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GENDER AND GROWTH ASSESSMENT: MACROECONOMIC STUDY

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The in-depth macro-economic analysis that forms this report has largely been conducted by Elissaios Papyrakis[1], with some support from the rest of the team. While the key insights from this analysis have been presented in the National Overview, this report is potentially an invaluable resource, methodologically and in terms of the detail of analysis, for both policy-makers and research analysts interested in the theme of gender and growth in Nigeria.

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Executive Summary

Abstract

The research was commissioned by the UK Department for International Development and the Canadian International Development Agency to explore gender-growth linkages in the context of mineral-rich economies. The report provides a thorough literature review of macroeconomic studies on gender, natural resource abundance and growth and aims at quantifying the dependence of growth on gendered variables, institutional proxies (government effectiveness, political stability, rule of law) and resource dependence indices with the use of statistical (econometric) analysis. The study reveals that relative female to male schooling (often considered a strong determinant of economic growth performance) does not impact significantly on economic performance, once the analysis controls for differences in institutions and resource dependence. While resource-dependent economies are likely to underinvest in female education, there is no strong evidence linking such reduced female schooling to feeble growth performance.

Programme

The study commenced in May 2008 and ended in September 2008. Data collection took place between May and August 2008, with preliminary results and data issues discussed at the regional DFID office and the National Bureau of Statistics in Abuja and the Nigerian Institute for Social and Economic Research (NISER) in Ibadan.

Motivation and Objectives of the Research

An extensive literature in development economics points to a tendency of resource-rich countries to underperform in terms of economic growth, a phenomenon often coined as the "resource curse". In parallel, researchers and practitioners specialising in economic development have increasingly focused on the instrumental effects of gender bias on economic growth. The report aims at bringing together these two streams of development literature that have evolved so far independently.

The research strategy was designed to:

- provide an extensive literature review on the resource curse and macroeconomic gender-growth linkages;

- integrate the two separate literature streams and explore whether resource-rich countries suffer more from increased gender inequality (potentially due to structural characteristics or political economy reasons) and thereof reduced economic growth;
- identify research gaps and future research needs;
- critically evaluate the robustness of existing statistical analysis, and bring proxies of institutional quality and resource richness into perspective;
- provide a summary of Nigeria's macroeconomic history (economic growth, macroeconomic gendered data, role of mineral sector, institutions) and reflect on recent trends.

Key Findings and Recommendations

The study estimates cross-country growth regressions in the tradition of Klasen (2002), whose work has largely influenced (if not dominated) the gender-growth literature. The growth analysis has incorporated institutional and resource abundance variables and also focused on the linkages between resource dependence and gender inequality. The key findings can be summarised as follows:

- Contrary to Klasen's analysis, we find gendered education (the relative female-male years of schooling) to be the only consistently significant educational variable, enhancing growth. Gendered education, though, loses its statistical significance once the analysis takes into account variation in institutions (government effectiveness) and resource abundance.
- Both agricultural and mineral dependent economies experience increased gendered inequality (even after controlling for income levels, institutions and cultural differences).
- The report emphasises the fragility of statistical estimates of the role of gendered education on growth. While there is tentative evidence that gendered education may act as a resource curse channel for resource-dependent economies, institutions play a bigger role in enhancing economic growth. This suggests that mineral rich economies, such as Nigeria, may benefit much more from limiting the extent of corruption and concentrating on other resource curse effects (Dutch Disease, lack of diversification, rent-seeking, investment in "white elephant" projects), rather than treat gendered education as the foremost priority in economic planning.

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1 Introduction: Mineral-rich economies, gender and growth

Recent cross-country evidence suggests that resource abundance and to an even greater extent, mineral dependence, have been factors detrimental to long-term economic growth, a phenomenon often termed the 'resource curse' (Auty, 1994, Sachs and Warner, 1995, 1997, 1999a, 1999b, Leite and Weidmann, 1999, Rodriguez and Sachs, 1999, Gylfason, 2000, 2001a, 2001b, Stevens, 2003, Papyrakis and Gerlagh, 2004). With good governance and sound macroeconomic policies, exploited natural resources can become a major contributor to poverty alleviation and sustained GDP growth. The resource curse paradox has attracted increasing attention in the development policy agenda, as demonstrated by the recent establishment of the Extractive Industries Transparency Initiative (EITI) that aims to promote transparency and strengthen governance in the mineral sector (Collier 2007).

At the same time, the role of unequal access to education, property rights, assets and decision-making has received prominent attention in development research (Aghion et al., 1999 and Deininger and Olinto 2000, World Bank, 2006). Within this stream of work, much attention has been paid to the impact of gender inequality on economic development, specifically with reference to educational attainment (Dollar and Gatti 1999, Klasen 1999, 2002, Klasen and Lamanna 2003, Elson 2006). Gender inequality in education results in inefficiency by restricting access to schooling for talented females and thus depriving them of the opportunity to fully develop their potential and participate in the formal economy (Blackden et al., 2006).

The aim of this report is to bring together these two streams of development literature, which have so far evolved independently.[2] In Section 2 we provide an extensive literature review on the resource curse and the gender-growth literatures and discuss recent developments in the field. Section 3 explores whether resource-rich countries suffer from greater gender inequality than their resource-scarce counterparts, potentially due to structural characteristics or political economy reasons. We contribute to the resource curse literature by identifying a new transmission mechanism that links resource abundance to sluggish economic growth via gendered education. In multiple estimations that combine growth, resource abundance and gendered education variables, we find that resource-rich economies (both in agriculture and minerals) are likely to experience greater gender inequality which can further suppress their long-term growth rate. This transmission channel linking gender inequality in schooling with resource richness and growth has so far been neglected in the literature and relates to the overall tendency of resource-rich economies to under-invest in education and neglect pro-growth institutions. To our knowledge, this is the first cross-country empirical attempt to evaluate gender as an intermediate channel through which resource wealth impacts on growth. We find this gendered mechanism significant for both the agricultural and the mineral sector, suggesting a 'gendered' resource curse for resource-based economies. Our analysis also contributes to the literature focusing on gendered education and growth from a wider

[2] Our analysis in this paper is generally macroeconomic in nature. We mainly discuss interlinkages between income growth and gender at an aggregate level, although we occasionally make reference to the microeconomic welfare-gender literature and relevant intrahousehold and labour market dynamics. For some microeconomic studies focusing explicitly on female welfare and intrahousehold division of labour, education, and assets, see Agarwal 1997, Becker 1985, Hallman 2000, Kabeer and Mahmud 2004, Katz 1995, Quisumbing and de la Brière 2000 and Udry 1996.

perspective. So far, the work by Klasen (2002) on the beneficial impact of education and growth in schooling (gendered and broader) on economic growth has received prominent attention but very little scrutiny (if any) of methodological aspects and statistical specifications, for example paying attention to the acknowledged fragility of cross-country regressions of this type (Leamer, 1985; Levine and Renelt, 1992). We estimate growth regressions, replicating and augmenting Klasen's empirical model that focuses on the impact of overall education, female-male relative schooling and changes in these variables on growth (Klasen, 2002). However, Klasen's work ignores the role of both institutional proxies[3] and resource abundance variables, which have received increasing attention in the growth literature as income growth determinants. Hence we include proxies for both institutional quality and resource abundance in growth estimations, and find that contrary to Klasen's findings, institutions and resource abundance appear to be more important than education in explaining growth variation. The only educational variable that generally remains significant throughout our statistical analysis is the relative average years of male to female education, and even this loses its statistical significance once both institutional and resource abundance variables jointly enter as explanatory variables. In Section 4, we complement the analysis with a case study of Nigeria's macroeconomic performance over the last three decades as an infamous example of an economy affected in recent years by the resource-curse. We provide a summary of Nigeria's macroeconomic history, focusing on economic growth trends, macroeconomic gendered data (gendered education, literacy, employment, labour force participation), the role of the mineral sector, debt overhang[4], composition of exports (Dutch disease[5]) and institutions. Section 5 summarises our main results and spells out policy recommendations. We generally find that good institutions impact positively on economic growth both directly and via raising female education, while resource abundance tends to mitigate or even cancel out such positive effects.

[3] Knowles et al. (2002) use regional dummies and 'Catholicism and Muslim dummies, which allow for the effect of religion on institutional quality, including government performance', following La Porta et al. (1999).
[4] Where the debt of a country exceeds its future capacity to pay it.
http://encyclopedia.thefreedictionary.com
[5] For an explanation of Dutch disease, see section 2.11

2 Literature review

2.1 Resource rents and growth

Since the seminal work of Jeffrey Sachs and Andrew Warner (1995) there has been a large body of theoretical and empirical work investigating the so-called 'paradox of plenty'; i.e. the tendency of resource-scarce economies to outperform their resource-rich counterparts in terms of economic growth. The first attempts to elucidate the correlation between resource wealth and sluggish growth rates focused on Dutch disease explanations (i.e. currency appreciation and declining volume of exports), the crowding-out of pro-growth industrial activities, and the declining prices of primary commodities relative to manufactured ones (see Prebisch 1950, Corden 1984, Corden and Neary 1984, Matsuyama 1992). More recently the focus has shifted towards political economy explanations, exploring the tendency of resource-rich countries to suffer from increased rent-seeking activities, corruption, bad governance, low saving rates and 'white elephant'-type public investment (see Leite and Weidmann 1999, Auty 2000, Baland and Francois 2000, Torvik 2002, Bulte et al. 2005, Robinson and Torvik 2005, Papyrakis and Gerlagh 2006).

One of the most striking manifestations of the resource curse appears to be the disappointing performance of the oil cartel countries, many of which have experienced negative growth rates in GDP per capita over extended periods. Oil-rich Venezuela had the second highest GDP per capita in Latin America before the first oil boom in the 1970s, but sustained an average income growth rate of -0.3 per cent thereafter. Nigeria's mediocre average growth of 0.12 per cent per annum over the 1970-2000 period also suggests a stagnant economy. Resource rents can also have a detrimental effect on regional economies within countries. Papyrakis and Gerlagh (2004b), for instance, note that Alaska is the only US state with a negative growth rate over the last two decades, despite its extensive oil reserves and fishing industry.

Figure 1 illustrates how resource abundance impedes efforts to increase per capita income and improve living standards. The thick grey line captures the strong negative correlation between the average annual growth of GDP per capita between 1970-2000 and the share of mineral production in GDP in 1971 for a sample of 98 countries. Data on income and mineral production are provided by the Penn World Tables 6.2 from the Center for International Comparisons at the University of Pennsylvania (CIC 2008) and by the Sachs and Warner database at the Center for International Development (CID 2008) at Harvard University respectively. Most countries with a mineral production accounting for more than 20 per cent of their GDP experience negative rates of income growth. A 10 per cent increase in mineral production (the difference between Nigeria and Mali or Malawi) would decrease economic growth by approximately 0.6 per cent.

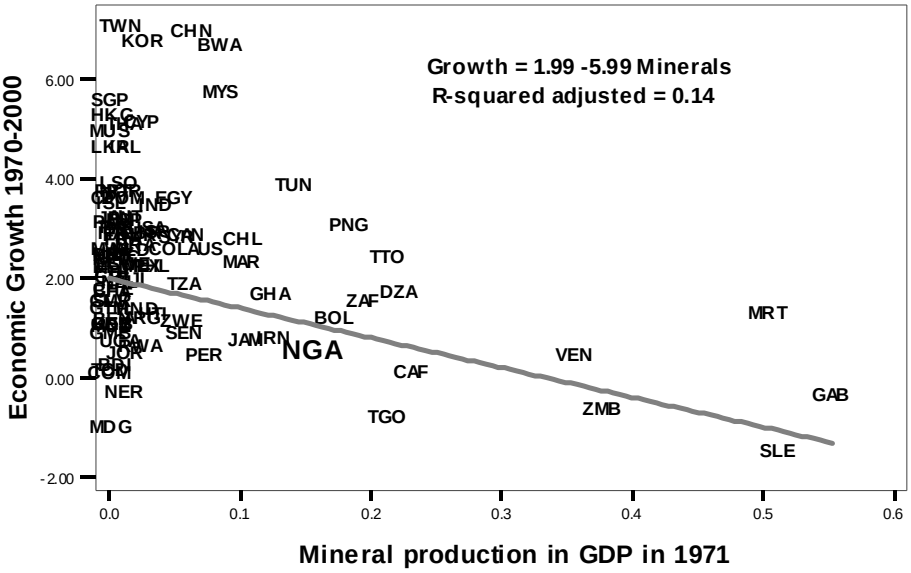


Figure 1: Resource abundance and economic growth

Note: Country observations are represented by their 3-letter ISO acronym codes. Nigeria (NGA) depicted in bold. All three-letter country codes available at the webpage of the International Organization for Standardization: www.iso.org

The resource curse hypothesis is by no means an economic law. Wright (1990) argues that the industrial expansion of the US at the beginning of the 20th century was supported to a large extent by the discovery of minerals. More recently, resource-rich Norway (the world's second largest oil exporter), Iceland and Botswana experienced robust and sustained rates of economic growth (see Gylfason and Zoega 2001, Acemoglu et al. 2003, Lange and Wright 2004). In the literature the contracting impact of natural resource rents on economic growth is generally associated with the indirect crowding-out effect of natural resources on several growth determinants. Resource-rich countries that manage to sustain their pro-growth activities (high investment rates, education, trade openness and good governance) achieve fast rates of income growth. Below, we provide a concise overview of leading explanations of why resource dependency has resulted in sluggish economic performance.

2.1.1 Dutch Disease

The negative link between trade and resource rents is often referred to as the 'Dutch Disease', originally referring to the adverse effects of natural gas discoveries in the late 1950s on Dutch manufacturing through the appreciation of the Dutch guilder. Resource revenues create a demand shock that triggers inflationary pressures and results in an overvaluation of the local currency (see Corden, 1984, Neary and van Wijnbergen, 1986). Increased income raises the prices of non-tradeable goods (which are not determined by international markets), the terms of trade deteriorate and the resulting loss of competitiveness reduces the level of exports (Fardmanesh, 1991). Since the magnitude of exports and openness are conducive to economic growth (Frankel and Romer 1999), resource wealth will indirectly inhibit income growth. If

the export sector consists mainly of manufacturing the exchange rate appreciation will lead to its contraction.

Apart from a decrease in the volume of exports, their composition often becomes skewed away from manufacturing goods and towards primary goods (Corden and Neary 1982). Man-made capital and labour shift into booming primary sectors and away from manufacturing or other sectors that prove to be more conducive to growth in the long run. This was the case, for instance, in the Faroe Islands and Greenland, both of which offered wage premiums within their fishing industries (Paldam 1997).

The contraction of the export sector and manufacturing is a matter of concern due to the learning-by-doing potential it offers. Matsuyama (1992) argues that a shift of labour from manufacturing deprives the economy of the growth-enhancing learning-by-doing externalities found in the sector. Krugman (1987) claims that an increase in resource income often creates a loss in comparative advantage for many manufacturing industries, which may become permanent if resource exploitation lasts too long. Furthermore, Herberttson et al. (1999) relate resource revenue fluctuations to exchange rate volatility and increased risk for investors.

2.1.2 Institutions

There is an extensive literature on the beneficial role of institutions in economic development (see for example North 1981, 1991, Murphy et al. 1993, Knack and Keefer 1995, Mauro 1995, Acemoglu et al. 2001, 2002). Good standards in terms of rule of law, bureaucratic efficiency, corruption constraints, political stability, democratic liberties and transaction transparency are strongly associated with economic prosperity. This implies that any negative direct effect of natural resources on institutions will indirectly frustrate economic growth.

Many scholars have claimed that resource rents tend to erode the sound institutional base of the economy. Resource rents often tempt individuals to engage in rent-seeking competition rather than productive activities (see Krueger 1974, Tornell and Lane 1999, Baland and Francois 2000, Torvik 2002). This is strongly related to the nature of natural resources themselves, especially in the case of minerals. In most cases there is limited access to resource usage rights, granted to a few public or private companies or even individuals, due to the limited physical availability of the resources. Such sector conditions that restrain intense competition create excessive profits accruing to a few agents in the economy. The larger the amount of resource rents (or the stricter the access to them), the fiercer rent-seeking competition is expected to be.

Resource revenues also tend to increase unlawful informal activities that generate wealth for a few economic actors. For instance, resource rents often induce individuals to bribe the administration in order to gain access to them (Leite and Weidmann 1999). In most cases, even in market economies, resource management is not granted through an open-access auction but through the intervention of public officials.

Another institutional aspect of the resource curse lies in the manner in which resource rents are utilised in the economy. A large share (if not all) of the resource revenues remains property of the government. Government officials are likely to either appropriate the rents or utilise them to reward the electorate of their party or interest groups that favour it. For instance, as Auty (1994) and Ross (1999) point out, domestic firms often achieve protection

against international competition by means of import substitution supported by resource transfers. Ross (2001a, 2001b) argues that oil and mineral revenues make governments less accountable to society by relieving social pressure by means of increased public spending (which consecutively increases public satisfaction). Robinson and Torvik (2005) argue that rents can be channelled into 'white elephant' projects of low social return as a politically appealing way of canvassing votes. Collier and Hoeffler (1998) and de Soysa (2000) also argue that resource abundance is harmful to political stability, and since resource wealth is often geographically concentrated it may trigger ethnic or regional conflict or exacerbate existing tensions.

2.1.3 Investment

Investment (such as in building infrastructure) is widely perceived as one of the fundamental elements for successful economic development (see Barro 1991, Sachs and Warner 1997). Levine and Renelt (1992) found in their regression analysis that investment is one of the few robust determinants of economic growth. At the same time, recent empirical research has identified the crowding-out impact of resource abundance on investment rates and consequently on economic growth (Sachs and Warner 1995, Gylfason and Zoega 2001).

Several explanations justify the negative relationship between resource abundance and investment. World prices for primary commodities tend to be more volatile than world prices for other goods, therefore an economy based on primary production will shift relatively often from booms to recessions, creating uncertainty for investors (see Herbertsson et al. 1999). Furthermore, resource abundance often leads to a contraction of the manufacturing sector, which is mainly responsible for the accumulation of capital goods. Often complementarities in investment or positive externalities in manufacturing result in a further decrease in the profitability and productivity of investment (Milgrom et al. 1991). Last, even if the level of investment in physical capital is of similar magnitude in resource-abundant and resource-scarce regions there are differences in its quality and the efficiency of its use. Investments often fail to reach the productive base of the economy (Usui 1997) and resource transfers often provide protection to many infant manufacturing industries that subsequently fail to mature (Bell et al. 1984). Instead, resource-abundant governments often invest in military and internal security sectors or engage in prestigious and popular projects with very low rates of return (Ascher 1999, Robinson and Torvik 2005).

2.1.4 Policy failures

Resource-abundant countries tend to be myopic, have irrationally optimistic expectations of future resource revenues and accumulate foreign debt to a greater degree than resource-scarce countries. Manzano and Rigobon (2003), for instance, argue that the resource curse may be related to excessive debt accumulated using natural resources as collateral. Educational policies often seem to be neglected in resource-dependent countries. This is largely due to the fact that the primary sector generally demands a less-skilled and educated labour force (Gylfason 2001a). Auty and Mikesell (1998) argue that since resource revenues often accrue to governments, the decision-making of their management lies in only a few hands. A limited number of people involved in resource management implies less accountability and control over the ways resource rents are utilised.

2.1.5 Gender inequality and growth

Researchers and practitioners specialising in development have increasingly focused on the instrumental effects of gender bias on economic growth. A new literature focusing on the linkages between gender inequality and economic growth has been rapidly developing, inspired to a large extent by Klasen's influential work (Klasen 1999, 2002). In many developing countries in particular, girls with innate abilities similar to those of boys are often deprived of formal education and hence become constrained in developing their human capital fully (Blackden and Bhanu 1999, Knowles et al. 2002). In a similar vein Schultz (2002) claims that marginal returns to education tend to be higher for individuals with little schooling (mainly women) and that female education is associated with positive externalities on children's education.

Figure 2 captures the strong association between relative female-male education (average years of schooling of adults) and economic growth of GDP per capita between 1970 and 2000. Data on education are provided by the Barro and Lee dataset at the Center for International Development (CID 2008) at Harvard University. As can be seen from the graph, countries with perfect equality in education between the sexes (value of female/male education proxy equal to 1) grew on average by approximately 2 per cent per year (grey line). Countries where female education accounts for only 50 per cent of its male equivalent experienced growth rates close to 0. Below, we present some of the main mechanisms that link gender equality with economic growth.

2.1.6 Education

The impact of gender inequality in education on economic growth is possibly the gender-growth linkage that has attracted the most attention in the literature. Gender inequality in education deprives girls with innate abilities similar to those of boys of opportunities to develop their human capital and participate in a series of growth-supporting economic activities. Assuming declining marginal productivity to education, gender inequality results in boys less able than girls becoming educated. This subsequently lowers the average human capital available in the economy, results in inefficient public resources and slows down economic growth (Dollar and Gatti 1999, Knowles et al. 2002, Schultz 2002). Amongst these studies, Klasen's econometric analysis has received prominent attention (Klasen 2002). A series of other cross-country studies reach similar conclusions about the beneficial impact of gender equality in education on growth (Benavot 1989, Dollar and Gatti 1999, Klasen and Lamanna 2003, Abu-Ghaida and Klasen 2004), although little emphasis is given to the robustness of the results and the relative importance of institutional variables, which have received increasing attention in the growth literature. A noticeable exception is the study by Morrison and Jütting (2005) which conditions the positive effect of gender inequality on the presence of social institutions that ensure equal opportunities both in education and in labour market participation. A micro-study by Assaad (2005) confirms that institutions are likely to rule over gendered schooling in explaining growth differences. He notes that in Egypt the positive impact of female education on total factor productivity crucially depends on specific social norms that prevent gendered discrimination at work.

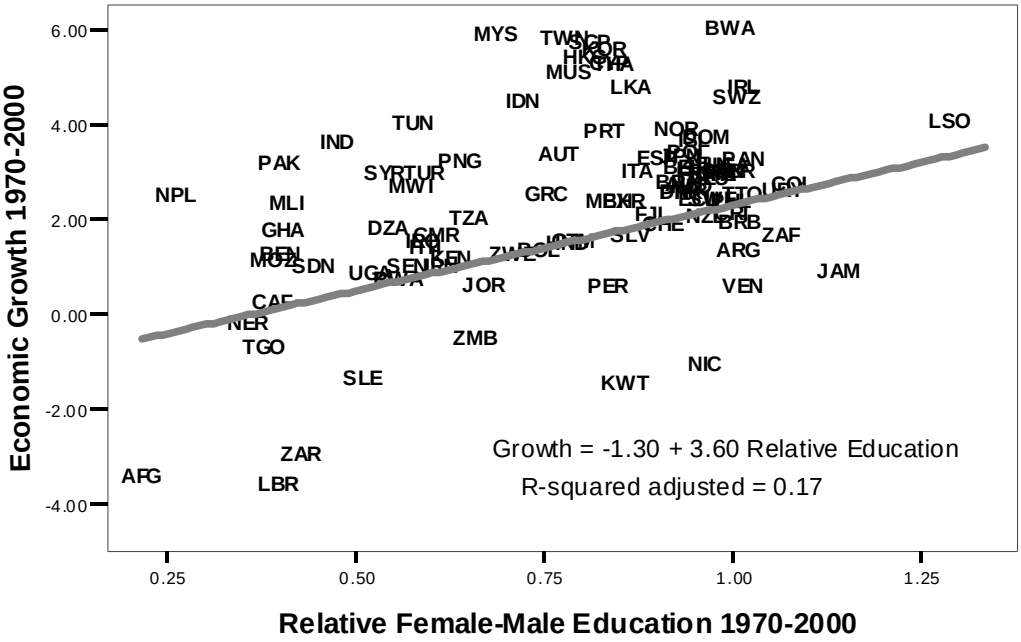


Figure 2: Economic growth and female-male education

Note: Country observations are represented by their 3-letter ISO acronym codes. All three-letter country codes available at the webpage of the International Organization for Standardization: www.iso.org

As Knowles et al. (2002) state, it is also likely that male and female human capital are imperfect substitutes in specific production processes. If this is indeed the case, gender inequality in education implicitly forces educated men to perform activities more suitable for women. Increased female education may also create positive externalities for other family members. Partners of similar educational attainment may support each other's lifelong learning (Baliga et al., 1999). Similarly, female education is likely to have positive external effects on the quantity of children and their upbringing, with educated mothers providing a more learning-supportive environment at home (Schultz 2002, Klasen 2002).

2.1.7 Employment

There is some tentative evidence in the literature that increased female employment leads to enhanced growth rates. Esteve-Volart (2004) estimates the impact of low female to male labour force participation for 16 Indian states and finds a strong positive effect on economic growth. He claims that differences in gendered employment can explain up to a third of income per capita disparities. Klasen and Lamanna (2003) perform a similar analysis at a country level and also find a positive correlation between female employment and income growth. Nevertheless, little attention has been given so far to either the robustness of this finding or causality issues. Goldin (1994) claims that it is the process of economic development itself that affects female employment rather than the other way round. Several studies indentify a U-shaped gendered Kuznets curve in which female employment decreases at initial levels of economic development but increases at a higher income level once the economy industrialises (Psacharopoulos and Tzannatos 1989, Goldin 1994).

2.1.8 Wages

The literature focusing on the impact of gender inequality in wages on economic development points in the opposite direction. Most studies tend to support findings that a gender wage gap has benefited trade expansion and hence economic growth. Seguino (1997, 2000a, 2000b) cites lower female wages in export-orientated industries, for instance, as creating a comparative advantage in labour-intensive commodities (and stimulating export-led growth) in many East-Asian economies. Busse and Spielmann (2006) find that a 1 per cent increase in the gender wage gap increases the share of labour-intensive exports in total exports by 0.3-0.4 per cent. Similarly, Taiwan's export growth is attributed in part to low female wages as a means to maintain the competitiveness of domestic industries and shield them from intense international competition in commodity markets and capital flight (Seguino 1997, 2000a, 2007, Berik et al. 2000).

2.1.9 Fertility

There is strong support in the literature for findings that higher female education results in lower fertility rates. Educated women face a higher opportunity cost of raising children (Becker et al. 1990, Schultz 1994). Government intervention (e.g. in the form of establishing family planning centres and approving legal clauses that prohibit child labour) may accelerate the transition to an economy with low fertility rates (Hazan and Berdugo, 2002). Shultz (1994) carried out one of the first studies that tested this hypothesis empirically. He claims that an increase in female schooling by just one year is sufficient to decrease fertility rates by 12 per cent. The effect often extends beyond gender equality in education. Paul-Majumder and Begum (2000) provide supportive evidence indicating that on average, female workers in the garment industry in Bangladesh postpone both their age of marriage and the birth of their first child by approximately four years.

Lower fertility rates successively tend to impact positively on GDP per capita growth (Bloom and Canning 2000, Klasen 2002). As population growth adjusts, more physical capital per person (enhanced capital-deepening) raises average labour productivity. Similarly, lower fertility lowers the family dependency burden (the number of dependent members outside work) and hence permits a faster accumulation of savings in the economy.

2.1.10 Structural adjustment

There has been much criticism of the side-effects of structural adjustment on social spending and the provision of public goods, many of which have disproportionately affected the female population. Structural adjustment, as promoted by the World Bank and the International Monetary Fund (IMF) since the mid 1980s, endorses cutbacks in fiscal deficits, stringent monetary policy, a downsizing of the public sector, and trade liberalisation. Structural adjustment reforms have many merits in terms of pursuing macroeconomic stability and increased efficiency with more market-oriented allocation of resources. Simultaneously, though, little if any attention has been paid to efficient ways of reducing public deficits without affecting vulnerable segments of the society and women in particular. Many governments have chosen to cut public expenditure directed to the poor (where women are disproportionately represented) rather than reduce subsidies to the urban rich population or close tax loopholes (World Bank 1994, López 2006).

In the past, several governments in developing countries (e.g. in Bolivia, Malawi, Zambia and Pakistan to mention a few) adopted drastic cutbacks in public expenditure and reduced trade protection via tariffs often prescribed by their IMF-designed Structural Adjustment Programs. As a result of tight fiscal policies, the provision of public basic services (education, health, water and electricity supply) had to be downsized with a simultaneous increase in their cost of supply. The lowering or abolition of tariffs also deprived governments of public revenues and further exerted pressure on social spending (Rao, 2001). Rao (ibid) estimates that a $1 decline in trade-tax revenues results on average in a decrease of public expenditure on capital formation and human capital by $0.37. At the same time, governments switch from trade-relevant tariffs to valued added taxes (VAT) on basic commodities and services to compensate for loss of revenues. The consequent contraction of public investment and increase in the price of basic commodities (food, water, electricity) affects poor households as a whole and does not need to be gender-specific. Nevertheless, it is usually women who are in charge of purchasing household basic commodities and who counterbalance price increases by extending their work time and effort (Grown, 2006, Peralta et al., 2006, Palmer 1995). Removal of state support such as public services and subsidies for inputs and credit marginalise poor producers, many of them women, and deprive them of access to assets essential to commencing production (Atthill et al. 2007). This argument is usually absent in the growth-gender literature, which generally does not disaggregate welfare and income effects on a gender basis.

2.2 Empirical analysis

2.2.1 Economic growth, gendered education and resource abundance

Over the last two decades there has been an expanding number of studies on growth econometrics, largely thanks to advancements in computer technology and the user-friendliness of statistical software (i.e. Grier and Tullock 1989, Barro 1991, Knack and Keefer 1995, Sachs and Warner 1995, Frankel and Romer 1999, Bils and Klenow 2000, Alesina et al. 2003, Dollar and Kraay 2003). The studies evaluate the importance of specific variables as growth determinants. Depending on the focus of the study, the statistical analyses evaluate the impact of a specific set of variables (e.g. investment, trade, governance) on long-term economic growth (usually spanning a period of at least two decades in order to avoid short-term fluctuations).

To identify the dependence of growth on natural gendered education we estimate cross-country growth regressions in the tradition of Klasen (2002), whose work has largely influenced if not dominated the gender-growth literature. We include initial income per capita in our regressions to check for the conditional convergence hypothesis that predicts higher growth in response to lower starting income per capita, keeping other explanatory variables constant. We construct a general growth specification where economic growth depends on a series of growth-relevant variables. Thus per capita economic growth between 1970 and 2000 depends on the logarithm of initial per capita income, on a set of educational variables (the sign of dependence is the subject of our analysis), on resource abundance and on a set of other explanatory variables.[6]

[6] Appendix A lists variables and data sources used in the main analysis.

We estimate our general growth specification using Ordinary Least Squares, consecutively alternating the set of growth-explanatory variables (Tables 1 and 2). Estimating different specifications is crucial in checking for the robustness of statistical estimations (see Leamer 1985; Levine and Renelt 1992; Rodriguez, 2007). In all regressions we include initial income per capita in 1970 (*LnY70*), average investment rate between 1970 and 2000 (*Investment70-00*), population growth between 1970 and 2000 (*Population growth*), Sachs and Warner's measure of trade openness (*Trade openness*) and regional dummies. Data on income, investment and population are provided by the Penn Word Tables of the University of Pennsylvania (CIC, 2008). As a measure of openness we use the percentage of years during the period 1965-1990 in which the country is considered an open economy according to the Sachs and Warner (CID 2008) database. We also include in alternating order a series of variables that capture institutional quality and good governance (see columns (2)-(7) of Tables 1 and 2). We include in alternating order indices of government effectiveness (*Government effectiv*), rule of law (*Rule of law*) and political stability (*Political stability*) in 1996 (the first year for which data are available) from the Kaufmann et al. (2007) database, an index of democracy in 1970 (*Democracy*) by Marshall and Jaggers (2002), of *Ethnic fractionalisation* by Alesina et al. (2003) and an indicator of *Land-lockedness* by Gallup et al (1999). We also include the same educational variables found in Klasen (2002), although we extend the period of analysis up to the year 2000. We add the average years of schooling for the whole population in 1970 (*Schooling70*) and the relative female-male average years of schooling for the same year (*Relative schooling70*). Similar to Klasen (2002) we also incorporate the rate of growth in overall years of education (*Growth schooling*), as well as the rate of growth in relative female-male years of schooling (*Growth rel schooling*). All data on education are provided by the Barro-Lee dataset (CID 2008). As is now supported in many studies (Rodrik et al., 2004, Kahn 2005), we find that institutions rule over geography, trade openness and other relevant variables in explaining variation in growth rates. Good institutions (government effectiveness, political stability, rule of law and ethnic fractionalisation that protect property rights and enhance government performance) strongly increase economic growth. Similarly, ethnic fractionalisation, widely associated with internal strife and conflict, negatively impacts on long-term growth rates. Initial income is strongly and negatively correlated with income growth, suggesting that poorer countries grow faster once other implicit characteristics (institutions, education) are taken into account. Contrary to Klasen (2002) and other studies in the literature (Sachs and Warner 1995, 2001) we do not find that investment, trade openness and population growth strongly affect economic development, at least not consistently.[7] Even more importantly for this study, we find the relative female-male years of schooling (*Relative schooling70*) to be the only consistently significant educational variable. Gendered education appears to be significant for economic growth and dominates over other educational proxies. The effect is also of substantial magnitude. An increase of the share of female to male education from 30 per cent (as in Sudan and Zaire) to 50 per cent (as in Cameroon and Turkey) would result in an increase in economic growth of approximately 0.20x2.28=0.45 percentage points per year (see Column 1 of Table 1).

[7] Dollar and Kraay (2003) find that the statistical significance of trade openness on growth and income levels varies depending on the specification used. Hoeffler (2001) claims that the investment coefficient suffers from similar statistical fragility.

Table 1: Growth regressions (1)

Dependent variable: Growth1970-2000	(1)	(2)	(3)	(4)
Constant	*12.27*	*12.19*	*9.52*	*10.65*
LnY70	*–1.52***	*–1.49***	*–1.23***	*–1.39***
	(0.33)	*(0.33)*	*(0.35)*	*(0.40)*
Investment70-00	*0.03*	*0.04*	*0.06*	*0.06*
	(0.03)	*(0.03)*	*(0.04)*	*(0.04)*
Population growth	*–0.10*	*–0.09*	*–0.07*	*–0.16*
	(0.13)	*(0.14)*	*(0.16)*	*(0.14)*
Trade openness	*0.52*	*0.45*	*1.29**	*1.10**
	(0.61)	*(0.63)*	*(0.57)*	*(0.56)*
Schooling70	*–0.13*	*–0.17*	*0.03*	*–0.03*
	(0.11)	*(0.11)*	*(0.10)*	*(0.11)*
Relative schooling70	*2.28**	*2.29**	*2.28**	*2.63**
	(1.10)	*(1.33)*	*(1.36)*	*(1.35)*
Growth schooling		*–0.12**	*–0.04*	*–0.02*
		(0.07)	*(0.08)*	*(0.09)*
Growth rel school		*0.03*	*0.08*	*0.09*
		(0.06)	*(0.06)*	*(0.06)*
Government effectiv	*1.21****	*1.25****		
	(0.37)	*(0.36)*		
Ethnic fractionalis			*–1.53**	
			(0.69)	
Democracy				*0.03*
				(0.03)
Sub-Saharan Afr	*–1.27**	*–1.30**	*–0.90*	*–1.65**
	(0.67)	*(0.68)*	*(0.75)*	*(0.75)*
South Asia	*0.69*	*0.94**	*1.02**	*0.19*
	(0.63)	*(0.53)*	*(0.60)*	*(0.74)*
Latin America	*0.03*	*–0.02*	*–0.54*	*–0.89*
	(0.48)	*(0.48)*	*(0.53)*	*(0.55)*
East Asia	*1.26**	*0.94**	*0.67*	*0.44*
	(0.52)	*(0.53)*	*(0.77)*	*(0.77)*
R2 adjusted	*0.63*	*0.62*	*0.55*	*0.53*
N	*87*	*87*	*83*	*83*

Note: robust standard errors for coefficients in parentheses. Superscripts *, **, *** correspond to a 10, 5, and 1 per cent level of significance.

Table 2: Growth regressions (2)

Dependent variable: Growth1970-2000	(5)	(6)	(7)
Constant	*9.59*	*9.13*	*12.83*
LnY70	*–1.31*** (0.32)*	*–1.13*** (0.31)*	*–1.45*** (0.30)*
Investment70-00	*0.05 (0.03)*	*0.03 (0.03)*	*0.03 (0.03)*
Population growth	*–0.17 (0.15)*	*–0.10 (0.16)*	*–0.12 (0.14)*
Trade openness	*1.34** (0.60)*	*0.83 (0.57)*	*0.20 (0.55)*
Schooling70	*0.01 (0.10)*	*–0.07 (0.10)*	*–0.23** (0.11)*
Relative schooling70	*3.01** (1.51)*	*2.59* (1.42)*	*1.84* (1.11)*
Growth schooling	*0.01 (0.10)*	*–0.11 (0.08)*	*–0.13 (0.08)*
Growth rel school	*0.11 (0.07)*	*0.11 (0.07)*	*0.07 (0.06)*
Landlockdeness	*–0.05 (0.37)*		
Political stability		*0.53** (0.23)*	
Rule of law			*1.43*** (0.37)*
Sub-Saharan Afr	*–1.58** (0.78)*	*–1.67** (0.76)*	*–1.47** (0.67)*
South Asia	*0.60 (0.64)*	*1.23* (0.64)*	*0.19 (0.62)*
Latin America	*–0.83 (0.54)*	*–0.88* (0.54)*	*–0.20 (0.49)*
East Asia	*1.10* (0.62)*	*1.31** (0.63)*	*1.24** (0.56)*
R2 adjusted	*0.55*	*0.58*	*0.65*
N	*87*	*87*	*87*

Note: robust standard errors for coefficients in parentheses. Superscripts *, **, *** correspond to a 10, 5, and 1 per cent level of significance.

At a second stage (Table 3) we estimate the main growth specification incorporating the share of mineral and agricultural production in GDP in 1971 respectively (Mineral production and Agricultural production). Data on natural resources are provided by the Sachs and Warner database at the Center for International Development (CID 2008). We use government effectiveness as an institutional proxy, although results can be replicated by adopting other institutional measures instead (e.g. rule of law, political stability). The mineral abundance proxies are strongly and negatively correlated with economic growth as predicted by the resource curse hypothesis. The relative female-male schooling variable now becomes insignificant, capturing a potential strong correlation with the resource abundance variables, which is the focus of our section 3. Resource abundance rules over gendered education as a

growth determinant, capturing the underinvestment of resource-rich economies in female education possibly because of the presence of male-dominated economic structure or the negligence of public institutions.

Table 3: Growth regressions (3)

Dependent variable: Growth1970-2000	(*8*)	(*9*)
Constant	*8.09*	*18.71*
LnY70	*–0.91*** (0.32)*	*–1.83*** (0.35)*
Investment70-00	*0.03 (0.02)*	*–0.01 (0.03)*
Population growth	*–0.09 (0.16)*	*–0.24 (0.15)*
Trade openness	*0.62 (0.65)*	*0.66 (0.59)*
Schooling70	*–0.18 (0.11)*	*–0.11 (0.10)*
Relative schooling70	*1.96 (1.36)*	*0.67 (1.10)*
Growth schooling	*–0.12 (0.07)*	*–0.02 (0.07)*
Growth rel school	*0.01 (0.06)*	*–0.06 (0.05)*
Government effective	*0.65** (0.31)*	*0.69** (0.31)*
Natural capital		
Mineral production	*–3.82*** (1.36)*	
Agricultural production		*–8.78*** (2.96)*
Sub-Saharan Afr	*–0.80 (0.73)*	*–0.75 (0.62)*
South Asia	*1.02* (0.62)*	*0.67* (0.36)*
Latin America	*–0.24 (0.50)*	*–0.34 (0.42)*
East Asia	*1.58*** (0.60)*	*1.20** (0.47)*
R2 adjusted	*0.60*	*0.66*
N	*79*	*77*

Note: robust standard errors for coefficients in parentheses. Superscripts *, **, *** correspond to a 10, 5, and 1 per cent level of significance.

2.2.2 Natural resources and gendered education

A number of theoretical and empirical studies have focused on the contracting impact of natural resources on a number of growth-relevant variables such as the rate of investment, trade openness, and institutions (see Papyrakis and Gerlagh 2004, Bulte et al. 2005, Sachs and Warner 2005). No attention has been paid so far to any possible negative impact of resource dependence on gender variables as an indirect mechanism affecting long-term growth. To our knowledge, this is the first attempt to examine any possible crowding-out effects of resource abundance on gendered variables and gendered education in particular. If resource abundance

indeed reduces gendered education and gendered education promotes growth, as suggested by Tables 1 and 2, this would suggest an indirect transmission mechanism relating natural resources to economic growth via a negative effect on female schooling.

First, however, we estimate a specification that relates gender inequality in education with a number of gender-relevant variables. Following the recent study by Neumayer and de Soysa (2007), we augment the Klasen-type specification to include the effects of democratic institutions (*Democracy*), initial income (*LnY70*), the share of Muslims in total population (*Muslim*), and geographic proxies on gender inequality. Data on the decomposition of the religions of populations by country are provided by La Porta et al. (1999).[8] Following their findings, we expect countries of higher income per capita, better institutional quality and lower representation of Muslims in population to pursue more actively pro-female policies. Next, we add the resource abundance proxies in our general specifications (mineral production and agricultural production), since the potential correlation between resource intensity and gendered outcomes is a focal point of the study. Empirical results are reported in Table 4.

Table 4: Natural resources and gender

Dependent variable:	*Relative Schooling70 (10)*	*Relative Schooling99 (11)*	*Relative Schooling70 (12)*	*Relative Schooling70-99 (13)*
Constant	*0.35*	*0.35*	*1.77*	*1.59*
LnY70	*0.05* *(0.04)*	*0.06* *(0.04)*	*0.09* *(0.06)*	*–0.07* *(0.05)*
Mineral production	*–0.35*** *(0.16)*	*–0.22** *(0.14)*		
Agricultural prod			*–1.29**** *(0.41)*	*–1.19**** *(0.31)*
Democracy	*0.01**** *(0.003)*	*0.01**** *(0.003)*	*0.01**** *(0.003)*	*0.005*** *(0.002)*
Muslim	*–0.24**** *(0.09)*	*–0.19**** *(0.07)*	*–0.31**** *(0.07)*	*–0.23**** *(0.05)*
Sub-Saharan Afr	*0.05* *(0.06)*	*0.06* *(0.06)*	*0.06* *(0.06)*	*0.03* *(0.05)*
South Asia	*–0.23** *(0.13)*	*–0.21** *(0.11)*	*–0.24*** *(0.10)*	*–0.20*** *(0.08)*
Latin America	*0.13*** *(0.06)*	*0.12**** *(0.05)*	*0.05* *(0.05)*	*0.06** *(0.04)*
East Asia	*–0.02* *(0.07)*	*0.04* *(0.05)*	*–0.14* *(0.09)*	*–0.06* *(0.06)*
R2 adjusted	*0.58*	*0.59*	*0.66*	*0.73*
N	*79*	*79*	*76*	*76*

Note: robust standard errors for coefficients in parentheses. Superscripts *, **, *** correspond to a 10, 5, and 1 per cent levels of significance

We find higher income levels and better institutions to be positively correlated with female-male education ratios as expected. Evidence also suggests that nations with large Muslim

[8] We also added the share of Catholics in total population as an explanatory variable, but it remains statistically insignificant throughout all regressions.

populations experience greater incidences of gender inequality in education. The share of mineral production in GDP is strongly and negatively correlated with our gendered education proxy, suggesting that there is strong evidence for a gendered resource-curse channel. Mineral-rich countries appear to suffer from lower female than male education and the effect can be of considerable magnitude. A difference of 10 per cent in the share of mineral production in GDP is associated with a drop in female years of schooling of 3.5 per cent compared to the male equivalent (column 10 of Table 4). Since differences in mineral dependence between resource-scarce and resource-rich economies are of even greater magnitude, the effect on gendered education is further amplified.

In column 11 of Table 4 we use the average female-male ratio of years of schooling for the 1970-1999 period as the dependent variable and confirm that our main findings still hold. It appears that mineral abundance had a long-term effect on gendered education (other studies have also confirmed a long-term impact of resource abundance proxies on growth-relevant variables such as institutions, investment and trade (see Sachs and Warner 1995, Papyrakis and Gerlagh 2003). In columns 12 and 13 we use agricultural production in GDP as an alternative measure of resource abundance. Again, we find a strong and negative statistical association between agricultural production and gendered education. Countries with an extensive primary sector (minerals, agriculture) suffer from increased gender inequality in education, an effect that holds after controlling for other socio-economic characteristics (initial GDP per capita, institutions, religious composition).

2.3 The case of Nigeria

Nigeria, despite being one of the world's major oil exporters (with crude oil production exceeding 2 million barrels per day in 2006), has experienced a rather disappointing economic performance over the last four decades with minimal improvements in living standards and extensive macroeconomic instability. Several factors (amongst which gender inequality, widespread corruption, political instability, underinvestment, lack of diversification, Dutch disease adjustments) have jointly resulted in poor growth performance. In this section we provide a summary of Nigeria's macroeconomic history and explore how the country's performance conforms to the overall resource curse experience of mineral-rich economies. We pay particular attention to the country's overall macroeconomic management, institutions and gender dimensions.

Since 2000, economic performance has drastically improved. The economy is currently growing at approximately 6 per cent per year, but this is likely to be partly attributed to the recent surge in oil prices, as well as to the recent economic reforms pursued by the Obasanol administration. Unless economic fundamentals and overall macroeconomic management improve drastically the current growth rate will prove to be unsustainable in the long run, especially if oil prices adjust downwards.

2.3.1 Gross domestic product

Income growth over the last four decades has been erratic, with frequent alternating booms and slumps. Overreliance on the mineral sector created a see-saw effect for GDP per capita growth in line with oil price volatility (see Iyoba and Oriakhi 2008). Real income per capita grew between 1960 and 2006 by less than 1 per cent per year. Even this modest rate is largely attributed to the recent soaring oil prices. Between 1960 and 2000 the average annual growth

rate in GDP per capita amounted to a mediocre 0.50 per cent. As indicated in Table 5, the economy expanded rapidly in the 1960s and 1970s following the exploitation of new oil reserves and the beneficial impact of the two oil crises on oil prices.[9] Nevertheless, as comparing the difference between the rates of change in GDP and GDP per capita makes obvious, rapid population growth (in excess of 2 per cent for most of the period) eroded a large proportion of such growth benefits to the average worker. Throughout the whole period incidences of fast growth in GDP per capita, exceeding 2 per cent, were largely adjustments to previous recessions or falling oil prices rather than any representation of a general trend. Following a prolonged period of contracting output between 1980 and 1984, the Babangida administration introduced a Structural Adjustment Programme (SAP) in 1986 in an effort to liberalise trade flows and modernise the financial system (Iyoba and Oriakhi 2008). There is little evidence that the SAP was either successfully implemented or that the real economy benefited from it. Since 2003 there has been a reversal of fortune, largely supported by soaring oil prices. Prudent spending and improvements in economic fundamentals (investment rates, diversification, education) are much needed in order to avoid a short-lived increase in economic growth similar to that of the 1970s.

Table 5: Economic growth

Year	*GDP growth (%*	*GDP per capita growth (%)*	*Year*	*GDP growth (%)*	*GDP per capita growth (%)*
1961	*0.19*	*-2.09*	*1984*	*-4.82*	*-7.39*
1962	*4.10*	*1.71*	*1985*	*9.70*	*6.67*
1963	*8.58*	*6.07*	*1986*	*2.51*	*-0.39*
1964	*4.95*	*2.51*	*1987*	*-0.70*	*-3.56*
1965	*4.88*	*2.43*	*1988*	*9.90*	*6.71*
1966	*-4.25*	*-6.51*	*1989*	*7.20*	*4.08*
1967	*-15.74*	*-17.75*	*1990*	*8.20*	*5.07*
1968	*-1.25*	*-3.62*	*1991*	*4.76*	*1.75*
1969	*24.20*	*21.19*	*1992*	*2.92*	*-0.02*
1970	*25.01*	*21.97*	*1993*	*2.20*	*-0.69*
1971	*14.24*	*11.46*	*1994*	*0.10*	*-2.71*
1972	*3.36*	*0.83*	*1995*	*2.50*	*-0.34*
1973	*5.39*	*2.76*	*1996*	*4.30*	*1.44*
1974	*11.16*	*8.26*	*1997*	*2.70*	*-0.08*
1975	*-5.23*	*-7.82*	*1998*	*1.88*	*-0.84*
1976	*9.04*	*5.90*	*1999*	*1.10*	*-1.56*
1977	*6.02*	*2.86*	*2000*	*5.40*	*2.67*
1978	*-5.76*	*-8.62*	*2001*	*3.10*	*0.47*
1979	*6.76*	*3.57*	*2002*	*1.55*	*-1.00*
1980	*4.20*	*1.19*	*2003*	*10.69*	*7.96*
1981	*-13.13*	*-15.55*	*2004*	*6.00*	*3.43*
1982	*-0.23*	*-2.94*	*2005*	*7.20*	*4.66*
1983	*-5.29*	*-7.83*	*2006*	*5.20*	*2.75*

Source: World Bank (2008): World Bank Development Indicators 2008

Looking beyond income, Nigeria also appears to have made little progress in broader human development (Table 6, Graph 1). Between 1975 and 2005 its UN Human Development Index (HDI), capturing progress in income per capita as well as education and life expectancy, only

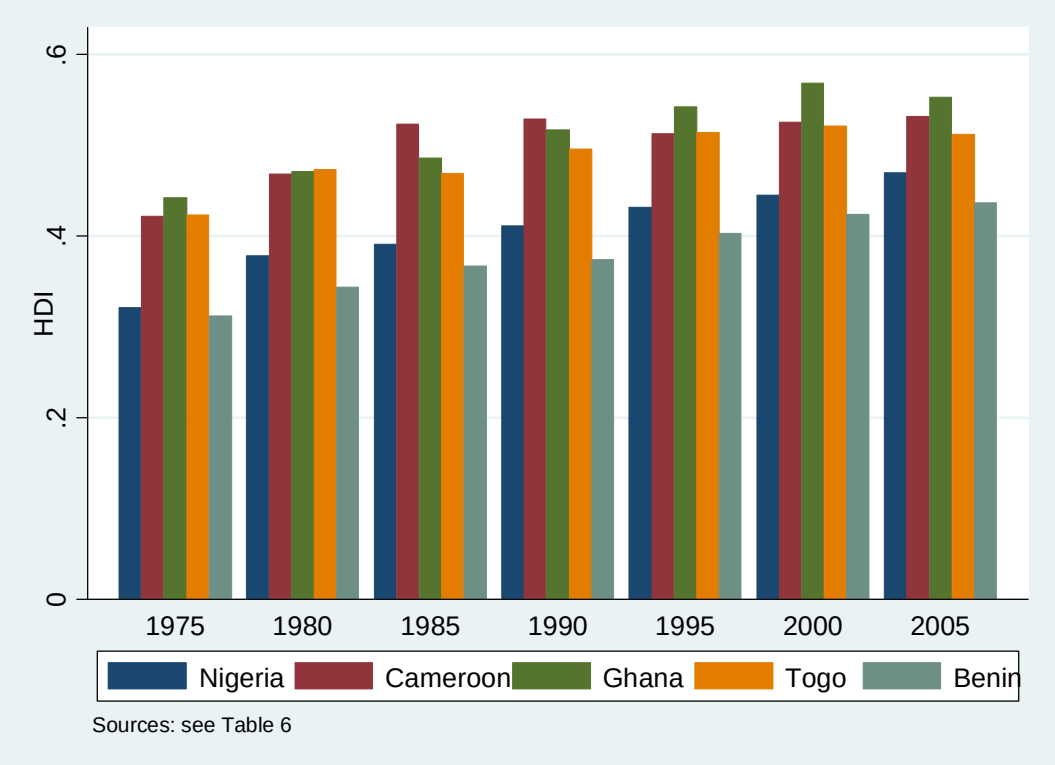
[9] The late 1960s negative growth rates are attributed to the Nigerian civil war.

improved from 0.321 to 0.470, little faster than in neighbouring West African countries. The largest increase took place between 1975 and 1980, but this possibly captures the fact that initial increases in welfare are easier to achieve. Nigeria still lags behind many resource-scarce neighbouring economies (i.e. Cameroon, Ghana, Togo). Indonesia, often compared to Nigeria as a counter-example of successful resource-based development (Bevan et al. 1999), achieved much higher growth in human development for the same period, arriving at medium human development status (with its HDI index rising from 0.471 to 0.728).

Table 6: Human Development Index

Year	*HDI index*	*HDI % change*	*HDI Cameroo*	*HDI Ghana*	*HDI Togo*	*HDI Benin*
1975	*0.321*		*0.422*	*0.442*	*0.423*	*0.312*
1980	*0.378*	*17.76*	*0.468*	*0.471*	*0.473*	*0.344*
1985	*0.391*	*3.44*	*0.523*	*0.486*	*0.469*	*0.367*
1990	*0.411*	*5.12*	*0.529*	*0.517*	*0.496*	*0.374*
1995	*0.432*	*5.11*	*0.513*	*0.542*	*0.514*	*0.403*
2000	*0.445*	*3.01*	*0.525*	*0.568*	*0.521*	*0.424*
2005	*0.470*	*5.62*	*0.532*	*0.553*	*0.512*	*0.437*

Source: United Nations (2008): Human Development Report 2007/2008



Graph 1: Human Development Index of Nigeria and neighbouring West African countries

2.3.2 Economic fundamentals

Sound economic fundamentals (high investment rates, good institutions, diversified economic structures) are vital elements of sustained economic growth. An influx of resource rents often

induces myopic macroeconomic planning and discourages the formation of a growth-inductive environment. As Table 7 indicates, Nigeria has traditionally invested rather a low share of its GDP, often falling below 10 per cent in the early 1980s. Since investment is largely associated with the building of new infrastructure supporting the productive capacity of the economy, low rates of investment jeopardise sustained long-term economic growth. On a rather more positive tone it has to be acknowledged that the liberalisation of credit markets, the establishment of new banks and the privatisation of public enterprises following the 1986 SAP boosted domestic investment. Nevertheless, the share of investment in GDP reached its peak in 1998, and despite the current influx of petrodollars and increased public revenues investment is no longer on the rise. Although under-investment is rather endemic in Sub-Saharan Africa as a whole (largely explained by the low availability of domestic savings and high investment risk), much-faster growing South Asian and Southeast Asian economies tend to experience investment rates well above 30 per cent (with China and India approximately to 45 and 35 per cent respectively).

Table 7: Investment rate

Year	*Investment (% of GDP)*	*Year*	*Investment (% of GDP)*
1961	*11.73*	*1984*	*9.53*
1962	*10.54*	*1985*	*8.97*
1963	*11.18*	*1986*	*15.03*
1964	*13.31*	*1987*	*15.98*
1965	*15.39*	*1988*	*18.01*
1966	*13.89*	*1989*	*17.73*
1967	*13.66*	*1990*	*14.74*
1968	*12.37*	*1991*	*23.43*
1969	*12.19*	*1992*	*21.80*
1970	*14.82*	*1993*	*23.29*
1971	*18.72*	*1994*	*19.64*
1972	*21.09*	*1995*	*16.34*
1973	*22.41*	*1996*	*14.17*
1974	*16.97*	*1997*	*17.45*
1975	*25.23*	*1998*	*24.11*
1976	*31.48*	*1999*	*23.38*
1977	*28.33*	*2000*	*20.26*
1978	*27.53*	*2001*	*24.09*
1979	*22.08*	*2002*	*26.23*
1980	*21.25*	*2003*	*23.86*
1981	*23.28*	*2004*	*22.36*
1982	*20.00*	*2005*	*20.86*
1983	*14.74*		

Source: World Bank (2008): World Bank Development Indicators 2008

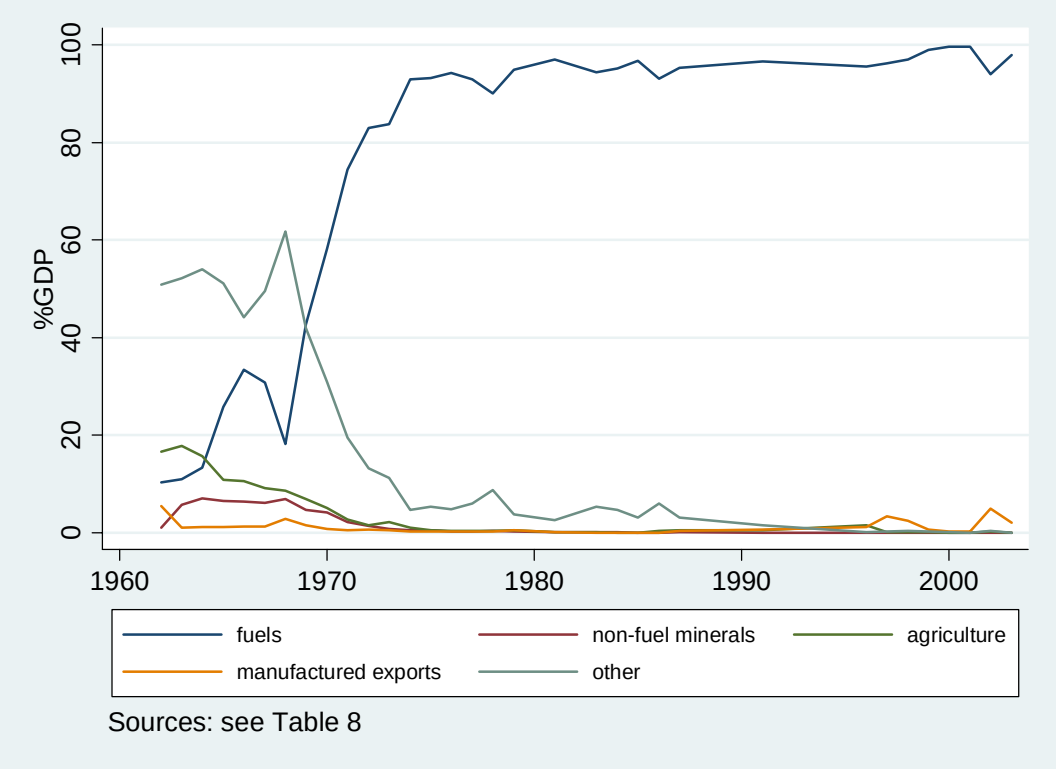
Over-reliance on oil left Nigeria vulnerable to external economic shocks and price fluctuations. Since the emergence of the mineral sector in the 1960s, oil has increasingly become the driving force of the Nigerian economy. According to Dutch disease theory, increased demand, supported by the influx of resource rents, boosts relative wages in the non-traded sectors and the booming resource-dependent industry, while the rest of the economy shrinks, due both to the relocation of labour and to appreciation of the local currency. Nigeria has been no exception to this rule of thumb. As Table 8 and Graph 2 illustrate, the shares of

the agriculture and oil sectors in GDP were almost equal at the beginning of the 1980s after the second oil shock. Although the relative importance of sectors largely depends on relative prices (and hence on external conditions), its neglect of agricultural policies has transformed Nigeria to a net importer of the agricultural commodities it traditionally produced (i.e. rice and maize). Even more importantly, manufacturing's relative share shrunk from 10 per cent of GDP at the beginning of the 1980s to a mediocre 2.3 per cent in 2006 with no signs of immediate recovery. Although agricultural production has increased in recent years in an attempt to diversify the economy, soaring oil prices have kept the relative share of the oil sector in GDP at very high levels (close to 38 per cent in 2006). As a result, Nigeria is likely to remain a largely resource-driven economy and hence prone to resource-curse development failures, at least in the short-term.

Table 8: GDP decomposition

Year	*Agriculture (% of GDP)*	*Manufacturing (% of GDP)*	*Oil (% of GDP)*
1981	*21.18*	*9.42*	*21.46*
1982	*22.98*	*9.72*	*17.35*
1983	*24.23*	*10.23*	*13.91*
1984	*28.38*	*8.00*	*15.16*
1985	*29.05*	*8.90*	*16.75*
1986	*29.56*	*8.82*	*13.82*
1987	*29.66*	*6.65*	*25.40*
1988	*35.00*	*7.47*	*21.47*
1989	*26.10*	*5.26*	*35.30*
1990	*25.57*	*5.18*	*37.46*
1991	*25.63*	*5.86*	*37.33*
1992	*22.67*	*4.79*	*46.34*
1993	*28.68*	*5.44*	*35.40*
1994	*33.00*	*6.78*	*24.35*
1995	*27.28*	*5.27*	*39.65*
1996	*26.41*	*4.75*	*42.84*
1997	*28.83*	*4.98*	*38.15*
1998	*32.94*	*5.09*	*27.20*
1999	*29.69*	*4.58*	*32.07*
2000	*21.83*	*3.52*	*47.72*
2001	*28.31*	*3.85*	*35.32*
2002	*44.13*	*3.18*	*26.02*
2003	*38.59*	*3.14*	*32.30*
2004	*30.48*	*2.82*	*37.22*
2005	*29.02*	*2.57*	*38.87*
2006	*28.50*	*2.31*	*37.61*

Source: Nigerian National Bureau of Statistics (2007): Nigeria, National Accounts



Graph 2: Fuels, non-fuel minerals, agriculture, manufactured exports and other sectors as shares of GDP (%)

Table 9 presents a similar picture for the decomposition of exports. Exports were much more skewed towards agriculture at the beginning of the 1960s, but by the early 1970s oil was already accounting for more than 50 per cent of the volume of exports.[10] Ever since then there has been a persistent dominance of oil in exports which has been independent of oil price fluctuations. Oil currently accounts for 98 per cent of all exports and the current level of oil prices is most likely prone to reinforce the current trend. The share of agricultural commodities in exports has been negligible in recent years, although there has been a slight increase in manufacturing. Nevertheless, unless investment deliberately targets non-oil activities it is very unlikely that any drastic changes in sectoral composition can be expected.

[10] Any remaining share, not attributed to minerals, agriculture and manufacturing, belongs to food exports and services.

Table 9: Exports decomposition (% of total exports)

Year	*Fuels*	*Non-fuel Minerals*	*Agriculture*	*Manufactured exports*
1962	*10.30*	*1.09*	*16.63*	*5.56*
1963	*10.99*	*5.74*	*17.88*	*1.09*
1964	*13.41*	*7.01*	*15.69*	*1.17*
1965	*25.88*	*6.52*	*10.92*	*1.12*
1966	*33.42*	*6.44*	*10.58*	*1.27*
1967	*30.84*	*6.17*	*9.15*	*1.27*
1968	*18.21*	*7.00*	*8.61*	*2.82*
1969	*42.72*	*4.71*	*6.92*	*1.51*
1970	*58.15*	*4.20*	*5.11*	*0.72*
1971	*74.47*	*2.18*	*2.74*	*0.52*
1972	*83.00*	*1.48*	*1.56*	*0.64*
1973	*83.82*	*0.79*	*2.22*	*0.50*
1974	*92.96*	*0.53*	*1.01*	*0.27*
1975	*93.24*	*0.46*	*0.58*	*0.23*
1976	*94.23*	*0.29*	*0.36*	*0.27*
1977	*93.00*	*0.28*	*0.38*	*0.21*
1978	*90.14*	*0.34*	*0.38*	*0.31*
1979	*94.87*	*0.19*	*0.47*	*0.46*
1980	..	..	..	..
1981	*97.06*	*0.15*	*0.12*	*0.13*
1982	..	..	..	..
1983	*94.41*	*0.12*	*0.08*	*0.03*
1984	*95.15*	*0.14*	*0.05*	*0.02*
1985	*96.72*	*0.05*	*0.04*	*0.04*
1986	*93.11*	*0.03*	*0.41*	*0.02*
1987	*95.37*	*0.07*	*0.52*	*0.44*
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	*96.63*	*0.02*	*0.56*	*0.70*
1992	..	..	..	..
1993	..	..	..	..
1994	..	..	..	..
1995	..	..	..	..
1996	*95.58*	*0.01*	*1.62*	*1.11*
1997	*96.28*	*0.01*	*0.08*	*3.36*
1998	*96.98*	*0.00*	*0.10*	*2.47*
1999	*98.94*	*0*	*0.13*	*0.60*
2000	*99.64*	*0.01*	*0.01*	*0.21*
2001	*99.66*	*0.01*	*0.01*	*0.31*
2002	*94.04*	*0.03*	*0.28*	*5.01*
2003	*97.90*	*0*	*0.01*	*2.07*

Source: World Bank (2008): World Bank Development Indicators 2008

A front that Nigeria has achieved considerable progress in recent years appears to be its debt management. As Table 10 illustrates, at the beginning of the 1970s Nigeria's debt (external, public) amounted to a single-digit share of GDP. As often happens with resource-rich economies, the Nigerian government resorted to overspending and excessive borrowing while the price of primary commodities remained high (Manzano and Rigobon 2003). When natural

resource prices adjust downwards the adjustment is usually painful. Following the crash in oil prices in the mid 1980s external debt accounted for more than 100 per cent of Nigeria's GDP. However, since the early 1990s debt has been steadily declining, leaving spaces for valuable resources to be allocated to investment rather than loan repayments.

Table 10: Debt

Year	*External debt (% of GDP)*	*Public debt (% of GDP)*
1970	*6.67*	*3.60*
1971	*10.46*	*5.92*
1972	*8.81*	*5.27*
1973	*11.73*	*7.37*
1974	*7.57*	*4.75*
1975	*6.07*	*3.79*
1976	*3.68*	*2.21*
1977	*8.73*	*2.37*
1978	*13.94*	*6.32*
1979	*13.21*	*6.88*
1980	*13.90*	*6.65*
1981	*19.06*	*9.42*
1982	*24.06*	*16.32*
1983	*50.25*	*32.05*
1984	*63.06*	*37.70*
1985	*65.63*	*43.06*
1986	*109.90*	*88.72*
1987	*123.80*	*114.76*
1988	*129.64*	*120.52*
1989	*126.33*	*122.68*
1990	*117.45*	*110.79*
1991	*122.75*	*118.35*
1992	*88.72*	*80.95*
1993	*143.94*	*123.73*
1994	*139.85*	*118.14*
1995	*121.28*	*100.11*
1996	*88.97*	*72.04*
1997	*78.54*	*62.47*
1998	*94.24*	*72.94*
1999	*83.76*	*64.29*
2000	*68.19*	*65.28*
2001	*64.67*	*60.87*
2002	*65.24*	*60.07*
2003	*59.53*	*53.78*
2004	*52.58*	*45.30*
2005	*22.41*	*20.56*

Source: World Bank (2008): World Bank Development Indicators 2008

Probably the most important challenge Nigeria will face in the years to come in its effort to achieve robust and sustained economic growth will be the control of endemic corruption and an increase in transparency. Although there has been criticism of the inefficient management of resource rents, the corrupt malpractices of governing regimes was a much bigger problem in the past. Former rulers directed resource revenues into private accounts abroad and widely tolerated if not rewarded extensive rent-seeking and bribery (Iyoba and Oriakhi 2008,

Kwakwa et al. 2008). Following the death of General Sani Abacha in 1998, billions of dollars, speculated to have originated from the oil sector, were found deposited in Swiss and other foreign accounts. Table 11 provides data on variables that capture corruption constraints. The Corruption Perception Index and Corruption Control Index range between 0-10 and -3 and 3 respectively, with higher values indicating higher transparency. Nigeria appears to have made little progress in combating fraud, and corruption is still embedded in everyday life in the form of bribery and rent-seeking. Although corruption again appears to be endemic in most Sub-Saharan economies (see also Table 11 for neighbouring Ghana and Cameroon), it is likely to have more pervasive effects in economies with concentrated sectors such as Nigeria, with its dominant oil industry. Nigeria's commitment to implementing the newly-launched EITI (aimed at making petroleum revenues and contracts more transparent) may slowly reverse the current trend and is certainly a step in the right direction. Nevertheless, corruption also largely relates to how public revenues are utilised, and hence further institutional constraints and controls will need to be implemented.

Table 11: Corruption

Year	*Corruption Perception Index (CPI)*	*Corruption control (CC)*	*CPI Ghana*	*CPI Cameroon*
1980-1985	*1*			*4.6*
1988-1992	*0.6*			*3.4*
1996	*0.7*	*-1.25*		*2.5*
1997	*1.8*			
1998	*1.9*	*-1.12*	*3.3*	*1.4*
1999	*1.6*		*3.3*	*1.5*
2000	*1.2*	*-1.14*	*3.5*	*2*
2001	*1*		*3.4*	*2*
2002	*1.6*	*-1.37*	*3.9*	*2.2*
2003	*1.4*	*-1.24*	*3.3*	*1.8*
2004	*1.6*	*-1.32*	*3.6*	*2.1*
2005	*1.9*	*-1.23*	*3.5*	*2.2*
2006	*2.2*	*-1.29*	*3.3*	*2.3*
2007	*2.2*		*3.7*	*2.4*

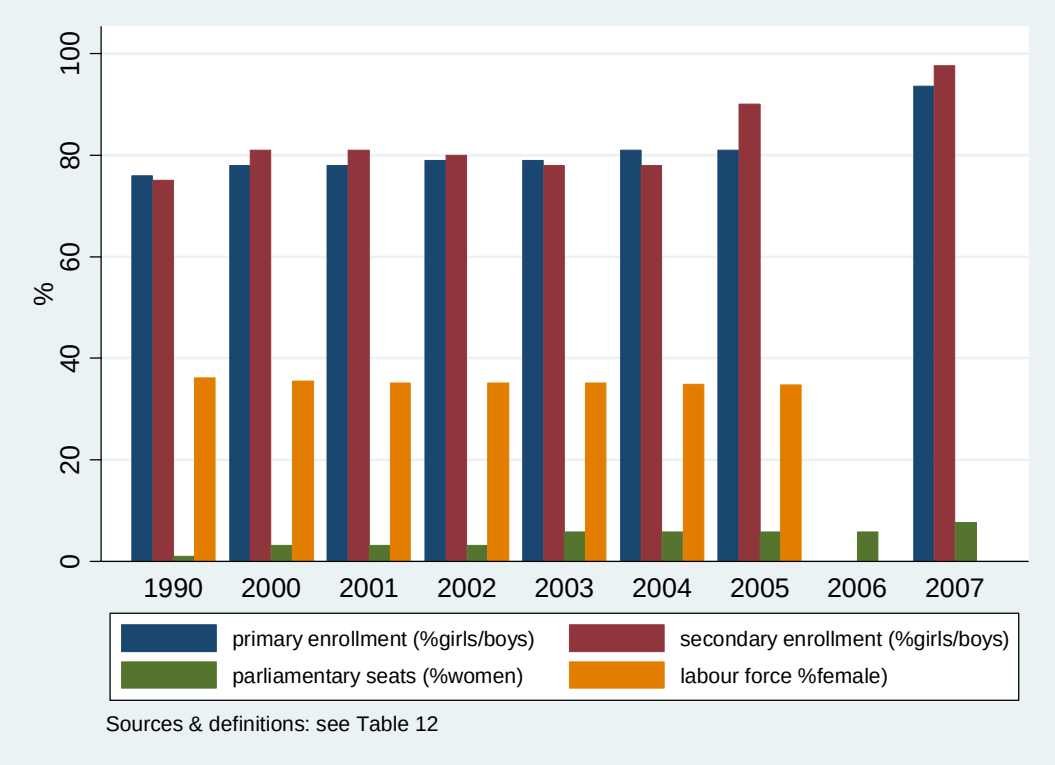
Source: Transparency International (2008) and Kaufmann et al. (2007)

Until recently little attention has been given to female empowerment and gender equality as a means to promote economic opportunities and broader development. As Table 12 and Graph 3 illustrate, female education has been largely neglected in recent years with a ratio of girls to boys in primary and secondary education close to 75 per cent in 1990. Only in very recent years have there been drastic improvements in equalising opportunities for both sexes. At the same time, there has been increasing representation of women in parliament, but a mediocre share of 7.7 per cent share in 2007 demonstrates that women are still largely under-represented in policy-making. There has also been a rather stagnant share of women in the overall labour force (close to 35 per cent). The share needs to be interpreted with caution due to problems with the measurement of informal activities.

Table 12: Gender

Year	*Ratio of Girls to Boys: Primary Education (%)*	*Ratio of Girls to Boys: Secondary Education (%)*	*Parliamentary Seats held by Women (%)*	*Female Labour For (% of Total Labour Force)*
1990	*76*	*75*	*1.0*	*36.20*
2000	*78*	*81*	*3.1*	*35.47*
2001	*78*	*81*	*3.1*	*35.17*
2002	*79*	*80*	*3.1*	*35.15*
2003	*79*	*78*	*5.8*	*35.16*
2004	*81*	*78*	*5.8*	*34.84*
2005	*81*	*90*	*5.8*	*34.70*
2006			*5.8*	
2007	*93.6*	*97.6*	*7.7*	

Source: National Planning Commission (2007): 2006 MDG Nigeria Report and World Bank (2008): World Bank Development Indicators



Graph 3: Measures of gender inequality in Nigeria by year (% female)

3 Conclusions

Many countries in the developing world possess large amounts of resource wealth, yet they continue to suffer from extensive poverty. Current soaring mineral prices have temporarily secured high rates of GDP growth for most of them. Nevertheless, without improvement in the economic fundamentals that underpin long-term growth, current growth rates are not likely to be sustainable. Resource-dependent countries are generally characterised by underinvestment, low levels of human capital, corruption, overvalued currencies and technological stagnation, which can be termed the resource curse (Gylfason 2001a, Gylfason 2001b, Papyrakis and Gerlagh 2007). In this report we emphasise the role of gender inequality as a contributory explanation behind the resource curse, a mechanism rather overlooked in the literature. We found resource-rich countries to suffer more from gender inequality than their resource-scarce counterparts, which we tentatively attribute to structural characteristics of their economies or political economy reasons.

To our knowledge, this is the first cross-country empirical attempt to link gender inequality and resource rents as a potential resource curse mechanism. In our empirical analysis we find that economies rich in minerals and other natural resources experience enhanced gender inequality in education, which appears to suppress long-term growth. Government budgets in resource-rich economies need to put greater emphasis on social spending for the female population. A combined scheme of increasing female schooling, access to assets and social services, broader employment opportunities and participation in policy making will be compatible with the current Millennium Development Goals and ensure that women can fully develop their productivity potential and participate in economic activities. The EITI initiative, announced at the World Summit for Sustainable Development in Johannesburg in 2002, currently aims to strengthen governance and transparency in the mineral sectors of developing economies. Although it largely focuses on the full disclosure of oil, gas and mineral companies' payments and government revenues rather than the spending side of resource revenues per se, the participation of multiple stakeholders (civil society groups, the private sector, media, parliament representatives) can exert pressure on governments for gender-equitable social spending. Gender groups should have an active role to play in the EITI process and their involvement should hence be widely encouraged. If women were to receive greater access to social spending via a resource-based government budget this would also facilitate economic diversification away from mineral activities, with women participating mainly in labour-intensive manufacturing and services.

Many of the extractive projects in developing countries are funded to a large extent by multinational development banks and international organisations such as the World Bank and the IMF. This implies that there is great potential for external pressure on how local governments utilise their resource rents. Lending agencies should press for resource revenues not to accrue to a few individuals such as politicians or members of the local elites or to accommodate the needs of specific societal layers, ethnic or religious groups and geographic areas. For this purpose, loans for extractive projects should be provided in the form of conditional aid. International lenders should fund projects in countries where governments agree in advance to an independent monitoring of the resource rents and ways to spend them. It is essential to specify beforehand the way in which resource rents will be utilised to alleviate poverty, improve welfare levels and benefit vulnerable women. In this respect most of the resource rents should reach the largest base of the society in terms of gender-equitable

investments in education, health projects, infrastructure, rural development and environmental programmes dealing with the negative externalities of extraction.

The establishment of stabilisation funds that insulate the economy from resource shocks and adverse resource price trends would also shield the economy from resource-curse effects (Stiglitz 2005). Resource revenues are deposited in such funds (such as the Norwegian Petroleum Fund, established in 1990) and subsequently invested abroad. Usually, the interest earned on the resource assets re-enters the local economy while most of the resource revenues remain in the fund. In addition, such funds help to smooth consumption over time by allowing governments to channel more resources into the economy in periods of recession. In this way, resource rents are not misused by governments for either political or individual purposes. The disadvantage of this solution is that it often faces adamant opposition from governments in developing countries (as it deprives them of opportunities to seize public revenues or increase public consumption), and it also does not address the issue of limited provision of public goods for the female population. Alternatively, as a means of insulating the local economy from abrupt resource shocks, governments should use resource rents to repay accumulated public debt. This policy is particularly relevant for resource-rich countries, which in general use their resource base as collateral to facilitate their foreign borrowing. Again, though, debt management and fiscal discipline may impose a painful downward adjustment of social spending, affecting particularly vulnerable women. Successful debt management, therefore, cannot take place in isolation without careful consideration of the potential side-effects for the provision of public goods.

Nigeria has made progress in recent years in increasing social expenditure on women, although there are still large disparities across northern and southern states. It has also drastically reduced its public debt with the help of increased public revenues from high oil prices. Corruption, though, still appears to be a major obstacle for sustainable economic development. Initiatives to increase transparency in the public and private sectors, enhance women's participation in policy making and raise investment rates are all major challenges the country needs to face. Even more importantly, Nigeria needs to control the relative importance of the mineral sector in the local economy. Such a policy does not necessarily focus on discouraging the development of mineral projects but rather on encouraging projects in other sectors, possibly with the support of the resource rents. If such diversification with expanding activities in labour-intensive manufacturing, agriculture and services has a gender-promoting element embedded, the beneficial effects on economic development are likely to be further enhanced.

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Appendix A: List of variables used in main analysis

Growth70-00	*Average annual growth in GDP per capita between 1970 and 2000, G=(ln(Y2000/Y1970)/30)x100 per cent. Data on GDP per capita data from the Center fo International Comparisons at the University of Pennsylvania (CIC 2008).*
LnY70	*The logarithm of real GSP per capita in 1970 (2000 US Dollar Prices). Source: Center for International Comparisons at the University of Pennsylvania (CIC 2008)*
Investment70-00	*Average gross domestic investment, private and public, as a share of GDP. Source: Cent for International Comparisons at the University of Pennsylvania (CIC 2008).*
Population growth	*Annual growth rate in population between 1970 and 2000. Source: Center for International Comparisons at the University of Pennsylvania (CIC 2008).*
Trade openness	*The fraction of years from 1965 to 1990 in which the country is rated as an open economy according to the criteria imposed by Sachs and Warner. Source: Sachs and Warner dataset. Cent for International Development at Harvard University (CID 2008).*
Schooling70	*Average years of schooling amongst adults (age 15 and older) in 1970. Source: Barro an Lee dataset. Center for International Development at Harvard University (CID 2008).*
Relative schooling70	*Average years of schooling amongst female adults (age 15 and older) in 1970 divided by its male equivalent. Source: Barro and Lee dataset. Center for International Developmen at Harvard University (CID 2008).*
Relative Schooling70-9	*Average years of schooling amongst female adults (age 15 and older) between 1970-199 divided by its male equivalent. Source: Barro and Lee dataset. Center for International Development at Harvard University (CID 2008).*
Growth schooling	*Growth in the average years of schooling amongst adults (age 15 and older) between 19 and 1999. Source: Barro and Lee dataset. Center for International Development at Harvard University (CID 2008).*
Growth rel school	*Growth in the average years of schooling amongst female adults (age 15 and older) between 1970 and 1999 divided by its male equivalent. Source: Barro and Lee dataset. Center for International Development at Harvard University (CID 2008).*
Government effectiv	*Index of government effectiveness in 1996 by Kaufmann et al. (2007), measuring the competence of the bureaucracy and the quality of public service delivery. Measure rangi from -3 (least effective) to 3 (most effective).*
Ethnic fractionalis	*Index of ethnic fractionalisation by Alesina et al. (2003). Measure ranging from 0 (least fractionalised) to 1(extremely fractionalised) based on racial or linguistic characteristics (most data for mid 90s).*
Democracy	*Political regime measure ranging from -10 (institutionalised autocracy) to 10 (institutionalised democracy). Data by Marshall and Jaggers (2002).*
Sub-Saharan Afr, South Asia,Latin America, Ea Asia	*Regional dummies. Data by Gallup et al. 1999.*
Landlockdness	*A dummy variable equal to 1 if the country is landlocked country, and 0 Otherwise. Data by Gallup et al. 1999.*
Political stability	*Index of political stability in 1996 by Kaufmann et al. (2007), measuring the likelihood o violent threats to, or changes in, government. Measure ranging from -3 (least stable) to 3 (most stable).*
Rule of law	*Rule of law index in 1996 by Kaufmann et al. (2007), measuring the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence. Measure ranging from -3 (least stable) to 3 (most stable).*
Mineral production	*Value of mineral production in GDP in 1971. Source: Sachs and Warner dataset. Center for International Development at Harvard University (CID 2008).*
Agricultural productio	*Value of agricultural production in GDP in 1971. Source: Sachs and Warner dataset. Center for International Development at Harvard University (CID 2008).*
Muslim	*Share of Muslims in total population (most data for 1990s). Source: La Porta et al. 1999*

Appendix B: Klasen's work and inconsistencies

Previous empirical work focusing on the role of gender inequality in education on economic growth, mainly by Klasen (2002) and Klasen and Lamanna (2003), has suffered from various inconsistencies and weaknesses in terms of the data used and the robustness of estimates. Such inconsistencies should be highlighted so that the average reader treats the corresponding empirical results with caution. Since these inconsistencies are generally not acknowledged in the literature, we aim with this appendix to expose some of the most important deficiencies of previous econometric work in the field.

Part of the criticism arises from the list of variables and dataset used in Klasen (2002) and Klasen and Lamanna (2003). For their main growth specification, Klasen (2002) and Klasen and Francesca (2003) use as explanatory variables the following set of regressors: initial income (*LNINC60*), population growth (*Popgro*), growth in the labour force (*LFG*), the value of exports and imports in GDP (*OPEN*), the rate of investment (*Inv*), the average years of schooling for men at the beginning of the period (*ED60*), growth in the same measure (*GED*), the ratio of female to male years of schooling at the beginning of the period (*RED60*) and the ratio of the growth in female to male schooling (*RGED*). Additionally, Klasen (2002) and Klasen and Lamanna (2003) make use of a set of geographic dummy variables: Eastern Europe and Central Asia (*ECA*), Latin America and Caribbean (*LAC*), Middle East and North Africa (*MENA*), South Asia (*SA*), Sub-Saharan Africa (*SSA*), and OECD countries (*OECD*). In Table 13, column 14, we present results for the main specification as they appear in Klasen (2002) explaining variation in economic growth over the 1960-1992 period. In column 14 we present the corresponding results for the 1960-2000 period as they appear in Klasen and Francesca (2003). The specifications correspond to the ones found in Klasen (2002) and Klasen and Lamanna (2003). It is not obvious why growth in the labor force is used as an independent variable along with population growth, when the two are largely correlated for the majority of countries. Apart from multicollinearity issues, the intuition behind using growth in labour force to explain GDP per capita growth (rather than overall GDP growth) is lacking. Data on labour force size are provided by the Women's Indicators and Statistics compiled by the United Nations Children's Fund and cover different periods of time for individual countries. Data are also provided for a limited number of countries (120). In terms of educational proxies, it is not obvious why male education is used as a proxy for average education (an upper-bound estimate), especially when in some countries female schooling years exceed their male equivalent (see Figure 2). Even more problematic appears to be the *RGED* variable, capturing the ratio of growth in female and male education. While higher values of the ratio may be driven by large increases in female schooling (claimed to be pro-growth), the values may also be largely influenced by the feeble growth rates in male schooling in countries where most of the male population was already educated in 1960. The dummy variables used to capture geographic influences are also uncommon in growth econometrics. Eastern European and Central Asian countries are expected to be largely heterogeneous in terms of cultural and socioeconomic characteristics. Last, given the large emphasis given on institutional quality (i.e. property rights, rule of law, protection against expropriation risk, transparency) as one of the major determinants of long-term growth (Acemoglu et al. 2001, 2002, Knack and Keefer 1995, Mauro 1995, North 1981, 1991 and Murphy et al. 1993), it is surprising that institutional proxies are absent from the empirical framework in Klasen (2002) and Klasen and Lamanna (2003). As we commented earlier, the

inclusion of institutional and resource proxies is likely to influence the statistical significance and size of other coefficients.

Table 13: Growth regressions

Dependent variable: Growth in GDP per capita	*(14) Gr1960-1992 (Klasen 2001)*	*(15) Gr1960-2000 (Klasen and Lamanna 2003)*	*(16) Gr1960-1992 (own calculations)*
Constant	*6.33*	*7.35*	*7.37*
LNINC60	*–1.13***	*–2.27****	*–1.16****
	(-5.0)	*(-4.54)*	*(-2.86)*
Popgro	*–0.55**	*–2.80****	
	(–1.4)	*(–5.27)*	
LFG	*0.62**	*2.33****	
	(1.5)	*(5.01)*	
OPEN	*0.007***	*–0.001*	
	(1.9)	*(–0.20)*	
Inv	*0.056***	*0.06****	
	(1.7)	*(2.93)*	
ED60	*0.19***	*0.01*	*0.47****
	(2.3)	*(0.18)*	*(3.64)*
GED	*12.61****	*10.42****	*3.23*
	(3.8)	*(2.39)*	*(1.05)*
RED60	*0.90**	*0.68*	*2.36***
	(1.3)	*(0.81)*	*(2.24)*
RGED	*0.69****	*0.70****	
	(3.0)	*(2.43)*	
ECA	*– 0.77*	*– 0.10*	
	(–0.9)	*(–0.15)*	
LAC	*–1.31***	*–0.87**	
	(–1.8)	*(–1.55)*	
MENA	*–0.15*	*–0.17*	
	(–0.2)	*(–0.33)*	
SA	*–0.46*	*–0.07*	
	(–0.7)	*(–0.12)*	
SSA	*–1.42***	*–0.83**	
	(–2.1)	*(–1.44)*	
OECD	*0.49*	*0.47*	
	(0.7)	*(0.78)*	
R2 adjusted	*0.61*	*0.76*	*0.27*
N	*109*	*93*	*95*

Note: t-statistics adjusted for heteroscedasticity in parentheses. Superscripts *, **, *** correspond to a 10, 5, and 1 per cent level of significance.

Another statistical inconsistency lies in the fragility of empirical estimations. This becomes apparent when we contrast Columns 14 and 15 of Table 13, which refer to the same growth specification estimated for 1960-1992 and 1960-2000, as appearing in Klasen (2002) and Klasen and Lamanna (2003) respectively. In the extended period 1960-2000 in column 15, trade openness (*OPEN*) has the wrong sign and remains insignificant, which largely contrasts findings for the earlier period. Even more importantly, the level of education (*ED60*) and ratio of female to male schooling (*RED60*) also appear to be insignificant for the extended period (Column 15), with no discussion on the change in statistical significance. It is also unclear why the sample size drops from 109 to 93 countries for the extended period 1960-2000, when data availability is normally a problem for earlier rather than later periods. In Column 16, we estimate a similar specification to that of Klasen (2001) focusing only on initial income and

the educational variables (once we include Klasen's (2001) labour force growth variable the sample size drops significantly). Consistently with our earlier results, we find relative female-male education to be significant along with the level of initial male schooling in 1960.

Appendix C: Panel regressions

In Table 4 we perform panel data analysis with four observations per country (1960s, 1970s, 1980s and 1990s). We adopt a similar growth specification to Table 3, with growth intervals of 10 years. *LnY*, *Schooling*, *Relative Schooling*, and *Democracy* refer to the same variables used in previous analysis at the beginning of each decade. Similarly, *Growth*, *Investment*, *Population Growth*, *Growth Schooling*, and *Growth rel school* are now decade averages for previously-used variables. *Agriculture* and *Minerals* capture the share of agricultural production and mineral exports in GDP at the beginning of the decade. Data on mineral exports and agricultural production are provided by the World Bank Development Indicators (World Bank (2008)). *Ethnic fractionalis* and *Trade Openness* represent the exact same variables used in Tables 1-4. The variables *1960*, *1970*, *1980* and *1990* are dummy variables capturing variation across decades. We estimate the regressions using random effects, with our results confirming the overall importance of relative female-male schooling in explaining growth variation. In regression (20), similar to our previous findings, relative schooling becomes insignificant when entered jointly with our measure of mineral abundance (while agriculture appears to play a minor role). Similar to Klasen (2002) and Klasen and Lamanna (2003), we also find the level of general education at the beginning of the decade to be insignificant. Any comparison of results between Tables 1-2, and Table 14, below, has to be conducted with caution, since the growth intervals are of different length (30 and 10 years respectively).

Table 14: Panel regressions

Dependent variable: Growth	*(17)*	*(18)*	*(19)*	*(20)*
Constant	*13.40*	*11.37*	*14.30*	*12.33*
LnY	*–1.66*** (0.30)*	*–1.65*** (0.33)*	*–1.77*** (0.37)*	*–1.45*** (0.35)*
Investment	*0.05*** (0.02)*	*0.04*** (0.02)*	*0.05*** (0.02)*	*0.07*** (0.02)*
Population growth	*–0.11 (0.15)*	*–0.19 (0.15)*	*–0.33* (0.20)*	*–0.39* (0.20)*
Trade openness	*1.45*** (0.46)*	*1.53*** (0.53)*	*1.30*** (0.53)*	*0.82* (0.47)*
Schooling	*0.11 (0.10)*	*0.11 (0.11)*	*0.12 (0.12)*	*0.11 (0.11)*
Relative schooling	*2.54*** (0.83)*	*2.96*** (0.94)*	*2.70*** (1.02)*	*1.19 (1.03)*
Growth schooling	*0.01*** (0.003)*	*0.01*** (0.003)*	*0.01*** (0.003)*	*0.01** (0.006)*
Growth rel school	*0.004 (0.009)*	*-0.006 (0.006)*	*0.001 (0.01)*	*0.02 (0.02)*
Ethnic fractionalis	*–2.13*** (0.73)*		*–2.01*** (0.81)*	*–0.70 (0.83)*
Democracy		*0.01 (0.02)*		

Agriculture			*–1.13* *(1.80)*	
Minerals				*–1.78**** *(0.59)*
Sub-Saharan Afr	*–1.52**** *(0.60)*	*–2.36**** *(0.62)*	*–1.24** *(0.67)*	*–2.06*** *(0.68)*
South Asia	*–0.20* *(0.75)*	*–0.45* *(0.88)*	*–0.01* *(0.80)*	*0.04* *(0.81)*
Latin America	*–0.74** *(0.47)*	*–1.10*** *(0.55)*	*–0.44* *(0.56)*	*–0.49* *(0.49)*
East Asia	*1.06** *(0.60)*	*1.24*** *(0.61)*	*1.11** *(0.64)*	*0.97** *(0.59)*
1960	*-dropped-*	*1.44**** *(0.37)*	*0.52**** *(0.56)*	*-dropped-*
1970	*–0.18* *(0.31)*	*1.18**** *(0.27)*	*0.52* *(0.34)*	*-dropped-*
1980	*–1.33**** *(0.33)*	*-dropped-*	*–0.64**** *(0.26)*	*–0.88**** *(0.27)*
1990	*–0.34* *(0.35)*	*0.88**** *(0.26)*	*-dropped-*	*0.02* *(0.29)*
R2 adjusted	*0.44*	*0.43*	*0.44*	*0.49*
N	*289*	*287*	*211*	*186*

Note: t-statistics adjusted for heteroscedasticity in parentheses. Superscripts *, **, *** correspond to a 10, 5, and 1 per cent level of significance.