Science and Technology Agency, 2005.

Table 5. Cost and profit of small-scale processing in Bangladesh

|   | Sweet<br>potato | Cake   | Fuchka/<br>Chatpoti <sup>a</sup> | Chana-<br>chur<br>mix <sup>b</sup> | Jilapi <sup>c</sup> | French<br>fries | Puffed<br>corn | Fried<br>maize | Potato<br>flakes | GNI<br>(2003) |
|---|-----------------|--------|----------------------------------|------------------------------------|---------------------|-----------------|----------------|----------------|------------------|---------------|
| Total production cost (TK) (1)                | 14 100          | 5 750  | 206 592                          | 59 790                             | 342 712             | 96 310          | 142 000        | 34 950         | 22 000           |               |
| Total return (TK) (2)                         | 22 000          | 10 000 | 360 000                          | 96 000                             | 480 000             | 160 000         | 166 000        | 50 000         | 80 000           |               |
| Net profit (TK) (3)=(2)-(1)                   | 7 900           | 4 250  | 153 408                          | 36 210                             | 137 288             | 63 690          | 24 000         | 15 050         | 58 000           |               |
| Labour input (manday) (4)                     | 40              | 45     | 576                              | 300                                | 536                 | 360             | 55             | 40             | 50               |               |
| Labour cost (TK) (5)                          | 2 000           | 2 250  | 57 600                           | 20 000                             | 53 600              | 36 000          | 5 500          | 2 000          | 2 500            |               |
| Total income (6)=(3)+(5)                      | 9 900           | 6 500  | 211 008                          | 56 210                             | 190 888             | 99 690          | 29 500         | 17 050         | 60 500           |               |
| Income per capita per day (TK) (7)=(6)/(4)    | 248             | 144    | 366                              | 187                                | 356                 | 277             | 536            | 426            | 1 210            |               |
| Income per capita per day (US\$) <sup>d</sup> | 4               | 2      | 6                                | 3                                  | 6                   | 5               | 9              | 7              | 21               | 1             |

Source: Compiled by author based on data in Alam, 2005b. GNI data is from World Bank, 2005.

<sup>a</sup> A small puffed, oval shaped crispy ball made from flour

<sup>b</sup> Fried pulses mixed with rice flake and nuts

<sup>c</sup> A juicy coil-like sweet made from wheat and pulse flour

<sup>d</sup> US\$ 1= 58 takas

alcohol, Asia and the Pacific need to increase maize production by 8.7 million tons or 4.8 per cent of current maize production (author's calculation).

#### IV. ANALYSIS OF R&D PRIORITIES

To support policy planners in deciding how to allocate resources for R&D activities in an appropriate manner, a questionnaire survey was conducted in the eight Asian countries (Bangladesh, India, Indonesia, Lao People's Democratic Republic, Myanmar, Sri Lanka, Thailand and Viet Nam) that participated in the AGRIDIV project.

##### **Methodology**

The questionnaire survey consists of two parts: step 1 and step 2. Step 1 includes questions about the profile of respondents. Step 2 is designed to reveal the importance, expected effects and expected support necessary for 15 R&D topics concerning agricultural diversification (table 6). The questionnaire was designed by referring to the survey sheet used for the Technology Forecast Survey, conducted by the Ministry of Education, Culture, Sports, Science and Technology of the Government of Japan (NISTEP, 2001).

The 15 R&D topics were collected from the study results of the AGRIDIV country studies. As mentioned in the previous chapter, 43 technological constraints to agricultural diversification were identified in the project. From the total list, the 15 most frequent constraints were selected for this survey, which seemed to represent common problems in the region and could significantly contribute to poverty alleviation in rural areas (table 7).

The questionnaires were distributed to collaborators of the study in their respective countries in February 2005. The collaborators were requested to select respondents for the survey who worked in the field of agricultural technological development. All the answer sheets were collected by the collaborators after completion by the respondents and returned to CAPSA by July 2005.

##### **Results and discussions**

###### *(1) Profiles of respondents*

The total number of respondents was 259 from eight countries. 41 per cent of the respondents are researchers followed by extension staff 14 per cent. 44 per cent of the respondents belong to research institutes followed by universities 15 per cent (tables 8, 9).

**Table 6. Items included in the questionnaire**

|  |   |
|--|---|
| Step 1   |   |
| 1. Name of respondent  |   |
| 2. Sex   |   |
| 3. Year of birth   |   |
| 4. Profession (Choose from Research, Research management, Policy planning, Extension, Farming, Education and Others)   |   |
| 5. Organization (Choose from Research institute, Administrative agency, Extension organization, Farm, Farmers' organization, University, Private company and Others) |   |
| Step 2   |   |
| A) the degree of the respondent's expertise in the respective research topics (Choose from the options below)  |   |
| High:  | You have considerable knowledge as a specialist about the topic through current research or work related to the topic.  |
| Medium:  | You were once engaged in research or work related to the topic; or have some specialist knowledge about the topic through research or work in a similar field.  |
| Low:   | You have read technical books or literature about the topic or have listened to experts connected with the topic.   |
| None:  | You have no expertise in the topic.   |
| B) Degree of importance to your country (Choose from the options below)  |   |
| High:  | Extremely Important   |
| Medium:  | Important   |
| Low:   | Somewhat important  |
| Unnecessary:   | Not important   |
| Unknown:   | You have no expertise in the topic  |
| C) Expected effect (Choose from the options below)   |   |
| Poverty alleviation:   | Contribution to poverty alleviation especially in rural areas. Increase or stabilize income and create job opportunities, contribution to rural welfare, etc.   |
| Socio-economic development:  | Contribution to creation of new industry and urban employment, development of social and economic infrastructure, etc.  |
| Environmental issues:  | Resolution of regional or global environmental problems, protection of the natural environment and ecology, prevention of environmental destruction and pollution, optimal use of natural resources, etc. |
| Intellectual resources:  | Expansion of human intellectual resources through discovery of new rules and principles, establishment of original theories, development of art and culture, etc.   |

**Table 6. (continued)**

|  |  |
|--|--|
| D) Effective measurement should be taken to implement the research topic and realize expected effect (Choose from the options below) |  |
| Human resources development:   | Foster human resources through education, training and securing an appropriate number of researchers, technical personnel and research supporters.   |
| Infrastructure:  | Develop research and development infrastructure such as equipment, establishment of databases, provision of reference materials and gene resources.  |
| Funding:   | More research funds injected by the government, international funding organizations, developed countries and private investment.   |
| Integration with extension:  | Reinforce integration of research and extension through capacity development of extension systems and closer collaboration between research and extension staff to promote technology transfer to farmers and other users. |
| Domestic research collaboration:   | Research collaboration among organizations in your country.  |
| International research collaboration:  | Research collaboration with other countries in the region, developed countries or international research institutes.   |
| Collaboration among sectors:   | Promotion of collaboration among the academic sector (research institutes, universities etc.), and the government and private sectors (private companies, NGOs, farmers groups, etc.)                                      |

Source: Questionnaire survey, 2005.



**Table 7. R&D topics surveyed**

|     | <i>Research topics</i>  | <i>Short title</i>                  |
|-----|---|-------------------------------------|
| 1.  | Development of technology to improve soil fertility in an economical way (e.g. growing green manure crops, application of compost)  | Economical soil improvement         |
| 2.  | Development of effective use of inputs to minimize the cost and maximize the output (e.g. micro-doses of fertilizers: application of small quantities of fertilizers directly into the planting hole to minimize input costs) | Effective input use                 |
| 3.  | Development of technologies to prevent soil erosion in upland areas   | Soil conservation                   |
| 4.  | Development of improved crop varieties with stable yield under abiotic stress like water deficiency or high temperatures (e.g. early maturing varieties to escape post-flowering moisture stress periods)                     | Stress tolerant variety             |
| 5.  | Development of improved intercropping technology which minimizes labour inputs and maximizes overall products in the farmland (e.g. appropriate seeding rate choices for a two-crop intercropping)                            | Intercropping technology            |
| 6.  | Development of cheaper agricultural machinery available to farmers  | Cheaper machinery                   |
| 7.  | Development of labour saving technologies for crop cultivation  | Labour saving technology            |
| 8.  | Development of improved crop varieties with high disease and pest tolerance or high competitiveness with weeds  | Pest tolerant variety               |
| 9.  | Development of pest and weed control technology in economical ways (e.g. crop rotation with pest non-susceptible varieties, increased density of crops to close the canopy more rapidly, damage control from wild animals)    | Economical pest control technology  |
| 10. | Development of appropriate water management technologies, which enable upland crop cultivation in lowland areas or paddy fields   | Water management technology         |
| 11. | Development of improved processing technology to increase the demand of crops as processed food or feed   | Food/feed processing technology     |
| 12. | Development of technology for non-food/feed processing and establishment of new uses (e.g. biodegradable plastics and biofuel from maize, cassava, etc.)  | Non-food/feed processing technology |
| 13. | Development of technology to decrease contamination of poisonous materials in crops to meet sanitary standards for export (e.g. cadmium, arsenic and sulfur dioxide content in cassava products)                              | Decreasing contamination            |
| 14. | Implementation of consumers' preferences surveys to be aware of changing demand for food  | Consumer preference survey          |
| 15. | Clarification of profitability, production costs, marketing, environmental limitations, acceptance of new technologies and other socio-economic conditions of farmers   | Socio-economic survey               |

Source: Questionnaire survey, 2005.

**Table 8. Profession of respondents**

| <i>Profession</i>   | <i>Persons</i> | <i>Percentage</i> |
|---------------------|----------------|-------------------|
| Research            | 107            | 41                |
| Extension           | 36             | 14                |
| Education           | 29             | 11                |
| Policy planning     | 27             | 10                |
| Farming             | 27             | 10                |
| Research management | 18             | 7                 |
| Others              | 15             | 6                 |
| <b>Total</b>        | <b>259</b>     | <b>100</b>        |

Source: Questionnaire survey, 2005.

**Table 9. Place of work of the respondents**

| <i>Organization</i>   | <i>Persons</i> | <i>Percentage</i> |
|-----------------------|----------------|-------------------|
| Research institute    | 115            | 44                |
| University            | 38             | 15                |
| Extension services    | 36             | 14                |
| Administration        | 24             | 9                 |
| Farm                  | 24             | 9                 |
| Private company       | 5              | 2                 |
| Farmers' organization | 2              | 1                 |
| Others                | 15             | 6                 |
| <b>Total</b>          | <b>259</b>     | <b>100</b>        |

Source: Questionnaire survey, 2005.

## (2) *Priority of R&D topics*

The respondents were requested to evaluate the priority of the R&D topics by selecting their answer from four options: "high" (extremely important), "medium" (important), "low" (somewhat important) and "unnecessary" (not important). The answers from respondents who indicated they have no expertise of the topic were excluded from further analysis. The degree of importance of the topics was estimated by calculating the 'Importance Index (I-Index)'. Each option was assigned a weight, ranging from 1 to 0, according to the importance of the topics.

If all the respondents answered "high" for a specific R&D topic, the I-Index would be 100, while if all the respondents answered "unnecessary", the I-Index would be zero.

Table 10 shows the I-Index of all the surveyed R&D topics calculated using the answers of all the respondents from the eight countries. "Pest tolerant variety" received the highest I-Index as well as "economical soil improvement". The I-Index of the other four R&D topics, namely, "effective input use", "soil conservation", "stress tolerant variety" and "food/feed processing technology" received almost the same level, which were equal to or more than 80. In this paper, we would like to select these six R&D topics as priority R&D topics for further analysis. Conversely, "consumer preference survey" followed by "intercropping technology" and "labour-saving technologies" received the lowest I-Index.

Comparing the I-Index among the respective eight countries, "labour saving technologies" has the largest standard deviation ( $SD=11.5$ ), followed by "water management technologies" ( $SD=11.3$ ). For the former, Sri Lanka received the highest I-Index, while the I-Index of the other seven countries was less than 70. As for the latter, the I-Index of Sri Lanka is also the highest and is the only country whose I-Index is greater than 90.

One salient feature of agriculture in developing Asian countries is the low productivity of labour and excess of labour in rural areas due to a lack of labour absorption in the industrial sector (Yamada, 1992). The results of evaluating the priority of R&D topics, as determined by respondents, show that these characteristics are clearly recognized. Cost-saving technologies, such as technologies to improve soil fertility using local resources (green manure crops, compost, etc.) and the development of varieties with high pest tolerances, which can reduce chemical fertilizer and pesticide usage are recognized as the most important of the 15 R&D topics. Meanwhile, "labour-saving technology" received a low priority evaluation, which will contribute to cost reduction, (because no money need be spent developing the technology), but may result negatively on employment unless alternative job opportunities are created.

If we compare the results of respective countries, we find that some countries have different tendencies for R&D prioritization. Unlike the other seven countries, Sri Lanka generated high priority responses to "labour-saving technology". This seems attributable to the fact that labour saving is a key issue in Sri Lanka. The per capita gross national income of Sri Lanka is the second highest of the surveyed countries (World Bank, 2005). As a consequence, the agricultural wage rate is supposed to be higher than other countries in the survey group. In addition, the reconstruction project related to the tsunami disaster in 2004 accelerated

Table 10. Importance Index (I-Index) of 15 R&amp;D topics

| R&D topic                               | Bangladesh | India | Indonesia | Lao<br>People's<br>Democratic<br>Republic | Myanmar | Sri Lanka | Thailand | Viet Nam | Total | SD   |
|---|------------|-------|-----------|---|---------|-----------|----------|----------|-------|------|
| 1. Economical soil improvement          | 95         | 71    | 96        | 83  | 87      | 95        | 79       | 86       | 88    | 8.7  |
| 2. Effective input use                  | 86         | 75    | 85        | 62  | 93      | 93        | 81       | 77       | 80    | 10.3 |
| 3. Soil conservation                    | 66         | 79    | 82        | 70  | 86      | 95        | 80       | 89       | 80    | 9.6  |
| 4. Stress tolerant variety              | 85         | 81    | 81        | 69  | 87      | 90        | 68       | 88       | 81    | 8.7  |
| 5. Intercropping technology             | 70         | 68    | 72        | 65  | 88      | 76        | 64       | 62       | 69    | 8.3  |
| 6. Cheaper machinery                    | 86         | 84    | 82        | 62  | 83      | 92        | 72       | 71       | 78    | 10.0 |
| 7. Labour-saving technology             | 52         | 67    | 61        | 67  | 61      | 89        | 68       | 53       | 63    | 11.5 |
| 8. Pest tolerant variety                | 89         | 80    | 92        | 74  | 85      | 100       | 84       | 95       | 88    | 8.4  |
| 9. Economical pest control technology   | 79         | 79    | 73        | 63  | 82      | 98        | 78       | 80       | 78    | 9.7  |
| 10. Water management technology         | 73         | 84    | 70        | 60  | 63      | 93        | 83       | 74       | 74    | 11.3 |
| 11. Food/feed processing technology     | 83         | 90    | 87        | 69  | 88      | 88        | 81       | 76       | 82    | 7.2  |
| 12. Non-food/feed processing technology | 73         | 75    | 61        | 57  | 58      | 82        | 83       | 66       | 70    | 10.1 |
| 13. Decreasing contamination            | 79         | 71    | 68        | 61  | 65      | 85        | 80       | 85       | 75    | 9.3  |
| 14. Consumer preference survey          | 74         | 75    | 73        | 58  | 50      | 68        | 71       | 55       | 67    | 9.8  |
| 15. Socio-economic survey               | 79         | 83    | 81        | 67  | 77      | 92        | 76       | 76       | 78    | 7.2  |

Source: Questionnaire survey, 2005.

the demand for labour in the country.<sup>3</sup> Against this backdrop, labour-saving technologies are of exceptionally higher priority in Sri Lanka.

Water is becoming a precious resource in the world due to global climate change and the burgeoning world population. Especially in Sri Lanka, water shortages have been a serious problem in the dry zone and the farmers have on established traditional tank-irrigation system. The highest I-Index for “water management technology” reflects the long experience of water management in Sri Lanka though the difference is not as significant as “labour-saving technology”.

(3) *Expected outcomes of implantation of the R&D topics*

The results of the survey on the expected outcomes of R&D topics are shown in table 11. Among all the respondents in the eight countries, 80 per cent or more agreed that “poverty alleviation” would be achieved through the technological development of “intercropping technology” and “pest tolerant variety” (indicated as “A” in table 11). As for the outcome of “socio-economic development”, 80 per cent or more of respondents answered “cheaper machinery”, “labour-saving technology”, “pest tolerant variety”, “food/feed processing technology”, “consumer preference survey” and “socio-economic survey” would have positive impacts (indicated as “A” in table 11). “Economical soil improvement”, “soil conservation”, “pest tolerant variety”, “economical pest control” and “decreasing contamination” are the topics which 80 per cent or more respondents thought would contribute to “environmental issues” (indicated as “A” in table 11). There were no R&D topics surveyed for which more than 50 per cent of respondents thought implanting action would increase “intellectual resources”.

Figure 2 displays compiled results from respondents and shows the number of countries for which 80 per cent or more of respondents answered that the specific technologies would contribute to poverty alleviation. In six countries, 80 per cent or more answered “intercropping technology” would contribute to poverty alleviation. Conversely, no country achieved 80 per cent affirmation by respondents for “soil conservation”, “labour-saving technology”, “decreasing contamination” or “consumers’ preferences survey”.

(4) *Relationships between priority and expected effects*

By analyzing the results of the survey on the three expected outcomes, namely, “poverty alleviation”, “socio-economic development” and “environmental

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<sup>3</sup> Speculation based on a personal communication to the collaborator in Sri Lanka.

Table 11. Expected effects and actions to realize these outcomes

|                                      | 1. Economical<br>soil<br>improvement | 2. Effective<br>input use | 3. Soil<br>conservation | 4. Stress<br>tolerant<br>variety | 5. Intercropping<br>technology | 6. Cheaper<br>machinery | 7. Labour-<br>saving<br>technology | 8. Pest<br>tolerant<br>variety |
|--------------------------------------|--------------------------------------|---------------------------|-------------------------|----------------------------------|--------------------------------|-------------------------|------------------------------------|--------------------------------|
| <b>Importance Index</b>              | <b>88</b>                            | <b>80</b>                 | <b>80</b>               | <b>81</b>                        | <b>69</b>                      | <b>78</b>               | <b>63</b>                          | <b>88</b>                      |
| <b>Expected effect</b>               |                                      |                           |                         |                                  |                                |                         |                                    |                                |
| Poverty alleviation                  | B                                    | B                         | C                       | B                                | A                              | B                       | C                                  | A                              |
| Socio-economic development           | C                                    | B                         | C                       | B                                | B                              | A                       | A                                  | A                              |
| Environmental issues                 | A                                    | C                         | A                       | D                                | D                              | D                       | D                                  | A                              |
| Intellectual resources               | D                                    | D                         | D                       | D                                | D                              | D                       | D                                  | D                              |
| <b>Measurement</b>                   |                                      |                           |                         |                                  |                                |                         |                                    |                                |
| Human resources development          | B                                    | B                         | B                       | B                                | C                              | B                       | B                                  | B                              |
| Infrastructure                       | D                                    | D                         | D                       | D                                | D                              | D                       | D                                  | D                              |
| Funding                              | B                                    | C                         | B                       | B                                | C                              | B                       | C                                  | A                              |
| Integration with extension           | B                                    | B                         | B                       | C                                | B                              | C                       | C                                  | B                              |
| Domestic research collaboration      | B                                    | C                         | C                       | C                                | C                              | C                       | C                                  | A                              |
| International research collaboration | C                                    | D                         | D                       | B                                | D                              | D                       | D                                  | A                              |
| Collaboration among sectors          | C                                    | D                         | C                       | D                                | D                              | D                       | D                                  | B                              |

Table 11. (continued)

|                                      | 9. Economical<br>pest control<br>technology | 10. Water<br>management<br>technology | 11. Food/feed<br>processing<br>technology | 12. Non-food/<br>feed<br>processing<br>technology | 13. Decreasing<br>contamination | 14. Consumer<br>preference<br>survey | 15. Socio-<br>economic<br>survey |
|--------------------------------------|---|---------------------------------------|---|---|---------------------------------|--------------------------------------|----------------------------------|
| <b>Importance Index</b>              | 78  | 74                                    | 82  | 70  | 75                              | 67                                   | 78                               |
| <b>Expected effect</b>               |   |                                       |   |   |                                 |                                      |                                  |
| Poverty alleviation                  | C   | C                                     | B   | C   | D                               | D                                    | B                                |
| Socio-economic development           | B   | B                                     | A   | B   | B                               | A                                    | A                                |
| Environmental issues                 | A   | B                                     | D   | B   | A                               | D                                    | D                                |
| Intellectual resources               | D   | D                                     | D   | D   | D                               | D                                    | D                                |
| <b>Measurement</b>                   |   |                                       |   |   |                                 |                                      |                                  |
| Human resources development          | B   | B                                     | B   | B   | B                               | B                                    | B                                |
| Infrastructure                       | D   | D                                     | D   | D   | D                               | D                                    | D                                |
| Funding                              | B   | B                                     | B   | B   | B                               | C                                    | B                                |
| Integration with extension           | A   | C                                     | C   | C   | C                               | C                                    | B                                |
| Domestic research collaboration      | A   | B                                     | C   | B   | C                               | C                                    | C                                |
| International research collaboration | A   | D                                     | C   | C   | B                               | D                                    | D                                |
| Collaboration among sectors          | C   | C                                     | C   | C   | D                               | D                                    | C                                |

Source: Questionnaire survey, 2005.

Note: As for expected effects and measurements, each grade represents the following:

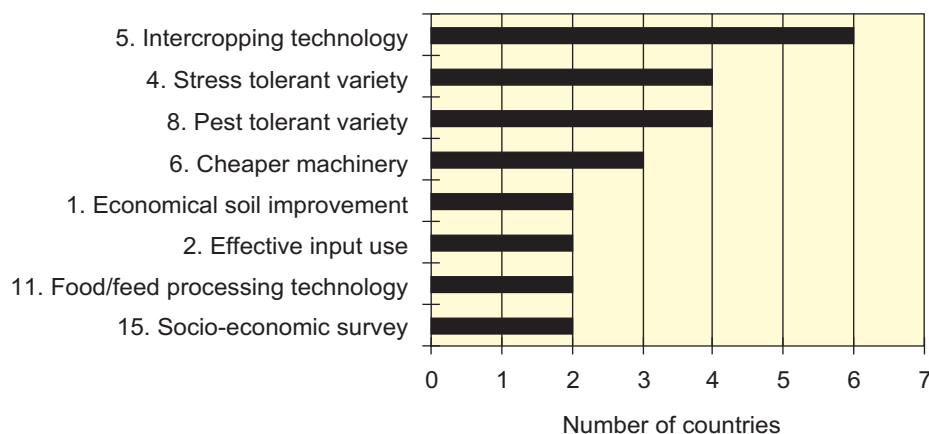
A: Quite effective (100-80% of respondents chose the option).

B: Effective (65-79%).

C: Somewhat effective (50-64%).

D: Less effective (0-49%).

**Figure 2. Number of countries where 80 per cent or more of the respondents expected poverty to be alleviated by implementing the R&D topics**



Source: Questionnaire survey, 2005.

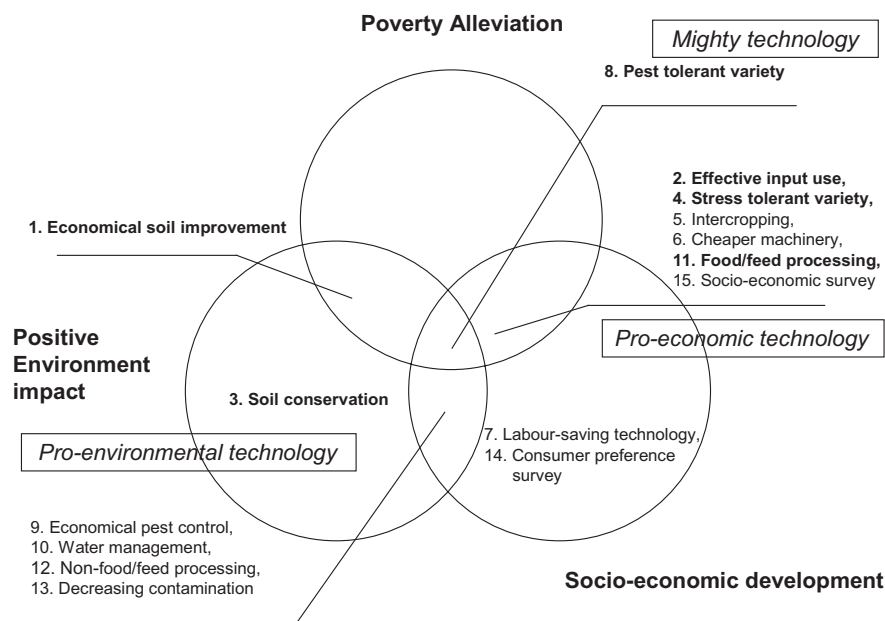
issues”, we can examine why six R&D topics were classified with higher priority (I-Index=80 or more) in the surveyed region.

Among the options of expected outcomes, “poverty alleviation” can be used as a proxy for direct or short-term positive impact on the welfare of rural poor people. “Socio-economic development” can be used as a proxy for long-term positive impact on welfare. “Environmental issues” can be used as a proxy for external economic impacts (downstream impacts). In this discussion, we would like to determine if a specific R&D topic is effective for achieving a specific effect; if the R&D topic was supported by 80 per cent or more of respondents it is quite effective (indicated as “A” in table 11), effective if supported by 65 to 79 per cent (indicated as “B” in table 11), and somehow effective if supported by 50 to 64 per cent (indicated as “C” in table 11).

All the R&D topics can be classified based on the expected outcome (figure 3). Among the six priority topics, “pest tolerant variety” was the only topic recognized as quite effective for all three outcomes. We can conclude that this kind of technology is a “Mighty technology” which can realize multiple beneficial impacts on a range of outcomes.

The second group R&D topics, by priority ranking, consists of “economical soil improvement” and “soil conservation”. They were recognized as quite effective



**Figure 3. Classification of the surveyed R&D topics**

Source: By author.

Note: Six Priority R&D topics are shown in bold. The classification was conducted by seeing whether each R&D topic received grade A or B (supported by 65-100% of respondents).

for “environmental issues”, while “poverty alleviation” and “socio-economic development” scored relatively lower. This indicates that respondents recognized these technologies have more economic externalities than short/long term economic impacts. Supposing the budget of a Government is limited, whilst it is urgent to tackle poverty alleviation, these R&D topics would be considered less urgent. Therefore, external support is required for this second group of technologies, namely “pro-environmental technologies”, to mitigate the negative impacts of agricultural development.

The third group of priority R&D topics consists of “pro-economic technologies” which are recognized as effective for improving rural welfare both on a short and long-term basis with less expected economic externalities. The group includes “effective input use”, “stress tolerant variety” and “food/feed processing technology”. They are thought to be quite effective or effective for short/long term welfare improvement but relatively less effective for dealing with economic externalities.

It is interesting to note that “effective input use” is included in this group, which means that respondents expected the reduction of fertilizer use would have less than positive effects on environmental problems. A possible interpretation is that the respondents are afraid of the negative impacts of reduced input use, especially concerned that reducing fertilizer inputs would result in a deterioration of soil fertility. “Stress tolerant variety” is an effective measure for expanding crop production in disadvantaged areas. However, the results of the survey show the respondents are afraid of the negative impacts of the technology: since the environment in disadvantaged areas is very fragile and the expansion of crop production in these areas could cause negative impacts unless properly managed. “Food/feed processing” or value adding activities are known to be effective measures to augment rural income and generate employment. The survey results indicate that in spite of the positive impact of adding value to produce and products, it can occasionally cause serious negative impacts to the environment such as water pollution and/or odors, which are serious problems in developing regions where environmental regulations are not well implemented.

The I-Index of “labour-saving technology” was low in most countries while it was thought to be quite an effective component of “socio-economic development” based on the survey results (table 11). This indicates that respondents clearly recognized its long-term impact. Most Asian developing countries have an excess capacity of labour in rural areas. However, if non-agricultural industry is developed in the near future, the surplus availability of rural labour drops relatively. The survey results reflect the respondents’ perspectives of rural development in the future. A similar tendency can also be found for “non-food/feed processing technology”, “decreasing contamination” and “consumer preference survey”, for which it can be interpreted that these R&D topics are expected to be important only after preliminary economic development has been achieved.

(5) *Effective steps to implement the research topics*

The survey’s results of effective steps that should be taken to implement the research topics and realize the expected effect are shown in table 11. While almost all the other options received relatively higher support from the respondents, less than 50 per cent replied that infrastructure development would be a useful measure to achieve the expected effects of technological development.

(6) *Differences of attitude among researchers, extension staff and farmers*

To reveal differences between the attitudes towards technological development, the survey results were compiled according to the occupation of the

respondent (table 12). Researchers place much more priority than extension staff on “stress tolerant variety”, “intercropping technology” and “decreasing contamination”. The researchers also place significantly higher priority than farmers on “effective input use”, “stress tolerant variety”, “economical pest control technology” and “socio-economic survey”. Significant priority differences between extension staff and farmers were observed only for “effective input use”.

The differences found regarding “stress tolerant variety” between researchers and extension staff/farmers can be attributed to the respondents’ expectations of how the technology could contribute to environmental issues. While 60 per cent of researchers expect the development of stress tolerant varieties could have positive impacts on environmental problems, only 39 per cent of extension staff and 15 per cent of farmers felt the same. This result reflects the current status of technological development for plant varieties with abiotic stress. While the breeding of new plant varieties with resistance to pest and diseases is relatively easy because of the limited number of genes that can effectively enhance these characteristics, varieties resistant to abiotic stress, such as high temperature, drought and salinity are more difficult to produce because tolerance to abiotic stress is achieved by more complicated genetic systems and the introduction of a single specific gene is usually insufficient to acquire stress tolerance. As climate change on a global scale casts serious shadows over agriculture, researchers are more interested in technologies to mitigate the negative impacts of climate change. On the other hand, farmers and extension staff are still suspicious of whether the development of stress tolerant plant varieties can be put to practical use.

The difference between researchers and farmers regarding “effective input use” can also be attributed to the respondents’ expectations of how technology could contribute to environmental issues and boost intellectual resources. While researchers thought that efficient agro-input use could reduce negative impacts on the environment through reducing the runoff of nutrient from farmland, farmers worry that any decrease in agro-inputs would deteriorate soil fertility. The level of agro-input use in developing Asia is still lower than that of industrialized countries (table 4). However, in some specific areas, commercial crop production has been intensively implemented and the overuse of agricultural chemicals has become a serious environmental concern. Researchers pay attention to the overuse of inputs, while farmers without access to adequate input supplies gave less priority to this.

The reasons for the differences in priority between researchers and farmers on “socio-economic survey” seem to be contradictory. While researchers gave more priority than farmers to the subject, farmers expect more positive impacts on

Table 12. Importance index and expected outcomes of R&amp;D goals by respondents' occupation

| R&D topic  | 1. Economical<br>soil<br>improvement | 2. Effective<br>input<br>use | 3. Soil<br>conservation | 4. Stress<br>tolerant<br>variety | 5. Inter-<br>cropping<br>technology | 6. Cheaper<br>machinery | 7. Labour-<br>saving<br>technology | 8. Pest<br>tolerant<br>variety |
|--|--------------------------------------|------------------------------|-------------------------|----------------------------------|-------------------------------------|-------------------------|------------------------------------|--------------------------------|
| Importance index   |                                      |                              |                         |                                  |                                     |                         |                                    |                                |
| No. of R&D topic   | 1                                    | 2bc                          | 3                       | 4ac                              | 5a                                  | 6                       | 7                                  | 8                              |
| Researchers  | 87                                   | 83                           | 81                      | 85                               | 68                                  | 79                      | 61                                 | 89                             |
| Extension staffs   | 91                                   | 80                           | 70                      | 76                               | 56                                  | 68                      | 62                                 | 90                             |
| Farmers  | 82                                   | 64                           | 79                      | 62                               | 58                                  | 71                      | 67                                 | 77                             |
| Effects of poverty alleviation (percentage of respondents who expect positive impacts)     |                                      |                              |                         |                                  |                                     |                         |                                    |                                |
| No. of R&D topic   | 1                                    | 2                            | 3                       | 4                                | 5                                   | 6                       | 7                                  | 8                              |
| Researchers  | 72                                   | 75                           | 57                      | 77                               | 83                                  | 68                      | 60                                 | 78                             |
| Extension staffs   | 72                                   | 81                           | 55                      | 81                               | 81                                  | 57                      | 64                                 | 68                             |
| Farmers  | 76                                   | 85                           | 57                      | 62                               | 73                                  | 82                      | 67                                 | 91                             |
| Effects of socio-economic impact (percentage of respondents who expect positive impacts)   |                                      |                              |                         |                                  |                                     |                         |                                    |                                |
| No. of R&D topic   | 1                                    | 2                            | 3c                      | 4                                | 5                                   | 6ac                     | 7                                  | 8a                             |
| Researchers  | 61                                   | 66                           | 69                      | 76                               | 72                                  | 90                      | 87                                 | 64                             |
| Extension staffs   | 69                                   | 69                           | 65                      | 77                               | 71                                  | 71                      | 75                                 | 82                             |
| Farmers  | 59                                   | 65                           | 29                      | 77                               | 47                                  | 59                      | 67                                 | 73                             |
| Effects of environment improvement (percentage of respondents who expect positive impacts) |                                      |                              |                         |                                  |                                     |                         |                                    |                                |
| No. of R&D topic   | 1                                    | 2ac                          | 3                       | 4ac                              | 5                                   | 6                       | 7                                  | 8                              |
| Researchers  | 86                                   | 71                           | 89                      | 60                               | 46                                  | 22                      | 21                                 | 79                             |
| Extension staffs   | 81                                   | 41                           | 97                      | 39                               | 32                                  | 14                      | 11                                 | 75                             |
| Farmers  | 71                                   | 20                           | 86                      | 15                               | 27                                  | 12                      | 11                                 | 55                             |
| Effects of intellectual resource (percentage of respondents who expect positive impacts)   |                                      |                              |                         |                                  |                                     |                         |                                    |                                |
| No. of R&D topic   | 1                                    | 2bc                          | 3                       | 4                                | 5                                   | 6                       | 7                                  | 8                              |
| Researchers  | 27                                   | 26                           | 24                      | 37                               | 25                                  | 38                      | 30                                 | 43                             |
| Extension staffs   | 25                                   | 28                           | 39                      | 42                               | 19                                  | 29                      | 21                                 | 46                             |
| Farmers  | 12                                   | 5                            | 0                       | 38                               | 13                                  | 35                      | 22                                 | 55                             |

Table 12. (continued)

| R&D topic  | 9. Economical<br>pest control<br>technology | 10. Water<br>management<br>technology | 11. Food/feed<br>processing<br>technology | 12. Non-food/feed<br>processing<br>technology | 13. Decreasing<br>contamination | 14. Consumer<br>preference<br>survey | 15. Socio-<br>economic<br>survey |
|--|---|---------------------------------------|---|---|---------------------------------|--------------------------------------|----------------------------------|
| Importance index   |   |                                       |   |   |                                 |                                      |                                  |
| No. of R&D topic   | 9c  | 10                                    | 11  | 12  | 13a                             | 14                                   | 15c                              |
| Researchers  | 78  | 75                                    | 81  | 69  | 79                              | 66                                   | 81                               |
| Extension staffs   | 73  | 66                                    | 75  | 65  | 58                              | 64                                   | 73                               |
| Farmers  | 60  | 68                                    | 64  | 79  | 64                              | 50                                   | 63                               |
| Effects of poverty alleviation (percentage of respondents who expect positive impacts)     |   |                                       |   |   |                                 |                                      |                                  |
| No. of R&D topic   | 9   | 10                                    | 11  | 12  | 13c                             | 14                                   | 15c                              |
| Researchers  | 60  | 58                                    | 69  | 54  | 19                              | 26                                   | 63                               |
| Extension staffs   | 64  | 52                                    | 68  | 64  | 25                              | 33                                   | 79                               |
| Farmers  | 60  | 55                                    | 73  | 71  | 57                              | 17                                   | 88                               |
| Effects of socio-economic impact (percentage of respondents who expect positive impacts)   |   |                                       |   |   |                                 |                                      |                                  |
| No. of R&D topic   | 9   | 10                                    | 11c                                       | 12c   | 13b                             | 14ac                                 | 15                               |
| Researchers  | 70  | 69                                    | 92  | 75  | 68                              | 91                                   | 91                               |
| Extension staffs   | 64  | 64                                    | 88  | 59  | 55                              | 92                                   | 71                               |
| Farmers  | 40  | 73                                    | 64  | 29  | 100                             | 83                                   | 71                               |
| Effects of environment improvement (percentage of respondents who expect positive impacts) |   |                                       |   |   |                                 |                                      |                                  |
| No. of R&D topic   | 9   | 10ac                                  | 11  | 12  | 13                              | 14                                   | 15                               |
| Researchers  | 89  | 78                                    | 30  | 72  | 84                              | 14                                   | 35                               |
| Extension staffs   | 82  | 56                                    | 20  | 73  | 80                              | 25                                   | 32                               |
| Farmers  | 70  | 45                                    | 9   | 43  | 86                              | 17                                   | 12                               |
| Effects of intellectual resource (percentage of respondents who expect positive impacts)   |   |                                       |   |   |                                 |                                      |                                  |
| No. of R&D topic   | 9   | 10                                    | 11  | 12  | 13                              | 14                                   | 15c                              |
| Researchers  | 33  | 36                                    | 39  | 43  | 35                              | 18                                   | 32                               |
| Extension staffs   | 39  | 16                                    | 40  | 36  | 25                              | 8                                    | 25                               |
| Farmers  | 0   | 27                                    | 18  | 14  | 29                              | 0                                    | 6                                |

Source: Questionnaire survey, 2005.

a:  $p < 0.05$  (Chi-square test) between researchers and extension staffsb:  $p < 0.05$  (Chi-square test) between extension staffs and farmersc:  $p < 0.05$  (Chi-square test) between farmers and researchers

poverty alleviation from the socio-economic survey than researchers. There is no doubt that accurate information about the economic situation of farm households can be used positively to formulate policy measures to alleviate poverty. However, the results of the current survey have shown that researchers are less confident that the conclusions of a socio-economic study can contribute to poverty alleviation, although they admit the importance of the socio-economic study in general. More attention should be paid to promoting a socio-economic study, which could result in actual beneficial impacts on the welfare of the rural poor, as well as, producing scientific findings.

## **V. CONCLUDING REMARKS**

This article highlights the level of priority placed by survey respondents on selected R&D topics in order to realize economic development through agricultural diversification using secondary crops. It also shows the trends of agricultural diversification by calculating SID. The article draws the following conclusions:

- The recent SID trends shows agricultural diversification in Asian countries has stagnated. The extent of diversification is determined by various factors. Above all, technological development has a crucial role because most developing countries focus their R&D activities on major cereals and less attention had been paid to secondary crops. Secondary crop production in developing Asian countries has a comparative advantage in international markets and offers better profitability in disadvantaged areas, especially upland areas that lack irrigation facilities. Therefore, appropriate support to R&D activities focusing on secondary crops will produce positive impacts on poverty alleviation in rural areas.
- Among the R&D activities concerned with agricultural diversification, cost-saving technologies, such as improving soil fertility with local resources (green manure crops, compost, etc.) and the development of varieties with high pest tolerance, which can reduce chemical fertilizer and pesticide inputs, should be enhanced. Labour-saving technology received a low priority ranking, which could contribute to cost reduction but may produce negative impacts for employment unless alternative job opportunities are created. However, if the non-agricultural sector is developed in the near future, the surplus availability of rural labour will decrease. R&D on labour-saving technology should be encouraged based on a long-term perspective.

- Researchers as producers of technologies, extension staff as mediators and farmers as end users of developed technologies have differing priorities and concerns surrounding technological development. Farmers themselves diversify their technological needs based on their economic situation, current cropping patterns and location of their fields. Farmer's technology preferences are poorly defined in cases where there is high diversity in environmental conditions, which is generally the case with small, poorer households (Menter and others, 2004). Moreover, the survey has shown that researchers may accord higher priority to research topics for which they are not confident of the actual impacts on poverty alleviation. To reduce these knowledge gaps among stakeholders of technological development, dialog among researchers, extension staff and farmers should be nurtured.
- The survey has provided an example of a prioritization process and interpretation of survey results. It should be noted that the results of the survey indicate only the rough direction of technology development. In addition, nearly half of the respondents are researchers and research managers. It is vital to keep it in mind that the survey results may be biased to the preferences of people who work in research institutes. Therefore, it is necessary to conduct further analysis using a participatory approach to identify specific research topics that can meet the practical needs of the end users of the developed technologies. We hope that the results of the survey will provide a good opportunity for all the stakeholders to consider an R&D strategy that can contribute to the overall goal of technological development, such as poverty alleviation and environmental conservation.

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## THE IMPACT OF DEMOGRAPHY, GROWTH AND PUBLIC POLICY ON HOUSEHOLD SAVING: A CASE STUDY OF PAKISTAN

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*The present study investigates the behaviour of household saving by employing the Johansen-Juselius cointegration technique and error correction model to determine the long run and short run dynamics of the system respectively using "time-series" data for Pakistan over the period 1972-2003. The study found the existence of one cointegrating vector, indicating a valid long run economic relationship among the determinants of household saving.*

*The study established that there exists a valid long run inverse relationship between household saving and demographic variables. The results also reveal that income and growth variables have a significant positive effect on household saving. Similarly, the positive impact of real interest rates on saving indicates that the substitution effect dominates the income effect in Pakistan. The study also found that the rate of inflation affects household saving rate negatively. Furthermore, public saving 'crowds-out' private saving less proportionately in Pakistan, than in other comparable cases.*

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## I. INTRODUCTION

Development economics has for several decades recognized the importance of the mobilization of domestic savings for economic growth in developing countries. The positive relationship between saving/investment and economic growth has long been an established fact in economics.<sup>1</sup>

Pakistan's saving performance is not very impressive relative to other developing countries in the region that have experienced sustained high growth comparable to Pakistan. Despite the lacklustre performance of domestic saving in previous decades, household saving during the past four decades has been more than 80 per cent of domestic saving and significantly contributed to total saving. In spite of its sheer contribution to total saving, very few empirical studies have been conducted to analyse households saving behaviour in Pakistan. Most of the relevant available studies have used cross-sectional data.<sup>2</sup> Most of the empirical studies are based on total national/domestic saving. However, some studies have examined private sector saving, but only a few have explicitly focused on household saving. Moreover, most of the studies have used cross-country data for estimation. Cross-country regression analysis is based on assumptions of homogeneity about the nature and quality of data; these are very restrictive assumptions so the validity of the results becomes doubtful. There is a need to use individual country time-series data for undertaking econometric analysis of saving/investment behaviour to provide a sound foundation for a policy debate. However, there is compelling evidence that many macroeconomic time-series datasets are non-stationary and as a result, ordinary least square estimates using these data may produce spurious results. Although by now there exist well developed techniques for handling non-stationary time-series data, no attempt has yet been made in Pakistan to study household saving and its determinants using these methods within an integrated theoretical framework. The present study evaluates the determinants of household saving in the process of economic development in the light of Pakistan's experience during the period 1972-2003.

The plan of the paper is as follows: section II provides an overview of saving trends in Pakistan, section III discusses theoretical aspects of household saving determinants, data sources and econometric methodology is discussed in section IV, and the empirical findings are presented and analysed in section V. section VI presents a concluding summary.

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<sup>1</sup> See Schmidt and others (1996), Bisat and others (1997), and Sinha (1999) etc.

<sup>2</sup> See Akhter (1986,1987), Burney and Khan (1992) and Siddique (1993).

## II. SAVING TRENDS IN PAKISTAN

In this section, we examine saving trends and some fiscal indicators of Pakistan in different eras. Self-reliance has always been an avowed objective of Pakistan's economy. A higher degree of self-reliance is a desirable long-term goal of any economy, but unfortunately, Pakistan is included in those countries, which rely on external sources due to deficiencies in domestic resource mobilization. The process of development in the past has been accompanied with large internal and external imbalances. The perspective plan (1965-85) envisaged that by 1985 more than 95 per cent of investment would be financed through domestic sources while investment would be as large as 22.9 per cent of GNP. It was expected that the marginal savings rate could rise to 28 per cent during the period 1975-80. In fact the marginal saving rate fell during that period. It was expected that dependence of external resources would be reduced from 21.4 per cent and 13.6 per cent of investment during the sixth and seventh plan respectively. In fact the opposite has happened and the share of external resources in total investment increased to 25 per cent. This resulted in a deteriorated balance of payments of situation in Pakistan.

Table 1 shows domestic savings and the decomposition of saving rate trends on an aggregated annual basis for the period 1960-2000. Pakistan's saving performance is not very inspiring; indeed, it is abysmally low and hovers around 11.44 per cent for the period 1960-61 to 2000-01.

**Table 1. Trends in Saving and Investment in Pakistan**

| Period             | As per cent of GDP |                |                  |                  |                 | As per cent of GTI |                    |
|--------------------|--------------------|----------------|------------------|------------------|-----------------|--------------------|--------------------|
|                    | Public Saving      | Private Saving | Household Saving | Corporate Saving | Domestic Saving | External Resources | Domestic Resources |
| 1960-61 to 1969-70 | 2.26               | 10.43          | 8.92             | 1.51             | 13.54           | NR                 | NR                 |
| 1970-71 to 1979-80 | 0.87               | 9.40           | 7.95             | 1.45             | 8.44            | 36.88              | 63.11              |
| 1980-81 to 1989-90 | 1.60               | 12.71          | 11.64            | 1.07             | 9.65            | 21.02              | 78.98              |
| 1990-91 to 1999-00 | 1.56               | 12.49          | 11.05            | 1.44             | 14.13           | 24.29              | 75.71              |
| 1960-61 to 2000-01 | 1.57               | 11.28          | 9.92             | 1.36             | 11.44           | 22.52              | 65.74              |

Source: State Bank of Pakistan (1980-2003)

Note: 1. *NR* stands for Not Reported  
2. *GTI* stands for Gross Total Investment

Pakistan's saving performance is not very impressive relative to other countries in the region that have experienced sustained high growth. Therefore, Pakistan has relied heavily on foreign capital to fill the gap between domestic saving and domestic investment. A disturbing feature of savings performance is that the savings rate has fallen over time from 13.54 per cent during the 1960s to 8.44 per cent and 9.65 per cent during the 1970s and the 1980s respectively though it increased during 1990s.

The macroeconomic dynamic represents a unique paradox, which arises from its high dependence on external resources to finance gross investment. Domestic savings financed 75 per cent of total gross investment, the remaining 25 per cent of total investment was financed through external sources. Public saving was on average 1.57 per cent of Gross Domestic Product (GDP) for the period 1960-2000. The persistently large fiscal deficit is one of the main reasons of macroeconomic imbalances in Pakistan. On the other hand the Government has failed to implement serious tax reform, the tax to GDP ratio has remained stagnant around 13 per cent for the last 30 years. Both factors are jointly responsible for the dismal state of public saving in Pakistan.

Private saving consists of household saving and corporate saving. Household saving performance is better than corporate or public saving, thus, household savings contribute more than 80 per cent of the total share in domestic saving rates. But it also has remained stagnant around 11 per cent for the last 30 years. The performance of corporate saving has remained very poor; over the period 1960-2000 average corporate saving was 1.36 per cent of GDP.

### III. THEORETICAL ASPECTS OF HOUSEHOLD SAVING DETERMINANTS

We identified many determinants of household saving in Pakistan and classified them into the following three groups: demographic variables, income and growth variables and policy variables.

#### Demographic factors

Demographic variables are considered important for empirical studies of household savings. The population structure has been identified as a factor affecting saving behaviour in less developed countries.<sup>3</sup> Changes in the dependency ratio

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<sup>3</sup> Young-age dependency is usually defined as the ratio of the population less than 15 years to working age population (15-64) and old-age dependency is defined as the ratio of population age 65 and above to working age population.

affect saving behaviour, not only in the form of changed demand for health expenditure, human capital formation, and retirement consumption levels, but this ratio can also affect Government expenditure.

Leff (1969) found a significant inverse relationship between dependency rates and saving rates in less developed countries. Subsequently studies by Kelly (1973, 1976, 1988), Gupta (1975), Lahiri (1989) and Fry (1991) have also found a negative relationship between dependency rates and saving rates.

### **Growth and income factors**

Many empirical studies have noted a very high degree of correlation between growth rates and saving rates; however, direction of causation is not clear. Mason (1981) wrote, that "With positive growth in aggregate real income, the lifetime resources of young savers exceed those of old dissavers and there can be positive aggregate saving".

Economic development theories generally assume that the causality runs from saving to the formation of human and physical capital to growth. On the other hand, many consumption theories have assumed that the causality runs from growth to saving (Modigliani (1970, 1993)).

The life cycle hypothesis implies that there is positive relation between income and saving, Modigliani in a recent study (1993) argued for there being a positive relation between income and saving for poor countries. He noted that, for poor developing countries the saving ratio tends to rise with income, while in developed countries there is no significant, systematic relationship between income and saving.

The life cycle model identifies growth in per capita income as one of the important determinants of saving rates, because people are forward looking and base their savings decisions on lifetime income. But in reality the current level of income also plays a significant role in explaining saving behaviour. Therefore, this study includes both these variables in household savings models.

### **Economics policy factors**

The real interest rate is considered an important factor for inter-temporal decision-making. The sensitivity of savings to interest rate fluctuations has been the subject of much debate in less developed countries literature. At the theoretical level, the influence of real interest rates on saving depends on the relative strengths of offsetting substitution and income effects. A rise in the real rate of return may

increase saving by making future consumption cheaper relative to current consumption (substitution effect). At the same time, higher real interest rates may reduce the amount of saving necessary to purchase a given amount of future consumption (income effect). Thus, the impact of real interest rates on saving is a controversial issue in economic literature. Inflation is generally considered an important indicator of macroeconomic stability, so, higher inflation creates uncertainty and in anticipation of higher inflation rates in the future people substitute their future consumption for present consumption, consequently saving less. So, an increase in the inflation rate is expected to have a negative impact on saving.

Inflation can have a positive effect on saving rates as uncertainty about future asset values and future real incomes in an inflationary environment may encourage saving in order to maintain future consumption levels. Thus, the direction of the impact of inflation is indeterminate a priori.

The final variable of public saving in our study is used to gauge the impact of public saving on household saving, as public saving has significant relevance to household saving. The stance of the Government toward public saving may have a very large impact on household saving. According to the full Ricardian equivalence, public saving is a perfect substitute for private saving. The full Ricardian equivalence holds when there is a perfect capital market and no uncertainty. In the case of developing countries, these two assumptions do not hold and that may in fact make public saving not a perfect substitute for private saving.

## IV. DATA AND METHODOLOGY

### 1. Data Sources and Model

The model consists of eight variables, growth rate per capita income (GR), per capita income (PC), young dependency ratio (YD), old dependency ratio (OD), real interest rate (IR), inflation rate (IF) and public saving (PS). All the data were obtained from *World Development Series*, *Economic Survey of Pakistan* and the *State Bank of Pakistan Annual Report*.

According to the variables identified earlier our empirical savings function takes the following form.

$$HS = \alpha_0 + \alpha_1 GR + \alpha_2 PC + \alpha_3 YD + \alpha_4 OD + \alpha_5 IR + \alpha_6 IF + \alpha_7 PS + U \quad E(1)$$

(+)            (+)            (-)            (-)            (+/-)            (+/-)            (-)

Symbols below the variables in E(1) indicates the expected coefficient signs

## 2. Econometric Procedure

In this paper, the impact of the determinants on household savings rates are examined in the following ways:

1. To examine whether a time series has a unit root, this paper has used augmented Dickey-Fuller (ADF) unit root test.
2. To find the long run relationship among the variables, this paper has applied the Johansen's multiple cointegration test.
3. Once the variables are found to be co-integrated, meaning that long-run equilibrium holds between them, they may still be in disequilibrium in the short run. Therefore, we estimated an error correction model (ECM) to determine the short run dynamic of the system.

The cointegration and error correction modeling techniques are now well-know and widely used in applied econometrics. The cointegration technique pioneered by Granger (1986), Engle and Granger (1987) allows long-run components of variables to obey long-run equilibrium relationships with the short-run components having a flexible dynamic specification. In the light of Shintani's (1994) finding that the Johansen method is more powerful than the Engle-Granger method, the multivariate cointegration framework that we propose to use here is established as the standard for vector autoregression systems. Unlike the Engle and Granger cointegration method the Johansen procedure can find multiple cointegration vectors. Considering a VAR model of order  $p$  with Gaussian errors, the dynamics of  $X_t$  are presumed to be governed by a  $p$ th-order Gaussian vector autoregression:

Let  $X_t$  be an  $I(1)$  vector representing the  $n$ -series of interest. A VAR of length  $p$  for  $X_t$ , would then be of the form.

$$X_t = \sum_{j=1}^p \Pi_j X_{t-j} + \mu + \varepsilon \quad E(2) \quad t = 1, 2, 3, \dots, T$$

Where the  $\Pi_j$  are matrices of constant coefficients,  $X_t$  is a  $(n \times 1)$  vector of  $I(1)$ ,  $\mu$  is an intercept,  $\varepsilon$  is a Gaussian error term and  $T$  the total number of observations. It is convenient to rewrite E(2) in first difference notation reformulate in error correction form as

$$\Delta X = \sum_{j=1}^p \Gamma_j \Delta X_{t-j} + \Pi X_{t-p} + \mu + \varepsilon \quad E(3)$$



Where  $\Delta$  is the first difference operator and the  $E(3)$  contains information on both the short and long run adjustments to changes in  $X_t$ , via the estimates of  $\Gamma_j$  and  $\Pi$ , respectively.

If  $\text{Rank}(\Pi) = r$  ( $r < n$ ) then cointegration is indicated (with  $r$  cointegrating vectors present) and further, in this case  $\Pi$  may be factored as  $\Pi = \alpha\beta$ , with the matrix  $\beta$  comprising the  $r$  cointegrating vectors and  $\alpha$  can be interpreted as the matrix of corresponding ECM weights. The matrix  $\Pi$  contains the information on the long run relationship between variables. If the rank of  $\Pi = 0$ , the variables are not cointegrated. On the other hand if rank (usually denote by 'r') is equal to 1 there exists one cointegrating vector and finally if  $1 < r < n$  there are multiple cointegrating vectors. Johansen and Juselius (1990) have derived two tests for cointegration, namely trace test and the maximum Eigen value test. The first task in Johansen procedure is to choose an autoregressive order ( $p$ ). There are tests for the choice of this appropriate lag length.<sup>4</sup> The ECM weights  $\alpha_i$  determine the short run term error correction responses of the variables to deviations from long run equilibrium values.

## V. EMPIRICAL RESULTS AND ANALYSIS

The Johansen cointegration method and error correction model technique has been used in order to examine the long run and the short run dynamics of the system respectively.<sup>5</sup>

Prior to testing the long run cointegration relation ship, it is necessary to establish the order of integration presented. To this end, an augmented Dickey-Fuller (ADF) was carried out on the time-series levels and difference forms. The results are given in table 2 and show; all the variables have a unit root in their levels and are stationary in their first difference. Thus all eight variables (HS, GR, PC, YD, OD, IR, IF and PS) are integrated of order one  $I(1)$ .<sup>6</sup>

$$\Delta X = \gamma_0 + \gamma_1 X_{t-1} + \sum_{i=1}^p \beta_i \Delta X_{t-i} + \gamma_3 T + \mu_t$$

<sup>4</sup> Akaike information criteria in Schwarz (1978).

<sup>5</sup> The Johansen-Juselius (1990) can find multiple cointegrating vectors; the Engle-Granger approach has several limitations in the case of more than one cointegration vector.

<sup>6</sup> The term  $I(1)$  is used in time series analysis. The first step in cointegration analysis is that all the variables must be stationary in same order and  $I(1)$  means that all variables are stationary in their first difference or stationary in same order.

**Table 2. Test of the unit root hypothesis**

| Variables | Level                |          | First Difference     |          |
|-----------|----------------------|----------|----------------------|----------|
|           | <i>t</i> -statistics | <i>k</i> | <i>t</i> -statistics | <i>k</i> |
| HS        | -2.72                | 2        | -3.84**              | 2        |
| GR        | -2.91                | 4        | -5.53*               | 3        |
| PC        | -0.29                | 4        | -5.18*               | 4        |
| YD        | -0.56                | 1        | -4.13**              | 1        |
| OD        | -3.06                | 1        | -3.96**              | 4        |
| IR        | -1.84                | 1        | -4.26**              | 1        |
| IF        | -1.62                | 4        | -3.97**              | 4        |
| PS        | -1.32                | 1        | 3.89**               | 2        |

The optimal lags (*k*) for conducting the **ADF** test were determined by **AIC** (Akaike information criteria).

\*\* and \* indicate significance at the 5 per cent and 1 per cent levels, respectively.

Note: The *t*-statistic reported in is the *t*-ratio on  $\gamma_1$  in the following regression.

In the next step, the data series are a further check for the presence of cointegration using Johansen maximum likelihood cointegration test for HS, GR, PC, YD, OD, IR, IF and PS has been estimated and reported in table 3. In this respect, the maximum likelihood procedure developed in Johansen (1988) and Johansen and Juselius (1990) is adopted. The maximum Eigen value statistic and the cumulative form of that statistic, known as the trace statistic are reported in table 3. The trace and maximum Eigen value tests rejected the null hypothesis that there are zero cointegration vectors. Both tests suggest that there is one cointegration vector. Starting with a null hypothesis of no cointegration ( $r = 0$ ) among the variables, the trace statistic of 171.25.05 exceeds the 99 per cent critical value of the  $\lambda$ trace statistic (critical value is 168.36). Thus, it is possible to reject the null hypothesis ( $r = 0$ ) of no cointegration vector, in the favour of the general alternative  $r \geq 1$ . As is evident in table 3, the null hypothesis of  $r \leq 1$ ,  $r \leq 2$  and so on cannot be rejected at 5 per cent of the level of significance. Consequently, we conclude that there is one cointegration relationship involving given variables of HS, GR, PC, YD, OD, IR, IF and PS.

On the other hand, the  $\lambda$ max statistics reject the null hypothesis of no cointegration vector ( $r = 0$ ) against the alternative ( $r = 1$ ) as the calculated value  $\lambda_{\max}(0, 1) = 52.10$  exceeds the 99 per cent critical value (57.69). Similarly, the null hypothesis of  $r \leq 1$ ,  $r \leq 2$  and so on cannot be rejected at 5 per cent of level of significance. Thus, on the basis of the  $\lambda$ max statistics there is also one cointegration vector. The presence of one cointegration vector shows that there exists a long run relationship among the variables.

**Table 3. Johansen's test for multiple cointegration vectors**

| <i>Cointegration test among [HS GR PC YD OD IR IF PS]</i> |            |   |                            |                            |
|---|------------|---|----------------------------|----------------------------|
| <i>H0:</i>  | <i>H1:</i> | <i>Tests statistics</i>                         | <i>95% Critical values</i> | <i>99% Critical values</i> |
| <b><math>\lambda_{\text{trace}}</math></b>                |            | <b><math>\lambda_{\text{trace}}</math></b>      |                            |                            |
| $r = 0$   | $r \geq 1$ | 171.25  | 156.00                     | 168.36                     |
| $r \leq 1$  | $r \geq 2$ | 119.15  | 124.24                     | 133.57                     |
| $r \leq 2$  | $r \geq 3$ | 78.78   | 94.15                      | 103.18                     |
| $r \leq 3$  | $r \geq 4$ | 45.38   | 68.52                      | 76.07                      |
| $r \leq 4$  | $r \geq 5$ | 23.47   | 47.21                      | 54.46                      |
| $r \leq 5$  | $r \geq 6$ | 8.73  | 29.68                      | 35.65                      |
| $r \leq 6$  | $r \geq 7$ | 4.62  | 15.41                      | 20.04                      |
| $r \leq 7$  | $r \geq 8$ | 0.32  | 3.76                       | 6.65                       |
| <b><math>\lambda_{\text{max}}</math> values</b>           |            | <b><math>\lambda_{\text{max}}</math> values</b> |                            |                            |
| $r = 0$   | $r = 1$    | 52.10   | 51.42                      | 57.69                      |
| $r \leq 1$  | $r = 2$    | 40.37   | 45.28                      | 51.57                      |
| $r \leq 2$  | $r = 3$    | 33.40   | 39.37                      | 45.10                      |
| $r \leq 3$  | $r = 4$    | 21.91   | 33.46                      | 38.77                      |
| $r \leq 4$  | $r = 5$    | 14.74   | 27.07                      | 32.24                      |
| $r \leq 5$  | $r = 6$    | 4.11  | 20.97                      | 25.52                      |
| $r \leq 6$  | $r = 7$    | 4.30  | 14.07                      | 18.63                      |
| $r \leq 7$  | $r = 8$    | 0.32  | 3.76                       | 6.65                       |

Note: Critical values obtained from Osterwald-Lenum (1992).

We estimated an error correction model (ECM) to determine the short run dynamics of system. To estimate the short run error correction model, we used the general to specific approach (Hendry, 1995).

Using the notion of general-to-specific modeling, firstly 2 lag of both explanatory and dependent variables and 1 lag of residual from cointegrating regression was included. Subsequently, the insignificant variables were dropped in order to get a parsimonious model.

The coefficient of the error correction term has the correct sign (negative) and is statistically significant at 1 per cent.<sup>7</sup> Meaning, not only that the ECM is valid but also that there is a significant conservative force tendency to bring the model back into equilibrium whenever it strays too far. The results of the diagnostic test indicate that the household saving equation passes the test of

<sup>7</sup> The error correction term was calculated from the maximum likelihood estimates of cointegrating vector.

**Table 4. Error correction model results**

| <i>Dependent variable = <math>\Delta HS</math></i> |                               |                           |
|--|-------------------------------|---------------------------|
| <i>Regressors</i>                                  | <i>Estimated coefficients</i> | <i>Long run estimates</i> |
| <i>Constant</i>                                    | 0.42*                         |                           |
| $\Delta HS (-1)$                                   | 0.42***                       |                           |
| $\Delta (GR)$                                      | 0.15***                       | 0.37**                    |
| $\Delta (PC)$                                      | 0.29*                         | 0.39*                     |
| $\Delta YD$  | -1.32**                       | -1.61*                    |
| $\Delta OD (-1)$                                   | -0.27**                       | -0.32**                   |
| $\Delta IR (-1)$                                   | 0.47**                        | 0.17*                     |
| $\Delta (IF)$                                      | -0.41**                       | -0.72*                    |
| $\Delta IF (-1)$                                   | -0.61**                       |                           |
| $\Delta PS (-1)$                                   | -0.22                         | -0.54**                   |
| $RES (-1)$   | -0.05*                        |                           |
| <i>Diagnostic tests</i>                            |                               |                           |
| <i>Serial correlation</i>                          | 0.62                          |                           |
| <i>Heteroscedasticity</i>                          | 1.47                          |                           |
| <i>Functional form</i>                             | 0.32                          |                           |
| <i>Normality</i>                                   | 0.26                          |                           |

Note: \*\*\*, \*\* And \* indicate significance at the 10 per cent, 5 per cent and 1 per cent levels, respectively

**RES (-1)**, the error correction term. All variables are measured in natural logarithms.

serial correlation, functional form, normality and “heteroscedasticity”. The small sizes of coefficient of error correction figures indicate that the speed of adjustment is rather slow for the equation to return to their equilibrium level once it has been shocked.

Since all the variables are measured in logarithms, the regression coefficients can be directly interpreted as elasticities. Table 4 shows short run and long run estimates of a parsimonious model of household savings for Pakistan.

The coefficients for short run and long run growth rate per capita and per capita income have a positive significant effect on household saving.

The results reveal that both per capita income and growth rate have significant positive impacts on household saving. The long run elasticity from the coefficients GR and PC suggests that a 1 per cent increase of the (GR and PC) yield .37 per cent and .39 per cent increase in HS respectively.

The results also indicate that demographic variables (young and old dependency) have exerted significant negative impacts on the household saving rate. The coefficients for the short run and long run of the young and old dependency ratios have significant negative effects on household saving and the long run elasticities are 1.61 and .32 respectively. The young dependency coefficient is larger than the old dependency coefficient. These two dependency rates are likely to have different effects on the household savings rate.<sup>8</sup> The cohort effect of young dependency versus old dependency on saving by stage of development is an interesting phenomenon and needs further investigation (Kim and Zang, 1997).

The findings regarding the impact of demographic variables (young and old dependency) on household saving rate are in the line with recent empirical time-series studies (Horioka, 1997; Thornton, 2001; Prema-Chndra and Pnag-Long, 2003).

The impact of the real interest rate (*IR*) has a significant positive effect on household saving. As argued earlier, when the substitution effect dominates the income effect, the real interest rate has a positive effect on the saving rate. Thus, our finding is in complete disagreement with Fry (1982, 1988), Fry and Mason (1980) and Basalla (1989) who all favour a positive relationship between *IR* and *HS* in developing countries. The long run elasticity of *IR* indicates that a 1 per cent increase in *IR* will increase *HS* by 17 per cent.

Similarly, short run and long run coefficients of the inflation rate also have a significant negative effect on *HS*. The long run elasticity from the coefficient *IF* indicates that a 1 per cent increase in *IF* yields a .72 per cent decrease in *HS*.

This study finds a significant inverse relationship between public saving and household saving. The long run coefficient of public saving (*PS*) indicates that a 1 per cent increase in public saving leads to an average decrease of 0.54 percentage points in household saving. The study strengthens recent evidence regarding the inability of the Ricardian equivalence to fully explain the counterbalancing of household saving with public saving (Edwards, 1996; Liu and Woo, 1994).

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<sup>8</sup> The proportion of population age structure in Pakistan has changed between 1951 to 2000: the proportion under 15 years has risen from 40 per cent to 45 per cent in 2000, and the relative size of the age group between 15-64 has declined from 57 per cent to 52 per cent over the corresponding period. These changes imply not only an increase in overall dependency, from 75 per cent in 1951 to 88.3 per cent in 2000, but also a gradual shift in the structure of the dependency burden toward the young age group.

## **VI. CONCLUSIONS**

Domestic resource mobilization is one of the key determinants of economic growth. Despite high economic growth Pakistan's saving performance is very low relative to other countries in the region that have experienced similar growth rates. In this paper, we have used the Johansen-Juselius cointegration technique and error correction model to determine the short run dynamics of the system to time-series data for Pakistan's economy, over the period 1972-2001. The paper finds the existence of one cointegrating vector, indicating a valid long run economic relationship among the variables.

According to our findings both per capita income and the growth rate of per capita income have a significant positive effect on the household saving rate. Efforts to enhance economic growth potential could be rated as one of the most important policy measures to promote household saving behaviour in the country.

The demographic variables have a significant negative effect on household saving rates in Pakistan. Population structure over previous decades in Pakistan has changed and the inclination is towards an increase in dependency on the young. Therefore, a policy implication that could be drawn from this study is the need to lower Pakistan's fertility level, which is the highest among the developing countries and might remain high due to a high level of dependency on the young.

Furthermore, our study also found that the inflation rate affects household saving rates negatively. Inflation in Pakistan is a major source of macroeconomic instability that should be controlled to set the economy on a trajectory of growth. The Government should encourage national saving schemes to augment household savings for the formation of capital, but maintain a healthy balance between suppressing inflation and facilitating investment growth in a non-inflationary environment.

The real interest rate has a significant positive impact on saving rates, which confirms financial repression in Pakistan. Therefore, one of the key messages to emerge from the present endeavour is that, an environment that promotes financial development in the country would have a significant impact on the promotion of saving potential. This will result in a sustainable domestic capital resource generation capacity for the country. The results also confirm the "crowding out" impact of public saving on private saving but less proportionately, than in other comparable cases.

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## REMITTANCES AND SUSTAINABLE LIVELIHOODS IN SEMI-ARID AREAS

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*Can migrant remittances be a viable and sustainable livelihood solution for households in semi-arid areas? The present study attempts to examine the impact and potential of remittances from rural migrants in providing a viable livelihood diversification and investment option in rural areas. Focusing on the migration pattern in selected villages of semi-arid and drought prone districts of Andhra Pradesh, India, the paper argues that remittances do provide a scope for accumulation of wealth and asset creation for households in addition to providing basic consumption needs. If this wealth is to become a viable sustainable private investment option in rural areas there is a need to address some policy, institutional factors and other dynamics whereby the remittances become more a productive instrument; instead of just a means for reducing household poverty.*

### INTRODUCTION

Remittances are a positive outcome of migration. Remittances, the portion of a migrant worker's earnings sent back from the destination of employment to the origin of the migrant, play a central role in the livelihood of many households and have become a focal point in the ongoing debate concerning the viability and sustainability of this livelihood option.

The role and importance of remittances in the international migration of skilled workers from developing countries like India and others, has been widely studied and recognized for its contribution towards foreign exchange earnings and macroeconomic stability etc. However, remittances generated by internal migration mainly from rural to urban and rural to rural areas have been overlooked or had limited attention. Policies have often tended to ignore migration, or have the

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implicit or explicit aim to reduce migration and as a result the trend has been to consider migration as undesirable and problematic in academic, press and policy debates (De Haan, 1999). The result of this is to ignore the vital livelihood activity of the migrants and further worsen their plight by depriving them of opportunities and rights in the work place and reducing the chance of liberation from the poverty trap.

The present paper attempts to shed light on some of the issues, such as, the pattern of remittances and how it has affected the livelihood status of the migrants in a semi-arid context. By analysing the nature, form and characteristics of the migration from the sample villages, the paper examines the remittances earned and their utilization patterns. It does not attempt an evaluation of either positive or negative aspects of migration, instead, it studies the role of remittances: in addressing concerns of livelihood; and, as a source of rural investment so as to enhance the positive externalities of the capital. Assuming that the households utilize their remittances in varied activities, the paper looks into how much of the remittances are utilized as productive investments and focuses on the constraints encountered by the migrants in saving and getting good returns for the investments made using remittances. The paper argues that remittances have provided a strategy for poor households to escape poverty, and also have potentially adequate scope to become viable rural investment tools provided the required policy, institutional and social security support systems are in place. Such an analysis can help formulation of policies for recognition of migration remittances not only as a vital livelihood option but also an avenue for rural investments especially in geographically disadvantaged areas.

The existing literature on migration has focused on various issues and the economic aspect has been found to be the most important determinant in rural to urban migration, particularly in developing countries. Traditional microeconomic models of migration were founded on theories related to individual optimizing behaviour that viewed rural-urban migration as the result of large differences in employment opportunities and income (Todaro, 1969; 1976), in the "new" economics of migration the emphasis is on the family and family strategies as crucial elements in migration decisions (Stark, 1982; 1991). Families see migration as a form of portfolio diversification in which remittances play an important role. Families first invest in migrants leaving, but they do so in the expectation of returns in the form of remittances. Migration is also undertaken as a survival strategy in which the temporary or long-term migration of people from a household is seen as a way for the household to maximize its chances for survival in an uncertain environment by diversifying its sources of income (Bilsborrow, 1998; Massey and others, 1993;

Stark, 1991). However, migration takes place both as individual optimization behaviour and family strategy.

Although some of these factors of migration are common throughout the world, migration in semi-arid regions is predominantly influenced by geography and climate. Erratic rainfall, a poor natural resource base and recurring droughts are such a common phenomenon in these parts that they become the overarching context within which migration takes place. The worsening state of dry land agriculture created by drought, recurring crop failures and a lack of livelihood diversification leads to distress and survival migration (Krishnaiah, 1997; Rao, 1994; Ravindra, 1989 and Reddy, 1990). The remittances from migration play a vital role in providing sustenance for the poor, and indeed, migration is the dominant livelihood strategy (Conroy and others, 2001; Mosse and others, 2002 and Prasad, 1997). In regard to the utilization of remittances, evidence of productive farm or non-farm investment is scarce but a number of studies do report such investment by a small percentage of migrants and return migrant households (Krishnaiah, 1997; Oberai and Singh, 1983; Sharma, 1997; Rogaly and others, 2001). Again, remittances contribute to the welfare and improved livelihood of the receiving household – be it in terms of basic necessities such as food, clothing, or better health and education; thereby building human and social capital or to a smaller extent in terms of savings or business investments (Sander, 2003). Several studies have observed that migrants have been able to escape poverty using their experience and migration has changed from being purely for survival in the past to a strategy for accumulation of capital now (Deshingkar and Start, 2003; Mitra and Gupta, 2002; Rogaly and Coppard, 2003).

It is evident from the literature that remittances do provide a much needed livelihood option during periods of stress and are utilized for several purposes, including, productive and social purposes. However, in the past, relatively little attention has focused on the question of how remittances are used by the households and the impact of the remitted money on the livelihoods of the migrants. Due to the lack of official data available for estimating remittances from rural-urban migrants, accurate analysis of remittance utilization is inadequate. Perhaps because of these failings, most remittance studies have tended to take a dim view of the economic impact of remittances: these studies have found that the bulk of such income transfers are spent on consumption and not on investment in rural assets. Here in this study, we have made an attempt to gather information on the varied activities in which remittances are used. We contend here that contrary to the popular belief that remittances being used predominantly for social and consumption purposes, they are also used for productive purposes related to

investment in agriculture and non-farm activities, all in the context of semi-arid areas.

This paper is divided into four sections. Section one provides a contextual overview of the study area and methodology used for undertaking the study. Section two enumerates the nature and characteristics of migration in the sample villages. Section three deals with patterns of remittances and their utilization in sample villages and also discusses the factors that limit the earning and utilization of remittances at both the migrants destination and origin. Section four evaluates the potential for remittances to become viable rural investment tools and throws light on the necessary institutional and policy changes.

## **I. CONTEXTUAL OVERVIEW OF THE STUDY AREA**

In the semi-arid areas in Andhra Pradesh, where often only a single crop is sown in a year and drought is a regular phenomenon, migration in its many forms and patterns – seasonal/distress, rural-to-rural, rural-to-urban – is common. Both of the study districts, Mahaboobnagar and Anantapur, are, among the most backward districts in Andhra Pradesh and have very poor socio-economic indicators. Chronically drought-prone, the districts have huge tracts of unirrigated land which mostly have only a single sowing season. The irrigated area as a percentage of the total cropped area in these two districts is as low as 16.9 per cent in Anantapur district and 23.8 per cent in Mahaboobnagar, while the corresponding figure for the entire state is 42.5 per cent (Directorate of Economics and Statistics, 2003). As a result the productivity from agriculture in these rainfed areas is becoming increasingly risky, as there is drought every alternate year (Deb and others, 2002). Given the inability of agriculture to fully guarantee livelihood security, supplementary sources of livelihood and household diversification strategies have assumed importance. Seasonal migration by households of people in the two districts has emerged as an important strategy for survival and food security.

The study was carried out in four villages namely Thimmayapalli (Addakal mandal) and Rangapur (Achampet mandal) of Mahaboobnagar district, and Sivarampet (Kuderu mandal) and Chinnababaiahpalli (Somandepally mandal) of Anantapur district.

**Table 1. Demographic profile of the sample villages**

| Name of the village | Population |        |       | No. of households of various categories |     |     |    |       |
|---------------------|------------|--------|-------|---|-----|-----|----|-------|
|                     | Male       | Female | Total | SC                                      | ST  | BC  | OC | Total |
| Thimmayapalli       | 719        | 699    | 1 418 | 22                                      | 228 | 108 | 1  | 359   |
| Rangapur            | 1 136      | 1 145  | 2 281 | 40                                      | 455 | 170 | 26 | 691   |
| Sivarampet          | 341        | 306    | 647   | 7                                       | 6   | 118 | 45 | 176   |
| Chinnababaiahpalli  | 205        | 197    | 402   | 45                                      | 0   | 8   | 22 | 75    |
| Total               | 2 401      | 2 347  | 4 748 | 114                                     | 689 | 404 | 94 | 1 301 |

The caste composition of the households differs across the sample villages as seen in table 1. In both Rangapur and Thimmayapalli, the scheduled tribe (ST) population is more. There is a correlation between the numerical strength of a caste group and migration. In Rangapur, there are 455 ST households followed by 170 backward caste (BC) households and 40 scheduled caste (SC) households and 26 other caste (OC) households. In Thimmayapalli there are 228 ST households, followed by 108 BC households, 22 SC households and 1 OC household. In the two villages of Anantapur district, BCs (Sivarampet) and SCs (Chinnababaiahpalli) are the majority. In Sivarampet, there are 118 BC households followed by 45 OC households, 7 SC households and 6 ST households. In Chinnababaiahpalli, there are 45 SC households followed by 22 OC households and 8 BC households. There are no ST households in this village.

### Methodology

The field study employed both qualitative and quantitative methods that used data collection instruments such as household surveys, extensive discussions and compiling life history with members of migrant households. The villages were selected on the basis of their poor natural resource endowments (percentage of irrigated land relative to total cultivable land is less than 10 per cent), and limited livelihood diversification. Further, all four villages also had a tradition of migration, which was an important livelihood option for most poor households in these villages. The use of qualitative tools like interviews, first-person narratives and life histories have been made for this study. The study was divided into three phases beginning with a survey of relevant literature. This was followed by a pre-study survey and a final phase of intensive field study. During the final phase the researchers stayed on site for a fortnight, accessing information from 100 households (25 in each of the four sample villages) through focus group discussions, interviews with key informants, in-depth semi-structured interviews of households. Local non-governmental organizations, reports and official data were also accessed for additional information.

During the field study the researchers accessed information from a sample of 25 households covering different socio-economic categories, in each of the four villages of both districts, selected on a random sampling basis (wherever required purposive sample was carried out). Participatory rural appraisal (PRA) methods were also used in identifying the different socio-economic groups in the village; big, medium, small, marginal farmers and landless (table 2). Female members in the small and marginal categories were selected from the sample households in the villages for the study.

**Table 2. Sample households**

| Type             | Thimmayapalli | Rangapur | Sivarampet | Chinnababaiahpalli | Total |
|------------------|---------------|----------|------------|--------------------|-------|
| Large farmers    | 3             | 5        | 2          | 2                  | 12    |
| Medium farmers   | 2             | 3        | 2          | 2                  | 9     |
| Small farmers    | 14            | 8        | 5          | 4                  | 31    |
| Marginal farmers | 4             | 5        | 10         | 12                 | 31    |
| Landless         | 2             | 4        | 6          | 5                  | 17    |
| Total            | 25            | 25       | 25         | 25                 | 100   |

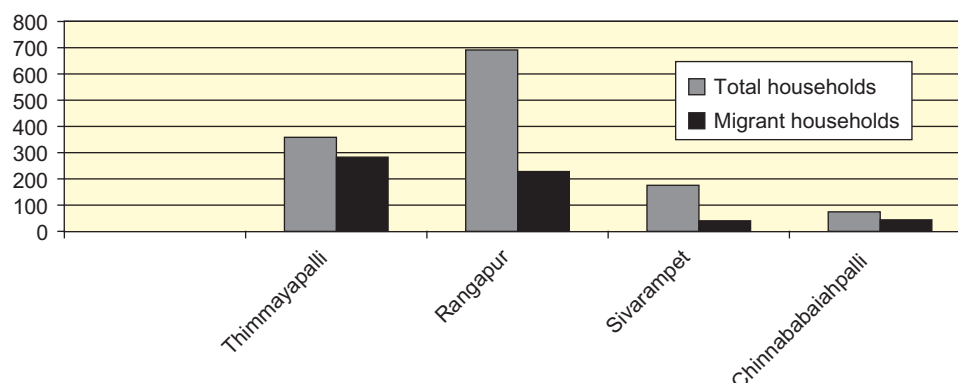
\* In Thimmayapalli and Rangapur: marginal farmers < 3 acres; small farmers 4-5 acres; medium farmers 6-10 acres; large farmers > 10 acres.

In Chinnababaiahpalli and Sivarampet: marginal farmers < 5 acres; small farmers 5-10 acres; medium farmers 10-15 acres; large farmers > 15 acres.

## II. OVERVIEW OF MIGRATION

Migration for paid employment is a regular feature across all the sample villages. The dominant form of migration across the four villages is rural to urban migration (97 per cent), although, on a lesser scale, rural to rural migration is also found. While the households in Mahaboobnagar mostly migrate to Mumbai and Hyderabad, the migrants from Anantapur district show a preference for Bangalore and Anantapur town.

In the four study villages, the estimates of migrant households as a percentage of total households varied considerably. As shown in figure 1, while migration was high in Thimmayapalli (79 per cent) and Chinnababaiahpalli (59 per cent), it was relatively moderate to low in Rangapur (33 per cent) and Sivarampet (23 per cent). The wide variation in the percentages of migrant households among the different villages is largely due to the differences in their resource endowments, livelihood diversification and social mechanisms. Both Thimmayapalli and Chinnababaiahpalli villages have hamlets that are predominantly inhabited by homogenous population groups, for example. STs in Thimmayapalli and SCs in

**Figure 1. Extent of migrant households in sample villages (No.)**

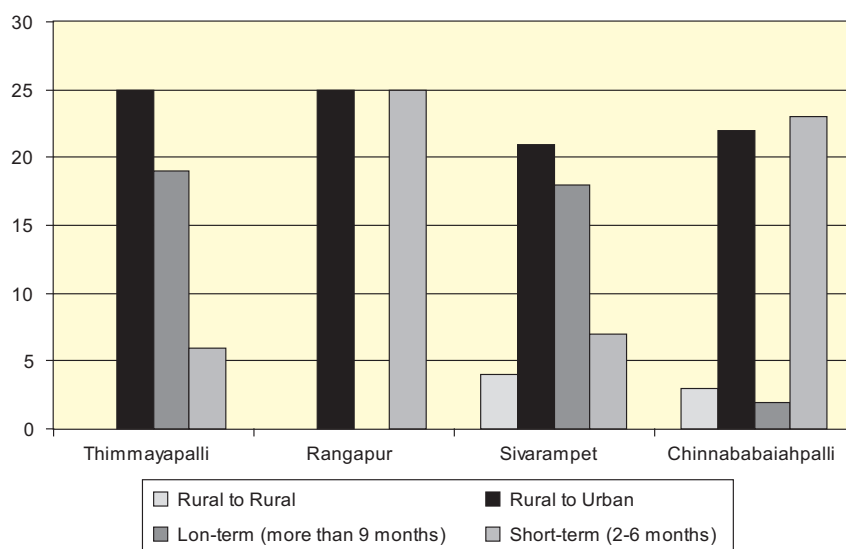
Chinnababaiahpalli. These groups are mostly dependent on wage labour. On the other hand, Rangapur and Sivarampet are better endowed and there is greater livelihood diversification.

Both long-term and short-term migrations are found in the sample villages (figure 2). Short-term (2-6 months) migration is high in Rangapur (25 per cent) and Chinnababaiahpalli (23 per cent), while long-term migration (9 months or more) is high in Thimmayapalli (19 per cent) and Sivarampet (18 per cent) villages. As revealed, long-term migration has increased from earlier years because of constriction of livelihood options due to persistent drought, which is more evident in the poorly endowed villages of Thimmayapalli and Sivarampet.

### Nature and characteristics of migrants

As mentioned earlier, the dominant form of migration in both of these districts has been rural to urban migration. This form of migration is seen to be intra-district and inter-state in the study villages. Seasonal migration for agricultural activities is also an important form of rural to rural migration, with agricultural wage labour migrating to neighbouring areas that have good irrigation facilities in search of employment. However, this form of migration was not dominant in the study villages because of a persistent drought for the last three years, which affected agricultural employment in most regions of these districts.

Further, most inter-state contractual migrations are either entire family migrations or husband and wife as a unit migrating for livelihood, while short-term migrations consist mostly of a single male migrant going in search of work with the

**Figure 2. Nature and duration of migration of households**

family staying at home. The migrant returns home occasionally with remittances to provide for needs of the family.

The study revealed that a majority of the migrants (90 per cent) used social networks as channels for migration rather than the contractual system. The overall dependence of migrants on middlemen/agents has declined over the years, and people have started migrating on their own. But during the initial years, migrants went through the contractual labour system, over time they have built up their networks, and today they migrate largely through these networks. This support system is an important factor for first time migrants at their destination. Regular migration to the same destination helped migrants establish contacts there, especially in places like Mumbai, Hyderabad and Bangalore. Migrants from the study villages in both districts used these established social networks instead of labour contractors for migration. The presence of friends or relatives in the urban area acted as an influencing factor in the decision to migrate. It enabled access to information related to employment opportunities, reduced transaction costs and ensured initial support at the destination.

As it is the case elsewhere in the country, migrants were predominantly male (80 per cent) for both rural to rural and rural to urban migrations. However, there were certain variations within rural to rural and rural to urban migration.



When agricultural labourers migrated to irrigated areas, the women of the family also joined the men, and they migrated as a unit. This was the case both for intra-district rural to rural seasonal migration as well as inter-state seasonal migration. Additionally it was a common characteristic among contractual labourers going for inter-state migration for longer periods (usually nine months) for canal and dam works in Karnataka and Maharashtra. Unlike rural to rural migration, rural to urban migration had fewer women participating unless the labour work was contractual in nature.

**Table 3. Characteristics of migrants**

| Characteristics                                       | Thimmayapalli |        | Rangapur |        | Sivarampet |        | Chinnaba<br>Baiahpalli |        | Total |        |
|---|---------------|--------|----------|--------|------------|--------|------------------------|--------|-------|--------|
|   | Male          | Female | Male     | Female | Male       | Female | Male                   | Female | Male  | Female |
| <b>Age</b>  |               |        |          |        |            |        |                        |        |       |        |
| Below 15 years (working)                              | 1             | 0      | 0        | 0      | 0          | 0      | 1                      | 0      | 2     | 0      |
| 15-25   | 4             | 1      | 3        | 2      | 1          | 0      | 3                      | 1      | 11    | 4      |
| 25-35   | 10            | 3      | 12       | 3      | 12         | 3      | 15                     | 2      | 49    | 11     |
| 35-45   | 4             | 1      | 2        | 1      | 4          | 2      | 2                      | 1      | 12    | 5      |
| 50 and above  | 1             | 0      | 2        | 0      | 3          | 0      | 0                      | 0      | 6     | 0      |
| Total   | 20            | 5      | 19       | 6      | 20         | 5      | 21                     | 4      | 80    | 20     |
| <b>Education</b>                                      |               |        |          |        |            |        |                        |        |       |        |
| Primary (1 <sup>st</sup> to 5 <sup>th</sup> class)    | 5             | 2      | 4        | 2      | 3          | 1      | 6                      | 2      | 18    | 7      |
| Secondary (6 <sup>th</sup> to 10 <sup>th</sup> class) | 0             | 0      | 5        | 2      | 0          | 0      | 2                      | 0      | 7     | 2      |
| Higher (intermediate and above)                       | 0             | 0      | 1        | 0      | 0          | 0      | 1                      | 0      | 2     | 0      |
| Illiterate  | 15            | 3      | 9        | 2      | 17         | 4      | 12                     | 2      | 53    | 11     |

In both streams of migration, poverty was the driving force and migrants predominantly were from the lower social strata like SCs, STs and BCs (95 per cent). The migrants were mostly landless labourers and marginal farmers trying to eke out a livelihood under distressed conditions. Table 3 shows that most of the migrants were in the 25-35 years age group (60 per cent) followed by of 35-45 years (17 per cent). Children in the 5-10 years age group accompanied the family if the entire family migrated, mostly in the case of seasonal and contractual works, to take care of infants at the destination, and, if there were no infants, they were left behind in the village under the care of grandparents or close relatives. Most of the migrants in both the rural to rural and rural to urban streams were unskilled and illiterate (64 per cent) followed by those with very little education up to primary level (25 per cent).

### **Migrant Employment Patterns at Destination**

Mainly, the migrants from the villages reported three types of employment, wage labour, self-employment and contract employment. Around 80 per cent of the migrants are involved mainly in the building/construction sector, canal and dam work, road-laying cable-laying work as wage labourers. The self-employment category mostly consists of skilled workers and artisans who constitute around 10 per cent of migrants. Most self-employed skilled workers are found in building construction activities as masons, statue makers, stone grinders, mechanics, drivers, rickshaw pullers and other activities, mostly in urban centres and big cities. In the third category, contract employment, most migrants are found working as watchmen in apartments in towns and cities, bell-boys in hotels and lodges, women maid-servants in houses and petty-jobs in business establishments and offices. This category of employment is semi-skilled and perceived to be slightly better than unskilled contractual and casual wage labour employment both in terms of earning potential and quality of work, this in turn increases the potential amount of remittances.

### **III. PATTERN OF REMITTANCES**

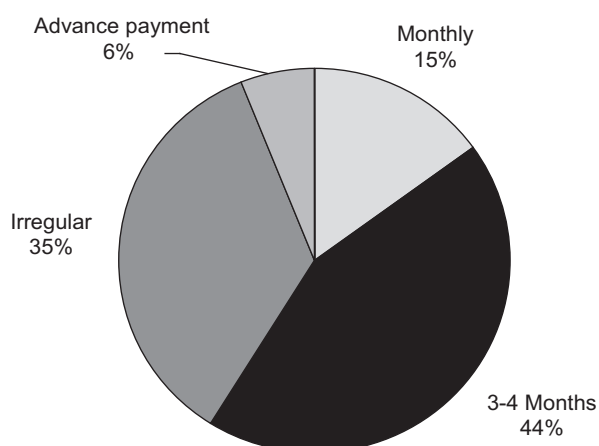
Remittances are the transfer of money by migrants to their households from the destination or the savings they bring home when they return to their villages. The study found that migrants send remittances home through several means such as money order, through the contractor, neighbours, co-workers or relatives.

It was found that seasonal and contractual labourers make regular and substantially greater remittances than short-term migrants. While most seasonal agricultural labourers return at the end of every season with their savings, the contractual labourers migrating, particularly from Mahaboobnagar district, for earth-moving work and road laying, get their payments in advance, which is used for either clearing debts, domestic consumption or investment in agriculture. The study found that in both districts, the majority of members (75 per cent) migrating during the last 15 years had not been able to save much due to the high cost of living at the destination. The hierarchy of expenses for migrants are food, rent for living and other expenses, such as health. As they were not covered under social security system and without a ration card they could not avail themselves of the benefits and hence they have highest expenditure for food. On the rent front, an average family spent around Rs. 300-400 for a one room hut in the outskirts of cities like Mumbai and Hyderabad.

Other major determinants of remittances are the size of the household, number of dependents (elderly people and children) and purpose (clearing debts, productive investment, consumption, among others). Large families usually send more members to urban areas to increase earning potential while the rest of the family take care of the household agricultural activities. Factors controlling the amount and duration of remittances are determined by the availability of work and the financial necessities at home. The duration of migration also mattered as staying for long periods especially in places like Mumbai, Hyderabad and Bangalore enabled migrants to earn more.

Regarding the regularity of remitting money (figure 3) from the 100 sample households, 15 households received remittances every month. The average amount sent was around Rs. 450 per household per month. 44 households received small amounts or migrants brought the money with them when they returned every three or four months. This latter category consisted of the relatively short-term migrants (six months and less) who went for work and returned with Rs. 3,000 to Rs. 4,000 in savings. 35 households were receiving remittances irregularly. This category again usually consisted of short-term migrants who went to nearby places. In six households the remittance was in the form of advances collected under the contract labour system before travelling to the destination. In Thimmayapalli and Rangapur villages of Mahaboobnagar district, the contractor usually paid around Rs. 6,000 as an advance, which he deducted from the total earnings of the migrants after completion of the work. If the advance exceeded the total earnings, the

**Figure 3. Frequency of remittances by migrants**



labourer had either to repay the balance money or continue to work for the same contractor in the next season/year.

### **Reasons for enhanced income at destination and better remittances:**

The study revealed that while in some instances accumulation was possible through remittances, in other instances there was a whittling away of meagre resources, thereby reverting back to the poverty trap. Overall, it appeared that migrants who were away for longer periods and migrated through the social network were able to accumulate resources. For instance, in Thimmayapalli, some of the migrants who went to Mumbai have invested in *kholis* (small one-room tenements) in Kalyannagar, near Mumbai from which they earn rent. Some migrants graduated from unskilled to skilled workers.

One of the major factors leading to the accumulation of assets was the repetition of migration to the same destination. Long-term migration to places like Mumbai, Hyderabad and Bangalore enabled migrant households to accumulate. The relatively higher wages (100-120 rupees per day) in those places and long periods of stay resulted in higher returns, which were invested in the diversification of income streams.

Learning new skills at the destination helped the migrant to earn better wages. In some cases casual construction workers picked up new skills to become skilled labourers. For instance one migrant from Thimmayapalli migrated to Hyderabad (in 2000) for manual unskilled work (digging and lifting materials), over a period of time, he learnt how to mix cement and sand in a machine. Presently, at the construction site, he supervises the mixture of construction materials. This promotion also raised his wage per day by 20 to 30 rupees. Others have picked up new skills, such as; hollow cement brick making, masonry, weaving and photography, which have led to better employment opportunities and higher earnings.

The absence of contractors and middlemen, particularly in Mumbai, information sharing, and limited initial expenditure (because they stayed with fellow villagers at the destination initially) were reported to be contributing factors for accumulation, particularly in Thimmayapalli and Rangapur villages.

### **Mode and Patterns of Deployment of Remittances**

In the districts households used remittances for various purposes as listed in table 4. Thirty-nine households spent the remittances on household consumption. Due to continuous drought in the study areas, the households spent more on buying food items from the market and often paid more for the goods.

**Table 4. Remittance utilization pattern  
in sample households**

| <i>Purpose of utilization</i> | <i>No. of households*</i> |
|-------------------------------|---------------------------|
| Agricultural investments      | 37                        |
| Household consumption         | 39                        |
| Clearing debts                | 45                        |
| House construction            | 12                        |
| Meeting health costs          | 42                        |
| Social functions expenditure  | 21                        |

*\*Note:* Total No. of households is more than 100 as remittances are put to use for more than one purpose.

The table shows that the major category on which remittances were spent was the repayment of debts. Around 45 per cent of households used the remittances to clear debts. In some cases, it was the primary reason for migration. The members of the sample households revealed that there are four main causes of debt prevalent in the villages. These included borrowing for: agricultural purposes; health; boring of wells; marriages and festivals. In the absence of formal institutional credit to cater to the varied needs of migrants, private moneylenders have been used, but are the last resort due to the steep price in terms of high interest rates. The drought from the last three years has aggravated the situation as more and more family members have taken loans and invested them in agriculture, borewells and other inputs, however without realizing any substantial returns. It was estimated in the group discussions in the sample villages that 90 per cent of the borewells failed in Thimmayapalli village, followed by 45 per cent in Sivarampet, 70 per cent in Chinnababaiahpalli and 30 per cent in Rangapur.

Another situation where remittances were utilized was health: 42 per cent of the migrants spent their earnings on health both at the destination and at the origin. Households also spent money on health, using remittances and loans from moneylenders, often falling into debt as revealed in the focus group discussions and household surveys. As a result of the unhygienic conditions in which migrant workers are forced to live at the destination, they fall victim to all sorts of chronic diseases like diarrhoea, tuberculosis, jaundice and malaria. Their health is also affected by the poor quality food, the long working hours and the nature of their work, which often includes doing demanding, heavy manual work. They are deprived of public health facilities at the destination due to their temporary status, and visiting private hospitals is expensive and therefore not affordable. They carry these diseases with them when they return to the village.

Apart from general diseases there are other occupational hazards and accidents, which have a bearing on the health of the migrants, these incur high expenditure for treatments. During the focus group discussions it was reported that there were a number of cases wherein the migrants themselves or their children had suffered from various kinds of accidents, often without any compensation and spent large sums on treatment at private hospitals.

Thirty-seven households invested the remittances in agricultural activities, which included the purchase of land and agricultural inputs like seeds, fertilizers and digging wells. Particularly in Thimmayapalli village, it was found that the long-term migrants to Mumbai invested their income in buying additional land and digging wells (around 76 per cent of the households). It can be seen clearly in the villages that in spite of the accumulation of resources through long periods away, migrants who invested their remittances in agriculture-related activities still failed to get returns due to continuous drought. The main barriers reported by the households include the limited knowledge applicable to various income generating activities, coupled with marketing constraints and the general business environment. Institutional credit facilities to supplement remittances in order to initiate enterprises are inadequate and the lack of information about credit sources, complicated bank procedures and the prevalence of corruption make credit inaccessible to households. Even if credit is available, it is often provided only to specific areas for investment which are ill suited to the needs and capabilities of recipients. Lack of market information regarding supply and demand makes it difficult for household to sell their products. Inadequacy, lack of managerial capacity and the skills to initiate potential non-farm activities are another detriment which discourages small and marginal farmers from venturing into new activities.

Remittances also went toward meeting the social expenditures of the households such as marriages and festivals. A sizeable number of households (21 per cent) spent their remittances on marriages and festivals. It was revealed in the field survey that the incidence of dowry is very high in the villages and in the sample households. On average, dowry figures ranged from Rs. 15,000 to Rs. 20,000. The same is also the case of the expenditure for various festivals in the villages. To pay debts incurred by these functions they migrate and periodically pay off the loans. With high interest rates this has become a vicious circle from which the households have not been able to escape.

Remittances were sometimes invested in house construction (twelve households). Mostly in the case of long-term migrants.

### **Productive investment of remittances**

In the study villages, it was found that members undertake various farm and non-farm activities. Around 37 per cent of migrant households invested their remittances in buying land and boring wells. A large number of households also invested remittances in buying livestock in the villages of Thimmayapalli and Rangapur. In Chinnababaiahpalli and Sivarampet villages, some members of the migrant households went into vegetable vending. Though diversification outside agriculture is limited some migrants have acquired new skills in tailoring and weaving at their destinations (five households), which were put to use in their villages after their return. In a few instances, migrants have invested their remittances in buying tractors for the village, which they rent out, or auto rickshaws for local transportation, one migrant household has set up a small *kirana* (grocery) shop in the village. Many migrants have supplemented the lumpsum amount of remittances with additional loans from private companies to undertake income-generating activities, like buying tractors. Three members from Thimmayapalli village have gone on to become moneylenders in the village after returning from their long stay in Mumbai. These investments in non-farm sectors have not only provided the migrant households regular income and opportunity to escape from poverty but also enabled them to provide options (even if the options were limited) for others in the village.

The reasons elicited by migrant households for limited non-farm activity according to the migrant households are:

- (a) Lack of awareness about various non-farm investment opportunities
- (b) Limited or non availability of required market linkages
- (c) Absence of any institutional support either from Government or non-governmental agencies.

### **Factors limiting higher migrant income and contributing to low productivity of investments from remittances**

As discussed earlier there were several causes for the lack of capital accumulation by the households reported in the study. There were a very few instances (12 out of 100 migrant households) where the migrants saved enough to improve their living standards. But in most instances remittances served the purpose of meeting existing requirements such as domestic consumption, clearing of old debts and the like. Some of the remittances went into productive investments, especially in agriculture. The study revealed that one of the primary reasons for lack of accumulation was the irregular availability of work at the destination, since

the labour market was inundated with cheap labour. Due to overcrowding and the depressed job markets in the urban centres, on average the migrants indicated that they get 15-18 days work in a month.

The lack of skills was found to be another detrimental factor in getting higher wages and regular employment in urban centres as more than 90 per cent of the migrants were without any skills. The scope and opportunity for learning new skills were limited as migrants were engaged in the same kind of manual work year after year.

Health is another area of concern. Nearly 50 per cent of the migrants spent their earnings both at their destination and at their origin. The households utilized the remittances and took further loans often falling into debt due to expenditure for health and as a result of accidents at the work place. This was revealed in focus group discussions.

Clearing earlier household debts accrued due to various productive and social purposes was one of the areas where the remittances were used by a majority of the migrant households.

For social functions like marriages, households spent a large amount paying dowry and other expenses. Festivals incurred even higher expenditure.

Diversification outside the agriculture sector was very rare in the study areas. Lack of awareness as to how to invest and in which non-farm activities is a major constraint for the development of alternate livelihoods in these areas. Support from Government and other agencies is limited.

#### **IV. CONCLUSION AND RECOMMENDATIONS**

Remittances are a crucial source of income for the families of poor migrants in semi-arid areas. The study shows that a number of factors limit the extent of remittances by reducing the earning of migrants at the destination; lack of adequate skill sets, lack of access to critical services such as water, sanitation, health, education and the lack of social security measures such as access to the public distribution system and ration cards. This in turn limits their ability to send remittances home. Even the limited remittances that are sent home are mostly used for meeting pre-existing household expenses such as health costs. Analyzing the pattern and utilization of remittances shows that they provide much needed financial support to households located in a marginal environment suffering persistent drought and distress conditions. In addition to using remittances for loan repayments and purchasing food many migrants use the remainder of the



money they save when they return for productive purposes, both farm and non-farm. However, as noted, the single biggest end use of remittances is to the welfare and improved livelihood of the receiving households in terms of basic necessities such as food or clothing, thereby, building human and social capital. To a smaller extent remittances also contributed to savings or investments in smaller enterprises and is also used for informal lending in the district or region.

Only a small portion of remittances gets invested in assets such as the construction of a house, procurement of agricultural land or livestock. In very few instances, and to a limited extent, remittances are utilized for micro-enterprises and non-farm investments. Evidence shows that investing remittances in agriculture; buying land, boring wells and investing in agricultural inputs also failed to provide returns due to persistent drought. There are instances of families going back to poverty trap despite bringing adequate remittances back home. Those few households that have diversified their remittance investments into non-farm activities have had better returns on investments which have demonstrated sustainability. Benefits are concentrated at the individual or household level and the spillover effects into the local economy are limited because of the absence of institutional, policy and market mechanisms appropriate to enhancing income generation potential at the destination or non-farm investment avenues at home.

There is a felt need to improve access to services for the migrants at their destination, which will enable them to be more productive. Extending the public distribution system at the destination even for the limited periods for which migrants are staying at the destination would lower expenditure and enable greater savings. Improving the migrant workers access to health facilities is one of the critical considerations for Government. In places which attract high levels of seasonal and also long-term migration such as Mumbai, there is a need to have attention focused on meeting the requirements of migrants and to build their income generation potential.

Similarly, at the point of origin, as the majority of remittances are used to repay loans borrowed from money lenders at high interest rates there is need to explore the possibilities of engaging self help groups to create a social fund, which would provide loans with lower interest rates and develop access to institutional credit. This would lessen the debt burden of households. Increasing the investment opportunities at the origin, excluding agriculture, would not only increase the extent of remittance inflows but also enhance the livelihood options for other poor households in the villages. Multiple options such as vocational training, increasing information flows regarding rural investment opportunities, the provision of loans from financial institutions, developing market linkages for at least some

selected non-farm products and services need to be explored by Government and non-governmental agencies. The development of entrepreneurial competence would definitely enhance investment in productive activities that can generate a return, as opposed to investing in lands or boring more wells. Proactive thinking and action on the part of different agencies would go a long way to not only making migration a livelihood option but also to creating viable and sustainable investment opportunities for semi-arid regions of India.

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## ECONOMIC GROWTH IN A VULNERABLE ISLAND NATION: AN EMPIRICAL STUDY OF THE AID-GROWTH NEXUS IN VANUATU

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*Among all the island countries of the world, Vanuatu, a small island nation in the South Pacific with a population of 220,000 was once ranked as the most vulnerable economy on the basis of having the least resilience to withstand the adverse impacts of external and internal shocks. Vanuatu is currently designated, on the basis of quality of life, as one of the five least developed countries among the Pacific island countries, the other four being Kiribati, Samoa, the Solomon Islands and Tuvalu. Recognizing its special circumstances, including its high dependency on strategic imports with unstable export earnings, proneness to natural disasters and inadequate human resource skills, the international community has been assisting the country with generous external aid ever since its independence in 1980. Bilateral development assistance comes especially from the two regional powers. But, in terms of pure grants given on an annual basis, multilateral funding agencies, including the Asian Development Bank, have been assisting the country with concessional loans for projects and reform programmes. Despite these annual aid inflows, Vanuatu has been performing poorly which is reflected in the stagnation of its per capita income. This article seeks to examine the nexus between aid and growth in Vanuatu and investigates causes behind the country's weak performance. Based on the analysis, the article then makes recommendations with some implications for policy.*

**Keyword(s):** *Pacific Islands, Vanuatu, foreign aid, growth, cointegration, error correction model.*

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## I. INTRODUCTION

Vanuatu, formerly known as the New Hebrides, is one of the youngest independent countries in the Pacific region, having achieved political independence from the Anglo-French condominium rule in 1980. It comprises an archipelago of about 85 islands located in the Southwest Pacific, approximately 2,300 kilometres off the coast of Australia. The economy of Vanuatu with a total population of 220,000, is dual in nature with subsistence agriculture dominating in all but the two islands of Efate, on which the capital, Port Vila, is situated, as is Santo, which has the major port. The country is prone to natural disasters, which include four to seven cyclones on average each year, affecting parts of the country and about 2000 earth tremors of varying intensity. In addition, Vanuatu's inadequacy in human resources, both in public services and the private sector, has led to near permanent dependency on expatriate technical services in several areas.

On the basis of the criteria<sup>1</sup> established by the United Nations Committee on Development Planning, Vanuatu, along with 23 other small island and developing States (SIDS), has been designated since 1971<sup>2</sup> as a least developed country (LDC) among the developing countries (Encontre, 2004). Although on the basis of the threshold income level Vanuatu was found eligible for graduation from LDC status in 1997, it was allowed to retain LDC status on the grounds of perceived deterioration in the quality of life following a major earthquake in 2002, which inflicted severe damage to public and private property in Port Vila.<sup>3</sup>

Due to LDC status, the country has been favoured with generous foreign aid in terms of both pure grants and technical assistance from Australia and New Zealand, the two major metropolitan powers in the region as well as from the

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<sup>1</sup> The current criteria (2006) in operation are: (i) economic vulnerability index (EVI); and the augmented physical quality of life index (APQLI). Present requirements are: a GDP per capita less than US\$ 1,035; an APQLI score greater than 64; and an EVI score of less than 34. The earlier (2003) criteria did not include EVI, but included the following: threshold per capita GDP of US\$ 765; an augmented physical quality of life index of 47; economic classification index of 26; and threshold population of 75 million. As of September 2006, there are 78 IDA-eligible countries, 50 of which have been designated as LDCs (UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, 2006). Twelve of them have also been designated as small island and developing States (SIDS). Although eight of them graduated, they were brought back to LDC status due to adverse developments subsequent to their graduation (Delaney, 2006).

<sup>2</sup> See General Assembly Resolution 2768 (XXVI) of 18 November 1971.

<sup>3</sup> Before the earthquake of 2002, the Prime Minister of Vanuatu pleaded in his 1997 address to the United Nations General Assembly for the retention of LDC status. In its resolution of 18 December 1997, the General Assembly decided to postpone consideration of the recommendation to graduate Vanuatu (Encontre, 2005).

European Union. In addition, Vanuatu has been receiving loan assistance on concessional terms from multilateral funding agencies.<sup>4</sup>

Despite the substantial annual inflows of aid ever since its independence, the economic performance of Vanuatu has been observed to be weak, with continuing stagnation in per capita income since the early 1990s (Sugden and Tevi, 2004; Gay 2004; UNESCAP, 2002). Two studies by Hughes (2003, 2004) under the auspices of the Australian think tank, the Centre for Independent Studies, were highly critical of the effectiveness of foreign aid to the Pacific island countries, including Vanuatu. Following these two studies, came the announcement in March 2006 that the United States Millennium Challenge Corporation approved a five-year US\$ 65.69 million compact with Vanuatu. This provoked further criticism from Hughes and Sodhi (2006) that the United States Government's decision was not justifiable in light of the ineffective use of aid.

There have been no studies on the nexus between aid and growth in Vanuatu. The only related study available is Hughes and Sodhi (2006), which did not use data extending more than 10 years. Since the sample period was so small, the analysis is unlikely to be statistically rigorous. The objective of this paper is to fill the gap by undertaking an empirical study of the data available for the full period of 25 years since Vanuatu's independence in 1980, with a view to examining the effectiveness of aid on growth. The remainder of the paper is organized along the following lines: the second section provides a brief background of the economy of Vanuatu, reviewing the trends in growth and aid inflows; the third section outlines the model to be employed for the analysis and reports the results; the fourth and final section presents conclusions and recommendations with implications for policy.

## **II. VANUATU'S ECONOMY**

Vanuatu has a much higher per capita income than the three States of Tuvalu, Solomon Islands, and Kiribati, but lower than other small island States in the region. However, the Pacific island countries themselves have lagged behind their counterparts in the Caribbean and Indian ocean regions.

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<sup>4</sup> The soft loans from the Asian Development Bank and the World Bank generally have a long maturity period ranging from 30 to 40 years with an interest rate varying from 1 per cent to 0.75 per cent, generally referred to as a service charge. Hence, as these soft loans have a grant element of more than 25 per cent, they are deemed to be overseas development assistance.

Table 1. Selected key indicators

|                             | Population<br>('000) | Per capita<br>GDP<br>(Current<br>Prices)<br>in US\$ | Human<br>dev.<br>index<br>ranking | Vulnera-<br>bility<br>index<br>ranking | Aid<br>per capita<br>in US\$ | Aid         |             |
|-----------------------------|----------------------|---|-----------------------------------|--|------------------------------|-------------|-------------|
|                             |                      |   |                                   |  |                              | % of<br>GDP | % of<br>GDP |
|                             | 2002                 | 2002  | 2003                              | 1997                                   | 2002                         | 1990        | 2002        |
| <b>Caribbean region</b>     |                      |   |                                   |  |                              |             |             |
| Antigua and Barbuda         | 76                   | 10 449  | 60                                | 2                                      | 192.1                        | 1.2         | 1.9         |
| Bahamas                     | 314                  | 15 797  | 50                                | 4                                      |                              |             |             |
| Barbados                    | 270                  | 9 423   | 30                                | 38                                     | 12.8                         | 0.2         | 0.1         |
| Belize                      | 256                  | 3 382   | 91                                | 25                                     | 88.6                         | 7.6         | 2.6         |
| Dominica                    | 79                   | 3 438   | 70                                | 15                                     | 381.7                        | 11.9        | 12.1        |
| Dominican Republic          | 8 745                | 2 514   | 95                                | 91                                     | 18.2                         | 1.4         | 0.7         |
| Grenada                     | 80                   | 4 060   | 66                                | 14                                     | 117.5                        | 6.3         | 2.3         |
| Guyana                      | 765                  | 937   | 107                               | 16                                     | 84.9                         | 42.6        | 9.0         |
| Haiti                       | 8 132                | 415   | 153                               | 97                                     | 8.9                          | 5.9         | 4.5         |
| Jamaica                     | 2 651                | 3 008   | 98                                | 19                                     | 9.2                          | 5.9         | 0.3         |
| St. Kitts and Nevis         | 42                   | 7 745   | 49                                | 29                                     | 683.8                        | 5.1         | 8.0         |
| St. Lucia                   | 1 419                | 4 124   | 76                                | 18                                     | 226.5                        | 3.1         | 5.1         |
| St. Vincent and Grenadines  | 120                  | 4 060   | 87                                | 21                                     | 40.1                         | 7.8         | 1.3         |
| Suriname                    | 436                  | 2 199   | 86                                | 60                                     | 26.9                         | 15.5        | 1.2         |
| Trinidad and Tobago         | 1 303                | 7 384   | 57                                | 49                                     | 5.6                          | 0.4         | 0.1         |
| <b>Indian ocean</b>         |                      |   |                                   |  |                              |             |             |
| Maldives                    | 280                  | 2 182   | 96                                | 8                                      | 88.9                         | 9.8         | 4.4         |
| Mauritius                   | 1 211                | 3 740   | 65                                | 26                                     | 19.8                         | 3.7         | 0.5         |
| Seychelles                  | 82                   | 8 320   | 51                                | 24                                     | 97.8                         | 9.8         | 1.1         |
| <b>The Pacific</b>          |                      |   |                                   |  |                              |             |             |
| Cook Islands                | 19                   | 2 651   | 62                                | NA                                     | 490.9                        | NA          | 28.0        |
| Fiji                        | 799                  | 2 281   | 92                                | 9                                      | 41.4                         | 3.9         | 1.8         |
| Kiribati                    | 85                   | 530   | 129                               | NA                                     | 203.3                        | 22.5        | 18.6        |
| Papua New Guinea            | 5 099                | 523   | 137                               | 31                                     | 36.4                         | 12.8        | 7.2         |
| Marshall Is.                | 51                   | 2 008   | 121                               | NA                                     | 823.3                        | NA          | 49.6        |
| Micronesia (Fed. States of) | 114                  | 1 864   | 120                               | NA                                     | 702.0                        | NA          | 37.4        |
| Samoa                       | 175                  | 1 484   | 74                                | 20                                     | 214.2                        | 42.6        | 14.5        |
| Solomon Islands             | 418                  | 541   | 128                               | 11                                     | 56.8                         | 21.7        | 11.0        |
| Tonga                       | 98                   | 1 347   | 54                                | 3                                      | 217.2                        | 26.3        | 16.4        |
| Tuvalu                      | 11                   | 345   | 118                               | NA                                     | 260.0                        | 47.2        | 45.0        |
| Vanuatu                     | 183                  | 1 138   | 118                               | 1                                      | 133.0                        | 33.0        | 11.7        |

Source: ADB (2004), IMF (2004b), Jayaraman (2006), UNESCAP (2004), Sahay (2004), UNDP (2005), Commonwealth Secretariat (1997).

NA = Not Available



Vanuatu's apparently high average per capita income of about US\$ 1,200 (mainly due to expatriate salaries in the private sector) hides deficiencies in basic human resource development aspects. Life expectancy is about 66 years and the adult literacy rate is 34 per cent. About 20 per cent of the population has no access to health services and 13 per cent has no running water supply. In terms of quality of life, taking into account indicators that include; expectancy of life at birth, mortality rate, nutrition and literacy, Vanuatu is at the bottom with the Human Development Index rank: 129 in the list of all island nations in the region and just one above Papua New Guinea: 133 (United Nations, 2004).

More than 20 per cent of the population lives in the two urban towns of Port Vila (the capital) and in Luganville on Santo Island. The rural population is dispersed amongst the island group with limited inter-island communications. Land ownership is closely related to indigenous culture, generally referred to as *kastom* in pidgin. *Bislama* is the language widely spoken along with English in the urban areas. As part of the unique culture of the South Pacific region, the ownership of land is vested in the community. Thus, land is not an economic commodity, as sale is not possible to those outside the community or foreigners.

Dispersal of the population along with restricted availability of land and access to basic infrastructure and services, such as power and social services including health and education have contributed to the disparity of incomes. This is despite the prevalence of the much romanticized "subsistence affluence" among the isolated rural communities (ADB, 1997). Subsistence agriculture dominates land related economic activities, amounting to about 55 per cent of the primary sector's output, most of which is consumed by rural communities. Subsistence agriculture also determines the reservation wage. Under the current minimum wage law, the urban wage, which takes into account the transfer cost to Port Vila and Luganville has been fixed at vatu 20,000 per month. At the current exchange rate of US\$ 1 = vatu 115, this amounts to US\$ 174 per month. Skilled labour in urban areas is remunerated at a much higher rate – one of the highest in the region.

In the 1980s, four major agriculture products, copra, cattle (beef), cocoa and *kava*, which were once referred to as the "four Cs", supported the rural population and to this day they continue to be the main source of cash income to pay for the children's education and medicines, kerosene and others. Copra is marketed by the state owned Vanuatu Commodities Marketing Board, which has proven over time to be an inefficient state enterprise. Cocoa, coffee and *kava* exports are handled by the private sector. These products along with vegetables and fruits, mainly for domestic consumption, contribute 15 per cent of the gross

domestic product (GDP). In the 1980s, copra accounted for 35 per cent of total exports, while shares of beef and cocoa were 6 per cent and 4 per cent, respectively. Annual cyclones severely affect steady growth.

With the emergence of timber exports through middlemen acting on behalf of Malaysian and Korean companies, with concomitant environmental concerns arising out of indiscriminate logging by land-owning communities, exports of cocoa and coffee receded into the background. In recent years timber has accounted for 11 per cent of total exports, copra 31 per cent and beef 9 per cent. Other exports include minerals and handicrafts. Because most of the exports are primary agricultural products that compete with those of other island economies, and because they form a small proportion of total world trade, Vanuatu is a price taker. Consequently, export earnings are subject to the high degree of variation in world prices. Since 1997, copra and cocoa prices have fallen considerably. On the other hand, prices for most manufactured goods and other strategic imports, including fuel, have risen. The resultant effects of the high variability in terms of trade are reflected in the high volatility of export earnings.

A study by Yari (2003) showed that Vanuatu suffered considerably. The instability measure of export earnings (average percentage deviation of export earnings from the exponential trend level for 1998-2000) for Vanuatu was 21.5 per cent, which is higher than that of Nauru (20 per cent), Papua New Guinea (18 per cent), Solomon Islands (17 per cent) and Fiji (14 per cent). Aside from the negative effects of the terms of trade, production levels of the commodity themselves have also fluctuated.

Frequent cyclones resulting in uprooting of crops have been the main reason for these variations in output. Damages to farm and hinterland roads linking marketing centres and harbours and jetties in remote islands have also had adverse effects. Delays in the restoration of these links further adversely affected exports and rural incomes.

Air links brought increasing tourism revenue that helped counter import deficits until the late 1990s. Nearly 60 per cent of total foreign exchange earnings are contributed by tourism, which also dominates the services sector.<sup>5</sup> However,

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<sup>5</sup> The services sector of Vanuatu is marked by the significant presence of an offshore financial center. Absence of direct taxation of any kind in respect of incomes and profits earned by citizens of Vanuatu and residents and non-residents alike has made Vanuatu a pure tax haven, attracting funds from industrialized nations. However, its contribution to GDP has been observed to be on the decline, especially after the European Union and the United States of America, in the wake of the 2001 terror attack, successfully persuaded Vanuatu to streamline the legislation as well as tighten surveillance measures to control money-laundering activities in recent years (Fossen, 2002).

most of the tourists preferred the two urban centres and hence, little of the tourism dollar trickled down to rural communities in other islands. In 1998 and the subsequent two years, Vanuatu suffered a heavy loss in tourism earnings due to civil unrest, when people took to the streets to protest against abuse of pension funds held in trust by the State-owned Vanuatu National Provident Fund (Jayaraman, 2003), in the country. A hefty rise in tourist arrivals in 2000 reversed the trend but with the September 11<sup>th</sup> terror attack of 2001 in the United States of America, once again tourism declined. In addition, the recessionary conditions, following September 11<sup>th</sup>, in the industrialized countries also had a negative influence on tourism earnings. Added to these unforeseen circumstances, annual cyclones and frequent tremors have also taken their toll on resort hotels and other tourist facilities.

In sum, internal shocks resulting in the annual variability in growth rates in agricultural production due to weather conditions and civil unrest, combined with external shocks including a fall in the terms of trade and a decline in demand for domestic exports including cocoa and copra have been the main causes behind the variability in national output.

On the fiscal front, Vanuatu has no direct taxation of any kind and hence there is a high degree of dependence on indirect taxation. This takes the form of high import duties, VAT, user fees and charges as well as other forms of indirect taxation. Overall fiscal deficits have remained sustainable, mainly because of generous external aid and pure grants from bilateral sources, primarily Australia, New Zealand and the European Union, see table 3.

Until the early 1990s, budgetary grants from bilateral sources were financing recurrent expenditures, which include wages and salaries of the civil service and housekeeping expenditures. Reforms in the delivery of aid in years after the mid 1990s have redirected aid towards the implementation of projects and programmes rather than for government expenditures. External aid to Vanuatu amounted to 33 per cent of GDP in 1990, which was the third highest amongst the Pacific island economies. Due to a shift in the priorities of the donors, there has been a general decline in subsequent years and Vanuatu has received much less aid. Aid was only 12 per cent of GDP in 2002. Thanks to external aid, the current account in the balance of payments has been sustainable and overall balance has been satisfactory.

Table 4 presents details of GDP growth in Vanuatu in both aggregate and per capita terms. The data presented relates to the 25 year period from 1980, when the country gained independence. Average per capita GDP growth rates have been negative during the two successive five-year periods of 1995-1999 and

**Table 2. The Caribbean, Indian ocean and the Pacific region:  
output growth and variability**

|                             | 1990-2003<br>Average<br>Growth<br>Rate (%) | SD  | 1990-1997<br>Average<br>Growth<br>Rate (%) | SD   | 1998-2003<br>Average<br>Growth<br>Rate (%) | SD  |
|-----------------------------|--|-----|--|------|--|-----|
| <b>Caribbean region</b>     |  |     |  |      |  |     |
| Antigua and Barbuda         | 3.2  | 3.0 | 3.0  | 3.6  | 3.3  | 0.8 |
| Bahamas                     | 0.4  | 3.8 | 0.9  | 3.5  | 2.2  | 1.4 |
| Barbados                    | 0.4  | 3.6 | 0.1  | 4.1  | 1.4  | 2.8 |
| Belize                      | 6.7  | 4.3 | 5.7  | 4.1  | 7.2  | 4.6 |
| Dominica                    | 1.4  | 2.3 | 2.7  | 1.4  | 0.5  | 3.1 |
| Dominican Republic          | 4.7  | 4.0 | 3.9  | 4.6  | 5.0  | 2.2 |
| Grenada                     | 3.6  | 3.0 | 2.8  | 2.7  | 3.9  | 1.8 |
| Guyana                      | 3.3  | 5.2 | 5.9  | 4.1  | 0.5  | 3.2 |
| Haiti                       | -0.4                                       | 5.4 | -0.4                                       | 6.5  | 0.6  | 1.7 |
| Jamaica                     | 1.0  | 2.0 | 0.2  | 2.4  | 1.0  | 0.9 |
| St. Kitts and Nevis         | 3.7  | 2.1 | 4.5  | 2.3  | 2.3  | 1.1 |
| St. Lucia                   | 1.7  | 3.2 | 2.7  | 2.4  | 0.8  | 4.8 |
| St. Vincent and Grenadines  | 3.2  | 2.5 | 3.3  | 3.0  | 2.7  | 1.7 |
| Suriname                    | 2.1  | 5.3 | 0.7  | 6.2  | 2.4  | 1.7 |
| Trinidad and Tobago         | 2.9  | 2.6 | 2.0  | 2.3  | 4.2  | 1.6 |
| <b>Indian ocean</b>         |  |     |  |      |  |     |
| Maldives                    | 7.7  | 3.1 | 8.4  | 3.6  | 6.7  | 2.3 |
| Mauritius                   | 4.6  | 2.2 | 4.7  | 2.4  | 4.4  | 2.0 |
| Seychelles                  | 3.6  | 2.9 | 4.0  | 3.3  | 2.7  | 2.1 |
| <b>The Pacific</b>          |  |     |  |      |  |     |
| Cook Islands                | 3.3  | 4.2 | 2.7  | 4.6  | 3.5  | 5.3 |
| Fiji                        | 1.6  | 3.7 | 2.6  | 2.4  | 2.7  | 4.2 |
| Kiribati                    | 2.9  | 5.8 | 3.0  | 2.8  | 5.0  | 4.5 |
| Micronesia (Fed. States of) | 1.8  | 4.0 | 2.3  | 5.1  | 0.2  | 4.6 |
| Papua New Guinea            | 3.2  | 6.2 | 5.6  | 8.4  | -0.2                                       | 3.9 |
| Marshall Is.                | 2.3  | 7.9 | -0.9                                       | 7.7  | 0.3  | 4.6 |
| Samoa                       | 0.5  | 7.6 | -8.1                                       | 11.2 | 3.9  | 2.1 |
| Solomon Islands             | 0.1  | 5.6 | 2.9  | 3.8  | -3.7                                       | 6.0 |
| Tonga                       | 2.5  | 2.8 | 3.3  | 3.5  | 2.3  | 2.1 |
| Tuvalu                      | 3.8  | 5.4 | 5.6  | 6.2  | 4.8  | 4.5 |
| Vanuatu                     | 2.1  | 3.7 | 4.4  | 4.0  | 0.8  | 3.4 |

Source: Jayaraman (2006).

Note: SD = standard deviation.

**Table 3. Vanuatu: Key Economic Indicators**

|                                    | <i>1990-1997<br/>average</i> | <i>1998-2003<br/>average</i> |
|------------------------------------|------------------------------|------------------------------|
| Fiscal balance (% of GDP)          | -4.0                         | -1.8                         |
| Balance on goods (%)               | -26.5                        | -22.3                        |
| Growth of exports (%)              | 0.9                          | -2.2                         |
| Growth of imports (%)              | 4.2                          | 2.7                          |
| Current account balance (% of GDP) | -7.9                         | -7.8                         |
| Overall balance (% of GDP)         | -0.8                         | -4.2                         |
| Inflation (%)                      | 4.4                          | 0.8                          |
| Growth rate (%)                    | 3.4                          | 0.8                          |

Source: ADB (2003), IMF (2006).

2000-2004. External aid also declined from a high of US\$ 611 in constant prices during 1980-1984 to US\$ 163. As a proportion of Gross National Income (GNI), aid also decreased to 15 per cent during 2000-2004 as against 32 per cent in 1980-1984.

While external aid to Vanuatu until the mid 1990s from Australia and New Zealand and other bilateral agencies was, as noted earlier, directed largely at budgetary purposes, loans from international agencies were for both physical and social infrastructure projects. This approach appeared to be sensible. Both the Asian Development Bank (ADB) and the World Bank were well experienced in funding rural and agriculture development projects of the kind the Pacific island nations needed. These projects require large capital outlays and skills in project preparation, appraisal as well as monitoring and supervision during the implementation stages. However, from the late 1990s the trend changed. Donors joined together and shifted their attention to strengthening governance, which became the buzzword in the mid 1990s.

Based on the IMF approach of tightening credit and Government expenditures, which was part of the Washington Consensus, the ADB approved in 1997 a loan of US\$ 20 million for comprehensive reforms aiming at achieving good governance. Furthermore, it was specifically concentrated on improving budgetary procedures and methods and preparing manuals. The ADB was joined by Australia, which contributed technical assistance in terms of skilled expatriates. At one time, Gay (2004: 30) notes, about 42 international consultants descended on Port Vila to prepare manuals for various ministries and agencies including Finance

**Table 4. Vanuatu: aid, growth and exports (averages)**

|   | 1980-1984 | 1985-1989  | 1990-1994 | 1995-1999  | 2000-2004 |
|---|-----------|------------|-----------|------------|-----------|
| GDP per capita in vatu (constant prices of 2000)      | 80 391.12 | 77 292.732 | 82 139.85 | 86 087.522 | 77 877.4  |
| GDP per capita in vatu growth rate (%)                | 2.5       | -4.0       | 3.9       | -2.1       | -1.5      |
| GDP in vatu (millions) in current prices              | 9 867.3   | 14 026.2   | 21 233.6  | 28 025.0   | 32 780.6  |
| GDP in vatu (millions) (constant prices of 2000)      | 22 432.5  | 28 217.7   | 25 895.1  | 29 824.3   | 31 274.0  |
| GDP growth rate (%)                                   | 5.0       | -1.6       | 6.7       | 1.1        | 0.6       |
| AID as per cent of GNI (%)                            | 32.5      | 27.7       | 25.0      | 16.3       | 14.8      |
| AID per capita in US dollars current prices of 2000   | 254.1     | 257.2      | 283.1     | 202.7      | 169.4     |
| AID per capita in US dollars constant prices of 2000  | 611.6     | 425.2      | 350.4     | 218.5      | 163.1     |
| AID per capita in vatu in current prices of 2000      | 22 127.6  | 28 024.8   | 32 744.6  | 24 157.9   | 23 071.5  |
| AID per capita in vatu constant prices of 2000        | 52 072.6  | 46 206.2   | 40 513.3  | 25 982.6   | 22 235.7  |
| Exports in vatu (millions) in current prices          | 2 963.8   | 2 329.6    | 2 518.4   | 3 655.6    | 3 089.8   |
| Exports in vatu (millions) in constant prices of 2000 | 6 752.5   | 3 993.9    | 3 070.2   | 3 926.2    | 2 963.1   |
| Exports as per cent of GDP (%)                        | 29.9      | 16.8       | 11.9      | 13.0       | 9.4       |
| Exports growth rate (%)                               | 10.4      | -6.5       | 3.6       | 3.8        | 1.0       |

Source: World Development Indicators (2004).  
Asian Development Bank (2005).

and Planning and others.<sup>6</sup> Once they left, there were “few lasting results” (Gay, 2004). A major part of the loan proceeds were used for the payment of expatriate salaries during their stay in the country, the Government is still paying off the loans used for their salaries as “the remaining loan funds were mostly for near term consumption oriented programs, artificially giving the economy a short-term

<sup>6</sup> Gay (2004: 35) quotes from the personal communication from the Director of Trade, Industry and Investment: The Comprehensive Reform Program was “a complete waste of time. It paid for the salaries of a few consultants and did nothing for the country”.

boost" (Gay, 2004: 31). In fact, consumption expenditures funded by external aid gave rise to "Dutch disease effect", raising the spectre of inflation.<sup>7</sup>

It is now increasingly recognized in hindsight that the ADB and bilateral agencies should have been aware that Vanuatu's problems were related to balanced regional development. External aid should have been continued for growth enhancing projects and programmes, including outer island development; such project assistance would have raised rural incomes through augmenting the supply of export-oriented commodities that would have benefited the whole country. Gay (2004) rightly noted that Vanuatu did not experience problems of a persistent rise in domestic credit, or bulging and unsustainable fiscal deficits and yawning current account deficits in balance of payments of the kind faced by Latin American countries, requiring IMF-style structural adjustment loans. Vanuatu's fiscal and current account deficits were small and sustainable.<sup>8</sup>

The problem for Vanuatu was more of a "trade-deficit" related one, which can be solved only by export growth promotion measures. For a subsistence oriented Pacific island nation, such as Vanuatu, it is necessary to step up agricultural production, through physical infrastructure projects in terms of better farm roads, roads connecting hinterlands to jetties in remote islands (so that surplus farm produce enters markets for cash generation), as well as establishing processing facilities enabling the emergence of value added industries utilizing the raw materials for coconut milk, cream and oil and the like. Instead, the ADB and bilateral agencies preferred big bang programmes under the "banner of governance" (Sugden and Tevi, 2004: 17). No doubt, aid works in an environment of good governance, however, the time has come for the donor community to strike a balance between assistance for project development and governance.

The next section presents the methodology for testing a long run relationship between growth and aid during the previous 25-year period.

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<sup>7</sup> Two recent studies Rajan and Subramanian (2005), Raghuram and Subramanian (2005) indicated that some of the aid receiving countries in Africa were under the influence of the "Dutch disease", the effect of which is reflected in the appreciation of the real exchange rate. Appreciation of exchange rates has been seen to adversely affect the competitiveness of exports, thereby weakening economic growth.

<sup>8</sup> This point was made by Jayaraman (2002) while evaluating the proposal made by Knapman and Saldanha (1999) for a Currency Board Arrangement (CBA) for Vanuatu. Jayaraman described the CBA as an invasive procedure which was not warranted, since the island country did not experience any spiraling inflation or currency crises of the kind experienced by Latin American countries.

### III. DATA, MODELING METHODOLOGY AND RESULTS

The choice of modeling methodology for the empirical analysis of aid effectiveness in Vanuatu is highly constrained by the deficiency of reliable time series data. Unfortunately, a lack of attention to building good statistical databases has been a common feature in all the island countries.<sup>9</sup> Since Vanuatu gained independence only in 1980, national income data for earlier years are not available. Because aid effectiveness has to be studied over a long period, spanning to 20 to 30 years, lack of data for a number of relevant variables has been a major handicap. The only longer time series data available are: gross domestic product; aid in highly aggregated form without any distinction between technical assistance and project or programme aid; and earnings from exports. All the data are drawn from World Development Indicators (WDI), published by the World Bank (2005). Data relating to investment expenditure, projects and other budget items including recurrent government expenditure on wages and salaries are not consistently available over the period either from WDI or from official sources so as to form reliable time series for a 26-year period (1979-2004). Under these circumstances, we utilized only three variables, namely GDP, aid and exports for which data series were available in the following empirical analysis.

The hypotheses to be tested are: (i) aid enhances the productive capacity of the country; (ii) consequently, higher production and movement of products from hinterlands, rural communities and remote islands to commercial centres and ports would lead to a rise in traditional exports including copra, beef and fish; and (iii) a rise in export would result in growth. In our estimation procedure, we use the data in real and per capita terms, such as GDP per capita (GDPPC), exports per capita (EXPPC) and aid per capita (AIDPC).

#### Modeling Strategy

For examining possible long-term relationships amongst GDPPC, EXPPC, and AIDPC, we resort, in the first instance, to the autoregressive distributed lag (ARDL) bounds testing approach proposed by Pesaran and others (2001). The advantages of this approach are that it allows testing for the existence of a cointegrating relationship amongst variables in levels irrespective of whether these variables are  $I(0)$  or  $I(1)$ , and it is more appropriate (than the Johansen-Juselius multivariate approach) for testing for long run relationships amongst variables when

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<sup>9</sup> Hughes (2006) comes down heavily upon this deficiency, by pointing out that poor personnel policies, contribute to jobs in the Bureau of Statistics being considered as dead ends to careers. Further, governments have created an environment of suspicion that statisticians were expected "to produce politically suitable data" (Hughes 2006: 3).



the sample size is small (Pesaran and others, 2001). For these reasons, the ARDL procedure has become increasingly popular in recent years and we begin the empirical analysis with this procedure.

Expressing the variables in logarithmic terms, the test for cointegration is based on the following error correction version of the ARDL model pertaining to the three variables of interest:

$$\begin{aligned} \Delta \text{LGDP}PC_t = & \alpha_0 + \sum_{i=1}^{m1} \alpha_{1i} \Delta \text{LGDP}PC_{t-i} + \sum_{i=1}^{m2} \alpha_{2i} \Delta \text{LEX}PORTS_{t-i} + \sum_{i=1}^{m3} \alpha_{3i} \Delta \text{LAID}PC_{t-i} \\ & + \gamma_1 \text{LGDP}PC_{t-1} + \gamma_2 \text{LEX}PORTS_{t-1} + \gamma_3 \text{LAID}PC_{t-1} + \varepsilon_t \end{aligned} \quad (1)$$

where  $\varepsilon_t$  is the disturbance term.

In Equation (1) the null hypothesis is that the three series are not cointegrated, which has the testable form of

$$H_0 : \gamma_1 = \gamma_2 = \gamma_3 = 0 \text{ vs } H_a : \text{Not } H_0$$

Following Pesaran and Pesaran (1997) this null hypothesis may conveniently be tested with the familiar F-statistic, which, however, has a non-standard asymptotic distribution under both  $H_0$  and  $H_a$ . Appropriate critical values are reported in Pesaran and Pesaran (1997; Appendix C) for different numbers of regressors (three in our case), and whether the ARDL model contains intercept and/or trend terms. Two sets of critical values are given – one set assumes that all variables are  $I(1)$  and the other assumes they are all  $I(0)$  – providing a band covering all possible classifications of the variables into  $I(1)$  and  $I(0)$ . Values of the calculated F-statistic above the upper level of the band indicate rejection of the null of no cointegration, whereas values below the lower level of the band support the conclusion of no cointegration. The test is inconclusive if the F-statistic falls within the band, in which case we resort to the traditional practice of conducting unit root tests followed by other tests for cointegration.

### Empirical Results

Using the 26 annual observations (1979-2004) described above, it was found that a common lag length of  $m1 = m2 = m3 = 2$  was sufficient to account for serial correlation in the ordinary least squares (OLS) residual for the ARDL test equation (1). As the resulting value of the F-statistic, 3.98, fell between the lower and upper bounds of 3.17 and 4.14, respectively, the results regarding cointegration were inconclusive. These results were invariant to the choice of dependent variable

to use in equation (1).<sup>10</sup> That is, the ARDL bounds tests did not provide any strong evidence that per capita GDP, exports and aid were tied together in a long-run relationship.

Consequently, following Kremers and others (1992), we also carried out a test for cointegration based on the significance of the coefficient of the lagged error correction term ( $\lambda$ ) in an error correction model.<sup>11</sup> Based on an underlying ARDL model with lag lengths (1, 1, 0) selected by the Hannan-Quinn criterion, the following ECM model specification was used

$$\begin{aligned} \Delta \text{LGDP}PC_t = & \alpha_0 + \alpha_1 \Delta \text{LGDP}PC_t + \alpha_2 \Delta \text{LEX}PORTS_t + \alpha_3 \Delta \text{LAID}PC_t \\ & + \lambda \text{ecm}_{t-1} + \varepsilon_t \end{aligned} \quad (2)$$

where  $\text{ecm}_{t-1} = (\text{LGDP}PC - \delta_0 - \delta_1 \text{LEX}PORTS - \delta_2 \text{LAID}PC)_{t-1}$

The long run coefficients are derived from the estimated ARDL(1, 1, 0) as follows

**Table 5. Estimated long run coefficients using the ARDL approach  
ARDL(1, 1, 0) selected based on Hannan-Quinn criterion**

| <i>Dependent variable is LGDP</i> |                    |                    |                       |                       |
|-----------------------------------|--------------------|--------------------|-----------------------|-----------------------|
| <i>Regressor</i>                  |                    | <i>Coefficient</i> | <i>Standard error</i> | <i>T-ratio [prob]</i> |
| C                                 | $(\hat{\delta}_0)$ | 9.5290             | 1.3469                | 7.0749 [.000]         |
| LEXPORTS                          | $(\hat{\delta}_1)$ | .1027              | .1017                 | 1.0098 [.326]         |
| LAIDPC                            | $(\hat{\delta}_2)$ | .0908              | .1209                 | .75118 [.462]         |

Note firstly that the long run parameters are not estimated with a great deal of precision given the relatively large estimated standard errors for  $(\hat{\delta}_1)$  and  $(\hat{\delta}_2)$ . Moreover, although the estimated parameters (elasticities) have the expected signs they are of small magnitude.

The resulting estimated error correction model is summarized in table 6.

<sup>10</sup> The calculated values of the F-statistics were 3.94 and 0.03 for LEXPORTS and LAIDPC, respectively.

<sup>11</sup> We firstly conducted ADF unit root tests with the result that each variable is I(1). Details are not shown, in order to conserve space, but are available upon request.

**Table 6. Estimated Error Correction Model**

| <i>Dependent variable is <math>\Delta LGDPPC</math></i> |                    |                            |                       |
|---|--------------------|----------------------------|-----------------------|
| <i>Regressor</i>  | <i>Coefficient</i> | <i>Standard error</i>      | <i>T-ratio [prob]</i> |
| $\Delta LEXPORTS$                                       | .14760             | .037139                    | 3.9742 [.001]         |
| $\Delta LAIDPC$   | -.1561E-3          | .8326E-3                   | -.18750 [.853]        |
| ecm (-1)  | -.26186            | .084658                    | -3.0932 [.006]        |
| R-squared   | .51437             | R-bar-squared              | .46812                |
| S.E. of regression                                      | .040411            | F-stat. F ( 2, 21)         | 11.1213 [.001]        |
| Mean of dependent variable                              | .0022506           | S.D. of dependent variable | .055411               |
| Residual sum of squares                                 | .034295            | Equation log-likelihood    | 44.5552               |

From table 6 we see that in the short-run, growth ( $\Delta LGDPPC$ ) responds in a statistically (and economically) significant manner to the relative growth in exports, and in response to the previous year's long run disequilibrium. That is, just over 26 per cent of last year's disequilibrium is "corrected" in the current year.

The null hypothesis of no cointegration is expressed as  $H_0: \lambda = 0$  vs  $H_a: \lambda < 0$ . The test statistic is  $\tau(\hat{\lambda}) = -3.0932$ , which, using the critical values tabulated in Banerjee and others (1998), has a 10 per cent critical value of -3.24. Hence this test also fails to find significant statistical evidence that these three series form a cointegrating relationship.

In order to be as thorough as possible in our empirical investigations, we also developed two bivariate models to search for significant relationships between exports and growth, and aid and exports in Vanuatu. In summary, the results for the export-growth model are presented below.

(i) Exports-growth nexus

Using the OLS results from the following ARDL(1, 1) model

$$LGDPPC_t = \beta_1 + \beta_2 LEXPORTS_t + \beta_3 LEXPORTS_{t-1} + \beta_4 LGDPPC_{t-1} + \varepsilon_t \quad (3)$$

We obtained the long run equilibrium coefficients shown in table 7.

Although the estimated long run export-elasticity coefficient (0.12215) has a positive sign, it is only marginally statistically significant with a 1-tailed p value of 0.068. In the error correction modelling exercise with  $\Delta LGDPPC$  as the dependent model (table 8) we observe that from the estimated ECM coefficient (-0.39669) there seems to be a fairly rapid movement towards a possible long-run equilibrium

**Table 7. Long run coefficients for exports-growth relationship (H-Q criterion)**

| Dependent variable is LGDPPC<br>23 observations used for estimation from 1982 to 2004 |             |                |                |
|---|-------------|----------------|----------------|
| Regressor   | Coefficient | Standard error | T-ratio [prob] |
| LEXPORTS  | .12215      | .078526        | 1.5556 [.136]  |
| C   | 10.3079     | .64663         | 15.9410 [.000] |

**Table 8. Error correction representation for equation (3)**

| Dependent variable is $\Delta$ LGDPPC<br>23 observations used for estimation from 1982 to 2004 |             |                         |                |
|--|-------------|-------------------------|----------------|
| Regressor  | Coefficient | Standard error          | T-ratio [prob] |
| $\Delta$ LEXPORTS  | .15174      | .043873                 | 3.4585 [.002]  |
| $\Delta$ C   | 4.0891      | 1.5487                  | 2.6403 [.016]  |
| ecm (-1)   | -.39669     | .14530                  | -2.7301 [.013] |
| R-Squared  | .49946      | R-bar-squared           | .42043         |
| S.E. of regression   | .042926     | F-stat. F (2, 20)       | 9.4796 [.001]  |
| Residual sum of squares  | .035010     | Equation log-likelihood | 41.9719        |

relationship (about 2.5 periods on average). The fact that this coefficient is statistically significant (p-value = 0.013) suggests that exports and real income are joined in a systematic long run relationship.

(ii) Aid-Exports nexus

For the aid-exports relationship, however, the statistical results shown in table 9 were much less conclusive. In fact, the estimated long run aid-exports elasticity coefficient was perversely *negative* (-0.13351) although it was clearly not statistically significant (p-value = 0.762).

Moreover, as revealed by the results for the ECM model in table 10, even for the short run the coefficient for the change in aid is negatively signed (-0.0402). Just as for its long run counterpart, it fails to be statistically significant as well (p-value = 0.75).

Hence, even from a simple bivariate perspective, we are not able to find empirical evidence to support the idea that foreign aid has helped to promote income growth in Vanuatu, via a positive influence on exports.

**Table 9. Estimated long run coefficients from ARDL(1, 0) model (H-Q criterion)**

| Dependent variable is LEXPORTS<br>23 observations used for estimation from 1982 to 2004 |             |                |                |
|---|-------------|----------------|----------------|
| Regressor   | Coefficient | Standard error | T-ratio [prob] |
| LAIDPC  | -.13351     | .43555         | -.30654 [.762] |
| C   | 9.5572      | 4.5096         | 2.1193 [.047]  |

**Table 10. Error Correction representation for the aid-exports relationship**

| Dependent variable is $\Delta$ LEXPORTS<br>23 observations used for estimation from 1982 to 2004 |             |                         |                |
|--|-------------|-------------------------|----------------|
| Regressor  | Coefficient | Standard error          | T-ratio [prob] |
| $\Delta$ LAIDPC  | -.0402      | .1244                   | -.3235 [.750]  |
| C  | 2.8810      | 1.5075                  | 1.9111 [.070]  |
| ecm (-1)   | -.3014      | .1476                   | -2.0420 [.055] |
| R-squared  | .20130      | R-bar-squared           | .12144         |
| S.E. of regression   | .21958      | F-stat. F (2, 20)       | 2.5204 [.106]  |
| Residual sum of squares  | .96430      | Equation log-likelihood | 3.8406         |

#### IV. SUMMARY AND CONCLUSIONS

This paper undertook an empirical study of the effectiveness of aid to Vanuatu over the last 25 years. The study employed a trivariate model adopting the ARDL bounds testing and the error correction modeling approaches to investigate whether there was a long-term relationship between aid, growth and exports. Data on aid, GDP and exports, all in constant prices and on a per capita basis were utilized. Results of empirical analysis showed there was only weak evidence of the existence of a long-term relationship amongst the three variables.

It is not unusual that the study found no link between aid and growth, since the aid data for Vanuatu is in highly aggregated form. Comparable results were also obtained in similar studies, when aggregated data were used in the absence of detailed data for projects, programmes and technical assistance. Islam (1992) and Mbaku (1993), in their studies on Bangladesh and Cameroon respectively, found that aid did not contribute to growth. Recent studies of a cross-sectional nature in Africa (Rajan and Subramanian, 2005; Raghuram and Subramanian, 2005) using aggregate data also drew this conclusion.

However, through bivariate model analyses on export-growth and the aid-export relationship in Vanuatu, it was established that exports positively influenced growth, but aid did not contribute positively to exports. It is apparent that aid has not led to any increase in the productive capacity of the country, which would have raised its export potential.

The results will not come as a surprise to the critics of aid to Vanuatu. By analyzing the data from a much shorter period and without employing any sophisticated analysis, Hughes and Sodhi (2006) came to the conclusion that aid had not benefited Vanuatu in the past. By resorting to a more detailed empirical analysis of data over a longer period, our study confirmed the finding that aid did not contribute to growth, but exports positively influenced growth. Hence, our recommendation is that external aid be re-directed towards promoting production of agricultural exports, all of which are grown by rural communities. Aid should be directed to outer island development projects, including roads connecting farms and hinterland in remote, isolated islands to ports and jetties for speedy movement of exports so that rural communities benefit through rises in their incomes as well.

Donor agencies would do well to undertake a fresh evaluation of their programmes. They should carefully review their policies and consider whether the emphasis on governance has been overdone. Further, they should strive towards striking an appropriate balance between aid for improving governance and aid for growth and income generating activities.

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## CENTRAL ASIA AFTER FIFTEEN YEARS OF TRANSITION: GROWTH, REGIONAL COOPERATION, AND POLICY CHOICES

Malcolm Dowling\* and Ganeshan Wignaraja\*\*

*This paper presents a coherent and systematic analysis of the collapse and subsequent revival of the Central Asian republics since 1990. The focus is on the pattern of growth and structural changes during the cycle of decline and subsequent revival in the Central Asian republics, which have yet to be adequately analysed in the literature on transition. The paper relates economic performance to initial conditions, country characteristics and policies. Within this framework, it proposes a simple typology of policies (including a new "type III" set of policies on regional cooperation and industrial competitiveness) and relates them to the cycle of decline and revival. It goes on to examine the medium-term prospects for and policy needs of the Central Asian republics.*

### I. INTRODUCTION

The decline of some socialist countries after the collapse of the former Union of Soviet Socialist Republics has been well documented.<sup>1</sup> The literature is extensive with good surveys undertaken by Fischer and Sahay (2000), Campos and Coricelli (2002) and Svejnar (2002). Much of the literature has focused on the transition in Central and Eastern Europe and the Baltic States, South-Eastern Europe, and the Russian Federation within the Commonwealth of Independent States. However, an important group of countries – the Central Asian republics – have

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<sup>1</sup> See EBRD (2005) for the details of these groupings.

traditionally received less interest.<sup>2</sup> Strategically located and landlocked between Europe and Asia, they have had rich and varied experiences implementing policy reforms over the past fifteen years. With large endowments of minerals and other commodities, they have also become a focus point of international attention, particularly given the increasing demand for raw materials in rapidly growing economies, especially China and India.

The length and depth of the recession following the transition in the former Soviet economies was unexpected by early observers.<sup>3</sup> Initial estimates were that the power of market forces and the efficiency gains of competition, along with better allocation of existing resources, would more than compensate for adjustments in moving from a centrally planned to a market economy (Lipton and Sachs, 1990; Balcerowitz, 1994; Sachs, 1996). These observers suggested that a “big bang” (or shock therapy) approach would rapidly bring about the transition and that economic prosperity would be higher than during the Soviet period.

This optimism was obviously misplaced, as most countries went into a period of sharp contraction in the early 1990s. A series of stylized facts has been proposed to explain this decline. These include: (i) tight credit policies; (ii) a collapse in credit – as subsidies to firms were reduced; (iii) an increase in real interest rates; (iv) a general disorganization within the economy – as centrally planned producers and distributors had to be replaced by less specialized firms and suppliers; (v) the development of new business habits among both producers and consumers; (vi) major adjustments in the labour market; and (vii) the dissolution of the Council of Mutual Economic Assistance – governing trade among Soviet bloc members (Svejnar, 2002; Campos and Coricelli, 2002; Djankov and Murrell, 2002).

While these stylized facts developed, there was extensive discussion on the merits of either big bang or gradual reform policies. Within this debate various kinds of policy reforms were bandied about. Such policy reforms were deemed necessary for a more rapid and efficient transition, based on economic performance. There is some consensus that big bang reforms are too simplistic, and that a more complex approach is needed to ensure effective transition to a market economy.

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<sup>2</sup> Some notable exceptions include the papers in Rumer (ed. 1996, ed. 2000, and ed. 2002) and Burghart and Sabonis-Helf (ed. 2004). See also Pomfret (2000 and 2003a), Starr (2004), Hausmann and others (2005), and UNDP (2005).

<sup>3</sup> Fischer and Sahay (2000) note: “A decade ago it was generally expected that output would fall at the start of the reform process, as a result of both macroeconomic stabilization and the reallocation of resources from unproductive to sectors that would be profitable at world prices. ...although the extent to which output collapsed far exceeded expectations. By the time output had bottomed out, it had fallen by more than 40 per cent on average” (Fischer and Sahay, 2000, p. 4).

Observers have developed two categories of policies to reflect this complexity: type I policies include standard big bang instruments such as macro, price, and exchange rate reforms, type II policies include regulatory, legal and other institutional reforms. Additional policy instruments may also be required to reflect the special landlocked circumstances of the Central Asian republics.

This paper aims to present a coherent and systematic analysis of the collapse and subsequent revival of the Central Asian republics during the period 1990-2005. Six economies are examined: Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The focus is on the pattern of economic growth, its causes, and the associated transformations in economic structure during the cycle of decline and subsequent revival, which has been inadequately analysed in the literature to date. This paper relates economic performance to initial conditions, country characteristics, and economic policies. And within this framework, it proposes a simple typology of policies (including a new category: "type III") and assesses them against the cycle of decline and revival. It also examines medium-term economic prospects and policy needs.

**Table 1. A snapshot of the Central Asian republics**

| Country                 | GDP per capita, 2004<br>(In US dollars) | Population, 2004<br>(In million) | Share of world reserves |     | Geography                      | Reform status    |
|-------------------------|---|----------------------------------|-------------------------|-----|--------------------------------|------------------|
|                         |   |                                  | Oil                     | Gas |                                |                  |
| Oil exporters           |   |                                  |                         |     |                                |                  |
| Azerbaijan              | 1 029.4                                 | 8.3                              | 0.6                     | 0.8 | Landlocked                     | Active           |
| Kazakhstan              | 2 723.9                                 | 15.0                             | 3.3                     | 1.7 | Landlocked                     | Active           |
| Turkmenistan            | 1 250.7                                 | 6.2                              | 0.042                   | 1.6 | Landlocked                     | No reforms       |
| Non-oil exporters       |   |                                  |                         |     |                                |                  |
| Kyrgyzstan              | 432.4                                   | 5.1                              |                         |     | Landlocked                     | Active           |
| Tajikistan              | 323.1                                   | 6.7                              |                         |     | Landlocked                     | Active           |
| Uzbekistan <sup>1</sup> | 461.2                                   | 26.0                             | 0.05*                   | 1.0 | Double landlocked <sup>2</sup> | Partially active |

Sources: British Petroleum (2005), ADB Key Indicators 2005, World Bank, *World Development Indicators 2006*; authors estimates.

<sup>1</sup> Uzbekistan has small oil reserves and significant natural gas reserves but does not export except to neighbouring countries.

<sup>2</sup> Goods from Uzbekistan must pass two borders to reach seaports.

## II. TYPOLOGY OF POLICIES

The literature on economic adjustment in developing and transition economies suggests that the pattern of long-run growth and structural change is a function of many factors. These include initial conditions, country size, geographical location, investment, human capital, technological progress and, above all, economic policies.<sup>4</sup> Based on the complexity of the various transitions, analysts typically distinguish between type I and type II policies (Svejnar, 2002; World Bank, 2002). Table 2 provides a policy matrix with examples of each, including the new “type III” typology.

**Table 2. Typology of economic policies during transition**

| <i>Policy type</i> | <i>Focus of policy</i>  | <i>Results</i>   |
|--------------------|---|--|
| <b>Type I</b>      | <p><b>Macroeconomic</b> – inflation, monetary and fiscal policies, and exchange rate policy</p> <p><b>Microeconomic</b> – labour market and wages, social safety nets, price liberalization (exceptions for energy, staple food, and housing) and removal of subsidies</p> <p><b>Banking and state-owned enterprises</b> – reduced subsidies, privatization, and bank liberalization.</p> | <p>These reforms did not achieve the anticipated increase in productivity in the Central Asian republics. One reason was that governments were unable to quickly create revenue flows to finance even recurrent expenditures, particularly those tied to State-owned enterprises (SOEs). As a result, there was some hesitation in replacing inefficient SOEs with more efficient private enterprises, as removing subsidies frequently led to the failure of these SOEs. Banking reforms were successful in allowing entry although State banks, which retained their influence in many Central Asian republics. Social benefit systems were inadequate given limited resources. This overall situation did not improve until the late 1990s.</p> |

<sup>4</sup> See the classic study by Chenery, Syrquin, and Robinson (1986). For a comprehensive survey of recent studies on growth see Durlauf and Quah (1999).

Table 2. (continued)

| <i>Policy type</i> | <i>Focus of policy</i>   | <i>Results</i>  |
|--------------------|--|---|
| <b>Type II</b>     | <b>Primarily legal policies:</b> <ul style="list-style-type: none"> <li>• <b>Developing legal and regulatory frameworks for industry and finance</b></li> <li>• <b>Privatization of medium- and large-scale enterprises</b> – sale of assets to employees or independent parties</li> <li>• <b>Restructuring the labour market</b> – wage determination, unemployment compensation, and retirement benefits</li> </ul> | Withstanding pressures from special interest groups was the main obstacle governments faced in trying to build a level playing field attractive to foreign investors. In the oil exporting Central Asian republics, for example, these policies proved successful in providing a reliable environment to attract foreign direct investment. For non-oil exporters, these reforms were less successful. Privatization did not bring expected benefits and special interest groups were able to influence policy.   |
| <b>Type III</b>    | <b>Regional cooperation</b> – within the Central Asian republics using various initiatives such as trade facilitation, transport, and energy policy dialogue and cooperation.<br><br><b>Develop industrial competitiveness policies</b> – to foster diversification away from natural resources and other raw material production into manufacturing.  | These policies were slow to develop, particularly in the first half of the 1990s when the Central Asian republics were more concerned with developing national identities and earning revenue through customs taxation. Recent developments, however, suggest a greater willingness to lower tariffs and cooperate on both transport and energy policies. To foster economic diversification, Kazakhstan introduced an innovative industrial development strategy in 2003, which contains elements of an industrial competitiveness policy agenda such as fostering industrial clusters. Azerbaijan is also assessing its industrial competitiveness and may follow suit. |

Big bang policies of type I are standard macro, price, and exchange rate reforms and are components of stabilization and structural adjustment programmes of international financial institutions (Lipton and Sachs, 1990; Balcerowitz, 1994; Sachs, 1996). These are macro stabilization and inflation policies focusing on monetary and fiscal issues, trade reforms, as well as policies aimed at dismantling the command and control institutional structure of the former Soviet system. These policies also include microeconomic reforms designed to address price distortions that constrain market efficiency, such as more efficient resource allocation, replacing

subsidies with market-determined prices, breaking up or rationalizing SOEs, and allowing markets to use production factors efficiently. Sometimes included are reforms of state-owned banks and the establishment of social safety nets to deal with the unemployment created by reallocation of resources during the transition. Type I reforms are sometimes also referred to as “first generation” reforms.

Type II category reforms primarily deal with the development of legal and regulatory frameworks for both the public and private sectors. Often these reforms focus on productive sectors – i.e., industry, agriculture, and the services – details may vary but include the revision of laws affecting the private sector, a reduction in bureaucratic red tape for establishing small businesses, building transparency in public enterprises, and creating procedures for the privatization and development of regulations governing institutions. These reforms are sometimes referred to as “second-generation” reforms, implying that they are implemented once type I policies are in place.

Type III policies add two sets of initiatives that have particular pertinence to the landlocked Central Asian republics: (i) regional cooperation and (ii) industrial competitiveness. With small domestic markets, the landlocked Central Asian republics are isolated from international markets and thus unable to reap economies of scale. They also face high transport and transit costs, and are therefore relatively unattractive to foreign direct investment (except for oil and gas). Using regional initiatives in key areas – notably in transport, trade, and energy – can not only link the Central Asian republics with each other, but help link them to international markets (UNDP, 2005). Examples of these initiatives in the Central Asian republics would include road, rail and air transport system integration; harmonization of border posts and customs procedures as well as the development of an efficient regional energy market. Regionwide free trade agreements (to reduce trade barriers) and monetary and financial cooperation (including policy dialogue and surveillance, bond market development, and open exchange rate policies) could also be added (Lamberte, 2005).

To be effective, regional cooperation initiatives in the Central Asian republics need to be underpinned by policies that seek to improve industrial competitiveness – to support the often difficult process each firm faces in building the technological compatibility required to cost-effectively compete in export markets. The experiences of more advanced developing and transitional economies show that building capabilities at the firm-level requires conscious investment in acquiring information, engineering, training, and of course research and development to translate imported technologies into productive use (Lall, 1992; Nelson and Pack, 1999). Missing factor markets and weak institutional support (for technology, skills,

finance, and export marketing) constrain firms from building better production capabilities. Changing market and institutional imperfections to create greater competitiveness can be addressed by introducing market-friendly measures, such as increasing the importation of technology (e.g., foreign investments, technology licensing, and consultants); adopting international best practices and standards for quality management of small and medium enterprises; upgrading technology-based institutions; improving access to industrial finance for technological development; and strengthening production linkages between small and large firms along the supply chain and within industrial clusters (Lall and Teubal, 1998; Wignaraja, 2003).

Applying any of the type I, II, or III policies alone would result in partial transitional economic success. However, taken together they present an interlocking set of complementary policies that are much more likely to succeed. We will return to these policies throughout the paper. The introduction and speed of implementation has a direct bearing on both the collapse of the economies of the Central Asian republics in the first half of the 1990s, as well as their subsequent revival.

### **III. COLLAPSE**

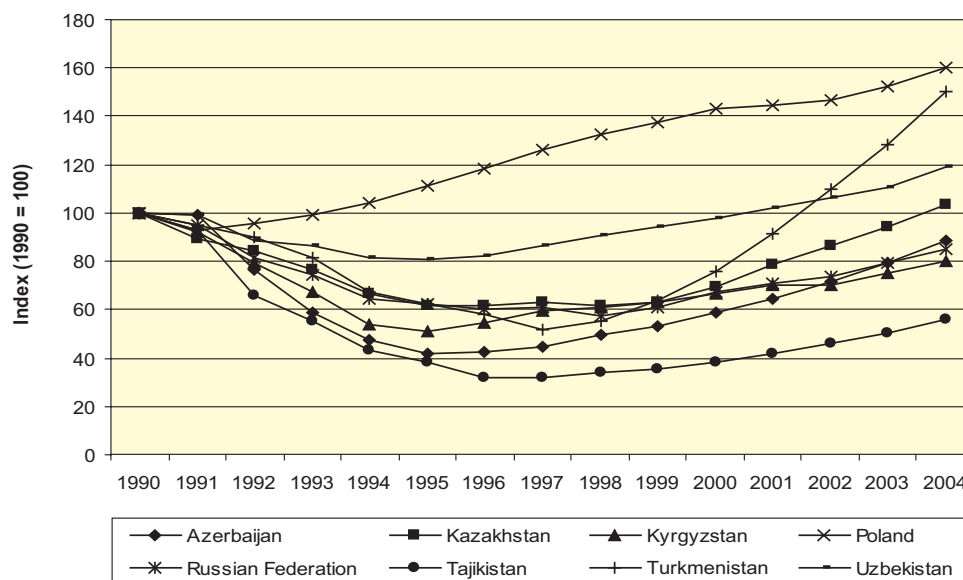
All of the Central Asian republics suffered severe reductions in real output following the breakup of the former Union of Soviet Socialist Republics (figure 1). Between 1990 and 1996, real output fell by between 40 per cent and 60 per cent in all the Central Asian republics with the exception of Uzbekistan, where real output fell less than 20 per cent.<sup>5</sup> Aside from reasons common to all the transition economies,<sup>6</sup> there are several features of the collapse particular to the Central Asian republics, some of which are related to their previous status as republics in the former Union of Soviet Socialist Republics, while others relate to geography and resource endowment.

During the Soviet period, the Central Asian republics were required to supply raw materials, energy, and intermediate inputs to the Russian Federation as part of the integrated production system. The Russian Federation supplied finished manufactured goods to the Central Asian republics and other regions (International Monetary Fund and others, 1991). This naturally constrained the flexibility of the industrial sector during the transition. To compound matters, SOEs in the Central

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<sup>5</sup> A similar magnitude of economic collapse is reported by other studies. Using national GDP data, Zhukov (2002) finds that real GDP in 1990-1995 fell by 58 per cent in Tajikistan, 49 per cent in the Kyrgyzstan, 39 per cent in both Kazakhstan and Turkmenistan, and 19 per cent in Uzbekistan.

<sup>6</sup> For example, see Campos and Coricelli (2002) and World Bank (2002).

**Figure 1. Changes in real GDP, 1990-2004**

Source: World Bank, *World Development Indicators* online.

Asian republics had been under Russian Federation management; thus, there were few qualified local managers able to take over during the transition. Private manufacturing was prohibited during the Soviet era so there was no private sector apart from informal trade. Furthermore, international trade was handled directly from Moscow or through Russian Federation SOEs. As a result there were virtually no opportunities to develop marketing relationships with foreign buyers or investors during the early transition period.

In addition, all of the Central Asian republics were dependent on Soviet subsidies to industries, and when those were suspended, it added significant fiscal pressure. This made maintaining social safety nets more difficult as budgets were stretched, and thus, poverty increased rapidly. There was also a breakdown in the supply of raw materials and other inputs during the early stages of transition. This further exacerbated profitability and affected operations of a variety of SOEs, as well as newly privatized industries.

In terms of geography, all of the Central Asian republics are landlocked. Sea access for traded goods is through the Russian Federation or Islamic Republic of Iran. Uzbekistan is double landlocked – meaning goods have to pass two



borders to reach the sea. There are also other geographic barriers, including harsh winters and high mountains in Tajikistan and semi-arid conditions throughout much of the region. This harsh climate and these geographic constraints mean high costs for transport, communications, energy and transit as well as extended delivery times to international markets (see Raballand, Kunth, and Auty, 2005; UNDP, 2005).<sup>7</sup> Early on in the transition process, this remoteness meant that industries had limited access to information or technology through contacts with overseas buyers and markets.

Finally, the Central Asian republics are richly endowed with commodities such as crude oil, natural gas, cotton, gold, copper, aluminium and iron. Three Central Asian republics (Azerbaijan Kazakhstan and Turkmenistan) export natural gas and oil to international markets, while Kyrgyzstan and Uzbekistan export gold (see table 1).<sup>8</sup> These commodity exports account for between 30 per cent to 88 per cent of total exports, depending on the country (see Freinkman, Polyakov and Revenco, 2004). Commodities also contribute substantially to fiscal revenues and provide resources for investment in development. During the Soviet era, these resources were distributed and marketed through Moscow (see Sabonis-Helf, 2004). In the early years of the transition, these transit links were severely disrupted. Companies such as Gazprom, which markets oil and natural gas products, took advantage of their monopolies over distribution to price commodities below market levels. The result was a drop in commodity exports and an associated drop in government revenue throughout the Central Asian republics.

### **The collapse affected each Central Asian republics differently**

Kazakhstan is the largest of the Central Asian republics geographically (2.7 million square kilometres – the size of India) and has a wealth of natural resources. It now produces over a billion barrels of oil a year, almost as much as Indonesia (British Petroleum, 2005). The collapse in output was largely the result of the interruption of oil and natural gas production and exports, loss of subsidies from the Union of Soviet Socialist Republics, and the exit of skilled Russian

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<sup>7</sup> UNDP (2005) suggest that there is an asymmetry in transport costs for shipments between Central Asia and Europe. Data provided by the study shows it costs \$8,500-\$10,000 to ship a truckload of cargo from the Benelux countries to Central Asia and only \$6,000-\$7,000 to ship in the opposite direction. In an "ideal world", shipments would cost \$5,000-\$6,000 in either direction.

<sup>8</sup> Uzbekistan is recognized to have significant natural gas reserves and small oil reserves. However, it has witnessed modest gas production growth by avoiding the Russian Federation's pipeline system and by concentrating on the domestic markets and on exports to its immediate neighbours. See British Petroleum (2005).

Federation technicians, scientists and managers.<sup>9</sup> The development of a manufacturing sector related to mineral extraction was also inhibited by a lack of revenue, weak domestic investment, and the failure to attract foreign direct investment. Poor fiscal performance meant that the government was unable to maintain infrastructure spending, and as a result, public investment and the provision of social services suffered.

The other two oil- and natural-gas-producing Central Asian republics, Azerbaijan and Turkmenistan, suffered similar disruptions. However, they were smaller economies and more dependent on Soviet markets and subsidies. As a result, the disruptions to supply of oil and natural gas were somewhat more serious than in the case of Kazakhstan. Furthermore, Azerbaijan was adversely affected during its conflict with Armenia over the disputed Nagorny Karabakh region – lasting from 1988 until the 1994 ceasefire – which claimed 30,000 lives, created about half a million Azeri refugees from Armenia into Azerbaijan, and resulted in widespread damage to physical infrastructure in both countries.

Even though Uzbekistan exports gold, it relied more on agricultural production than the other Central Asian republics. Population densities were also higher with its 26 million people constituting close to 40 per cent of the total population of the Central Asian republics. With import substitution and State ownership the rule – rather than export promotion or private sector production – Uzbekistan adopted a cautious approach to economic reform. While there were disruptions in gold marketing, Uzbekistan suffered the smallest decline in production and income among the Central Asian republics. It also benefited early on from buoyant world prices for cotton, its main export. In addition, some agricultural reforms occurred as collective farms were gradually converted to private ownership. However, the increase in productivity was small and recovery to pre-transition levels of income in agriculture has been slow.

With limited natural resources and small domestic markets, Tajikistan and the Kyrgyzstan were even more closely tied to Moscow than the other Central Asian republics, through supply chains in manufacturing and from gold mining in Kyrgyzstan (see IMF and others, 1991; Zhukov, 2000). As a result, the collapse in these two Central Asian republics followed closely the decline in the Russian Federation's economy (figure 1). Nevertheless, Tajik production fell much further and recovered more slowly than the other Central Asian republics, partly due to

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<sup>9</sup> A useful distinction can be made between the oil and gas exporting Central Asian republics and non-oil and gas exporting Central Asian republics. For further explanations see the papers in Rumer (ed. 1996) as well as Fischer and Sahay (2000), Trushin and Trushin (2000), Zhukov (2000), Pomfret (2003a), Linn (2004), and Loukoianova and Unigovskaya (2004).

the civil war that erupted shortly after independence in 1991 and lasted until 1997. World Bank estimates suggest that the war killed 50,000 and caused \$7 billion in physical damage (World Bank, 2005). Tajikistan also had relatively higher levels of poverty, lower levels of education, and poorer quality infrastructure than other Central Asian republics.

Aside from the dominant role of mineral production – with sales and marketing done outside the region during the Soviet period, there were other reasons for the poor performance of the Central Asian republics in the early 1990s. Generally, enterprise restructuring was not as successful as in other transition economies, such as Eastern Europe (see the literature cited in Djankov and Murrell, 2002). Privatization did not positively affect output or productivity. New owners were not as effective as they were in Eastern Europe, in part because ownership was often transferred to workers who were not efficient managers. Lack of type II policies relating to governance issues such as the legal framework and operational transparency probably contributed to the poor performance.

The lack of non-Russian Federation markets played an important role in the length of the collapse. It took time to build relations with foreign firms outside the Russian Federation and to attract foreign investment for increasing production capacity in natural resources. Transport bottlenecks and transfer taxes with the Russian Federation and within the Central Asian republics themselves increased costs and reduced the attractiveness for both domestic and foreign investors. Also, technical capacity was reduced as many Russian Federation technicians returned home.

Four of the Central Asian republics (Azerbaijan, Kazakhstan, Kyrgyzstan and Tajikistan) attempted to implement economic reform programmes in the 1990s, including both type I and type II policies. The timing of these programmes, coverage, and implementation speed and success varied among countries. There is general agreement that the effectiveness of type I and type II policies during the collapse was compromised by the size of the adjustments required, the extent of disruptions in production and trade linkages, the lack of a core private sector to build on, inefficiency and technological obsolescence of SOEs, a virtual absence of markets or regulatory institutions, and widespread rent-seeking (for recent studies see Trushin and Trushin, 2000 and 2002; Zhukov, 2002; Pomfret, 2003a). In contrast with the four reform-minded Central Asian republics, Uzbekistan and Turkmenistan maintained largely unchanged Soviet-era economic policies during 1990-1996 (Wall, 2003; Sabonis-Helf, 2004).

## IV. REVIVAL

### Economic Growth

To analyse the revival of growth in the Central Asian republics we should revisit figure 1 to examine some interesting comparisons. Most obvious is that trends in the Central Asian republics are very similar to those of the Russian Federation. Early on, some observers called it an L-shaped pattern – a relatively steep decline evening out over the first five to nine years (Boeri and Terrell, 2002). However, if we look at the entire 15-year period covered, it is far more a U-shaped curve bottoming out between 1995 and 1997 for the Central Asian republics and the Russian Federation (although the Russian Federation financial crisis led to another decline in 1998). Turkmenistan and Uzbekistan are exceptions, as Uzbekistan had a much milder decline to begin with, and growth in Turkmenistan accelerated quite dramatically from 1997. Production in Uzbekistan returned to the 1990s level of real gross domestic product (GDP) in 2001, Turkmenistan in 2002, and Kazakhstan in 2004. By 2004, real GDP in Azerbaijan was 88.5 per cent of the 1990 level, Kyrgyzstan was 80.4 per cent, and Tajikistan was 55.8 per cent.

In contrast, the best performers in Central and Eastern Europe and the Baltic States had a very mild downturn. By 1993 or 1994, they had recovered to precrisis GDP levels as a result of (i) a higher initial level of development, (ii) inflows of FDI, (iii) proximity to Western European markets, (iv) implementation of appropriate stabilization and other early policy reforms (see World Bank, 2002; EBRD, 2005; Simoneti and others, 2005). Similarly, the revival in the Central Asian republics can be viewed from several perspectives.

There are five basic reasons for the revival of the Central Asian republics: (i) higher international commodity prices and their impact on investment, fiscal performance, income, and consumption; (ii) an acceleration in FDI inflows, particularly in oil and gas, and in manufacturing to a lesser extent; (iii) better macroeconomic management; (iv) an upturn in agriculture due to good weather, high world commodity prices, and several agricultural reforms; and (v) improved political stability.<sup>10</sup>

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<sup>10</sup> On the economic revival in Central Asia see also Rumer (2002), Starr (2004), Dowling and Wignaraja (2005), and IMF (2005).

### Commodity Prices

After remaining relatively stable through the late 1990s (British Petroleum, 2005), world commodity prices have accelerated upwards since 2000, particularly from 2002-2005, largely in response to rising demand and supply bottlenecks (table 3). Oil and natural gas prices shot up, with oil prices per barrel rising from \$25.0 to \$53.0 between 2002 and 2005. Prices for cotton, gold, and other minerals were also strong. Export earnings from these commodities, and the associated revenues flowing into the government coffers gave the Central Asian republics the ability to begin addressing social issues, develop and improve infrastructure, and increase economic efficiency (Makhmutova, 2005).

**Table 3. International prices for oil, cotton, and gold  
(US\$ per unit)**

| Commodity           | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---------------------|------|------|------|------|------|------|
| Oil <sup>1</sup>    | 28.5 | 24.5 | 25.0 | 28.8 | 38.3 | 53.0 |
| Cotton <sup>2</sup> | 59.2 | 48.0 | 46.2 | 63.3 | 63.6 | 63.3 |
| Gold <sup>3</sup>   | 279  | 271  | 310  | 363  | 421  | 375  |

Sources: Oxford Economic Forecasting, Economist Intelligence Unit, *IMF World Economic Outlook* and authors' estimates.

<sup>1</sup> US dollars per barrel; Brent crude

<sup>2</sup> US cents per pound

<sup>3</sup> US dollars per troy ounce

### Foreign direct investment inflows

Average annual FDI inflows in the oil- and gas-exporting Central Asian republics doubled to \$2.3 billion in Kazakhstan during 1997-2004, \$917.5 in Azerbaijan and \$156.8 million in Turkmenistan (table 4). FDI in Kazakhstan and Azerbaijan rapidly approached those in Central and Eastern Europe and the Baltic States (Simoneti and others, 2005). Oil, gas, and mining benefited most from the FDI inflows, but the nascent manufacturing sector was also targeted. Substantial raw material deposits along with high international prices; favourable corporate tax rates for foreign investors; a strengthening of supply lines for export; improvements in the energy supply infrastructure; and low cost technical manpower attracted much of the investment (Moldasheva, 2002, World Bank, 2003; Sabonis-Helf, 2004). Macroeconomic stabilization and the implementation of economic reforms also played a role in attracting FDI (see section below). FDI brought not only capital but also access to ownership the advantages of multinationals (e.g., market access, new technology, and management skills), vital for efficient exploitation and export.

Other Central Asian republics also saw an increase in FDI in the late 1990s but overall levels were lower than the oil and gas exporters. Aside from the issue of the lack of oil and gas deposits, there was policy uncertainty, lack of transparent investment procedures, inadequate transport linkages with major investor markets, and under-developed market institutions (Wall, 2003; Mogilevsky, 2004; World Bank, 2004).

**Table 4. Trends in exports, FDI, and remittances, 1990-2004**  
(in \$ millions)

|                           | Average annual exports |               |             | Average annual FDI |               |             | Average annual remittances |               |             |
|---------------------------|------------------------|---------------|-------------|--------------------|---------------|-------------|----------------------------|---------------|-------------|
|                           | 1990-<br>1996          | 1997-<br>2004 | %<br>change | 1990-<br>1996      | 1997-<br>2004 | %<br>change | 1990-<br>1996              | 1997-<br>2004 | %<br>change |
| <b>Oil exporters:</b>     |                        |               |             |                    |               |             |                            |               |             |
| Azerbaijan                | 801.3                  | 2 200.6       | 174.6       | 478.7              | 917.5         | 91.7        | ..                         | 118.5         | ..          |
| Kazakhstan                | 6 521.2                | 11 579.6      | 77.6        | 1 050.5            | 2 263.4       | 115.5       | 74.7                       | 68.9          | ..          |
| Turkmenistan              | 2 085.5                | 2 386.6       | 14.4        | 89.1               | 156.8         | 76.1        | ..                         | 105.7         | 41.4        |
| <b>Non-oil exporters:</b> |                        |               |             |                    |               |             |                            |               |             |
| Kyrgyzstan                | 434.9                  | 665.4         | 53.0        | ..                 | 27.9          | ..          | 1.6                        | 31.8          | 1 863.1     |
| Tajikistan                | 551.7                  | 804.8         | 45.9        | 13.5               | 23.1          | 71.3        | 0                          | 43.1          |             |
| Uzbekistan                | 3 848.0                | 3 585.0       | (6.8)       | 39.2               | 105.1         | 168.2       | 0                          | 0             |             |

Source: World Development Indicators online, World Bank.

### Better macroeconomic management

Macroeconomic stability, helped by declining inflation, has improved. Inflation rates have fallen significantly throughout the region over the past few years indicating improved macroeconomic management. Average inflation for the Central Asian republics as a group declined from 20.4 per cent to 6.9 per cent between 1997 and 2001 and between 2002 and 2004 (table 5). In 2005, inflation fell somewhat to 6.3 per cent. Greater price stability was partly the result of greater fiscal and monetary discipline as well as greater stability in exchange rates (IMF, 2005; Hausmann and others, 2005).

Economic reforms were also implemented across the region, albeit at different levels. According to the EBRD (2005), significant progress towards a market economy was achieved by 2005 through economic reform in Kyrgyzstan and, to a somewhat lesser extent, in Azerbaijan and Kazakhstan. Higher EBRD average transition indicator scores for these reform-minded economies compared

**Table 5. Inflation, transition indicator scores, and private sector share of GDP**

| Country           | Annual average inflation (%) |           |      | EBRD average transition indicator | Private sector share in GDP (%) |
|-------------------|------------------------------|-----------|------|-----------------------------------|---------------------------------|
|                   | 1997-2001                    | 2002-2004 | 2005 | score, 2005 (a)                   | 2005 (b)                        |
| Oil exporters     |                              |           |      |                                   |                                 |
| Azerbaijan        | -0.5                         | 3.9       | 9.6  | 2.8                               | 60.0                            |
| Kazakhstan        | 10.9                         | 6.5       | 7.6  | 2.9                               | 65.0                            |
| Turkmenistan      | 15.0                         | 6.8       | -    | 1.4                               | 25.0                            |
| Non-oil exporters |                              |           |      |                                   |                                 |
| Kyrgyzstan        | 19.1                         | 3.0       | 4.4  | 3.0                               | 75.0                            |
| Tajikistan        | 46.0                         | 11.2      | 7.1  | 2.5                               | 50.0                            |
| Uzbekistan        | 32.1                         | 9.7       | 7.8  | 2.4                               | 45.0                            |

Sources: ADB (2005a); ADB (2006); EBRD (2005).

Notes: (a) This is a simple average of individual scores on the extent of reform in privatization, markets and trade, and financial institutions. The average scores range from 1 to 4 where 1 represents no change from a rigid centrally-planned economy and 4 represents the standards of an industrial market economy.

(b) EBRD staff estimates.

with other Central Asian republics is one indication.<sup>11</sup> The reform-minded Central Asian republics that applied small-scale privatization as well as liberalization of prices, trade and foreign exchange systems have improved the most. Currently, Kyrgyzstan has the most open trade regime in the region and in 1998, joined the World Trade Organization (WTO) – the only Central Asian republics to do so.<sup>12</sup> Kazakhstan is also reforming its trade regime and laws and is on its way to joining WTO. Reform agendas still to be tackled in these Central Asian republics include large-scale privatization, banking reform and interest rate liberalization and building a competition policy. Among the other Central Asian republics, Uzbekistan and Tajikistan have made progress recently in price liberalization and small-scale privatization. By contrast, Turkmenistan remains largely unreformed with little

<sup>11</sup> The widely cited EBRD Transition Indicator Score is based on the perceptions of its country economists. Pomfret (2003a) among others regards qualitative perception data about progress in reform as being less reliable than quantitative indicators (e.g. effective rates of protection). Given concerns about the quality and reliability of data in the Central Asian republics, however, this indicator offers a useful albeit impressionistic measure of reform progress.

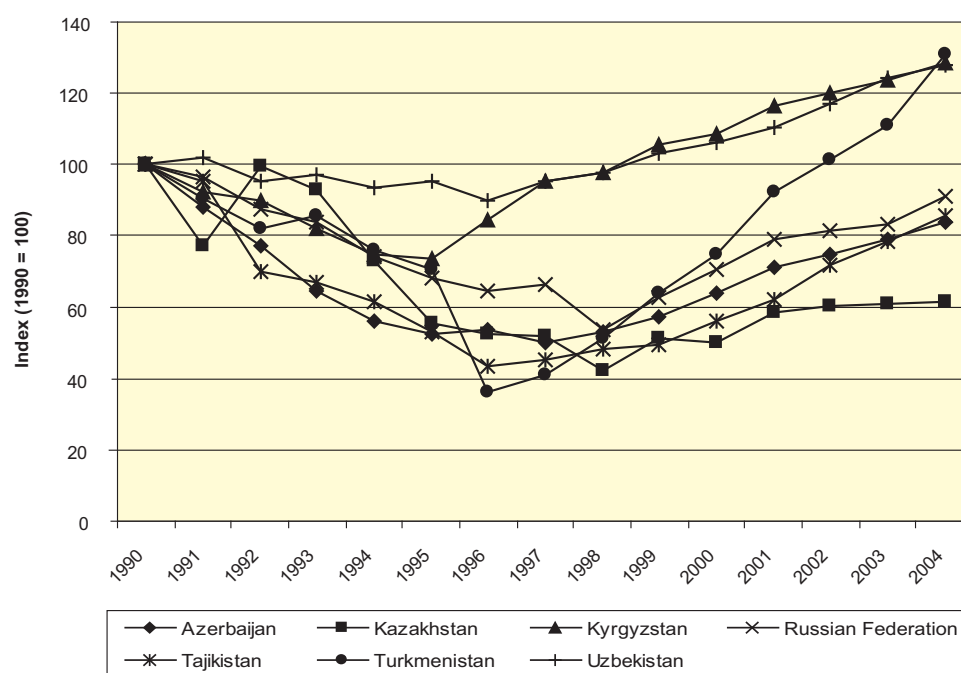
<sup>12</sup> See Mogilevsky (2004) for details of the trade regime and the WTO accession process in Kyrgyzstan.

prospect of adopting market-oriented reforms in the near future.<sup>13</sup> Better macroeconomic management and economic reform have typically provided a more conducive environment for private sector development in the region. As expected, estimates of private sector shares in GDP in 2005 were higher in the reform-minded Central Asian republics (between 60-75 per cent) relative to the others.

### Agricultural upturn

Since the late 1990s, agriculture has been a major driver of growth in the non-oil exporting Central Asian republics, particularly the Kyrgyzstan and Uzbekistan (figure 2). This success is derived from generally favourable weather conditions,

**Figure 2. Changes in real agricultural output, 1990-2004**



Source: World Bank, *World Development Indicators* online.

<sup>13</sup> According to the IMF (2004) and the EBRD (2005), Turkmenistan has maintained an inward-oriented, state-controlled development strategy since independence with extensive central management over capital allocations, domestic prices, production, and foreign trade. Exploitation of extensive gas reserves – which have financed prestige infrastructure projects (particularly Ashkhabad) and a welfare state – have enabled it to postpone the transition to a market economy.



high world prices for cotton and wheat, along with several agricultural reforms. Some productivity gains were also achieved in collective farms producing cotton and wheat.

Kyrgyzstan wide-ranging agricultural reforms emphasized collective farm privatization. An estimated 70 per cent of farm land is now privately owned (World Bank, 2005). Moreover, price and quantity controls were largely removed, public monopolies dismantled, and public investment in the rehabilitation of irrigation systems was increased. Uzbekistan, by contrast, undertook limited agricultural reform (Rumer, 2002; Rozelle and Swinnen, 2004). In an attempt to improve food security, small garden plots to grow fruits and vegetables were granted to peasants in the early 1990s by presidential decree. By the late 1990s, privatization took the form of dismantling agricultural cooperatives (known as “shirkats”), distributing land leases to individual farmers, conditional on farmers using the land in accordance with State orders. State control remains pervasive in Uzbekistan for agricultural purchasing, pricing, subsidies, distribution and provision of inputs.

### **Political Stability**

Improved political stability in the late 1990s was also a significant factor contributing to the region’s economic revival. The most notable developments were (i) the ending of the civil war in Tajikistan in 1997 and (ii) the 1994 signing of a ceasefire resolving the conflict between Armenia and Azerbaijan. Tajikistan is remarkable among post-conflict economies for its speed in forming a functioning government, its focus on implementing an economic development agenda and in seeking aid from multilateral institutions (World Bank, 2005). The ceasefire enabled Azerbaijan to reduce defense expenditures, invest in infrastructure, and concentrate more on attracting FDI into oil and gas. The ceasefire, a booming oil and gas industry, and a high growth environment also stimulated domestic investment in industries closely linked to oil and gas.

### **Other Features of the Revival**

#### *Structural Change*

Central Asia’s revival has been driven by structural changes that have shifted production away from agriculture toward industrial goods and minerals. This shift was obvious in the oil- and gas-exporting Central Asian republics. Between 1998 and 2004, industry’s share of GDP rose from 36 per cent to 54 per cent in Azerbaijan and from 31 per cent to 39 per cent in Kazakhstan (table 6).<sup>14</sup>

<sup>14</sup> In Turkmenistan, the share of industry in GDP remained constant at 44 per cent during 1998-2001 according to World Bank, *World Development Indicators* online.

While oil- and gas-continue to drive the industrial sector in these economies, manufacturing has also grown. And manufacturing growth in the Central Asian republics is closely linked to the emergence of manufactured exports, which grew at about 10 per cent per annum for the region as a whole during 1998-2003. In 2003, aggregate manufactured exports of the Central Asian republics reached \$3.7 billion. Export growth from the oil-exporting Central Asian republics averaged about 11 per cent per year (see table 4). For non-oil exporting countries, export performance was more modest but has accelerated since 2001. The largest economies, Kazakhstan (\$2.1 billion) and Uzbekistan (\$785 million), were the region largest manufacturing exporters.

**Table 6. Industry and manufactured exports in the Central Asian republics**

| Country                              | Share of industry in GDP <sup>1</sup> (%) |                 | Average annual manufactured export growth (current \$) | Manufactured exports (\$ millions) | Major manufactured exports (% of total)                    |
|--------------------------------------|---|-----------------|--|------------------------------------|--|
|                                      | 1998                                      | 2004            | 1998-2003  | 2003                               | 2003   |
| <b>Oil exporters</b>                 |   |                 |  |                                    |  |
| Azerbaijan                           | 36  | 54              | 11.2%  | 134.4                              | Machinery (21%),<br>Chemicals (38%),<br>Iron & steel (20%) |
| Kazakhstan                           | 31  | 39              | 10.1%  | 2 117.0                            | Iron & steel (70%)   |
| Turkmenistan                         | 44  | 44 <sup>2</sup> | 23.0%  | 225.0                              | Textiles & garments (83%)                                  |
| <b>Non-oil exporters</b>             |   |                 |  |                                    |  |
| Kyrgyzstan                           | 23  | 23 <sup>3</sup> | 5.4%   | 193.1                              | Textiles & garments (37%)                                  |
| Tajikistan                           | 22  | 21              | 7.4%   | 250.1                              | Textiles & garments (92%)                                  |
| Uzbekistan                           | 26  | 22              | 8.5%   | 785.0                              | n.a.   |
| <b>Total Central Asian republics</b> |   |                 | <b>9.9%</b>  | <b>3 705.0</b>                     |  |

Sources: Author's estimates based on data from IMF; National Statistics Committee of Kyrgyzstan; and World Bank, *World Development Indicators* online.

n.a. = not available

<sup>1</sup> 2001

<sup>2</sup> 2003

<sup>3</sup> Industry comprises mining, manufacturing, construction and utilities.

The structure of manufactured exports varies from country to country. Some Central Asian republics have specialized in labour-intensive activities while others have moved towards more capital- and technology-intensive activities (Wignaraja, 2005). Textiles and garments, for example, account for 80 per cent of manufactured exports in Tajikistan and Turkmenistan, and 37 per cent in Kyrgyzstan. While a detailed breakdown of Uzbekistan's manufactured exports is unavailable, they are thought to be largely in textiles and transport.<sup>15</sup> In Kazakhstan, 70 per cent of its large manufacturing export base consists of iron and steel products with the rest being chemicals, plastics and machinery. Azerbaijan's much smaller export base is a mix of iron and steel, chemicals and machinery.

Concentrating on one or two exports is inevitable in the early stages of export-led manufacturing growth, as in the Central Asian republics. This is particularly true when suddenly thrust into international markets with little experience and logistics from being landlocked. Still, export concentration means greater vulnerability to internal or external shocks that affect specific industries. This is now recognized within the region. Kazakhstan in particular is trying to foster economic diversification away from (just) extracting raw materials using an "Innovative Industrial Development Strategy" (IIDS) 2003-2015, which was introduced in 2003 (Government of Kazakhstan, 2003). The programme will complement existing economic reforms rather than supplement them. IIDS emphasizes the creation of priority industrial clusters and supports investment institutions, industrial credit, and innovation.<sup>16</sup> IIDS is still in its first phase – involving diagnostic studies, training, and institution-building – so it is still too early to assess its impact on Kazakhstan's eventual export performance.

Natural resource availability, lower transport costs, incentive policies and initial conditions are some factors responsible for the improved performance of manufactured exports and the pattern of product specialization in the region since the late 1990s (Gormart, 2003a; Freinkman and others, 2004; World Bank, 2004; Wignaraja, 2005). Some common explanations underline the record of reform-minded Central Asian republics. For example, the emergence of textiles and garments as major exports in Kyrgyzstan and Tajikistan is associated with the availability of

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<sup>15</sup> As Wall (2003) notes: "Most of Uzbekistan's export trade take place under state trading arrangements. Trade data being a state secret in Uzbekistan, it is not possible to carry out any serious analysis of export policy, but such aggregate data as are available show that in 2002 cotton fiber, energy and gold accounted for 70 per cent of total official exports... All export data is thought to be highly unreliable", (pp. 32-33).

<sup>16</sup> Detailed studies undertaken by the Center for Marketing and Analytical Research of Kazakhstan have identified seven priority industrial clusters: Tourism, oil and gas engineering, food, textile, logistics services, metallurgy, and construction materials.

inexpensive cotton, new foreign investment, relatively inexpensive yet skilled labour, and the implementation of market-oriented reforms. Growth in iron, steel, and chemical exports from Kazakhstan and Azerbaijan reflect the abundance of iron ore and crude reserves, FDI, improvements in macroeconomic management, ample supplies of skilled manpower and significant infrastructure investments. New investments have rehabilitated existing capacity and created new production facilities.

Turkmenistan and, to a lesser extent, Uzbekistan, have largely followed inward-oriented economic policies inherited from the former Union of Soviet Socialist Republics, with export growth linked to raw material availability and some special circumstances. Uzbekistan's textile exports mainly derive from domestic firms which have the advantages of cheap cotton, low labour costs, a protected domestic market and the demand and proximity to regional markets. Turkmenistan attracted export-oriented foreign investment in textiles and garments from Turkey by way of their close historical ties, inexpensive cotton and highly-subsidized electricity driving production.

#### *Poverty Reduction*

After generally increasing from 1990 to 1997, poverty levels have slowly dropped in the years since (table 7). Based on Asian Development Bank and World Bank estimates over the past six years, the incidence of poverty was between 28 per cent and 30 per cent in oil-exporting Kazakhstan and Turkmenistan, and in Uzbekistan. In Azerbaijan, Kyrgyzstan and Tajikistan, estimates for the incidence of poverty were nearly twice as high, ranging from 48 per cent to 57 per cent. For the region as a whole, the incidence of poverty averages 40 per cent.

Lower inflation rates, stronger growth, creation of new external trade links and the restoration of social and political stability contributed to the decline in poverty in the Central Asian republics.<sup>17</sup> In addition, remittance income from unskilled and semi-skilled overseas workers in Turkey, the Russian Federation, and Kazakhstan has become an important source of income for the poorer segments of society in the non-oil-exporting Central Asian republics. There has also been a trickle-down effect from labour-intensive industries, such as garments, newly developed within the region. For social development, foreign aid has also contributed to poverty reduction, particularly in Kyrgyzstan and Tajikistan.

Rural poverty remains a significant problem in some Central Asian republics as many urban unemployed move to rural areas looking for work, but find few

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<sup>17</sup> See Gormart (2003b), World Bank (2005c), and Dowling and Wignaraja (2005).

**Table 7. Poverty estimates**

|                                | <i>National poverty incidence (Population below poverty line, %)</i> |                      |
|--------------------------------|--|----------------------|
|                                | <i>Early period</i>  | <i>Recent period</i> |
| <b>Oil exporters</b>           |  |                      |
| Azerbaijan                     | 68.1 (1995)  | 49.6 (2001)          |
| Kazakhstan                     | 34.6 (1996)  | 27.9 (2002)          |
| Turkmenistan                   | –  | 29.9 (1998)          |
| <b>Non-oil exporters</b>       |  |                      |
| Kyrgyzstan                     | 51.0 (1997)  | 47.6 (2001)          |
| Tajikistan                     | –  | 56.6 (2003)          |
| Uzbekistan                     | –  | 27.5 (2000)          |
| <b>Central Asian republics</b> |  | 39.9                 |

Sources: ADB (2004a), World Bank (2005b).

– = not available.

opportunities on State farms. Income disparities and poverty are more pronounced in certain subregions, for example, the Ferghana Valley and border regions of Kazakhstan, Kyrgyzstan and Tajikistan. Still, despite some regional inequalities, overall income distribution is reasonably equitable with an average Gini coefficient of 33.2 per cent.

In terms of the Millennium Development Goals (MDGs), the Central Asian republics have made some progress, but there is a long way to go, with concerns that Kazakhstan, Tajikistan and Uzbekistan will not make the 2015 deadline. In fact, the distance to achieving some targets appears to be lengthening. There is evidence of high and indeed, increasing rates of malnutrition in Tajikistan and Uzbekistan. Education standards have also slipped and the collapse in the social sector in some Central Asian republics adversely affected the health indicators. The second Asian regional report on MDGs<sup>18</sup> – calls for a reshaping of national and local institutions involved in the delivery of services to help achieve the MDGs. Key issues include improving the provision and quality of services, reducing barriers to accessing these services, and broadening the range of service providers. The report also analyses how regional cooperation and trends towards economic integration can help speed the development process.

<sup>18</sup> A Future Within Reach: Reshaping institutions in a region of disparities to meet the Millennium Development Goals in Asia and the Pacific (Asian Development Bank, the United Nations Development Programme and the United Nations Economic and Social Commission for Asia and the Pacific, sales no. ST/ESCAP/2376, September 2005).

### *Policy Trends*

Type I and type II policies were important in enabling the Central Asian republics to begin returning their national GDP to pre-1990 levels. This was particularly important in creating a more stable and attractive environment for FDI in Kazakhstan and Azerbaijan, and to increasing agricultural efficiency – and thus profits – in Kyrgyzstan. Still, the main impetus for revival since the late 1990s was higher commodity prices for oil and gas, cotton, gold, and metals, along with the restoration of political stability in certain Central Asian republics. China has been experiencing rapid economic growth and the inelastic global demand for these commodities has helped create a bullish external environment for the Central Asian republics.

Type III policies have been relatively unused since 1990. Only Kazakhstan has recently started to introduce industrial competitiveness policies through the Innovative Industrial Strategy, 2003-2015 (Government of Kazakhstan, 2003). Although Azerbaijan and Uzbekistan are studying their own industrial competitiveness, they have yet to design or implement relevant market-friendly policies. To varying degrees, Central Asian republics participate in the various regional initiatives to address the constraints of being small, landlocked economies. These include the Commonwealth of Independent States, Eurasia Economic Community, Shanghai Cooperation Organization, Central Asian Economic Community, and the Single Economic Space and the Special Programme for the Economies of Central Asia. Most have differing objectives, however, sometimes conflicting objectives and overlapping country coverage.<sup>19</sup> Because of this, these initiatives have had limited impact thus far in harmonizing regional objectives in the key areas of trade, energy and transportation (Pomfret, 2003b).<sup>20</sup> Table 8 describes the relative level of implementation.

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<sup>19</sup> See UNDP (2005) and [aric.adb.org](http://aric.adb.org) for details.

<sup>20</sup> The Central Asia Regional Economic Cooperation Program (CAREC) was initiated in 1997 to improve living standards and reduce poverty in CAREC countries through more effective regional cooperation. To date, the CAREC program has focused on financing infrastructure projects and improving the regional policy environment in the areas of transport, energy, trade policy and trade facilitation. The countries covered include the Central Asian republics as well as Afghanistan, PRC and Mongolia. Furthermore, the CAREC Program is underpinned by an alliance of multilateral institutions (ADB, IMF, World Bank and EBRD) with the ADB serving as the CAREC secretariat.

**Table 8. Implementation of policy typology<sup>1</sup>**

|                          | Type I & II     | Type III                   |                      |
|--------------------------|-----------------|----------------------------|----------------------|
|                          | Economic reform | Industrial competitiveness | Regional cooperation |
| <b>Oil exporters</b>     |                 |                            |                      |
| Azerbaijan               | high            | low                        | medium               |
| Kazakhstan               | high            | medium                     | medium               |
| Turkmenistan             | low             | low                        | low                  |
| <b>Non-oil exporters</b> |                 |                            |                      |
| Kyrgyzstan               | high            | low                        | high                 |
| Tajikistan               | medium          | low                        | high                 |
| Uzbekistan               | medium          | low                        | low                  |

Source: Author's estimates

<sup>1</sup> High = Strong Implementation.

The recent proliferation of bilateral free trade agreements (FTAs) in the region has added an additional layer of complexity (table 8). In 1995, there were three ADB developing member country FTAs (two bilateral and one cross-regional) notified to WTO. By March 2006, there were 18, with another 21 FTAs already signed or being implemented but which had not yet been registered with WTO. Each Central Asian republics now has at least one FTA in place with each other and some have several overlapping accords. The drive towards political alliances, foreign investment, and market access for small landlocked economies seems to be the main motivation for FTAs in the region. However, the proliferation of a large number of bilateral arrangements can lead to the “spaghetti bowl” effect – a term popularized by Bhagwati (2002). There can be harmful effects caused by multiple rules of origin arising from overlapping agreements among signatories of FTAs. Complex rules of origin increase administrative and business costs, particularly for SMEs which only have a limited capacity to absorb them.<sup>21</sup> Also, if they have large transactions costs, these rules can deter foreign investment and trade. Thus, an economic case can be made for streamlining rules of origin and other procedures that affect business in the Central Asian republics by consolidating overlapping bilateral FTAs. The goal could be a region-wide FTA with relatively low trade barriers compared with the rest of the world, incorporating standards and trade rules compatible with WTO agreements.

<sup>21</sup> No estimates are available of the costs associated with rules of origin for FTAs in Central Asia. A recent literature survey by Tapp (2005) indicates that administrative costs to enterprises pertaining to rules of origin from the EU are in the range of 3 per cent to 5 per cent of the value of exports while that for NAFTA is less than 2 per cent.

Table 9. FTAs/FAs in Central Asia (as of March 2006)

| <b>A. Summary of WTO status</b>           |                     |                          |                         |
|---|---------------------|--------------------------|-------------------------|
|   | <b>WTO notified</b> | <b>Not notified</b>      | <b>Total</b>            |
| <b>Total</b>                              | <b>18</b>           | <b>21</b>                | <b>39</b>               |
| <b>Central Asia only</b>                  | <b>5</b>            | <b>7</b>                 | <b>12</b>               |
| <b>Cross-regional</b>                     | <b>13</b>           | <b>14</b>                | <b>27</b>               |
| Central Asia and others                   | 12                  | 13                       | 25                      |
| Multi-regional                            | 1                   | 1                        | 2                       |
| <b>B. Individual FTAs in Central Asia</b> |                     |                          |                         |
| <b>Agreements</b>                         | <b>Date</b>         | <b>Status</b>            | <b>WTO Notification</b> |
| <b>Central Asia 1 ( Central Asia 7)</b>   |                     |                          |                         |
| Tajikistan-Armenia FTA                    | 1994                | FTA signed               |                         |
| Azerbaijan-Uzbekistan FTA                 | 1996                | FTA signed               |                         |
| Azerbaijan-Turkmenistan FTA               | 1996                | FTA signed               |                         |
| Tajikistan-Kyrgyzstan FTA                 | 1996                | FTA signed               |                         |
| Tajikistan-Uzbekistan FTA                 | 1996                | FTA signed               |                         |
| Azerbaijan-Kazakhstan FTA                 | 1997                | FTA signed               |                         |
| Uzbekistan-Kazakhstan FTA                 | 1997                | FTA signed               |                         |
| Armenia-Kyrgyzstan FTA                    | 1995                | FTA Under Implementation | Yes                     |
| Kyrgyzstan-Kazakhstan FTA                 | 1995                | FTA Under Implementation | Yes                     |
| Armenia-Turkmenistan FTA                  | 1996                | FTA Under Implementation | Yes                     |
| Kyrgyzstan-Uzbekistan FTA                 | 1996                | FTA Under Implementation | Yes                     |
| Armenia-Kazakhstan FTA                    | 2001                | FTA Under Implementation | Yes                     |
| <b>Cross-regional</b>                     |                     |                          |                         |
| Pakistan-Kazakhstan PTA                   | 2003                | PTA proposed             |                         |
| Pakistan-Tajikistan PTA                   | 2004                | PTA proposed             |                         |
| Azerbaijan-the Russian Federation FTA     | 1992                | FTA signed               |                         |
| Uzbekistan-the Russian Federation FTA     | 1992                | FTA signed               |                         |
| CIS FTA <sup>1</sup>                      | 1994                | FTA signed               | Yes                     |
| Tajikistan-the Russian Federation FTA     | 1994                | FTA signed               |                         |
| Azerbaijan-Moldova FTA                    | 1995                | FTA signed               |                         |
| Azerbaijan-Ukraine FTA                    | 1995                | FTA signed               |                         |
| Uzbekistan-Georgia FTA                    | 1995                | FTA signed               |                         |
| Uzbekistan-Moldova FTA                    | 1995                | FTA signed               |                         |
| Tajikistan-Belarus FTA                    | 1998                | FTA signed               |                         |
| Tajikistan-Ukraine FTA                    | 2001                | FTA signed               |                         |
| GUAM FTA <sup>2</sup>                     | 2002                | FTA signed               |                         |
| Common Economic Space <sup>3</sup>        | 2003                | FTA signed               |                         |
| Armenia-the Russian Federation FTA        | 1992                | FTA Under Implementation | Yes                     |
| Kyrgyzstan-the Russian Federation FTA     | 1993                | FTA Under Implementation | Yes                     |
| Armenia-Moldova FTA                       | 1995                | FTA Under Implementation | Yes                     |
| Armenia-Ukraine FTA                       | 1996                | FTA Under Implementation | Yes                     |



Table 9. (continued)

|                                    |      |                          |     |
|------------------------------------|------|--------------------------|-----|
| Azerbaijan-Georgia FTA             | 1996 | FTA Under Implementation | Yes |
| Kyrgyzstan-Moldova FTA             | 1996 | FTA Under Implementation | Yes |
| Armenia-Georgia FTA                | 1998 | FTA Under Implementation | Yes |
| Kyrgyzstan-Ukraine FTA             | 1998 | FTA Under Implementation | Yes |
| Kazakhstan-Georgia FTA             | 1999 | FTA Under Implementation | Yes |
| Turkmenistan-Georgia FTA           | 2000 | FTA Under implementation | Yes |
| EurAsEC Customs Union <sup>4</sup> | 2001 | FTA Under Implementation | Yes |
| <b>Multi-regional</b>              |      |                          |     |
| SCO FTA <sup>5</sup>               | 2003 | FTA Proposed             |     |
| ECOTA                              | 2003 | FTA Signed               | Yes |

Source: ADB Free Trade Agreement Database, released 27 March 2006.

<sup>1</sup> Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Tajikistan, Ukraine, Uzbekistan

<sup>2</sup> Azerbaijan, Georgia, Moldova, Ukraine

<sup>3</sup> Belarus, Kazakhstan, the Russian Federation, Ukraine

<sup>4</sup> Belarus, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Uzbekistan

<sup>5</sup> China, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, the Russian Federation

Two recent studies shed light on the gains from adopting type III policies in Central Asia. First, using a general equilibrium approach, the UNDP human development report for Central Asia (UNDP, 2005) concludes that the region's GDP could be 50-100 per cent higher in 10 years following a comprehensive programme of regional cooperation and integration.<sup>22</sup> This programme would include a reduction in trade costs through more efficient transit, better coordination of water use and flood control, more efficient energy pricing and management, and cooperation in education and knowledge sharing. The UNDP suggests that the cumulative gains would be even higher if this highly dynamic regional economy becomes fully integrated with its neighbours and the world economy. It also indicates that smaller and poor economies of the region – Kyrgyzstan and Tajikistan – would benefit even more. “The benefits from regional cooperation are likely to be distributed in a way that on average helps the poor more than the better off, according to the report” (p. 207).

In the second study, using a scenario planning approach, per capita incomes in the region could double by 2015 and poverty could halve if the region adopted policies for economic reforms, regional cooperation, and industrial

<sup>22</sup> UNDP (2005) also provides some indication of the costs of non-cooperation in the region including costs of agricultural output loss from poor water management of \$1.75 billion and 30-50 per cent GDP lost for major civil wars.

competitiveness (Dowling and Wignaraja, 2006). Policy reforms would include an acceleration of privatization, better corporate governance, financial sector liberalization, and export promotion. Regional cooperation would include an integrated road and rail network, streamlining customs codes and border procedures, and developing a regional energy market and infrastructure. Industrial competitiveness policies would promote diversification, link enterprises global value chains, upgrade supplier development, restructure technology institutions, and foster partnerships between government and the private sector.

## **V. ASSESSMENT AND CONCLUSIONS**

The Central Asian republics experienced a decline in output equivalent to that of the United States of America during the Great Depression. With limited policy reform and the economic downturn that followed the breakup of the Union of Soviet Socialist Republics, some observers were ready to write off the Central Asian republics as hopeless cases. Isolated geographically, suffering severe disruptions and a breakdown in traditional market structures and facing a lack of alternative trade and supply opportunities, it may be easy to understand the early hopelessness. As isolated, landlocked provinces within a large centrally planned economy, the Central Asian republics after independence had to deal with a huge gap in capacity and lack of experience in governance, both in the public and private sectors (particularly as many Russian Federation managers and expatriates returned home). This predicament can not be overemphasized when assessing the performance of the Central Asian republics since 1990.

The Central Asian republics slowly began to cope with this myriad assortment of problems (Starr, 2004). And the evidence that has accumulated since the recession bottomed out in the mid-1990s suggests that, quite to the contrary, an economic revival is under way. While the oil-exporting countries of Azerbaijan, Kazakhstan and Turkmenistan show more robust economic activity, non-oil exporters Kyrgyzstan, Tajikistan and Uzbekistan are also growing more rapidly. Structural change, particularly the expansion of the manufacturing sector, along with poverty reduction, has accompanied the accelerated growth in the region.

This experience highlights the importance of the speed of reform and the nature of the policy mix, based on initial conditions, for a successful transition. The evidence casts further doubt on whether the type I “big bang” approach to economic transition is appropriate in the light of the local conditions (Newbery, 1991; Rana and Dowling, 1993; Rana, 1995). Generally, the approach had a limited impact from 1990 to 1996 in the Central Asian republics. There were disruptions in trade and production with other members of the former Union of Soviet Socialist

Republics, migration of skilled personnel, political instability, loss of investment confidence, and isolation from external markets. Against this backdrop, local entrepreneurs were unable to disentangle reform incentives from innate volatility, which also contributed to a lack of foreign investor confidence with the exception of the mineral sector (where the rents remained high). Furthermore, policies that were adopted did not address the preconditions for growth, efficient and well-functioning markets for goods, services, or factors of production. Nor did they deal with the critical issue of reforming and upgrading institutions from the Soviet era, whether these changes be in the legal system, bureaucratic procedures, or the technical education and capacity-building required of a market economy.

The route Turkmenistan took suggests that a complete lack of reform is not a viable option in the long-term if developing a competitive market economy is the goal (the revival in growth since 1998 was a direct result of higher gas and cotton prices, Turkmenistan's primary exports). Excessive state interference and domestic distortions from the inward, Soviet-style economic policies hinder private sector activity and market development, with the exception of the energy sector. Rural poverty will also likely persist if agricultural reforms and social investments in health and education are not made.

For Uzbekistan – the only Central Asian republics that followed a gradual policy adjustment strategy – there was a smaller decline in output than the more reformist republics.<sup>23</sup> This gradual approach to policy reform shows the importance of keeping some continuity of institutions during transition. Recent performance, however, indicates that now is the time to move on. Inward orientation, import substitution and excessive State intervention from the Soviet era have run their course. The economy may be primed for new economic policies aimed at boosting the private sector in developing a market economy.

With higher commodity prices (particularly oil and gas), an upturn in agriculture, and better implementation of type I and type II policies, local and foreign investors have seen the incentives taking effect from the mid-1990s, particularly in Azerbaijan and Kazakhstan. As a result, FDI increased, with domestic investment following suit. These factors have driven the rapid acceleration in growth since 1998. Structural change, manufactured exports and poverty reduction have all accompanied this growth.

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<sup>23</sup> Others have referred to the relatively limited decline in output in Uzbekistan during the early 1990s amidst cautious economic reform as the "Uzbek puzzle". Loukoianova and Unigovskaya (2004) suggest that Uzbekistan's economic performance may have been overestimated and that its official GDP data are less accurate than those of the other CIS countries. Meanwhile, Zettelmeyer (1998) argues that Uzbekistan's output drop was cushioned by low initial industrialization, its cotton production which could be readily sold on international markets and its self-sufficiency in energy.

Kyrgyzstan is the economy reputed to be the best reformer in Central Asia. However, after some minor gains, it can be characterized by a marked lack of foreign investment, domestic manufacturing competitiveness, and high economic growth. This suggests that further policy measures are needed to accelerate growth in this small, resource-poor, landlocked economy.

Short-term, prospects for the Central Asian republics are optimistic. Through 2008, international financial institutions project annual economic growth in Central Asia to be close to 10 per cent (ADB, 2006 and IMF, 2005). Although inflation is expected to rise somewhat, growth among oil exporters will continue to be propelled by a combination of high world oil and gas prices, buoyant international energy demand, continued inflows of FDI, and larger investments in modern infrastructure. For the non-oil exporters, growth will be somewhat slower. A lot will depend on favourable non-oil export commodity prices (e.g. cotton, gold, aluminum, and other metals) to aid in financing expansion in the services sector, and contribute to the cost of implementing economic reforms.

The gains from better allocation of existing resources, however, could slow as the revival continues. To sustain future growth, type III policies to increase industrial competitiveness and regional cooperation need to be added to the policy mix. These include measures to accumulate higher levels of technology and capacity at the corporate level, which are vital to boosting industrial competitiveness. Market expansion through regional cooperation to realize economies of scale should be paramount. Also, the interaction of FDI inflows within the context of regional cooperation will enhance the ability of the Central Asian republics to reap the benefits of a dynamic comparative advantage for individual countries and the region as a whole.

In this paper, we have shown that initial conditions and policies are critical to economic success during transition. Relying on a "one-size-fits-all" approach that emphasizes rapid reform has brought limited gains in the small, landlocked transition economies of Central Asia. Without the recent boom in commodity prices and continued resource exploitation, the region might have witnessed a much more prolonged period of economic stagnation. To sustain growth during transition, the case was made for a more gradual and more comprehensive approach that includes policy reform, regional cooperation and industrial competitiveness. Implementing a more comprehensive policy agenda requires political stability and good governance, a strong commitment to a nationally agreed policy agenda, and investment in capacity-building for economic policy management in an open economy.

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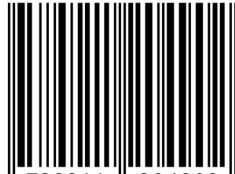
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