

INTERRELATIONSHIPS BETWEEN MACRO-ECONOMIC CHANGES AND CHANGES IN HOUSEHOLD BALANCE SHEETS: A CGE AND MICRO-ECONOMIC MODELLING APPROACH

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Abstract

An important question in economics is the nature of macro-micro linkages in the economy, ie to what extent do GDP growth, job creation, changes in repo rates, changes in exchange rates, international trade, changes in prices, etc, at a macro-level give rise to micro-level changes (ie at a household and firm level). It is also important to determine to what extent household and firm dynamics impact on the macro-economy. This is especially important in the light of the New Growth Framework and the Dti Industrial policy action plan (IPAP), which propose that investments be made in specific key industries with the view that such investments will have both macro-effects (ie higher levels of economic growth and job creation) as well as micro-effects (ie higher levels of income equality and asset accumulation by households, and lower levels of poverty and unemployment at a household level).

In this paper such interactions are investigated by means of a national Social Accounting Matrix (SAM) as well as a micro-economic model focusing on the linkages between household incomes on the one hand and household saving, asset accumulation, and liabilities on the other hand. The aim is to arrive at an in-depth understanding of the interrelationship between national and household accounts. Such an understanding will be of great value in informing economic policy formulation in South Africa.

Introduction

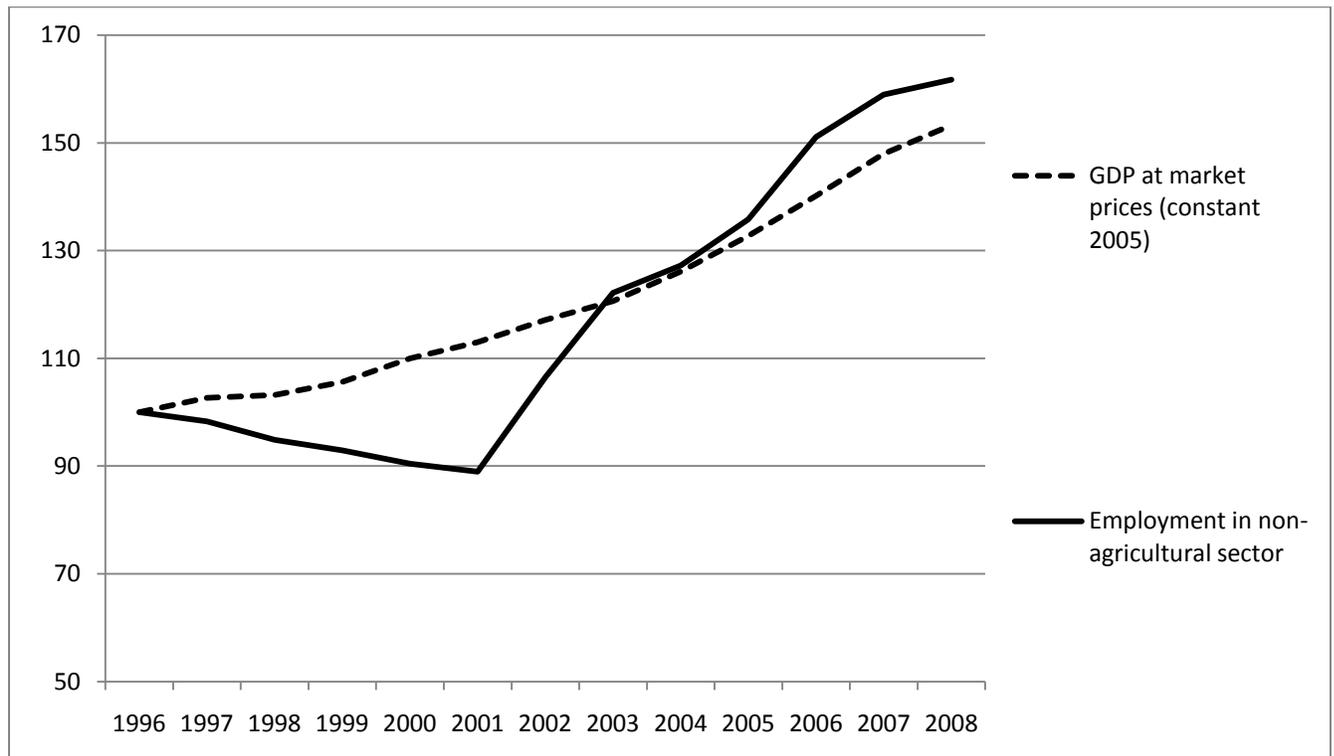
South Africa experienced interesting economic dynamics over the past few years. These include, inter alia, that while the South African economy has been doing very well in macro-economic terms, this is not true with respect to reducing unemployment, poverty, income inequalities and inequalities with respect to living standards. Although the Reconstruction and Development Programme (RDP), Gear and AsgiSA were formulated and implemented (to a greater or larger extent) to ensure higher levels of economic growth and to ensure that such growth translates into jobs and poverty reduction, this only occurred to a limited extent.

In figure 1 the relationship between economic growth and employment growth is shown. For comparison purposes both GDP growth and employment figures were transformed to indices where the 1996 GDP and employment figures were both set at '100'. It appears from this figure that GDP growth did not give rise to a consistent level of employment growth during

the period 1996 to 2008. While there were positive GDP-employment elasticity rates between 2002 and 2008, such rates were negative between 1996 and 2001.

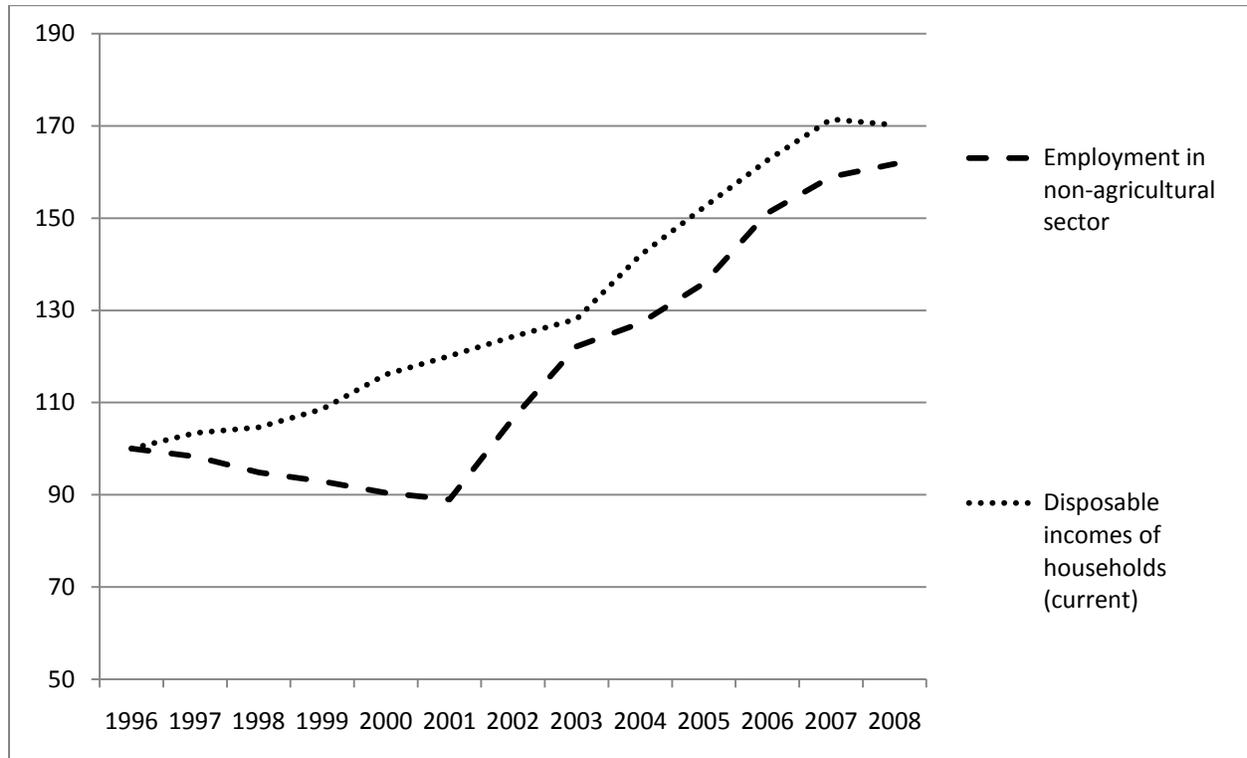
Figure 1

Relationship between economic growth and employment, 1996 to 2008 (1996=100)



The relationship between employment and household income growth is equally complex. It appears from figure 2 that during the period 1996 to 2001 employment declined while household disposable income decreased. During the period 2002 to 2008 there was, however, a strong correlation between employment and income with income growth outstripping employment growth. After 2008 this dynamic changed again as non-agricultural employment declined by 4% during the period 2008 to 2010 while household income grew by 18% in nominal terms during the same period (SAIRR 2010, SARB 2011).

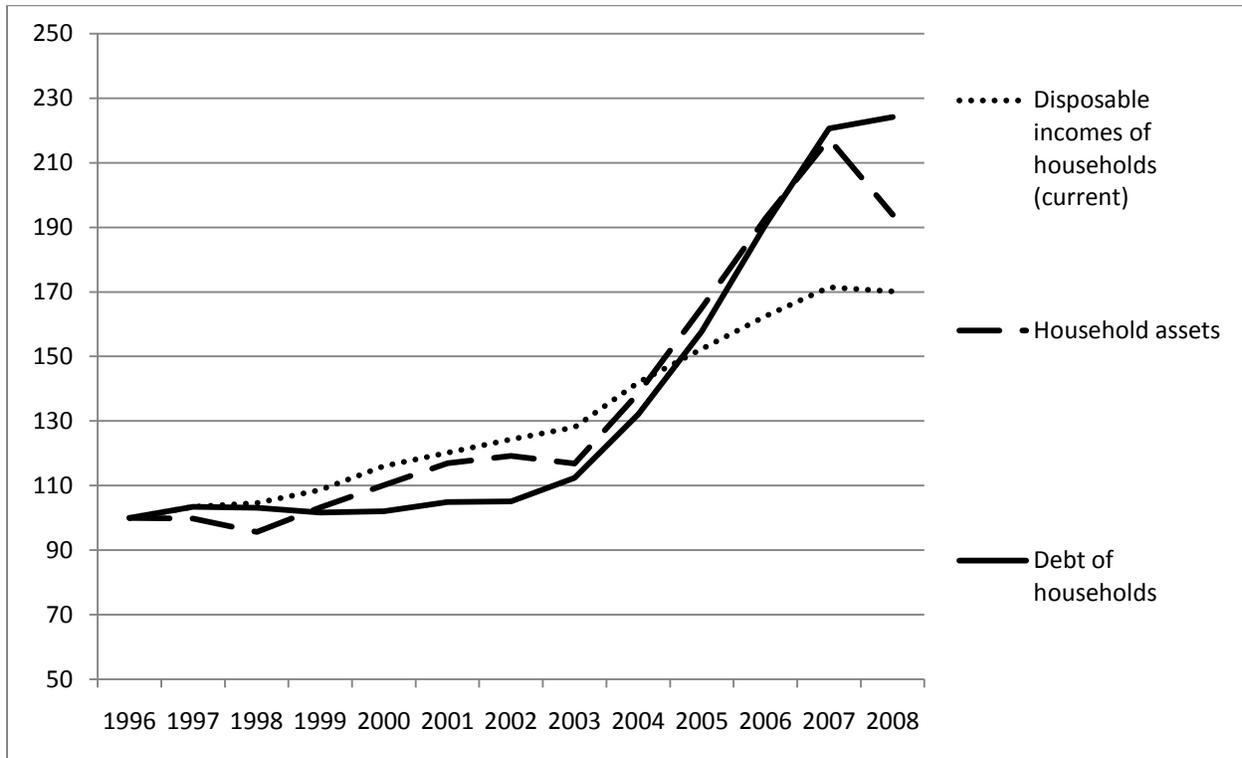
Figure 2
Relationship between employment and household income, 1996 to 2008 (1996=100)



The final part of the transmission path to be focused on in this study between economic growth and household balance sheets, is the relationship between household disposable income and household balance sheet aspects such as household assets and household debt. In this regard, it appears from figure 3 that there is a fairly strong correlation between household income, assets and debt with the proviso that during the period 1996 to 2005 the growth in income was higher than that of assets and debt. After 2005 the growth in assets and debt far outstripped household income growth. This finding is supported by Reserve Bank figures showing that household net wealth to disposable income ratios increased from 307.8 to 359.2 in 2008 (SARB 2011).

Figure 3

Relationship between household income, household assets and household debt, 1996 to 2008 (1996=100)



The realisation that macro-economic-household balance sheet linkages are fairly complex and dynamic as shown in figures 1 to 3 above, gave rise to a large number of researchers becoming involved in studies to arrive at a more in-depth understanding of such linkages in order to identify ways of optimising the elasticities between the various components in the macro-economic-household balance sheet transmission path. Therefore, the focus of this paper, namely macro-economic-household balance sheet linkages, has become an increasingly important issue for government as well as the private sector. As part of this debate, existing assumptions about the said transmission path are being questioned and investigated in this paper.

Statement of the research problem

To enable government and the private sector to arrive at an in-depth understanding regarding macro-economic-household balance sheet linkages, this study will ask the question as to what percentage of employment, income, asset, liability and net worth growth results from 1% economic growth?. To answer this question the transmission path between economic growth and household balance sheets needs to be disaggregated into the follow research questions:

- How elastic is sectoral output growth to employment creation?

- How elastic is employment creation to household income?
- How elastic is household income to the net worth (assets minus liabilities) of households?

The research questions as stated above were investigated for purposes of this paper during an extensive econometric modelling exercise during 2011. This study will be reported in this paper by firstly providing a brief literature overview regarding macro-economic-household balance sheet linkages followed by a description of the computable general equilibrium modelling conducted for purposes of this paper using a National Social Accounting Matrix (SAM) developed by Coningarth economists for the Development Bank of Southern Africa (DBSA). Thereafter the macro-economic-household balance sheet linkage results from the said modelling exercise will be shown and discussed. The paper will conclude with an overview, an exposition of the policy implications of the findings of the study under discussion followed by some concluding remarks.

Theoretical and empirical overview

Banerjee (2011) conducted a large-scale research project supported by the World Bank focusing on macro-micro linkages worldwide. He indicates that during the past decade there has been a large number of macro-economic changes giving rise to a larger number of micro-economic changes. The UNDP (2003) indicates in this regard that such linkages also work the other way around, namely during the past decade or more micro-economic changes have impacted on macro-economic dynamics.

Macro-economic and micro-economic variables are often not optimally linked. Banerjee (2011) indicates in this regard that micro-economic distortions often have macro-consequences, while the UNDP (2003) refer to macro-economic distortions that have micro-consequences. An excellent example of this is the interplay between macro- and micro-economic dynamics during the recent recession where micro-level distortions in the financial sector had large-scale macro-economic impacts while macro-level distortions had far-reaching micro-level consequences for firms and households (Roubini & Mihm 2011).

The UNDP (2003) indicates that macro-micro-linkages can take a variety of forms, including:

- macro-level changes giving rise to micro-level changes;
- macro-level change not giving rise to micro-level changes;
- micro-level changes giving rise to macro-level changes;
- micro-level change not giving rise to macro-level changes; and
- unlinked macro-micro-dynamics.

When applying the UNDP's taxonomy of macro-micro-linkages to the South African context it becomes evident that in some instances macro- and micro-level variables have strong linkages. Some are weakly linked while in a large number of cases macro- and micro-variables are not linked at all. In a study conducted by Hodge (2009) it was shown that economic growth-employment elasticities in South Africa differed over the period 1955 to 2005, namely

such elasticities differed between -1.7 to 0.9. For most of the years between 1955 and 2005 such elasticities differed between 0.3 and 0.7, which is indicative of fairly weak GDP-employment linkages in South Africa.

Research methodology

To test for the strength of macro-micro-linkages in South Africa as indicated in the research problem of this paper, a Social Accounting Matrix (SAM) was used. A SAM creates a picture of an economy, firms and households describing backward and forward linkages between various macro- and micro-economic components. A graphical presentation of a SAM is provided in figure 4.

Figure 4
GRAPHICAL REPRESENTATION OF A TYPICAL CGE MODEL

	Intermediate consumption	Final consumption			
Supply of goods	Economic sectors	Households	Government	Exports	Inventories
Economic sectors					
Value added	Employment, profit-type income, capital consumption, compensation of employees and taxes	Gross value added			

For purposes of this study, a 2006 National SAM developed by Coningarth Economists for the Development Bank of South Africa was used. To study macro-economic-household linkages by means of this SAM, household balance sheet (household assets and household liabilities) information was added to the SAM in the form of satellite accounts. In this way an expanded SAM was created for research purposes. A graphical representation of this expanded SAM is reflected in figure 5.

Figure 5
Graphical presentation of the expanded SAM used in this study

		Suppliers			Final demand				Households		
		Primary	Secondary	Tertiary	Final Cons Exp	Inventory	Net Exp/Imp	Government	Income	Assets	Liabilities
Producers	Primary										
	Secondary										
	Tertiary										
Value Added	Compensation										
	Profit										
	Government										
Households	Income										
	Assets										
	Liabilities										

The macro-micro-linkage results obtained by means of the expanded SAM are shown and discussed below.

Results

By means of the expanded SAM shown above the economic flows between sectors and subsectors in the South African economy were modelled to determine the strength of the linkages between the various sectors given the current sectoral distribution of Gross Value Added (GVA) per sector in South Africa. By means of such modelling, the initial, indirect and induced impacts on the economy as a whole of economic activities of specific sectors can be determined. The meaning of the terms 'initial', 'indirect' and 'induced' impacts for purposes of this study are as follows:

- **Initial impact:** The initial impact is the impact of a particular sector or subsector or activity on the economy. This impact is quantifiable in economic terms.
- **Indirect impact:** Indirect impacts are determined from the activities of suppliers.
- **Induced impacts:** Induced impacts are the impacts on the economy due to an increased aggregate demand by households for goods and services as a result of incomes earned through employment or self-employment. Together with the indirect impact shown above, induced impacts give rise to the total indirect impacts as reflected in the table below.

In table 1 the indirect impacts and multipliers brought about by sectoral GVA growth during 2010 are shown as determined by means of the SAM used for purposes of this study. The total economic impacts (direct plus indirect impacts) of sectoral GVA growth are shown in this table. It appears from this table that the biggest sector multipliers were found in the manufacturing, utilities and personal services sectors. The reasons for the highest aggregate

demand multipliers found in these sectors include (1) the total economic impact of the manufacturing sector is large because of the size of the manufacturing sector GVA (17% of national GVA, and (2) the manufacturing, utilities and personal services sectors have a wide range of ties with other sectors (Sampson Research 2011).

Table 1
Total 2010 GVA per sector (R mil, 2005 prices) and its indirect impact

Sector	GVA	Indirect impact (R million)	Total impact (R million)	Multiplier
Forestry and fishing	41 244	78 246	119 490	1.9
Mining and quarrying	100 659	53 578	154 237	0.5
Manufacturing	280 203	750 890	1 031 093	2.7
Electricity, gas and water supply	34 310	69 949	104 259	2.0
Construction	58 523	50 502	109 025	0.9
Trade	218 570	264 567	483 137	1.2
Transport and communication	167 462	265 652	433 114	1.6
Business services	385 491	624 966	1 010 457	1.6
Government services	250 539	0	250 539	0.0
Personal services	102 493	378 915	481 408	3.7
Total	1 639 494	2 537 267	4 176 761	1.5

The first linkage explored by means of the SAM is the elasticity between GVA growth and job opportunities by occupational group and population group. It appears from table 2 that the most job opportunities resulting from economic activity during 2010 giving rise to GVA will accrue to the higher skilled occupational categories, including legislators and managers, professionals and technical and associate professionals. This finding is in line with available All Media and Products Survey (AMPS) figures that show that during the period 2009 to 2010 the number of professional and technical workers increased by 1.7% while that of clerical and sales workers increased by 9.1%. During the same period the number of production and mining workers decreased by 1.5% (SAARF 2010 and 2011).

Table 2

Job opportunities created for the 2010 GVA (2005 prices) of R 1.639 trillion by occupation group and population group

	Africans	Coloureds	Asians	Whites
Legislators and managers	44 423	13 919	12 946	102 794
Professionals	64 579	14 953	14 565	97 945
Technical & associate professionals	23 753	8 255	6 113	50 686
Clerks	25 522	8 568	5 517	26 505
Service and sales workers	38 573	6 606	3 792	15 443
Skilled agriculture and fishery workers	6 026	979	93	2 616
Craft and related workers	28 424	7 592	2 898	18 103
Plant and machine operators	30 228	4 848	2 814	5 387
Elementary occupations	27 757	4 910	1 098	4 453

Having shown the GVA job opportunity linkages derived from the SAM in table 2, the next linkage to be explored was the GVA household income linkage (see table 3). It is clear from this table that the biggest household income gains because of economic activities are found among the higher income groups (R37 186+ pm in terms of 2005 prices). This finding is in line with SAIRR (2006 and 2010) statistics showing that while the number of higher income households (R360 000+ pa in 2004 prices) grew by 31.5% during the period 2004 to 2009, the number of middle income households (R96 000 to R360 000 pa in 2004 prices) grew by 23.2% over the same period.

Table 3

Household income gains by income group and population group

Income per month (2005 prices)	Africans	Coloureds	Asians	Whites
1 - 1 004	627	208	19	446 674
1 005 - 10 602	5 110	183	72	94 525
10 603 - 15 802	11 803	576	193	106 209
15 803 - 19 932	14 237	638	288	109 951
19 933 - 24 172	17 466	1 069	666	33 148
24 173 - 29 440	23 692	1 199	1 072	33 148
29 441 - 37 185	44 199	1 815	2 608	66 767
37 186 - 49 394	53 550	3 727	5 113	171 045
49 395 - 70 464	72 002	7 794	9 294	85 452
70 465 - 107 537	86 473	12 959	18 520	148 891
107 538 - 141 062	60 915	15 609	18 699	466 160
141 063 +	100 411	38 473	55 326	101 843

The final macro-economic-micro-economic linkage investigated in this study is the linkage between GDP, household asset values, household debt values and household net worth values by household income group. The results derived from the SAM in this regard are shown in table 4.

It was estimated by means of SAM modelling that South Africa's gross household income amounted to R1 805 billion during 2011. Such an estimate is in line with SARB (2011) figures putting household gross incomes at R1 793 billion. SARB gross household income estimates consist of the following items:

- household production gross operating surplus: R325 421 million
- compensation of workers: R1 195 696 million
- net property income: R194 419 million
- net transfer to households: R77 692 million

By means of the SAM, total household assets are estimated at R7 458 billion, which is about 4.13 times the value of gross household income.

The highest asset to gross income ratios are found with respect to the highest income group. It appears from table 4 that a strong correlation prevails between income and asset values per income group. The higher income groups also appear to have the highest net worth to gross income ratios. Such ratios are, however, lower than the income to asset ratios because of the relatively high level of indebtedness of higher income groups in South Africa.

Table 4
Household balance sheet estimates by household income group

Income per month	Gross household income (R million)	Asset to gross income ratio	Asset value (R million)	Debt to gross income ratio	Debt value (R million)	Net worth (R million)	Net worth to gross income ratio
1 - 1 004	2 696	0.87	2 345	0.05	135	2 210	0.82
1 005 - 10 602	6 957	1.13	7 848	0.10	696	7 152	1.03
10 603 - 15 802	18 819	1.39	26 087	0.15	2 823	23 264	1.24
15 803 - 19 932	26 826	1.64	44 112	0.20	5 365	38 747	1.44
19 933 - 24 172	13 853	1.90	26 355	0.25	3 463	22 892	1.65
24 173 - 29 440	19 015	2.29	43 538	0.33	6 180	37 358	1.96
29 441 - 37 185	46 128	2.68	123 478	0.40	18 451	105 027	2.28
37 186 - 49 394	121 265	2.94	355 913	0.45	54 569	301 344	2.49
49 395 - 70 464	125 522	3.45	433 207	0.55	69 038	364 169	2.90
70 465 - 107 537	284 992	3.97	1 130 705	0.65	185 245	945 460	3.32
107 538 - 141 062	837 359	4.48	3 754 510	0.75	628 020	3 126 490	3.73
141 063 +	301 974	5.00	1 509 870	0.85	256 678	1 253 192	4.15
Total	1 805 404	4.13	7 457 969	0.68	1 230 661	6 227 307	3.45

Discussion and concluding remarks

It is clear from the results provided in this study that macro-economic-micro-economic linkages are both different and weaker in South Africa than generally assumed by government economic policies (RDP, Gear, AsgiSA, NGP). In terms of such policies it is expected that economic growth will translate into job opportunities, which will translate into higher household income and eventually a more equal distribution of income. Instead, the results of this study show that 1% economic growth will translate into less than 0.5% job growth, which will predominantly benefit highly skilled income earners and their household balance sheets.

The implications of the findings of this study are that existing macro-economic-micro-economic linkages should be investigated in more detail in order to find workable policy and programme measures to strengthen such linkages to the benefit of lower income households. Such policy measures should include labour market measures to ensure higher labour absorption rates as well as broad-range skills development courses to improve economic participation, financial literacy and entrepreneurship.

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