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Understanding Labour Demand in South Africa and the Importance of Data Sources

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Introduction

The aim of this paper is to clarify what is meant by labour demand in the Department of Higher Education and Training's (DHET) Labour Market Intelligence Partnership (LMIP) project, to highlight the sources of data that can be used to understand labour demand and that are available to the LMIP and to make a distinction between analysing and forecasting labour demand.

It is this author's assessment that there may be very different notions of what some of the key concepts actually mean, so in the first section of the paper I clarify what is meant by labour supply and demand. The LMIP is concerned with establishing the foundation for labour market information systems (LMIS) in South Africa in which data on labour demand is indispensable, including the development of a system for forecasting the supply of and demand for skills. Thus a brief history of manpower forecasting analysis (MFA) and its evolution into labour market analysis is given, exploring the different emphases of these approaches and how each of these might contribute to understanding labour market demand over time. What survey data can be used for in the analysis of labour demand is then examined, before exploring possible sources of data on the South African labour market and how the value of these data can be improved. Finally, some suggestions on sources of administrative data that could also be used by the DHET for analysis of the labour market, and of labour demand, are made.

What is labour demand? What is labour supply? How are they related?

Labour market outcomes result from a combination of the demand for labour by firms and the labour that workers supply. Firms are the focus of trying to understand labour demand, whilst workers are the focus of trying to understand labour supply. Who is working where and at what wage depends both on which firms are hiring workers, the wage they are paying these workers and the number of jobs that need to be filled, as well as which workers are making themselves available for work.

In the textbook case labour demand is the derived demand of all firms currently operating. Firms wish to produce goods or services, sell these goods and services and make a profit. The summation of all the employment requirements of all the firms is the total demand for labour. Economists have traditionally thought that the main influence on the employment required by firms is the wage rate firms pay their workers and the productivity of the workers they employ. Firms are thought to demand more labour the lower the wage paid and the higher the productivity of the potential employees.

In the simple textbook case all workers are thought to be identical, but this is clearly not the case. Some firms, for example, in IT or finance, need many highly skilled workers, whilst agriculture or mining are likely to demand a higher fraction of unskilled labour. Some workers have skills that few other workers have, whilst there are many unskilled workers looking for work.

The DHET may be interested in whether, and where, workers with different skills are working. It is important to note that these outcomes are not purely indicative of labour demand. Instead, these types of outcomes are themselves the result of the combination of the supply of labour from workers and the demand for labour by firms.

Labour Supply

Economists distinguish between stocks and flows – a helpful distinction when thinking about the data the DHET has on labour supply. Economists think of the total number of people (with their differing levels of skills and education) willing to work at the wage the market is offering for their levels of skills as the supply of labour. This is the total stock of labour supplied at a particular point in time. But this can vary over time as people retire, have children, become sick or enter the labour force after school or tertiary education. These additions or subtractions to the total stock of labour are called flows. These flows are what the DHET has good and fairly detailed data on. The Higher Education Management Information System (HEMIS) data can be used to show the numbers of graduates over the last 15

years from public institutions and what degrees or diplomas these individuals obtained or attempted to obtain. But this is data only on *some* parts of the *changes* in labour supply, i.e. some of the flows, rather than the total stock of labour. The total stock of labour supplied, or the labour force, can really only be investigated using labour force survey data. For example, if we used the HEMIS data to explore labour supply we would find that a large number of individuals had tertiary degrees. But this is clearly not an accurate picture of all the potential workers in the country, most of whom have not been to university. To get a more accurate overall picture we would need to use household survey data or administrative data, which is discussed below.

A brief history of planning and analysis in the labour market

One of the aims expressed in discussions with the DHET was forecasting labour demand requirements by occupation or skill level. This is reminiscent of the older manpower forecasting analysis literature, which has largely been abandoned, both in economics and by many policy makers. For example, the South African Department of Labour's 2003 document "State of Skills in South Africa" notes that this shift has occurred over the last five decades, and that the aims of manpower forecasting analysis has generally been regarded as unworkable. This strong conclusion and the actual aims of the LMIS both merit further discussion by those involved in the current DHET project, as some parts of the project appear to be influenced by the manpower forecasting analysis literature, for example, the forecasting of labour demand using the Applied Development Research Solutions model, under Theme 2 of the LMIS project. Deliberation on the methods of analysis in this theme are under way involving the Economic Cluster departments and the DHET.

Manpower forecasting analysis had as its main aim the goal of predicting the demand for certain types of labour, usually by different occupational categories. This aim was formulated to assist countries with the task of estimating the need for different types of education and thus to assist in planning how state education should be expanded. It was extremely popular in the 1950s and 1960s, but was found to be unworkable and has been abandoned in many countries.

The main criticisms of MFA were that any attempt at forecasting detailed educational demand was bound to fail, given the rate at which society and technology was changing rapidly (Psacharopoulos, 1991). The increasing sophistication of the forecasting models led to overconfidence in the forecasts without actually improving the forecasts (Bray, 2008). Spaletti (2008) reviews some of the flawed assumptions underlying the forecasting models, focusing on the complexities of predicting the demand for labour, given shifts in demand and in technology, and the clearly important responses to changes in the prices of labour of different skill levels and capital, which were ignored in the forecasting models. He also notes that one of the key weaknesses of the manpower forecasting approach is that converting forecasts of occupational requirements into educational requirements is not simple. Besides a few occupations there is no specific relationship between occupations and educational qualification attained. Individuals trained as teachers may end up in the civil service, whilst doctors could end up as non-medical consultants. As a result of these criticisms and a realisation that the forecasts were inaccurate, MFA was generally abandoned in the 1980s (Spaletti, 2008, Psacharopoulos, 1991).

What followed the emphasis on manpower forecasting analysis has been the more recent approach focusing on labour market analysis (LMA). In LMA emphasis is placed on understanding the current state of the labour market, rather than predicting its future trajectory. Instead of a focus purely on headcounts of different kinds of workers, the role of the cost or price of labour was recognised as a crucial determinant of labour market outcomes (Psacharopoulos, 1991), and thus studying who earned what and in which occupations and industries was an important part of the focus of labour market analysis.

Labour market analysis has been used to evaluate specific public policies or the effects of external changes. Card (1990) studied the effect on wages

and employment of the Mariel boatlift in Miami, where 125000 Cubans arrived in the US, finding that there was almost no effect on the wages or unemployment levels of Americans living in Miami. In South Africa research by Keswell and Poswell (2004) has shown that the returns to tertiary education are extremely high, suggesting that there are skills shortages that could be lessened by increasing the supply of tertiary graduates.

What can labour market data be used for?

Having defined labour demand and labour supply, and having distinguished between labour market analysis and manpower forecasting analysis, I now turn to exploring what labour market data can be used for and then discuss what data is available in South Africa.

How to explore the demand for and supply of labour?

Labour force survey data is obtained from nationally representative household surveys conducted mostly by Statistics SA and thus enables exploration South Africa's total supply of labour. It is possible to work out the number of people willing to work and how many of them are actually working, as well as the education levels of those who are part of the labour supply. As a result of the availability of micro data from household surveys, conducted mainly by Statistics SA, we now know a large amount about individuals and workers, such as participation and unemployment levels (Casale et al., 2004), as well as mobility and labour market transitions (Cichello et al, 2005, Banerjee et al, 2008).

In addition, labour force surveys also enable one to observe the outcomes of the demand and supply of labour. One can know which of those people willing to work actually have found employment, what level of education they have, what type of occupation they are engaged in, how much they earn and a little about the firm they work for.

Understanding labour demand more fully requires firm-level micro data. It is helpful to know which firms are expanding and which are contracting their employment levels, as well as the wages firms are paying to unskilled and skilled workers, for example. Firm data can come from surveys conducted by statistical agencies or international organisations, as well as from administrative data collected by tax agencies or various government departments. Unfortunately this type of data has been far less available than the household survey data. This has meant we currently know much less about labour demand than labour supply in South Africa. Which data can be used to explore labour demand in the South African context is outlined below.

Data sources for analysis of labour demand in South Africa

Labour force surveys, October Household Surveys and PALMS

In the labour market analysis tradition household survey data is generally used to explore the labour market outcome of the demand and supply of labour from the worker perspective. This is because household surveys obtain data that is representative of all individuals. It is not limited to those working in firms or the formal sector, for example, as a survey of employees in formal firms would be.

Information about post-Apartheid labour market outcomes is mainly obtained from household surveys undertaken by Statistics SA, such as the Labour Force Surveys (LFS), and their predecessors, the October Household Surveys (OHS). Nationally representative OHSs were conducted from 1994 until 1999. The LFSs were then run biannually until September 2007, after which the Quarterly Labour Force Survey (QLFS) was introduced, which continues to run 4 times a year. As mentioned above, these data sources can be used to explore and better understand labour market outcomes in post-Apartheid South Africa and the trends that have occurred over the last 18 years.

These data have been made publicly available by Statistics SA and there is a large and established research community that makes use of these data. Casale et al (2004) use the data to explore changes in employment in the post-Apartheid period. Burger and Yu (2006) use the household survey data to explore how individual earnings has evolved and argue that real earnings have not been declining as

Casale (2004) had suggested. Burger and Yu (2006) also argue that whilst real earnings have been rising for those working in skilled occupations, earnings have been flat for semi and unskilled workers.

There is also a branch of the economics literature in South Africa which highlights concerns with data quality in the surveys conducted by Statistics SA and academic and international institutions. Part of the analysis required in any analysis of the South African labour market is to assess what is an actual trend and what is likely to be an artefact of the data. For example, informal employment seems to have been better captured by Statistics SA in the late 1990s and early 2000s (Casale et al 2004, Devey et al 2006), so that which looks like large increases in employment may actually be improved capturing in the surveys (see Figure 1). Similarly, trends in informal self-employment taken from the Survey of Employers and Self-employed, may be due to mistakes made in the data collection rather than indicating a massive drop-off in levels of self-employment (see Table 1). As a final example, Wittenberg (2004) highlights the differences in manufacturing employment as measured in OHS 1996, the 1996 Census and the 1996 manufacturing survey, all conducted by Statistics SA around the same time.

One of the difficulties in using the Statistics SA household survey data is that questions, surveys and sampling have changed over time, as has the demographic model of the population of South Africa used by Statistics SA to generate the survey weights. Numerous different researchers have been using this data over the years, all doing similar work to make these data comparable. As a result of this duplication DataFirst has made a comprehensive effort to build a composite dataset of all the above surveys that is publicly (and freely) available to any researcher interested in using the data. The result of this is the Post-Apartheid Labour Market Series (PALMS) dataset. This data has, as far as possible, been made comparable over the surveys, so that researchers can worry about their analysis rather than spending time putting the data together.

Another issue is that labour income questions have changed over time and were not asked in the earlier QLFSs. Although income questions were reintroduced to the QLFS in 2009, the data does not seem to be of as high quality as the LFS income data. Imputation of missing data is the main issue. It is not possible to ascertain which income data is imputed and which is an actual individual response. This is a problem for any analysis exploring income returns to different levels of education over time, for example, the earnings premium for those with tertiary education.

If the LMIS is partly concerned with labour income then any concerns about poor quality income data would need to be articulated to Statistics SA in the hope that the data would be improved. DataFirst is engaging with Statistics SA to obtain the unimputed QLFS income data. Some work has also been done by DataFirst to explore the quality of the newer QLFS income data and to provide data that has been corrected for some of the problems. The data is freely available from the DataFirst website and a working paper will be released shortly. The LMIP could commission its own research to check and then use this data, as well as help to publicise its availability to other researchers.

Not all the data appearing in the OHS, LFS and QLFS surveys is in PALMS. The latter gives attention to labour market outcomes, so there is data on employment status, labour income and some data on employers. Analysis of PALMS could also be undertaken to explore the major trends in, for example, employment and unemployment by different education levels and the monetary returns to education, skills and training of different types.

As another example one can also explore the changes in employment across 1 digit occupation categories in the OHSs and LFSs using PALMS. Figure 2 suggests that there have been declines in skilled agricultural work, flat professional employment and increases in employment in elementary occupations. But even at this much aggregated level, it is clear from Figure 2 that the data are noisy and that reliable conclusions would be difficult to draw at any further level of disaggregation. This is the limit of most survey data unfortunately. Since the LFSs are relatively small surveys (30 000 households) finely disaggregated

analysis is not possible. For example, there are 4 digit occupational categories that potentially provide very good information on what people are doing in their jobs (for example, code 2213 is a food scientist, whilst code 9162 is a factory sweeper). But it would be impossible to explore trends in these categories at this level of disaggregation over time with any useful level of accuracy.

It may be possible to suggest extra questions for Statistics SA to include in the LFSs if the DHET thought this would add value, but this would need to be agreed with Statistics SA. For example, if one was interested in the performance of students from different tertiary institutions one could request that Statistics SA include questions about which university individuals had attended. But one would still face the limitations of a relatively small survey, where few individuals in the survey would have tertiary qualifications. This would also make strong conclusions difficult.

It is possible to conclude that South African researchers would be better served by a household survey focused on labour market outcomes that had a larger sample, but that was conducted less frequently. This would enable more detailed analysis, which was noted above to be impossible with the current household surveys, but at a similar cost. Unfortunately part of the difficulty is that Statistics SA takes its commitments to the international statistics standards seriously, particularly the International Monetary Fund's (IMF) Data Quality Assessment Framework and Special Data Dissemination Standard (2007), and a quarterly survey is best practice according to these standards.

NIDS, KIDS and other household surveys

Statistics SA has undertaken most of the household surveys in the post-Apartheid period. But there are some which have been conducted by academics, with funding from international organisations and, in the case of the National Income Dynamics Study (NIDS), the South African presidency. NIDS is an on-going, nationally representative panel, or longitudinal survey, repeating similar surveys every two years to the same households to explore how conditions are changing for these households. The KwaZulu-Natal Income Dynamics Study (KIDS) had a similar function and was run twice after the initial wave of the PSLSD survey in 1993. It provides one of the only ways to look at the changing conditions for households over the early post-Apartheid period. Panel surveys can be used to answer questions cross sectional surveys cannot. For example, we can investigate the extent to which people move between jobs (Banerjee et al, 2008) and the changes in their earnings as this occurs, and the differences between earnings in the formal and informal sector (Badaoui et al, 2008).

Firm Surveys

Firm surveys are the most important tool to understand patterns of labour demand. Formal sector firm surveys are currently undertaken almost exclusively by Statistics SA, but these are currently not in the public domain. DataFirst is engaging Statistics SA to release this data publicly. Firm survey data can be used to answer questions that household surveys cannot. For example, what kind of firms are creating jobs, which new firms have started to operate and which firms are shrinking or dying. A recent paper by the author (Kerr, Wittenberg and Arrow, 2013) uses South African firm data (the Quarterly Employment Statistics Survey [QES]) to explore patterns of job creation and destruction. This data reveals important insights that are not possible using labour force survey data, including that job creation in the formal sector in South Africa is coming mostly from the largest firms, with small firms making negative contributions to net job creation. The QES survey data is not currently publicly available.

There have been some firm surveys conducted by academics and international organisations in South Africa, but these have been small, cross sectional surveys (Edwards et al, 2008, Valodia and Velia, 2006). The surveys have been used to explore important issues in labour demand, for example, to estimate elasticities of substitution between capital and different kinds of labour (Behar, 2010a), and the complementarity or substitutability of labour of different skill levels (Behar, 2010b).

The Survey of Employers and the Self-Employed (SESE) is a survey of businesses that are not

registered for VAT, and thus samples firms that are not covered by Statistics SA's formal sector firm surveys. The SESE was conducted in 2001, 2005 and 2009, with another round having been completed in 2013. The samples for Statistics SA's other firm surveys (including the QES mentioned above) are sampled through the business register. The SESE targets businesses that do not make it into the business register, because they are not registered for VAT, and thus do not make it into the samples for Statistics SA's other firm surveys. More than 85% of the businesses in the SESE are 1 person firms, i.e. these "firms" have no employees. This is a source of data on informal firms, but given that revenue and profits are small, as is employment, it is perhaps not a priority for the LMIP.

Labour demand research in South Africa would make a giant leap forward if the data from firm surveys conducted by Statistics SA was released publicly, although Statistics SA would require that this is done in a way that preserves the confidentiality of the firms that respond, to comply with the Statistics Act.

Administrative Data

Household survey data allows analysts to explore labour market outcomes from the individual's perspective. How is an individual's education level related to her employment prospects or earnings, for example, whilst firm survey data potentially allows one to explore which firms are shrinking and which firms are growing or creating well-paying jobs, increasing our knowledge of labour demand. Administrative sources of data are increasingly being used to explore and understand labour market outcomes, labour supply and labour demand, as well as evaluate public policy in many parts of the world. These are data obtained from government activities, such as the process of collecting taxes from workers or firms or paying government employees. In South Africa there are several possible sources of administrative data that could be used to better understand labour demand. These are explored below.

UIF data

UIF data on firms' employee levels and salaries paid might be a good substitute for some aspects of the confidential firm survey data collected by Statistics SA and could be extremely helpful in understanding patterns of labour demand from the firm side, if the data is of good quality. For example, UIF data could be used to analyse which types of firms are demanding more labour and thus growing, and which markets new firms are entering. It could also be used to understand what salary structures look like within firms, and how the labour demand of firms is constrained (or not) by minimum wages. This would be analysis that has never been undertaken in South Africa and would deepen our knowledge of the workings of the South African labour market, as well as contribute to policy discussions about the role of institutions, such as bargaining councils in South Africa.

It is unclear whether the UIF data is of good quality and if it could thus be used to understand the demand side of the labour market. Thus one very useful outcome for the LMIS researchers to pursue would be to approach the Department of Labour to access the data, explore the quality of the data, and, if it is of decent quality, to begin analysing it and perhaps make this data available to other researchers. Data quality checking would include investigating whether there were unusually large changes in employment within firms, which would suggest bad matching of firms. Researchers would also check whether large amounts of data were missing, perhaps because the Department of Labour's records are not well kept. These are all hypothetical examples, given the current lack of access to this data.

SARS data

Data from the South African Revenue Service would also enable analysts to study important labour demand issues in the South African labour market. For example, one could explore how firms' internal pay structures work, how this changes as firms expand or contract and how this differs across sectors, which would help to suggest how earnings or employment might evolve in the future. This analysis would only apply to firms registered with SARS. Unregistered businesses would be excluded

and would have to be analysed using the SESE (discussed above) or other sources of data. The SARS data is not currently available, but, with the agreement of the South African Revenue Service, could be made available through a secure data centre, like the one recently developed by DataFirst at the University of Cape Town. Such centres allow data owners to preserve the confidentiality of their data whilst still making it available to researchers.

Public Employment Service data from the Department of Labour

The Public Employment Service (PES) database of the Department of Labour may be of some use, though this would depend on the quality of the data available, what data is available and for which periods. The difficulty with such a database is that those who register are a select group, they are not a representative group of all unemployed South Africans and thus conclusions drawn from the data may not be generalizable to all unemployed South Africans. The data could be used to explore how successful the service has been in matching employers and employees. If the service is well utilised then exploring which employers and employees use the site and who matches with whom, would be an example of the analysis that has not been undertaken before. This would be useful to understand how the process of workers and firms meeting actually works and whether there are indeed large search frictions that prevent workers and firms engaging in profitable employment relationships. Kvasnicka (2009) used German Public Employment Service data to explore whether temporary employment for the unemployed was a stepping stone to regular employment. A similar study for South Africa using the PES or the Expanded Public Works programme would be of benefit to policy makers in South Africa.

PERSAL data

As well as being a policy maker, the government is a major employer in the South African labour market. Around 22% of the 10.1 million people estimated to be working in the formal sector, are working for local, provincial or national government, or state owned enterprises in 2012, according to Statistics SA's first quarter QLFS of 2012. Information on the kinds of labour demanded by the various national and provincial departments and municipalities could be undertaken using PERSAL administrative data, which could include trends over time. Because this is not a survey, but rather a census of *all* public sector workers, a much more accurate picture can be painted of what is happening, although it is limited to the public sector. Although this data is confidential there are examples of this kind of work being undertaken. For example, the study "Educator Attrition and Mortality in South Africa" (Mobile Task Team, 2005) used PERSAL data to look at mortality rates for teachers employed in South African public schools. Similar types of analysis focusing on issues pertinent to the project could be something the DHET LMIS researchers may wish to attempt.

Companies and Intellectual Property Commission data

South African companies are required to register with the Companies and Intellectual Property Commission (CIPC). Again the data is not publicly available, but could perhaps be accessed for the LMIP. Edwards and Sundaram (2013) used CIPC data to explore the links between crime and firm activity in South Africa. The authors did note that there were some data quality issues, but this is another interesting source of administrative data that could be utilised to better understand labour demand.

Linking data sets

Linking datasets was mentioned as a potential piece of value added work by the HSRC and the DHET in the initial stages of setting up this paper on labour demand. As mentioned above, one can put the OHSs, LFSs, and QLFSs together and explore trends over time, using the PALMS dataset, for example. One can also use the panel nature of some surveys to link individuals over time. For example, the LFS had a rotating panel component between 2001 and 2004, whilst NIDS has been designed as a panel study. One can also use different pieces of data from different data sets. For example, by using the LFS data to show trends in what percentage university graduates make up in the total labour force and then using the HEMIS data to explain which universities have contributed to these changes.

What one cannot do is link individuals in the household surveys to other data, for example, their tax records, university registration/graduation in HEMIS or their replies to the census. This is because Statistics SA does not currently allow personal details to be released, so one could not match individuals' HEMIS records with their LFS data (if they were surveyed). This type of linking is becoming more common in other countries, but has, thus far, been uncommon in South Africa. If SARS was to release unit record data for analysis, there would have to be close cooperation between SARS so that data could be linked without violating confidentiality.

Non-Survey data

In some of the presentations to the LMIS workshop held in Pretoria on 27 February 2013, non-survey data were suggested as useful sources of information for the LMIS project. As noted above, a sample survey is, if done correctly, representative of the whole population being studied. There is no way to generalise data that is not the outcome of a nationally representative survey, however. That said, the LMIS project may wish to include non-survey data on labour demand and this should be an area of discussion amongst the DHET officials and other stakeholders.

Conclusion

As part of the Labour Market Intelligence System, the DHET requires labour market demand data. I have outlined what demand and supply mean from a labour economist's point of view, with the aim of stimulating discussions and conclusions about data for both the demand for, and supply of, labour. I noted that whilst the DHET had good information on some of the flows on the supply side, data on the stock of labour supply will have to be sourced from elsewhere, predominantly the household surveys conducted by Statistics SA.

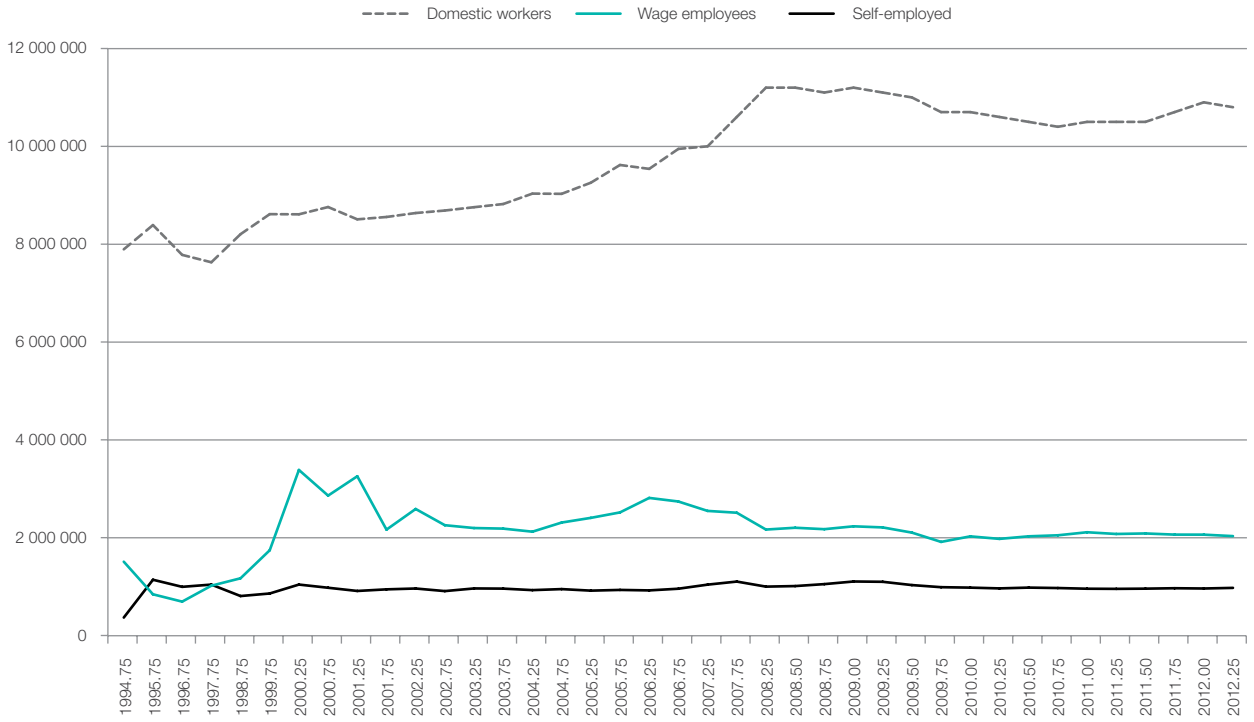
I then explained both manpower forecasting analysis and the newer methods of labour market analysis, in order to highlight that there may be a variety of (possibly conflicting) aims on the part of different actors within the LMIS project and to stimulate further discussion on what will be required for the LMIS.

The paper then moved to suggesting a range of data sources that could be used to analyse labour demand, including the labour force surveys and PALMS, firm surveys, tax data from SARS and other administrative data including UIF data and PES data from the Department of Labour, the CIPCs firm data and the government's employee database, PERSAL. Which of these data could be used immediately was explained, as was how the data could be improved and which other data might be useful, if they were made accessible and were found to be of good quality.

Building a Labour Market Intelligence System requires both demand and supply side information. This paper has highlighted some important definitions in the analysis of labour demand, suggested areas that need further clarification before any analysis of labour demand is undertaken and provided an overview of what data can be used to better understand the demand side of the labour market.

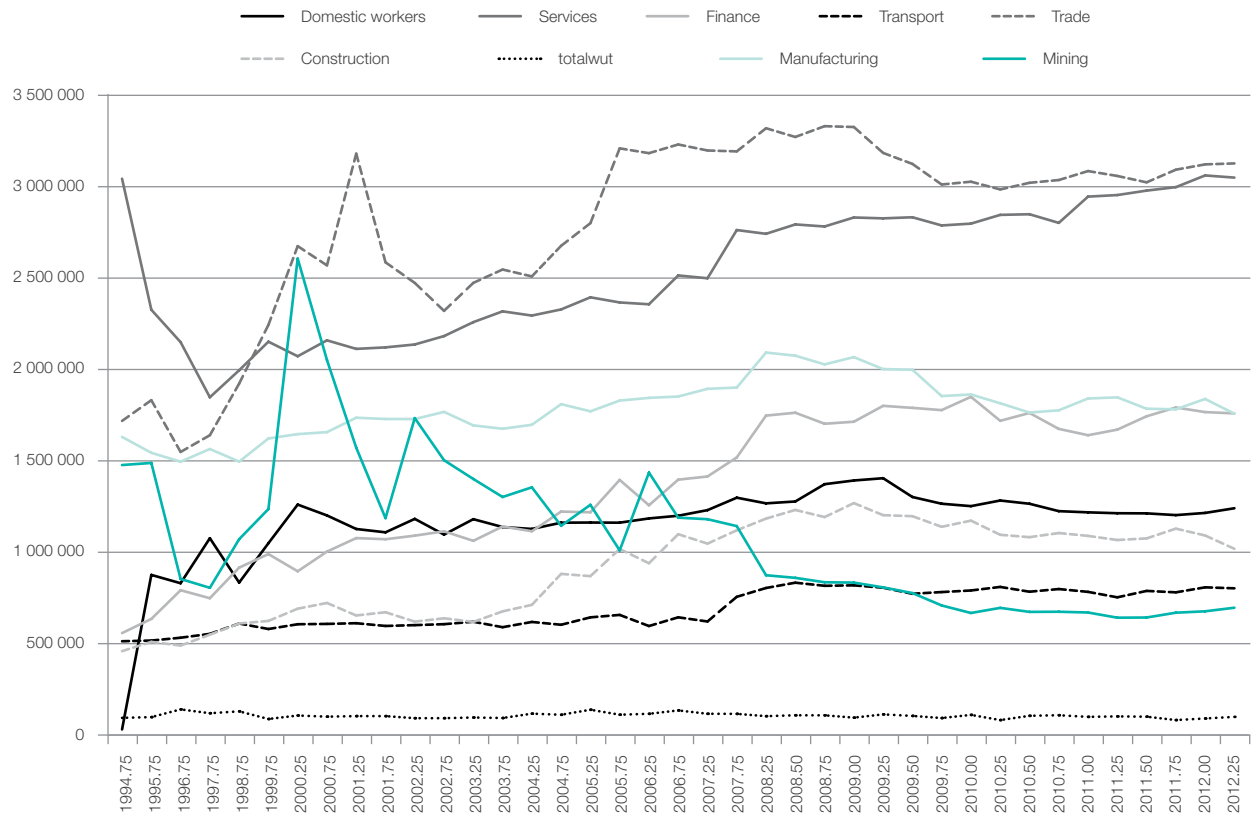
Figures and Tables

Figure 1: Employment in the South African Labour Market 1994–2007



Source: PALMS data, DataFirst

Figure 2: Occupational trends in the OHS and LFS data 1994–2007



Source: PALMS data, DataFirst

Table 1: Non-registered Self-Employment in South Africa

Year	2001	2005	2009
Number of self-employed (thousands)	2 258	1 668	1 076

Source: Survey of Employers and Self-employed, Statistics SA 2001, 2005, 2009

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