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5255

**PROJECTING SOUTH AFRICAN
LABOUR SUPPLY TO 2024**

Phase I Report

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Contents

1. TERMS OF REFERENCE.....	4
2. POPULATION PROJECTIONS.....	5
3. AN ANALYSIS OF LABOUR FORCE PARTICIPATION RATES.....	12
4. LABOUR SUPPLY PROJECTIONS.....	15

Tables

Table 1 – Population projection: 2007, 2014 and 2024.....	6
Table 2 – Labour force participation rates by population group, gender and age group 15-64, September 2005.....	13
Table 3 – Labour market statistics, 2001 to 2007.....	14
Table 4 – Aggregate labour supply, 2007-2024.....	16

1. Terms of reference

1. A population projection has been carried out from 2007 to 2024, using the SPECTRUM model by population group, gender and age group, based on:
 - The population composition reported by the Community Survey 2007;
 - Fertility as estimated by the Community Survey 2007 and projected to drop for Africans and Coloureds;
 - Mortality as determined by background mortality and the effect of AIDS; and
 - International migration, with some discussion of alternative projections.

The projection has yielded estimates of the population by population group, gender and age group for each year between 2007 and 2024; this information is available in electronic format. Particular attention has been paid to projections for 2014 and 2024.

2. A tabulation of labour force participation rates by population group, age and gender in the September Labour Force Surveys from 2000 to 2006 and projections on stated assumptions to 2024 have been carried out. Particular attention has been paid to projections for 2014 and 2024. Both broad and narrow labour force definitions were considered.
3. An estimate of labour supply to 2024 is given, obtained by multiplying labour force participation rates (LFPRs) by population. Particular attention has been paid to projections for 2014 and 2024.

2. Population projections

The population projections are built up using the SPECTRUM model with its AIM extension to model the spread of the AIDS epidemic. This model is used by Statistics South Africa in preparing its demographic forecasts.

Population projections are built up from the following components:

- A start date for the projection and an end date, set at 2007 and 2024 respectively.
- An initial distribution of the population by population group, gender and five-year age group. This distribution is based on the 2001 Census and the 2007 Community Survey results¹ and is an extrapolation of the data to mid-2007.
- Fertility data. The Community Survey estimates the African Total Fertility Rate at 2.7, while the Coloured, Asian and White rates are estimated at 2.3, 1.4 and 1.4 respectively for 2007. Since the Asian and White rates are already low, they are projected to remain constant between 2007 and 2024. African and Coloured rates are projected to drop by 0.02 per year, so that they reach 2.36 and 1.96 respectively by 2024.
- Mortality data. The SPECTRUM/AIM model requires both the projection of background life expectancy (what life expectancy would be in the absence of AIDS) and parameters representing the spread of the AIDS epidemic. These data are based on the Actuarial Society's ASSA 2003 model.
- Two immigration scenarios are considered: a low projection in which net immigration rises linearly from 80,000 per year in 2007 to 114,000 per year in 2024, and a high projection based on double the stream in the low projection. All net immigration is assumed to be African. The implications of these assumptions are that, in the case of the low projection, the increase in the 15-64 age group accounted for by immigration will be 17.5% of the total increase in that group for the period 2007 to 2014. For the period 2014 to 2024, the corresponding proportion will be 29.8%. In the case of the high projection, the increase in the 15-64 age group accounted for by immigration will be 31.4% between 2007 and 2014 and 47.8% between 2014 and 2024.

The Microsoft Excel file **proj.xls**, which accompanies this report, sets out both assumptions and results for each year between 2007 and 2024. Table 1 extracts information for 2007, 2014 and 2024 from this file. The main features of table 1 are:

- An estimated population of 48.7-million in 2007, rising to 54.7-million in 2024 under the low immigration assumption and to 56.5-million under the high immigration assumption. The population growth rate is 0.7% per annum over

¹ The data are taken from Statistics South Africa, *Community Survey 2007*, Statistical Release P0301, 24 October 2007 (revised version).



the whole period under the low immigration assumption and 0.9% per annum under the high immigration assumption.

- The proportion of the population in the 15-64 age group rises from 63.6% in 2007 to 67.7% in 2024 under the low immigration assumption and to 68.0% under the high immigration assumption. The population in the economically active age range will grow more rapidly than the population as a whole. The 15-64 growth rate will be 1.1% per annum in the low immigration case and 1.3% in the high immigration case.

Table 1 – Population projection: 2007, 2014 and 2024

	2007	2014	2024
Africans (low immigration)			
Fertility			
Input TFR (total fertility rate)	2.70	2.56	2.36
Calculated TFR	2.70	2.56	2.36
GRR (gross reproduction rate)	1.34	1.27	1.17
NRR (net reproduction rate)	1.13	1.07	0.99
Mean age of childbearing	26.9	26.9	26.8
Child-woman ratio	0.41	0.37	0.35
Fertility table: UN sub-Saharan Africa			
Mortality			
Male LE (life expectancy)	47.9	48.8	45.8
Female LE	52.8	52.0	43.6
Total LE	50.4	50.5	44.7
IMR (infant mortality rate)	81.9	86.3	85.5
U5MR (under 5 mortality rate)	125.7	121.7	120.1
Life table: UN East Asia			
Immigration (thousands)			
Male immigration	50	57	67
Female immigration	30	37	47
Total immigration	80	94	114
Vital rates			
CBR per 1,000 (crude birth rate)	24.3	23.8	21.2
CDR per 1,000 (crude death rate)	15.2	15.4	20.2
RNI percent (rate of natural increase)	0.92	0.84	0.10
GR percent	1.13	1.07	0.36
Doubling time	61.9	65.3	193.2
Annual births and deaths (thousands)			
Births	935.43	987.19	946.25
Deaths	582.69	638.7	900.06
Population (millions)			
Total population	38.44	41.49	44.56
Male population	18.51	20.17	22.18
Female population	19.92	21.31	22.38
Percent 0-4	11.16	10.59	9.72
Percent 5-14	22.09	20.06	19.02
Percent 15-49	53.75	56.19	57.13
Percent 15-64	62.09	65.36	67.21
Percent 65 and over	4.66	3.99	4.04
Percent females 15-49	52.86	54.98	55.24

Projecting the labour supply to 2024

	2007	2014	2024
Sex ratio	92.9	94.7	99.1
Dependency ratio	0.61	0.53	0.49
Median age	23	25	27
Africans (high immigration)			
Fertility			
Input TFR	2.70	2.56	2.36
Calculated TFR	2.70	2.56	2.36
GRR	1.34	1.27	1.17
NRR	1.13	1.07	0.99
Mean age of childbearing	26.9	26.9	26.8
Child-woman ratio	0.41	0.37	0.35
Fertility table: UN sub-Saharan Africa			
Mortality			
Male LE	47.9	48.8	45.8
Female LE	52.8	52.0	43.6
Total LE	50.4	50.5	44.7
IMR	81.9	86.3	85.5
U5MR	125.7	121.7	120.1
Life table: UN East Asia			
Immigration (thousands)			
Male immigration	100	114	134
Female immigration	60	74	94
Total immigration	160	188	228
Vital rates			
CBR per 1000	24.3	23.9	21.3
CDR per 1000	15.2	15.3	20.0
RNI percent	0.92	0.86	0.13
GR percent	1.33	1.31	0.62
o Doubling time	52.3	53.3	113.2
Annual births and deaths (thousands)			
Births	940	1010	990
Deaths	580	650	930
Population (millions)			
Total population	38.44	42.15	46.42
Male population	18.51	20.58	23.26
Female population	19.92	21.58	23.16
Percent 0-4	11.16	10.59	9.72
Percent 5-14	22.09	19.79	18.72
Percent 15-49	53.75	56.60	57.80
Percent 15-64	62.09	65.69	67.67
Percent 65 and over	4.66	3.93	3.90
Percent females 15-49	52.86	55.28	55.73

	2007	2014	2024
Sex ratio	92.9	95.4	100.5
Dependency ratio	0.61	0.52	0.48
Median age	23	25	27
Colours			
Fertility			
Input TFR	2.30	2.16	1.96
Calculated TFR	2.30	2.16	1.96
GRR	1.12	1.05	0.96
NRR	0.98	0.92	0.83
Mean age of childbearing	27.5	27.4	27.2
Child-woman ratio	0.33	0.31	0.29
Fertility table: average			
Mortality			
Male LE	53.7	54.0	51.8
Female LE	58.5	58.1	53.2
Total LE	56.2	56.1	52.5
IMR	66.1	66.5	66.7
USMR	93.5	90.8	91.2
Life table: UN East Asia			
Immigration			
Male immigration	0	0	0
Female immigration	0	0	0
Total immigration	0	0	0
Vital rates			
CBR per 1000	19.7	19.0	16.5
CDR per 1000	12.7	13.6	17.5
RNI percent	0.7	0.5	-0.1
GR percent	0.7	0.5	-0.1
Doubling time	99.0	130.3	0.0
Annual births and deaths (thousands)			
Births	86.60	87.10	77.28
Deaths	55.69	62.61	81.94
Population (millions)			
Total population	4.40	4.59	4.69
Male population	2.13	2.23	2.30
Female population	2.27	2.36	2.40
Percent 0-4	9.48	8.75	7.84
Percent 5-14	19.18	17.58	16.52
Percent 15-49	56.15	56.16	54.96
Percent 15-64	66.84	68.86	69.58
Percent 65 and over	4.51	4.82	6.06
Percent females 15-49	55.23	55.06	53.57

Projecting the labour supply to 2024

	2007	2014	2024
Sex ratio	93.85	94.39	95.82
Dependency ratio	0.50	0.45	0.44
Median age	26	28	30
Asians			
Fertility			
Input TFR	1.40	1.40	1.40
Calculated TFR	1.40	1.40	1.40
GRR	0.68	0.68	1.40
NRR	0.65	0.65	1.33
Mean age of childbearing	27.2	27.2	27.2
Child-woman ratio	0.22	0.21	0.19
Fertility table: average			
Mortality			
Male LE	63.9	64.1	65.1
Female LE	69.3	69.0	65.1
Total LE	66.6	66.6	65.1
IMR	32.9	33.2	32.1
U5MR	42.8	41.5	39.8
Life table: UN East Asia			
Immigration			
Male immigration	0	0	0
Female immigration	0	0	0
Total immigration	0	0	0
Vital rates			
CBR per 1000	12.4	12.0	10.3
CDR per 1000	8.5	10.3	14.5
RNI percent	0.39	0.17	-0.41
GR percent	0.39	0.17	-0.41
Doubling time	178.6	404.9	0
Annual births and deaths (thousands)			
Births	15.56	15.35	13.02
Deaths	10.69	13.17	18.23
Population (millions)			
Total population	1.25	1.28	1.26
Male population	0.62	0.63	0.55
Female population	0.63	0.65	0.71
Percent 0-4	6.37	5.88	5.17
Percent 5-14	15.46	12.98	11.49
Percent 15-49	58.30	57.31	54.30
Percent 15-64	72.44	73.77	72.97
Percent 65 and over	5.73	7.36	10.37
Percent females 15-49	57.64	55.67	47.26

	2007	2014	2024
Sex ratio	98.12	97.43	77.94
Dependency ratio	0.38	0.36	0.37
Median age	30	33	38
Whites			
Fertility			
Input TFR	1.40	1.40	1.40
Calculated TFR	1.40	1.40	1.40
GRR	0.68	0.68	0.68
NRR	0.66	0.66	0.66
Mean age of childbearing	27.2	27.2	27.2
Child-woman ratio	0.19	0.19	0.20
Fertility table: average			
Mortality			
Male LE	67.3	67.2	65.5
Female LE	72.6	72.3	69.2
Total LE	70.0	69.8	67.4
IMR	24.6	25.1	25.5
USMR	30.4	30.5	31.1
Life table: UN East Asia			
Immigration			
Male immigration	0	0	0
Female immigration	0	0	0
Total immigration	0	0	0
Vital rates			
CBR per 1000	9.7	9.9	8.8
CDR per 1000	13.0	14.3	17.6
RNI percent	-0.32	-0.45	-0.88
GR percent	-0.32	-0.45	-0.88
Doubling time	0	0	0
Annual births and deaths (thousands)			
Births	45.28	44.62	37.15
Deaths	60.33	64.86	74.60
Population (millions)			
Total population	4.65	4.52	4.23
Male population	2.27	2.20	2.05
Female population	2.38	2.32	2.19
Percent 0-4	4.97	4.82	4.49
Percent 5-14	11.73	10.06	10.07
Percent 15-49	51.70	50.32	46.34
Percent 15-64	70.81	70.96	68.59
Percent 65 and over	12.49	14.15	16.85

Projecting the labour supply to 2024

	2007	2014	2024
Percent females 15-49	50.89	49.07	44.30
Sex ratio	95.68	94.57	93.38
Dependency ratio	0.41	0.41	0.46
Median age	38	40	42
All (low immigration)			
Immigration			
Male immigration	50.00	57.00	67.00
Female immigration	30.00	37.00	47.00
Total immigration	80.00	94.00	114.00
Vital rates			
CBR per 1000	22.2	21.9	19.6
CDR per 1000	14.6	15.0	19.6
RNI percent	0.77	0.68	0.00
Annual births and deaths (thousands)			
Births	1082.87	1134.26	1073.70
Deaths	709.40	779.34	1074.83
Population (millions)			
Total population	48.74	51.88	54.74
Male population	23.53	25.23	27.08
Female population	25.20	26.64	27.68
Percent 0-4	10.29	9.81	9.05
Percent 5-14	20.67	18.79	17.94
Percent 15-49	53.89	55.70	56.05
Percent 15-64	63.62	66.37	67.65
Percent 65 and over	5.42	5.03	5.35
Sex ratio	93.4	94.7	97.8
Population growth rate		0.86%	0.18%
15-64 growth rate		1.46%	0.51%
All (high immigration)			
Immigration			
Male immigration	100.00	114.00	134.00
Female immigration	60.00	74.00	94.00
Total immigration	160.00	188.00	228.00
Vital rates			
CBR per 1000	3.0	2.8	2.3
CDR per 1000	2.6	2.7	3.1
RNI percent	0.04	0.01	-0.08
Annual births and deaths (thousands)			
Births	148.38	148.08	128.44
Deaths	127.29	141.29	175.70
Population (millions)			
Total population	48.74	52.54	56.60
Male population	23.53	25.64	28.16

	2007	2014	2024
Female population	25.20	26.91	28.46
Percent 0-4	10.29	9.82	9.07
Percent 5-14	20.67	18.59	17.73
Percent 15-49	53.89	56.04	56.63
Percent 15-64	63.62	66.62	68.02
Percent 65 and over	5.42	4.97	5.19
Sex ratio	93.4	95.3	98.9
Population growth rate		1.04%	0.39%
15-64 growth rate		1.57%	0.47%

3. An analysis of labour force participation rates

Labour force participation rates are defined in South African official statistics as the employed plus the unemployed on the official measure, expressed as a percentage of the population between the ages of 15 and 64. LFPRs can be found for subgroups, with subgroups defined by population group, gender and age group often considered. Those people who are unemployed according to the expanded definition of unemployed but not on the official definition are regarded as discouraged workers. Discouraged workers are not economically active on the official definition, but they are on the expanded definition. Both definitions are used in this study.

It should be noted at the outset that there will be a change in the definition of employed persons in the new Quarterly Labour Force Survey, due to report for the first time on 28 August 2008. The main difference in the new definition is that a person must have worked at least an hour in market activities (done work for pay, helped unpaid in a household business or run his/her own business), whereas in the old definition a range of non-market activities, where the product was entirely consumed within the household, counted as employment as well. Additionally, there is a change in one of the criteria for unemployment. In the old definition, an unemployed person had to be available for and start work within two weeks of the interview. In the new definition, an unemployed person must have been available for work in the week before the interview. These changes should have a downward impact on the estimate of employment, but the impact on unemployment is not known. They will therefore have an unknown (but probably downward) impact on LFPRs. All analysis at this stage has to be based on the old Labour Force Survey and its definitions, but it must be appreciated that projections based on the old definitions may soon be regarded as obsolete.

LFPRs by population, age group and gender, based on the September 2005 Labour Force Survey, are presented in table 2. 63.9% of all men between 15 and 64 are

economically active on the official definition, compared to 50.3% of all women. On the expanded definition, the male rate rises to 72.2% and the female rate to 64.4%. The differences reflect lower LFPRs for women in all age groups.

Table 2 – Labour force participation rates by population group, gender and age group 15-64, September 2005

Official definition					
Male					
	African	Coloured	Asian	White	All
15-19	10.6	30.0	22.8	12.4	12.5
20-24	52.8	75.4	67.5	73.1	56.1
25-29	77.9	87.0	88.6	93.2	80.0
30-34	85.1	90.2	96.3	91.5	86.6
35-39	86.2	87.8	93.3	94.3	87.7
40-44	81.9	89.0	89.9	91.3	84.2
45-49	78.7	84.5	87.5	94.4	82.2
50-54	71.8	79.3	78.1	86.1	75.4
55-59	64.9	63.2	74.5	76.9	67.2
60-64	44.6	22.3	74.9	43.5	43.6
<i>All ages</i>	60.6	72.8	77.1	77.9	63.9
Female					
	African	Coloured	Asian	White	All
15-19	8.2	24.3	20.3	8.9	9.7
20-24	44.3	68.4	57.0	52.3	47.1
25-29	61.8	70.6	65.5	78.9	63.9
30-34	67.7	75.3	73.2	79.5	69.9
35-39	65.9	69.5	59.8	72.8	66.8
40-44	63.5	61.5	59.2	80.5	65.2
45-49	65.4	64.8	39.4	74.2	65.8
50-54	53.6	42.2	35.3	67.1	53.6
55-59	44.0	30.1	16.3	45.4	42.2
60-64	18.9	4.0	10.4	26.0	18.9
<i>All ages</i>	48.3	56.0	49.0	60.3	50.3
Expanded definition					
Male					
	African	Coloured	Asian	White	All
15-19	15.8	35.5	27.4	13.2	17.4
20-24	69.4	84.1	72.5	77.4	71.1
25-29	91.7	96.7	91.0	93.6	92.2
30-34	95.3	95.0	96.3	93.9	95.1
35-39	94.1	90.7	64.5	87.2	94.2
40-44	90.0	90.8	91.6	91.6	90.3
45-49	85.7	87.6	89.8	96.1	87.7
50-54	79.5	82.4	80.8	86.8	81.2

55-59	70.4	67.1	74.5	78.8	71.7
60-64	48.9	25.3	74.9	43.5	46.7
<i>All ages</i>	70.3	78.0	79.4	79.5	72.2

Expanded definition

Female					
	African	Coloured	Asian	White	All
15-19	14.8	37.1	25.9	9.6	16.5
20-24	69.0	83.7	67.5	59.3	69.5
25-29	56.0	85.7	77.4	83.7	85.6
30-34	88.6	86.7	78.0	81.7	87.3
35-39	86.3	80.9	67.8	77.6	84.3
40-44	78.6	70.9	65.3	81.7	77.7
45-49	77.7	71.3	47.5	76.3	76.0
50-54	62.4	47.1	38.7	69.3	61.0
55-59	49.7	36.8	16.3	45.6	46.8
60-64	19.7	4.2	10.4	26.0	19.5
<i>All ages</i>	64.6	66.8	55.5	62.9	64.4

Table 2 should be interpreted in the light of table 3, which sets out labour market statistics for every September Labour Force Survey since 2001.

Table 3 – Labour market statistics, 2001 to 2007

September						
Thousands	2001	2002	2003	2004	2005	2006
Population 15-65	28,117	28,527	28,938	29,305	29,697	30,006
Employment 15-65	11,181	11,296	11,424	11,643	12,301	12,800
Unemployed 15-65	4,655	4,936	4,434	4,135	4,487	4,391
Labour force (narrow)	15,836	16,232	15,858	15,778	16,788	17,191
Unemployment rate (%) (narrow)	29.4	30.4	28.0	26.2	26.7	25.5
Participation rate (%) (narrow)	56.3	56.9	54.8	53.8	56.5	57.3
Labour absorption rate (%)	43.7	41.0	39.3	39.1	40.3	41.7
Discouraged workseekers	2,994	3,194	3,773	3,948	3,312	3,217
Labour force (expanded)	18,830	19,426	19,631	19,726	20,100	20,408
Unemployment rate (%) (expanded)	40.6	41.9	41.8	41.0	38.8	37.3
Participation rate (%) (expanded)	67.0	68.1	67.8	67.3	67.7	68.0

Tables 2 and 3 together show that:

1. The narrowly defined labour force grew from 15.8-million in 2001 to 17.2-million in 2006 and the expanded labour force grew from 18,8-million to 20,4-million, reflecting average annual growth rates of 1.7% and 1.6% respectively.
2. There is no clear trend in either the narrow or the expanded LFPR.
3. The narrow male LFPR for African men is considerably lower than for the three other population groups. Coloured male participation is intermediate, with Asian and White male rates similar. The gap narrows between African men and other men when expanded LFPRs are considered. There is little difference between narrow and expanded LFPRs for Asian and White men.
4. The pattern for women is different. The gap between the narrow and the expanded rate for Africans and Coloureds is smaller than for men. The Asian narrow and expanded participation rates are below the Coloured rates, reflecting a lower propensity to participate in the labour market after marriage. White narrow participation is slightly higher than Coloured participation, but the reverse is true for broad participation.

4. Labour supply projections

These features suggest the following initial approach to labour supply projection:

1. A projection based on constant 2005 narrow and expanded participation rates by population group, gender and age group.
2. A projection based on some closing of the gap (say, by a third) between White and other narrow and expanded participation rates by gender and age by 2024 and linear interpolation for the years in between.

Table 4 sets out the results of the projections under different assumptions. From 2007 to 2024, the narrowly defined labour force is projected to grow at an average annual rate of between 1.29% (on the no-convergence, low immigration assumptions) and 1.86% (on the one-third convergence, high immigration assumptions). The absolute increase in the labour force varies from 4.40-million to 6.53-million. The expanded labour force is projected to grow at an average annual rate of between 1.27% (from a higher base) and 1.66%. In this case, the absolute increase in the labour force varies from 5.03-million to 6.79-million.

The Microsoft Excel file **proj13.xls** sets out the population group and gender composition of the projected labour force under the various assumptions. The percentage Africans rises from 72.3% in 2007 to between 78.0% and 79.1% on the narrow definition of labour force participation, and from 74.6% in 2007 to between 79.5% and 80.4% on the expanded definition. The percentage males rises from 55.7% to between 57.7% and 58.4% on the narrow definition and from 53.6% to between 55.6% and 56.3% on the expanded definition. The reason the proportion of men rises is because the proportion of men in the population is projected to rise, partly as a result of international migration.

Table 4 – Aggregate labour supply, 2007-2024

Millions				
Low immigration				
Year	Narrow		Expanded	
	Constant	Convergence	Constant	Convergence
2007	18.13	18.13	21.05	21.05
2008	18.47	18.53	21.45	21.48
2009	18.84	18.96	21.87	21.93
2010	19.20	19.39	22.27	22.37
2011	19.55	19.81	22.67	22.80
2012	19.89	20.22	23.05	23.22
2013	20.21	20.62	23.42	23.63
2014	20.52	21.00	23.78	24.02
2015	20.82	21.37	24.12	24.40
2016	21.10	21.73	24.44	24.76
2017	21.36	22.07	24.75	25.10
2018	21.60	22.39	25.03	25.42
2019	21.82	22.69	25.28	25.72
2020	22.01	22.97	25.51	25.99
2021	22.18	23.22	25.70	26.22
2022	22.32	23.45	25.87	26.42
2023	22.44	23.65	25.99	26.59
2024	22.53	23.82	26.08	26.73
Growth % p.a.				
2007-2014	1.78	2.12	1.76	1.90
2014-2024	0.94	1.27	0.93	1.07
2007-2024	1.29	1.62	1.27	1.42
High immigration				
Year	Narrow		Expanded	
	Constant	Convergence	Constant	Convergence
2007	18.13	18.13	21.05	21.05
2008	18.52	18.58	21.50	21.53
2009	18.93	19.05	21.97	22.04
2010	19.34	19.53	22.44	22.54
2011	19.74	20.00	22.90	23.03
2012	20.14	20.47	23.35	23.52
2013	20.52	20.93	23.79	23.99
2014	20.88	21.37	24.20	24.45
2015	21.24	21.80	24.62	24.90
2016	21.58	22.22	25.01	25.33
2017	21.90	22.63	25.39	25.75
2018	22.21	23.02	25.75	26.15
2019	22.49	23.39	26.08	26.52
2020	22.75	23.73	26.38	26.86
2021	22.98	24.06	26.64	27.17
2022	23.19	24.35	26.88	27.45
2023	23.37	24.62	27.07	27.69
2024	23.52	24.86	27.23	27.90

Projecting the labour supply to 2024

Growth % p.a.				
2007-2014	2.04%	2.38%	2.01%	2.16%
2014-2024	1.20%	1.52%	1.19%	1.33%
2007-2024	1.54%	1.87%	1.53%	1.67%