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Labour immigration, per capita income growth, and unemployment in post-apartheid South Africa

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Abstract: Since the inception of the post-apartheid era, South Africa has experienced considerable increase in immigration. This increase has mostly been enticed by the socio-economic outlook of the rainbow nation relative to developing nations. Unfortunately, increased immigration, particularly labour-based immigration, has spurred fierce debates on outcomes that, in many instances, manifested into xenophobic violence. Thus, this study sought to evaluate whether labour-based immigration contributes to changes in per capita income growth and unemployment using both macro and micro level data. Results from the autoregressive distributed lag, ordinary least squares, difference, and instrumental variable estimations showed that labour immigration has an insignificant causal effect on both per capita income growth and unemployment. Hence, contrary to pessimistic public and political sentiment, per capita income and unemployment are caused by broader socio-economic factors. Policies should be aimed at ensuring equitable human development with strong ties to inclusivity, job creation, constitutional obligations, and international solidarity.

Key words: immigration, post-apartheid, income growth, instrumental variable, autoregressive distributed lag, unemployment

JEL classification: F22, J61, O15

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1 Introduction

Internationally, immigration has economic and social implications for both sending and receiving countries. Critical to the question on immigration is the effect on security, cultural assimilation, and economic factors, particularly the labour market and development. South Africa has been a critical nation faced with an increasing public perception of immigrants negatively affecting livelihoods of locals. In comparison with other African countries, South Africa with its economic and political attractiveness has experienced large inflows of immigrants mostly from the continent (Rasool et al. 2012a: 11–20). The immigration stock of the southernmost country has increased by 302.89 per cent from 2000 to 2017, accounting for 7.1 per cent of the total population (United Nations 2017: 26).

South Africa continues to gain both unskilled and skilled immigrants predominantly from the Southern African region, raising public opposition due to fear of losing jobs and detrimental effects on income growth, welfare costs, and security (Maharaj 2010: 363; Crush 2008). These conceptions in the public sphere have fuelled with increased social and economic problems, particularly higher unemployment rates and inequality, although there has been a marginal rise in per capita income growth. South Africa has an unemployment rate of 28.7 per cent, with unskilled workers facing higher rates. Contrarily, per capita income in the country has marginally improved, averaging 1.21 per cent growth since the end of apartheid in 1994, with decline reaching consecutive negative rates since 2015 (World Bank 2020).

The relationship between international immigration and macroeconomic issues of growth and employment has been prone to periodic opposing theoretical and empirical formulations (Salt and Findlay 1989; Bijak 2006; Audebert and Dorai 2010; Wickramasinghe and Wimalaratana 2016: 13–32). Furthermore, panel or grouped analysis of assumed homogeneous immigration effects on countries has proved incomplete and general due to heterogeneity among countries (Brücker and Siliverstovs 2006: 735–54). Academically, in South Africa limited studies have been undertaken with the main studies evaluating the impact of immigration on unemployment, wages, and crime, with a focus on regulated work permit holders and outcomes of the male labour market (Sibanda 2008; Chiranga 2013; Mayda et al. 2013). This study aims to fill the gap presented in terms of overall labour immigration without exclusion of non-permit holders and female workers within the labour market. Moreover, this study adds knowledge on per capita income impacts of such migration which is empirically lacking in the South African context. This study utilizes a combined approach of both micro and macro data estimates using the 10 per cent sample census and annual macro indicators. Firstly, the background of the issue of immigration in the South African context is presented. Secondly, a descriptive overview of immigration at the national and the provincial level is presented and analysed. Lastly, theoretical and empirical literature is reviewed followed by methodology and concluding remarks.

2 Background to the study

The current development of an increase in widespread international immigration, mostly influenced by political and economic instability in sending countries, is a critical issue that states differ on how to react in terms of policy (United Nations 2017: 4–5; Thielemann and Schade 2016: 143). Movement of people from different regions became not only much easier but also questionable along the lines of the effects on recipient countries in terms of national security and economic stability (Shin 2017: 15–16; Ting 2006: 41–42). Globally, countries have experienced a

growing hostility against immigration pressuring states to establish well-structured policies that cultivate integration and allow a gateway for economic development that benefits both citizens and migrants.

South Africa compared with other African countries has been the major recipient of immigrants, most notably due to its attractive political and socio-economic advantage. Labour immigration in South Africa significantly traces its roots from the arrival of European settlers in the southern region who at the start were involved in subsistence farming (Kang'ethe and Duma 2013). The discovery of minerals in the 1860s spurred investments in the country and led to industrialization benefiting the minority at the cost of the majority native population who received low to no benefits for their contribution. The accumulation of wealth through resource-based exports led to growth of the economy coupled with growth of the manufacturing and service sectors. According to Crush (2008), immigration during the apartheid era was mostly from the European population and several neighbouring populations who partook in the labour market, mostly in the mining industry. Restrictions were made on immigrants in 1913 that disallowed issuing work permits to immigrants of African and Jewish ancestry, this was subsequently overturned after 1986. Regardless of these restrictions many African immigrants contributed heavily to the labour market through contracts and undocumented labour.

Kabwe-Segatti and Landau (2008) argue that the notion of immigration that occurred in the colonial and apartheid era continued to revolve around natives, leading to the negative view of immigration in the current era. A gradual increase in the number of immigrants occurred in the 1990s after South Africa's attainment of a democratic political system and inclusive economy. The United Nations (2015) estimates the international migrant stock of South Africa to have grown from 1,163,883 in 1990 to 3,142,511 in 2015, which is a 170 per cent increase in the migrant population with African immigrants making up about 78 per cent of the population.

Policy changes, particularly after the apartheid era that aimed at liberalizing control of labour-related immigration (especially professional and scarce skills), coupled with economic and political turmoil within neighbouring countries have catalysed the influx. After apartheid, the government enacted labour immigration-related policies that were continuously amended because of lobbying and influence from civil society and prominent international human rights groups (Segatti 2011). The policies adopted and reformed included the Aliens Control Act (No. 76) of 1995, which was further combined with the Refugees Act (No. 130) of 1998, the Immigration Act (No. 13) of 2002, the Immigration Amendment Act (No. 19) of 2004, and the Immigration Amendment Act (No. 13) 2011. The Aliens Control Act (No. 76) was aimed at aligning issues of human rights with those of the immigrant whereas the control of labour immigration was more protectionist and recognized immigrants as 'aliens', like the apartheid regime. Prominent changes occurred after lobbying from many civil rights groups in 2002, with amendments that aimed at liberalizing immigration control by allowing more immigrants to gain access to labour-related visas (Vigneswaran 2008: 783–801). These reforms led to the preceding Acts that were revised to attract scarce skilled labour into the country and to ensure human rights are upheld.

The inclusionary stance of policies that allowed African immigrants to acquire permits of different professions as opposed to the low-skilled work in mines consequently played a crucial role in enabling access to the labour market (Posel 2004: 277–92; Kalitanyi and Visser 2010: 376–90). This led to an increase in immigrants, particularly from Zimbabwe, Nigeria, Democratic Republic of the Congo, Lesotho, Angola, Ghana, Malawi, Somalia, and Pakistan. Although pull factors of favourable policies and stable growing economy played a crucial role in migration from these respective countries, many immigrated because of considerable political, economic, and social problems, rampant particularly in African countries after 1994 (Waller 2006). Additionally, overseas countries with a relatively more stable footing, such as India, China, United Kingdom,

Germany, United States, Netherlands, and France, have become prominent countries for immigrants entering the labour market (Statistics South Africa 2015a). Given South Africa's economic standing, liberalization of skilled migration labour laws, and further prospects of globalization, the surge in labour immigration has been on an increasing trend.

The immense increase in immigration to South Africa occurred from 2006 to 2011, of which 75.3 per cent immigrants were of African origin mostly from the Southern African Development Community (SADC) region, notably Zimbabwe (Statistics South Africa 2013: vi). The increase in immigrants from the African continent has been mainly due to the pernicious political, economic, and natural factors within their respective countries of origin (Isike and Isike 2012: 103–05). Professionals around the world, specifically in African regions faced with economic and political uncertainty, transferred their skills to emerging and developed countries that offered better security and prosperity. Temporary residence permit holders have played their role in the economy, accounting for approximately 85.3 per cent being economically active (Statistics South Africa 2013). South Africa has benefited from the skills harnessed from other African countries that have rapidly become sending nations.

Although immigration increased, the skills shortage in South Africa continues to be a problem, especially in key areas of health, science, and education (Erasmus and Breier 2009: 19). The failing education system, lack of skilled workers, and adverse brain drain has negatively affected sectors that could be filled by immigrants (Kabwe-Segatti and Landau 2008). Skill-based policies and skilled in-migration, which has been cited as rapidly arising from the African continent, continue to rapidly fail to reduce the imbalance between emigration and immigration. Thus, the democratic era of the rainbow nation faces elevated net outflows of skilled labour compared with net inflows of professionals mostly from Europe and cheap labour from African immigrants that persisted during the apartheid era restrictions (Rasool et al. 2012b: 400).

The intensification of immigration to post-apartheid South Africa also brought about an increase in entrepreneurial aspirations by migrants in the formal and informal sectors, notably an increase in 'spaza' shops (Piper and Charman 2016). The South African economy was an immensely small informal economy, yet faced relatively increasing unemployment in the formal sector. Migrants from Zimbabwe, Mozambique, Somalia, and other countries have played a major role in growing the informal sector after apartheid, but this innovative success is unloaded because of the view by pessimistic citizens towards the 'foreigner' (Crush 2017). Kalitanyi (2007) affirmed the contributions of immigrants in job creation, which benefits locals with findings that 80 per cent of immigrants employ South Africans in their businesses.

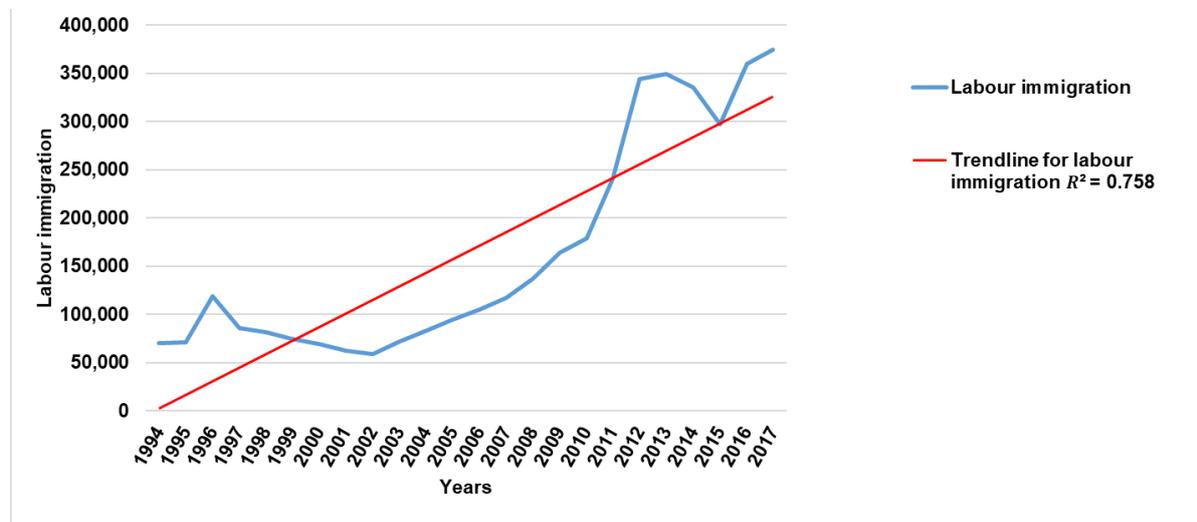
Although foreign nationals made different contributions and immigrated mostly because of factors beyond their control, they faced growing tensions with locals. Negative public opinion grew during the post-apartheid era, mostly towards African nationals referred to as '*makwerekwere*' by anti-immigrant citizens (Neocosmos 2010: 1; Matsinhe 2011: 295). South Africa experienced intense periods of growing negative perceptions of foreign nationals with xenophobic attacks erupting in 2008, leading to the death of over 50 immigrants of African origin (Desai 2008: 50–51). Small businesses, mostly owned by Somali immigrants, in townships continued to be constantly looted, with the number of shopkeepers murdered significantly increasing. The anti-immigrant movement in the country has mainly been attached to socio-economic issues (Adjai and Lazaridis 2013). South Africa faces an increase in unemployment, inclusive growth, lack of service delivery, and crime rates that have mainly been argued to be related to the rise of immigrants in the country. Immigration, in this case, has been viewed in the public and political realm as detrimental to the livelihood of the citizenry, causing increased competition for resources such as jobs, houses, and spill-overs from economic growth. Inflows that have led to this perspective are discussed and analysed in a critical perspective in the next section.

3 Immigration flows in post-apartheid South Africa

Since the dawn of democratization, South African immigrant flows show that immigration has surged across the board. Labour immigration has been no different given the push factors in neighbouring countries and pull factors of attractive economic and political standing comparative to other African countries. Internally, regions continue to experience different concentrations of immigrants. These issues are further discussed with illustrations and descriptive analysis at the national and regional level in Figures 1–4.

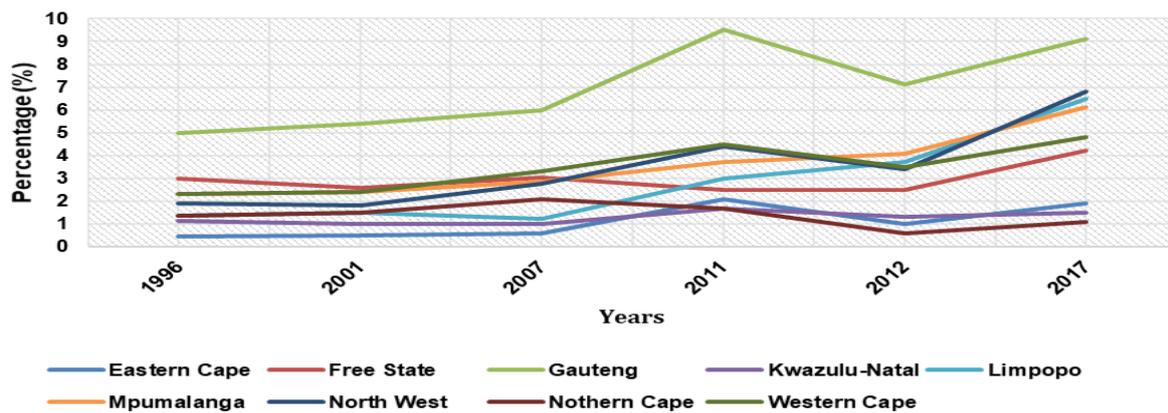
The labour immigration trend in South Africa over the period 1994–2017 is presented in Figure 1. Labour immigration has exceptionally increased since the inception of the new democratic era from 70,002 immigrant entrances in 1994 to 374,505 in 2017. Thus, post-1994 South Africa, in line with stable economies with a viable constitution, became a major attraction for labour immigration. This is clear as labour immigration increased by over 66.76 per cent only two years after 1994, becoming a record change in entrances after apartheid. However, this rise relatively decreased in the following years and increased again in 2003, with a 20.07 per cent increase from 58,747 labour immigrant entrances in the previous year. This was after the introduction of the Immigration Act (No. 13) of 2002 and the Immigration Amendment Act (No. 19) of 2004 which made conceptions such as permits of full-time work on a temporary basis and less state-oriented control policy coupled with economic and political instability within sending SADC countries. Critical to the inflows has been the differences in distribution of immigrants across provinces in South Africa, particularly in terms of concentration in relation to the citizen population; these differences are shown in Figure 2, which shows concentration at regional level constituting nine provinces.

Figure 1: Labour immigration trend from 1994 to 2017



Source: author's compilation based on data from Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

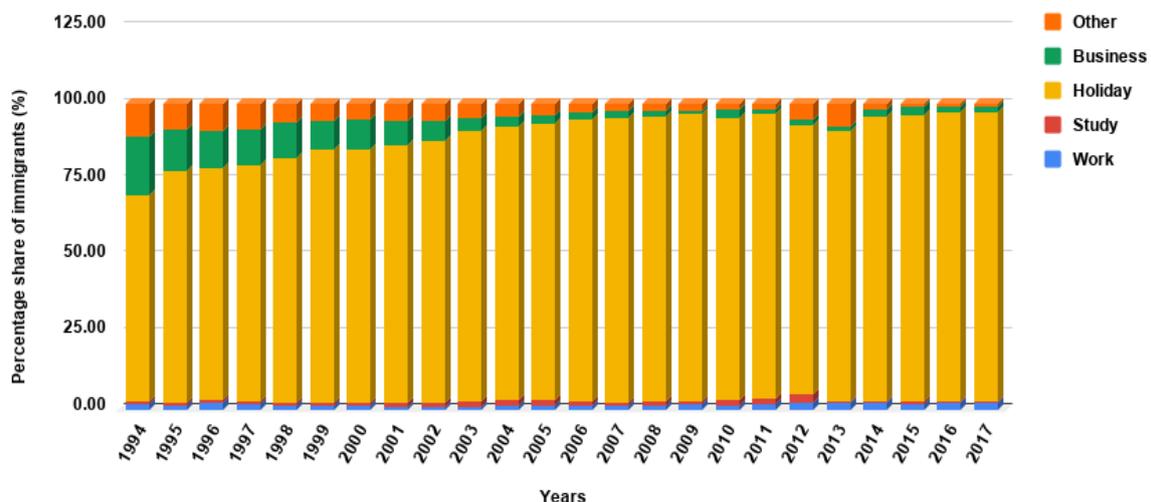
Figure 2: Immigrant concentration by province



Source: author's compilation based on data from Statistics South Africa (1998, 2003, 2008, 2011, 2015c, 2017b).

Immigrant concentration by province follows a similar increasing trend but different levels in concentration, as shown in Figure 2. The average concentration per province has increased by 123 per cent since 1996, reaching 4.67 per cent from 2.09 between 1996 and 2017. Although there was a relative slow place in growth concentration in major provinces from 2011 to 2012 the trend continues to increase above concentration levels of 2 per cent. Gauteng, which is recognized as the economic hub of South Africa and in proximity of prominent sending countries, has held the highest immigrant concentration with over 4.97 per cent, which has since reached 9.1 per cent. Excluding Northern Cape, all provinces during the post-apartheid era face increased immigrant concentration, with Limpopo, Eastern Cape, North West, Mpumalanga, and Western Cape experiencing an increase of over 109 per cent. Limpopo, which is close to the Zimbabwe–South African border, faces the largest upward trend with concentration rates increasing by 372 per cent since 1996. This has been enticed by the collapse of the Zimbabwean economic and political outlook leading to increased immigration into the province. However, Figures 1 and 2 explain the frame of changes in terms of inflows, but a critical comparative analysis in relation to other forms of immigration is needed. Figure 3 illustrates the distributional differences of reasons for inflows.

Figure 3: Distribution of foreigners by reason of entrance

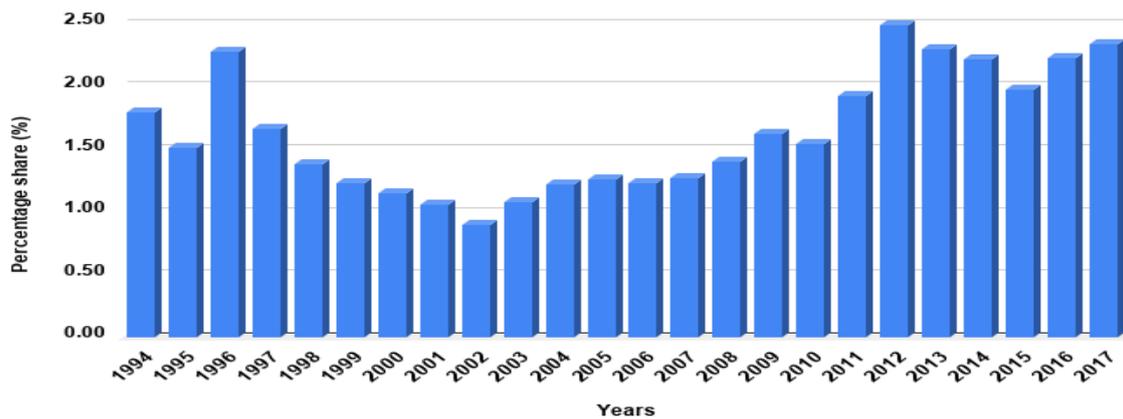


Source: author's compilation based on data from Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

Although labour immigration flows have been increasing since 1994, inflows of tourism have dominated. Figure 3 shows how the distributions of different economic migrants and visitors have changed over the years. Since 1994, most in-migration has been related to holiday travel, increasing

from 67.35 in 1994 to 94.11 per cent in 2017. Contrarily, the share of business-related visits has gradually decreased from a record high of 19.54 per cent in 1994 to a record low below 4.26 per cent since 2003. The highest achievement of business share in the recent decade was 2.95 per cent in 2010, which can be accounted for by the soccer world cup that attracted much business. Study- and labour-related entrances have accounted for the smallest share of foreign populations entering the country, achieving percentage shares below 3 per cent since 1994. Figure 4 shows a clearer picture of the changes in the share of labour immigration.

Figure 4: Share of foreign entrances into the labour market



Source: author's compilation based on data from Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

Figure 4 specifically shows the share of immigrants entering for work. Labour-based immigration exhibits a similar trend in the share of entrances, as shown in Figure 1. In 1994, labour-related entrances into South Africa accounted for 1.8 per cent which relatively declined until 2003, although a spike in share occurred in 1996 accounting for 2.28 per cent. Although labour-related migration has become a contentious issue, it has increased since 2003 but stayed below the 1.8 per cent share of 1994, with the only consistent trend over the end of apartheid rate occurring from 2011 to 2017. Hence, the reasons behind the rise in debate over immigration can be augmented to also include the length of stay and nature of legal immigration. Contrary to holiday, business, and study entrances, labour migration has higher probability of negative effects based on factors such as the skill set of individuals whereas the former contributes heavily to the economy regardless of characteristics.

4 Selected prior research completed in this field

Numerous studies focus on empirically evaluating the migration–growth and migration–employment nexus in both receiving and sending countries (Nyberg-Sørensen et al. 2002: 4–5). Most studies adopted ordinary least squares (OLS), vector autoregression (VAR), and vector error correction model, and econometric modelling, with few adopting the autoregressive distributed lag (ARDL) bounds test model. Furthermore, research within receiving developing states, particularly African states, has been lacking because developing countries form a part of net-sending countries and developed countries, mostly in Europe, are net receivers of immigrants.

Boubtane et al. (2013) employed the VAR approach to collect panel data from 22 OECD countries from 1987 to 2009. The study provided evidence of significant contribution by immigrants towards increased economic growth and employment. Additionally, a bidirectional positive relationship exists between immigration and gross domestic product (GDP) per capita whereas a negative relationship exists between immigration and host unemployment rates. Hence, countries with

better economic conditions and low unemployment benefit more from immigration than less-performing economies. Boubtane et al. (2013) argue that policies should encourage immigration that fosters growth and overall economic benefits, particularly of skilled workers. These empirical findings and policy assertions included with theoretical work by Barro and Sala-i-Martin (1995) and Dolado et al. (1994).

Kim et al. (2010) incorporated the endogenous growth two-bloc model to analyse the impact of migration between the United Kingdom and the European Union. The findings illustrate migration as generally beneficial to both receiving and sending countries. Migration further increases the world growth rate, but detrimental effects are bound by unskilled labour. Migration from a low to a high total factor production area of no skill bias or skilled migration leads to growth for which distribution mechanisms can lead to a loss for non-migrants (Kim et al. 2010: 16). Hence, migrants and skill groups in regions that experience decrease in relative size benefit the most.

Country-specific research has been extensively done by different academics in terms of economic growth and unemployment effects of migration. Feridun (2004, 2005) studied the impact of macroeconomic immigration in two Scandinavian economies, Finland and Norway, respectively. The studies adopted the VAR model and the Granger causality test for causal relationships between immigration and the two macroeconomic variables. Finnish data from 1981 to 2001 indicated a positive bidirectional relationship between immigration and GDP per capita. Furthermore, migration was directly proportional to unemployment in the economy. Thus, increase in immigrants led to an increase in both growth and unemployment. Contrarily, in Norway employment was found to have no drastic changes due to immigration (Feridun 2005: 359): results on the effects of immigration in terms of GDP per capita resembled the conclusions in Finland. The differences in unemployment effects, in this case, approve the possibility of failure of policies that adopt recommendations from bloc-based conclusions.

Research in Greece by Tzougas (2013) employed the error correction version of the ARDL model with the Granger causality test to identify causality patterns between the variables. The results of the study showed a bidirectional relationship between immigration and GDP per capita, with a 1 per cent increase in immigration leading to a 0.048 per cent increase in GDP per capita. The conclusion of a bidirectional relationship between GDP per capita and immigration in Greece is similar to findings by Dritsakis (2008). Furthermore, immigration is found to have no effect on unemployment in the short run, but long-run equilibrium relationships are met for all variables as asserted in theory.

Locally, less empirical research has been undertaken on the broader scale, with main studies focusing on permit-based immigrants. Home affairs provides work permits based on skills and rigorous vetting to reduce the possibility of unemployment by demanding from the employer proof of unavailability of such skills among the citizenry. Sibanda (2008) adopted the data from 1980 to 2006 using the error-correlation model to estimate the impact of immigration on both wages and unemployment. The study found a negative impact on the labour market, with natives facing higher rates of unemployment. Surprisingly, evidence in the study supported overall wage increases for natives, as standard of living for workers. Chiranga (2013) used simple linear regressions to analyse the impact immigration had on socio-economic factors. The results obtained show positive impact of an increase in immigration on unemployment, economic growth, poverty, and crime. Mayda et al. (2013) adopted the mixture approach in evaluating the impact of migrants in the male labour market, finding no effect within national estimations and negative effect within district level analysis.

5 Data and statistical approach

5.1 Data sources and variables description

Diverting from past studies on the question of immigration mostly separated by macro and micro data, this study utilizes both approaches of analysis using national and regional data. National level macroeconomic data adopted in this study include the annual unemployment rate, per capita income growth, and change in labour immigration within a time-series period from 1994 to 2019. The unemployment rate and per capita income growth rates are both acquired from the database of the South African Reserve Bank (n.d.) while the change in labour immigrants is accounted for by data from the annual publications of Statistics South Africa (2004, 2006, 2015b, 2016, 2017a). The annual publication includes the total number of immigrants who identify as labour immigrants when entering the country.

The region level analysis adopts micro survey data from the 10 per cent sample census data from 1996, 2001, and 2011, with inclusion of the community surveys of 2007 and migration quarterly labour force surveys of 2012 and 2017, respectively (see Statistics South Africa 2012, 2017b). The community surveys are continuous surveys implemented to provide information and estimations that are lacking between population and small-scale household surveys while building capacities for the national census. Critical to this study within surveys is information on individual labour market participation outcomes, level of income, education, and basic demographics such as age, sex, race, and province. For the purpose of this study, the sample adopts labour market analysis done at aggregate within nine South African provinces that utilize population estimates by Statistics South Africa to formulate provincial per capita income growth rates. Provincial data give increased accuracy in migration changes and per capita income growth. Moreover, provincial data include less statistical complications due to geographical demarcation, which affects district level analysis.

5.2 Statistical approach

As mentioned, this study adopts both the macro approach and the robust micro approach to analysing the immigrant effect within the labour market. Studies crucial to the statistical approach used in this study include Feridun (2007), Tzougas (2013), and Dustmann et al. (2003). The micro survey analysis, which expands different models used in prior literature and applies these in evaluating the immigration impact question, is adopted first.

Micro survey analysis

Empirical methods in analysing the outcome of migration on the labour market are diverse and increasingly debated. These differences in methodology have led to specific differences in findings across studies on the same labour markets. The most prominent models in adopting survey data include the national skill-cell approach, pure spatial approach, and mixture approach (Borjas 2003; Butcher and Card 1991; Card 2001). Although these models show robustness, they differ in questions they sought to ask and, in many instances, find different results due to lack of account for downgrading of immigrants within the group-specific approaches. Thus, following Dustmann et al. (2005) and Fromentin (2012), this study adopts the overall effect model to account for downgrading and contributes applicable results that are relevant to policy regardless of different elasticities inherent within local labour participants. Given this literature, the following econometric specifications are adopted:

$$\ln\tilde{y}_{it} = \alpha_0 + \alpha_1 + \alpha_2\rho_{it} + \alpha_2\ln s_{g_{it}} + \partial_t^u + \theta_t^u + \varepsilon_{it}^{\tilde{y}} \quad (1)$$

$$U_{it} = \delta_0 + \delta_1 + \delta_2 \rho_{it} + \delta_2 \ln sg_{it} + \delta_3 a_{it} + \ln \tilde{y}_{it} + \partial_t^u + \theta_t^U + \varepsilon_{it}^U \quad (2)$$

where per capita income growth rate (\tilde{y}_{it}), unemployment rate among natives (U_{it}), concentration of immigrants within a provincial population (ρ_{it}), non-immigrant skill group (sg_{it}), and a vector of average ages of immigrants and non-migrants (a_{it}) are presented in province (i) during the year (t) with annual ($\partial_t^{\tilde{y}}$ and ∂_t^u) and provincial ($\theta_t^{\tilde{y}}$ and θ_t^U) effects. This model is estimated using OLS, differenced model, and instrumental variable (IV). OLS is used to identify the relative causal relationship within the timelines of surveys across provinces between immigrant concentration, native unemployment, and per capita income. Due to possible occurrences of estimate bias and simultaneity, the differenced and IV regression are adopted to counter the bias estimator problem and omitted variable issues. Furthermore, the IV is adopted with two lags of immigrant ratio and skill set components within a provincial population (ρ_{it}). This is adopted as a greater estimator as immigrants are more likely to migrate to areas where most immigrants are settled.

Robust tests

This study reports the F -statistic for overall significance to check model fit, the Durbin–Watson (DW) test to check for autocorrelation, and the J -statistic for possibility of restriction overidentification for the IV estimates. As reported, two main models are used including macro data analysis at the national level, which is discussed in the next section.

Macro data analysis: ARDL method

The model used in this study relates to the methodology regression analysis adapted by Feridun (2007) and Tzougas (2013). These researchers adopted a trivariate approach to evaluating the immigration effect on unemployment and growth, respectively. Diverting from the incorporation of GDP per capita as a variable in the model, this research uses the per capita growth rate in relation to the study aims. The model is specified in the following two functions, where GDP per capita growth ($PGDPg_t$) is a function of labour immigration ($LIMM_t$) and unemployment (UR_t), while unemployment is a function of labour in-immigration and GDP per capita growth:

$$PGDPg_t = \alpha + \beta_1 LIMM_t + \beta_2 UR_t + \varepsilon_t \quad (3)$$

$$UR_t = \alpha + \beta_1 LIMM_t + \beta_2 PGDPg_t + \varepsilon_t \quad (4)$$

Unit root tests

Data unit root testing is an important step before estimation of an econometric model because an unidentified unit root can lead to spurious regressions that may lead to biased results. Spurious regressions refer to situations in which non-stationarity leads to results that establish a causal relationship between variables that is non-existent in real terms (Noriega and Ventosa-Santaularia 2011). Hence, the unit root tests in this case play a pivotal role in adoption of a model to analyse data. The ARDL model employed in this study can only be used with data that is integrated at $I(0)$, $I(1)$ and not equal to or more than $I(2)$.

To test for unit root, this study adopts the most frequently used the augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests.

Co-integration tests

Co-integration is the existence of a long-run relationship between variables. Among the several techniques to co-integration that exist, this study adopts the ARDL approach used in research by Feridun (2007) and Tzougas (2013). The ARDL model framework consists of lagged variables in relation to both the dependent and the independent variables. This introduction of lag values reduces the possibility of spurious results due to missing variables. Moreover, the ARDL model diverts from conventional models such as Engle and Granger (1987) and Johansen (1988) in terms of small sample data and order integration of variables. Specifically, the ARDL model can be adopted to examine small data sample as opposed to conventional methods that are more reliable for larger data samples. Furthermore, the variables display of different levels of integration can be applied in the ARDL model. The ARDL model can be used for variables integrated to order zero $I(0)$ and one $I(1)$, but not integrated to order equal to or more than two (Alimi 2014). Thus, given the weakness of Johansen's (1988) co-integration in terms of smaller sample size and the spurious estimation within Engle and Granger (1987) in terms of data that are integrated to both order zero and one, the ARDL model is well fitted for estimation in this study.

This study uses the following three-way ARDL approach for bounds testing:

$$\Delta PGDPg_t = \alpha_{0PGDPg} + \sum_{i=0}^p \alpha_{1PGDPg} \Delta PGDPg_{t-i} + \sum_{i=0}^p \alpha_{1PGDPg} \Delta LIMM_{t-i} + \sum_{i=0}^p \alpha_{1PGDPg} \Delta UR_{t-i} + \theta_{1PGDPg} PGDPg_{t-i} + \theta_{2PGDPg} LIMM_{t-i} + \theta_{3PGDPg} UR_{t-i} + \varepsilon_t \quad (5)$$

$$\Delta IMM_t = \alpha_{0LIMM} + \sum_{i=0}^p \alpha_{1LIMM} \Delta IMM_{t-i} + \sum_{i=0}^p \alpha_{2LIMM} \Delta PGDPg_{t-i} + \sum_{i=0}^p \alpha_{1LIMM} \Delta UR_{t-i} + \delta_{1LIMM} PGDPg_{t-i} + \delta_{2LIMM} LIMM_{t-i} + \delta_{3LIMM} UR_{t-i} + \varepsilon_{2t} \quad (6)$$

$$\Delta UN_t = \alpha_{0UR} + \sum_{i=0}^p \alpha_{1UR} \Delta UNM_{t-i} + \sum_{i=0}^p \alpha_{2UR} \Delta PGDPg_{t-i} + \sum_{i=0}^p \alpha_{1UR} \Delta LIMM_{t-i} + \gamma_{1UR} PGDPg_{t-i} + \gamma_{2UR} LIMM_{t-i} + \gamma_{3UR} UN_{t-i} + \varepsilon_{3t} \quad (7)$$

The equations are used to test the null hypothesis of no co-integration. This study uses the bounds test for co-integration, which tests the following null hypothesis of no co-integration (H_0) and alternative hypothesis of co-integration (H_1) hypotheses:

$$H_0: \theta_{1PGDPg} = \theta_{2PGDPg} = \theta_{3PGDPg} = 0$$

$$H_1: \theta_{1PGDPg} \neq \theta_{2PGDPg} \neq \theta_{3PGDPg} \neq 0; \text{ for equation (5)}$$

$$H_0: \delta_{1LIMM} = \delta_{2LIMM} = \delta_{3LIMM} = 0$$

$$H_1: \delta_{1LIMM} \neq \delta_{2LIMM} \neq \delta_{3LIMM} \neq 0; \text{ for equation (6)}$$

$$H_0: \gamma_{1UR} = \gamma_{2UR} = \gamma_{3UR} = 0$$

$$H_1: \gamma_{1UR} \neq \gamma_{2UR} \neq \gamma_{3UR} \neq 0; \text{ for equation (7)}$$

To examine the existence of a long-run relationship among the variables, the F -statistic is utilized. If the F -statistic exceeds the given upper bound critical value, the null hypothesis is rejected. Contrarily, if the F -statistic is below the specified critical value no co-integration exists and if the statistics falls within the lower and upper bound range the test will be rendered inconclusive

5.3 Model estimation

The co-integration test identifies whether there is existence of a long-run relationship. Co-integration makes the researcher adopt the error correction term (ECT) that calculates how long adjustments back to the equilibrium point take after an immediate economic shock. Thus, the short-run model is dependent on individual coefficient lags while the long-run information is contained in the ECT. Contrarily, if the existence of co-integration is rejected only the short-run dynamic model of the ARDL is estimated.

If there is no sign of integration, the following short-run model without the ECT term is adopted:

$$\Delta PGDPg_t = \alpha_{10} + \sum_{i=1}^p \alpha_{11} \Delta PGDPg_{t-i} + \sum_{i=1}^p \alpha_{12} \Delta LIMM_{t-i} + \sum_{i=1}^p \alpha_{13} \Delta UR_{t-i} + \varepsilon_{1i} \quad (8)$$

$$\Delta LIMM_t = \alpha_{20} + \sum_{i=0}^p \alpha_{21} \Delta LIMM_{t-i} + \sum_{i=0}^p \alpha_{22} \Delta PGDPg_{t-i} + \sum_{i=0}^p \alpha_{23} \Delta UR_{t-i} + \varepsilon_{2i} \quad (9)$$

$$\Delta UN_t = \alpha_{30} + \sum_{i=1}^p \alpha_{31} \Delta UR_{t-i} + \sum_{i=1}^p \alpha_{32} \Delta PGDPg_{t-i} + \sum_{i=1}^p \alpha_{33} \Delta LIMM_{t-i} + \varepsilon_{2i} \quad (10)$$

In summary, the estimation of the ARDL model depends immensely on the outcome of the co-integration tests. The existence of co-integration means the researcher must adopt the equilibrating model with an ECT. Furthermore, if no co-integration is detected the short-run model is estimated without the ECT as it determines the convergence rate given the existence of a long-run relationship (Ndavi 2012).

5.4 Causality tests

The presence of both short-run and long-run relationships indicates the existence of causality but does not specify the direction or nature of the cause. Thus, the Granger causality test is adopted to identify the direction and nature of the causal relationship between variables. The Granger causality model is used to identify whether one variable x causes another y (Lopez and Weber, 2017: 972–84). Hence, if lagged values of x are significantly predicting current y values regardless of inclusion of prior y values, then a causal relationship exists. The causality can be tested using the following null hypothesis.

$$H_0: \beta_1 = \dots = \beta_k = 0 \quad (11)$$

If the null hypothesis is rejected, then the researcher concludes that x exerts a cause on y . The same procedure can be adopted to test for causal effect in the opposite direction. As estimation depends on the nature of the relationship, different equations are adopted to undertake the Granger causality test. The Jarque–Bera test, the Lagrange multiplier test, the Breusch–Pagan–Godfrey test, as well as the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) stability tests are utilized for diagnostics.

6 Results

6.1 Micro survey analysis

Per capita income growth effects of immigration

Table 1 presents the findings from estimations for the micro data on the impact of per capita income across regions. Results from the OLS model show that the migrant to non-migrant ratio has negative yet insignificant impact on per capita income. These results are supported across models with regard to the difference and IV models. Moreover, results from the differenced estimation show positive yet insignificant results. These results are equivalent to respective independent variables, with only the semi-skilled to unskilled ratio having significant negative association at the 10 per cent level of significance on per capita income within the differenced model. The IV model is rendered a robust fit with an F -statistic significant at the 5 per cent level of significance and instruments are rendered legitimate by the J -statistic.

Table 1: Results for OLS, difference, and IV— $\ln\tilde{y}_{it}$

Variable	OLS		Difference		IV	
	Coefficient	t -Statistic	Coefficient	t -Statistic	Coefficient	t -Statistic
<i>Immigrant ratio</i>	-0.003523	-1.66654	0.00941	2.01975	-0.00404	-1.60270
<i>Skilled/unskilled</i>	0.09187	1.03827	-0.04594	-0.20724	0.08892	0.91005
<i>Semi-skilled/unskilled</i>	-0.04336	-1.10230	-0.08919	-1.84026*	-0.05558	-1.02262
Constant	0.02584	3.76728***	-0.00330	-0.63973	0.03410	3.45489***
F -statistic	2.1909		2.4166*		3.58342**	
DW statistic	2.17852		2.365626		1.73172	
Probability (J -statistic)						0.1224

Note: OLS, ordinary least squares; IV, instrumental variable. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

Source: author's compilation based on Statistics South Africa (1998, 2003, 2008, 2012, 2015c, 2017b).

The existence of negative yet insignificant impact of labour immigration on per capita incomes contrasts most studies in other countries (Feridun 2004; Boubtane et al. 2013; Gross 2004; Latif 2015). This could be explained by the skill set and productivity level differences of immigrants entering South Africa compared with the native population. Thus, the rainbow nation, which has a population skewed towards unskilled and relatively low-skilled labour, is prone to lack of complementary skill-based immigration. Hence, labour immigration fails to increase per capita incomes; however, labour immigrants with high skill sets accommodated within the work permit framework increase overall total income levels, as concluded by Chiranga (2013).

Unemployment effects of immigration

Table 2 presents the findings from estimations of the impact on unemployment across regions. Results from the OLS and differenced models indicate that immigrant ratio and unemployment show a negative yet insignificant relationship. Furthermore, the IV model shows that this relationship is positive yet insignificant, as concluded by the respective estimations. Interesting within the estimations is the significant negative relationship between unemployment and mean age within the labour market. OLS and IV estimations show that mean age has a negative relationship to unemployment at the 1 and 5 per cent level of significance, respectively. These results support the findings within labour market statistics that indicate the youth and unexperienced persons are most prone to unemployment. In relation to robustness and validity,

the IV model is rendered a robust fit with an F -statistic significant at the 1 per cent level of significance together with the OLS model and instruments are rendered legitimate by the J -statistic.

Table 2: Results for OLS, difference, and IV— U_{it}

Variable	OLS		Difference		IV	
	Coefficient	t -Statistic	Coefficient	t -Statistic	Coefficient	t -Statistic
<i>Immigrant ratio</i>	-0.006561	-0.96038	-0.00869	-0.75309	0.019038	1.368047
<i>Skilled/unskilled</i>	-0.22490	-0.75667	-0.18383	-0.35789	-0.68945	-1.19615
<i>Semi-skilled/unskilled</i>	0.024948	0.202907	0.187618	1.563248	0.203603	0.774436
<i>Mean_age/100</i>	-2.69340	-3.14775***	0.707138	0.290834	-1.18039	-0.29013**
<i>Income per capita</i>	0.108569	0.238722	-0.21987	-0.60735	4.102915	2.261449
Constant	1.281530	4.54135***	-0.01876	-0.99858	0.616222	0.461867
F -statistic			0.93825	0.46711	6.35304	0.00039***
DW statistic			2.32638			1.32586
Probability (J -statistic)					0.81664	

Note: OLS, ordinary least squares; IV, instrumental variable. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

Source: author's compilation based on Statistics South Africa (1998, 2003, 2008, 2012, 2015c, 2017b).

These findings resemble those by Latif (2015), Gross (2004), Ruhs and Vargas-Silva (2015), and Feridun (2004, 2005) within other countries. According to these studies, immigration posits insignificant impact on unemployment rates because of the nature of skill sets held by immigrants. Immigrants, generally, have different skills to those of natives, and are more determined to work either in positions less desirable to natives or in complementary jobs that are lacking in skills supply. Furthermore, due to restrictive policies, immigrants can struggle to enter the labour market and venture into self-employment. The findings differ drastically from those of Sibanda (2008) and Chiranga (2013) because the timeline adopted by the respective researchers included apartheid era-related immigration and the adoption of restricted work permit-based immigration as opposed to general labour immigration that accounts for both unpermitted and permitted legal immigrants.

6.2 Macro data analysis: ARDL method

Unit root test results

The results of the ADF and PP tests in Table 3 show that t -statistic for the two variables $PGDPg_t$ and UR_t is below the critical value at the 10 and 1 per cent level of significance, respectively. Contrarily, the null hypothesis cannot be rejected for $LIMM_t$. Thus, $LIMM_t$ is non-stationary at level. Both ADF and PP test results indicate all the variables are stationary as the null is rejected at first difference at the 5 per cent level of significance.

Table 3: Results for unit root tests

	ADF				PP			
	Intercept		Intercept and trend		Intercept		Intercept and trend	
	Level	Δ	Level	Δ	Level	Δ	Level	Δ
$PGDPg_t$	-2.767*	-5.409***	-2.846	-4.052***	-2.750*	-5.684***	-2.813	-5.598***
UR_t	-4.611***	-4.835***	-3.968**	-4.871***	-1.771486	-4.793***	-2.054	-4.810***
$LIMM_t$	0.467	-3.859***	-1.416	-4.052**	0.379	-3.855***	-1.449	-4.026***

Note: ADF, augmented Dickey–Fuller; PP, Phillips–Perron. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively. The null hypothesis is that the variable has a unit root.

Source: author's compilation based on South African Reserve Bank (n.d.) and Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

Co-integration analysis

The bounds test was used to assess the null hypothesis that co-integration does not exist. The F -statistic was used to test the validity of the null hypothesis with rejection supported if the value was above the upper bound. Moreover, if the F -statistic was below the lower bound, we failed to reject the null hypothesis and, in-between the lower and upper bound, the test is inconclusive. Table 4 shows the results of the bounds test for three different equations depending on the dependent variable. There is no co-integration when labour immigration and unemployment are dependent variables and results are inconclusive with regard to GDP per capita growth at 5 and 10 per cent level of significance only. Hence, it is evident that no long-run relationship exists in all three equations; thus, as discussed in Section 5 on methodology, only the short-run dynamic model was estimated.

Table 4: Results of autoregressive distributed lag (ARDL) bounds test

Dependent variables	Calculated F -statistic	Decision at 1%	Decision at 5%	Decision at 10%
$F(PGDP/LIMM, UR)$	4.094235	No co-integration	Inconclusive	Inconclusive
$F(UR/LIMM, PGDP)$	1.742877	No co-integration	No co-integration	No co-integration
$F(LIMM/PGDP, UR)$	0.149934	No co-integration	No co-integration	No co-integration
Critical interval values		Level of significance	Lower I(0)	Upper I(1)
		1%	5.15	6.36
		5%	3.79	4.85
		10%	3.17	4.14

Note: $PGDP$, GDP per capita growth; $LIMM$, labour immigration; UR , unemployment.

Source: author's compilation based on South African Reserve Bank (n.d.) and Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

Short-run dynamic model

Table 5 shows the short-run model with GDP per capita growth as a dependent variable. Using the Akaike information criterion (AIC) to specify the orders of the model the ARDL short-run model (1,1,0) is incorporated. Independent variables, labour immigration, and unemployment have a negative impact on growth in the estimation but are rendered insignificant. Hence, there is no significant proof that unemployment and labour immigration have any effect on the per capita levels of growth in the country. The regression of the short run also shows a weak fit with $R^2=0.359977$, as expected. Contrarily, the F -statistic of the model approves the model as significant at a level of 10 per cent. Serial correlation and heteroscedasticity are not identified in this model with values insignificant at all levels, 1, 5, and 10 per cent.

Table 5: Short-run dynamic model: dependent variable $\Delta PGDPg$

Variable	Coefficient	t-Statistic	Probability*
Constant	0.754294	0.196155	0.8467
$\Delta PGDPg(-1)$	0.315467	1.520772	0.1457
$\Delta LImm$	-0.000004	-1.427061	0.1707
ΔUR	-0.275127	-1.219172	0.2385
$\Delta UR(-1)$	0.318550	1.495432	0.1521
R-squared	0.359977	AIC	3.869586
Adjusted R-squared	0.217750	SBC	4.116432
F-statistic (probability)	0.076402*	Durbin-Watson statistic	2.173424
Short-run diagnostic tests			
Serial correlation Lagrange multiplier		0.934553 (0.3472)	
Heteroscedasticity Breusch-Pagan-Godfrey		0.883465 (0.4935)	
Jarque-Bera		4.720088 (0.0944)*	

Note: AIC, Akaike information criterion; SBC, Schwarz-Bayes criterion. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

Source: author's compilation based on South African Reserve Bank (n.d.) and Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

Following the previous model with GDP per capita growth as dependent variable, Table 6 presents results with the dependent variable being unemployment. Using the AIC to specify the orders of the model, the ARDL short-run model (1,1,0) is incorporated. Only the lag of unemployment rate is significant at 1 per cent, with other independent variables in the estimation being insignificant. Ultimately, as identified in the model prior, there is no significant proof of a short-run causal relationship of per capita income growth and labour immigration on growth. The regression of the short run also shows a moderate association around the mean with $R^2=0.359977$. Lastly, the model shows no signs of serial correlation and heteroscedasticity with values insignificant at all levels, 1, 5, and 10 per cent. These results support the findings from the micro model and, thus, are robustly conclusive.

Table 6: Short-run dynamic model: dependent variable ΔUR

Variable	Coefficient	t-Statistic	Probability
Constant	6.869774**	2.077442	0.0516
$\Delta UR(-1)$	0.737489***	5.135511	0.0001
$\Delta PGDPg$	-0.316995	-1.542183	0.1395
$\Delta LImm$	0.00000104	0.326095	0.7479
R-squared	0.635863	AIC	3.801750
Adjusted R-squared	0.578368	SBC	3.999227
F-statistic (probability)	11.05939	Durbin-Watson statistic	1.786767
Short-run diagnostic tests			
Serial correlation Lagrange multiplier		0.684360 (0.4189)	
Heteroscedasticity Breusch-Pagan-Godfrey		2.064718 (0.1389)	
Jarque-Bera		13.78134 (0.001)***	

Note: AIC, Akaike information criterion; SBC, Schwarz-Bayes criterion. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

Source: author's compilation based on South African Reserve Bank (n.d.) and Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

Causality test

Table 7 shows the results for the Granger causality test to identify the causal relationship between variables in reference to the third objective of this study. Following no findings of short-run and long-run relationships in prior analysis, the results show that labour immigration does not ‘Granger-cause’ per capita income or unemployment. Furthermore, both unemployment and per capita income have no causal relationship with labour immigration. Hence, labour immigration occurs regardless of income growth and unemployment levels. This can be illustrated by high growth of immigration to South Africa which faces elevated unemployment and moderate per capita income growth. These findings are consistent with results of the short-run dynamic model presented in Tables 5 and 6.

Table 7: Short-run Granger causality test

Null hypothesis	F-statistic	Probability
LIMM does not Granger-cause PGDP	2.39742	0.1372
UR does not Granger-cause PGDP	0.24710	0.6245
LIMM does not Granger-cause UR	1.07308	0.3126
PGDP does not Granger-cause UR	1.61733	0.2181
PGDP does not Granger-cause LIMM	0.20181	0.6581
UR does not Granger-cause LIMM	0.07412	0.7882

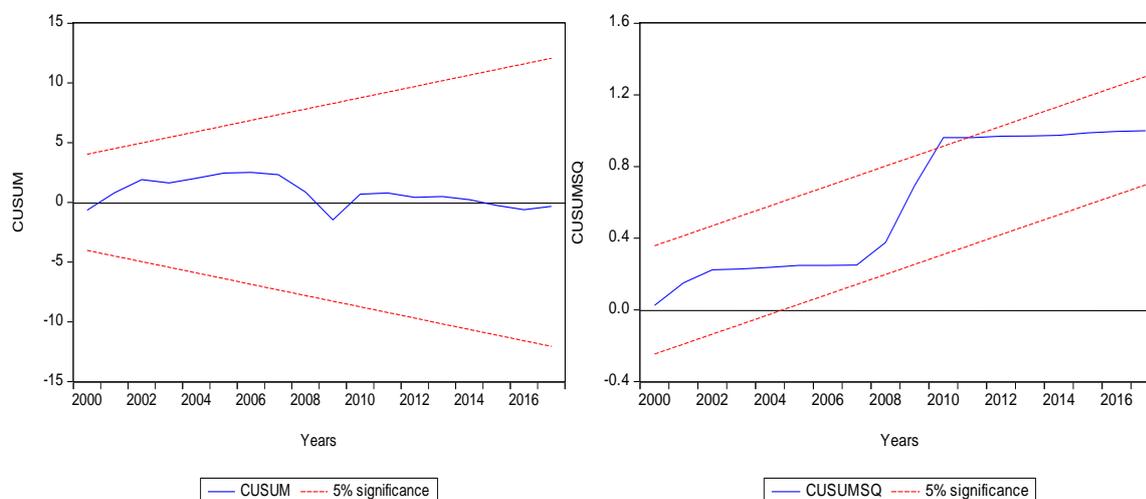
Note: PGDP, GDP per capita growth; LIMM, labour immigration; UR, unemployment.

Source: author’s compilation based on South African Reserve Bank (n.d.) and Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

Stability test

The previous section established the short-run estimate of the causal relationship between labour immigration, per capita income growth, and unemployment. The modelling adopted could include sudden changes in constancy leading to model instability. Hence, the CUSUM and CUSUMSQ tests of constancy were adopted. Both tests involve plotting two critical lines at the 5 per cent level of significance together with the cumulative sum. If the cumulative sum breaks out of the area between the two critical lines the test finds model instability. Figure 5 shows the plots of the CUSUM and CUSUMSQ tests, with the plot trend within the 5 per cent confidence band. The parameter stability null hypothesis is not rejected, indicating evidence of stability of the model. Thus, the model results can be interpreted with confidence of reliability.

Figure 5: CUSUM and CUSUMSQ tests



Source: author’s compilation based on South African Reserve Bank (n.d.) and Statistics South Africa (2004, 2006, 2015b, 2016, 2017a).

7 Conclusion and policy implications

This paper sought to interrogate the per capita income and unemployment impacts of international labour immigration in the post-1994 era. Immigrants, within both social and political settings, have been attached to the continuous reduction in economic advancement and employment probabilities within the country with limited evidence. To tackle this issue, the study utilized both micro data from provincial regions from the censuses and household surveys and national data. Thus, the OLS, difference, IV, and ARDL models were adopted with all the models supporting lack of significant relationship from immigration to per capita income and from immigration to unemployment. This can be explained by the net outflow rather than inflow of productive skilled labour, differences in job market aspirations that could force immigrants to enter self-employment or low-skilled labour, and several external factors. Thus, in a critical point of departure, this study argues that reduced per capita growth and increased unemployment continue to occur due to other macroeconomic constraints.

Palát (2012: 214) asserts that labour migration, particularly of the youth, can lead to deeper economic collapses requiring states to respond proactively with favourable policies. Hence, both government and private institutions should reform policies to benefit from immigration. Furthermore, given the overarching evidence of no negative effect in the South African context, policies should be favourable towards structural incentives that can enable an immigration surplus. Taking into consideration no evidence of long- or short-run impact of labour immigration on per capita income growth rates and unemployment, it is crucial for the government to adopt inclusive policies that attract skilled and innovative immigrants. The critical skills visa needs to be less restrictive and continuously updated, with further benefits offered to foreign nationals with skills lagging in the economy. This includes the reduction of the documentation process and adopting an online-based assessment mechanism as adopted by other skill-attracting countries.

Alignment of regional and international policies with national policies is also crucial to South Africa. Thus, development, reformation, and implementation of immigration policies should be aligned with multilateral and bilateral agreements, particularly trade. Segatti and Landau (2011: 6) assert that South Africa lacks convergence and coordination of policies and agreements within regional blocs such as the SADC. Regional institutions need strategic consultations with labour and private sector organizations across regions to improve effectiveness of bilateral human movement policies. Moreover, strategic alliance and programmes should be instituted to improve the freedoms and capabilities of unskilled immigrants within the region, enabling them to participate without barriers to development of the socio-economic status of the sending and receiving countries.

South Africa faces increased issues of xenophobic violence, generating a need for effective national conversation on immigration. Organizations should ensure development of campaigns or programmes that accommodate both locals and foreigners to reduce social tensions that ultimately lead to issues such as xenophobic attacks. Current programmes such as professional and university graduate international exchanges can play a pivotal role in skills transfer and in increasing efficiency and growth among citizens. Moreover, there is need for community outreach centres that enable conversations about identity, culture, and rights because issues of xenophobia are erroneously narrowed to economic inequalities. Kessi (2015: 10–13) stressed this factor by noting that xenophobia, although catalysed by economic problems, is deeply entrenched in broader issues such as nationalism, racism, and other forms of societal and psychological issues.

Although this study contributes to an increasing area of migration within Africa and several developing nations, the limited focus on unemployment and per capita income growth needs to

be expanded to account for broader issues. These include welfare, inequality, human development, and cultural assimilation, which continue to become political and civil debates based on assumed consequences as opposed to robust research. Thus, researchers and institutions are challenged to advance and approach the question of immigration within an interdisciplinary realm, in particular the humanistic approach.

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