MONASH UNIVERSITY

AUSTRALIA

Department of Economics
Discussion Papers
ISSN 1441-5429

School Dropouts and Economic Growth: A Cross-Country Analysis

Kausik Chaudhuri & Pushkar Maitra

No. 03/01

Monash University
Victoria 3800
Australia

School Dropouts and Economic Growth: A Cross-Country Analysis*

Kausik Chaudhuri
Indira Gandhi Institute of Development Research
General A. K. Vaidya Marg
Goregaon (E)
Mumbai 400065
India
Email: kausik@igidr.ac.in

and

Pushkar Maitra
Department of Economics
Monash University
Clayton Campus
VIC 3168
Australia
Email: Pushkar.Maitra@BusEco.monash.edu.au

December 2000

JEL Classification: O41, J24
Key Words: School Dropouts, Growth, Panel Data.

* We would like to thank Heather Anderson, John Landon-Lane, Farshid Vahid, participants at the 5 th Australasian Workshop held at the University of Queensland and seminar participants at Monash University for comments and suggestions. The usual disclaimer applies. The first version of the paper was written when Kausik Chaudhuri was a visiting lecturer at the Department of Economics, University of Sydney.

School Dropouts and Economic Growth: A Cross-Country Analysis

Abstract

Development in human capital in the form of public education and health provision is necessary for the development of a country. Most cross-country studies on the effect of schooling on education emphasize the importance of school dropouts. This paper analyses the determinants of the dropout rates at various levels using a panel of 138 countries. We consider three definitions of school dropouts – at the primary school level, between primary and secondary school and at the secondary school level. We find that income and government spending generally has a significant effect on school dropout rates. The stock of adult education is significant in reducing the dropout rates at the primary school level whereas the impact is just the reverse for the dropout rates at the secondary school level. Political instability in the country also exerts some impact on the dropout rates. Correcting for the potential endogeneity of income we find that the reverse causation argument holds only for dropouts at the primary school level.

JEL Classification: O41, J24
Key Words: School Dropouts, Growth, Panel Data.

1. Introduction

During the last decade economists and policy makers have diverted their emphasis from economic growth to economic development, particularly in the context of developing countries. In view of the fact that the grave problems of unemployment, poverty, low life expectancy, high child mortality rate, low level of adult literacy etc, are still widespread in the developing nations, it has been suggested that these countries should embark on a policy of sustainable economic development. Consequently strong commitments towards the development of social sectors like education have been urged upon.

It is conventional wisdom in the endogenous growth literature that human capital enhances economic growth. For example Barro (1991), Levine and Renelt (1992), Barro and Lee (1993), Barro and Sala-i-Martin (1995) among others have documented positive significant impact of schooling (which they use to define the level of human capital) on growth of per capita real GDP across countries. On the other hand several other studies revealed that there exists either a negative or no significant impact of education on growth. Using a Cobb-Douglas production function and log-difference of the variables from a panel of 58 developing countries, Lau, Jamison and Louat (1991) found that education had a negative impact on growth in Africa, the Middle East and in North Africa while an insignificant impact was obtained for the South Asian and Latin American countries. Jovanovic, Lach and Levy (1992), using a different set of capital stocks and the NSD education data, also concluded that the former had a dampening impact on growth for the developing (non OECD) countries included in their sample. The World Bank's World Development Report (1995) also pointed out the insignificance of education in explaining economic growth. Islam (1995) obtained that the natural log of years of schooling had a consistently negative significant impact on the level of the income. The study by Spiegel (1994) showed that the findings of negative coefficients is robust to the inclusion of a wide variety of variables such as regional dummies, political instability, share of machinery investment, and size of the middle class. Pritchett (1996) obtained a large and significant negative impact of human capital accumulation on productivity growth using a cross-country data from 91 countries in his study. This view therefore essentially argues that contrary to the general belief, investment in human capital can be regarded as 'wastage of resources' and policymakers should channel funds earmarked to enhance human capital accumulation to some alternative use. The above mentioned empirical studies indicate that there is no general consensus regarding the positive impact of education (mainly measured by enrollment ratios) on economic growth. There might be two plausible explanations behind this. First, it might be the case that the quality of education rather than the quantity of schooling which matters for economic growth. Indicators like enrolment ratios and literacy rates just capture the quantum of schooling but not the quality of schooling. There have therefore been attempts to use alternative measures of schooling that might better capture quality achievement within the existing schooling system. For example Hanushek and Kim (1995) and Lee and Barro (1997) use test scores in Mathematics, Science and Reading as measures of school quality. The negative impact of human capital on growth is reduced when we quality index schooling. Second, following Bils and Klenow (1998, 2000) one might argue the existence of a reverse causality running from economic growth to education. This might be due to the fact that the returns to staying in school are likely to change as the country grows. It may be that the opportunity costs of staying in school can turn out to

[1] An alternative measure for quality achieved within the existing school systems is test-scores in Mathematics, Science and Reading as used by Hanushek and Kim (1995) and Lee and Barro (1997).

be lower than the outside options such as joining the labour force especially in face of stagnant demand for educated labour worldwide.[2]

However all studies agree that overall school dropouts is a fairly big problem and one needs to examine the issue of school dropouts at a greater details. To the best of our knowledge there is very little analysis of school dropouts at the aggregate level, though several studies have used micro data sets to examine the effect of various individual, household and community characteristics on school dropouts. Using aggregate data, Lee and Barro (1997) documented that the dropout at the primary school level is significantly negatively related to the level of GDP and the primary education of adults. In addition they also find that lower pupils to teacher ratio reduces school dropouts but average teacher salary and educational spending per pupil do not have a significant impact on school dropout rates. Examining dropouts at primary school (as in Lee and Barro (1997)) is however only part of the story. In fact school dropouts can happen at different stages and there is no unique way in which macroeconomic aggregates (like the level of income in the country or the existing stock of human capital in the country) affect school dropouts at the different levels. It matters how we define school dropouts. In this paper we construct three different measures of school dropout. The proportion, starting primary school but not completing it, measures the first dropout $(DROP1)$. The proportion completing primary school but dropping out thereafter is measuring the second dropout $(DROP2)$ and the third is the proportion starting secondary school but not completing it $(DROP3)$. For estimation purposes we will use panel data from a set of 138 countries.

[2] In this paper, we also address the issue of reverse causality from dropout rates to growth by using an

The principal findings of this paper may be summarised as follows. First, per capita real income has a significant impact on the dropout rates. The effect for the developing countries is different than compared to all countries in case of dropout rates at the secondary level. Instrumenting per capita income does not change our findings a great deal and we find that while there exists some reverse causation (school dropout affecting income directly) this effect is not very strong and is evident only for dropouts at the primary school level. Second, government spending generally has a significant contribution in reducing the dropout rates at all levels. Third, the stock of adult education is significant in reducing the dropout rates at the primary school level and between primary and secondary school, whereas the impact is just the reverse for the dropout rates at the secondary school level. Finally, political instability in the country exerts some impact on the dropout rates.

The rest of the paper is outlined as follows: Section 2 introduces our model specification along with the estimation methodology. The data along with the empirical results are presented in Section 3. Section 4 briefly considers the robustness of the empirical results and in particular examines the reverse causation argument and finally Section 5 concludes.

2. Model Specification and Estimation Methodology

This paper estimates school dropouts as a function of the level of per capita GDP, the existing stock of human capital, government expenditure on education and political factors. The estimated equation therefore is

---

instrumental variable estimation, which is explained later.

$$\begin{aligned} DROPs_{it} = {} & \alpha_i + \delta_t + \beta_1 LNGDP_{it} + \beta_2 LNGDPSQ_{it} + \beta_3 HUMANM_{it} + \\ & \beta_4 HUMANF_{it} + \beta_5 SHPUPP_{it} + \beta_6 PINSTAB_{it} + \beta_7 ASIAE + \\ & \beta_8 LAAM + \beta_9 SAFRICA + \beta_{10} OECD + u_{it} \end{aligned} \qquad (1)$$

Here $DROPs_{it}$ is the drop out rate in the *i*th country in the *t*th period at level *s*, *s* = *1, 2, 3*. $DROP1_{it}$ denotes the drop out rate at primary school, $DROP2_{it}$ denotes the drop out rate between primary school and secondary school and finally $DROP3_{it}$ denotes the drop out rate at secondary school. So $DROP1_{it}$, $DROP2_{it}$ and $DROP3_{it}$ are defined as follows:

$$\begin{aligned} DROP1_{it} &= PRI_{i,t-1} - PRIC_{it} \\ DROP2_{it} &= PRIC_{i,t-1} - SEC_{it} \\ DROP3_{it} &= SEC_{i,t-1} - SECC_{it} \end{aligned}$$

where PRI_{it} and SEC_{it} measures the percentage of primary school and secondary school attained in the total population and $PRIC_{it}$ and $SECC_{it}$ measure the percentage of primary school and secondary school completed in the total population in country *i* at time *t*. Notice that if we define dropouts contemporaneously in that if the dropout rate at primary school is defined as the difference between the proportion attending and completing primary school at time *t* then a higher dropout rate could be the result not of individuals dropping out if school from demographic patterns and population growth and increased demand and supply of schooling. The drop out rate at level *s* is assumed to be a function of the log of GDP per capita $SHPUPS$, the square of the log of GDP per capita $(LNGDPSQ)$, the stock of human capital (denoted by $HUMANM$ and $HUMANF$ respectively), the ratio of real government current educational expenditure per pupil at primary school to real per capita GDP (in percentage) denoted by *SHPUPP*.[3] We also expect political factors (like coups, revolutions, assassinations) in a country to affect school dropouts at different level. We therefore include a variable to measure the effect of such political factors (*PINSTAB*), which is a weighted average of the number of assassinations per million per year and number of revolutions per year.[4] The problem is that is a priori difficult to say what the sign of the political instability variables will be. On one hand one could argue that an increase in political instability should increase school dropout rates while on the other hand one could argue that as political instability increases staying in school could be a safer option. The presence of country specific effects (α_i) allows for any number of unspecified country-specific, time invariant variables that influence dropout rates for any given level of the other explanatory variables used in the regression. The inclusion of a separate intercept in each time period allows us to capture the impact of aggregate shocks, which can exert some effect on dropout rates. Finally we include a set of region dummies (*ASIAE*, *LAAM*, *SAFRICA*, *OECD*).[5] The inclusion of these regional dummies can be justified on the ground that although the country dummy allows for country-specific unspecified factors, the regional dummy can provide some directions of the movements in the dropout rates in a specific region. Filmer and Pritchett (1999) in a cross-country study also find that there are certain regional characteristics that are not adequately captured by the use of country dummies.

[3] Note that in the estimating equation for *DROP3* we instead use *SHPUPS*, the ratio of real government current educational expenditure per pupil at secondary school to real per capita GDP (in percentage).

[4] *PINSTAB* = 0.5*Number of Assassinations per million population per year + 0.5*Number of revolutions per year.

[5] *ASIAE* = 1 if the country is in East Asia, 0 otherwise; *LAAM* = 1 if the country is in Latin America, 0 otherwise; *SAFRICA* = 1 if the country is in Sub Saharan Africa, 0 otherwise; *OECD* = 1 if the country is an OECD country, 0 otherwise. The reference case is that the country is an *OTHER* - not from any of the four groups *ASIAE*, *LAAM*, *SAFRICA*, *OECD*.

The government expenditure on education (reflected in our model by the ratio of total public spending per capita relative to per capita GDP) matters because it captures the fact that a bigger overall budget is likely to enhance the availability of resources for education. Defined in this way, per capita public spending on education can also serve as a proxy for teacher-student ratio at various levels of education, average salary of teachers and improvements in the existing stock of infrastructure such as instructional materials. Total educational expenditure per pupil is likely to have a positive effect on child schooling and should significantly decrease school drop out rates. For example, Fuller (1986) provides evidence that there is a positive relationship between student achievement and the availability of textbooks and other instructional materials. The impact of per capita income in case of school enrollment is well established in the literature. The existing stock of human capital is measured by the average years of schooling for men and women above age 25. In some way, it captures parental influence on dropout rates.[6] It can be argued that more educated parents would strongly encourage their children to attain a certain basic minimum level of education. Finally we could expect that political unrest within a country would deter school attendance and hence enhance dropouts.

Equation (1) can be estimated using standard panel data estimation technique such as the Fixed-Effects model and the Random-Effects model. Using a standard Hausman test we find that the Fixed Effects estimates are efficient. We extend the standard Fixed Effects estimation by allowing for country specific heteroskedasticity. The standard errors are computed robustly to allow for arbitrary heteroskedasticity both between and within countries. This is the Fixed Effects GLS estimation.

[6] The use of aggregate data may limit us to use this explanation, but it certainly posits a relationship between flow and stock of education.

3. Data and Empirical Results

3.1 Data

The data used in this paper comes mainly from Barro and Lee (1997) and Lee and Barro (1997). The paper will focus on dropout rates from 1960 - 1985 for a panel of 138 countries.[7] Instead of using the annual dropout rates, we have used dropout rates at five-year intervals. Summary statistics for all of variables analysed in this study are presented in Table 1.[8]

Table 1 goes here

It is evident from Table 1 that the dropout rate is the highest at the primary school level. The average dropout rates are similar between the developing and the OECD (developed) countries and the null hypothesis of the equality of the average primary school dropouts in developing and developed countries cannot be rejected using a standard t-test.[9] Among the developing countries the dropout rate at the primary level is highest among the Latin-American countries. A test of equality of the mean rejects the hypothesis that the average primary school dropout rate is equal between the Latin-American countries versus other developing countries. This is in line with the findings by Filmer and Pritchett (1999) who point out that no schooling is a problem in the Sub-Saharan African countries where as dropout at the primary level is a major problem in the Latin American countries. Dropout at the secondary school level is larger in case of OECD countries compared to all the developing countries. A t-test rejects the null hypothesis of the equality of means between the two groups of countries. A comparison among the developing nations reveals that the dropout is always lower in Sub-Saharan

[7] The unavailability of the political variables after 1980 does not permit us to use the data beyond 1980 for the regression analysis.
[8] The summary statistics are presented for contemporaneous drop out rates. So for the primary school dropout it is defined as $DROP_{it} = PRI_{it} - PRIC_{it}$ and for the other dropout measures in the similar way.
[9] The results are available on request.

African countries compared to other parts of the developing world. It is also evident from Table 1 that as compared to the OECD countries the government spending in secondary education is larger in the developing world, where as in case of primary education the government spending in OECD countries is larger.[10]

3.2 Basic Results

Table 2 presents the results for the dropout rates using Fixed-Effects regression allowing for country-specific heteroskedasticity. The standard errors are computed robustly to allow for arbitrary heteroskedasticity both between and within countries. In each case we present separate results for "all countries" and "developing countries" or the Non-OECD countries. In all cases the null hypothesis that the country dummies are jointly insignificant is strongly rejected.[11]

Table 2 goes here

Let us first examine the baseline results presented in Table 2.[12] We start off by examining the results for all countries in the sample. The region dummies show that relative to the "other countries" in the sample, the primary school dropout rates are significantly lower for the OECD, East Asian and Sub-Saharan African countries – *OECD, ASIAE* and *SAFRICA* are all negative and significant. Note that the Latin America dummy (*LAAM*) is however not significantly different from zero. None of the region dummies have a significant effect on the dropout rate between primary and secondary school. However the region dummies *LAAM, SAFRICA* and *OECD* are significant and positive for *DROP3*, implying that relative to the "other countries" in the sample, the secondary school dropouts are always higher in the Latin American,

[10] A t-test of equality of mean rejects the null hypothesis in both cases.
[11] Our results from a standard fixed effects specification gives almost the same results as the one presented in Table 2 and are not presented in the paper. The results are however available on request.
[12] Although we started with 138 countries, because of missing observations the number of countries are different in the regression analysis.

Sub-Saharan African and OECD countries. The dummy for East Asian countries (*ASIAE*) is positive but not significant. Interestingly note that all of the region dummies change their sign as one moves from *DROP1* to *DROP3*.

An increase in per capita income (measured by *LNGDP*) results in an increase in the primary school dropout rate and there is a non-linearity in the effect of per capita income on *DROP1*, which is reflected, in the negative significant coefficient of *LNGDPSQ*. The configuration of the sign of the coefficients of *LNGDP* and *LNGDPSQ* implies that at the very low levels of income, dropout rates at the primary school level increases with an increase in per capita income and but beyond a certain level of income the dropout rate at primary school falls with any further increase in income. The same is true for the dropout rate between primary and secondary schooling. However, the coefficients of *LNGDP* and *LNGDPSQ* (though *LNGDPSQ* is no longer significant) change their sign when we consider the dropout rate at the secondary level. Here, the dropout rate decreases with an increase in income (and it rises after income attains a certain level). What is happening is that as the economy starts to grow, starting at very low-income levels, outside opportunities increase implying that dropout rates are higher initially. As the economy develops significantly, the returns to schooling are higher and this results in a reduction in the dropout rates at the primary school level and between the primary and secondary school level. The configuration of the signs is the opposite in the case of dropouts at the secondary school level. What is happening here is that even at low levels of income, the returns to more than secondary schooling is very high. Therefore as the economy starts to grow, secondary school dropout rates fall. However at high level of per capita income the returns to secondary schooling are no longer as high and individuals find it optimal to actually drop out of school and accumulate work experience.

The impact of parental influence as measured by *HUMANM* and *HUMANF* is negative and significant for both the dropout rates at the primary level as well in between primary level and secondary level. Surprisingly though *HUMANM* and *HUMANF* change signs for dropout rates at the secondary school level. Remember that *HUMANM* and *HUMANF* measure the average schooling years in the male and female population over age 25. The negative and significant sign implies that the higher the number of years of education of adult males and females, the lower is the dropout rate at the primary school as well as at the transition level (between primary and secondary school). One could argue that more educated parents are more willing to send their children to school. A year increase in the average number of years of schooling for the male population over 25 reduces the primary school dropout rate by 2.32% but a year increase in the average schooling years in the female population over 25 reduces the primary school dropout rate by 3.15%. However the effects of *HUMANM* and *HUMANF* are not significantly different from each other – the null hypothesis $H_0 : HUMANM = HUMANF$ cannot be rejected. The effects of *HUMANM* and *HUMANF* are similar for dropout rates at the transition level, though the magnitudes are smaller. For example, a year increase in the average number of years of schooling for the male population above 25 reduces school dropout by 1.29% while a year increase in the average number of years of schooling for the female population above 25 reduces school dropout by 2.31%. Once again though the null hypothesis of equality of the effect of *HUMANM* and *HUMANF* cannot be rejected.

The results for *DROP3* though are very different. Here *HUMANM* and *HUMANF* are both positive and significant indicating that an increase in the number of years of schooling for the adult male or adult female population increases the school dropout rate at the secondary school level. In particular, a year increase in the average number of years of schooling for the male and female population above 25 increases secondary school dropout by 3.24% and 3.87% respectively. However, once again the null hypothesis of equality of the effect of *HUMANM* and *HUMANF* cannot be rejected. One possible explanation of this somewhat strange result is that an increase in the stock of education reduces the return to higher education, particularly education beyond a certain level. An alternative explanation stems from the presence of the educated unemployed. Given that in most countries, particularly in developing countries, secondary schooling (or higher) is not necessarily a ticket to a job, the opportunity cost of staying in secondary school might be quite high in terms of the on-job experience that is foregone. Further, many individuals might be dropping out of secondary schooling in order to enrol in some kind of vocational/technical training. Unavailability of data on the percentage enrolled in such programs (particularly age-wise distribution of the population) prevents us from analysing this issue further.

The coefficient of *SHPUPP* is negative and significant in explaining *DROP1* and *DROP2* indicating that an increase in school resources reduces dropout rates at the primary school level and dropout rates between primary and secondary school level. An increase in school resources also results in a reduction in the dropout rates at the secondary school level (in this case school resources is measured by the ratio of real government current educational expenditure per pupil at primary school to real per capita GDP (in percentage) - *SHPUPS*). Interestingly political instability (measured by

PINSTAB) does not have a significant effect on school dropouts at the primary school level or dropouts between primary and secondary school levels. However *PINSTAB* is positive and significant for *DROP3* implying that an increase in political instability increases school dropout at the secondary school level. This result is quite expected.

Let us now turn to the estimates for the developing countries. Once again we consider Fixed-Effects estimation, with country specific heteroskedasticity. Since developing countries are defined to be the Non-OECD countries, we include only three region dummies: *ASIAE*, *LAAM*, *SAFRICA*. In each of the three cases, the null hypothesis that the country dummies are jointly significant cannot be rejected. Excepting at the secondary schooling level, per capita income does not have a significant impact on the school dropout rates: Notice that neither *LNGDP* nor *LNGDPSQ* is significant in the estimation results for *DROP1* and *DROP2*. For *DROP3*, *LNGDP* is positive and significant implying that an increase in per capita income increases the dropout rate at the secondary school level. There is a significant non-linearity in the effect of per capita income on secondary school dropout rate - *LNGDPSQ* is positive and significant.

Turning to the effect of the existing stock of human capital on school dropouts (measured by *HUMANM* and *HUMANF*), we find that *HUMANM* does not have a significant effect on *DROP1* and *DROP2* but has a positive and significant effect on *DROP3*. *HUMANF*, on the other hand, has a negative and significant effect on *DROP1* and *DROP2* but has a positive and significant effect on *DROP3*. The null hypothesis of the equality of the effect of *HUMANM* and *HUMANF* $(H_0 : HUMANM = HUMANF)$ is always rejected. In developing countries therefore women's education always has a stronger effect on school dropout rates, whichever direction it might be. For example a year increase in the average number of years of schooling for the female population above 25 reduces school dropouts at the primary school level by 1.24%, reduces school dropout between primary and secondary school by 2.18% and increases school dropout at the secondary school level by 3.84%. A year increase in the average number of years of schooling for the male population above 25 has no (significant) effect on school dropouts at the primary school level or between primary and secondary school, and increases school dropout at the secondary school level by 2.35%. An increase in school resources reduces dropouts at every level and unlike in the case of "all countries" we find that now political instability does not have a significant effect on school dropouts at the secondary school level, but increases school dropouts both at the primary school level and between primary and secondary school.

Examining the dropout rates at the aggregate level may posit another interesting question: Is dropout rates at the different level of school education the same for male and female population? We examine this issue in the next section of the paper.

3.3 Gender Differences in Dropouts

Are there any significant gender differentials in school dropout rates? To examine this question, at each of the three stages we examine the dropout rates separately for boys and girls. We therefore define the following:

$$
\begin{aligned}
DROP1M_{it} &= PRIM_{it-1} - PRICM_{it} \\
DROP2M_{it} &= PRICM_{it-1} - SECM_{it} \\
DROP3M_{it} &= SECM_{it-1} - SECCM_{it} \\
DROP1F_{it} &= PRIF_{it-1} - PRICF_{it} \\
DROP2F_{it} &= PRICF_{it-1} - SECF_{it} \\
DROP3F_{it} &= SECF_{it-1} - SECCF_{it}
\end{aligned}
$$

Here $PRIM$ and $PRICM$ measure the percentage of primary school attained and complete respectively in the male population and $SECM$ and $SECCM$ measure the percentage of secondary school attained and complete respectively in the male population. $PRIF, PRICF, SECF, SECCF$ denote the corresponding percentages for the female population. So $DROP1M$ is defined as the percentage of males that start primary school but never complete and $DROP1F$ is defined as the percentage of females that start primary school but never complete. $DROP2M, DROP3M, DROP2F, DROP3F$ are accordingly defined.

Table 3 presents the fixed effects estimates for male dropouts (with country specific heteroskedasticity) while Table 4 presents the corresponding estimates for female dropouts.

Tables 3 and 4 go here

As before, we consider estimates for "all countries" and also "developing countries". An increase in per capita income increases the dropout rate for both males and females and an increase in the number of years of schooling of adult male and adult female result in lower primary school dropout rates for male and female. The "all country" estimates show that, a year increase in the average schooling years in the male population above 25 decreases the male primary school dropout rate by 2.11% and reduces the female primary school dropout rate by 2.26%. On the other hand, a year increase in the average schooling years in the female population above 25 decreases the male primary school dropout rate by 4.63% and reduces the female primary school dropout rate by 2.88%. The null hypothesis of equality of effect of *HUMANM* and *HUMANF* is rejected for *DROP1M* but not for *DROP1F*. Adult female education therefore has a stronger effect than adult male education on male dropout rates at the primary school level.

There are some interesting differences between male and female dropouts at the primary school level when we look at developing countries only. First, per capita income has a significant impact on female dropout rate at the primary school level but does not have any effect on male dropout rate. An increase in per capita income increases female dropout at the primary school level. Second, *HUMANF* has a significant and negative effect on male primary school dropout, *HUMANM* does not. On the other hand neither *HUMANM* nor *HUMANF* have a significant effect on female primary school dropout. Third, relative to "other countries" in the sample, male primary school dropouts are significantly lower for the Sub-Saharan African countries, but none of the region dummies are significant in case of female primary school dropouts. Fourth, an increase in school resources reduces male primary school dropouts but does not have a significant effect on female primary school dropouts. However notice that political instability reduces school dropouts for both males and females in developing countries.

Turning to the estimated coefficients for *DROP2M* and *DROP2F*, we find that an increase in per capita income reduces the dropout rate between primary and secondary school but the relationship changes sign at very high-income levels. An increase in the number of years of education of females above 25 in the population reduces both male and female school dropouts between primary and secondary school (though the effect is only significant for male dropouts) and an increase in the average number of years of schooling of males above 25 exerts a negative significant effect on the dropout rates for females only (there is no such effect for males). The null hypothesis of equality of the effect of *HUMANM* and *HUMANF* on *DROP2F* cannot be rejected. An increase in school resources reduces the dropout rate between primary and secondary school for both males and females. An increase in school resources also has a higher negative effect on the male dropout rate between primary and secondary school. Finally in the all country case, an increase in political instability in the country has no significant effect on the dropout rates for male but actually reduces the dropout rates for females. It is likely that in the case of girls, parents view staying in school possibly as a safer option.

The results for the developing countries have some interesting points that are worth noting. First, the signs of *LNGDP* and *LNGDPSQ* are different in the two cases. Notice than while an increase in per capita income reduces male school dropouts between primary and secondary school, it increases the corresponding female school dropout rate. Second, while an increase in number of years of schooling of adult females significantly reduces male school dropouts between primary and secondary school, it does not have a significant effect on female school dropouts at the same level. On the other hand an increase in number of years of schooling of males above 25 significantly reduces female school dropouts between primary and secondary school, it does not have a significant effect on male school dropouts at the same level. Finally political instability significantly increases male dropout but does not have a significant effect on female school dropout rates between primary and secondary school.

Turning to the results for *DROP3M* and *DROP3F*, we find that relative to other countries in the sample, secondary school dropout rates are significantly higher for both males and females everywhere else. An increase in per capita income reduces the secondary school dropout rate for males but the effect is not significant for females. An increase in the number of years of education of adult females in the population increases the secondary school dropout rate for both males and females - years of schooling for adult females has a stronger effect on the dropout rates for females while and increase in the number of years of schooling for adult males have a stronger effect on the dropout rates for men. The null hypothesis of equality of *HUMANM* and *HUMANF* is rejected in both cases. An increase in school resources also has a negative effect on the secondary school dropout rate for both males and females. Finally an increase in political instability in the country increases the secondary school dropout rates for both males and females for all countries. The results are quite similar in the developing countries: only in this case political instability does not have a significant effect on secondary school dropout rates and an increase in per capita income also affects female dropout rates. What is interesting is that the signs of *LNGDP* and *LNGDPSQ* are the opposite in the developing country case. In the all country case, an increase in per capita income reduces the school dropout rate at the secondary school level but interestingly in the developing country case an increase in per capita income increases the school dropout rate for both males and females.

4. Robustness of the results

In this section, we examine the robustness of our results. Several robustness checks are considered. Not all the results are presented but they are all available on request.

It could be argued that the growth experiences of the East-Asian countries may dominate the results for the developing countries used in the sample and therefore bias the results. We therefore excluded the East-Asian Countries from our sample and then re-estimated the model for the developing countries. The income variable loses its significance both in case of $DROP1$ and $DROP2$ but remains significant for $DROP3$. Years of schooling for adult males are not significant in case of $DROP2$. Political instability becomes positive and significant in case of $DROP3$ where as it loses its significance in case of other two.

As a second check we re-estimate the basic model using per capita GDP $(GDPSH)$ and the square of the per capita GDP $(GDPSHSQ)$ as opposed to the corresponding log values. In this case the sign and significance of $HUMANM$, $HUMANF$ and the region dummies remain unaffected but now level of per capita income and political instability no longer have significant effects on school dropouts at the primary level. For the dropout in between primary and secondary, our results remain unchanged where as for $DROP3$ the political instability variable becomes significant

The last robustness check that we perform in the paper is the most important one. It could be argued that lower dropout rates could directly result in higher incomes, in which case one could not interpret a statistical relationship between income and school dropouts to imply that income causes lower school dropouts (reverse causation). Therefore the use of $LNGDP$ and $LNGDPSQ$ in equation (1) could lead to endogeneity problems. To correct for the possible endogeneity we re-estimate equation (1) and this time we use instruments for $LNGDP$ and $LNGDPSQ$. This is the Fixed-

Effects Instrumental Variable estimation and to the extent these estimates are similar to the Fixed-Effects estimates presented above (Table 2), it is evidence that the association between income and school dropouts is not primarily created by reverse causation.[13] Needless to say, the use of the instrumental variable approach is dependent on the availability of valid instruments.

To obtain valid instruments for *LNGDP* and *LNGDPSQ*, we need variables that are determinants of income growth but are exogenous with respect to school dropout rates. The large body of empirical literature on the cross-country determinants of growth provides a large number of variables that can be used as instruments. Easterly, Kremer, Pritchett and Summers (1993) have shown that growth rates of income over five year periods are in part explained by terms of trade shocks. This finding suggests the use of terms of trade (TOT) as an instrument because changes in terms of trade can be regarded as being exogenous. We also use two other instruments. Levine and Renelt (1992) show that the ratio of investment to GDP $(INVSH)$ is robustly related to growth and Fischer (1993) shows that a large black market premium for foreign exchange is negatively related to growth. So the third instrument that we use is the black market premium in the foreign exchange market (BMP). We use each of these instruments jointly and also separately (to check whether there is an incidental association between these instruments). The methodology that we use is similar to the one used by Pritchett and Summers (1996). Note that we conduct the IV estimation only in the all country case.

[13] Note that in this case we do not account for country specific error variances - instead consider the standard Fixed-Effects estimation.

We however also need to examine whether there is sufficient reasons to warrant instrumental variable estimation in the first place. We use the Davidson and MacKinnon (1993) augmented regression test - we include the predicted values of each endogenous right hand side variable, as a function of all exogenous variables, in a regression of the original model. A test of exogeneity is that the coefficients of the predicted values of the regressors included are jointly equal to be zero.

Table 6 goes here

In Table 5 we present the results from the Davidson and MacKinnon (1993) augmented regression tests. Notice that the null hypothesis of exogeneity of *LNGDP* and *LNGDPSQ* is rejected only for *DROP*1. The IV estimates for *DROP*1 are presented in Table 6 using the various instruments. For *DROP*2 and *DROP*3 the null hypothesis of exogeneity of *LNGDP* and *LNGDPSQ* cannot be rejected. Even in the case of *DROP*1, however, the null hypothesis of exogeneity of *LNGDP* and *LNGDPSQ* is rejected when we use or the black market premium in the foreign exchange market (*BMPL*) and when we use the as instruments. The null hypothesis of exogeneity cannot be rejected when we use the ratio of investment to GDP (*INVSH*), terms of trade (*TOT*) as the relevant instrument or when we use all of them together. The last case implies that there is some incidental association between the three instruments used. The estimated coefficients for *DROP*1 show that the significance of the average number of years of education of adult males and females above the age of 25 in affecting school dropouts at the primary school level is reduced considerably. Other results are fairly similar and hence we do not discuss them again.

5. Conclusion

While the theoretical literature on the endogenous growth theory suggests that growth enhanced by education empirical studies have failed to arrive at a consensus regarding how important education is for growth. Possible explanations include the fact that it might be the quality of education rather than the quantity of schooling which matters for economic growth and the indicators generally used to measure education just capture the quantum of schooling. Second, one might argue that there exists a reverse causality running from education to economic growth. However all argue that school dropouts are an important problem. The literature has unfortunately not paid sufficient attention to this issue.

This paper uses panel data from 138 countries to determine the factors that influence school dropout rates. We consider three alternative definitions of school dropouts - the proportion of the population starting but not completing primary school, the proportion of the population completing primary school but not starting secondary school and finally the proportion of the population starting but not completing secondary school. We find that it matters how we define school dropout.

To briefly summarise our results, we find that income generally has a significant effect on school dropout rates. Government spending has a significant contribution in reducing the dropout rates at all levels. The stock of adult education is significant in reducing the dropout rates at the primary school level whereas the impact is just the reverse for the dropout rates at the secondary school level. Further adult male education has a stronger effect on female dropout rate while adult female education has a stronger effect on male dropout rate. Finally, political instability in the country exerts some impact on the dropout rates. Correcting for the potential endogeneity of income (lower school dropouts might directly result in higher income - the reverse causation argument) we find that the reverse causation argument holds only for dropouts at the primary school level.

Bibliography

1. Barro, R. J. (1999), 'Inequality and Growth in a Number of Countries', *Mimeo, Harvard University.*

2. Barro, R. J. (1991), 'Economic Growth in a Cross Section of Countries', *Quarterly Journal of Economics,* **106**(1), 407 – 443.

3. Barro, R. J. and Lee J. (1997), 'International Measures of Schooling Years and Schooling Quality', *American Economic Review*, Papers and Proceeding, **86**(2) 218 - 223.

4. Barro, R. J. and Sala-I-Martin, X. (1995), *Economic Growth,* New York: McGraw-Hill Inc.

5. Barro, R. J. and Lee J. (1994), 'Sources of Economic Growth', *Carnegie-Rochester Series on Public Policy,* **40**, 1 - 46.

6. Barro, R. J. and Lee J. (1993), 'International Comparisons of Educational Attainment", *Journal of Monetary Economics,* **32**(3), 363 - 394.

7. Benhabib, J. and Spiegel, M. M. (1994), 'The Role of Human Capital in Economic Development: Evidence from Aggregate Cross Country Data', *Journal of Monetary Economics,* **34**(2), 143 - 174.

8. Bils, M. and Klenow, P. J. (2000), 'Does Schooling Cause Growth?', *American Economic Review, forthcoming.*

9. Bils, M. and Klenow, P. J. (1998), 'Does Schooling Cause Growth or the Other Way Around', *National Bureau of Economic Research, Working Paper # 6393.*

10. Davidson, R. and MacKinnon, J. G. (1993), *Estimation and Inference in Econometrics*. New York: Oxford University Press.

11. Easterly, W., Kremer, M., Pritchett, L. and Summers, L. H. (1993) 'Good Policy or Good Luck? Country Growth Performance and Temporary Shocks', *Journal of Monetary Economics,* **32**(3), 459 - 484.

12. Filmer, D. and Pritchett, L. (1999), 'The Effect of Household Wealth on Educational Attainment: Evidence from 35 Countries', *Population and Development Review,* **25** (1), 85 - 120.

13. Fischer, S. (1993), 'The Role of Macroeconomic Factors in Growth', *Journal of Monetary Economics,* **32**(3), 485 - 512.

14. Forbes, K. J. (2000), 'A Reassessment of the Relationship Between Inequality and Growth', *American Economic Review, forthcoming.*

15. Fuller, B. (1986), 'Raising School Quality in Developing Countries: What Investment Boosts Learning?" *World Bank Discussion Papers.*

16. Hanushek, E. and Kimko, D. (2000), 'Schooling, Labor Force Quality and Growth of Nations', *American Economic Review, forthcoming.*

17. Hanushek, E. (1995), 'Interpreting the Recent Research on Schooling in Developing Countries', *World Bank Research Observer*, **10**(2), 227-246.

18. Hanushek, E. and Kim, D. (1995), 'Schooling, Labor Force Quality and Economic Growth', *National Bureau of Economic Research, Working Paper # 5399.*

19. Islam, N. (1995), 'Growth Empirics: A Panel Data Approach', *Quarterly Journal of Economics*, **110**(4), 1127-1170.

20. Jovanovic, B., Lach, S. and Lavy, V. (1992), 'Growth and Human Capital's Role as an Investment in Cost Reduction', *mimeo.*

21. Lau, L. J., Jamison, D. T and Louat, F. F. (1991), 'Education and Productivity in Developing Countries: An Aggregate Production Function Approach', *Policy Research Working Paper 612, Office of the Vice President, Development Economics, World Bank, Washington, D.C.*

22. Levine, R. and Renelt, D. (1992), 'A Sensitivity Analysis of Cross-Country Growth Regressions', *American Economic Review*, **82**(4), 942-963.

23. Lee J. and Barro R. J. (1997), 'Schooling Quality in a Cross Section of Countries', *National Bureau of Economic Research, Working Paper # 6198.*

24. Lucas, R. E. (1988), 'On the Mechanics of Economic Development', *Journal of Monetary Economics,* **22**(1), 3-42.

25. Pritchett, L. and Summers, L. H. (1996), 'Wealthier is Healthier', *Journal of Human Resources*, **XXXI**(4), 841 - 868.

26. Pritchett, L. (1996), 'Where Has all the Education Gone?', *Policy Research Working Paper 1581, Policy Research Department, Poverty and Human Resources Division, World Bank, Washington, D.C.*

27. Spiegel, M. (1994), 'Determinants of Long-Run Productivity Growth: A Selective Survey with Some New Empirical Results', *Mimeo.*

28. World Development Report 1995: Workers in an Integrating World, New York: Oxford University Press for the World Bank

Table 1: Descriptive Statistics of the Variables Used

	Drop-Out 1/	Drop-Out 2/	Drop-Out 3/	Per Capita Income	Parental Influence Male	Parental Influence Female	Per Capita Spending on Education (in percentage) Primary	Per Capita Spending on Education (in percentage) Secondary	Political Instability
All (138)									
Mean	25.51	0.30	8.82	3350.81	4.51	3.56	13.51	47.95	0.09
Median	25.40	1.21	6.14	1829.00	4.09	3.01	11.40	21.90	0.00
Coeff. of Variation	0.58	55.55	1.00	1.05	0.61	0.80	0.65	1.55	1.77
All Developing (114)									
Mean	25.76	0.41	6.75	2068.02	3.63	2.62	12.87	56.99	0.11
Median	25.38	1.20	4.71	1369.00	3.26	2.18	10.80	23.40	0.01
Coeff. of Variation	0.61	27.86	1.00	0.98	0.60	0.81	0.68	1.45	1.60
OECD (24)									
Mean	24.63	-0.08	16.56	8686.84	7.55	6.88	15.68	18.47	0.02
Median	25.69	3.75	15.26	8975.00	7.71	7.31	13.80	17.90	0.00
Coeff. of Variation	0.42	-338.14	0.67	0.39	0.31	0.37	0.55	0.41	2.66
Sub-Saharan Africa (43)									
Mean	21.26	1.27	3.64	1024.04	2.26	1.22	17.28	113.67	0.11
Median	19.55	1.71	1.87	771.00	2.08	0.94	13.80	86.80	0.09
Coeff. of Variation	0.65	5.25	1.28	0.81	0.56	0.91	0.65	0.96	1.41
Latin America (29)									
Mean	39.19	2.10	8.30	3037.91	4.15	3.67	9.02	17.63	0.14
Median	39.30	2.75	6.79	2421.00	4.10	3.57	8.30	15.25	0.02
Coeff. of Variation	0.33	5.04	0.75	0.68	0.37	0.44	0.56	0.57	1.66
East Asian (14)									
Mean	24.50	2.67	9.41	2581.29	5.11	3.40	9.20	20.91	0.08
Median	23.60	3.94	9.00	1766.50	5.18	3.26	8.35	13.65	0.00
Coeff. of Variation	0.49	4.08	0.71	0.77	0.39	0.52	0.43	1.38	1.78
Others (28)									
Mean	16.58	-3.54	7.70	2733.25	3.92	2.63	12.81	35.77	0.11
Median	12.71	-2.12	5.41	1851.00	2.91	1.23	11.70	21.90	0.00
Coeff. of Variation	0.77	-4.25	1.05	0.97	0.71	1.03	0.51	1.33	1.64

Numbers in () denotes the number of countries.

1/ is the dropout at the primary level, 2/ at the primary to secondary transition level and 3/ at the secondary level.

Table 2: Empirical Results for Dropout Rates						
	Dropout at Primary		Dropout in between		Dropout at Secondary	
	All Countries	Developing Countries	All Countries	Developing Countries	All Countries	Developing Countries
ASIAE	-44.006	-3.368	23.306	17.278	11.523	12.105
	(0.000)	(0.795)	(0.296)	(0.477)	(0.141)	(0.296)
LAAM	-11.090	-9.281	-1.707	0.116	28.649	28.431
	(0.215)	(0.430)	(0.939)	(0.996)	(0.000)	(0.001)
SAFRICA	-56.876	-23.633	14.290	21.402	33.704	28.208
	(0.000)	(0.063)	(0.532)	(0.383)	(0.000)	(0.002)
OECD	-62.672	..	12.724	..	31.224	..
	(0.000)	..	(0.562)	..	(0.000)	..
LNGDP	45.530	9.399	57.579	-3.185	-7.440	8.988
	(0.000)	(0.209)	(0.000)	(0.555)	(0.033)	(0.001)
LNGDPSQ	-2.916	-0.763	-3.692	0.086	0.256	-0.892
	(0.000)	(0.109)	(0.000)	(0.808)	(0.284)	(0.000)
SHPUPP/SHPUPS 1	-0.198	-0.138	-0.111	-0.172	-0.012	-0.007
	(0.000)	(0.001)	(0.010)	(0.000)	(0.000)	(0.000)
HUMANM	-2.328	0.356	-1.291	0.601	3.237	2.346
	(0.000)	(0.371)	(0.066)	(0.209)	(0.000)	(0.000)
HUMANF	-3.150	-1.243	-2.317	-2.183	3.869	3.844
	(0.000)	(0.015)	(0.005)	(0.001)	(0.000)	(0.000)
PINSTAB	0.099	1.977	-0.789	1.685	1.004	0.200
	(0.940)	(0.098)	(0.591)	(0.086)	(0.016)	(0.538)
No. of Countries	98	75	98	75	98	75
No. of Observations	367	271	367	271	348	256

1 SHPUPS is used in case of dropout at the secondary level.
All the estimation is reported with fixed-effect model allowing for country-specific error variance.
Numbers in the parenthesis are p-values for a two-tailed test which is based on robust standard errors

Table 3: Empirical Results for Dropout Rates for Male

	Dropout at Primary		Dropout in between		Dropout at Secondary	
	All Countries	Developing Countries	All Countries	Developing Countries	All Countries	Developing Countries
ASIAE	-43.253	-2.089	29.130	17.071	43.973	10.346
	(0.000)	(0.876)	(0.098)	(0.388)	(0.010)	(0.369)
LAAM	-5.132	-3.197	16.106	16.894	61.333	36.094
	(0.604)	(0.799)	(0.344)	(0.404)	(0.000)	(0.001)
SAFRICA	-36.643	-25.037	33.286	21.662	52.779	12.447
	(0.001)	(0.055)	(0.062)	(0.278)	(0.001)	(0.264)
OECD	-58.029	..	17.155	..	65.486	..
	(0.000)	..	(0.316)	..	(0.000)	..
LNGDP	14.317	-5.024	41.868	-21.377	-16.002	6.537
	(0.081)	(0.598)	(0.000)	(0.003)	(0.000)	(0.139)
LNGDPSQ	-0.959	0.206	-2.765	1.236	0.763	-0.760
	(0.061)	(0.738)	(0.000)	(0.006)	(.007)	(0.009)
SHPUPP/SHPUPS 1	-0.252	-0.285	-0.142	-0.148	-0.021	-0.006
	(0.000)	(0.000)	(0.004)	(0.002)	(0.000)	(0.036)
HUMANM	-2.114	-0.745	-0.919	0.709	6.509	4.693
	(0.000)	(0.214)	(0.209)	(0.151)	(0.000)	(0.000)
HUMANF	-4.637	-3.126	-4.021	-3.185	2.468	1.850
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PINSTAB	0.866	2.161	-0.114	2.083	0.896	0.060
	(0.522)	(0.099)	(0.941)	(0.045)	(0.015)	(0.909)
No. of Countries	98	75	98	75	98	75
No. of Observations	367	271	367	271	348	256

1 SHPUPS is used in case of dropout at the secondary level.

All the estimation is reported with fixed-effect model allowing for country-specific error variance.

Numbers in the parenthesis are p-values for a two-tailed test which is based on robust standard error

Table 4: Empirical Results for Dropout Rates for Female

	Dropout at Primary		Dropout in between		Dropout at Secondary	
	All Countries	**Developing Countries**	**All Countries**	**Developing Countries**	**All Countries**	**Developing Countries**
ASIAE	-29.368	-3.578	3.988	18.654	11.408	12.087
	(0.041)	(0.833)	(0.885)	(0.513)	(0.138)	(0.195)
LAAM	-15.830	-15.468	-15.911	-16.497	22.776	22.322
	(0.253)	(0.341)	(0.556)	(0.572)	(0.010)	(0.019)
SAFRICA	-52.923	-18.219	4.557	5.487	15.465	24.495
	(0.000)	(0.287)	(0.864)	(0.846)	(0.046)	(0.007)
OECD	-72.775	..	-4.813	..	28.370	..
	(0.000)	..	(0.856)	..	(0.000)	..
LNGDP	65.432	46.311	60.215	19.658	-4.305	17.092
	(0.000)	(0.000)	(0.000)	(0.000)	(0.178)	(0.000)
LNGDPSQ	-4.091	-3.059	-3.923	-1.408	0.109	-1.292
	(0.000)	(0.000)	(0.000)	(0.000)	(0.622)	(0.000)
SHPUPP/SHPUPS[1]	-0.109	-0.033	-0.094	-0.083	-0.009	-0.002
	(0.008)	(0.284)	(0.001)	(0.006)	(0.001)	(0.017)
HUMANM	-2.263	-0.256	-1.854	-0.779	1.074	0.434
	(0.000)	(0.514)	(0.000)	(0.097)	(0.016)	(0.008)
HUMANF	-2.878	0.666	-2.401	-0.255	5.029	5.197
	(0.000)	(0.286)	(0.001)	(0.701)	(0.00)	(0.000)
PINSTAB	0.237	2.591	-1.768	-0.338	0.804	0.305
	(0.850)	(0.029)	(0.079)	(0.694)	(0.037)	(0.388)
No. of Countries	98	75	98	75	98	75
No. of Observations	367	271	367	271	348	256

Notes:
[1]: SHPUPS is used in case of dropout at the secondary level.
All the estimation is reported with fixed-effect model allowing for country-specific error variance.
Numbers in the parenthesis are p-values for a two-tailed test which is based on robust standard errors

Table 5: Results from Davidson-Mackinnon test for Endogeneity			
Instruments	Dropout at Primary	Dropout in between	Dropout at Secondary
Black Market Premium	0.135	0.262	0.697
Terms of Trade	0.003	0.314	0.987
Investment-GDP Ratio	0.039	0.368	0.538
All of the above	0.085	0.300	0.599

Table 6: Instrumental Variable Estimates for *DROP* 1
(All Countries Only)

	Black Market Premium	**Terms of Trade**	**Investment Share**	**All Three Instruments**
ASIAE	-87.465	49.555	-11.237	-43.261
	(0.000)	(0.000)	(0.299)	(0.017)
LAAM	-22.638	233.556	16.283	83.700
	(0.055)	(0.001)	(0.174)	(0.002)
OECD	8.428	170.002	-12.259	-24.048
	(0.666)	(0.005)	(0.438)	(0.167)
SAFRICA	-97.411	0.068	1.237	-28.446
	(0.000)	(0.993)	(0.906)	(0.086)
LNGDP	56.128	62.799	46.989	277.530
	(0.005)	(0.002)	(0.011)	(0.007)
LNGDP2	-4.600	-11.788	-1.422	-19.141
	(0.001)	(0.000)	(0.276)	(0.008)
HUMANM	-2.253	-1.188	-2.439	-2.529
	(0.104)	(0.384)	(0.061)	(0.047)
HUMANF	-3.481	3.798	-5.453	0.752
	(0.069)	(0.138)	(0.009)	(0.732)
SHPUPP	-0.162	-0.644	-0.146	0.270
	(0.136)	(0.003)	(0.163)	(0.195)
PINSTAB	2.337	-4.496	4.575	1.509
	(0.489)	(0.265)	(0.129)	(0.652)
F- test for Joint Significance	2.25	8.93	4.30	2.49
(Davidson-Mackinnon Test)	(0.1346)	(0.0031)	(0.0391)	(0.0851)
Number of Countries	97	99	102	95
Number of Observations	350	345	367	331

Notes:

Numbers in the parenthesis are p-values for a two-tailed test which is based on robust standard errors

Titles in the Department of Economics Discussion Papers (New Series commenced October 1999)

01-99
Should China be Promoting Large-Scale Enterprises and Enterprise Groups?
Russell Smyth

02-99
Division of Labor, Coordination, and Underemployment
Heling Shi

03-99
Attitude Choice, Economic Change, and Welfare
Yew-Kwang Ng and *Jianguo Wang*

04-99
Economic Reform, Overlapping Property Rights, and Polarisation in the Real Estate Market
J. Ram Pillarisetti

05-99
Economic Reform, Growth and Inequality in Human Development in Transitional Economies
J. Ram Pillarisetti and *Mark Mcgillivray*

06-99
Efficiency and Liquidity in the Electricity Market: A Preliminary Analysis
Barry A. Goss and *S. Gulay Avsar*

01-00
Effects of Externality-Corrective Taxation on the Extent of the Market and Network Size of Division of Labor
Yew-Kwang Ng and *Xiaokai Yang*

02-00
Incomplete Contingent Labor Contract, Asymmetric Residual Rights and Authority, and the Theory of the Firm
Xiaokai Yang

03-00
The Effects of Education on the Timing of Marriage and First Conception in Pakistan
Lata Gangadharan and *Pushkar Maitra*

04-00
A Production Theory Approach to the Imports and Wage Inequality Nexus
Christis G. Tombazos

05-00
Simultaneity, Rationality and Price Determination in US Live Cattle
Barry A. Goss, S. Gulay Avsar and *Brett A. Inder*

06-00
Free Riding and the Welfare Effects of Parallel Imports
Jong-Say Yong

07-00
The Determinants of Judicial Prestige and Influence: Some Empirical Evidence from the High Court of Australia
Mita Bhattacharya and *Russell Smyth*

08-00
Causality in International Capital Movements: The Income Mobility of Australian Investment Abroad
Robert D Brooks, *Dietrich K Fausten* and *Param Silvapulle*

01-01
Outside Options and the Competitiveness of Vertical Alliances: A Core Theoretic Approach
Jong-Say Yong

02-01
Resource Inflows and Household Composition: Evidence From South African Panel Data
Pushkar Maitra and *Ranjan Ray*

03-01
School Dropouts and Economic Growth: A Cross-Country Analysis
Kausik Chaudhuri and *Pushkar Maitra*

04-01
HOGLEX demand systems and welfare policy in major ASEAN developing countries: A Bayesian analysis using expenditure unit records
Hikaru Hasegawa, Tran Van Hoa, Ma. Rebecca Valenzuela

05-01
Unprotective Tariffs, Ineffective Liberalization and Other Mysteries: An Investigation of the Endogenous Dimensions of Trade Policy Formation in Australia
Christis G. Tombazos

06-01
Strategic FDI and Industrial Ownership Structure
Christopher J. Ellis and *Dietrich Fausten*

07-01
Forecast Errors and Efficiency in the US Electricity Futures Market
S. Gulay Avsar and *Barry A. Goss*

08-01
Good Capitalism versus Bad Capitalism: Effects of Political Monopoly of the Ruling Elite on the Extent of the Market, Income Distribution, and Development
Wai-Man Liu and *Xiaokai Yang*