

ASSESSING THE ECONOMIC CONTRIBUTION OF LABOUR MIGRATION IN SOUTH AFRICA BY A DYNAMIC MULTISECTORAL MACROECONOMIC MODEL

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Economic Contribution of Labour Migration in South Africa- A Dynamic Multisectoral Macroeconomic Model

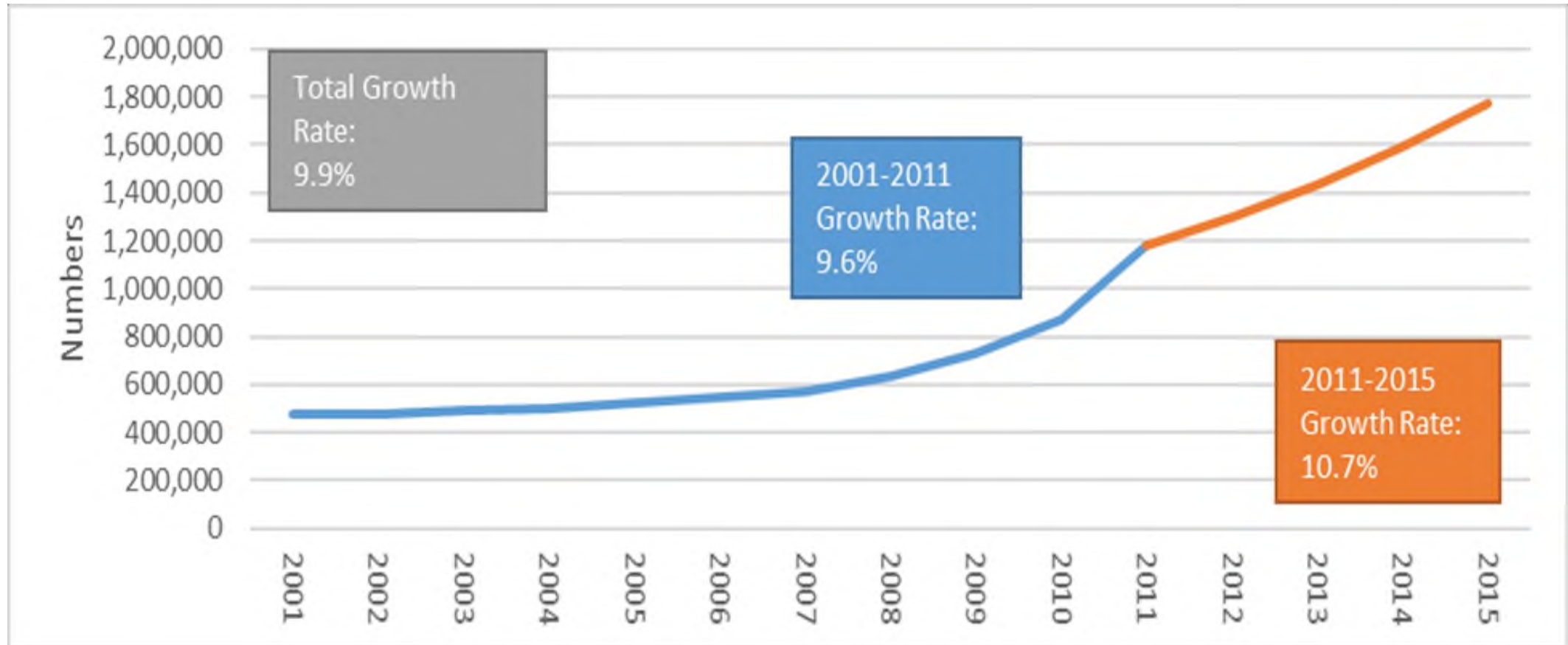
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- Migrant Data
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- Production Function Approach
- Growth Accounting
- Comparison of Approaches

Background & Objective To The Study

- Client : ILO & OECD
- Pilot Study Involving 10 Countries
- RSA selected as One of The Case Studies
- INFORUM / SAFRIM
- Economic Impact of Migrant Workers on RSA Economy

Migrant Data - Migration Over Time (2001-2015)



Migrant Data - Migrant Workers per Skill Level (numbers), 2001-2015

Sectors	Skill Level	2001	2003	...	2011	...	2015
Agriculture; hunting; forestry and fishing	Skilled	2,817	3,905	...	6,286	...	8,766
	Semi-Skilled	18,604	17,988	...	27,391	...	38,857
	Unskilled	34,999	22,244	...	39,729	...	41,795
	Total	56,420	44,137	...	73,406	...	89,419
Mining and quarrying	Skilled	6,701	7,552	...	4,475	...	4,066
	Semi-Skilled	64,530	64,327	...	33,659	...	28,580
	Unskilled	11,271	10,399	...	4,333	...	2,956
	Total	82,502	82,278	...	42,467	...	35,602
.....							
.....							
Total	Skilled	149,321	165,339	...	285,399	...	385,591
	Semi-Skilled	226,961	234,449	...	580,086	...	966,422
	Unskilled	96,520	89,245	...	315,324	...	423,346
	Total	472,802	489,033	...	1,180,809	...	1,775,359

Migrant Data - Average earnings of migrant workers per Sector & Skill Level, 2011, Rand per worker, 2010

Sector	Skilled	Semi-Skilled	Unskilled
Agriculture; hunting; forestry and fishing	123,796	45,611	28,612
Mining and quarrying	289,059	79,791	69,712
Manufacturing	223,496	90,669	59,267
Electricity; gas and water supply	278,393	123,873	N/A
Construction	217,335	51,731	52,665
Wholesale and retail trade	220,530	91,877	62,643
Transport; storage and communication	126,349	69,460	51,579
Financial and business services	286,982	113,003	54,678
Community; social and personal services	190,173	100,287	48,034
Average	217,346	85,145	47,466

Migrant Data - Average earnings of migrant workers per Sector & Skill Level, 2011, Rand per worker, 2010

Sector	Skilled	Semi-Skilled	Unskilled
Agriculture; hunting; forestry and fishing	-2,991	-18,292	-12,465
Mining and quarrying	68,307	-40,501	9,092
Manufacturing	62,866	13,558	-1,955
Electricity; gas and water supply	61,389	9,266	N/A
Construction	45,700	-9,625	-1,210
Wholesale and retail trade	37,451	6,503	-2,921
Transport; storage and communication	767	-2,381	-2,772
Financial and business services	64,737	8,459	1,208
Community; social and personal services	43,743	-124	26,839
Average	42,441	-3,682	-8,293

Direct Impact – Production Function Approach : Gross

Primary Sector – Production Function Equation

Summary Output				
<i>Regression Statistics</i>				
Multiple R		1.000		
R Square		1.000		
Adjusted R Square		0.917		
Standard Error		0.053		
Observations		15.000		
ANOVA				
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	3.000	2 611.973	870.658	309 182.862
Residual	12.000	0.034	0.003	
Total	15.000	2 612.006		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-	#N/A	#N/A	#N/A
Capital Rm, 2010 Constant Prices	0.773	0.073	10.666	0.000
Skilled Numbers	0.023	0.082	0.283	0.782
Semi- and Unskilled workers (SU)	0.176	0.044	3.996	0.002

Direct Impact of Skilled Migrant Workers on Production – Labour and Capital Combined (R Million, Constant 2010 Prices)

Sectors	2 001	2 002	2 003	2 004	...	2009	2010	2011
Agriculture; hunting; forestry and fishing	10 554	8 026	8 429	10 061	...	25 232	16 762	14 802
Mining and quarrying	25 105	17 069	16 302	18 021	...	26 573	14 469	10 537
Manufacturing	22 521	21 611	23 038	23 628	...	20 017	17 041	17 551
Electricity; gas and water supply	1 201	1 122	1 167	1 169	...	1 255	1 284	1 630
Construction	5 847	5 826	6 456	6 890	...	9 202	9 261	11 297
Wholesale and retail trade	5 098	5 283	5 368	5 543	...	8 409	10 530	11 551
Transport; storage and communication	1 548	1 606	1 638	1 700	...	2 363	2 777	2 852
Financial and business services	6 388	6 687	6 869	7 179	...	10 089	11 835	12 124
Community; social and personal services	7 788	8 096	8 283	8 642	...	12 963	16 015	17 599
Total Sectors	86 051	75 328	77 551	82 833	...	116 103	99 974	99 943

Direct Impact of Semi- and Unskilled Migrant Workers on Production – Only Labour Component (R Million, Constant 2010 Prices)

Sectors	2 001	2 002	2 003	2 004	...	2009	2 010	2 011
Agriculture; hunting; forestry and fishing	2 852	2 460	2 360	1 984	...	3 821	5 213	7 249
Mining and quarrying	4 033	3 997	4 383	4 192	...	5 223	4 617	4 103
Manufacturing	15 596	16 897	18 079	19 526	...	29 999	35 265	39 539
Electricity; gas and water supply	574	619	667	732	...	1 507	2 005	2 623
Construction	13 770	14 800	15 697	16 791	...	31 975	42 497	53 882
Wholesale and retail trade	23 200	23 375	23 593	23 967	...	44 409	58 834	79 747
Transport; storage and communication	3 612	3 665	3 729	3 822	...	8 926	13 063	19 540
Financial and business services	8 786	8 971	9 219	9 582	...	23 297	33 452	48 955
Community; social and personal services	17 898	18 829	19 902	21 248	...	36 454	43 561	104 593
Total Sectors	90 323	93 614	97 630	101 845	...	185 611	238 508	360 232

Shocking the Model

The INFORUM Model was shocked with the production Function Method , using the following Function :

$$\text{outc} = (!(\text{I-AMC}) * (\text{fdc} - \text{migrant_lab}))$$

where $!(\text{I-AMC})$ = the Leontief Inverse

fdc = final demand, and

migrant lab = impact of migrant workers on production

It is important to note that it was necessary to convert the impact of the Growth Accounting Approach - which is in GVA units - to production units by making use of Output/GVA ratios for each sector.

Total Macroeconomic Impact of Skilled Migrant Workers on the South African Economy - Production Function Approach – Including Capital ,(R Million, Constant 2010 Prices)

Time	2 001	2 007	2011	Average Impact for the Data Points 2001, 2007, 2011
GDP				
Actual situation - incl. skilled migrant workers	2 008 181	2 624 840	2 838 258	2 490 426
Actual situation - excl. skilled migrant workers	1 954 128	2 536 508	2 775 034	2 421 890
<i>Impact of skilled migrant workers</i>				
- Value impact	54 053	88 332	63 224	68 536
- Percentage impact	2.77%	3.48%	2.28%	2.84%
Total Population including and excluding skilled migrant workers and their family members				
Actual situation - incl. skilled migrant workers and family	45 602 570	49 342 461	52 071 672	49 005 568
Actual situation - excl. skilled migrant workers and family	45 372 846	49 016 630	51 632 596	48 674 024
Number of skilled migrant workers and family	229 725	325 831	439 075	331 544

Total Macroeconomic Impact of Skilled Migrant Workers on the South African Economy - Production Function Approach, (R Million, Constant 2010 Prices)

Time	2 001	2 007	2011	Average Impact for the Data Points 2001, 2007, 2011
Per Capita GDP Income				
Actual situation - incl. skilled migrant workers	44 037	53 196	54 507	50 580
Actual situation - excl. skilled migrant workers	43 068	51 748	53 746	49 521
Value impact of skilled migrant workers on the income of South Africans	968	1 448	761	1 059
Percentage impact	2.25%	2.80%	1.42%	2.15%
Employment numbers				
Actual situation - incl. skilled migrant workers	11 526 276	12 579 577	12 728 743	12 278 199
Actual situation - excl. skilled migrant workers	10 815 845	11 764 047	12 221 535	11 600 476
Impact - Number	710 430	815 530	507 208	677 723
Percentage impact	6.16%	6.48%	3.98%	5.54%

Total Macroeconomic Impact of Skilled Migrant Workers on the South African Economy - Production Function Approach , (R Million, Constant 2010 Prices)

Time	2 001	2 007	2011	Average Impact for the Data Points 2001, 2007, 2011
Government income				
Actual - incl. skilled migrant workers	271 949	604 769	810 339	562 352
Excl. skilled migrant workers	269 846	591 380	795 022	552 083
Value impact	2 103	13 389	15 317	10 270
Percentage impact	0.77%	2.21%	1.89%	1.63%
Net impact of skilled migrant workers on the Fiscal Balance				
Number of skilled migrant workers	149 321	211 790	285 399	215 503
Government income accrued from skilled migrant workers (Rand value per worker)	14 084	63 219	53 669	43 657
Government expenditure on skilled migrant workers, including their family members (Rand value per worker)	870	1 567	2 530	1 656
Net government income accrued from skilled migrant workers (Rand value per worker)	13 214	61 652	51 139	42 001

Macroeconomic Impact of Semi and Unskilled Migrant Workers on the South African Economy - Production Function Approach , (R Million, Constant 2010 Prices)

Time	2 001	2 007	2011	Average impact for the data points 2001, 2007, 2011
GDP				
Actual situation - incl. semi- and unskilled migrant workers	2 008 181	2 624 840	2 838 258	2 490 426
Actual situation - excl. semi- and unskilled migrant workers	1 953 848	2 571 200	2 551 125	2 358 724
<i>Impact of semi- and unskilled migrant workers</i>				
- Value impact	54 333	53 640	287 133	131 702
- Percentage impact	2.71%	2.04%	10.12%	5.29%
Total Population including and excluding semi- and unskilled migrant workers and their family members				
Actual situation - incl. semi- and unskilled migrant workers and family	45 602 570	49 342 461	52 071 672	49 005 568
Actual situation - excl. semi- and unskilled migrant workers and family	44 836 935	48 491 552	49 952 358	47 760 282
Number of semi- and unskilled migrant workers and family	765 636	850 909	2 119 314	1 245 286

Macroeconomic Impact of Semi and Unskilled Migrant Workers on the South African Economy - Production Function Approach , (R Million, Constant 2010 Prices)

Time	2 001	2 007	2011	Average impact for the data points 2001, 2007, 2011
Per Capita GDP Income				
Actual situation - incl. semi- and unskilled migrant workers	44 037	53 196	54 507	50 819
Actual situation - excl. semi- and unskilled migrant workers	43 577	53 024	51 071	49 387
Value impact of semi- and unskilled migrant workers on the income of South Africans	460	173	3 436	1 433
Percentage impact	1.04%	0.32%	6.30%	2.82%
Employment numbers				
Actual situation - incl. semi- and unskilled migrant workers	11 526 276	12 579 577	12 728 743	12 278 199
Actual situation - excl. semi- and unskilled migrant workers	10 883 204	12 116 506	10 820 426	11 273 379
Impact - Number	643 071	463 071	1 908 317	1 004 820
Percentage impact	5.58%	3.68%	14.99%	8.18%

Macroeconomic Impact of Semi and Unskilled Migrant Workers on the South African Economy - Production Function Approach , (R Million, Constant 2010 Prices)

Time	2 001	2 007	2011	Average impact for the data points 2001, 2007, 2011
Government income				
Actual - incl. semi- and unskilled migrant workers	271 949	604 769	810 339	562 352
Excl. semi- and unskilled migrant workers	268 768	591 994	758 698	539 820
Value impact	3 181	12 775	51 641	22 533
Percentage impact	1.17%	2.11%	6.37%	4.01%
Net impact of semi- and unskilled migrant workers on the Fiscal Balance				
Number of semi- and unskilled migrant workers	497 663	553 091	1 377 554	809 436
Government income accrued from semi- and unskilled migrant workers (Rand value per worker)	6 393	23 097	37 488	27 837
Government expenditure on semi- and unskilled migrant workers, including their family members (Rand value per worker)	2 645	3 374	3 956	3 325
Net government income accrued from semi- and unskilled migrant workers (Rand value per worker)	3 748	19 723	33 532	24 512

Regression Underpinning Nett Economic Impact – Production Function

Primary Sector

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.94							
R Square	0.89							
Adjusted R Square	0.82							
Standard Error	11 935							
Observations	15.00							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	5.00	9 988 327 629	1 997 665 526	14.03	0.00			
Residual	9.00	1 281 895 157	142 432 795					
Total	14.00	11 270 222 786						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	184 407	83 682	2	0	-4 896	373 710	-4 896	373 710
Capital Rm, 2010 Constant Prices	0.281	0.068	4.133	0.003	0.127	0.435	0.127	0.435
Skilled Numbers - Locals	0.464	0.298	1.556	0.154	-0.211	1.139	-0.211	1.139
Skilled Numbers - Migrants	6.372	1.709	3.728	0.005	2.506	10.239	2.506	10.239
Semi- and Unskilled workers (SU) Numbers - Locals	0.003	0.025	0.107	0.917	-0.054	0.059	-0.054	0.059
Semi- and Unskilled workers (SU) Numbers - Migrants	0.232	0.681	0.341	0.741	-1.309	1.773	-1.309	1.773

Nett Macroeconomic Impact of Semi and Unskilled Migrant Workers on the South African Economy - Production Function Approach , (R Million, Constant 2010 Prices)

Date	2 001	2 007	2 011	Average impact for the data points 2001, 2007, 2011
GDP				
Actual situation - incl. semi- and unskilled migrant workers	2 008 181	2 624 840	2 838 258	2 490 426
Actual situation - excl. semi- and unskilled migrant workers	1 962 096	2 545 681	2 524 335	2 344 038
<i>Impact of semi- and unskilled migrant workers</i>				
- Value impact	-46 085	-79 159	-313 923	-146 389
- Percentage impact	-2.29%	-3.02%	-11.06%	-5.88%
Total Population including and excluding semi- and unskilled migrant workers and their family members				
Actual situation - incl. semi- and unskilled migrant workers and family	45 602 570	49 342 461	52 071 672	49 005 568
Actual situation - excl. semi- and unskilled migrant workers and family	44 836 935	48 491 552	49 952 358	47 760 282
Number of semi- and unskilled migrant workers and family	-765 636	-850 909	-2 119 314	-1 245 286

Nett Macroeconomic Impact of Semi and Unskilled Migrant Workers on the South African Economy - Production Function Approach , (R Million, Constant 2010 Prices)

Date	2 001	2 007	2 011	Average impact for the data points 2001, 2007, 2011
Per capita GDP income				
Actual situation - incl. semi- and unskilled migrant workers	44 037	53 196	54 507	50 819
Actual situation - excl. semi- and unskilled migrant workers	43 761	52 497	50 535	49 079
Value impact of semi- and unskilled migrant workers on the income of South Africans	-276	-699	-3 972	-1 740
Percentage impact	-0.63%	-1.31%	-7.29%	-3.42%
Employment (numbers)				
Actual situation - incl. semi- and unskilled migrant workers	11 526 276	12 579 577	12 728 743	12 278 199
Actual situation - excl. semi- and unskilled migrant workers	11 494 123	12 092 453	10 941 408	11 509 328
Impact - Number	-32 153	-487 124	-1 787 335	-768 870
Percentage impact	-0.28%	-3.87%	-14.04%	-6.26%

Macroeconomic Impact of Semi and Unskilled Migrant Workers on the South African Economy - Production Function Approach , (R Million, Constant 2010 Prices)

Date	2 001	2 007	2 011	Average impact for the data points 2001, 2007, 2011
Government income (current prices)				
Actual - incl. semi- and unskilled migrant workers	271 949	604 769	810 339	562 352
Excl. semi- and unskilled migrant workers	270 672	591 477	748 447	536 866
Value impact	-1 277	-13 292	-61 892	-25 487
Percentage impact	-0.47%	-2.20%	-7.64%	-4.53%
Net impact of semi- and unskilled migrant workers on the Fiscal Balance				
Number of semi- and unskilled migrant workers	497 663	553 091	1 377 554	809 436
Government income accrued from semi- and unskilled migrant workers (Rand value per worker)	-2 565	-24 031	-44 929	-31 487
Government expenditure on semi- and unskilled migrant workers, including their family members (Rand value per worker)	2 645	3 374	3 956	3 325
Net government income accrued from semi- and unskilled migrant workers (Rand value per worker)	-5 210	-27 406	-48 884	-34 812

Growth Accounting Approach

Growth Accounting Equation is as follows:

$$gY = \alpha_K g_k + (1 - \alpha_K) g_L + SR$$

where gY = growth of output

g_L = growth of labour

g_k = growth of capital

α_K = capital share of total income

$(1 - \alpha_K) = \alpha_L$ = labour share total of income

SR = Solow residual

Output growth is thus equal to a weighted sum of input factor (capital and labour) growth, with the weights given by their respective factor shares, plus the Solow residual

Accounting for Migrant Workers' Contributions to Main–Sector Growth in South Africa according to their skills: 2001 – 2011

Direct migrant labour contribution to the main sectors of the economy with the Growth Accounting method.

		Primary	Secondary	Tertiary	Total
Gross Value Added growth rates		0.47%	3.09%	4.20%	3.47%
Capital Contribution to Growth		1.28%	1.26%	1.19%	1.22%
Total labour		-1.84%	1.33%	2.03%	1.21%
Labour Contribution to Growth - Local workers	Total	-1.80%	0.99%	1.52%	0.85%
	Skilled	-0.06%	-0.06%	0.21%	0.11%
	Semi and unskilled	-1.74%	1.06%	1.31%	0.75%
Labour contribution to growth - migrant workers	Total	-0.04%	0.34%	0.50%	0.36%
	Skilled	-0.04%	0.10%	0.28%	0.18%
	Semi and unskilled	0.0011%	0.24%	0.22%	0.18%
Total Factor Productivity (TFP) contribution to growth		1.04%	0.49%	0.99%	1.04%

Comparison of two approaches regarding Gross Macroeconomic Impact of Semi-Skilled and Unskilled Migrant Workers on the South African Economy

Indicators	Growth Accounting Approach			Production Function Method		
	2001	2011	Average impact for the data points 2001, 2007, 2011	2001	2011	Average impact for the data points 2001, 2007, 2011
GDP						
Actual - incl. semi and unskilled migrants	2 008 181	2 838 258	2 490 426	2 008 181	2 838 258	2 490 426
Excl. semi and unskilled migrants	1 930 550	2 736 990	2 398 016	1 953 848	2 551 125	2 358 724
Impact of semi and unskilled migrants				-	-	-
- Value impact	77 631	101 268	92 410	54 333	287 133	131 702
- Percentage impact	3.87%	3.57%	3.71%	2.71%	10.12%	5.29%
TOTAL POPULATION						
Actual - incl. semi and unskilled migrants	45 602 570	52 071 672	49 005 568	45 602 570	52 071 672	49 005 568
Excl. unskilled migrants	44 836 935	49 952 358	47 760 282	44 836 935	49 952 358	47 760 282
Number of semi and unskilled migrants	765 636	2 119 314	1 245 286	765 636	2 119 314	1 245 286

Comparison of two approaches regarding Gross Macroeconomic Impact of Semi-Skilled and Unskilled Migrant Workers on the South African Economy

Indicators	Growth Accounting Approach			Production Function Method		
	2001	2011	Average impact for the data points 2001, 2007, 2011	2001	2011	Average impact for the data points 2001, 2007, 2011
PER CAPITA GDP INCOME (RAND, 2010 PRICES)						
Actual - incl. semi and unskilled migrants	44 037	54 507	50 580	44 037	54 507	50 819
Excl. semi and unskilled migrants	43 057	54 792	49 984	43 577	51 071	49 387
Value impact of semi and unskilled migrants	979	-285	596	460	3 436	1 433
Percentage impact of semi and unskilled migrants	2.22%	-0.52%	1.18%	1.04%	6.30%	2.82%
EMPLOYMENT (NUMBERS)						
Actual - incl. semi and unskilled migrants	12 072 796	14 065 297	13 313 832	11 526 276	12 728 743	12 278 199
Excl. semi and unskilled migrants	11 526 276	12 728 743	12 278 199	10 883 204	10 820 426	11 273 379
Impact - Number	546 520	1 336 553	1 035 634	643 071	1 908 317	1 004 820
Percentage impact	4.53%	9.50%	7.78%	5.58%	14.99%	8.18%

Comparison of two approaches regarding Macroeconomic Impact of Semi-Skilled and Unskilled Migrant Workers on the South African Economy

Indicators	Growth Accounting Approach			Production Function Method		
	2001	2011	Average impact for the data points 2001, 2007, 2011	2001	2011	Average impact for the data points 2001, 2007, 2011
GOVERNMENT INCOME (CURRENT PRICES)						
Actual - incl. semi and unskilled migrants	271 949	810 339	462 692	271 949	810 339	562 352
Excl. semi and unskilled migrants						
Value impact	236 842	782 535	439 276	268 768	758 698	539 820
Difference	35 107	27 804	23 416	3 181	51 641	22 533
Net impact of semi and unskilled migrant workers on the fiscus						
Number of semi and unskilled migrant workers	497 663	1 377 554	809 436	497 663	1 377 554	809 436
Government income accrued from semi and unskilled migrant workers (Rand value per worker)	70 543	20 184	34 663	6 393	37 488	27 837
Government expenditure on semi and unskilled migrant workers, including their family members (Rand value per worker)	2 645	3 956	3 325	2 645	3 956	3 325
Net government income accrued from semi and unskilled migrant workers (Rand value per worker)	67 899	16 228	31 339	3 748	33 532	24 512

Concluding Remarks

- Skilled Migrant Workers Make a Significant Contribution To RSA Economy
- For Semi – and Unskilled Migrant Workers , the Results of The Analysis are not clear .
 - This is supported by the results of the Gross Impact Analysis of Semi- and Unskilled Migrant Workers
- If semi and unskilled migrant workers have low skills and only replace local workers, they have a negative impact on RSA economy.
 - This is supported by the Net Impact Analysis of Semi- and Unskilled Migrant Workers.

THANK YOU