Impact of Internal Migration on School Enrollment and Completion Rates in South Africa

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Abstract

South Africa struggles with low secondary-school completion rates and this has a negative effect on poverty and inequality. In this study, we examine the relationship between internal migration (international migrants were excluded) and non-migrant educational outcomes (secondary-school enrollment and completion rates) in South Africa between 1996 and 2011. We use census data for 1996, 2001, and 2011 (at district and municipal levels) in several linear probability regression models that include the First Difference (FD) and System Generalised Method of Moments (GMM-SYS) with instrumental variables. We find that internal migrants have a positive effect on both the enrollment and completion rates of non-migrants. These results vary in intensity depending on the level of education of both internal migrant and non-migrant household heads. These results have implications for the local labor market and for income inequality in South Africa; internal migrants provide positive peer effects that contribute to raising non-migrant school enrollment and completion. Internal migrants also provide job-market competition, which can influence non-migrants' decisions to complete secondary schooling. While prior research has tended to focus on the relationship between immigration and education outcomes in the developed world, there is scant empirical evidence on the impact of internal migration on education outcomes in African countries. Our paper provides evidence from a country with a history of persistent internal migration. We recommend that improvement of the quality of basic education – in both rural and urban areas – be a high priority of the South African government, as well as increased financial access to tertiary institutions.

Keywords: migration, education, completion rates, enrollment, South Africa

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INTRODUCTION

South African secondary-school completion rates are very low, as evidenced by the fact that half of all pupils born during the period 1992–1994 had not completed Grade 12 by 2018 (BusinessTech, 2020). In comparison, countries in the Organisation for Economic Co-operation and Development (OECD) had an 80.3% average rate of upper-secondary-school completion (OECD, 2019), while in Southern Africa, Botswana and Mauritius have completion rates above 90% (Mwale et al., 2022). Additionally, black, and bi-racial South African learners are more likely to drop out of school than are white pupils, indicating the enduring legacy of apartheid in accounting for educational inequality, particularly with regards to access to quality schooling (Moses et al., 2017; de Clercq, 2020; Amin and Mahabeer, 2021). School quality generally remains poor despite relatively high levels of public spending on education since democratization in 1994 (Moses et al., 2017; Mlachila and Moeletsi, 2019). If the household head achieves some higher education in South Africa, the risk of poverty declines substantially compared to households where the head has no schooling (World Bank, 2019). With the nation's racially oppressive history, access to inclusive and affordable education is a key pathway out of poverty for black South Africans (Borgen Project, 2022; Walker et al., 2022).

The low completion rates mentioned above contribute to the wastage of large portions of the education department's budget. For example, the government allocated R249 billion in 2018/19 to the Department of Education budget alone; R20 billion of that budget was spent funding over one million repeating students in primary and secondary schools (van der Berg et al., 2019: 1). This additional expenditure could have been used to target other South African developmental goals (e.g., improving access to basic sanitation, healthcare, and building infrastructure in poorer provinces) (Maphumulo and Bhengu, 2019; Mazele and Amoah, 2022). Despite relatively high levels of public spending on education since democratization in 1994, education quality remains poor (Moses et al., 2017; Mlachila and Moeletsi, 2019).

In South Africa, slow grade-progression and poor completion rates can be attributed to supply-side factors related to the quality of basic education, which include class size, school quality, teacher availability, and infrastructure (UNICEF, 2020). Pupils also drop out because of demand-side factors, such as financial constraints, pregnancy, death of parents or guardians, and conflicting perceptions of the benefits of completing school (Spaull, 2015; Moses et al., 2017).

Migration is another possible explanation for low completion rates as it has consequences for both origin and destination areas (Brunello, 2021; Akyol and Erikci, 2022). Much of the economics literature that links migration to education outcomes has focused on immigration, which has been shown to have ambiguous effects on the educational outcomes of non-migrant residents (see, e.g., Hunt, 2017; Brandén et al., 2018). This ambiguity likely stems from the fact that there are both increasing costs, such as school resource constraints and negative peer effects, and

benefits, such as greater returns to relatively scarce higher levels of schooling, to a changing school-age population.

Research in internal migration and child schooling has been largely restricted to high-income and Global North countries, although increasing evidence on the effects of mobility on educational progression and achievement in low- and middle-income countries (LMICs) is emerging. For example, studies on the impact of the *hukou* household registration system in China have consistently indicated significantly worse educational outcomes of rural-urban migrant children compared to their urban counterparts (see, for example, Goodburn, 2020; Kim et al., 2021). This outcome has been attributed to institutional barriers of poor access to quality schooling and the lack of social capital – the latter taking time to build up (Hung, 2022; Xu and Wu, 2022).

In this paper, we study the impact of South African internal migration on non-migrant secondary enrollment rates and school completion of 19-21 year-olds over the period 1996 to 2011, at the local municipality and district levels using census data for the years 1996, 2001, and 2011.[3] We specifically focus on migrants from the Eastern Cape (EC) province given a strong historical connection between the space-economies of the former homelands and South Africa, beginning with the annexation of these territories to the Cape Colony in the late nineteenth century.[4] These policies contributed to turn particular areas of the EC into what would effectively become a labor reserve for various industries. The colonial and apartheid legacy of separate development, labor migration, Bantu education, and social displacement (Hartnack, 2017: 3), combined with lasting spatial and structural inequalities have meant that predominately black individuals who live in former homelands and townships remain the poorest and most marginalized (Moses et al., 2017). In this setting, access to quality education becomes very difficult and community-related factors that impact dropout and non-completion carry weight. However, the lifting of migration control in South Africa beginning in the late 1980s (Collinson and Wittenberg, 2001; Kok and Collinson, 2006) led to increased permanent household migration and urbanization, both internal and external to the Transkei and the EC (Kalule-Sabiti and Kahimbaara, 1995; Reed, 2013). To the best of our knowledge, only two studies to date have analyzed the impact of internal migration on child educational outcomes in South Africa. Firstly, Ginsburg et al. (2011) provide evidence that mobility in South Africa may enable children to access improved educational opportunities, school choice, and living circumstances. Secondly, Zoch (2016) shows that black pupils' outcomes improved substantially after moving from poorer neighborhoods to much wealthier ones. Both studies focus on intra-district migration while our study centers on inter-district migration.

[3] These are the three censuses that have been completed to date in South Africa. The 2021 Census is underway as of June 2022.

[4] We define a space-economy as comprising adjoining spatial regions that share related flows and markets for labor and land as well as infrastructure platforms.

The empirical analysis closely follows the approaches taken by Berker (2009), Hunt (2017), and Kollamparambil (2017). Specifically, we calculate municipality- and district-level schooling outcomes adjusted for individual characteristics and conduct the main analyses on a panel of local and district municipalities using national census data for 1996, 2001, and 2011. We employ First Difference (FD) and System Generalised Method of Moments (GMMSYS) estimators to deal with issues of dynamic panel bias (Ullah et al., 2018) and endogeneity.

In the empirical analysis, we find a positive relationship between internal migration and non-migrant secondary-school enrollment that varies depending on the education levels of the internal migrant and the non-migrant household heads. A single percentage point increase in the share of internal migrants in the population aged 16–64 from a household whose head has less than 12 years of education, increases the non-migrant probability of enrollment by 0.352 percentage points. Larger effects are seen as follows: a single percentage point increase in the share of internal migrants in the population aged 16–64, from a home with more than 12 years of education, increases the non-migrant probability of secondary school enrollment by 0.909 percentage points.

We closely follow the approaches taken by Berker (2009), Hunt (2017), and Kollamparambil (2017). Specifically, we calculate municipality- and district-level schooling outcomes adjusted for individual characteristics and conduct the main analyses on a panel of local and district municipalities using national census data for 1996, 2001, and 2011. We employ First Difference (FD) and System Generalised Method of Moments (GMM-SYS) estimators to deal with issues of dynamic panel bias (Ullah et al., 2018) and endogeneity.

We also find a positive effect of the share of 19–21-year-old internal migrants on non-migrant secondary-school completion. Specifically, a one percent increase in the lagged share of the population aged 16–54 – that is, internal migrants with less than 12 years of education – increases the probability of non-migrant secondary-school completion by 1.474 percentage points. This relates to the labor market, as young internal migrants compete with non-migrants for jobs and the latter upgrade their education in response by completing Grade 12. Additionally, a higher share of young working-age migrants is likely to change the wage structure and wage inequality, adding to our understanding of income and educational inequality in South Africa.

This study complements the work by Kollamparambil (2017), who used the 2008, 2012, and 2014 waves of the National Income Dynamics Survey (NIDS) data to analyze the effects of internal South African migration on inequality, finding that internal migrants are more likely to be unemployed than non-internal migrants before and after migration. Kollamparambil also reports that migration increases income inequality in urban centers, because internal migrant unemployment adds to existing unemployment. Our decision to use South African census data, was made as

it is more representative of the population at disaggregated district and municipality levels, but also covers a longer period of post-1994 migration than the NIDS data.

In the following section we contextualize South African education in both pre- and post-apartheid. Thereafter, we situate migration in its historical context.

THEORETICAL FRAMEWORK

Education is a leading indicator of social mobility and has a positive correlation with increasing income; higher levels of education and income induce migration among the lower-income earners in developing countries (Handler, 2018). Above a certain point, however, rising salaries slow migration down, resulting in an inverted U-shaped association between education and migration (Handler, 2018).

Internal migration of children of school-going age modifies the spatial distribution of the school-age population, and changes the educational opportunities and net benefits for both non-internal-migrant children in destination and origin areas, depending on the relative densities and inflows of internal migrants (Berker, 2009), as well as the internal-migrant children themselves (Swanson and Schneider, 1999; Haveman et al., 2004). For example, a strain on the local school system may be due to an inflow of internal-migrant children and an increase in the average number of learners per input (e.g., strain on teachers), but also to a higher density of less-educated parents among internal migrants (Hunt, 2017). An alternative argument is made by Huang (2022), that internal-migrant children have negligible to no negative peer effects on destination schools because of parental presence. This means that internal-migrant children's behavior would be better compared to children left behind by their parents.

Benefits to non-migrant residents may arise from a shift in relative skills that will allow for higher labor market returns to those with higher levels of education and therefore incentivize investment in education (Betts, 1998). Wages and job availability for non-migrants may decline as a result of migration if the skills of internal migrants and non-migrants are interchangeable; alternatively, migration can increase wages and job opportunities for non-migrants if the skill sets of internal migrants and non-migrants are complementary (Viseth, 2020).

Increased low-skilled migration may increase competition for low-skilled jobs, driving wages down. Thus, non-migrant school completion may increase in response, preventing wages from falling (Hunt, 2017).

Empirical literature

With reference to the United States, McHenry (2015) focused on the eighth grade and found that an increase in low-skilled immigrants leads non-migrant children to increase their secondary school attendance and pass rates, and stay longer in school (obtaining more grades). McHenry identifies the channels of these effects by analyzing non-migrant student responses to questions about their school experiences,

expectations, and attitudes. Hunt (2017) studied the effects of immigration on non-migrant secondary school and her results differed, depending on gender and race. Hunt's study found that immigration increases the likelihood of completing secondary school for both non-migrant black and white Americans while no statistically significant effect was found for Hispanics. Hunt also reports that non-migrant enrollment (particularly for children with low-educated parents) rises in response to immigration (similar to McHenry's findings). According to Hermansen and Birkelund (2015), increased immigrant concentration in Norwegian schools is linked to better prospects of non-migrants completing secondary education; the authors adopted a similar approach to McHenry, as they followed cohorts (from Grade 10), observing their outcomes at age 21. Hermansen and Birkelund, (2015) used data that allowed them to monitor longer-term effects, rather than short-term education outcomes at one point in time. In a cross-country study analyzing the Programme for International Student Assessment (PISA) results for 41 OECD countries, Silveira et al. (2019) similarly found a positive effect of increased migration on non-migrant children's mathematics scores at age 15.

Other scholars report heterogeneity in school performance of immigrants and non-migrant children that can be attributed to variations in socioeconomic status. For example, Dustmann and Glitz (2011) report that immigrant children to OECD countries generally fare much more poorly academically, than do local children in mathematics and English once they arrive in their destination countries. They also report that Australia, Canada, and the United Kingdom are exceptions, as immigrant children perform just as well or better than non-migrant children. This is likely due to these countries' migration policies that are geared toward attracting migrants with better education and language skills. D'Agostino et al. (2021) show that first-year science, technology, engineering, and mathematics (STEM) university students who migrated from southern to northern/central universities have lower levels of academic performance than students from the upper parts of Italy and study at institutions in the same region. This is an important contribution, as the authors highlight the challenges posed by migrating over larger distances and the effects on education outcomes.

The literature abounds with studies on negative migration effects. For instance, Brunello and Rocco (2013) conducted a survey of 19 OECD countries and report that increased immigration is associated with the negative impact on non-migrant students' academic performance. Hu (2018) provides evidence for developing countries, by reporting large, negative, spillover effects of Chinese internal-migrant children operating through peers and teacher effects, while Ballatore et al. (2018) report negative effects of immigration on non-migrant children aged 7–10 in Italian schools.

Other studies found minor to null effects of immigration on non-migrant education outcomes (see, e.g., Brandén et al., 2018; Huang, 2022). Huang's (2022) spatial equilibrium model and regression results show that Chinese internal-migrant

children's peer effects contribute to marginally reducing non-migrant school test scores by 0.038 standard deviations – effects that dissipate within one year. China's discriminatory *hukou* system has meant that rural-urban internal migrants face barriers that frustrate access to better paying jobs and promotions, keeping parents in a low-skilled and low-wage cycle (Song and Zhou, 2019; Goodburn, 2020; *China Labour Bulletin*, 2021). Goodburn (2020) in particular, finds that rural-urban migration children have lower education outcomes and end up in lower-quality schools after leaving junior high school, leading to their low-level labor market skills. These disagreements in the literature highlight the need for further scholarship on understanding the channels through which purported effects are said to be occurring. They also highlight the limited evidence on this topic for sub-Saharan Africa, something this paper aims to address.

MIGRATION IN HISTORICAL CONTEXT

Perennial labor-shortage problems of farmers in both the Cape Colony and Natal were solved by contracting migrant labor from the Transkei and Ciskei. From the 1880s onwards, the colonial government introduced several measures to increase the labor supply to white-owned farms. Bergh (2010) narrates how Cape Colony legislation was used to create "reserves" that provided creating cheap labor for white-owned farms. These included a hut tax on black people in the Cape Colony, as well as a labor tax on those living in the reserves (van der Horst, 1942).

Despite the relative success of these measures, the amount of labor supplied to the agricultural sector remained insufficient. White farmers and Anglo-controlled mining companies advocated for the creation of black reserves through the 1913 Natives Land Act and early pass laws (Schierup, 2016: 1053). The result was the establishment of "influx control," which not only increased labor supply, but also reduced the cost of unskilled laborers, who otherwise would have sought higher-wage employment in urban areas (Mncube and Harber, 2013). It was, however, under the apartheid regime that labor regulation took prominence as an "extreme extra-economic coercion of the majority of the workforce" (Legassick, 1974: 255).

Building upon existing legislation such as the Development Trust and Land Act of 1936, the migrant labor system and spatial allocation of labor became permanently institutionalized following the 1945 Black Urban Areas Consolidation Act, the 1967 Physical Planning Act, and the 1968 Promotion of the Economic Development of the Homelands Act. Former non-migrants were resultantly reclassified as foreigners which, along with the establishment of centralized labor bureaus set up to monitor the movement of this newly "alienized" foreign non-migrant labor force, set in motion a "permanent condition of rural-urban migrancy" (Schierup, 2016: 1053).

Without much productive rural land to farm there was little choice for workers but to seek work as temporary/contract migrant laborers in urban areas. Muller (1983, citing Nattrass (1976) and BENSO (1982)), notes that the number of migrants from rural homeland areas increased threefold between 1938 and 1980. As argued

by Nattrass (1983: 17) such a migrant labor system becomes self-perpetuating, since economic participation outside the homelands, particularly by the youth (young people tend to be innovators of change) undermines economic development inside the homeland. As a result, oscillating migration tripled in scope from around 500,000 in 1936 to just over 1.3 million workers by 1980 (Nattrass, 1976; BENSO, 1982).

In a study of lifetime migration in the former Transkei, Kalule-Sabiti and Kahimbaara (1993) found that prior to 1970, the Transkei experienced net-out-migration to the mines. However, migration dynamics were reversed in the 1970s following internal self-rule and political independence. Between 1980 and 1990 in-migration occurred at a faster pace. Two-thirds of all migrants were aged 15–44, whereas 68 percent of non-migrants were younger than 15. Most internal Transkei migration was from rural to urban centers, with the largest share of these migration inflows coming from South Africa and comprised people aged 55 years and older (Kalule-Sabiti and Kahimbaara, 1993).

Posel and Casale (2006) show that circular labor migration and the reliance of households on remittances from migrant workers remained significant during the first decade of democracy. At the onset of democracy, the Eastern Cape (EC) and its former homelands continued to be one of the largest senders of migrants to other provinces. Between 1992 and 1996, close to 250,000 people left the EC, 80 percent of whom moved to KwaZulu-Natal, Western Cape (WC), and Gauteng. Using the 1996 census, Kok (1999: 42) shows the clear "dominance of the former homeland areas as a reservoir of migrant workers." Kok (1999) found that in several districts of the Transkei, the size of the ex-migrant population is almost equivalent to that of the population who did not migrate. As argued by Posel and Zeller (2010), the continued prevalence of temporary migrant labor post-apartheid might be indicative of deeply entrenched migration patterns that could over time be supplanted by the permanent settlement of individuals and households. Studies by Bekker (2002) and van der Berg et al. (2019) found lower return migration from the WC to the EC. Similar trends are identified using the 2008 NIDS data, which indicates significantly lower estimates of labor migration and remittances compared with the Labour Force Survey (LFS) for the period 2002–2005.

DATA DESCRIPTION

Observations in this study are based on three post-apartheid South African Population Censuses for 1996, 2001, and 2011, which capture information on the change of residence between census years; this is important for distinguishing migrant from non-migrant individuals and households. The combination of these data sets allowed us to capture all the information needed in the study. The nine South African provinces are divided into a panel of metropolitan and district municipalities, which are then subdivided into local municipalities. The non-migrant and migrant status of individuals older than five years is determined using information about mobility across municipalities within five years prior to the census. Non-migrant residents are

defined as individuals reporting to reside in the same municipality five years prior to, and at the time of the census. Recent migrants from this point on are referred to simply as migrants and are defined as individuals residing in different municipalities five years prior to, and at the time of the census. For example, a migrant in the 2001 census would be defined as an individual whose district or municipality changed sometime between 1996 and 2001. The study also distinguishes between those migrants who moved at least three years prior to the census, that is, between 1996–1998 or 2006–2008, in the case of the 2001 and 2011 censuses respectively.

In South Africa, education is compulsory up to and including Grade 9. The primary-school-age population usually consists of children aged 6–13 years, while the secondary-school-age population usually consists of children aged 14-18 years. We focus on two educational outcomes at the municipal and district levels (secondary-school enrollment and completion) and closely follow the approach taken by Berker (2009) and Hunt (2017).

None of the data sets under consideration provides information on where individuals lived when they received education. To increase the chances of matching information on the place of residence and education of children, secondary-school completion rates are computed for 19–21-year-olds – who would have been 14–16 years old five years prior to the census data being collected.

Methods

Following the empirical approaches of Berker (2009) and Hunt (2017), we estimate, as an initial first step, regression models at the individual level to calculate district and municipality education outcomes adjusted for the characteristics of non-migrants and migrants. These baseline models are common in the literature (see, e.g., Wang, 2019; D'Agostino et al., 2021). Specifically, the study estimates the following linear probability regressions:

$$P\left(E_{ijt} \geq 12\right) = \phi_0 + \phi_1 F_{ijt} + \phi_2 R_{ijt} + \phi_3 \sum_{a=19}^{21} A_{ijt}^{a} + \sum_j \sum_t \lambda_{jt}(\delta_j \times \nu_t) + \eta_{ijt} \quad (4.1)$$

$$P\left(Enroll_{ijt}\right) = \gamma_0 + \gamma_1 F_{ijt} + \gamma_2 R_{ijt} + \gamma_3 \sum_{a=15}^{17} A_{ijt}^{a} + \gamma_4 X_{ijt} + \sum_j \sum_t \pi_{jt}(\delta_j \times \nu_t) + \xi_{ijt} \quad (4.2)$$

where E_{ijt} and $Enroll_{ijt}$ are the educational attainment and enrollment status of individual i in municipality/district j at time t, respectively, F is a gender dummy, R are race dummies, A^a are age dummy variables, δ_j are municipality/district dummies and ν_t are time dummies. The vector X contains household-level covariates, including

the educational attainment of the household head, the household composition (number of children, working-age adults, and retired persons) and per capita income. Regressions (4.1-2) are weighted using census person weights.

In a second step, the study uses the coefficients $\hat{\lambda}_{jt}$ and $\hat{\pi}_{jt}$ as the dependent variable in a municipality/district panel analysis:

$$\hat{\lambda}_{jt} = \kappa_0 + \kappa_1 I_{jt}^{19-21} + \kappa_2 I_{jt}^{E} + \kappa_3 X_{jt} + \delta_j + \nu_t + \varepsilon_{jt} \quad (4.3)$$

$$\hat{\pi}_{jt} = \mu_0 + \mu_1 I_{jt}^{15-17} + \mu_2 I_{jt}^{E} + \mu_3 X_{jt} + \delta_j + \nu_t + \varepsilon_{jt} \quad (4.4)$$

$I^{a_1-a_2}$ and I^{E} represent the primary variables of interest, with the former representing the share of the population aged a_1-a_2 in municipality/district j that are migrants, and the latter the share of the working-age population who were migrants with educational attainment *E (E<12,E=12 and E>12)*. To capture non-migrants' exposure to migrant classmates (peer effects), equation (4.3) makes use of migrants who changed their municipality/district at least three years prior to the time of the census, while (4.4) makes use of migrants who changed their municipality/district at any time during the five years prior to the time of the census.

Although a positive correlation between $I^{a_1-a_2}$ and I^{E} is expected (most migrant children move with their parents), it should be possible to identify their effects separately, as not all working-age migrants have children. X_{jt} is a vector of municipality/district-level characteristics that might be related to educational outcomes, including the unemployment rate, average per capita income, proportion of the population living in overcrowded households, proportion of the population that is male and the proportion of the population living in rural areas. All these controls are entered in log form to allow for non-linearity. Regressions (4.3-4) are estimated using weights, w_{jt}, computed as the inverse of the squared standard errors on $\hat{\lambda}_{jt}$ and $\hat{\pi}_{jt}$ from equations (4.1-2).

The regressions above are likely to suffer from endogeneity problems. For example, there are likely to be municipality/district factors that influence both migrant choice and educational outcomes, as well as a bidirectional relationship migration inflows and educational attainment. We follow empirical techniques in the migration literature (see, e.g., Jacobs et al., 2022; Mara and Landesmann, 2022) that include a lagged dependent variable as a control to address issues of persistence and autocorrelation, yielding dynamic models:

$$\hat{\lambda}_{jt} = \kappa_0 + \kappa_1 I_{jt}^{19-21} + \kappa_2 I_{jt}^{E} + \kappa_3 X_{jt} + \kappa_4 \hat{\lambda}_{jt-1} + \delta_j + \nu_t + \varepsilon_{jt} \quad (4.5)$$

$$\hat{\pi}_{jt} = \mu_0 + \mu_1 I_{jt}^{15-17} + \mu_2 I_{jt}^{E} + \mu_3 X_{jt} + \mu_4 \hat{\pi}_{jt-1} + \delta_j + \nu_t + \varepsilon_{jt} \quad (4.6)$$

An immediate problem with applying ordinary least squares (OLS) estimation to equations (4.5-6) is dynamic panel bias (Hausman and Pinkovskiy, 2017); that is, the lagged dependent variable is correlated with time-invariant municipality/district factors. This can be corrected by purging the fixed effects using a first difference (FD) estimator:

$$\Delta\hat{\lambda}_{jt} = \kappa_0 + \kappa_1 \Delta I_{jt}^{19-21} + \kappa_2 \Delta I_{jt}^{E} + \kappa_3 \Delta X_{jt} + \kappa_4 \Delta\hat{\lambda}_{jt-1} + \nu_t + \Delta\varepsilon_{jt} \quad (4.7)$$

$$\Delta\hat{\pi}_{jt} = \mu_0 + \mu_1 \Delta I_{jt}^{15-17} + \mu_2 \Delta I_{jt}^{E} + \mu_3 \Delta X_{jt} + \mu_4 \Delta\hat{\pi}_{jt-1} + \nu_t + \Delta\varepsilon_{jt} \quad (4.8)$$

The FD specifications use $1/\left(\frac{1}{w_{jt}} + \frac{1}{w_{jt-1}}\right)$ as weights.

However, even though fixed effects have been eliminated, the lagged dependent variable continues to be potentially endogenous through its correlation with $\Delta\varepsilon_{jt}$. Further endogeneity bias may also arise due to simultaneity between educational outcomes and migrant inflows, as well as the predetermined nature of several variables included in X (that is, correlated with past and potentially current realizations of ε_{jt}). These issues could be addressed using an Anderson and Hsiao (1982) levels estimator, which takes First Differences (FD) and then instruments potentially endogenous variables using lags of their own levels. However, lagged levels are often shown to be poor instruments if variables are close to a random walk (Roodman, 2020). To improve efficiency, the Arellano-Bover/Blundell-Bond (Arellano and Bover, 1995; Blundell and Bond, 1998, 2000) System Generalised Method of Moments (GMM-SYS) estimator introduces more instruments through combining a system in the difference estimator (equations 4.10-12) with levels as instruments, with the estimator in levels (equations 4.7-9) with First Differences as instruments.

Empirical results and discussion

In Table 1, we show the effects of migrant age and education on non-migrant probability of secondary-school enrollment, by education of the household head. We report the results in four separate panels (a) to (d). In the first rows of panels (a) to (d), when considering the migrant share of the population is aged 15–17, we found an initial positive effect on non-migrant enrollment in OLS specification, regardless of parental education on non-migrants. This effect dissipates by the time the GMM-SYS is adopted. This suggests that there are no significant positive or negative peer effects of migrants on enrollment.

We analyze this further by studying how migrants from households with varying parental education levels interact with non-migrants from households with varying parental education. In panel (a), where the enrollment rates of all non-migrants aged 15–17 are considered, a higher share of migrants from a home

where the head has less than 12 years of school, is related to significantly higher educational enrollment in the GMM specifications (coefficient = 0.391 at 10 percent significance). Migrants from homes with higher-educated parents have a larger positive effect on non-migrant enrollment (coefficient = 0.879).

These findings are nearly identical to what we find in panel (b) when considering the enrollment rates of non-migrants aged 15–17 residing with a household head who has less than 12 years of education, are the dependent variable. Migrants with less than 12 years of education have a positive effect on non-migrants' secondary-school enrollment (coefficient = 0.352), while migrants with more than 12 years of education have a much stronger positive effect on non-migrants' enrollment (coefficient = 0.909). The latter finding is similar to that reported by Hunt (2017) and shows that there is a positive effect on non-migrants from low-education households, from migrants coming from high-education homes. In panels (c) and (d) that consider the enrollment of non-migrants aged 15–17 residing with household heads with at least 12 years of education or higher, the migration effects are mostly insignificant. What may be happening here is that non-migrant parents from households with a low education could be encouraging their children to enroll, as they feel that migrants are their competition for future opportunities. Our result is also related to Jackson's (2015) study, that reports that increased migration of unskilled labor drives wages and prompts an increase in enrollment, as students register in anticipation of greater earning potential.

Table 1: Effect of migrants by age and education on non-migrant probability of secondary-school enrollment (15–17 years) by household-head education

	OLS (1)	OLS (2)	Dynamic OLS (3)	First difference (4)	GMM-SYS (5)
(a) All non-migrants aged 15-17 dependent variable					
Share population aged 15 to 17 that is migrant	0.413*** (0.069)	-0.190 (0.348)	-0.193 (0.280)	-0.123 (0.445)	0.512 (0.311)
Lagged share population aged 16 to 54 that is migrant with...					
... <12 years of education	0.438*** (0.143) -0.108	0.385*** (0.127)	0.240** (0.100)	0.228 (0.176)	0.391* (0.201)
...12 years of education	(0.102) 1.960***	-0.678 (0.490)	-0.685* (0.354)	-0.130 (0.646)	-1.324 (0.837)
...>12 years of education	1.960*** (0.561)	-0.020 (0.305)	0.271 (0.208)	0.413 (0.287)	0.879*** (0.243)
(b) Non-migrants aged 15-17 residing with household head who has <12 years of education					
Share population aged 15 to 17 that is migrant	-0.449** (0.213)	-0.385 (0.389)	-0.311 (0.333)	-0.191 (0.471)	0.455 (0.309)
Lagged share population aged 16 to 54 that is migrant with...					
... <12 years of education	0.284*** (0.106)	0.393*** (0.138)	0.274** (0.110)	0.225 (0.195)	0.352* (0.190)
...12 years of education	-0.226 (0.416)	-0.847 (0.539)	-0.867** (0.417)	-0.218 (0.717)	-1.045 (0.929)
...>12 years of education	-0.050 (0.379)	-0.024 (0.341)	0.255 (0.247)	0.446 (0.310)	0.909*** (0.293)
(c) Non-migrants aged 15-17 residing with household head with 12 years of education					
Share population aged 15 to 17 that is migrant	0.653** (0.274)	1.042*** (0.345)	0.919*** (0.337)	0.786 (0.644)	-0.356 (0.590)
Lagged share population aged 16 to 54 that is migrant with...					
... <12 years of education	0.082 (0.141)	0.225 (0.156)	0.180 (0.161)	0.373 (0.278)	0.281 (0.273)
...12 years of education	0.363 (0.515)	0.010 (0.592)	-0.080 (0.596)	0.165 (0.185)	-1.398 (1.129)
...>12 years of education	-0.340(0.385)	-0.712*** (0.256)	-0.769*** (0.254)	-0.880** (0.359)	-0.465 (0.623)
(d) Non-migrants aged 15-17 residing with household head who has >12 years of education					
Share population aged 15 to 17 that is migrant	0.414** (0.181)	0.604** (0.254)	0.606** (0.260)	0.410 (0.436)	-0.374 (0.967)
Lagged share population aged 16 to 54 that is migrant with...					
... <12 years of education	0.289** (0.129)	0.312** (0.139)	0.335** (0.152)	0.250 (0.369)	-0.349 (0.309)
...12 years of education	-1.317*** (0.475)	-1.171** (0.493)	-1.206** (0.523)	0.112 (0.152)	1.745* (1.032)
...>12 years of education	0.655 (0.436)	0.250 (0.371)	0.234 (0.381)	0.475 (0.493)	0.458 (0.697)
Unemployment rates	Yes	Yes	Yes	Yes	Yes
Share of non-migrant population aged 15–17	Yes	Yes	Yes	Yes	Yes
Area dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Economic/sociodemographic indicators	No	Yes	Yes	Yes	Yes
Lagged dependent variables	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the share of non-migrants aged 15 to 17 who are enrolled in secondary schooling, adjusted at the individual level for age, gender, race and household characteristics. Estimation is by weighted least squares with weights w the inverse of the squared standard errors on the district/municipality-year interaction coefficients in the individual regression for columns 1-3 and 5, and 1/(1/wt +1/wt-1) for column 4. All specifications include census-year dummies. Robust standard errors are indicated in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Source: Authors' own work

In Table 2 below, we split the migrant share of the population ages into four categories. The top row shows that there is no OLS effect (equation 4.3) of 19–21-year-old migrants (recent migrants who likely moved for work) on non-migrant secondary-school completion. However, the GMM-IV estimates show that migration benefits secondary-school completion of non-migrant children as wealthier, more capable students are more likely to migrate. These migrant students could also have received better-quality education prior to migrating, and be harder working than non-migrant students, resulting in positive peer effects that improve secondary-school completion rates (resonating with the findings of McHenry, 2015; Hunt, 2017; and Brunello et al., 2020). Brunello et al. (2020) further interrogate the professions that these students pursue after school completion. They show how immigration increases the shares of non-migrant Italian students who continue to college and those who complete high school and do not study further. What is significant about our positive result is that it provides nuance to discussions about low South African school completion rates mentioned in the introduction.

The mixed results of migration on school completion reveal something that is missing in this literature – that is, controlling for attitudes and perceptions of the populations being studied toward migrants and immigrants. In the outline of the theoretical framework we mentioned how migrants may be viewed as complementary or competition, but models are not capturing this phenomenon.

The second row of Table 2 shows that the overall effect of migrants aged 6–17 (with a high probability of having studied with non-migrants) on non-migrants completing 12 years of schooling is negative and statistically significant in the GMM regression. That is, the greater the lagged share of young migrants present in school, the less likely non-migrants are to have completed secondary school (in consonance with Ballatore et al., 2018). This could be due to an increased strain on school resources, holding all else constant. What could also be happening here is that many migrant pupils are increasingly registering in areas with poorer quality schools – migrants tend to move to areas where other migrants already reside – crowding out resources. Teachers can also spend more time working with weaker migrant pupils, affording less time to non-migrant students. This has implications for educational inequality and, subsequently, labor-income differences that account for the dominant portion of income inequality in South Africa (Hundenborn et al., 2018; Branson et al., 2012).

Table 2: Effect of migrants by age and education on non-migrant probability of secondary-school completion 19–21-year-olds

	OLS		Dynamic OLS	First difference	GMM-SYS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of population aged 19 to 21, that is migrant	-0.013	-0.138	0.139	0.310	2.587***	1.906**	1.563**
	(0.522)	(0.468)	(0.337)	(0.536)	(0.736)	(0.838)	(0.724)
Lagged share of population aged 6 to 17, that is migrant							
Lagged share population aged 16 to 54 that is migrant with...							-1.464***
							(0.565)
... <12 years of education	-0.646***	-0.249**	-0.097	-0.304**	-0.165	-0.162	1.474**
	(0.131)	(0.107)	(0.099)	(0.133)	(0.169)	(0.204)	(0.679)
...12 years of education	1.794***	-0.213	-0.755*	-0.373	0.091	-0.009	0.767
	(0.516)	(0.457)	(0.386)	(0.537)	(0.645)	(0.761)	(0.889)
...>12 years of education	-0.847	-0.513*	-0.403	-0.330	0.375	0.167	-0.353
	(0.526)	(0.284)	(0.263)	(0.274)	(0.347)	(0.466)	(0.464)
Unemployment rates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Share of non-migrant population aged 19–21	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Area dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economic/ sociodemographic indicators	No	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.870	0.921	0.947	0.608			
Observations	112	112	112	56	112	112	112
# of instruments					20	22	23
p-value Hansen test					0.233	0.102	0.341
p-value Diff Hansen					0.161	0.149	0.242

Notes: The dependent variable is the share of non-migrants aged 19 to 21 who have completed secondary schooling (12 years of education), adjusted at the individual level for age, gender, and race. Estimation is by weighted least squares with weights w the inverse of the squared standard errors on the district/ municipality–year interaction coefficients in the individual regression for Columns 1-3 and 5, and 1/(1/ wt +1/wt-1) for Column 4. All specifications include census-year dummies. The instruments in Column 5 include: the levels and first differences of: lagged dependent variable, the share population ages 19 to 21 that is migrant, and share of population ages 16 to 54 with varying levels of educational attainment; levels of: unemployment rate ages 15–24; unemployment rate ages 25–54; share of non-migrant population of age cohort; log per capita income; log overcrowding; log male; log rural; and year dummies. Columns 6 and 7 additionally allow for the unemployment rate, ages 15–24 to be potentially endogenous. Robust standard errors are reported in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Source: Authors' own work

CONCLUSION AND RECOMMENDATIONS

This study investigated the relationship between internal migration and secondary-school completion rates in several South African provinces. Following accepted practice, we used the instrumental variables approach to address endogeneity concerns of local internal migration and to control for possible environmental influences related to family socioeconomic backgrounds. This study found that internal South African migration has different effects on non-migrant education outcomes, although the overall effects are indistinct, as indicated in the relevant literature (see, e.g., Schneeweis, 2015; Hunt, 2017; Ballatore et al., 2018).

The empirical results suggest that the impact of migration on non-migration school enrollment is sensitive to education levels of the household heads (migrant and non-migrant). If migrants come from households where the head was educated at least up to the end of secondary school, then these migrants have a positive impact on school enrollment of non-migrants aged 15–17 who reside in households where the head is also educated up to at least Grade 12. This positive migration effect is more pronounced if the migrants come from homes where the head has tertiary-level education. These results have implications for South African higher education policy. Over the past decade, South African higher education has experienced a surge in numbers of students registering to study at the various types of institutions. This has in part been driven by the #FeesMustFall movement and the increased funding of previously disadvantaged groups by the National Student Financial Aid Scheme (NSFAS). The South African government is encouraged to increase funding support for parents who cannot afford to and who wish to study further than their secondary education, as this will benefit their children. The funding focus for tertiary education is currently on young students.

While increasing secondary-school enrollment is desirable, it means little if students do not complete their studies. This point highlights the importance of the result that internal migration of those aged 6–64 also has an overall large positive effect on secondary-school completion of non-migrants aged 19–21 years. Further investigation of this positive impact of migrants on secondary-school completion (see Table 1), reveals that working-age migrants aged 19–21 positively affect secondary-school completion of non-migrants aged 19–21 years. These migrant students may have higher work ethics and capabilities than non-migrant students; this provides evidence for the labor market channel. Non-migrants upgrade their schooling in response to an increase in similar-aged migrants who are likely to be job seekers, especially when these migrants have a lower level of education (Hunt, 2017). Increased school completion raises students' human capital and labor market potential but will not benefit the economy if there are not enough jobs generated in migrants' origin and destination areas. National and local government authorities are encouraged to develop rural communities and cities to create employment to absorb youth into the economy after they complete their studies. There is a risk of

South Africa emulating its neighbor, Zimbabwe, where thousands complete school and become economic migrants in other countries.

We also reported a negative relationship between the lagged share of young migrants aged 6–17 on the secondary-school completion of those aged 19–21 years. This could be evidence of pressure on school resources (e.g., strain on teachers) due to greater classroom sizes, since migrants of that age group would have been at school with non-migrants for much of their schooling lives. These negative results are important for budgeting and planning in South African education, which is characterized by regional divergences in wealth and inequality (Spaull, 2015; Moses et al., 2017; Weybright et al., 2017). South African public schools are generally oversubscribed, with classrooms that have many more students than policy permits or are feasible for the teacher to manage before factoring in the effects of migration. While the government has been sued by non-profit organizations to increase the number of schools, teachers, and available resources, the situation does not seem to be improving (du Plessis and Mestry, 2019; van Niekerk, 2020). The government is also encouraged to improve the quality of teaching colleges and the programs offered to produce more competent teaching staff.

This work can be extended in the future by researchers in two ways. Firstly, researchers can investigate the effects of South African internal migration on those left behind in communities and focus on other outcomes besides education. Secondly, our results do not demarcate the specific regions where the various migration effects are occurring. Neither do they study differences between private and public schools, nor by race, mother tongue language, nor gender. Scholarship that analyzes migration effects on a micro level can support policymakers in making more targeted interventions.

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