The Contribution of Residential Segregation to Racial Income Gaps: Evidence from South Africa

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July 2020

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Total word count: 17412

In this paper, we contend that local segregation should be an essential component of the analyzes of the determination of socio-ethnic income gaps. For this, we adopt a thorough distribution decomposition approach, as a general preliminary descriptive step to prospective specific structural analyses. Focusing on the contemporary White/African gap in South Africa, we first complete Mincer wage equations with an Isolation index that reflects the level of segregation in the local area where individuals dwell. Second, we decompose the income gap distribution into detailed composition and structure components. Third, we explore the heterogeneity of segregation effects on wage gaps along three theoretical lines: racial preferences, labor market segmentation, and networks links. Segregation is found to be the main contributor of the structure effect, ahead of education and experience, and to make a sizable contribution to the composition effect. Moreover, segregation is harmful at the bottom of the African income distribution, notably in relation to local informal job-search networks, while it is beneficial at the top of the White income distribution. Only minor influences of racial preferences and labor market segmentation are found. Specific subpopulations are identified that suffer and benefit most from segregation, including for the former, little educated workers in agriculture and mining, often female, immersed in their personal networks. Finally, minimum wage policies are found likely to attenuate most segregation's noxious mechanisms.

JEL Codes: J15, D31, R23

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I. Introduction

Persistent racial differences in socio-economic outcomes is a major concern as it threatens the stability of increasingly diverse modern societies. Earlier attempts to legally justify such differences were met with a fierce resistence of civil rights movements. In South Africa, the Apartheid regime clashed with the African resistence during most of the twentieth century, while in the United States, the Civil Rights movement battled relentlessly against the Jim Crow legislation. However, explaining the persistence of such differences, most notably income gaps (Bayer and Charles 2018; Leibbrandt et al. 2010b), even after these discriminatory legislations were repealed still constitutes a challenge for social scientists.

To explain these gaps, most of the literature invokes labour market mechanisms, operating either through human capital endowment gaps or discrimination (Altonji and Blank 1999). A notable exception is the recent contribution of Chetty et al. (2020) which shed lights on the role played by differences in intergenerational mobility. Yet, among pre-market factors, residential segregation has received much less attention than education or family backgrounds. Most of the time, the analysis is limited to the spatial mismatch hypothesis: the tendency for minority members living far from job centers to select poorer job alternatives (Kain 1968). However, because working decisions and selected job opportunities may depend also on people's interactions within their neighborhood, alternative mechanisms based on racial preferences or neighborhood effects may participate in generating income differences.

Nevertheless, there is only limited and mixed evidence on the effect of segregation on incomes, almost exclusively based on the United States, and the relative

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importance of segregation compared to other determinants is rarely assessed. Cutler and Glaeser (1997) find on average a negative effect, while Edin et al. (2003) estimate a positive effect and Oreopoulos (2003), consistently with the results on the Moving To Opportunity experiment (Katz et al. 2001), do not spot any effect at all. These disparate findings may be partly explained by heterogeneity in the mechanisms of segregation. In this regard, Cutler et al. (2008) show that segregation impact differently immigrants' wages depending on their education group, and Chetty et al. (2016) uncover a positive effect on children's future wages had they moved into lower-poverty neighborhoods before they had reached 13, but a small negative effect for older ones.

In this paper, we provide new evidence on the importance of segregation for racial income differences. We use South Africa as a benchmark case for examining these issues. Arguably, this is a most relevant case as the country combines the longest and most pronounced experience of legally enforced segregation with one of the largest racial income gap in the world.

Our analysis is organized into two parts. First, we document the effect of segregation on incomes in South Africa using a simple Mincerian framework. This analysis of the mean effect of segregation has a twofold virtue. Firstly, it establishes a premier estimate for South Africa, as the South African wage gap literature is actually silent on this phenomenon (Sherer 2000; Gradín 2012, 2014; Leibbrandt et al. 2010b). Secondly, it provides a useful benchmark of the aggregated pattern. Then, we scrutinize the heterogeneous association of incomes with residential segregation with RIF-regressions and generalized decompositions (Firpo et al. 2009; Fortin et al. 2011), which allows us to identify for whom segregation matters most.

Consistently with Cutler and Glaeser (1997), we find that segregation has, on

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average, a negative effect on incomes for Africans. The average effect for Whites is positive but unstable over time. Segregation is the main contributor to the racial income gap, even ahead of education, particularly for the structure effect. The differential effect of segregation emerges even clearer in the distributional analysis. Segregation is associated negatively with income at the bottom of the African distribution, while positively for the top of the White distribution. Again, segregation appears as the main contributor in the structure effect with the strongest positive contribution below the median.

In the second part of the paper, we exploit our estimations through the prism of the 2018 minimum wage reform in South Africa. We observe that the distinct policies advocated about this reform by the major political actors imply contrasting views about the resulting influence of segregation on the income gap. Motivated by natural constituencies of these parties, we examine three socio-economic mechanisms that might explain how segregation impacts incomes, namely: network effects, racial preferences, and labor market segmentation. For doing so, we employ identifying variables of each mechanism in ancillary regressions of the estimated quantile effect of segregation. We complete our analysis of the heterogeneity of segregation effects by detailing the socio-demo-economic characteristics of the African main winners and losers from segregation with a classification analysis in the spirit of Chernozhukov et al. (2018).

As a result, we exhibit local within-group networks as important channels mediating the effect of segregation on income gaps. Moreover, these network effects are heterogeneous, and even antagonistic, alternatively attenuating and amplifying racial income gaps in different sections of the distributions and across groups. Second, the 2018 minimum wage reform is found likely to attenuate the segre-

gation influence on wages for Africans, in a fashion consistent with the political constituencies of the main political parties in this country. Last, a classification analysis points at gender differences, network effects, and unionship as important sources of heterogeneity between winners and losers of this reform. However, education is unlikely to matter much for heterogeneity as both winners and losers, on average, quit schooling without any diploma.

The remainder of the paper proceeds as follows: Section II. discusses the potential economic channels through which segregation might affect income. Section III. describes the measure of segregation and the inference problem in mean and distribution decompositions that some measures elicit. Section IV. reviews segregation during Apartheid and the post-Apartheid trends of income inequality, and presents the data. Section V. expounds on the results obtained by decomposing the mean income gap. Section VI. extends the analysis to the entire income distribution. Section VII. discusses the potential consequences of the 2018 minimum wage reform for the racial gap and segregation. This section also examines the potential socio-economic mechanisms conveying the effect of segregation on incomes. The last section concludes the paper.

II.   How Segregation Relates to Incomes

II.A.   Individual Preferences for Segregation

In the housing market, segregation, through racial preferences, may transform neighborhoods into clubs and restrict the access to their amenities. In that case, individuals, when deciding where to live, take into account the racial composition of their targeted neighborhood. Schelling (1971) demonstrates that only a small

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preference for their own ethnic group is necessary to yield highly segregated local contexts. Realtors also play an important role. They can employ discriminatory tactics, such as redlining, because they are themselves racist or because they care for the racial preferences of their current or potential customers (Yinger 1986). Once established somewhere, individuals will vote for their contribution to local public goods. Alesina et al. (1999) show that individuals in more diverse communities vote for less spending in education when it also benefits to the minority group. This may generate differences in human capital accumulation across neighborhoods through differences in education quality, which finally materializes into wage gaps. Consequently, local segregation and income levels should be correlated in that case.

This mechanism is amplified if there is already an initial correlation between income and segregation. This would be the case if racial groups are hierarchized by income. Besides, economic gaps between races may be at the origin of racial prejudice (Blumer 1958).

II.B. Neighborhood and Peer Effects

Segregation may act on income through diffusion of labor-related behavior. Namely, individuals living in segregated areas may be more prone to develop specific work habits when they belong to some specific group and therefore to be subjected to group-specific income processes. For example, in the US, Black workers living in ghettos are sometimes believed to be characterized by tardiness, absenteeism, or unreliability, and this may be one reason for their lower incomes. Wilson (1987) claimed that it was inner-city isolation that generated bad work habits. In particular, there is some evidence of a 'ghetto culture' of bad habits that tends to

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reinforce these habits through social pressure. Even children often feel peer pressure to perform poorly at school. In these conditions, it may be difficult to escape unemployment and poorly paying jobs from within the ghetto. Bénabou (1993) shows that neighborhood and peer effects can explain some individuals' low quality of work. If one's peers are defined in connection to ethnicity, then the isolation index that we use measures the extent of such social pressure. Besides, social pressure may foster bad practices in one group and good work habits in another, which may further pull apart the incomes of the two groups under segregation.

In addition, ethnic networks may provide differential access to jobs and work promotions (Magruder 2010). In particular, local segregation against one group may limit its access to professional information obtained by other groups (Ioannides and Loury 2004). Ethnically isolated individuals may have lower incomes, ceteris paribus, because their information set is smaller.

II.C.   Segmented Labor Markets, Capital Ownership, Trade Unions, and Spatial Mismatch

Segregation may generate earnings differentials across groups by contributing to the segmentation of the labor market (Dickens and Lang 1985; Magnac 1991). Entrepreneurs may pay lower wages to the discriminated group because they are themselves racist and perceive a cost of employing a minority worker (Becker 1957). In addition, if racist entrepreneurs settle disproportionately in the same segregated areas, due to the proximity of an industrial park, for instance, then a correlation between local segregation and the wage gap across groups emerges.

Alternatively, racial discrimination from the employees, potentially sustained by trade unions, may serve as a device for protecting some insider workers' privi-

leges and higher wages in the primary sector. Historically, this was the case in the mining industry in South Africa (Thompson 2001, chap. 4). White miners were collectively organized and had laws passed that gave them a monopoly on well-paid jobs in mines, whereas African miners could have done the same work for a small fraction of their wage. Segregation eases the formation of such collective action by facilitating coordination within politically proactive groups, and the exclusion of discriminated groups. In these conditions, once again, segregation and incomes correlates. Note that in post-Apartheid South Africa, trade unions instead strive at reducing the wage gap, yielding a negative correlation with segregation.

Even when racial discrimination is statistical, rather than taste-based, segregation may still contribute to segmenting the labor market by limiting the information about minority workers reaching recruiters, which again generates wage gaps correlated with segregation. Large differences in capital ownership (and human capital) across groups, as is the case in South Africa, would strenghten this mechanism.

Segmentation can be implemented through entry barriers and costs into the primary sector. Thus, segregation may affect income levels by forcing minority workers to live far away from job opportunities (Kain 1968), thereby raising their search costs and commuting costs. In South Africa, post-Apartheid housing programs have been reinforcing the estrangement of many African workers from job opportunities for at least a decade (Bebbington et al. 2010).

Lastly, segregation may make traditional solidarity more salient by isolating them from the rest of the economy. For instance, in African communities, traditional redistribution within extended families, neighborhoods and kin groups, may discourage workers to search for well-paid jobs (Mhlongo 2019).

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III. Methodology

III.A. Measuring Segregation

1. Segregation Indices

One often measures segregation as the propensity of individuals to live with similar peers separately from other groups. The most standard measures assume a partition of the city[1] as given and use information on the subdivision of the city's population to compute an index. Massey and Denton (1988) propose considering five dimensions of segregation: evenness, exposure, concentration, centralization, and clustering. In this paper, we focus on evenness and exposure for several reasons. First, they are, by far, the most popular approaches in the segregation literature. Second, the other dimensions appear less specific to the notion of segregation, less politically salient, and may require fine-gridded data, which are typically not available.

Evenness refers to the degree of overlap between the spatial distributions of the two groups. The most common index in the empirical literature on segregation is the Dissimilarity Index, which quantifies the proportion of the minority group that would have to relocate to achieve an equal spatial distribution. Its formula in the case of two groups, say Africans and Whites, for a partition of the city into a set I of locations, is:

$$Dissimilarity = \frac{1}{2} \sum_{i \in I} |\frac{White_i}{White_{Population}} - \frac{African_i}{African_{Population}}| \qquad (1)$$

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[1]Segregation measures can also consider the country level. We will use the 'city' vocabulary in the remainder of this paper, as residential segregation is typically discussed at the city level.

where $Group_i$ is the number of Group individuals in location i, $Group_{Population}$ is the total number of Group individuals in the population, and the two groups are Africans and Whites.

In contrast, exposure measures the degree of potential contact between the two groups. One widely used measure of exposure is the Isolation index, which measures the probability of interacting with a member of the same group. Its formula, for example, for a White individual is:

$$Isolation = \sum_{i \in I} \frac{White_i}{White_{Population}} \frac{White_i}{Total_i} \qquad (2)$$

where $Total_i$ is the total population of location i.

Since we cannot observe the local network structure, our approach is pragmatic and relies on the Isolation index. Beyond its attractive axiomatic properties,[2] this choice is motivated by econometric identification assumptions that are discussed below.

III.B.   The Contribution of Segregation to an Income Decomposition

1.   General Issues

A central aim of this paper is to quantify the relative contribution of segregation to income gap distribution. Oaxaca-Blinder decompositions help quantify additive contributions of variables to the relationship between factors and outcomes. They often suggest explanations by factors or reciprocal links between outcomes and factors. As is typical in decomposition approaches (DiNardo et al. 1996; Sherer 2000),

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[2]It is notably asymmetric (Massey and Denton 1988) and respects the Independence and School Division properties (Frankel and Volij 2011).

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selection or endogeneity issues are not addressed and there is no causal interpretation of the decomposition, in general. The role of decomposition methods is to provide an initial, preliminary examination of the data, perhaps before specifying a causal or a theoretical model that would include factors found with substantial contributions. This descriptive-predictive approach is endorsed, for instance, in the survey of Fortin et al. (2011, pp. 96-97) on decomposition methods.

In a linear setting, the difference in mean outcome Y between two groups, A and B, is usually decomposed as follows:

$$\mathbb{E}[Y_A] - \mathbb{E}[Y_B] = (\mathbb{E}[X_A] - \mathbb{E}[X_B])\beta_A + \mathbb{E}[X_B](\beta_A - \beta_B)$$

where the composition effect, $(\mathbb{E}[X_A] - \mathbb{E}[X_B])\beta_A$, stems from the average difference in the characteristics X between the two groups, and the structure effect, $\mathbb{E}[X_B](\beta_A - \beta_B)$, comes from the difference in the coefficients β between the two groups (Jann 2008; Fortin et al. 2011). In particular, this simple adding-up property is automatically satisfied in the above standard Oaxaca-Blinder decomposition that relies on linear regressions to describe the means of the compared distributions. This is also the case when examining unconditional quantiles with RIF regressions because the last stage of their estimation is a linear regression. Each of the expectations and parameter vectors that appear in the above decomposition must be estimated from some dataset, which may involve usual sampling, estimation, specification, and measurement errors. In that sense, we examine the potential specification error associated with the usual omission of the segregation variable.

More generally, decompositions allow some quantitative assessment of the rel-

ative size of the covariates' contributions to the gap between the distributions of two groups. In this paper, we are interested in the contribution of the local segregation variable, while controlling for essential explanatory factors of earnings: the education and experience of the individuals. A debatable, albeit rather common, interpretation of the structural component is as a measure of the discrimination in the labor market.[3]

2. The Contribution of Segregation

However, if we directly include as a regressor in a linear equation a segregation measure that is specific to the location (such as the Dissimilarity Index), not to the group, it is no longer clear what the composition effect will capture. Indeed, any such fixed regressor at the location level may be highly correlated with local fixed effects. Then, there is a risk that incorrect shares of the gap between the two groups will be attributed for the composition and structure effects. Moreover, it would also amalgamate symmetric situations that describe different contexts. In South Africa, and for analyzing the link between segregation and income, an all-African township is clearly different from an all-White suburb.

As we need an asymmetric measure of segregation,[4] we primarily use the Isolation Index. Since, in our application, segregation is measured using the initial information taken from the 2001 Census and is fixed for all individuals, it is consistent with the idea that segregation may act on income over relatively long run.

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[3]For instance, Sherer (2000, p.319), referring to the structure effect, states that: *"To determine the extent to which earnings differentials represent labour-market discrimination, Blinder-Oaxaca decompositions are constructed using the output from OLS earnings regressions."*.

[4]In the words of Frankel and Volij (2011) (p.6): *"Although [Symmetry] is a standard property which is satisfied by most indices, it may not be suitable for work that focuses on the problems that face a particular ethnic group. For instance, if one is interested in the social isolation of blacks from all other groups, then one may prefer an index that treats blacks differently."*

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This allows the measure of segregation to be the same in the two studied periods.

III.C.   Econometric Strategy

Technically, our approach is based on assessing how a given variable contributes to the distribution gap between two groups for another variable. This endeavor stands as a preliminary stage prior to potential studies of structural and causal effects linking the two variables. Our empirical application is the contribution of segregation to the African-White wage gap in South Africa. Performing a thorough distribution decomposition and scrutinizing the heterogeneity of segregation effects will allow us to uncover patterns that remain hidden in mean analyses and traditional Mincer equations. In particular, we will obtain hints at socio-economic segregation mechanisms that explain income differences between socio-ethnic groups.

The approach is attractive when one considers that any model is a partial summary of the reality, which typically includes only a few relevant and important variables. However, during an investigation, an initially simple model can be replaced by a more sophisticated model in further stages. Often, the specification of the latter model may benefit from the estimation results of the former one. This paper similarly deals with a preparatory statistical examination of the data using refined decomposition methods.

Most models used in the literature are composed of a deterministic equation and an additive error. The deterministic component is often inspired from theoretical reasoning. For example, the celebrated Mincer equation model can be based on human capital investment decisions specified through a simplified while explicit theory. In other cases, the model emerges from merely observing empirical regularities in data for several variables, and from more or less conceptualized intu-

itions about plausible links between these variables. However, except for the most extreme structural modelling, the summoned theory only sketches the estimated relationship that is typically completed by using additional intuitions that are not always firmly established. Therefore, there is room for preliminary analyses that narrow down subsequent model specification, including with respect to the list of explanatory factors and the potential socio-economic mechanisms.

An explanatory model examines how some variables influence others. Usually, precise hypotheses are assumed about the shape of the deterministic component and restrictions on the error terms. The models that do not focus on how some variables influence others are usually called 'descriptive'. Here, our approach is intermediary between well and fully-specified explanatory models and purely descriptive models. Namely, we are interested in the link between a dependent variable (the wage rate of workers) and diverse independent variables, with a strong concern for one of them (the segregation variable). However, as is common in decomposition approaches, we keep the model specification incomplete with regard to the semi-parametric restrictions imposed on errors, for which we remain agnostic.

In our application, the deterministic component is a Mincer wage equation that is completed by the linear effect of a local segregation index, and this separately for each group of interest (Africans and Whites). The error component may arise from several sources: omitted factors, measurement errors, misspecification of the functional form, variations in the relationship across subpopulations or time, optimization errors when the estimated equations are derived from rational decision models...

In these conditions, the absence of semi-parametric restrictions implies that the

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convergence point of most estimators of the model parameters should be indeterminate. This allows for biases that may arise in ensuing, while so far unspecified, structural or causal models, that could be associated to measurement, endogeneity or selection issues, but are hard to model or correct from the broad starting point of an investigation. However, at this early stage, these nuisance patterns cannot be precisely identified. In this regard, decomposition methods, which are agnostic on error restrictions, have the advantage of relaxing the dependence of the estimation results on uncertain and often controversial identification hypotheses, while keeping open the possibility of interpretations including the above estimation concerns. Finally, as they offer a common ground to alternative structural models, decomposition results may be of interest in themselves.

Of course, inference is still possible, although around the unspecified probability limit of the used estimator. In particular, the estimated contribution of a given variable to the decomposition may include influences that would appear as biases in structural models with endogeneity (or selection) issues. However, it is still of interest to highlight factors with substantial structure or composition contributions in decomposition analyses. Indeed, this may provide hints not only about their explanatory power, but also about their association with missing correlated factors.

We provide in the Online Appendix an example of sensitivity analysis to potential endogeneity effects, by considering an augmented Mincer model where segregation is instrumented by a quadratic polynomial of the number of rivers between and within municipal districts, as in Cutler and Glaeser (1997). Even though a proper structural model should be more complicated, and may include diverse socio-economic mechanisms as discussed above and below, the estimated diagnoses suggest that potential endogeneity issues may not much perturb most of our de-

composition results. Moreover, as we use segregation levels observed in 2001 for both waves (2008 and 2014), the time lag mitigates a potential feedback that could arise from wage expectations. As a consequence, we will refrain from emphasizing correlated missing factors interpretations in our comments, although they remain a possibility.

Moreover, in structural studies of wages, a typically encountered concern is selection by labor market participation. Here, this issue would extend to the differential migrations of racial groups to their preferred or constrained neighborhoods. However, attempts to correct directly for general selectivity issues in decomposition methods have been found unpromising, in part because of limited identifying information for selection, but also because the specification of the selection process would require much more precise, and therefore risky, assumptions in decomposition settings than merely stating a list of variables.

Nonetheless, by imputing plausible wages for non-participants with rules akin to the ones used in Neal and Johnson (1996), we found clues that, in a basic structural Mincer model augmented with segregation, selectivity through labor market participation may matter. Additionally, Leibbrandt et al. (2010a) also provide evidence of the importance of such effect on the South African income gap. Therefore, the purely socio-economic interpretation of our results should probably be interweaved with selection effects potentially correlated with segregation features. Nonetheless, we often choose to bypass their discussion not only because we have little solid evidence about selection, although our main results seem to persist, but also for a convincing treatment of selection issues would require structural hypotheses.

In these conditions, our first objective is to assess the size of the contributions

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of segregation to the structure and the composition effects in a gap decomposition analysis for different within-group wage quantiles. Comparing quantiles for two groups is consistent with viewing these groups as somewhat distinct societies, and defining the relative wage rank of each individual in his own group (as opposed to absolute wage levels).[5] Obviously, if the segregation contributions are found negligible, there will be little motivation to develop structural modelling by incorporating segregation variables to wage determination models. In the opposite occurrence, our second purpose is to generate hints about explanations or selections by exploring the heterogeneity of the segregation effects. We proceed with this by running regressions of the previously estimated heterogenous effects of segregation on racial wage gaps so as to explore the roles of networks, labor market segmentation and racial preferences. In an attempt to capture hidden political and economic processes, this is also performed for wage intervals bounded by minimum wage policy proposals, respectively supported by the main political parties in South Africa. Finally, we will identify the characteristics of the subpopulations that suffer and benefit the most from segregation through their wages.

IV. Context and Data

IV.A. Segregation in South Africa

There is a long history of racial segregation in South Africa (Thompson 2001). 'Color bar' discriminatory legislation, against Africans and other non-White inhabitants, was in force from the early days of the Union of South Africa. This culminated during the Apartheid period, which was a nationwide social policy

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[5]Therefore, this differs from analyzing absolute poverty profiles across ethnic groups in South Africa, as in Leibbrandt et al. (2010b).

of separate development supported by the Afrikaner minority (Thompson 2001, Chap. 5-6; Giliomee 2003). The 1950 Population Registration Act categorized and recorded racial identities on individual identification documents into 'Blacks', 'Whites', 'Coloureds' and 'Indians'.[6] The 1950 Group Area Act allocated separate settlement regions to distinct races. A permit was needed to cross the internal borders of racial regions, which contributed to stabilizing the population composition of each region. Under the 1953 Reservation of Separate Amenities Act, the different races had access to separate hospitals, universities and other public amenities. The 1953 Bantu Education Act introduced separate schools for different races. Over time, several additional laws restricted a citizen's travel within the country. In practice, Africans were often excluded from cities and towns, unless they could justify their presence there with a work permit. Although spatial racial segregation has clearly declined since the end of the Apartheid in 1994, it remains very common de facto and would not fail to strike any casual observer traveling across the country. The coincidence of these facts, along with the history of discriminatory remuneration practices along ethnic lines, suggests that different work compensation rules, notably with respect to ethnicity, may have been implemented in low- and high-segregation areas.

IV.B. Racial income gaps in South Africa

At the demise of Apartheid in 1994, people's aspirations and expectations turned toward greater economic equality and improvements in their standards of living. However, the following decade was instead characterized by increasing inequality

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[6]We employ these categories, except replacing 'Blacks' with 'Africans' as, in the post-Apartheid South Africa, 'Blacks' refers to all the non-Whites groups together.

(Leibbrandt et al. 2012), poverty traps (Adato et al. 2006), and anti-poor growth (Özler 2007). South Africa is one the most unequal countries in the world, with especially large racial gaps in living conditions.

Over the 1993-2008 period, aggregate inequality increased (Agüero et al. 2007; Leibbrandt et al. 2012). By contrast, Statistics South Africa (2017) notes that while the Gini index modestly declined from 0.72 to 0.68 over the period 2006-2015, it has remained stable since 2009. Most of this increase in aggregate inequality is associated with an increase in within-group inequality (Leibbrandt et al. 2012), especially for Africans (Özler 2007). Despite an initial reduction in within-group inequality after 2006, by 2015, every group had nearly returned to its original level (Statistics South Africa 2017). On the other hand, evidence regarding between-group inequality is rather scarce. Leibbrandt et al. (2010b) find an increase in between-group inequality, whereas Leibbrandt et al. (2012) report a decreasing contribution of between-group inequality to aggregate inequality. However, this is relative to an extreme maximal counterfactual, which does not imply that between-group inequality, in absolute terms, has decreased. Finally, the emergence of an African middle class is a major novelty in the South African society (Statistics South Africa 2017). However, the size of the phenomenon might have been over-estimated (Bhorat and Khan 2018).

IV.C. Data

Our data source is the National Income Dynamics Study (NIDS hereafter), which is an individual panel data survey conducted every two years with a nationally representative sample. There are four waves available that cover the period 2008-2014. However, we will use only the 2008 and 2014 waves to avoid the short-

term fluctuations due to the 2008-2009 economic crisis[7] that may obscure the contributions of the main regressors in the decomposition. Data on incomes are usually considered relatively reliable (Leibbrandt et al. 2012). But, the sub-sample sizes by racial groups are sometimes relatively small.

Our second source of data is the community profiles from the 2001 South African Census. They provide the total counts of the South African population aggregated at geographic levels ranging from enumeration areas to provinces. The data are exhaustive but only provide summary statistics about the distributions of some socio-demographic characteristics within each location.

The NIDS are used for individual characteristics and income, while the community profiles serve for calculating the measure of segregation in each municipal district, subdivided by subplaces to obtain a more precise sense of local segregation. The lowest geographic sampling level in the NIDS is the municipal district. As we are interested in studying income differences, we restrict our sample to individuals older than 15 who report a positive total personal monthly real income. Amounts are deflated to November 2014 rands with the CPI. Income is measured as the monthly take-home pay from the main job. Other secondary sources of income are excluded to avoid contaminating the analysis with substantial measurement errors, notably from omissions and non-responses. The design of the NIDS explicitly separates self-employed from employees on which we concentrate. As a result, our base sample consists of 2922 Africans and 440 Whites in 2008 and 5291 Africans and 229 Whites in 2014. In the Online Appendix, we provide evidence of robustness with an alternative sample definition addressing issues with

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[7]According to a report on poverty levels by Statistics South Africa (2017), *"The number of people living below the food line increased to 15,8 million in 2009 from 12,6 million in 2006, before dropping to 10,2 million people in 2011."*

seasonal and part-time workers, workers older than the retirement age, and early retirement.

We focus on the African-White gap only, as these are the two most prominent groups in South Africa. Whites occupy the best economic positions and are the most advantaged group, while Africans are the most disadvantaged group and crystalized the fear of the Afrikaner minority during Apartheid. Though also often discriminated against, Coloureds and Asians stand economically between Africans and Whites. Table I reports the mean and standard deviation of the variables used in the analysis, across ethnic groups and survey rounds. As expected, Whites are generally more educated, older, and richer than Africans. They usually have more interactions with the other group, as shown by the statistics on isolation. In the next section, we report the results of the decomposition.

[Table 1 about here.]

V. Mean Analysis

We assume that expected incomes are determined by the individuals' education and experience, possibly quadratically. Then, we augment this specification with a measure of segregation. This will allow for comparisons with the literature and serve as a benchmark for the distributional analysis, in terms of the aggregate pattern of the income gap. As stated above, our measure of segregation is fixed in the year 2001 because we cannot measure segregation from the NIDS and have to rely on a measure constructed from the 2001 Census.[8] However, since segregation might affect income levels with a delay, it does not seem unreasonable to adopt

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[8]We also considered a measure of segregation coming from the 2011 Census (adjusted to the 2001 administrative boundaries) for 2014. It produced very similar results.

this approach. For example, bad habits may develop over several years before becoming ingrained. Our model takes the following form for each individual i:

$$Income_i = \alpha + \beta_1 \times Education_i + \beta_2 \times Education_i^2 + \beta_3 \times Experience_i$$
$$+ \beta_4 \times Experience_i^2 + \beta_5 \times Segregation(2001)_i + \epsilon_i \tag{3}$$

where $\alpha, \beta_1, \beta_2, \beta_3, \beta_4,$ and β_5 are parameters to estimate, and ϵ_i is a centered error term. We first run this OLS regression separately for Africans and Whites. The results are displayed in Table II.

[Table 2 about here.]

Several expected effects emerge. We find a positive and significant effect of experience for both groups with decreasing returns, as the coefficient for its square is negative. However, as experience is a function of age, these coefficient estimates might also capture a life-cycle phenomenon, older people being generally wealthier than their younger counterparts. The effect of isolation on mean income is positive for Whites and negative for Africans, although it loses its significance in 2014 for Whites. Finally, the effect of education is dominated by the quadratic term, which yields an overall positive effect for Whites and for Africans with more than 6 years of schooling, which concerns at least 72 percent of Africans aged 15 or older. This U-shape pattern may be explained by the skills mismatch characterizing the South African labor market.

Then, we decompose the mean, using the pooled sample as the reference group, in Table III, to elicit the magnitudes of the roles of the different correlates, notably segregation.[9] The income gaps between the two groups correspond to the difference

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[9]To avoid transferring part of the structure effect into the composition effect, we add a group

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between the mean predicted incomes of the two groups obtained via OLS. First, consistent with the high and rising inequality levels observed since the end of Apartheid (Agüero et al. 2007; Leibbrandt et al. 2012), the average real monthly income gap is considerable. It corresponds to 6658 rands in 2008 and rises to 6886 rands in 2014, almost twice the national minimum wage in 2019.

[Table 3 about here.]

The magnitudes of the composition and structure effects are comparable. Despite the emergence of an African middle class, Africans continue to lag behind on many socio-economic characteristics. A sizable and significant composition effect is thus an expected finding. However, the finding that this composition effect is roughly equal to the structure effect is less expected. It implies that Africans with similar socioeconomic characteristics as Whites benefit much less on average than Whites from these characteristics and that this is as important as the differences in socio-economic characteristics. This might be a consequence of racial discrimination in the job or housing markets (Kain 1968). Alternatively, it might reflect different work habits between Africans and Whites or different professions and activity sectors. For instance, if Africans work mainly in rural areas or the industrial sector, having a master's degree might give them access to a lower wage than Whites working in the financial service sector in an urban area. Thus, the racial gap in returns to education might signal a premium for urban areas and/or the financial sector. Over time, the share of the composition effect increases from 46.4 percent in 2008 to 52.7 percent in 2014.

When we more closely examine the detailed decomposition, we first note that

dummy to the pooled model for the decomposition (Jann 2008).

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all the groups of variables contribute positively to the gap through the composition effect. Education is the main contributor to the composition effect, accounting for 95.5 percent of the effect in 2008 and for 73 percent in 2014. This reinforces our discussion above: Africans lag behind Whites in terms of education and experience.[10] This may be partly due to the dual school system inherited from Apartheid. For instance, in 2009, grade three pupils in formerly White schools outperformed grade five pupils in formerly African schools on a standardized test designed for grade three students (Spaull 2013). This suggests that segregation may be partly responsible for the contribution of education through this duality.

The results for segregation present a different pattern. Its mean composition effect is close to zero and not significant in 2008, whereas it is positive and significant in 2014. However, the contribution of segregation in the composition effect increased by more than fivefold between 2008 and 2014, and while, in 2008, it represents around 3 percent of the total composition effect, it accounts for more than 15 percent in 2014, being the second-greatest contributor to the composition effect, after education. The 2008-2009 economic crisis, which struck South Africa during the last quarter of 2008, and the following turmoil drove many people into poverty.[11] As the most deprived are usually the most isolated, this might explain the massive increase of the role of segregation between the two periods.

In the structure effect, segregation emerges as the main relative contribution to

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[10]As the contributions of each factor sum up to the total effect, the total contribution of education is the sum of the contribution of the education variable and that of education squared. This is also true for experience and the distributional analysis in the next section.

[11]"it is clear that the [2008 global financial] crisis was particularly tough on those most deprived in our society" [...] "The last five years, notably between 2011 and 2015, have been a rough economic rollercoaster for South Africa" [...] "This period has seen the financial health of South African households decline under the weight of [this] economic [pressure] and, in turn, pulled more households and individuals down into poverty." (Statistics South Africa 2017, p.14 and 16)

the total structure effect. Its contribution is of similar order to education in 2008, although education reduces the gap while segregation increases it, and segregation is the only significant contributor in 2014. Education comes second, accounting for 30 percent of the structure effect in 2008, while its effect is not precisely estimated. When interpreting these figures, we should bear in mind that the constant term still represents a large share of the structure effect (17.6 percent in 2008 and 37.7 percent in 2014), hinting at substantial group-specific hidden factors.

VI. Decomposing Income Distributions

VI.A. *Distribution Analysis*

The main interest in a distribution analysis of the racial income gap is as a device for investigating the heterogeneity of the effects of segregation on this gap. Again, we pursue an agnostic perspective on endogeneity and selectivity phenomena. As a matter of fact, the distribution analysis may provide hints about where in the distribution these issues may matter most.

Then, instead of comparing the distribution means of the two groups and decomposing the mean gap, one can compare the marginal distribution quantiles of the two groups for the same quantile index (for example, for the median). In that case, the composition effect still solely describes the effect of the differences in the characteristics between the two groups, while permitting the comparison for the same given quantile index in the two distributions.

We depart from common approaches by decomposing the income distribution with RIF regressions (Firpo et al. 2009) instead of the reweighting approach (Di-Nardo et al. 1996). The reweighting approach suffers from path-dependence in the

detailed decomposition, which does not sum to the aggregate decomposition. RIF regressions are much simpler and perform better in practice for detailed decompositions.

VI.B.   Decompositions

The estimation results of the detailed Oaxaca-Blinder decompositions applied to the $\text{RIF}(y, q_\tau)$ dependent variable are presented in Figure I. In the top-left panel, we first display the quantiles of the racial gap in log income [12] for the two studied years. For both 2008 and 2014, the gap is always significantly different from zero and keeps the same sign for all quantiles. This first-order stochastic dominance result implies that an aggregate utilitarian social welfare of Whites is unambiguously higher than the corresponding figure for Africans, in both years. Finally, 2014 also first-order stochastic dominates 2008, within each racial group, which confirms the unambiguous improvement of each of these two income distributions over the studied period.

[Figure 1 about here.]

However, we observe two distinct patterns. In 2008, the income gap increases from the bottom quantile to the median and decreases thereafter. In 2014, it is relatively stable from the second decile to a little before the sixth decile and then declines as we approach the top of the distribution. More important, at any quantile, the income gap is always smaller, in log points, in 2014 than in 2008, but at a higher real income level than in 2008, which corresponds to an increase in the income gap. For instance, at the first quartile, the income gap of 1.45 log points

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[12]In the remainder of the paper, we refer to 'income' for simplicity, but it should be understood that we employ the natural logarithm of income.

in 2008 and 1.25 log points in 2014 coincides to gaps of 4026 rands in 2008 and 4390 rands in 2014.

We test the null hypothesis of no differences between quantiles levels in each year with t-tests on each quantile index. Dashed quantiles represent quantiles for which the null hypothesis is not rejected. The decline in log income differences occurs only significantly for intermediate quantiles ranging from the 32nd to the 68th income quantile. Therefore, this slower increase of the income gap for middle classes might be linked to the emergence of an African middle class.

We report the aggregate decomposition of the racial gap, for each year and each quantile, in the top-right panel of Figure I. This decomposition disentangles the differences in observed characteristics from the influences of market and social mechanisms that are captured by differences in the parameters. The dashed parts of the curves represent quantile composition and structure effects that are significantly different from zero at the 5 percent level. In 2008, the structure effect continuously decreases with quantiles, while the composition effect is increasing and plateaus near the 6th decile. At the upper end of the distribution, the structure effect actually contributes to reducing the income gap. In terms of relative size, the structure effect is slightly larger than the composition effect up to the 35th quantile. In 2014, the pattern is similar, although the two elicited components of the income gap are much closer and their change over quantiles much slower. Thus, the magnitude of the composition effect overtakes that of the structure effect beginning at the median, with the latter not contributing at all after the 65th quantile. This suggests that the hidden mechanisms that separate the incomes of Whites and of Africans operate primarily among the lower classes of these groups. This particularity will be exploited below in the analysis of the minimum wage

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reform.

To complete this description, t-tests are performed to compare the structure and composition effects in 2008 with their respective counterparts in 2014. Then, we examine whether the structure effect is significantly different from the composition effect in 2008 and in 2014. Regarding the temporal trend, there are no significant variations for the structure effect, except potentially for a small group of quantiles after the median. This stability over time may indicate relatively permanent socio-economic mechanisms, some of which might be linked to segregation. For the composition effect, a notable decline over time is observed from the 33rd quantile. Thus, the relative importance of each effect has changed over time. In 2008, the two effects are significantly different except around the 35th quantile. However, in 2014, both the structure and composition effects contribute equally below the median. Ultimately, the observed reduction in the income gap observed for the middle quantiles appears to be driven primarily by the reduction in the composition effect.

We delve deeper into the relative contribution of each factor to the composition (Figure I, middle panels) and the structure (bottom panels) effects. In 2008, experience does not play any role in the composition effect. Education is the most important contributor to the composition effect, followed by segregation, with the former representing twice the latter's contribution across almost the entire distribution.[13] Both are increasing throughout the distribution, except after the 6th decile, after which the contribution of education slightly decreases and that of segregation continues to increase. This parallel pattern explains the increasing

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[13]A t-test suggests that the contribution of education is significantly equal to twice that of segregation up to the 84th quantile.

contribution of the composition effect across quantiles, and when education decreases, segregation compensates for its reduction to form the plateau observed. In 2014, each contribution is ranked similarly as in 2008, but experience now contributes positively to the income gap from the first quintile, although it remains the smallest contributor. Education's contribution is stable across quantiles up to the median, at which point it begins to rise to its maximum around the third quartile, and declines slightly thereafter. In 2014, segregation's contribution slowly decreases until the median before recovering from its minimum around the third quartile. Then, it plateaus until it spikes dramatically in the very top quantiles. Both the rise and decline of education's contribution from the median and the tremendous spike exhibited by segregation at the very top materialize directly in the aggregate composition effect. The relative stability of the latter in the first half of the distribution comes from the contributions of education and experience compensating for the weakening of the contribution of isolation. As is typical in quantile analyses, substantial variations at extreme quantiles are likely to be statistical artifacts due to the restricted sample sizes used in the calculations for these quantiles.

For the structure effect, the ranking of the contributors differs drastically from that for the composition effect. Segregation is now the dominant factor at almost all quantiles, before experience, followed by education. The intercept parameter is specific to the structure effect and bears a precise interpretation in this context. Usually, in mean regressions, the intercept is viewed as the average income level individuals obtain once the effects of the other covariates have been removed. In quantile regressions, it is instead the minimum income level at the specified quantile regardless of the effect of other covariates. Thus, in the de-

composition, a significant difference between two intercepts may suggest intrinsic discrimination between the two groups. However, one cannot infer anything about the origin of this discrimination, whether it is true racial discrimination inherited from Apartheid or something else related to omitted factors. In both 2008 and 2014, the contribution of the intercept is positive and significant for approximately 20 percent of the population above the 6th decile. However, in both years, this positive contribution is systematically compensated for by a negative contribution of the same magnitude from education. The two terms statistically cancel out throughout the distribution, which is a consequence of the additive normalization of the decomposition and of the insignificance of the contributions of the other factors at these quantiles. Overall, the residual structure effect, after accounting for the intercept gap, is due primarily to segregation and experience. In both years, segregation contributes positively in the lower halves of the distributions and loses significance for the upper halves. Experience follows a similar pattern, except that it contributes negatively to the income gap above the 6th decile in 2008. A plausible explication for these findings is that in a particularly harsh dualistic labor market for Africans, experience in better jobs represents a signal of reliability and skills for Africans, whereas low-productivity Whites might be protected by discrimination. Alternatively, it is possible that affirmative action legislation adds a premium on experienced African workers. However, this effect disappears in 2014.

VI.C. RIF Regressions

To better understand the structure effect, we now examine the estimation results of the RIF regressions used for the above decompositions. The estimation results

are displayed in Figure II for each group, each year, and across quantiles. The partial relationship between education and income is identical in 2008 and 2014 for Africans, indicating that the variation in the structure effect is essentially due to changes in the returns to education of Whites. Moreover, the incomes of Africans display little sensitivity to their education level, whereas the incomes of Whites obey a more complex educational pattern, which is particularly pronounced at the top of their distribution. This might reflect greater heterogeneity in bargaining power for highly educated Whites occupying top positions.

[Figure 2 about here.]

Regarding experience, the pattern for Africans is similar in both years across quantiles. It differs only by its level. In 2008, the linear part is slightly higher, while the quadratic term is slightly lower but only negatively significant from the 4th decile. In 2014, the linear part is not positively significant before the 3rd decile, while the quadratic part is negatively significant after the median. Therefore, Africans enjoyed some small linear experience premium in the bottom of the distribution in 2008, while it vanished for the first quartile by 2014, presumably due to the 2009-2010 economic crisis. At the top of the distribution, the marginal returns to experience are decreasing with quantiles, but slightly less in 2014 than in 2008. In both years, Whites always experienced a better marginal return to experience, the only exception is the reversal of the linear component of experience at the top of the distribution in 2008, which explains the negative and significant contribution to the structure effect.

The most interesting lesson from these RIF regressions concerns the relationship between segregation and income. Segregation is negatively associated with

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income only for Africans at the bottom of the distribution and in the lower-middle class (up to the median in 2008 and to the 6th decile in 2014) in both years. On the other hand, it is positively associated with income for Whites in 2014 in the upper half of the distribution. It appears to have a positive effect for all Whites in 2008. Hence, the structural effect of segregation is substantial below the median because the gap between the quantile effects of the two groups is at its maximum. Then, it loses significance as the quantile effect for Africans fades away for the upper quantiles. This suggests that the economic mechanisms at work behind the effect of segregation are most likely different for Africans and Whites, and thus, policies addressing this concern for segregation should also differ. In the next section, we exploit the 2018 minimum wage reform to shed some lights on potential explanations of the effect of segregation.

VII.   Segregation and the 2018 Minimum Wage Reform

VII.A.   Minimum Wage in South Africa

Before January 2019, the legal minimum wage varied across activity sectors, ranging in 2015 from 1813 rands per month for Domestic Workers to 2844 rands per month for Contract Cleaners (Bhorat et al. 2016). In 2015, it implemented to approximately 39 percent of formal employees.

In 2018, the National Minimum Wage Bill was passed (for its enforcement in 2019) with the support of the ANC (African National Congress) members of parliament and opposition from the other parties. The minimum wage was set at 3500 rands per month, for 40 worked hours per week. While there is some doubt about its universal practical implementation, given the limited capacity of the

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monitoring agency, it is still a major shock on the economic and political system. For comparison, the median salary of workers covered by sector agreements is approximately 2447 rands per month, and 3400 rands per month for all workers in the formal sector (Bhorat et al. 2016). In any case, almost half of the South African labor force should benefit from the reform (47 percent according to the COSATU (Congress of South African Trade Unions)).[14]

The three main political parties have taken sharply contrasting positions on segregation, income sharing across racial groups and minimum wage policies. When the minimum wage law was passed, the Democratic Alliance voted against it, as they favor no minimum wage at all, to preserve jobs, or a much lower minimum. Moreover, they propose introducing different minimum wages in different sectors and allowing workers to accept wages below the minimum. In contrast, the Economic Freedom Fighters (EFF), which is the other important opposition party, voted against the law because they wanted a much higher minimum wage, ranging from 4500 to 12,500 rands per month depending on the sector. They even spurned the government's proposal, likening it to a 'slave wage'.[15] The unions also argue for a higher minimum wage, with 4500 rands per month having been proposed by the COSATU, which is fairly aligned with the government but did not sign an agreement on the law, and 12,500 rands per month being proposed by the SAFTU (South African Federation of Trade Unions).

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[14]See AllAfrica.com (2018), last accessed on the 14th of November, 2019.
[15]See citizen.co.za (2018), last accessed on the 14th of November, 2019.

VII.B. How May the Reform Affect the Relationship between Segregation and Income

We now propose an innovative approach that uses income decomposition estimates to advance the policy debate on the minimum wage reform. To do so, we examine how well the claims of the main political parties about the minimum wage, on the one hand, accord with the intervals of quantiles, for each group, in the graphs of quantile decomposition, on the other hand.

Clearly, some caution must be taken. In particular, if the reform substantially changes the structural data generating processes of incomes in the country, nothing should be deduced from the graphs. However, if one assumes that this is not the case and that, overall, the current relationship of incomes with education, experience and, specifically in our case, local segregation will not be substantially affected by the reform, then one could use the graphs to identify the populations most likely to be affected by the current reform or by the reforms proposed by the opposition parties. This can easily be achieved by examining the corresponding quantile intervals for each group. In that case, one could argue that, post reform, only the part of the curves that exceed the quantiles corresponding to the considered minimum wage should apply. This provides us with a quick and simple graphical diagnostic device.

Our identification strategy can be compared with the first identification assumption in (Chernozhukov et al. 2013, pp. 2236-2237). These authors assume, for the US, that the conditional density of wages below or at the minimum wage depends only on the value of the minimum wage; that the minimum wage has no effect on unemployment; and that there are no spillover effects onto wages above

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the minimum. While all of these assumptions are debatable, they seem to correspond to a benchmark for minimum wage effects. Our approach can be seen as another simplifying perspective in that it assumes some rigidity of the studied phenomena across quantiles.[16]

Under these tentative diagnostic rules, the government reform, and to a greater extent the reforms proposed by the EFF and the unions, would lead to the elimination of precisely the areas of the curves in which the segregation variable makes a significant contribution to the racial income gap. Although more causal studies would be necessary to confirm them, these results hint at the possibility that the minimum wage reform might eliminate, or at least substantially reduce, the factors that make local segregation contribute to the wage gap between Whites and Africans.

1. Our approach

We now probe potential mechanisms at play regarding the effects of segregation on incomes and how they relate to the programs of the political parties. To do so, we do no longer look at structure and composition effects of segregation, but instead at the 'local' marginal effects of segregation for diverse income subgroups that correspond to natural constituencies of political movements, by referring to minimum wage policies. Indeed, the distinctive political programs of the parties can be regarded as potential treatments. Because of the reduced sample sizes, we mostly focus on Africans.

Individual incomes are categorized into wage intervals according to whether

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[16]In contrast, simulations based on Computable General Equilibrium Models have been used for assessing the effect of minimum wages in South Africa (Pauw and Leibbrandt 2012). They seem to display negligible impact of these policies on poverty.

they would be treated under the hypothesis that a given party's minimum wage proposal would be enforced. As we consider several political movements, a specific target group is composed of individuals with wages below the minimum wage proposal for this movement, while above the minimal wage proposals of the other organizations with lower proposals. In that sense, a specific target group can be regarded as an intersection of potential treated and non-treated group definitions. The first specific target group, labelled NMW, gathers all individuals below the National Minimum Wage. Therefore, it can be seen as the ANC constituency, at least as far as the minimum wage policy is concerned, and will be the most important group in our discussions. It is relatively consistent with the ANC's supporters profiles found in a recent survey (citizensurveys.net 2018) that shows that low-income individuals are overrepresented when compared to supporters of the other two main parties. The second group, labelled COSATU, comprises people below the COSATU's proposition of 4500 rands and above the NMW. The third group, labelled EFF, regroups individuals below the EFF's proposition of 12500 rands and above the COSATU's one. The last target group, labelled N.C., are Not Concerned since they earn more than 12500 rands. We found in Figure III that the implicitly targeted individuals by these political movements are also the most affected by segregation among the Africans. This supports our strategy of analysis.

[Figure 3 about here.]

Then, we use the estimated RIF-regression coefficients of segregation as the dependent variable in descriptive regression models to capture the heterogeneity

of the effect of segregation in each target group.[17] This is possible because each observed individual corresponds to a specific quantile in the income distribution, and for its specific quantile index, we have a specific estimated RIF-regression coefficient of Isolation. All these individual-specific estimated coefficients can be partitioned in subsamples of interest. The dependent variable is therefore the marginal quantile effect of segregation experienced by an individual. We use robust standard error estimators to allow for the expected correlations of errors for different quantiles.

The set of independent variables in these regressions includes: household size and household income, gender, some labor-related characteristics (affiliation to a trade union, weekly worked hours, reservation wage), some dummies for industrial sectors (agriculture, mining, finance, private households, and community, social, and personal services), the province of residence, and the identifying variables related to theories that we discuss further below.

2. Socio-economic mechanisms for segregation and constituencies

First, individuals were asked how they obtained their current job. In particular, they may have accessed it through other household members, which denotes strong network links, or through friends and relatives in another household, which signals weak network links. These informal channels for job information and access have been found to be dominant in developing countries (Ioannides and Loury 2004). This provides us with two proxy variables hinting at the salience of local network

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[17]We do not account for the dependent variable already being an estimate when estimating the standard errors. Indeed, because of the large degrees of freedom in each of these regressions, the neglected uncertainty coming from this preliminary estimation step is unlikely to change the inference.

effects. The other answers to this question seem to rule out network effects.[18]

Regarding racial preferences, individuals were asked about their desire to leave their current neighborhood. They could state a strong or moderate preference to stay (or leave), or that they were unsure whether to stay or leave. We posit that if this predilection is somewhat correlated with racial residential segregation, this is likely to be related to racial preferences for a particular racial mix in their neighborhood.

As additional evidence that the desire to leave their current neighborhood conveys, at least to some extent, racial preferences, we study, in the Online Appendix, its association with trust in the own racial group and trust in the other racial groups. We also conduct a one-way ANOVA between the level of segregation and the desire to leave their neighborhood. Although the results are not clear cut, they provide some weak evidence that a desire to leave a neighborhood conveys some information about racial preferences.

Then, labor markets are segmented when, in a given sector, the same skill level is associated with a substantial remuneration gap, dividing two segments of workers. In South Africa, segmentation occurred during the Apartheid because jobs were mostly attributed along racial lines in favor of the Whites. Although the remaining racist labor regulations were abolished in 1994, some discriminating practices may have subsisted up to now. However, starting from 1998, segmentation might be attenuated, or diversified, by the Affirmative Action policy that constrains some firms to hire disadvantaged African workers according to some

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[18]However, whenever there was a doubt that an answer might also convey information on networks, like when individuals got their job through a previous employer, we controlled for these variables. However, we only discuss the most parsimonious model as these variants do not change the results.

inter-racial equity criteria.

The South African government passed the Employment Equity Act in 1998, which is the core of the South African Affirmative Action policy. This bill aims at achieving "Equity in the workplace by (a) promoting equal opportunity and fair treatment in employment through the elimination of unfair discrimination; and (b) implementing affirmative action measures to redress the disadvantages in employment experienced by designated groups, in order to ensure their equitable representation in all occupational categories and levels in the workforce." (Government Gazette 1998).

During Mbeki's presidency, the Affirmative Action policy was further completed with the Broad-Based Black Economic Empowerment (BBBEE) Act in 2003, later precised by a set of Codes of Good Practice in 2007, which sets the basis for the transfer of physical capital from the Whites to the Blacks (Africans, Coloreds, and Asians). Therefore, if a change should have occured in the segmentation of the labor market, it should have been after the Employment Equity Act.

Therefore, one of our handle on labor market segmentation is whether the current job started before the Affirmative Action Act, or after. We implement this via a dummy variable indicating whether this condition is satisfied, interacted with the years of schooling to account for different skill levels. All in all, workers who started to work just after the Employment Equity Act may face lower market segmentation than those who started before. In the Online Appendix, we explore the relevance of the Employment Equity Act of 1998 as a turning point of the labor market segmentation by using a regression discontinuity design.

Finally, trade unions may leverage better salaries for their adherents irrespec-

tive of their skills. If unionism follows racial lines, then it could lead again to a segmentation of the labor market. Therefore, we use the declared unionship status of the individuals to control for this form of segmentation.

Although this is not our object here to disentangle the complex causalities participating in the definition of constituencies and political programs for distinct parties, we believe that this approach provides suggestive information on the potential political processes behind the persistence or the attenuation of the impact of segregation on incomes in South Africa.

3.   Results

The estimation results are displayed in Table IV. Each estimated coefficient of an independent variable in the regressions can be interpreted as how this variable affects the mean effect of segregation on income, for a given target group. In the regressions of Table IV, the provincial and sectorial dummies mostly control for some fixed effects, whereas in the classification analysis, they are markers of the specific constituencies of the ANC and the EFF. Since they tell the same story, it is more relevant to discuss them with Table V. The estimated intercept is indicative of the base effect of segregation for each target group when the other included regressors have no effect. The estimated intercepts reflect the general pattern described earlier that Africans at the bottom of the distribution generally suffer from segregation, but contrary to the earlier analysis, they also reveal that rich Africans benefit from it, given that the additional regressors interactions with the segregation effect are controlled for. The other coefficients should be interpreted as depicting how the corresponding independent variables attenuate or reinforce the base effect of segregation on income.

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Male individuals tend to enjoy an attenuated effect of segregation, while only in the poorest African target groups, which suggests that segregation-based discriminations on race, social class and gender often cumulate. The effect is large, roughly six times greater among those below the national minimum wage than within the COSATU's specific target group. Since choices of places of residence and work may be made at household level, it may be relevant to examine household-level characteristics. A large household size accentuates the effect of segregation for Africans in the poorest group. This is consistent with larger households living farther away from the main employment centers or in deprived areas. In any case, more dependents puts more pressure on financially constrained households: one additional household member implies a 1 percent worsening of the effect of segregation. Household income dampens the effect of segregation in every group, even when segregation is positive. However, in most groups, the effect is very small, which indicates that nonlinearities in the analysis of the level of segregation and incomes are unlikely to matter for this analysis. A higher reservation wage, which should often imply rejection of low-pay jobs, in particular for Africans below the national minimum wage, makes workers less sensitive to the effect of segregation that is partly confined to this type of jobs. However, the effect is limited, with a 1170 rands increase in reservation wage only reducing the effect of segregation by 1 percent for the poorest. For the wealthiest group, the corresponding amount is of 654 rands, and of almost 3000 rands, for the specific target group of the EFF. Finally, omitting instead these household variables does not overly change the qualitative results for the variables describing socio-economic interactions, while

some other coefficients lose in significance.

Network effects In the poorest African target group, mobilizing a loosely-connected network (with weak links) reinforces the negative effect of segregation. This may be indicative of a bad-quality network that may only provide information on low-pay jobs. Moreover, the information flowing into this network may be somewhat redundant as similar people, with homogeneous human capital characteristics, are more likely to bring the same information. In that case, more segregation might imply worse quality and fewer job opportunities received through individual networks.

However, the coefficient of the weak links used for job search becomes significantly positive for African middle class workers earning between 4500 and 12 500 rands, which corresponds to EFF's specific constituency. This time, this is a good-quality network that may help workers to access more highly remunerated jobs.

At the top of the distribution, individuals no longer seem to get their jobs through acquaintances but instead relies heavily on their close family. Doing so substantially reinforces the positive effect of segregation, which is consistent with the capture of the best positions by a small elite: having obtained a job through family links increases the positive effect of segregation by 35 percent, even if significant only at the 10 percent level.

Note that this is the separation into the four specific constituencies that allowed us to find significant and somewhat plausible correlations of networks with the segregation-income associations. Besides, the last column in Table IV, which shows OLS estimates for the full sample, is eloquent about which confusion could

arise by pooling all constituencies together. Although these pooled results may sometimes appear to be more significant because of a larger sample size, this is not an important advantage as no new effect arise. In contrast some effects completely vanish with the pooling, such as the few points proxied with the preference to stay.

The heterogeneity of the segregation-income associations, notably for correlations with network variables, emerges much better with the chosen partition of the workers population. The positive significant coefficient of the strong links for the wealthiest and the opposite-sign coefficients of the weak links for the poorest and middle class could not have been found with a pooled specification. Opposite-sign effects would also have been missed for education and reservation wage.

Overall, these results are consistent with the literature. Referral effects depend on the social network built mostly through social interactions within the neighborhood (Bayer et al. 2008). They primarily affect the employment probability while the quality of that network will have an impact on wages. Loury (2006) shows that individuals with few alternatives rely more on their informal network and end choosing alternatives paying lower wages compared to other search methods. In South Africa, Magruder (2010) finds that, in the Cape Metropolitan area, having a present and employed father increases the employment rate of their sons by one-third, on average, but 55 percent of Africans and Coloureds have absent, unemployed, or deceased fathers. Therefore, segregation, by concentrating single parenthood in specific neighborhoods (Crane 1991) might be responsible for their limited job choices. The positive effect of strong links for the richest group is also consistent with this mechanism. Finally, Adato et al. (2006) also provide evidence, in the KwaZulu-Natal, of positive network effects for non-poor households' labor market outcomes, whereas poor households, at best, experience no effect.

Racial preferences The main significant effect of racial preferences in Table IV concerns the wealthiest African target group: a moderate inclination for not moving away reinforces their beneficial effect of segregation quite strongly. It is ten times greater than the effect of an additional rand of household income. These well-off individuals may want to stay next to their relatives as they have often obtained their job thanks to their family links. In the poorest group, individuals with a strong preference for leaving suffer more from segregation, while significantly only at the 10 percent level.

Labor market segmentation As mentioned before, education, interacted with the Affirmative Action dummy, alleviates the effect of segregation for the poorest and the richest African target groups. Education tends to attenuate the negative effect of segregation for the ANC constituency, and its positive effect for the best-off Africans, relatively more inclined to vote for the Democratic Alliance. However, no significant differences in segregative effects can be found between a job starting before or after the Affirmative Action legislation was passed. Therefore, it seems that Affirmative Action did not significantly reshape the labor market segmentation in terms of mean effects. Nonetheless, in the Online Appendix, we provide evidence that Affirmative Action has increased the polarization of the returns to education instead. This change in the labor market may be related to the effect of the reduction of stereotypes on African workers' productivity. By forcing firms to engage more African workers, employers learn more about their productivity, which reduces the noise of their belief, thereby encouraging them to remunerate these workers closer to their true productivity. The negative effect of education for the richest group suggests that better-off Africans exploited this information

deficiency to their advantage. This is consistent with individuals getting their jobs through family links and cronyism.

Being unionized attenuates the effect of segregation on incomes, both for the poorest and for the richest. Only the EFF group is not affected by unionism, with the effect only significant at the 10 percent level for the richest group. In the two poorest groups, trade unions play their role and leverage better wages for their members. The negative effect observed for the richest group may reflect the gains for the poor obtained by the unions maybe at the expense of the better-off workers.

4. Sorted effects

In Table V, we describe the main winners and losers from segregation: the "winners" (respectively "losers") are defined as being the 10 percent Africans most positively (respectively negatively) affected by segregation. Following Chernozhukov et al. (2018), we explore in this way the heterogeneity of the partial association of segregation and incomes by scanning the characteristics of the winners and losers from segregation.

[Table 5 about here.]

The main African losers from segregation are mostly little educated workers, often female, living in large households with few pecuniary resources. They mostly obtained their job, often in the agriculture and mining sectors, through their extended network, and are ready to work for a wage much below the National Minimum Wage proposed by the ANC. This might be because with a little more than 8 years of education on average, they are merely completing mandatory schooling.[19]

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[19]Schooling is mandatory in South Africa from age six turning seven to the age of 15 or completion of grade 9, whichever comes first.

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They are concentrated in KwaZulu-Natal, Gauteng, Eastern Cape, and Limpopo.

On the opposite, the main African winners from segregation are workers, mostly male, with a household income more than twice the National Minimum Wage. They were generally recruited through their extended network and are unionized. On average, they work more hours than the main losers, and a larger fraction have obtained their job before the Affirmative Action bill. They are also more educated, which may explain why they ask for higher salaries as reflected by their reservation wages. However, they still have fewer than 12 years of education, on average, a level which would have earned them a matriculation diploma. Therefore, they are probably as likely as the main losers to quit schooling without any diploma. Contrary to Cutler et al. (2008), this rules out education as an important dimension of heterogeneity for an analysis. Finally, African winners are mostly living in Gauteng, KwaZulu-Natal, and Mpumalanga, but are only overrepresented in Gauteng and Mpumalanga. They work mainly in Social services, Finance, Manufacturing, and Wholesale and Retail trade.

These results provide another perspective on the above-discussed mechanisms of the association of segregation and incomes. Whether this can be related to racial preferences or not, both the main losers and winners are reluctant to leave their residential area. One may think that they often adhere to the segregation context that they face. Having found their job through their extended network is a preponderant trait of the losers. This reinforce our suspicions about the negative influence of within-group networks backed up by local segregation, at least for some disadvantaged workers. Finally, there is some weak evidence of the role of labor market segmentation, noticeable through the prominent effect of the Affirmative Action, in providing higher earnings for the main winners of local segregation.

The regional and industrial differences between losers and winners fit well the electoral constituency of the ANC and the political strategy of the EFF. The traditional ANC strongholds are the northern provinces of Limpopo, Mpumalanga, and North West, and the Eastern Cape in the south. Gauteng, the Western Cape, the Northern Cape, and, to a lesser extent, the Free State have always been disputed with the Democratic Alliance. KwaZulu-Natal is currently administered by the ANC, while challenged by the IFP. The mostly rural Eastern Cape, Limpopo, and KwaZulu-Natal, simultaneously with the agricultural sector partially correspond to the ANC specific target group since the ANC largely relied on the rural vote from its inception.[20] Moreover, workers in the agricultural sector are often not unionized which coincides with the low unionization rate of the main losers.[21] Workers in the mining sector, on the other hand, are close to the COSATU, of which the National Union of Mineworkers is a member, founded by the currently sitting president Cyril Ramaphosa in the 1980s. The COSATU has always been supportive of the ANC.

The EFF's strategy is often to outbid the ANC and the trade unions. However, their minimum wage proposal much exceeds realistic earnings for the poorest workers, especially in the agricultural and mining sectors. If voters choose their champion according to their expected gain, then the EFF's proposal of 12500 rands should speak more to individuals working in the sectors of manufacturing, wholesale and retail trade, and construction, hence, mostly urban workers within the

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[20]See Afrobarometer.org (2015) , last accessed on the 14th of November 2019.

[21]Thompson (2001) describes the early formation of trade unions in South Africa consecutive to the rise in the cost of urban living. In 1945, 40% of the unionized workers were employed in commerce and manufacturing, and "the crucial terrain for labor relation was, as ever, the mining industries." (p.179). Unionization in agriculture, far from the urban centers, and being heavily mechanized or of the subsistence type, cannot easily develop.

EFF's constituency.[22] Indeed, most other political movements made minimal wage proposals too low to affect many of these workers directly. On the whole, although there are certainly many other determinants of political programs, it is intriguing to note that the ANC-led reform is liable to benefit the ANC's constituency in several ways. On the other hand, it should raise the wages of the workers employed in the modern and public sectors, from income categories that predominantly vote for the ANC. On the other hand, by removing wage intervals corresponding to especially harmful associations of segregation and wages, it should contribute to protect some of the main African losers of segregation. Interpretations of the estimates of the minimum wage proposal for the other parties would be still more tentative, as their proposals were not implemented and never had the chance to go through parliaments.

VIII. Conclusion

We proposed a new approach to analyzing the contribution of segregation to socio-ethnic income gaps, as a general preliminary descriptive stage to more specific structural or causal analyses. Performing a thorough distribution decomposition and scrutinizing the heterogeneity of segregation effects allow us to uncover patterns that remain hidden in mean analyses and traditional Mincer equations. The highlighted contribution of segregation to the distribution of the racial income gap not only promotes the integration of segregation mechanisms in earnings models, but also generate hints at the socio-economic mechanisms that explain income differences between socio-ethnic groups.

Segregation was found to be the main contributor to the structure effect, ahead

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[22]See citizensurveys.net (2018), last accessed on the 14th of November, 2019.

of education and experience, in the case of the distribution of African-White income gap in South Africa. More precisely, segregation negatively affects African bottom incomes, but positively White top incomes. Hints about a few operating mechanisms became apparent. Local and informal job-search networks, often operating along racial lines and stimulated in segregated contexts bear on the association segregation-income in a way that harms the poorest and benefit African middle classes. In contrast, labor market segmentation, in association with segregation, affects more the polarization of incomes within each racial group than their mean levels. Only minor influence of racial preferences has been detected, although this may be due to unprecise measure of these preferences. Finally, the subpopulations that suffer and benefit the most from segregation through their wages are identified. The worst impaired are the low-education workers in agriculture and mining, often female, and immersed in local informal networks.

These findings can assist in designing more effective public policies, for example by better targeting social programs towards the above-mentioned disadvantaged segregated categories. Since segregation is also observed to be a sizeable contributor to the composition effect, this fact should be exploited for policy aiming at reduced wage gaps. For example, highly segregated areas could benefit from public investment in mixed residential real estate. Some of these policies may involve complex interactions of segregation with other income determinants. For example, a shock on residential segregation may readjust the balance of human capital accumulation in this country since segregation upholds the dual school system that discriminates against Africans. Conversely, enhancing education may reduce segregation if it contributes to reshaping racial preferences and promoting openness and understanding among communities. The local, often race-exclusive, networks

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that are fostered by segregation, could be regulated consistently to the direction of their influences on the African-White wage gap.

Finally, we also examined the 2018 minimum wage reform, which, beside its direct effect on their incomes, was found likely to attenuate the harmful impact of segregation on poor Africans by wiping out intervals of the African distribution where most of this impact takes place.

However, to go further in the analyses, the proposed approach must make room for structural and causal studies of incomes. In that case, concerns typically encountered are the endogeneity of human capital factors and selection by labor market participation. In our case, these issues would extend to the potential endogeneity of segregation and differential migrations of racial groups to their preferred specific neighborhoods. Addressing these issues is an important challenge for future research, for which the current analysis has already provided valuable clues.

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TABLE I
Descriptive Statistics

| | 2008 | | | | 2014 | | | |
| | Whites | | Africans | | Whites | | Africans | |
	Mean	Std D.	Mean	Std D.	Mean	Std D.	Mean	Std D.
Income	12909.28	13268.02	3534.29	5777.53	14012.4	13514.05	4542.55	5065.90
Isolation	0.65	0.12	0.93	0.09	0.64	0.12	0.93	0.08
Dissimilarity	0.84	0.08	0.85	0.07	0.85	0.07	0.86	0.07
Years of schooling	12.82	2.03	8.92	4.36	13.28	1.83	10.55	3.66
Experience	21.48	11.69	22.68	13.23	24.03	13.07	20.19	12.73
Male	0.51	0.50	0.57	0.50	0.57	0.50	0.50	0.50
Age	40.31	11.68	37.60	11.12	43.31	13.23	36.74	11.01
Weak link	0.28	0.45	0.35	0.48	0.38	0.49	0.45	0.50
Strong link	0.06	0.24	0.07	0.25	0.04	0.19	0.04	0.20
Union membership	0.20	0.40	0.26	0.44	0.23	0.42	0.27	0.44
Household size	3.08	1.25	4.16	3.11	3.25	1.60	4.48	3.22
Household income	23931.78	20486.24	5868.31	8556.82	27279.05	26478.98	7411.73	9150.55
Hours worked weekly	42.82	13.64	36.36	20.41	41.56	14.70	41.59	15.89
Reservation wage	.	.	.	.	12580.69	14510.48	4774.53	5633.57
Firm size (50+)	.	.	.	.	0.30	0.46	0.25	0.43
Western Cape	0.42	0.49	0.06	0.23	0.37	0.48	0.05	0.22
Eastern Cape	0.03	0.18	0.09	0.29	0.07	0.25	0.08	0.28
Northern Cape	0.06	0.24	0.05	0.22	0.07	0.26	0.04	0.20
Free State	0.00	0.07	0.09	0.28	0.01	0.09	0.08	0.27
KwaZulu-Natal	0.05	0.22	0.26	0.44	0.09	0.29	0.27	0.45
North West	0.02	0.15	0.09	0.28	0.01	0.11	0.08	0.27
Gauteng	0.27	0.44	0.20	0.40	0.30	0.46	0.22	0.41
Mpumalanga	0.12	0.32	0.10	0.30	0.06	0.23	0.10	0.30
Limpopo	0.03	0.16	0.07	0.25	0.03	0.16	0.08	0.27
Agriculture	0.05	0.22	0.16	0.37	0.05	0.22	0.09	0.28
Mining	0.03	0.17	0.07	0.25	0.03	0.16	0.04	0.21
Manufacturing	0.15	0.35	0.17	0.38	0.14	0.34	0.11	0.32
Energy	0.01	0.10	0.01	0.09	0.02	0.12	0.01	0.11
Construction	0.03	0.17	0.07	0.25	0.05	0.21	0.08	0.27
Trade; Hotels	0.18	0.39	0.14	0.35	0.18	0.39	0.19	0.39
Transport	0.04	0.20	0.04	0.20	0.05	0.21	0.05	0.22
Finance; Real estate	0.17	0.38	0.08	0.26	0.21	0.41	0.10	0.31
Social services	0.34	0.47	0.26	0.44	0.29	0.45	0.31	0.46
Observations	440		2922		229		5291	

The variable Income, Household income, and Reservation wage are deflated to November 2014 rands. The dummy variables Male, Weak link, Strong link, Union membership, Firm size, and sectoral and provincial dummy variables are expressed as a share of the population. Firm size and reservation wage were only available in 2014.

TABLE II

OLS REGRESSIONS

	2008		2014	
	Whites	Africans	Whites	Africans
Experience	0.08***	0.04***	0.03**	0.02***
	(6.84)	(10.82)	(2.47)	(7.46)
Experience squared	-0.0014***	-0.0004***	-0.0003	-0.0002***
	(-5.87)	(-5.99)	(-1.26)	(-2.90)
Years of schooling	-0.17	-0.05***	-0.31	-0.06***
	(-1.53)	(-4.03)	(-1.13)	(-5.04)
Years of schooling squared	0.01***	0.01***	0.02*	0.01***
	(3.28)	(16.85)	(1.87)	(17.32)
Isolation	1.08***	-0.40**	0.55	-0.46***
	(3.70)	(-2.57)	(1.37)	(-3.22)
Constant	7.32***	6.66***	8.83***	7.29***
	(10.07)	(42.09)	(5.00)	(47.91)
Observations	440	2922	229	5291
R^2	0.355	0.346	0.279	0.259

t-statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE III
Oaxaca Decompositions

	2008	2014
Differential		
Prediction_1	9.09***	9.20***
	(214.76)	(161.92)
Prediction_2	7.70***	8.01***
	(455.18)	(626.79)
Difference	1.39***	1.20***
	(30.56)	(20.55)
Composition		
Experience	-0.01	0.06***
	(-0.57)	(4.13)
Education	0.64***	0.46***
	(20.78)	(14.81)
Isolation	0.02	0.11***
	(0.47)	(3.22)
Total	0.65***	0.63***
	(12.75)	(12.82)
Structure		
Experience	0.16	0.11
	(1.34)	(0.91)
Education	-1.13*	-1.76
	(-1.93)	(-0.99)
Isolation	1.05***	0.68**
	(4.80)	(2.53)
Constant	0.66	1.54
	(1.02)	(0.85)
Total	0.75***	0.57***
	(12.69)	(9.02)
Observations	3362	5520

t-statistics in parentheses.

Prediction_1 is the mean of the predicted logarithm of the real monthly income of Whites (in 2014 (Nov.) rands).

Prediction_2 is the mean of the predicted logarithm of the real monthly income of Africans (in 2014 (Nov.) rands). These predictions also correspond to each subgroup unweighted sample mean when the coefficients are estimated using OLS for each subsample.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE IV
OLS regressions of the RIF-regression coefficients of Isolation

	(1) NMW	(2) COSATU	(3) EFF	(4) N.C.	(5) Pooled sample
Male	0.064***	0.010**	-0.0026	-0.040	0.18***
	(3.48)	(2.20)	(-0.42)	(-1.06)	(10.55)
Household size	-0.011***	-0.00085	0.00026	0.011	-0.0077***
	(-3.99)	(-1.09)	(0.27)	(1.45)	(-2.75)
Household income (thousands ZAR)	0.018***	0.0011**	-0.00051*	-0.016***	0.0049***
	(6.06)	(2.20)	(-1.74)	(-8.39)	(3.28)
Hours worked weekly	0.0014**	0.000019	0.0000056	-0.0018	0.0039***
	(2.16)	(0.10)	(0.02)	(-0.93)	(5.78)
Reservation wage (thousands ZAR)	0.0095***	-0.00094	-0.00085*	-0.0093***	0.0034*
	(3.63)	(-1.37)	(-1.78)	(-4.59)	(1.81)
Network effects:					
Strong link	-0.052	0.0093	0.0027	0.19*	-0.099**
	(-1.29)	(0.72)	(0.17)	(1.78)	(-2.33)
Weak link	-0.050***	0.0054	0.012**	-0.0089	-0.10***
	(-2.86)	(1.25)	(2.06)	(-0.17)	(-5.89)
Labor market segmentation:					
Union	0.072***	0.011**	-0.0019	-0.076*	0.26***
	(2.59)	(2.14)	(-0.33)	(-1.70)	(13.25)
Before Affirmative Action	0.016***	0.000063	-0.00042	-0.037***	0.030***
	(2.92)	(0.04)	(-0.34)	(-2.97)	(8.52)
After Affirmative Action	0.011***	0.00076	-0.00032	-0.033***	0.025***
	(4.52)	(0.99)	(-0.31)	(-2.77)	(9.83)
Racial preferences:					
Strong preference to stay	-0.016	-0.00098	0.00019	0.090	0.018
	(-0.62)	(-0.15)	(0.02)	(1.47)	(0.71)
Moderate preference to stay	-0.0088	-0.0077	-0.0053	0.16**	-0.0036
	(-0.29)	(-1.00)	(-0.51)	(2.27)	(-0.12)
Moderate preference to leave	0.018	-0.00045	0.0011	0.12	0.051
	(0.45)	(-0.05)	(0.08)	(1.47)	(1.34)
Strong preference to leave	-0.074*	0.0031	0.021	0.070	-0.010
	(-1.75)	(0.28)	(1.61)	(0.84)	(-0.25)
Intercept	-1.10***	-0.14***	0.28***	0.60***	-0.96***
	(-18.68)	(-8.39)	(11.36)	(2.59)	(-16.16)
Province dummies	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes
N	2228	502	1293	420	4443
R-square	0.14	0.076	0.021	0.39	0.30
Adj. R-square	0.13	0.024	-0.00035	0.34	0.29
F	13.2	1.68	1.02	286.15[†]	79.0
P-value	<0.00005	0.018	0.44	<0.00005[†]	<0.00005

* $p<0.1$, ** $p<0.05$, *** $p<0.01$

NMW: National Minimum Wage; COSATU: trade unions; EFF: Economic Freedom Fighters; N.C.: Not Concerned.

Before Affirmative Action refers to the interaction of a dummy variable, taking the value 1 if the individual started his job before the passing of the Employment Equity Act of 1998, with the number of years of schooling. *After Affirmative Action* refers to the same interaction with the dummy variable taking the value 0 instead. *Province dummies* comprise a list of dummy variables for all the South African provinces (Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, North West, Northern Cape, Western Cape) except Mpumalanga which serves as the reference basis. *Sector dummies* comprise a list of dummy variables for specific South African industrial sector (Private households, Agriculture, Mining and quarrying, Finance, and Community, social and personal services), the excluded sectors (Manufacturing, Energy, Construction, Retail trade, and Logistics) defining the reference basis.

† Due to a clustering of observations when using subsamples, the sandwich estimator of the robust covariance matrix could not always be computed. We use instead the boostrap estimator obtained with the 554 replications over 1000 that could be used for such computations. Therefore, instead of the F-statistics, we report a Wald statistics.

TABLE V

CLASSIFICATION ANALYSIS - DIFFERENCE IN THE AVERAGE
CHARACTERISTICS OF THE AFRICAN MAIN WINNERS AND LOSERS FROM
SEGREGATION

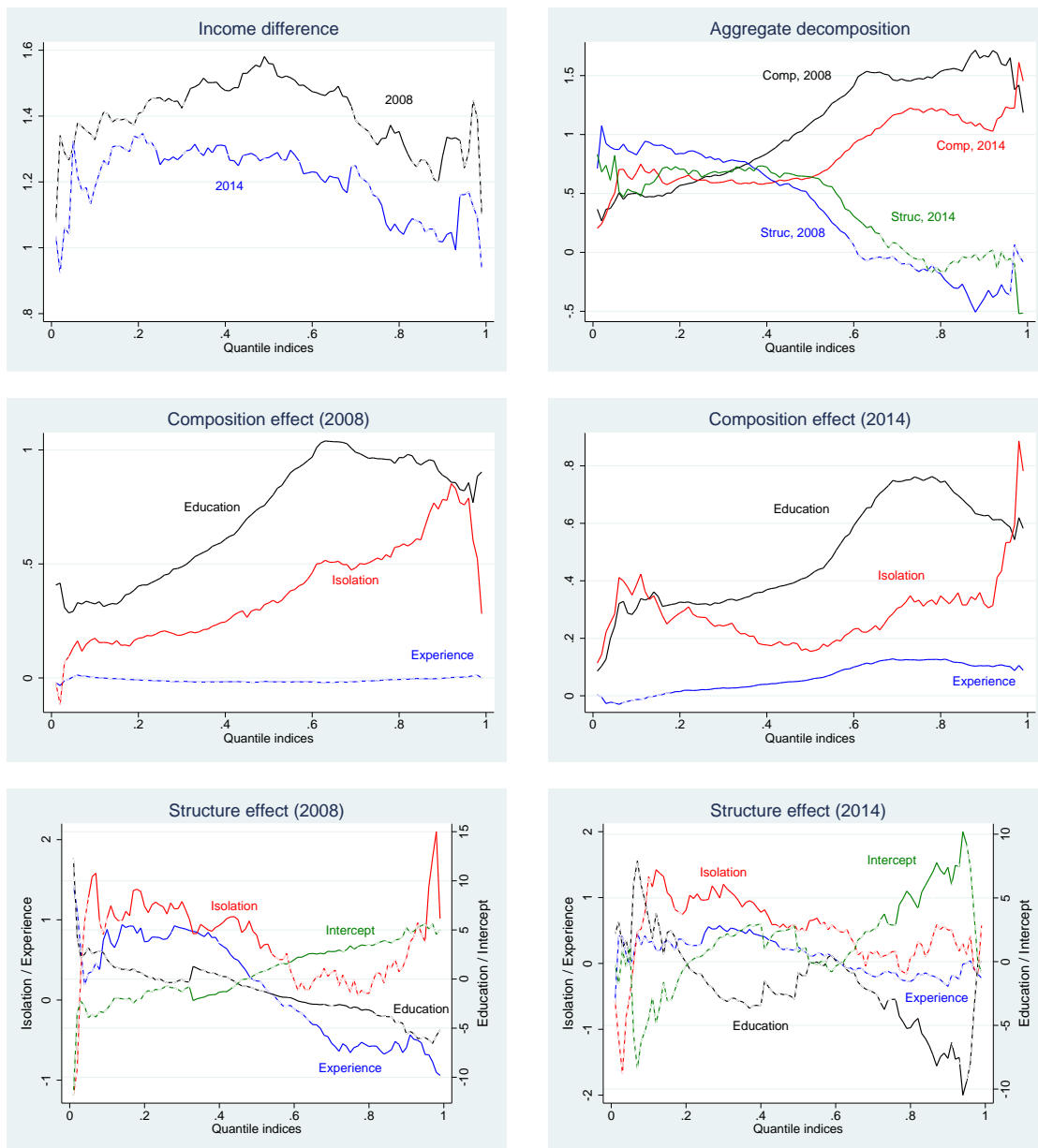|	Main losers		Main winners		Difference		
	Mean	S.E.	Mean	S.E.	Mean	S.E.	P-value
Isolation	.942	.003	.929	.003	.013	.004	.001
Male	.3	.02	.64	.02	-.34	.03	< 0.001
Household size	4.95	.14	4.2	.14	.75	.19	< 0.001
Household income	2635	136.77	8693.49	320.81	-6058.49	347.09	< 0.001
Strong link	.07	.01	.02	.01	.04	.01	.0011
Weak link	.65	.02	.39	.02	.26	.03	< 0.001
Union	.05	.01	.37	.02	-.32	.02	< 0.001
Hours worked weekly	38.09	.67	43.91	.49	-5.82	.84	< 0.001
Reservation wage	2247.69	107.77	5583.54	185.32	-3335.85	209.68	< 0.001
Before Affirmative Action	.03	.01	.12	.01	-.09	.02	< 0.001
Years of Schooling	8.32	.17	11.35	.13	-3.03	.21	< 0.001
Moderate preference to stay	.62	.02	.58	.02	.05	.03	.1511
Unsure	.17	.02	.14	.02	.03	.02	.2094
Moderate preference to leave	.1	.01	.13	.02	-.03	.02	.1275
Strong preference to leave	.04	.01	.07	.01	-.03	.01	.0767
Western Cape	.04	.01	.06	.01	-.03	.01	.0465
Eastern Cape	.13	.01	.06	.01	.08	.02	< 0.001
Northen Cape	.02	.01	.05	.01	-.03	.01	.0053
Free State	.09	.01	.08	.01	.01	.02	.6597
KwaZulu-Natal	.32	.02	.2	.02	.11	.03	< 0.001
North West	.08	.01	.07	.01	.01	.02	.646
Gauteng	.15	.02	.28	.02	-.13	.02	< 0.001
Mpumalanga	.06	.01	.13	.01	-.08	.02	< 0.001
Limpopo	.12	.01	.06	.01	.06	.02	< 0.001
Agriculture	.29	.02	.02	.01	.27	.02	< 0.001
Mining and Quarrying	.12	.01	.02	.01	.1	.02	< 0.001
Manufacturing	.01	.004	.09	.01	-.08	.01	< 0.001
Energy supply	.084	.012	.11	.01	-.02	.02	.2479
Construction	.002	.002	.02	.01	-.01	.01	.023
Wholesale and Retail trade	.05	.01	.09	.01	-.04	.02	.0213
Transport	.14	.02	.16	.02	-.02	.02	.4625
Finance	.02	.01	.07	.01	-.06	.01	< 0.001
Social services	.03	.01	.12	.02	-.1	.02	< 0.001

FIGURE I

Aggregate and Detailed Decompositions in 2008 and 2014

The dashed parts of the curves represent the effects not significantly different from zero at the 5 percent level, except for the income differences, where they represent the quantiles for which the income difference in 2008 is not significantly different from the income difference in 2014. "Comp" and "Struc" refer to the composition effect and the structure effect, respectively.
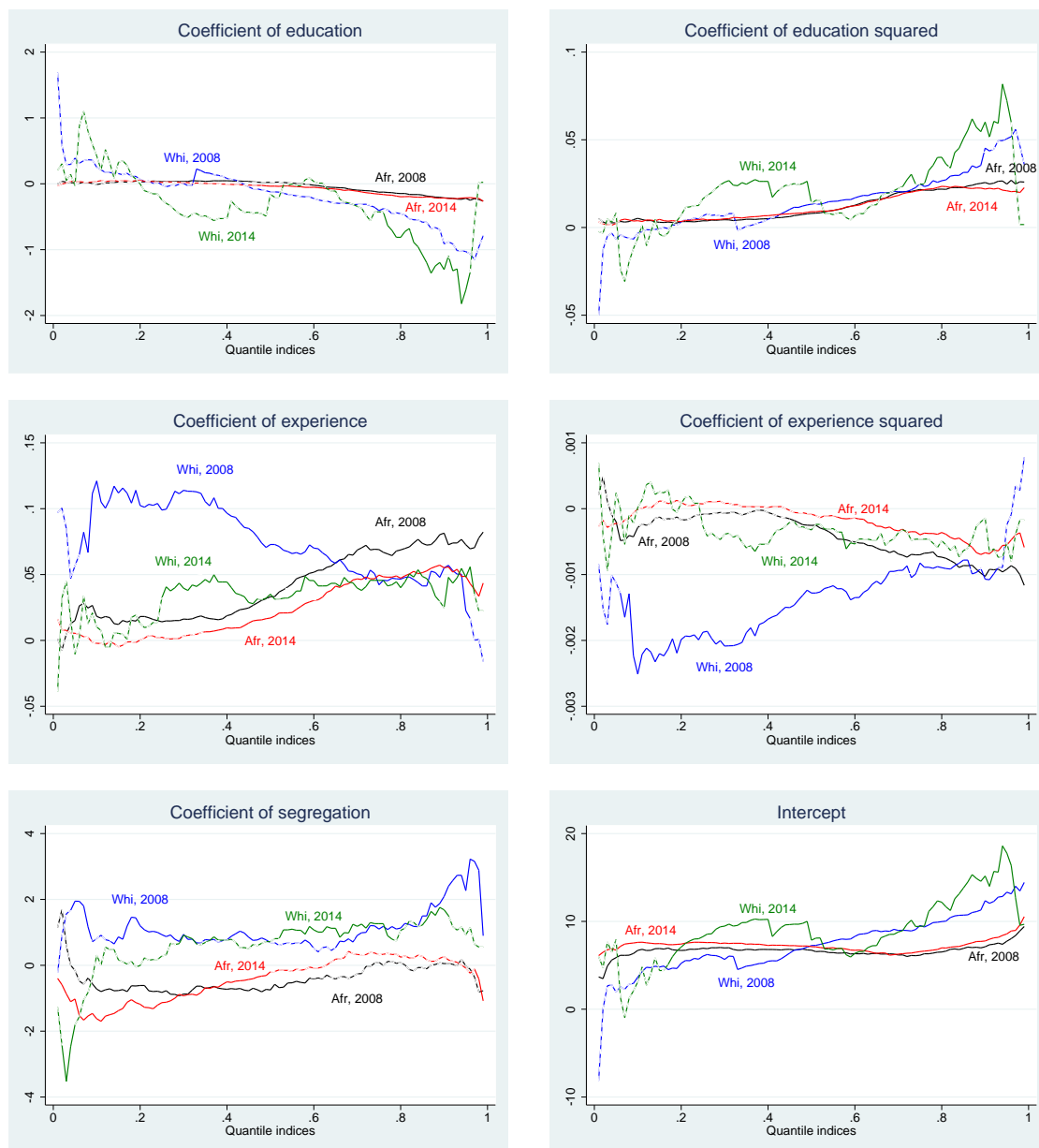
FIGURE II

RIF Regressions of Income by Racial Group and Year

The dashed parts of the curves represent the effects not significantly different from zero at the 5 percent level. "Afr" and "Whi" refer to Africans and Whites, respectively.
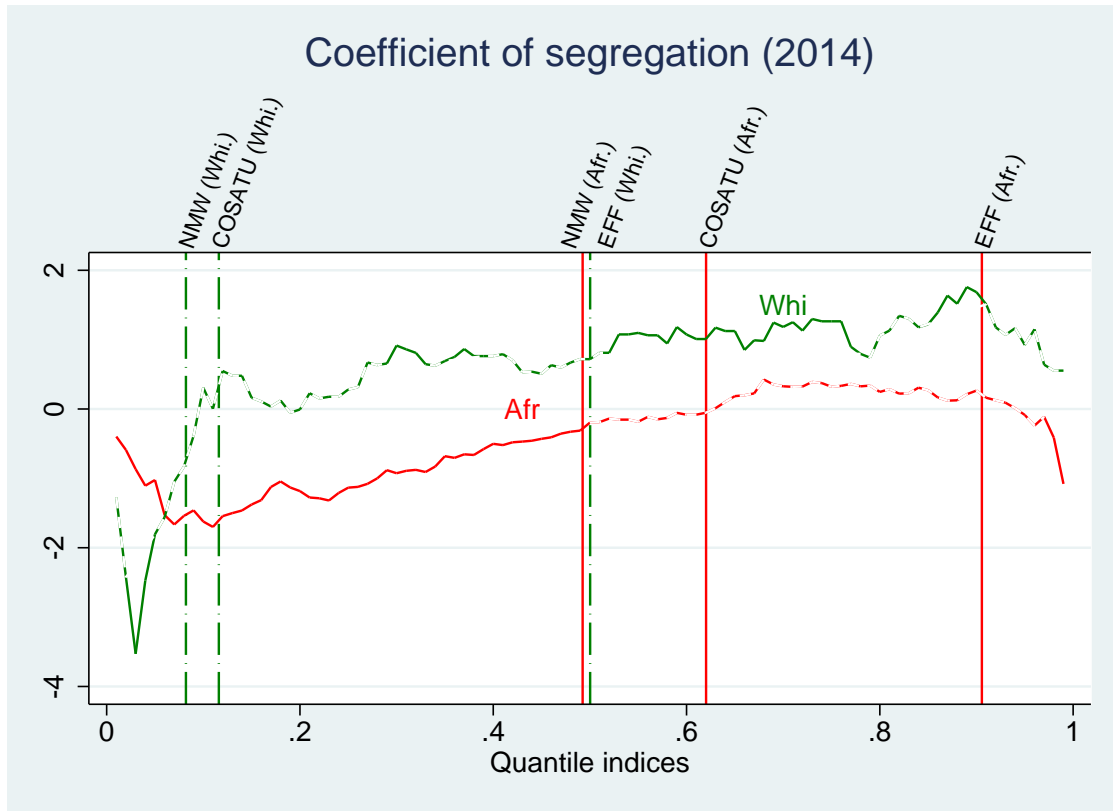
FIGURE III

RIF-regression coefficients of Segregation with target groups

The dashed parts of the curves represent the effects not significantly different from zero at the 5 percent level. "Afr" and "Whi" refer to Africans and Whites, respectively.