An overview of the demand for skills for an inclusive growth path

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2010

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1. Introduction

Economic growth in the long-run is driven primarily by two factors namely increased stock of factor inputs such as capital or labour and increased productivity through technological change (Bhorat and Hodge, 1999). Since the 1970s, South Africa's aggregate experience was similar to other developing countries with a steady increase in aggregate output, driven by an increasing stock of labour and/or capital most notably in the 1970s and 1980s. In turn, it is from the 1990s that we see the rapidly rising role of technology in the growth process. Indeed in the last two decades it is safe to argue that technological change and innovation have been one of the most important determinants of South Africa's growth level and trajectory.

We attempt though, in what follows below, to try and understand the nature of this economic growth path in South Africa, in terms of its impact in labour demand trends in general, and the demand for skilled workers in particular. In addition, as we argue below, the nature of our growth path also inadvertently defines and characterises the returns to households and individuals on the basis of their human capital attributes.

In trying then to deal with this, section 2 below will provide an overview of the South African labour demand trajectory for the period 1970 to 2005. Occupation-specific changes are examined as well as between- and within-occupation shifts due to economic growth. Section 3 investigates the notion of pro-poor growth in South Africa. Pro-poor growth, with regard to education levels, is also explored, accompanied by simple elasticities to estimate the impact of economic growth on employment across different education cohorts. The fourth section examine the role of institutions in predicting labour market outcomes. Does it matter where you study? Or in which field? These questions are answered through the use of a carefully tailored survey of graduate students. Section five discusses labour demand projections and the different econometric models used to predict future labour demand trends. Results from two such models are also presented. Section 6 concludes.

2. South Africa's labour demand trajectory: An overview

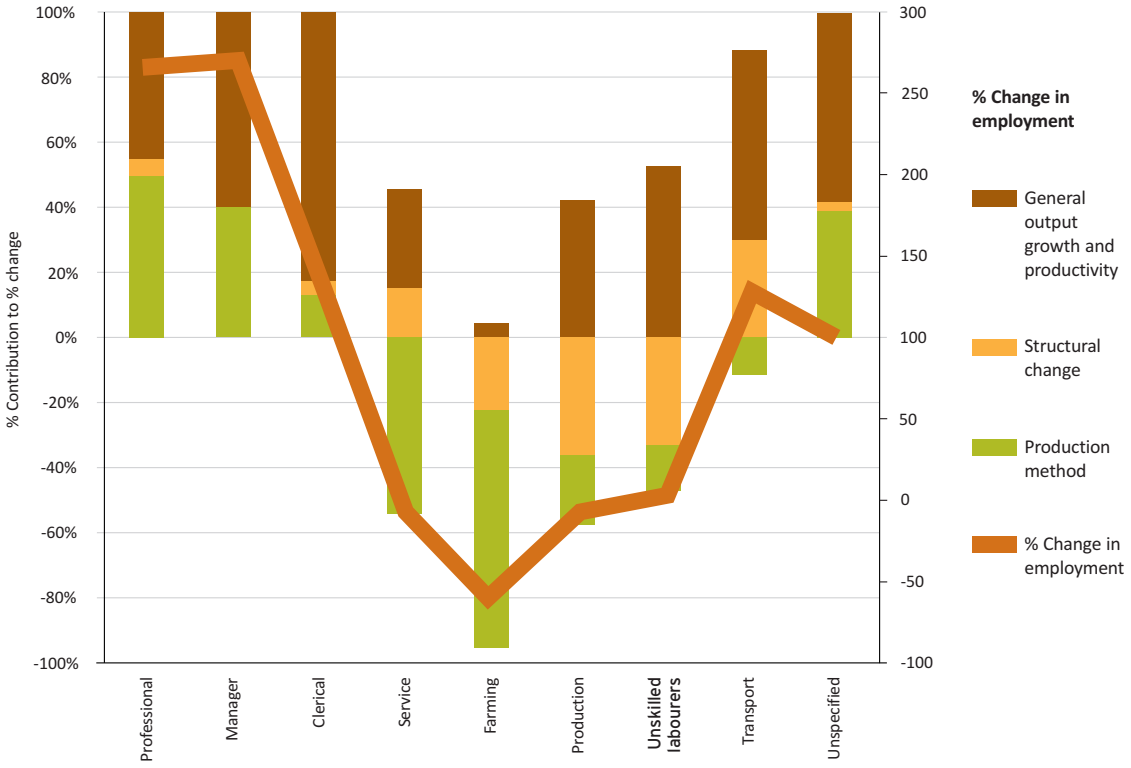
Detailed long-run analysis for South Africa over the period 1970–1995 indicates that the economy witnessed firstly, a significant change in the structure of domestic output. The latter was manifest in a move away from a dependence on the primary sectors, matched almost equally by a rapid growth in share of output within the tertiary sector. Secondly, over this same period, the domestic economy through the adoption of new technologies experienced rising capital-labour ratios. The consequence of these 'between-sector' and 'within-sector' forces has been – over the 25-year period – to entrench a very particular pattern of labour demand[1].

1 Within-sector employment shifts are those changes in labour allocation that come from within the industry itself. Sources of within-sector shifts include technological change in a sector; a change in the price of a non-labour factor, such as capital equipment or computers and outsourcing of non-core functions. Between-sector changes are relative employment shifts occurring between sectors in the economy as a result of changing shares in relative output of different sectors.

This pattern is exemplified by a steady decline in the demand for unskilled workers and a significant increase in the demand for highly skilled workers. At a sectoral level, this has meant an erosion of the unskilled workforce in the primary sector, matched in turn by a demand expansion in the skills-intensive segments of the services sector. (See: Bhorat et al, 2007; Bhorat and Hodge, 1999). The approach in Bhorat and Hodge (1999) suggest that labour demand shifts in an economy can be ascribed to three contributing factors. These are output growth, structural changes, and production method shifts. In turn it is possible to estimate the contribution of each of these factors to labour demand needs by occupation.

Figure 1 indicates the percentage change in employment by occupation together with the contribution of each of these three components (general output growth and productivity, structural change, and changes in production methods used), to the specific percentage change in employment by occupation over the 1970–1995 period.

Figure 1: Percentage change in employment, by occupation, 1970–1995



Source: Own calculations from Bhorat and Hodge (1999)

From 1970 to 1995, employment increased for professionals, managers, clerks, and workers in the transport industry. This was predominantly a function of output and productivity growth. Structural change had the smallest impact on these occupational groups. Lower-skilled occupations such as services, farming and production experienced a sharp reduction in aggregate employment over

the 1970–1995 period. In the case of farming this was mainly due to structural changes indicating that the structure of the economy changed over this time period: In particular it suggests that South Africa moved away from primary sector activities towards more secondary and tertiary sector production. The negative employment growth for services, production and unskilled labourers can be attributed in turn to production method changes. Production method changes in these occupations can be linked to technological advances which substituted human labour with capital. Ultimately then, the above suggests that over the period 1970–1995, South Africa's labour demand trajectory was characterised by a high and rising demand for skilled workers on the one hand, and a sharp erosion in the employment of unskilled employees. Indeed, this 25-year period marks the historical underpinnings of South Africa's economic growth trajectory which has been marked by a disproportionate dependence on skilled individuals.

Table 1 below provides a re-estimation of the determinants of labour demand by occupation, utilising a similar decomposition technique for the period 1995–2005, to examine labour demand trends in the post-apartheid era. The results indicate that there has been a rise in the relative demand for most occupational categories with the highest positive demand shift recorded for managers, followed by craft and trade workers and clerical workers. Operators and assemblers experienced the lowest relative increase. Coupled with the decline in the demand for elementary workers, this reflects, in keeping with the long-run trend analysis above, a general increase in preference for skilled and semi-skilled workers in the economy during the first decade of democracy in South Africa[2].

Table 1: Industry-based relative demand shift measures by occupation, 1995–2005

Occupation	Between	Within	Total	Share of within in total
Managerial	1.28	18.24	19.52	93.46
Professional	1.42	7.5	8.92	84.08
Clerical	2.43	14.66	17.09	85.78
Service	2.24	14.34	16.58	86.5
Agriculture and fishing	-0.17	-17.23	-17.4	99
Craft and trade	2.39	14.68	17.08	85.99
Operators and assemblers	0.73	5.2	5.93	87.62
Elementary	-0.13	-0.53	-0.66	80.37
Domestic workers	1.48	10.16	11.64	87.26
Unspecified	-0.18	-18.73	-18.91	99.03

Source: OHS 1995, LFS 2005(2) (Statistics SA) and authors' own calculations.

2 The decrease in relative demand for skilled agricultural and fishery workers is difficult to interpret due to the reclassification of skilled agricultural workers as a new occupation group.

In comparing the between- and within-sector contributions to overall labour demand shifts, it is clear that, for all occupation groups, within-sector factors played the dominant role in explaining relative demand shifts. Within-sector shifts explained more than 80% of the change in relative demand across all occupations. This share was highest for managers (93%) and lowest for elementary workers (80%), which may suggest that between-sector forces play a slightly larger role in the change in the demand for unskilled workers. Overall, however, it is clear that forces within firms and within sectors, including for example technological change and rising capital-labour ratios, were the main reasons for the relative labour demand shifts over the decade.

Ultimately then, the above analysis suggests two key causal factors in understanding the labour demand growth path. First, that a gradual skills-biased labour demand trajectory witnessed a dramatic decline in the demand for unskilled workers across most sectors, matched in turn by a rise in the demand for skilled (and less so semi-skilled) employees. Second, the key (but not sole) cause for these altered labour demand preferences appears to be that of technological changes occurring within firms and sectors. The nature and trajectory of labour demand in turn not only increased unemployment levels for those unskilled workers, but also ensured that new workseekers without the requisite skills and qualifications would find it increasingly difficult to source sustainable employment. Therein lies therefore an additional composite set of factors as a possible contributor to the economy's extraordinary unemployment numbers.

In terms of our focus here this evidence alludes to the fact that over a three to four decade period, South Africa's growth path has been built on a rising demand for skilled labour and to some extent semiskilled workers. Paralleling this skills-biased growth path, has been a steady erosion in the demand for unskilled or under-skilled workers. In short, South Africa's growth path in the modern era has been defined by a constantly increased need for skilled, educated workers at the expense of those who lack these supply characteristics.

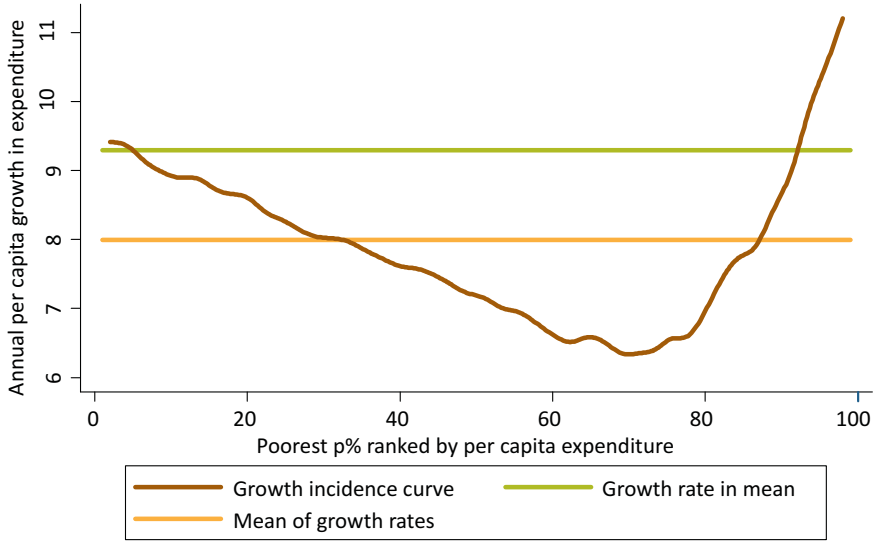
3. Education, labour demand and the nature of economic growth

There is very little debate, if any, amongst economists around the notion that a high level of economic growth is essential for poverty reduction. Indeed, increased growth rates, effectively measured by rising per capita incomes, would appear to make this link clear and simple: if you increase economic growth, poverty levels will fall in the society. However, a more detailed assessment of experiences around the world, indicate that there are two very important caveats to this generalised view that 'growth is good for the poor'. First, the impact of economic growth on poverty differs significantly across countries. Hence, research from the World Bank, indicates that a 2% increase in growth rates will result in a reduction in poverty ranging from one to 7%, depending on the country (Source: Ravallion, 2001). Second, as incomes grow, there is a high likelihood that this will also affect the *distribution* of that income. Put differently, economic growth often brings with it, some change in the levels of income inequality. When this occurs and if the result is an increase in inequality, the gains from growth to the poor may in fact be reduced. Higher inequality levels from growth through their deleterious impact on the distribution

of income, dilute the impact of economic growth on poverty. Given these two caveats to the growth-poverty nexus then, the critical insight is that economic growth may be necessary, but it is certainly not a sufficient condition for poverty reduction in a society. As a starting point for the analysis, we examine growth incidence curves (GIC) for this period according to a set of covariates. Methodologically, we draw on the work of Ravallion (2004) and Ravallion and Chen (2003), who developed these concepts. Essentially, the GIC approach allows us to determine whether growth in expenditure in this period has been pro-poor in nature by plotting the growth in expenditure across each centile of the distribution.

Bhorat and Van der Westhuizen (2010) estimated the GI curve for South Africa between 1995 and 2005 and found, as noted in Figure 2 below, that growth was pro-poor in the absolute sense. Absolute growth is defined when a change in household expenditure or/and income levels of the poor is positive. Relative pro-poor growth is when the growth of expenditure/income of the poor is larger than the growth in expenditure/income of those who are not defined as poor.

Figure 2: Growth incidence curve for South Africa, 1995–2005



Source: Bhorat and Van der Westhuizen (2010)

It is clear from Figure 2 that while individuals at the very bottom of the distribution clearly benefited more from the increased growth in expenditure than individuals up to the 70th percentile, this growth has not been pro-poor in a relative sense. Relative pro-poor growth was not evident, given that from around the 70th percentile of the distribution, growth in expenditure begins to increase steadily again, with individuals in the top 10% of the distribution enjoying the highest average annual growth rates in the society.

It is important to note that, at the bottom of the distribution, only the poorest 30% of individuals experienced average annual increases in expenditure above the mean of the percentile growth rates. Individuals between the 60th and 70th percentiles experienced the lowest growth rates at around 6%.

Pro-poor growth and human capital accumulation

In trying to interrogate this relationship between economic growth and education in more detail, we utilise the analytical approach available to us through Growth Incidence Curves. Essentially, we try and estimate the percentage change in expenditure across the percentile-defined distribution for households according to the level of education of the household head[3]. Hence, Table 2 below assesses measures of pro-poor growth across five education-categorised households, namely no education, Incomplete GET[4], Complete GET, Matric, and Tertiary. Growth incidence curves by level of education of household head are included in appendix 1.

Growth rates reported below are annual growth rates in per capita expenditure for the 1995–2005 period. Rates of pro-poor growth have been estimated at different percentiles ranked by per capita household expenditure. For instance, the first percentile represents the poorest 10% of households in South Africa. For example, the data show that for households in the first ten centiles, the average per capita growth rate over the 1995–2005 decade was 3.1%.

Examining the pattern of gains in poor households relative to non-poor households, we note first that growth has been absolutely pro-poor across the distribution, barring households where the head has a matric qualification. Second, for each level of education up to matric, the mean percentile growth rate lies below the national mean of 4.76%. Notably, only tertiary educated households return a mean growth rate above the national aggregate for the 1995–2005 period.

Table 2: Measures of pro-poor growth by education of household head, 1995–2005

	None	Incomplete GET	Complete GET	Matric	Tertiary	Total
Growth rate in mean	4.93	4.74	2.93	5.45	9.57	7.29
Growth rate at median	4.82	3.69	2.01	1.87	9.24	3.78
Mean percentile growth rate	4.6	3.89	2.03	2.52	8.54	4.76
Mean rate of pro-poor growth estimated across percentiles						
10	3.38	2.39	0.57	-1.22	0.78	3.1
15	3.98	2.79	0.62	-1.13	2.44	3.47
20	4.34	3.04	0.72	-1.03	3.59	3.66
25	4.56	3.17	0.8	-0.98	4.37	3.77
30	4.69	3.29	0.9	-0.83	4.99	3.82

Source: Income and Expenditure Survey (IES) 1995 and 2005.

Note: Pro-poor growth rates reported are average growth rates in per capita expenditure across the corresponding percentiles. For example, growth rates reported are average annual growth rates over the first 10, 15, 20, 25 and 30 percentiles respectively.

3 Education levels of all the individuals in the household were not available, and hence we resort to an imperfect measure of human capital accumulation within the household.

4 GET = General Education and Training, from grade R to grade 9

The picture that emerges from a preliminary analysis of the results above is that the income gains from employment have been concentrated, overwhelmingly, amongst better educated households. For example, the mean percentile growth rate in households where the head has a tertiary qualification (8.54%) is effectively double that in households headed by individuals with no education (4.6%). In poor households, that is, the bottom 30 percentiles, growth rates in households headed by individuals with only a matric qualification have been negative, indicating that these households experienced a drop in income over the period. In contrast, poor households headed by an individual possessing a tertiary qualification yield positive growth rates higher than those in which the head has only a complete GET or matric qualification. Simply put, better educated households, even when examining those at the bottom-end of the distribution, have benefited the most from growth.

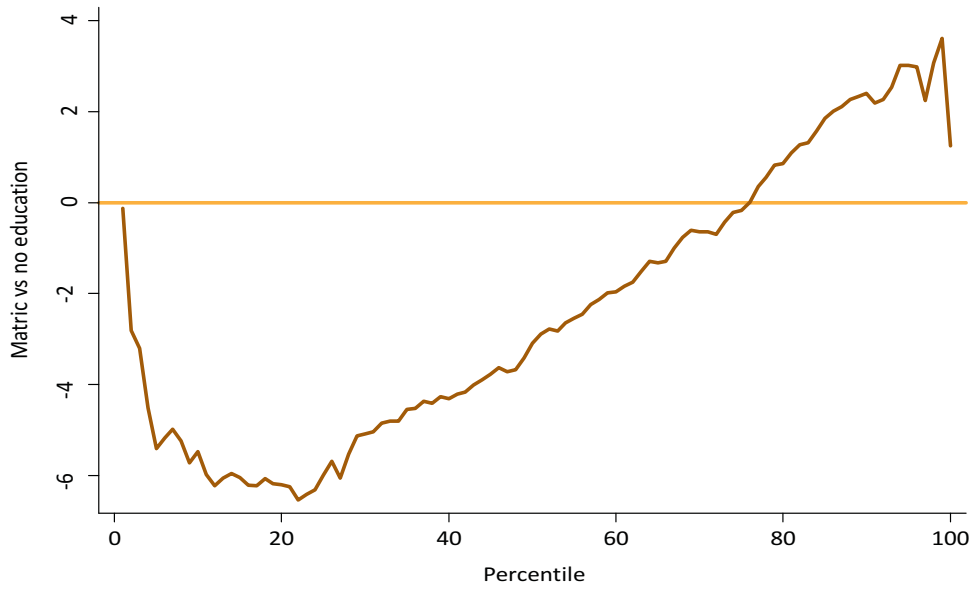
The large and positive per capita expenditure growth rates recorded for poor households with lower levels of education (no education and incomplete GET) relative to households where the head had a complete GET or a matric qualification, may be further explained by examining the demographics of these households. For instance, lesser educated households may be older households. A significantly larger proportion of lesser educated households were headed by individuals older than 65 years (10%) than tertiary headed households (2%) (Source: IES 2005/06, StatsSA). Individuals in these households – all descriptive and econometric evidence suggests – are more likely to be engaged in long-term employment. In turn, younger household heads in the Matric and Complete GET cohorts above are less likely to be employed, and if working, given years of experience, would be earning less than their older counterparts.

Another point worth noting is that poorer households with lower levels of education and older household heads are more likely to receive income in the form of grants than households where the head has a matric or a tertiary qualification (where the main source of income is likely to be wage income). Results from the IES 2005/06 showed that grant income was more important than wage income in 72% of households where the head was uneducated. In contrast, in tertiary-headed households, wage income was the main source of income for most households (92%). Furthermore, given that lesser educated households in the low-income bracket seem to be older households, income from old age pension grants is likely to be an important source of income in these households. Indeed, the IES showed that in 2005, 12% of households where the head had no education were pensioners, while for households headed by individuals with a matric or a tertiary qualification, this proportion stood much lower, at 1.5%. The negative growth rates recorded for households where the head has a matric qualification may be attributed to the low-income growth recorded by those households in the first place, as well as the insignificance of grant income in these households. Ultimately though, our pro-poor growth estimates suggest that economic growth in the first decade of democracy has benefitted tertiary educated households more than households headed by any other education cohort. In turn, at the mean, it is in fact

matric-educated household heads and those with a complete GET, who appear to have benefited the least from growth over the 1995–2005 period. While positive economic growth has been realised, it is evident that not all education cohorts across the percentile distribution have gained.

In order to shed some light on the negative matric growth rates, Growth Incidence Curves were used to plot the differential in the per capita expenditure growth rates at each percentile between matric headed households and households where the head had no education. The results obtained are shown in the figure below. We would normally expect this differential to be positive, suggesting a positive return for higher levels of schooling. However, for most of the distribution, the graph obtained lies below the origin, a startling and unexpected result.

Figure 3: Differential in mean percentile growth rate, matric vs no education

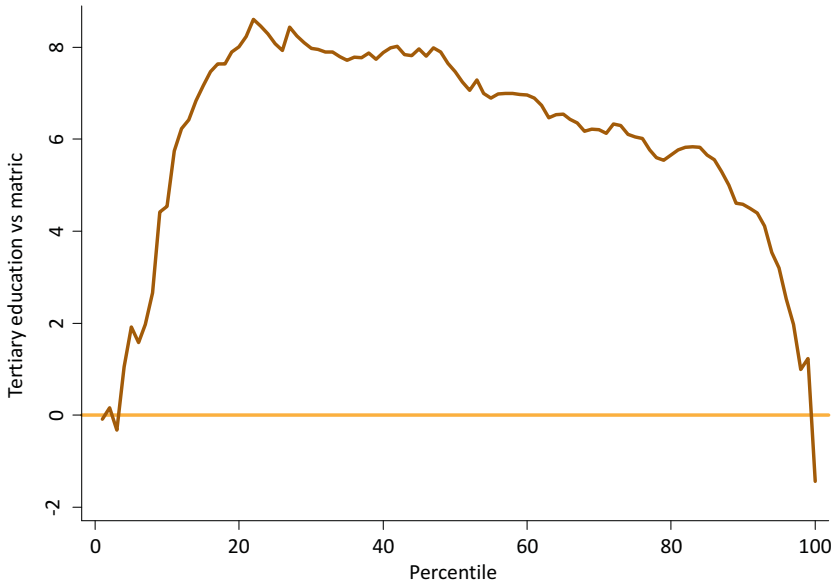


Source: Calculations using IES 1995 and 2005.

The figure above suggests that across most percentiles in the distribution, not only have there been lower returns for a completed matric qualification relative to no education at all, but the returns to schooling have in fact been negative for the first 75 percentiles. This result seems to point to the failure of the schooling system in South Africa in generating adequate income growth and mobility. This is an extremely powerful result as it suggests that completion of 12 years of schooling did not guarantee growth in the income of this household head, relative to a counterpart head with no schooling at all. It is only at the tertiary level that the returns to

education become evident. The figure below shows the differential in per capita expenditure growth by percentile in tertiary headed households versus matric-headed households. For most of the distribution, this differential is large and positive, reflecting the gains to accumulating human capital beyond the schooling system.

Figure 4: Returns from tertiary education vs matric, 1995–2005



Source: Calculations using IES 1995 and 2005.

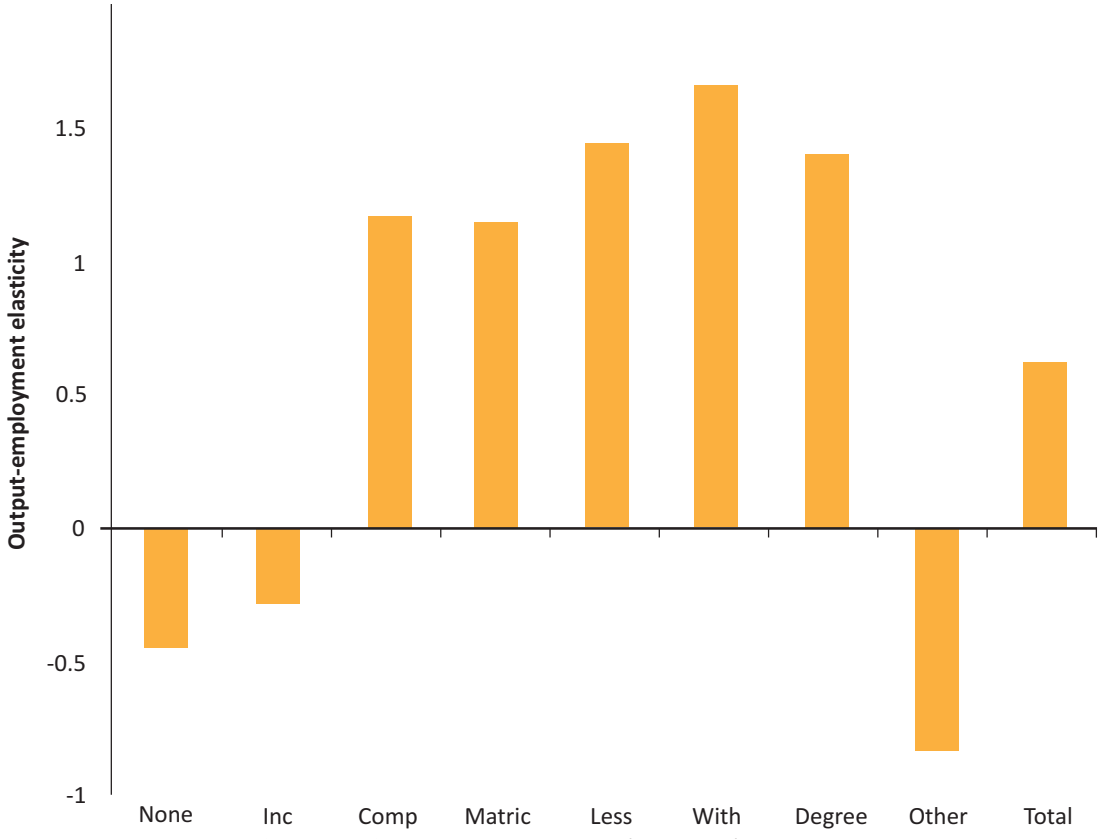
Viewed collectively, the results above reinforce the notion that over the 1995–2005 period, whilst at the national level there is some evidence of pro-poor growth, this has been unevenly distributed across predefined human capital covariates. In particular, those household heads with some secondary schooling, or indeed, complete secondary schooling, have witnessed the economic growth process deliver either negative or lower returns than lesser-educated household heads.

Another method to assess labour demand and education is that of output-employment elasticities. Below we present "simple elasticity" estimates which describe the relationship between output and employment for different levels of education[5]. The aggregate output-employment elasticity estimate for South Africa over the 2001 to 2007 period stands at 0.6. This implies that a 1% increase in output is associated with a 0.6 increase in total employment, reflecting a high level of sensitivity of employment shifts to economic growth. Of particular interest here however, is to try and understand how this simple elasticity varies when the employed are categorised by

5 Of course, formal modelling is required to control for the variety of different variables that may impact on the relationship between output and employment. Formal output-employment elasticities are determined through the econometric estimation of a labour demand equation (Oosthuizen, 2006). Consequently, the numbers presented are not output employment elasticities.

education levels. In doing so we begin to understand whether or not the process of economic growth has delivered equal employment gains to workers across the education continuum.

Figure 5: Output-employment elasiticities, by education level, 2001–2007



Source: Labour Force Survey, 2001 and 2007 and author's own calculations

Notes:
1. The ratio of employment growth to GDP growth presented in the final column is not a true output elasticity of employment.
2. Education categories are no education, incomplete GET, complete GET, matric (12 years of schooling), diploma/certificate with a complete matric, degree, and other

From the figure above, we note that although economic growth has had a positive impact on total employment, the gains from growth in output have been skewed towards the better educated. This is evidenced by the positive elasticity estimates for those with a Complete GET qualification or higher. In contrast, the output-employment elasticities for those with no education or an Incomplete GET are negative (-0.45 and -028 respectively). The latter two estimates show that a 1% increase in output over the 2001 to 2007 period was associated with a decline in the employment of those with no education and an incomplete GET of 0.5% and 0.3% respectively. In contrast, better educated individuals benefited from growth over the period, as evidenced

by the positive output-employment elasticity estimates for a complete GET, matric or tertiary qualification. For instance, a 1% increase in output yielded a 1.4% increase in employment for individuals with a degree qualification. The returns from growth in terms of employment gains to the better educated at the expense of lesser educated individuals reinforces the skills-bias growth trajectory of the South African economy found in previous studies (Bhorat and Hodge, 1999).

The above results suggest that as a manifestation of the nature of South Africa's labour demand trajectory, the economy's growth path has benefited richer households more than those in the middle or bottom-end of the distribution. The upshot has been growth which has been unevenly distributed. In turn though, and of particular interest to us here, is the fact that better educated households have gained more from growth than lesser educated households. In short a growth path, built on a skills-biased demand trajectory, in turn accrues benefits to those in better educated households – so creating a long-run trend wherein the winners from growth are ironically the better educated and the highly skilled.

4. Institutions and growth: Evidence from the pathways study

The Human Science Research Council (HSRC) conducted a Students Pathway Study (2005) which tracked the 2000–2002 cohort of leavers and graduates from seven selected Higher Education Institutions (HEIs)[6] in South Africa into their final labour market destinations. This dataset allows us to control for a range of variables, including standard covariates such as race, gender, the type of qualification, field of study, province, age, and home language, as well as other individual and household level characteristics unique to this dataset. In particular, the model allows us to control for the institution attended and therefore to model the probability of finding employment, taking account of employer perceptions associated with historically black and white institutions. The significant advantage of this dataset relative to the national estimates provided above is clear. We are able to control for a range of institutional and household characteristics, which the LFSs simply do not provide data on.

The descriptive evidence from the dataset appears to suggest that field of study and type of institution are important in determining the probability of finding employment. Furthermore, this data also suggests that irrespective of the field of study and institution attended, the probability of finding employment is higher for Whites than for Africans. The employment probit below tests this hypothesis by modelling the probability of graduates finding employment when controlling for a range of observable characteristics including field of study and type of institution in a multivariate context. The results are shown in Table 3.

6 The selected institutions were the University of Stellenbosch, University of the North, University of the Western Cape, University of Fort Hare, University of Witwatersrand, Technikon Pretoria, and Peninsula Technikon.

Table 3: Employment Probit for Graduates

Dependent variable: Probability of employment	III	IV
Individual characteristics		
Graduated	0,0084	-0,0002
African	–	-0,2666**
Coloured	–	-0,0741
Asian	–	0,0826
Female	-0,1658**	-0,1568
HBI	–	0,0454**
Technikon	0,0594*	0,0636*
Degree Qualification	0,0307	0,0221
Africans from HBIs	-0,2248**	–
Africans from HWIs	-0,2647**	–
Coloured from HBIs	0,0324	–
Coloureds from HWIs	-0,0505	–
Asians from HWIs	0,1003	–
Other from HBIs	0,1164	–
Humanities	-0,0274	–
Education	0,2127**	–
Commerce	0,0554	–
Other field	0,0641	–
Maths scores in Matric	0,0260**	0,0275**
Used social network[7]	0,0199	0,0318
Household characteristics		
English is home language	0,0559	0,0428
Parent employed	0,0076	0,0013
Parent graduated	0,0561*	0,0559
Observed probability	0,6934	0,6934
Predicted probability	0,7597	0,7545
Number Observed	2,965	2,965
Chi^2	495**	409**
Pseudo R^2	0,2460	0,2217

Notes:
1. Significant** at the 1% level – Significant* at the 5% level.
2. Provincial and age dummies omitted.

7 30% of the employed had found their job through a personal contact. Furthermore, a significantly higher proportion of Whites had made use of a social network in the job search process than Africans. Since the dataset contained information on the job search methods used for both the unemployed and the employed in the sample, a dummy variable was created that was one if the individual used a personal contact, or social network, and zero if another method of job search was employed. Other search methods included advertisement, direct application, employment agencies, and recruitment at the HEI.

The key result here, evident in specification III, is that Africans at Historically Black Institutes (HBIs) and Historically White Institutes (HWIs), controlling for other factors, have a lower probability of securing employment relative to Whites at HWIs. In this specification of the employment probit, the dummy for Africans at HWIs is significant and negative. Hence the result suggests that even when fully controlling for differences due to the quality of education and field, Africans at HWIs still have a lower probability of finding employment than Whites at these institutions. Indeed, the dummy variables for race and gender are significant across all specifications of the employment probit. Being African lowers the probability of finding a job relative to being White, and being female lowers the probability in finding employment relative to being male, even when controlling for a range of individual characteristics.

The results from specification III, albeit worrying, may not be solely the result of discrimination in the labour market. There could be other variables on the basis of which the selection process in employment is made, such as student performance in the higher education institution (HEI). One of the determinant factors may be the grades obtained at the HEI. While the dataset did not contain information on grades obtained at the tertiary institution, we know that maths scores in matric are a significant determinant of graduation. Hence this variable was included in the employment probit as a proxy for performance in subjects in HEI. Performance in mathematics at the matric level was found to be significant across all specifications, suggesting that those who had higher maths scores in the SCE examinations had a higher probability of finding employment. This proxy for relative performance at the HEI could arguably be a factor influencing employer decisions in the hiring process. Employers may thus be using grade performance, in addition to whether an individual is a graduate or not, in their hiring process. However, even when controlling for grades obtained, Africans at HWIs and HBIs were still found to have lower employment probabilities than their White counterparts.

The results show that household characteristics are not significant in influencing the probability of employment. Among the household level variables included were a dummy variable for parents with a tertiary qualification, and a dummy variable for individuals with at least one employed parent. The results show, however, that individual characteristics such as race, gender and age, are more important in determining employment outcomes than household variables.

Surprisingly, the graduation dummy is insignificant. This suggests that whether an individual completes a tertiary qualification or drops out halfway does not have any bearing on the probability of finding employment. This may be attributed to the fact that the leavers in the sample have completed some years of tertiary education and perhaps also acquired some workplace skills while at the HEI, which may still give them an advantage to those without any tertiary education.

Another important result is that field of study plays a central role in determining labour market outcomes. A rather unexpected result is that students who specialised in education have a higher

probability of finding employment relative to those who concentrated in SET fields. However, the results for education may be a sample size effect. Examining the enrolment by field and institution type we note that Africans constitute a dominant share of those who studied education in the sample (92% of the 3 555 enrolled in education in the sample were African). Indeed, less than 2% of Whites in the sample studied education. The higher probability of finding employment for those in education relative to those in SET fields may be explained further by the fact that in our sample, for those enrolled in SET fields, a large share were leavers (44% for the whole sample, and 54% of those from HBIs). Put simply, lower throughputs in SET have a significant bearing on the labour market outcomes for this cohort of non-completers.

The fourth specification, in which field of study was excluded, serves to show how field of study masks the effect of the race and institution type dummies on employment and earnings. In the employment probit, when field is excluded, the dummy for HBIs becomes significant. However, this specification is subject to omitted variable bias since race masks the effect of field on employment.

A possibly policy relevant result is that the technikon dummy variable was found to be positive and significant across all four specifications, suggesting an increased probability of finding employment for individuals who studied at technikons rather than universities. Although this is in contrast to the findings for the LFS employment probit above, it must be noted that only two technikons in South Africa were included in this analysis.

The results obtained show that, given labour demand needs, and a certain level of human capital, race still influences the probability of finding employment. Even when fully controlling for type of institution and degree, Africans at HWIs have a lower probability of finding employment than Whites. Ultimately then, there are two possible reasons for this differential in employment probabilities for Africans and Whites at HWIs. The first is that employers continue to discriminate against prospective African candidates. The second is that there are other characteristics on the basis of which employer decisions are made that we cannot control for due to the limitations of the information provided in our dataset.

In terms of our focus here though, these results suggest that whilst evidently higher levels of education are a necessary condition for employment, they are clearly not a sufficient condition. Indeed the fact from a sample of graduates, we continue to find non-zero levels of unemployment are worrying. It does suggest however that the institutions of human capital may not be adequately and effectively training their client base for immediate absorption into the labour market. Of particular concern also is how to sustain a growth path where the evidence suggests that Africans from HWIs are still less able to find a job than their White counterparts when controlling for a fairly exhaustive set of contributory variables.

5. Looking ahead: Labour demand predictions and economic growth

The foundation for labour demand projection models is to estimate employment by occupation for a base year and obtaining sectoral growth forecasts for the period in question. Another approach is to use labour multipliers and production (gross value added) estimates. All of the projection models take into account factors such as the impact of HIV and AIDS, government programmes and/or incentives, and the general structure of the economy. Predicting the future however is always an inexact science, and these models can only provide a possible future scenario. Most of these models do take account of various scenarios such as low growth vs high growth, but caution has to be taken when interpreting the results. Forecasting models only predict what might happen under certain assumptions, which is not always a reflection of the real world. Results are also often aggregated which leads to a misinterpretation of the outcomes of these projections. Whilst noting these limitations, the results of two such studies are given below.

Table 4 indicates the forecast of the number of workers required over the period 2001–2006 in selected high-skilled occupations as estimated by the Human Science Research Council. It is based on a two stage forecasting model estimating baseline employment by occupation numbers for 2001, and incorporating sectoral forecasts for the period 2001–2006. The Labour Force Survey of February and September 2001 was used to estimate base employment figures, whereas ABSA's growth predictions were used as exogenous variables determining the model's future labour demand.

Table 4: Number of people needed to meet and replace demand, 2001–2006

High-skilled occupations	Number in 2001	Number of workers required over next five years	% increase on 2001
Academics	37 237	6 651	17.86%
Doctors	34 370	5 207	15.15%
Nurses	155 516	35 461	22.80%
Computer-related professionals	75 841	15 600	20.57%
Scientists	4 647	795	17.11%
Science technology	4 729	599	12.67%
Educators	354 469	73 077	20.62%
Engineers	29 824	5 116	17.15%
Engineering technologists	32 132	5 973	18.59%
Managers	280 298	45 130	16.10%

Source: Human Resources Development Review 2003.

As seen in above table, the demand for educators are the highest when only looking at numbers, followed by managers. When comparing the share of the number of workers required relative to the number of workers in 2001 in each occupation, nurses have the highest demand (22.8%) followed by educators (20.62%). These two professions are heavily concentrated in the public sector and depend substantially on the government's fiscal stance.

This report was updated in 2008 and again a list of scarce high skilled occupations was identified. This list includes advance manufacturing, financial services, veterinary skills, pharmacists, social workers and engineers, technologists and technicians. In the intermediate skills component, tourism was highlighted as the sector where a growing skills crisis is brewing.

The Department of Labour also requested labour demand forecasting in order to re-establish the Sector Education Authorities (SETAs) in 2004. The purpose of the study was to examine the skills development initiatives in South Africa and to identify challenges in working opportunities. The demand for labour until 2010 was estimated under a labour demand model with three different growth scenarios namely low growth, high growth and most likely growth. Only the most likely growth scenario is very briefly discussed here (see SETA Reestablishment Draft 1). The results indicate that the economic sectors which display the most potential in labour growth are: post and telecommunication, activities auxiliary to financial intermediation, financial intermediation, electrical machinery and apparatus, and transport equipment. The average growth in demand for labour will be 2.4% per annum up to 2010. The lowest (more accurately the most negative) potential growth rate is in the water transport, mining of gold and uranium ore, and other mining and quarrying sectors with growth rates of -8%, -2.5% and -1.9% respectively. It is also apparent that as the skills levels increased in the economic sectors, so do the potential growth rates increase.

It is thus evident from above analysis that labour demand projections all point towards more skilled labour with low-skilled labour experiencing negative or slower growth rates. Noted earlier, these are projections based on labour demand models subject to numerous assumptions. Results must be interpreted with caution and not be the taken as the foundation for policymaking.

6. Conclusion

This paper has attempted to understand the nature of the economic growth path in South Africa related to labour demand trends in general as well as the demand for skilled workers in particular. Using data for the period 1970–2005, it was argued that this growth path has been built on a rising demand for skilled labour with a steady erosion in the demand for unskilled or under-skilled workers. The modern era in the South African economy has thus been defined by a growth path with a constant increased for educated workers at the expense of those with lower level of human capital. In trying to link the nature of South Africa's growth path to the human capital endowments of households, we showed that households at the top-end of the

income distribution benefited more from growth than those in the middle and bottom-end of the distribution. In particular, better educated households gained more from this economic growth than households who are lesser educated so effectively defining a growth path in South Africa manifest in generating high returns to the educated, at the expense of the less educated.

In extending this macro evidence, our micro-econometric analysis suggest that whilst graduates can and do find jobs more easily than the less educated – the aggregated outcome masks the fact that a higher education qualification does not guarantee employment. Indeed this evidence suggests that even in an economy characterised by a disproportionate demand for highly skilled workers, those with degrees do not have an equal probability of sourcing employment. In particular, the results allude to the centrality of ensuring that HEIs are indeed geared towards providing individuals who graduate with the highest certainty in the labour market, of being able to find employment. Ensuring that our institutions of human capital are functioning effectively in this manner, must surely be a key part of both our long-run human resource development and economic growth strategy.

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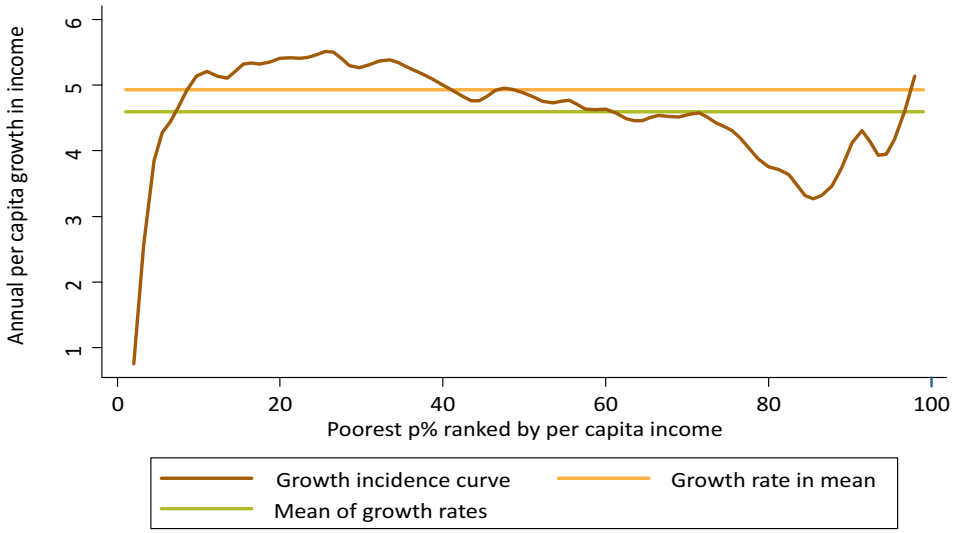
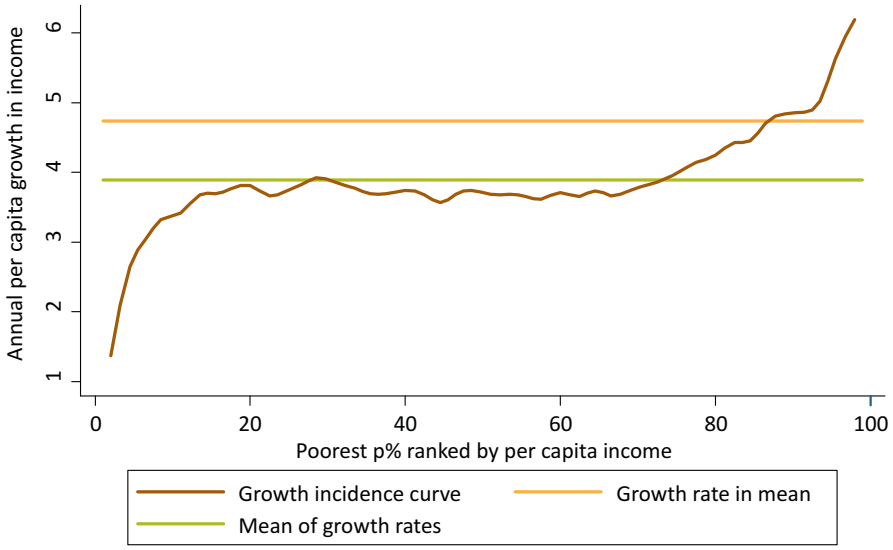
Appendix 1: Growth incidence curves by level of education, total income

Figure 6: Growth incidence curve: HH Head: No education: 1995–2005



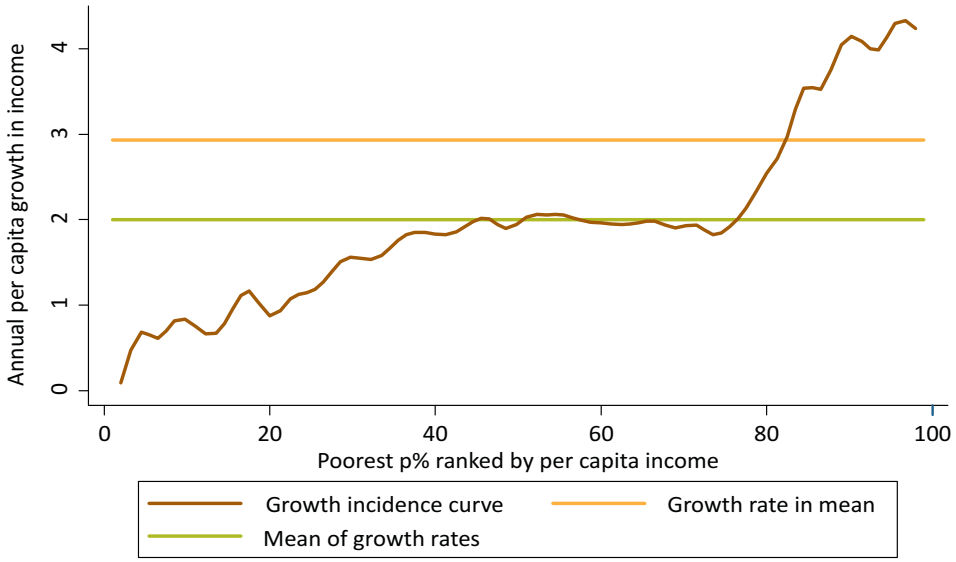
Source: Statistics South Africa, 1995 and 2005 and own calculations

Figure 7: Growth incidence curve: HH Head: Incomplete GET: 1995–2005



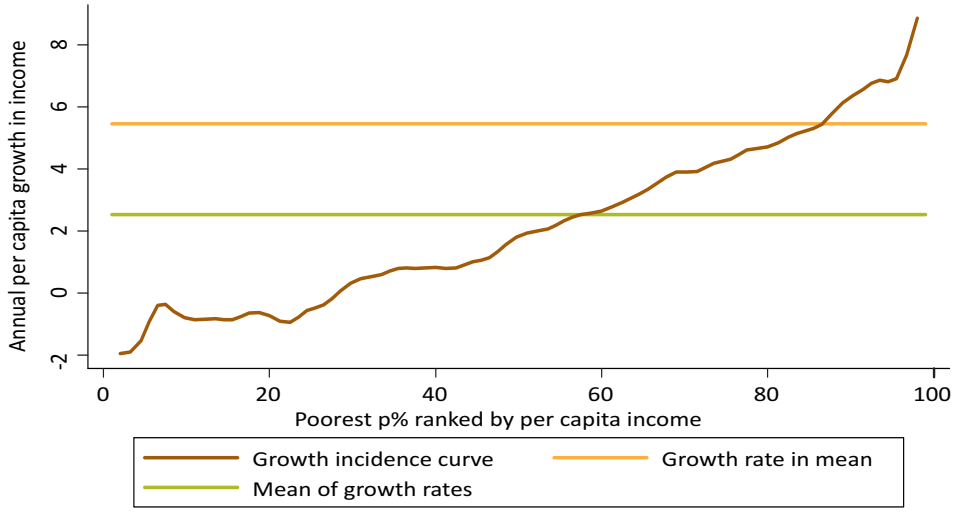
Source: Statistics South Africa, 1995 and 2005 and own calculations

Figure 8: Growth incidence curve: HH Head: Complete GET: 1995–2005



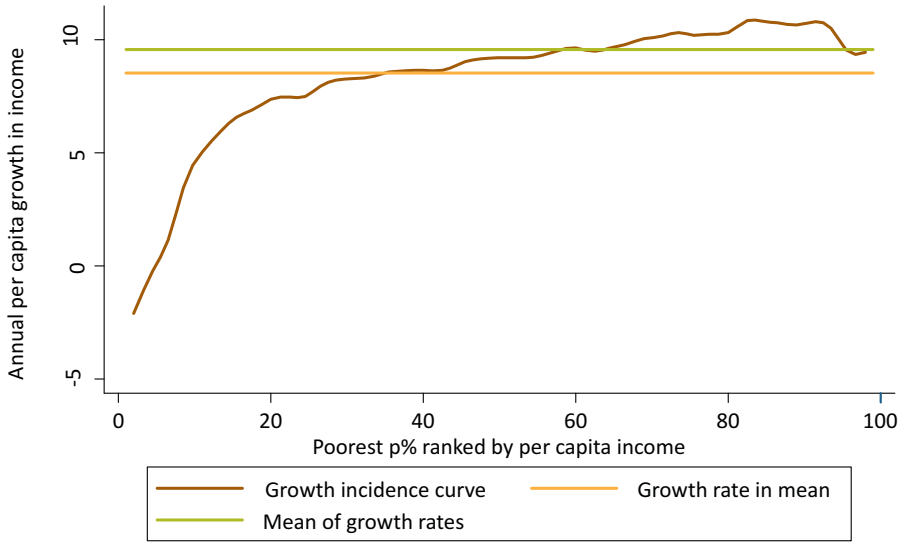
Source: Statistics South Africa, 1995 and 2005 and own calculations

Figure 9: Growth incidence curve: HH Head: Matric: 1995–2005



Source: Statistics South Africa, 1995 and 2005 and own calculations

Figure 10: Growth incidence curve: HH Head: Teriary 1995–2005



Source: Statistics South Africa, 1995 and 2005 and own calculations

Discussion – 17 April 2010

As an introduction to the session, the presenter gave a synoptic overview of general trends in skills demand in the South African labour market over the past 15–25 years. The details are contained in the paper, "An overview of the demand for skills for an inclusive growth path" (Bhorat and Jacobs, 2010). The prominent elements of this overview are summarised in the following sections.

1. Drivers of skill-biased technology change

The most powerful feature identified in the period was skills biased technology change (SBTC). This is a trend where, over time, relative demand for low-skilled jobs decreases while concurrently, demand for high skills jobs increases.

This can happen as an economy changes. Structural change in modern economies frequently manifests as a shift in emphasis from the production of raw materials to the production of services – i.e. from primary sectors to tertiary sectors. Under these circumstances, the demand for labour in the primary sector declines whereas demand for labour especially in the services sector increases. Primary extractive industries tend to employ relatively large proportions of low and unskilled labour, and services industries tend to employ a greater proportion of intermediate to high skills. Consequently, any broad shift in emphasis across the economy away from primary sectors to tertiary sectors will entail a decline in demand for low-skilled labour and rising demand for higher skilled labour.

Over time, new technologies are absorbed and implemented in production in enterprises and across whole sectors. The impact of technologies on production causes shifts in the workforce needs of enterprises, sectors and whole economies. Technologies in the form of machinery and more recently computers directly impact on the distribution of skills needs driving demand for higher skilled workers while eroding the demand for low skilled workers. Capital deepening can produce higher unemployment because it affects the skill composition of the workforce.

The cumulative impact of structural changes and of the implementation of machine and information technologies have driven SBTC in South Africa at least since the 1970s up to 1995, the period of most intense change. From 1995 to the present this trend has continued. Information technologies have proved to be a more powerful influence on the rate of SBTC than have structural changes.

This skill biased labour demand has had the effect of increasing unemployment levels in an economy which already suffers extraordinary levels of high unemployment. Furthermore, the skill bias also prejudices new work-seekers who do not hold the requisite skills and qualifications and find it increasingly difficult to obtain sustainable employment. This labour demand trajectory is not a function of regulation or of wages. It reflects 'a fundamental altering of the growth process'.

In this country, the gradual and ineluctable shift in demand for the higher skilled has strongly affected those population groups who were historically denied access or opportunity to complete a basic education qualification and/or the opportunity to pursue post-school study.

Furthermore, job losses in the recent recession reflect the same bias: unskilled, less experienced and younger workers were most likely to lose their jobs. The crisis response amongst employers is accentuating the basic patterns.

2. Income in the 1995–2005 period of economic growth in South Africa

The economic literature observes that economic growth impacts differently on poverty, reducing it at different rates per unit increase in growth across countries – and across time periods. Of particular interest is how increased growth is distributed across the population in the form of income. This is an important issue because the income gains from economic growth may be distributed unequally and can exacerbate rather than ameliorate income inequality.

When annual per capita growth in household expenditure (used as a proxy for household income between 1995 and 2005) is plotted against per capita expenditure, the top 10% of the distribution, it is clear that the highest earners enjoyed the strongest average annual income growth rates. In contrast, individuals between the 60th and 80th percentiles experienced the lowest growth rates. This means that the income of middle income groups – teachers, nurses, municipal workers, intermediate skilled government employees – declined the most relative to the population as a whole. Even the poorest 30% of individuals experienced average annual increases in expenditure above the mean of the percentile growth rates.

3. Education and the distribution of income benefits

In this context, how did level of education influence the distribution of income benefits to individuals and household during the period of economic growth experienced in South Africa between 1995 and 2005? In their analysis, the authors consider the percentage change in expenditure – again as a proxy for income – across a distribution of households (by percentile) according to level of education (of the household head).

The finding reveal what only tertiary educated households returned a mean income growth rate above the national aggregate for the 1995 to 2005 period. This shows that income gains from employment in the decade were tightly concentrated amongst better educated households.

To more closely examine the pattern of income gains in poor households relative to non-poor households, rates of pro-poor growth were estimated according to percentiles ranked by per capita household expenditure for the lowest 30 percentiles.

The analysis reveals that for each level of education up to matric, the mean percentile growth rate lay below the national mean of 4.76%. Second, that growth was absolutely pro-poor across the distribution, barring households where the head has a matric qualification. Third, the mean income growth rate by education status declines from no education to matric – in other words over the period, those with no education experienced larger income gains than those with a matric.[7] This is counter intuitive to the notion of human capital where there should be a gradation of upward increments in income returns across the distribution from low to higher skilled (i.e. from no education to matric). Higher qualifications should generate higher returns for the certificate holder than lower certificates.

This suggests that in the labour market there is low demand for those with a school leaving certificate. This environment has a potentially negative impact on the motivation of school leavers to obtain intermediate skills, as they struggle to break into the labour market. Comparing the matric and tertiary qualifications, there is no positive relationship between increased qualification and increase in income across the distribution. In the current labour market the reward kicks in at tertiary, punishing people who have accumulated 'poor human capital' in the form of a matric. This encourages matriculants to aim for a place in higher education which becomes a 'holy grail'.

4. Higher education and the labour market

Having observed the primacy of higher education qualifications as a contributor to income, it is important to disaggregate the population of people who hold degrees to consider the impact of race on the employment of graduates. The underlying question was: Is tertiary education enough to guarantee employment and high income?

The findings shows that while Africans who graduated from HBUs/HDIs had a lower probability of finding employment than white graduates, African graduates from HWIs equally still had a lower probability to find employment. Controlling for all variables, this outcome suggests points to racism at the point of entry to the workplace. The analysis showed that once graduates were employed earnings differentials showed no systematic bias by race.

As indicated, the presentation focused on the broader trends of skills demand aggregated across the whole economy. This formed an important backdrop against which more specific discussion could be pursued on obtaining a more fine-grained view of skills demand for the purpose of planning the supply side, the education and training institutions. What follows is a thematic account of the discussion about how skills demand may be understood from a forward-looking perspective.

7 The group with no education will be older, so they will likely have work experience that will positively affect their income. Also they may also be recipients of old age pensions.

5. The 'prediction' of skills demand

On the question of how to predict skills demand, misgivings about the value of such an exercise were expressed. Some of these misgivings included:

- Skills demand predictions can describe future demand with too much specificity. For example that by a particular date in the future, a precise number of persons with particular skills will be required in the economy (e.g. in 2020 South Africa will need a further 3 189 mechanical engineers. This creates an illusory impression of confidence in the value of an exact figure).
- Skills demand is estimated where the numbers presented are too aggregated. For example, a prediction may suggest that there is a requirement for 5 000 nurses by 2014. But there is a variety of nursing specialisms, and the prediction cannot reflect that within the overall number given, 4 000 primary healthcare nurses are needed.
- Predictions across the long term are less reliable in occupations that are strongly affected by technology. In a decade, some occupations could be wiped out.
- It is hard to predict with certainty for local labour markets that are subject to the influence of global economic events and shocks.
- The more high skills/intermediate skills we have the better was one argument put forward which guarantees that growth will not be constrained by skills shortages. Further observations in favour of this view suggest that skilled citizens can migrate globally to economies in short supply. Repatriated income and remittances from this group would in the end offset the costs of training even if they are not employed in their home country.
- Participants observed that there is a very large number of skilled foreign migrants in South Africa who struggle to find work and who encounter great difficulty in accrediting their qualifications etc. This group should be accommodated in the formal economy to ease current skills shortages without the need to train/skill South Africans de novo. This strategy would also have a positive spinoff by removing this group from competing with South Africans in the informal sector.
- It was argued that the problem is not necessarily about 'hard skills' acquisition, and not about the numbers but that it is also a matter of 'social capital'. Thus in addition to planning new jobs the focus should be on supporting the numbers of unemployed graduates to find jobs.
- Internships and placements is badly organised and very little opportunity for providing praxis is offered, in the private and public sectors. This is very unfriendly to inducting young people in work.

- There are very large numbers of foreign migrants in the country. Many of them are skilled but cannot work in South Africa because of the slow speed of accreditation.

On the other hand, it was observed that the sectoral structure of the economy – and its probable path dependence – does provide some broader parameters within which the trajectory of skills demand can be estimated. Also, government policy or regulations can in themselves generate labour demand for particular occupations (e.g. community development workers). On a larger scale, South Africa's government's allocation of billions of rands in infrastructure development must create the grounds for making assumptions about labour market demand at the occupational level among infrastructure related occupations.

Participants observed that to take advantage of these government projects from a labour absorbtion point of view it is necessary to go into the design of such project in the planning phase to design them with greater labour intensiveness in mind. This must be done at the planning phase – but needs the engineering designers with the skills to do this.

There is also the question of industrial policy, and strategic decisions regarding where South Africa intends to compete in global markets. The industrial focus of these decisions should provide a guide for more detailed skills demand analysis within particular industrial sectors or sub-sectors.

The suggestion is also that initiatives in rural development made by the new government department in the sphere of job creation and enterprise development may also provide some indication of the future skills demand (e.g. the stated intention is to encourage enterprises working up the agricultural value chain through value-adding to basic commodities. So skills in the field of food technology, food safety, etc. may be in demand).

The flow of discussion led to how higher education institutions could contribute to graduate production in the targeted fields. This question was raised against the background of observations of a significant population of unemployed graduates. In response it was suggested that higher education institutions are heavily funded by the state and also of critical importance to national development. For these reasons they should be considered as SOEs. Furthermore, a participant reminded the group that the state has before given huge money to support engineering – but there had been no expectation regarding any reciprocal commitment. Thus, the question was directly posed: 'Why can't you make certain demands of higher education, this was after all the case in the Asian tigers'?

Pressure – and incentive funding – would be necessary from government to bring higher education and industry together to support the development of key sectors for the future. As one member of the group observed, there is no existing department or chair in alternative energy in South African higher education, despite the fact that green challenges have been highlighted as a

growth area by government. Likewise, there is no pharmaceutical engineering chair, despite the fact that pharmaceuticals is said to be a sector earmarked for growth by government.

The rejoinder to this argument was that such an approach would not be welcomed by higher education institutions protective of their academic independence. Furthermore, this sector would raise a further objection to an instrumentalist view of education that neglects vital exposure to critical thinking, ethics and democratic citizenship that cannot be ignored or divested from the curriculum.

6. Role of the SETAs

It was pointed out that the SETAs are supposed to play a role first in the identification of scarce skills or skills gaps. In theory from their analysis of the Workplace Skills Plans submitted by employers, SETAs are supposed to develop Sector Skills Plans which reliably synthesise the skills needs across their sector.

The SETAs have not been able to perform this function to meet expectations for a number of reasons: first, large numbers of small and medium enterprises do not participate, second, the quality of data in many WSPs is questionable and third, many SETAs did – do – not have the technical expertise to build credible models of demand. A fourth challenge is to recognise that the creation of SETAs with bounded operational responsibilities creates artificial boundaries between sectors that will inevitably limit the effectiveness of skills planning that takes the full economy into account.

Even if the above challenges are resolved, it must be acknowledged that SETAs are best positioned to address skills gaps among currently employed workers, rather than to address scarce skills or hard to fill vacancies which involve the recruitment of new workers.

7. Focusing on longer term demand

Notwithstanding the reservations identified above, the workshop participants recognised that from a state perspective some sort of longer term perspective on the future workforce needs in the economy is essential. Furthermore, high skills are important but also expensive so there must be some allocative logic to which field finances are to be invested. The question that must be asked is: What are the priority skills going forward?

As one participant put it: "Everyone (every government) does this" (in some form or another) even taking into account the likelihood of economic shocks that disturb the assumptions necessary for model building, recognising that modelling demand has to be done on a recurring basis to update assumptions and information – and not as a once-off prediction.

The group recognised that there are different approaches that can assist in understanding the trajectory of skills demand including: modelling, forecasting and scenario-building. Some examples of these include:

- The use of macro-economic models (e.g. CGE) to predict future growth and based on this to construct broad skills supply strategies
- The use of methods that involve taking a realistic future growth/output target set for an economic sector and then working backwards from this desired state to estimate the skilled labour demand that would be required through time to meet the given target.
- The use of demographic data (e.g. a labour force survey) to measure changes in employment by occupation over a series of years. Trend lines can be used to estimate future demand.

The opinion of workshop participants seemed to be that forecasting longer term skills demand was more feasible where government – rather than the market – was in some way driving the process. This focus on a government driven process depends entirely on whether government seeks to take an interventionist approach as is characteristic of developmental states which 'coordinated' the economic trajectory of the country and sought to secure the inputs needed.

8. Information

To design and carry out labour market analysis is it necessary to have valid and reliable data? Participants noted unevenness in data available:

- National statistical data from StatsSA
- Expectations that the newly implemented Organising Framework of Occupations will enable a clear structure that links occupational information with qualification information
- Workplace Skills Plans, Sector Skills Plans, Annual Training Reports require higher levels of integrity
- Data from HEMIS is reliable whereas data from FET colleges is highly questionable.

9. How do we deal with general unemployment?

The intention of the workshop was to focus on 'skills demand' in the context of skills shortages and skills gaps in intermediate to higher skills occupations across a variety of economic sectors. However, the same question could also be applied to unemployed people faced by a job scarcity from a supply-side perspective. What skills would unemployed people need to get a job?

The size of the population of young people aged 18–24 who are not currently in education, in employment or in training is estimated at 2.7 million. The current size of this marginalised and potentially disaffected group, and its rate of increase – about 500 000 per year – suggests the need for urgent interventions to provide them with skills, that could give them a chance to become employed. The urgency of such a need would preclude a lengthy period of time in training.

The current design of preparation for employment of post school youth in South Africa is based on a three-year pre-/vocational qualification as in the new NCV, followed by further training on job-ready occupational skills or an internship. The time spent on occupational skilling would depend entirely on the choice of the NCV graduate and the availability of an appropriate qualification which might range from three months to three years.

Two important questions must be addressed for this scenario. The first is whether unemployed youth in the 18–24 category could afford to be in training for at least three to five years – assuming no repletion – unless fully funded by government. The second question concerns how and when the College sector would be able to accommodate a sufficient number of 18–24 year old unemployed people? It would take some years to 'massify' the college sector given its current state of unreadiness.

In short a massified college sector with fully funded students would not take care of the challenge soon enough. A different approach would be to downscale the college emphasis on the NCV – up to 80% of curriculum time – which does not generate a graduate with employable skills for three years. The colleges would focus the bulk of their time on supplying some form of relatively short skills training targeted at particular occupations where employability is most likely (e.g. welding, brick laying) in the formal or informal sector. This option would generate a higher graduate output from the colleges hopefully with marketable skills. It would shorten the time taken to offer training opportunities to large numbers of people, who the longer their condition remains unemployed and unskilled the harder it is to find a way back to a productive working life.

Participants recognised that there is a large number of young people whose only hope of gainful employment is in self-employment in the informal sector. This was in response to the discussion that seemed to be assuming that the colleges would be training young people for formal sector employment. It was argued that this should not be the case, and that curricula should be structured accordingly to address self-employment skills.

An alternative view on the colleges is that they should be left to drive the NCV. Instead a new set of institutions based on the community college idea practiced in the United States and elsewhere should be established with a two-year programme leading to employable skills or access to higher education.

10. Scope and scale of the problem – and the location of a solution

Members of the group argued strongly that 'the scale of the problem requires more than tinkering' – by this implying that government needs to resort to fundamentally powerful measures that are not within the domain of the DHET. Put differently this is not a problem that can be solved through education and skilling interventions alone or within the resource envelope available to the DHET alone – it was argued that 'there is a need to look for solutions outside of the fiscal envelope allocated to the DHET'. It was noted that only a specific kind of interventions could begin to impact on the employment chances of the large majority of unemployed people such as (not in order of importance):

- Outright restructuring of the economy
- Fixed exchange rate with a currency adjusted to encourage demand for South African goods and services – with a training and skills system aligned to this purpose
- A two-tier labour market
- Wage subsidy
- Deregulate the labour market for young workers
- Use incentives to generate better training opportunities in the private sector
- Provide students with vouchers to exercise choice of institution

Some of the above strategies put forward would have to be negotiated and agreed to through a compact between higher education/industry/labour and government. It was also pointed out that vested interests would have to be taken into account.