EDUCATION AND ECONOMIC DEVELOPMENT IN EAST ASIA SUMMIT ECONOMIES:
A STUDY IN CHINA-INDIA PUBLIC SERVICE EFFICIENCY AND COMPETITIVENESS

Tran Van Hoa

Vietnam and ASEAN Plus Research Program

Centre for Strategic Economic Studies

Victoria University, PO Box 14428, Melbourne, VIC 8001, Australia

Phone: 613 9919 1047, Fax: 613 9919 1350

Email: jimmy.tran@vu.edu.au; Website: http://www.staff.vu.edu.au/CSESBL/

ABSTRACT

As a major component of public services, basic and business education have been recognised by international research on growth as one of the three major contributors to economic development. China's interest in this has been demonstrated in its recent substantial education development policy. The paper generalises the standard growth regression to build a model of China's education-development using recent advances in policy modelling and economic development to provide substantive inputs to assist informed debates on the effectiveness of this policy on national development and public service equalisation. A comparison is then made with the evidence from India to map out the importance of public service policy not only in domestic development but also in the context of regional competitiveness between two major high-growth countries in an emerging East Asia Summit area.

JEL: I21, I28

Keywords: Public Services, Education, Economic Development, Generalised Growth Regression Models, Regional Public Service Efficiency Competitiveness, East Asia Summit, Policy Modelling.

INTRODUCTION

In developing countries such as China and India, the provision of public services and their wide-ranging equalisation and efficiency problems have taken an important part in national policy, academic study and debates in public finance or, more generally, fiscal management. The purposes are to promote economic development, growth, living standards, the people's well-being, and to effect poverty alleviation. This national focus is also often actively supported by international organisations such as the United Nations Development Program (UNDP) or attracts the interest of the Organisation for Economic and Co-operation Development (OECD). In China, the decisions by the 11th Five-Year Plan passed by the National People's Congress in 2006 and the CPC's 17th National Congress in 2007 reflect some of this focus and its planned enhancements which were contained in the 10th Five-Year Plan. From an international perspective, some authors have even claimed that "without extensive, universally distributed public services, there is no way the world can realise the United Nation's *Millennium Development Goals*, endorsed by 189 countries" (George, 2006). We also note that, at the international level, an equalisation of the gap in public service provision in general or in education in particular between China and other developing and developed countries (such as India and Japan in Asia and the OECD countries) is an important policy issue that urgently needs analysis and

remedial rectification (OECD, 2008). Only limited substantive research has been carried out and reported in this area.

The paper is focused on an important component of China's public services, namely education (basic and business) which ranks top (6104,18 million yuan) in government expenditure in 2005, exceeding national defence (2474,96 million yuan) (NBS, 2008). The paper has three aims. *First*, it surveys the *status quo* and trends in public outlay in China, and provides not heuristic but substantive quantitative evidence on the effectiveness of education in promoting growth and development. This evidence can be used for developing appropriate and effective public service equalisation policy in the country where public finance and especially expenditure have assumed a more important role in economic management since the 2001 WTO membership and with new and effective tax revenue bases and their perceived burden on the taxpayers (Gao, 2006). *Second,* the paper provides a comparison with the effectiveness of education on growth and development in India where the government's current policy is to develop, as part of its 'Look East Policy" and global economic integration, appropriate reforms to enhance its growth and development, international competitiveness, and regional co-operation (Tran Van Hoa, 2007b). *Third*, for practical policy implications, the comparison is also useful for national long-term strategic exploratory and planning purposes for the world's two most populous and currently high-growth economies, China and India. These two countries are also two major competitors in economic performance, trade and economic relations, and political influence in the East Asia Summit sphere (Thirlwell, 2007).

RECENT TRENDS IN PUBLIC SERVICE EXPENDITURE IN CHINA AND INDIA

The trend and dynamics of major public service expenditure shares and distribution during 1978-2005 among the major components in China that are relevant to our paper are depicted in Figure 1. In 2005, the total expenditure of these components accounted for 69.15 per cent of China's total government expenditure of 2,305,278 million yuan. The data show a number of interesting movements in public expenditure in China in almost three decades. *First*, there was a remarkable rising trend in expenditure on education, culture, science and public health (EHY), starting at 112,66 million yuan (11.38 per cent of total public service expenditure) in 1978 and moving up to 6104,18 million yuan (26.48 per cent) in 2005. This expenditure however peaked at nearly 28 per cent during the reforming period 1994-1997. *Second*, expenditure to support rural production (RUY) peaked at over 8 per cent during 1989-1996 and 2004 but remained interestingly unchanged at 7.78 per cent in both 1978 and 2005. *Third,* in contrast, administrative expenses (AY) stood at 4,990 million yuan (4.96 per cent) in 1978 but grew steadily and reached 4835,45 million yuan (20.98 per cent) in 2005. *Fourth*, expenditure on policy-related subsidies (POY) was high (over 10 per cent) during 1980-1992, but declined substantially to 998,47 million yuan (or 4.33 per cent) in 2005. Throughout the period, expenditure on pensions (PEY) had been lowest and slowly rising, but expenses on innovation, science and technology (IFSTY) had been sharply declining since the mid-1980s.

FIGURE 1: THE TREND AND DYNAMICS OF CHINA'S PUBLIC SERVICE EXPENDITURE, 1978-2005
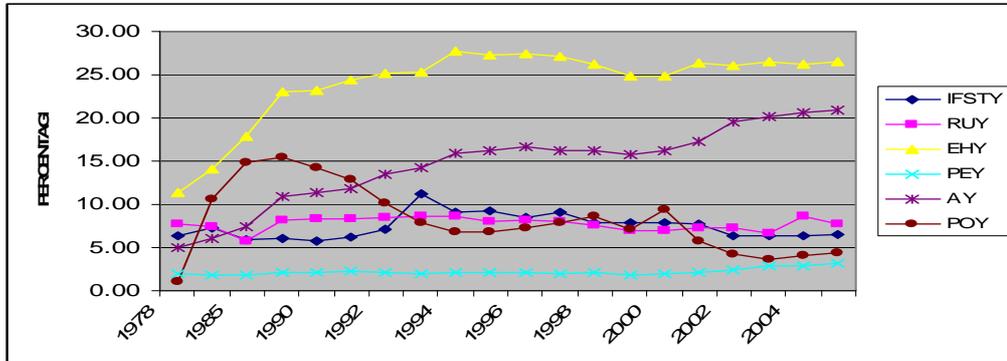
Sources of data for Figures 1-3: NBS (2008), RBI (2008). The full data are given in Appendix.

For regional comparative purposes, the composition of average government expenditure (China) and public outlay (India) shares by item or sector is given in Figures 2 (China) and 3 (India). The average shares were computed from the period 1978-2007. For China, we note that, during 1978-2005, expenditure on education, culture, science and public health (EHY) was a major component of public services. It took up to 24.07 per cent of the country's total government expenditure, and had exceeded expenditure for national defence since 1985. Another relevant component is expenditure for supporting rural production (RUY) which stood at 7.74 per cent. While innovation funds and science and technology promotion funds (IFSTY) accounted for 7.43 per cent, it is interesting to note that administrative expenses (AY) and expenditure on policy-related subsidies (POY) are much higher at 14.59 per cent and 8.17 per cent respectively. For India (Figure 3), we note for relevant sectors that, during 1986-2007, the shares of public outlay on education and health (including medical) (EDU and HEALTH) stood at 5.24 per cent and 4.43 respectively, or 9.67 per cent for both. For China, the equivalent sum was 24.07 per cent. Rural development and special areas (RURAL) programs used up to 8.62 per cent of India's total public outlay, a proportion not far away from its China's equivalent of 7.74 per cent.

FIGURE 2: CHINA'S GOVERNMENT EXPENDITURE SHARE BY ITEM, AVERAGE 1978-2005
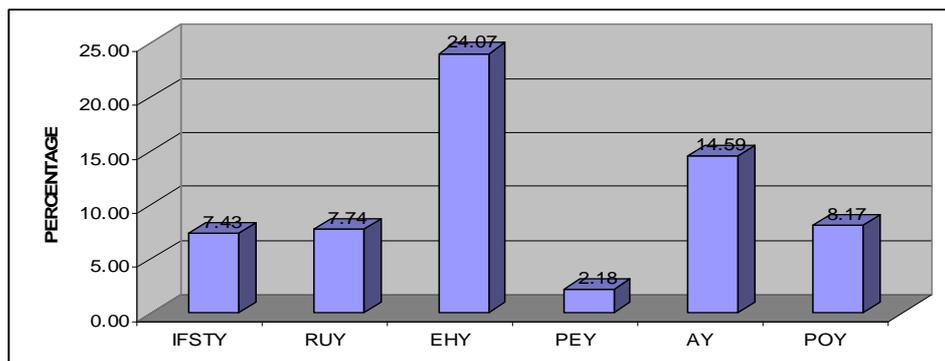
Three pertinent and legitimate questions of research and policy interest here are: *first*, as an end-outcome for policy analysis, what is the actual contribution the various items or sectors of public expenditure that has been made to the Chinese economy during the period under study? *Second,* what are the implications of this knowledge for developing appropriate and efficient future policy for public services in China? *Third,* what are China's competitiveness and challenges in public service allocation and management in a regional or global economy with growing regional economic integration (e.g., the emergence of East Asia Summit) and increasing globalisation?

FIGURE 3: INDIA'S PUBLIC OUTLAY SHARE BY SECTOR, AVERAGE 1986-2007
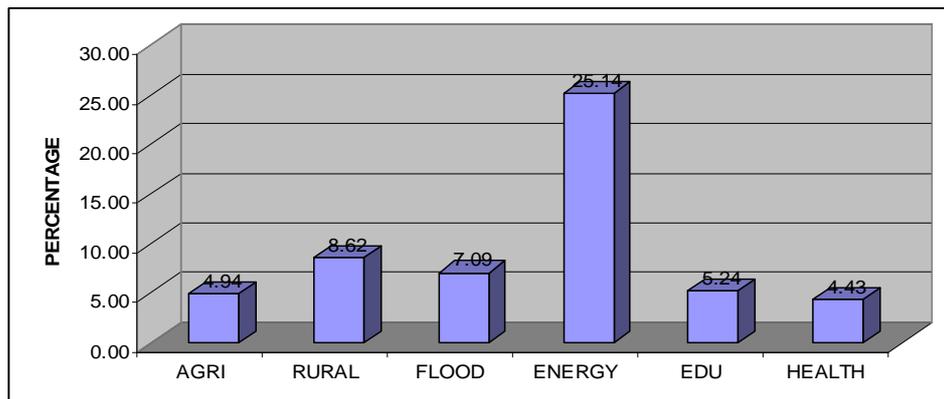
In the analysis below, we depart from a descriptive or statistical analysis and will develop a logical structure and, using official historical data, to empirically study in particular the effects of the two major and relevant components of government expenditure or public outlay, namely education and health and rural support, on development in China and, for regional strategic comparison, in India. Substantive findings are then reported and analysed. Appropriate policy recommendations on national public service or fiscal equalisation, and regional and global competitiveness enhancement are then suggested for possible use by corporate and government education policy-makers.

A MODEL OF PUBLIC SERVICES AND GROWTH FOR POLICY USES AND SUBSTANTIVE EVIDENCE FOR CHINA AND INDIA

Development, or equivalently growth, and its determination are traditionally a difficult field of study, conceptually and in practice. At the conceptual level, there is a large number of competing growth theories to explain development or to explore its determination. These include the production or expenditure channel as accepted in the United Nations System of National Accounts 1993 (SNA93), investment, innovation (or knowledge) and productivity sources, the wages-gross operating surplus components, industrial relations structure, the labour-school enrolment or skills or gender aspects, or the organisational management behaviour (see also Perkins *et al.*, 2006), to name a few.

At the practical level, much economic growth research has been focusing on exploring or finding the likely factors or actions determining growth (Easterly, 2007). This focus is attributable to either the lack of a general consensus on a *singular* growth

causation process or the increasingly acceptable recognition by senior experts in international organisations (e.g., the World Bank) of the 'applied, applied' nature of growth determination analysis (Krueger, 2007). As its methodology, this exploratory and applied line of research usually assumes *a priori* a set of linear equations and their structural or policy impact parameters (e.g., the computable general equilibrium approach or CGE) or a growth regression relationship. A number of important issues arise in this context. *First*, the lack of realism or credibility of the CGE for policy uses is well-known, due to its strict neo-classical assumptions that are often tenuous or inconsistent with real-life observations (Eichengreen et al., 2007). *Second*, the fragility of the so-called growth regression approach has been discussed by Levine and Renelt (1992) who show that conventional growth regression results are not robust. That is, they are very susceptible to changes in the set of macroeconomic conditioning factors or variables that are often used in growth regression. *Third,* these macroeconomic conditioning factors are not usually explicitly taken into account in an interdependent or simultaneous-equation context as they should be theoretically. *Fourth,* the actual functional form of the regression equations which is, usually or as a convention, linear or log-linear in the selected explanatory and independent variables, has also been advanced as a main cause of the fragility of growth regression results (Astra et al., 2005; Minier, 2007). *Fifth,* the exclusion of the effects of structural change, domestic reforms or crises, or regional shocks such as domestic turmoil, terrorist attacks, SARS, avian flu, tsunamis or cyclones (see Edwards, 2007), and the time-varying impact of the Prescott (a Nobel laureate) type in growth regression equations has also been suggested as a source of fragility (Durlauf and Johnson, 1995; Tran Van Hoa, 2005).

In a number of recent papers, Tran Van Hoa (e.g., 2004 and 2007a) uses a simple, new, effective and general integrated modelling approach to empirically study growth and its causal link to trade, investment, official development assistance (ODA), reforms and crises in major developing countries in Asia in recent years to provide inputs to improved development policy analysis, formulation and implementation. This approach provides a number of improvements on the limitations of the three popular approaches mentioned above. It also produces significantly more credible outcomes in the sense of model-data consistency as advocated by Nobel laureate Finn Kydland (2006). The approach, a so-called generalised growth regression, is adopted here to develop a model of China's (and India's) public services and growth (or development) for analysis and policy uses.

The Model

A simple and new public services-growth causality model for China (and India) and its improved features for more reliable policy uses can be briefly described as follows. We consider, for convenience and without loss of generality, a simple model of two simultaneous (circular causality) implicit or arbitrary functions for income (Y) and public services (PS) where the form of the functions is, importantly, not assumed *a priori* or routinely as linear or log-linear. The rationale or theoretical underpinning of the model is that it comprises and extends the basic economic-theoretic postulates of the well-known growth regression approach (Levine and Renelt, 1992), the interdependence between economic activities (Krueger, 2007), Johansen macroeconomic policy factors (1982), and the Keynesian SNA93 income accounting identity, by linking essentially income to PS, investment, ODA, economic policy,

shocks and reforms (Tran Van Hoa, 2004 and 2007a). This model incorporates, in one important structural specification aspect, not only economic factors but also geographic or demographic attributes and demographic dynamics (see Kydland, 2006). Thus for simplicity

$$F1(\alpha, Y, PS, FDI, ODA) = 0 \tag{1}$$
$$F2(\beta, PS, Y, ODA, X, W) = 0 \tag{2}$$

where F1 and F2 are two arbitrary functionals linking income and their theoretically plausible (and empirically testable) causal determinants such as PS, foreign direct investment (FDI) and ODA. In this model, Y may be defined as GDP or income per head of population (Easterly, 2007). ODA is net ODA grants to a recipient country or countries in focus. X and W denote, respectively, other economic (fiscal, monetary, trade and industry policy – see Sala-i-Martin, 1991) and non-economic (e.g., size, policy reform and external shocks – see Johansen, 1982; Tran Van Hoa, 2004) variables, relevant to a country's growth or development. A more recent use of shocks in applied econometric modelling is presented in Edwards (2007). Importantly for our empirical study, in addition to data for Y, PS, FDI, and ODA, data for X and W must be available and consistent with published time-series data in a standard Kuznets-type accounting framework (e.g., SNA93), or the recent World Bank World Tables.

Using Taylor's planar approximations (e.g., see Tran Van Hoa, 1992 and 2004), the 2-equation model (1)-(2) can be written equivalently in stochastic form and in terms of the rates of change for continuous economic variables (e.g., Y%, PS%, FDI%, ODA%, X%) and W of all the included endogenous and 'conditioning' variables (Y, PS, FDI, ODA, X and W) as

$$Y\% = \alpha_1 + \alpha_2 PS\% + \alpha_3 FDI\% + \alpha_4 ODA\% + u_1 \tag{3}$$
$$PS\% = \beta_1 + \beta_2 Y\% + \beta_3 ODA\% + \beta_4 X\% + \beta_5 W + u_2 \tag{4}$$

A more recent application of this approximation is described in Baier and Bergstrand (2008). Methodologically, in (3)-(4), Y% is simply the growth or development indicator (the rate of change in GDP) and the equations are linear and interdependent in the sense of Marshall or Haavelmo, α's and β's are the elasticities or impact parameters, and u's other unknown factors outside the model (Frankel and Romer, 1999) or the disturbances with standard statistical properties. In addition, in (3)-(4), circular and instantaneous causality exists and is regarded as a *testable* hypothesis. In their exact or non-stochastic forms (in which all disturbances are idealistically zero), these equations form the basic structure of the CGE models of the Johansen class, in which all elasticities are usually assumed (calibrated) to be given or known *a priori* and the impact of endogenous (say PS) or endogenised variables on Y is dependent on the exogenous variables and calculated system-wise using such iterative procedures as the Gauss-Euler algorithm with a known sparse matrix of elasticities. It can be verified that our so-called flexible (or function-free) PS-growth equation (3) in the model above is econometrically identified in the sense of mathematical consistency, and it can be estimated by an appropriate econometric method [i.e., an instrumental variables or two-stage least-squares (2SLS) technique] to provide efficient parameter estimates for reliable findings and subsequent policy recommendations.

The Data

Data for estimation were obtained from the online databases of China's National Bureau of Statistics (2008), ICSEAD (2007), and the Reserve of India (RBI 2008). For consistency with previous econometric impact studies, all economic (except GDP) data are in current value. In our study, all original data are obtained as annual (higher frequency data are not available) and then transformed to their ratios (when appropriate). The ratio variables include PS or, in our study, its major components such as education, health, innovation, science and rural subsidies, FDI, ODA, monetary policy, and government budget, all divided by current GDP to obtain country-specific heterogeneity harmonisation. Other non-ratio variables include unemployment (representing industry policy), population and binary variables that represent the occurrence of the economic, financial and other major crises, policy shift or reforms over the period 1986 to 2005 that may have affected China's (and India's) development. All non-binary variables are then converted to their percentage rate of changes. The use of this percentage measurement is a main feature of our policy modelling and impact approach, and avoids the problem of *a priori* chosen functional forms (e.g., the linear and log-linear transformation) and also of logarithmic transformations for negative data such as budget or fiscal deficits.

Substantive Empirical Findings

The estimates of the public services-growth models for China and (for comparison) India, obtained appropriately by the 2SLS estimation method, are given in Table 1.

Statistical Reliability Interpretation

From the results given in Table 1, we note a number of important findings. *First*, all four estimated models of growth (i.e., the rate of change in GDP and in GDP per capita) for China and India explain a high level of observed variance (that is, with R^2 of about 90 per cent and above). *Second,* when we look at the dynamic features of the estimated models using either plots or standard diagnostic tests, all estimated models appear free from serious first- or higher-order autocorrelation-induced or simple Markov scheme inefficiency problems. *Third*, the education and health components of public services have statistically and economically different effects on growth in China and India. More specifically, while education and health expenditure in China have a strong and negative impact on China's growth, they have a weak but positive effect on India's development. *Fourth*, rural subsidies have a beneficial impact on growth in both China and India. This impact is statistically moderate only for income per head in India. *Fifth,* the introduction of FDI into the models, as recommended from other international empirical studies on growth (e.g., Levine and Renelt, 1992) or as a dynamic variation of the time-tested classical capital-labour production function, shows uniformly its positive contribution to growth in both countries but very strongly in China. *Finally,* the introduction of crises, shocks or major policy reforms into the models provides substantive evidence about the characteristics of these crises, shocks, or policy reforms, and the roles they have played in, or contributed to, the economic performance of China and India in recent years.

TABLE 1: PUBLIC SERVICES AND GROWTH IN CHINA AND INDIA CAUSALITY MODELLING IN FLEXIBLE STRUCTURAL EQUATIONS, 1986-2005 2SLS ESTIMATION

	CHINA		INDIA	
	GDP	Income/Head	GDP	Income/Head
Variables	Impact	Impact	Impact	Impact
Constant	3.994**	2.541**	1.950*	0.825
Education/GDP			0.004	0.046
Health/GDP			0.001	0.007
Education+Health/GDP	-0.186**	-0.195**		
Rural Subsidies/GDP	0.028	0.029	0.043	0.071*
Innovation+Technology/GDP	-0.046**	-0.047**		
Unemployment	-0.014	-0.015		
FDI/GDP	0.036**	0.036**	0.005^	0.003
ODA/GDP	0.001	0.001	0.001	0.002*
China Reforms 1991	5.083**	5.186**		
China Reforms 1993	0.646	0.775		
India Reforms 1995			6.067**	4.459**
Asia Crisis 1997	0.047	0.367	-1.509	-0.543
Terrorist Attacks 2001	-0.322	-0.085	-2.239*	-2.206*
India Reforms 2004			3.864**	3.884**
R^2	96.18	96.30	89.92	89.28
DW	2.74	2.68	2.87	2.78

Sources of data: ICSEAD Economic and Trade Data (2007), NBS (2008), RBI (2008). Sample size=20. Notes: ** significant at the 5% level, * significant at the 10% level, ^ significant at the 15% level.

The modelling performance of the models above can also be evaluated, for more credibility or realism of the derived policy recommendations (to be discussed below), by the Kydland data-model consistency criterion (2006) where the trend and discrepancy between historical data and modelling predictions have to be tight and small. This performance is given in Figures 4 and 5 for both real GDP and income per head modelling in China and India. The success of our modelling education and health expenditures in China and India and their impact on development can be ascertained from Figure 6 where actual education and health expenditures and their modelling forecasts are given. A visual of Figures 4-6 indicates that all the models emulate well the troughs, peaks and turning points of GDP, income per head, and education and health expenditure shares in the two countries over the whole sample period.

FIGURE 4: MODEL-DATA CONSISTENCY PERFORMANCE BY KYDLAND CRITERION – CHINA'S GDP AND GDP PER CAPITA GROWTH
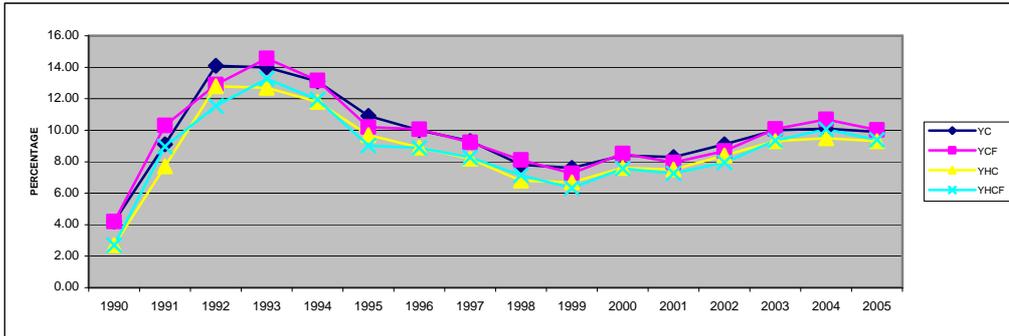

FIGURE 5: MODEL-DATA CONSISTENCY PERFORMANCE BY KYDLAND CRITERION – INDIA'S GDP AND GDP PER CAPITA GROWTH
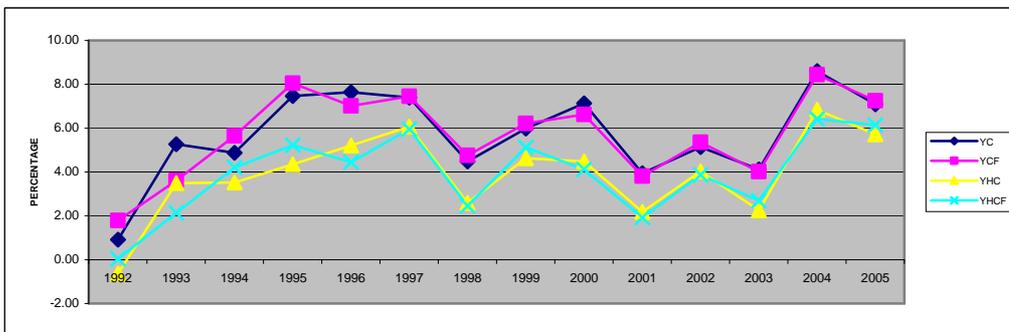
FIGURE 6: MODEL-DATA CONSISTENCY PERFORMANCE BY KYDLAND CRITERION – EDUCATION EXPENDITURE/GDP GROWTH IN CHINA AND INDIA
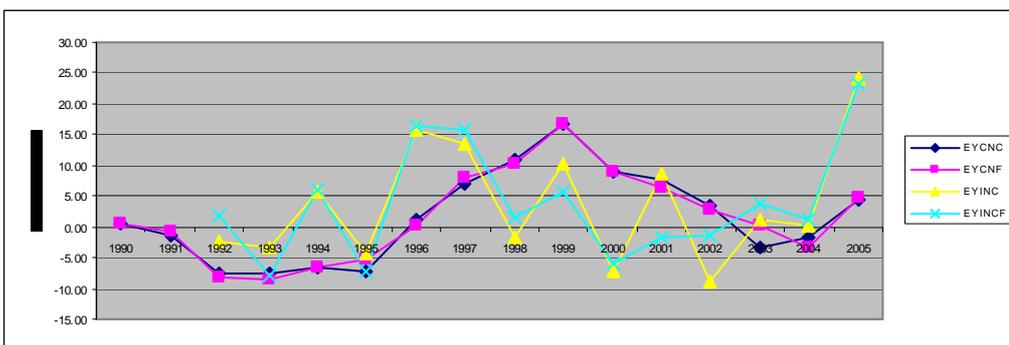
Notes: In Figures 4-6, YC=actual GDP growth, YHC=actual GDP per head growth, and YCF and YHCF are their predictions based on estimates in Table 1. EYCNC=China's actual education and health expenditure/GDP growth, EYCNCF=predicted EYCNC, EYINC=India's actual education expenditure/GDP growth, EYINCF=predicted EYINC.

POLICY IMPLICATIONS FOR CHINA'S NATIONAL AND INTERNATIONAL PUBLIC SERVICE AND COMPETITIVENESS EQUALISATION

While the *integrated* public services-growth (or generalised growth regression) models we introduced above may be simple in their structure, they contain the main ingredients and significant extensions of classical analysis on growth causality relationships for China and India, two high-growth countries in Asia and two global competitors in trade and economic relations. The models are also fairly consistent, for comparative purposes, with similar previous studies of a different and more limited kind (e.g., the CGE, growth and panel regression, or other quantitative growth determination studies). The causal empirics reported in the preceding section also provide a number of interesting and new insights, relevant to public service equalisation in China as currently required by its national development policy. They are also relevant to regional and global public service equalisation or catch-up policy in Asia and beyond as currently assessed and recommended by senior national policy-makers in China and India (e.g., Gao, 2004 and 2006; Bhattacharya, 2007) and the OECD (2008).

The Contribution of Education and Health Expenditures to Development

The findings reported in Table 1 indicate that education and health expenditures, as two components of public finance, had played a different part economically and statistically in China's and India's development and growth during the period 1986-2005. In the case of China, the impact is negative and highly significant. This seems to be at odds with other measures of achievements from education spending such as the expansion of education enrolment and staff, infrastructures and public service provision as reported by the MOE (2008) survey. In the case of India, the impact is however beneficial but statistically weak. The findings can be explained in a number of ways. *First*, in the case of China, the expenditure includes spending on a number of diverse items such as culture, education, science and public health. It is reasonable to expect that spending on culture and science might not have an immediate effect on economic development activities. *Second*, while growing health expenditure may reflect population growth demand, it may also represent a state of the people's well-being that requires immediately simply more resources. *Third,* increasing education expenditure and the expected subsequent improvement in labour skills, management and technology may also be regarded as an investment with long-term outcomes. Our models do not deal with these issues in the paper. In the case of India where separate data are available for education and health, the impact of these expenditures on development is positive but statistically weak.

As our findings are based on an aggregate of all expenditures at all three levels of education and in all regions of the country, they may be biased and not be able (due to a lack of appropriate data) to capture the precise contribution of a specific type of education (such as business) to development. As there is no solution on the detailed data question at this stage, it is worth mentioning a number of issues that can improve the empirical findings for use in policy analysis of public service equalisation and its impact on development. One particular area of high relevance is the issue of central-local fiscal transfers since, while collectively spending 69 per cent of total fiscal expenditure, local governments in China are responsible for close to 90 per cent of

total budgetary spending on health and education (Grewal, 2006). Other possible areas for study include official budget consolidation or centralisation, accounting system reforms, setting key performers, duplication avoidance (see OECD 2008), reduction of disparity in access and equity through the effective inter-governmental transfer/equalisation scheme (see World Bank, 2008), and private public partnerships. These are relevant and important aspects of education reforms but they are however outside the scope of our present research.

Despite these caveats, our findings should be taken as a representation of the actual state of an important component of public services in both China and India that requires serious attention and analysis at this stage, and that needs further study as a matter of relevant public policy research. A major implication of our findings is that there is, particularly, econometric support for effective education reforms in China and for improving its regional competitiveness. These reforms have been recognised, since 1986, as being central to China's 'Four Modernisations' and directly connected to its economic and social development. It has also attracted extensive interest and generated a voluminous literature worldwide.

Is Expenditure on Rural Support Useful for Development?

In contrast to education and health, our findings appear to lend support to the beneficial effects of public expenditure to support rural production (China) and in rural development and special areas programs (India) (two national priorities) on development and growth in both countries. A simple interpretation of the findings is that they are as expected, as both countries are currently in their early development stages and essentially rurally based as measured by their urban and rural population distributions. The benefits from rural support here are interesting however in the sense that they are obtained in spite of the fact that this type of public expenditure is relatively small and fairly stable as a share of total public expenditure (see Figure 1 for China) and also small as a proportion of GDP in both countries (at 0.88 per cent and 0.80 per cent for China and India respectively) during the sample period when compared to that of education and health in the case of China (2.89 per cent) or India (0.92 per cent). They are also interesting because the data for this expenditure share (not reported here) showed great volatility in both countries over the period under study. The precision of our findings in terms of their weak statistical efficiency especially in the case of China however needs further analysis.

The Role of National Reforms and Regional or Global Crises on Development

In the specification of our public services-growth models above, we have incorporated a number of developments in the region that could have impeded or enhanced growth and that, at this stage of their evolution, other existing modelling growth approaches in this area (such as the CGE and growth regression) have overlooked or are unable to accommodate. These developments include: (a) national resistance to reform in order to maintain the status quo, due to either a 'fear of the new' or for reasons of political ideology; (b) unexpected shocks and crises; and (c) major structural changes and 'good-in-a-market-economy-sense' policy reforms. China's major state-owned-enterprises (SOE) reforms of the early 1980s and its pro-FDI reform in the early 1990s, and India's decade-long reforms after the balance of payments crisis of 1991-2002 and its 'Look East Policy" of the early 2000s, have been considered fair

examples of 'good' structural reform. On the other hand, the emergence of economic and financial crises and turmoil in China, India, regionally or globally may be regarded as developments that can seriously hinder growth, regardless of the presence of other engines of positive economic development. The effects of relevant crises and reforms in China and India, as obtained from our models, can be seen from Table 1. As these crises and reforms are specific to China or India, we have avoided the problem of country-specific bias resulting from the so-called fixed-effects of the currently popular panel growth regression studies (see Eichengreen et al., 2007).

The overall picture of our reported findings is that, in studies of development and growth, the effects of 'good' reforms and 'damaging' crises can be highly significant and generally outweigh the contributions made by the consumer, investor, government and trade sectors of the economy. More specifically, China's reforms of the early 1990s and India's reforms of the mid-1990s and 2000s are found to have made significant contributions to these economies' development. On the other hand, the terrorist attacks in 2001 on the World Trade Centre in New York and on Washington DC are found as damaging factors to growth in both China and India but with a different level of certainty.

Education Effectiveness and Regional Competitiveness between China and India

The findings in Table 1 also provide important insights into public expenditure on education (and related skills improvements) which has been planned as a national priority for development in China and India, and recognised as a key engine of growth by international research on growth (e.g., Levine and Renelt, 1992). The importance of education expenditure in national development and regional competitiveness as measured by its public expenditure shares in China and India has also recently been raised by Bhattacharya (2007) in his presidential address to the 90th Conference of the Indian Economic Association in Kasmir. Despite this or similar concerns in India, our findings reported in Table 1 show that India appears to have an efficiency edge in its education expenditure outcomes even though its share in GDP (0.49 per cent or 0.92 per cent including health) is much lower than that in China (2.89 per cent including health) during the sample period.

What is the relevance of our findings to international assessment of China's public expenditure and regional competitiveness? In its recent report, the OECD (2008) suggests funding boost and more efficiency on education and health expenditures in China in the country's drive to modernise the economy and to bring the country's government spending to ultimately the OECD level (44.5 per cent in 2003). Our study here indicates however that, while the size or scale of public spending in general or of education (basic and business) in particular may be important, its efficiency is perhaps more relevant to national development and regional competitiveness. The substantive findings reported in Table 1 for China and India would support this assessment.

How to improve efficiency in China's education expenditure to promote development and growth? Public expenditure equalisation between say the national and local governments as mentioned earlier and also recommended by the OECD (2008) is one of the areas for improved efficiency for further study. Unevenly distributed education funding between Chinese regions and the emphasis on tertiary institutions at the expense of secondary schools are two other areas of attention assessed by the OECD

(2008). A study of India's efficiency edge over China in education expenditure outcomes and its role in regional and global competitiveness not only in economic development but also in trade and economic relations is another important area for future research.

The Impact of Financial Flows and ODA on Development in China and India

In our study, the effects of some major components of public services on development and growth in China and India were empirically obtained. These effects give some substantive insights into the effectiveness of public expenditure even though their statistical properties are in some cases weak and need further research preferably with a larger dataset (when it is available). However, the models we have postulated and estimated with our existing data are also able to provide substantive evidence on the impact of private and public financial flows (through FDI and ODA, two major areas of international economics) into China and India. In these two major developing and currently high-growth countries in the East Asia Summit region, our findings lend statistical support to the beneficial national policy of FDI-led development and growth. For strategic policy analysis, China appears to have an edge over India in FDI utilisation in this case. ODA is found on the other hand to have only small and negligible benefits on these two countries. Similar findings have been found for other developing countries such as Thailand and Vietnam in Asia (see Tran Van Hoa, 2007a). Perhaps, the efficiency of ODA in recipient countries is another issue that needs to be studied in more detail in the future.

CONCLUSIONS

In the preceding sections, we have briefly described the trends and patterns of public service expenditure in China and, for comparison, India, and developed a systematic structure to study its impact on development and growth. The resulting generalised growth regression models make use of recent developments in economic growth analysis and recent advances in econometric policy modelling. The estimated models provide substantive findings on the impact of two major national-priority components of public services, namely education (including health in the case of China) and rural support, on development and growth in China and, for strategic comparison, India. The findings provide empirical inputs to the current national and international debate, focus and research on public expenditure efficiency, management and equalisation. Importantly, the findings also provide empirical inputs for discussion on the aspect of regional and international competitiveness between the two economic giants in the East Asia Summit region within the context of increasing globalisation. Further research on the issues canvassed and raised in the paper is highly recommended for government and institution support.

REFERENCES

Baier, S L and Bergstrand, J H (2008), 'Bonus Vetus OLS: A Simple Method for Approximating International Trade-Cost Effects using the Gravity Equation', forthcoming.

Bhattacharya, B B (2007), 'Education, Skill Formation and India's Economic Development', Presidential Address, 90th Conference of the Indian Economic Association, 25-27

October 2007, University of Kashmir, Srinagar, India.

Durlauf, S N and Johnson, P A (1995),'Multiple Regimes and Cross-Country Growth Behaviour', *Journal of Applied Econometrics*, Vol. 10, No. 4, 365-84.

Easterly, W (2007), 'Was Development Assistance A Mistake?', American Economic Association Meeting, 5-7 January 2007, Chicago

Edwards, S (2007), 'Globalization, Crises and Growth', 2007 Max Corden Lecture, University of Melbourne, Melbourne, 11 Ocotober 2007.

Eichengreen, B, Rhee, Y and Hui Tong (2007), 'China and the Exports of Other Asian Countries', *Review of World Economics,* vol. 143, 201-226.

Gao P (2004), *China Fiscal Policy Report 2004-2005: the ScientificDevelopment Concept— Guiding New Train of Thoughts on China's Fiscal Policy,* Beijing, China Financial and Economic Press, 2004.

Gao P (2006), 'Chinese Revenue Position: Current Status and Future Trend', Paper Presented at the ACESA 2006 Conference *Emerging China: Internal Challenges and Global Implications*, Melbourne. 13-14 July 2006.

George, S (2006), 'Preface', in D. Chavez (ed) *Beyond the Market: the Future of Public Services,* http://www.tni.org/detail_pub.phtml?know_id=96. Accessed 9 Feb 2008.

Grewal, B. (2006), 'Distribution of Fiscal Transfers: Why Fiscal Capacity Equalisation Is Not the Right Policy for China', Proceedings of the ACESA 2006 Conference *Emerging China: Internal Challenges and Global Implications*, Melbourne. 13-14 July 2006.

Frankel, J A and Romer, D (1999), 'Does Trade Cause Growth?', *American Economic Review*, vol. 89, 379-399.

ICSEAD (International Center for the Study of East Asian Development) (2007), http://www.icsead.or.jp/index_e.html. Accessed 9 Feb 2008.

Johansen, L (1982), 'Econometric Models and Economic Planning and Policy: Some Trends and Problems', in Hazelwinkle, M and Rinnoy Kan, A H G (eds) (1982), *Current Developments in the Interface: Economics, Econometrics, Mathematics*, Boston: Reidel, 91-122.

Krueger, A O (2007), 'Understanding Context and Interlinkages in Development Policy: Policy Formulation and Implementation', American Economic Association Meeting, Chicago, 5-7 January.

Kydland, F E, (2006), 'Quantitative Aggregate Economics', *American Economic Review*, vol. 96, no. 5, 1373-1383.

Levine, R and Renelt, D (1992), 'A Sensitivity Analysis of Cross-Country Growth Regressions', *American Economic Review*, Vol. 82, No. 4, 942-63.

Minier, J (2007), 'Nonlinearities and Robustness in Growth Regressions', American Economic Association Meeting, 5-7 January 2007, Chicago

Ministry of Education (2008), 'Survey of the Educational Reform and Development in China', http://www.edu.cn/english_1369/. Accessed 9 Feb 2008.

NBS (2008), National Bureau of Statistics, 'Government Expenditure by Main Item', http://www.stats.gov.cn/tjsj/ndsj/2006/html/H0804E.HTM. Accessed 9 Feb 2008.

OECD (2008), 'China', http://oecd.org/document/. Accessed 9 Feb 2008.

Perkins, D H, Radelet, S and Lindauer, D L (2006), *Economics of Development*, New York: Norton.

RBI (2008) Reserve Bank of India, http://www.rbi.org.in/scripts/AnnualPublications.aspx?head=Handbook%20of%20 Statistics%20on%20Indian%20Economy. Accessed 9 Feb 2008.

Thirlwell, M P (2007), 'India: The Next Economic Giant', *Lowy Institute Paper 01*, http://lowyinstitute.org/Publication.asp?pid=154, Accessed 1 Oct 2007.

Tran Van Hoa (1992), 'Modelling Output Growth: A New Approach', *Economics Letters*, Vol. 38, 279-284.

Tran Van Hoa (2004), 'Korea's Trade, Growth of Trade and the World Economy in Post-crisis ASEAN+3 Free Trade Agreement: An Econometric and Policy Analysis', *Journal of the Korean Economy*, vol. 5, no. 2, 73-108.

Tran Van Hoa (2005), 'Impact of Economic Policy Reform and Regional and Global Shocks on Trade and Growth in East Asia: Econometric Evidence for China', *Journal of the Korean Economy*, vol. 6, no. 2, 215-244.

Tran Van Hoa (2007a), "Causal Empirics and Political Economy of Official Development Assistance and Development in Asia: The Case of Vietnam", *Journal of the Korean Economy*, Vol. 8, 91-119.

Tran Van Hoa (2007b), 'ASEAN3+India Trade Relations: Implications for Growth, Reforms, 'Look East' Policy and Economic Diplomacy', *Margin* (Journal of the National Council of Applied Economic Research, India), India, Vol. 1, No. 4, 341-357.

World Bank (2008), 'China', http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFI CEXT/C HINAEXTN/0,,contentMDK:21016303~isCURL:Y~menuPK:318981~pagePK:1497 618~piPK:217854~theSitePK:318950,00.html.

APPENDIX

TABLE 2: CHINA'S GOVERNMENT EXPENDITURE SHARES BY ITEM, 1978-2005

YEAR	IFSTY	RUY	EHY	PEY	AY	POY	% OF TOTAL EXPENDITURE
1978	6.39	7.78	11.38	1.91	4.96	1.13	33.54
1980	7.25	7.40	14.09	1.83	6.02	10.61	47.21
1985	5.84	5.71	17.89	1.76	7.38	14.79	53.38
1989	6.08	8.20	23.01	2.06	10.89	15.52	65.76

YEAR						
1990	5.78	8.33	23.17	2.07	11.38	14.30	65.02
1991	6.21	8.37	24.32	2.31	11.80	12.84	65.86
1992	7.10	8.54	25.16	2.11	13.47	10.21	66.58
1993	11.16	8.57	25.38	1.99	14.19	7.93	69.23
1994	9.02	8.68	27.76	2.07	15.84	6.83	70.19
1995	9.20	8.00	27.30	2.15	16.24	6.79	69.68
1996	8.41	8.20	27.40	2.06	16.73	7.30	70.10
1997	9.15	7.97	27.07	2.02	16.17	7.85	70.22
1998	7.82	7.63	26.27	2.09	16.18	8.68	68.67
1999	7.88	6.97	24.78	1.85	15.70	7.18	64.38
2000	7.85	6.96	24.83	1.93	16.22	9.46	67.24
2001	7.78	7.20	26.36	2.09	17.23	5.82	66.48
2002	6.35	7.23	26.09	2.45	19.53	4.23	65.87
2003	6.42	6.66	26.46	2.93	20.19	3.62	66.28
2004	6.34	8.63	26.20	2.87	20.68	4.05	68.76
2005	6.48	7.78	26.48	3.11	20.98	4.33	69.15
1978-2005 Average	**7.43**	**7.74**	**24.07**	**2.18**	**14.59**	**8.17**	**64.18**

Note: For Tables 2-3, see text for the definition of the variables.

TABLE 3: INDIA'S PUBLIC OUTLAY SHARES BY SECTOR, 1986-2007

YEAR	AGRI	RURAL	FLOOD	ENERGY	EDU	HEALTH	% OF TOTAL EXPENDITURE
1985-86	5.52	8.09	8.45	29.28	2.65	1.75	55.74
1986-87	5.66	8.42	8.23	29.27	3.06	1.64	56.28
1987-88	6.39	8.91	7.80	27.01	4.21	1.69	56.01
1988-89	6.04	8.13	7.47	27.51	4.46	1.73	55.34
1989-90	5.59	9.03	6.55	28.55	4.55	1.64	55.91
1990-91	5.83	8.80	6.81	29.30	3.97	1.78	56.49
1991-92	5.95	8.04	6.54	30.48	4.01	1.43	56.45
1992-93	5.79	8.75	6.46	27.85	3.96	1.67	54.47
1993-94	4.84	9.53	6.10	30.55	3.98	1.48	56.47
1994-95	5.45	10.33	6.22	28.00	4.01	1.66	55.67
1995-96	4.73	9.66	6.75	25.04	4.99	1.80	52.97
1996-97	5.03	8.42	6.70	22.97	5.90	5.62	54.64
1997-98	4.57	8.44	7.63	24.50	5.90	7.46	58.50
1998-99	5.08	8.03	7.13	23.47	6.39	10.28	60.37
1999-00	4.59	7.97	8.85	22.30	6.23	8.50	58.42
2000-01	4.08	5.87	7.28	19.71	6.29	7.78	51.02
2001-02	4.43	8.13	7.81	19.94	6.20	7.41	53.92
2002-03	3.64	9.90	5.69	21.27	5.99	7.68	54.17
2003-04	3.90	9.90	5.74	22.33	6.32	7.94	56.13
2004-05	4.16	7.95	7.22	23.03	7.57	8.32	58.25
2005-06	3.82	9.13	7.11	20.28	7.28	3.96	51.58
2006-07	3.66	8.21	7.52	20.51	7.38	4.29	51.57
1986-2007 Average	**4.94**	**8.62**	**7.09**	**25.14**	**5.24**	**4.43**	**55.47**