Mom-and-Pop Jobs: Wage Subsidies and Youth Unemployment in South Africa

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Abstract

Youth unemployment has been increasing in Africa. It is particularly pervasive in South Africa, where the youth unemployment rate is persistently high, posing considerable socioeconomic challenges. In response, the government introduced the Employment Tax Incentive (ETI) program in 2014 to boost employment opportunities for youth. This study examines the extent to which the ETI program increases youth employment by looking at hiring and separation rates. The study also examines whether the program displaces non-youth workers—one of the main concerns among unions in South Africa. We take advantage of detailed employee-firm matched panel tax data from the National Treasury and the Revenue Service covering the 2011-2018 period and estimate a Difference-in-Difference model. We find that the program is associated with a 0.003 probability points higher of hiring youth in the 18-24 age bracket. However, we find a significant reduction in both hiring and separation rates for workers in the 24-29 and 30-44 age groups, suggesting some displacement effects not only on at-risk non-youth workers but also youth in the older age bracket. We also find that the overall positive effects of hiring rates of younger workers are driven by microenterprises, typically referred to as mom-and-pop businesses. Overall, the paper uncovers important heterogeneity in the impacts that could inform policymakers to re-configure the program for better targeting.

Keywords: unemployment, labour market, wage subsidy, hiring, separation, displacement, firm-level, tax.

JEL Codes: J08, J23, J3, J48, J6

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1 Introduction

Africa is the youngest continent in the world, with 60% of its population below 25 years of age. In recent years, however, youth unemployment has become one of the most significant socioeconomic challenges giving rise to conflict, illegal migration, and political instability in many African countries. Cognizant, governments use active and passive labor market policies and programs to shore up employment opportunities for the youth. One of the most common active labor market policies to tame joblessness and improve labor market outcomes for the youth is a wage subsidy program. Although the evidence on employment impacts for youth and other target groups, such as women, is mixed with huge heterogeneity, active labor market policies, particularly wage subsidy program, is common in advanced countries compared to much of the developing world where high-productivity jobs are scarce (Almeida et al., 2014). Indeed, training, skills development, apprenticeship, and other low-budget active labor market interventions are typical in developing countries. But direct wage subsidy programs are not common due in part to fiscal constraints. Faced with high youth unemployment, some middle-income African countries have been experimenting with direct wage subsidy programs to boost employment opportunities and human capital development of the youth (Heckman et al., 2002). However, evidence about the impacts of these programs remains mixed, inconclusive, or lacking in the literature. There is also a lack of evidence regarding the potential displacement effects of such programs on non-youth workers, which is a major concern for organized labor and unions. To fill the evidence gap, this paper examines the impacts of South Africa's wage subsidy program—formally known as the Employment Tax Incentive (ETI) program—on youth and its potential displacement impacts on the non-youth workers.

The South African ETI program was commenced in January 2014. It was a result of some experimental inquiry into the feasibility of such a program in South Africa (Levinsohn et al., 2014; Levinsohn and Pugatch, 2014). It is one of the few wage subsidy programs in emerging economies that aims to improve youth employment by lowering hiring costs for employers associated with inexperienced and low-skilled youth workers and increasing the long-term employment prospects for the youth by increasing their human capital as they gain more work experience during the period of subsidized work. The ETI provides a direct wage subsidy to eligible formal firms that hire new young workers between the ages of 18 and 29 years. Eligible firms receive subsidies for each new qualifying youth employee that they hire. Firms can benefit from the subsidy for a maximum of two years. The amount of subsidy is determined on a sliding scale basis depending on the level of wages that the employee earns and the duration of employment. Eligible firms claim a subsidy from the government when

filing taxes, which minimizes potentially perverse incentive effects on the side of the youth and ensures long-term participation of the private sector in the development of the labor force (Burns et al., 2010).

While the South African wage subsidy program received some positive responses in light of the high and persistent youth unemployment rate in the country, there have been equally strong counterarguments against the program from labor unions. For instance, the Congress of South African Trade Unions (COSATU)—the country's main labor union—was against the introduction of the ETI program as a means of addressing youth unemployment in South Africa (Crichton and Maré, 2013). The union argues that the program carries potentially distortionary effects in the labor market against non-youth workers. As a result, firms would find it attractive to substitute non-youth workers with youth workers to minimize their wage bills. Non-youth workers who have comparable levels of experience, education, and other attributes are at high risk of being displaced, especially those at the bottom of the age bracket and have a similar level of productivity and attributes as the youth (Bhorat et al., 2020). Moreover, the risk of displacement could occur at a task or an activity level, depending on skill and experience requirements. This could be a potential concern, especially if the program disproportionately displaces vulnerable groups such as women and marginalized groups. There is, however, a lack of evidence about the extent of the displacement effect of the program on non-youth workers.

In this paper, we investigate the impacts of the ETI program on youth employment and potential displacement effects on non-youth workers. Specifically, we estimate the effects on hiring and separation rates across the entire age distribution of the workforce among *eligible* firms in South Africa. We use detailed firm-employee-linked administrative panel tax data from the South African Revenue Service and National Treasury (SARS-NT) collaboration. The panel data have information on more than 8.7 million data points on workers employed in over 1 million firms in South Africa, recording key information such as wages, age, education, industry, firm revenue, and costs. The data follows each worker and employer, allowing us to observe employment outcomes before and after the program implementation. We use a difference-in-difference (Diff-in-Diff) model using Ordinary Least Square (OLS) and Fixed Effects specifications to estimate the impacts on the hiring and firing rates of workers in age groups: 18-24, 25-29, 30-34, 35-44, 45-54, and 55-64. Furthermore, we perform firm heterogeneity analysis by firm size and sector. A key value addition of the paper is quantifying the ETI program's effects on hiring and separation rates for both the youth and non-youth workers and identifying pathways through which the overall employment outcomes are affected.

Our paper is situated within the growing body of literature investigating the impacts of

active labor market interventions, specifically wage subsidies in developing countries. Although this particular body of literature is scant in the African context, one of the early studies which attempted to assess the implications of wage subsidy programs was Burns et al. (2010) in South Africa. The study uses a simulation in Computable General Equilibrium (CGE) model to evaluate the economy-wide effects of the wage subsidy program. Their simulation study finds that under conditions of well-functioning markets and buy-ins from firms, a wage subsidy program significantly increases total employment and expands the national output, despite the additional burden of higher taxes. Using a similar approach but a disaggregated General Equilibrium Model, Go et al. (2010) analyzes the employment effects and fiscal cost of a wage subsidy program in South Africa. They show that the employment impact of a wage subsidy program in the South African labor market depends greatly on the elasticity of substitution of factors of production, with minimal effects if unskilled and skilled labor is complemented in production. More importantly, the study underscores that the wage subsidy program would be effective only if the labor market is sufficiently flexible. Although simulation studies provide useful insights, they rely on a set of stringent assumptions about the labor market, firms' and workers' behavior, and other key factors.

One of the earlier empirical studies in South Africa that aimed to inform policy before the ETI program came into effect is Levinsohn et al. (2014), which conducted a randomized control trial to examine the effects of a wage subsidy program on youth unemployment. In the study, participants in the treatment arm were given a voucher for a wage subsidy that hiring firms could claim monthly for up to six months. They find that participants who were given wage subsidy vouchers were more likely to be in wage employment two years after they were given the voucher. The result that the impact persisted even after the voucher was no longer valid presented a strong case for the scale-up of the ETI program at the national level. Upon implementation of the ETI program in 2014, Ebrahim et al. (2017b) in a first post-implementation study in the context of South Africa, and using the same SARS-NT data, attempted to estimate the overall impacts of the program at a national scale. They find no statistically significant change in the number of youth employed in the first 14 months of the ETI scheme.

Although there is budding literature assessing the impacts of the South African ETI program since the implementation of the program in 2014 and administrative tax data on firms and employees become widely available, the evidence on youth employment and potential displacement effect on the non-youth workers are still mixed. For instance, Ebrahim and Pirttilä (2019) examined the incidence and employment impacts of the ETI program using the same firm-employee-linked panel tax data and a Diff-in-Diff approach. They find that while the subsidy may have increased the earnings of those in the target group, it did

not improve the employment rate for the target population. Recently, using the same firm-employee linked panel tax data but covering a longer period, Bhorat et al. (2020) showed that the ETI program slightly decreased overall employment levels for non-eligible firms but increased employment levels for eligible firms. However, they find no significant impacts on workers who are at risk of displacement (i.e., the non-youth workers) nor on the non-wage benefits of those employed. However, both studies focus on estimating the impacts on the stock of workers at a point in time as opposed to the flow of workers measured by hiring and separation rates, which show the dynamic nature of the employment decisions by both firms and employees. Similarly, the analysis on the displacement effects of the program—for instance, Bhorat et al. (2020) examines the potential displacement effects of the program on the non-youth—considers only the total employment size across firms as opposed to the effects across the age distribution of workers within a firm. These two perspectives are important considerations given that firms could have the incentive to keep the size of their workers constant but substitute older workers with younger ones to benefit from the subsidy. Also, firms could have the incentive to change workers' turnover—both hiring and separation rates–changing the flow of workers without changing the overall stock of workers. Our study addresses these issues.

In a recent study, Budlender et al. (2021) investigate the seemingly contradictory evidence on employment outcomes of the ETI program using Event Study design. The study suggests that results from studies based on the matching approach do not yield consistent evidence because the pre-treatment period does not provide an informative counterfactual for the post-treatment period. They also show that partial approaches, in particular Diff-in-Diff, which exploits the full advantages of the panel structure of the data, are appropriate methods. Using the Diff-in-Diff method, they find that the ETI program significantly increased youth employment. Based on their assessments, they conclude that the contradictory results in the existing literature require a careful empirical investigation to definitively infer the impacts of the program on youth employment. Although the study sheds some light on the inconsistencies arising from a methodological perspective, the behavioral aspect of firms in re-shuffling the age structure of their employees in favor of the youth remains an important issue that is not well addressed in the literature.

Moreover, the conflicting evidence in the literature on the impacts of the ETI program could be attributed to empirical methods used in the studies. For instance, most of the studies use a before-after approach, pooling observations from more than two years after the program. This could bias the estimates if factors affecting the two groups' post-implementation trends are different, which is not unlikely. Besides, in a multi-period setting where treatment and participation vary over time, which renders the panel unbalanced as new firms become

eligible, and some of the existing firms become ineligible, estimating a Diff-in-Diff model using the pooled data yields a biased estimates (Lechner et al., 2016). Potential biases could also arise from firms dynamically selecting in and out of treatment over time (Callaway and Sant'Anna, 2020).

Our study fills the gap in the literature in two ways. First, we perform a comprehensive assessment of the impacts of the ETI program on hiring and separation rates along the entire age distribution of employees controlling for firm-level factors. This approach is different from assessing the impacts on the total employment size of eligible and non-eligible firms, given that eligibility for a subsidy depends on the age of the worker. Moreover, we use the recent tax administration data, which have more data points and covers longer periods between 2011 and 2018. Second, our paper contributes to the literature by focusing on the impacts of the program on the flow of workers as opposed to the stock of workers, which most of the existing literature focuses on. Considering decision lags on the side of firms to change the size of their workforce, we estimate the impacts on the flow of workers across the entire age distribution of the workforce within a firm as opposed to the size of youth and non-youth workers between firms. Third, our paper differs from previous studies by acknowledging the multiperiod setting in the data in which treatment timing is heterogeneous and dynamic selection into the program, which could potentially bias the estimates and address the issues using an appropriate empirical model.

The findings in our paper highlight that the ETI program significantly increases hiring rates of the youth in the 18-24 age group, although we find some displacement effects on workers in the 24-29 and 30-44 age groups. The effects are also heterogeneous depending on firm size and sector of operation. While much of the positive effect on hiring youth in the 18-24 age group is driven by higher hiring rates by micro-enterprises and firms operating in agriculture, the displacement effect on older youth in the 24-29 age bracket and non-youth workers aged 30-44 is driven by the significant effect on medium-sized firms and those operating in the services sector. The heterogeneous impacts of the ETI program across age and firm type underscores the need for better targeting. Moreover, in line with recent studies, such as Bhorat et al. (2020), our results suggest a significant displacement effect not only on the non-youth workers who are at risk but also on the youth in the older age bracket.

The rest of the paper is organized as follows. Section (2) describes the institutional setting of the ETI program and the unemployment situation in South Africa, with a particular focus on youth unemployment. Section (3) describes the data and lays out the empirical specification. While section (4) presents and discusses the results, section (5) concludes.

2 Background: Youth unemployment and the ETI program

2.1 Youth unemployment in South Africa

The socioeconomic challenges posed by persistently high levels of youth unemployment in South Africa are not a recent phenomenon. The international minerals boom and the ensuing rise in mineral prices, especially the price of gold, propelled South Africa through a period of sustained high economic growth. The mining-led growth allowed the country to undertake massive investments in expanding its agricultural and manufacturing sectors. In the boom decade of the 1960s, real output averaged almost 9% per year and increased employment levels with over 75% of new labor market entrants absorbed into the formal wage employment sector. However, from 1970 onwards, South Africa's labor market experienced a persistently high unemployment rate as the labor absorption capacity of the economy started to gradually decline (Nattrass and Seekings, 2010; Fallon and de Silva, 1994). The percentage of new entrants accommodated by the formal economic sector declined to 35.4% between 1975 and 1980, a sizeable decline from the peak levels in 1965-1970. This decline reflected a slow growth in South Africa's economy brought about by the global recession in the aftermath of the 1973 oil price shock and negative effects on investment due to heightened political uncertainty following the 1976 Soweto uprising. The trend continued with unemployment averaging over 23% in 1980-1989, and by 1989 the share of the workforce in the formal sector employment was 42%.

In 1990, South Africa officially abolished apartheid and started transitioning to a full democratic dispensation. During the transition period 1990-1993, the country experienced an economic recession as real output declined by a cumulative 3.5%. This exacerbated South Africa's employment challenges, during which the labor market achieved almost no growth in formal employment. Employment contracted by 1.2% per annum as significant job losses in the key gold mining and manufacturing sectors (equivalent to 30% and 10% reduction in sectoral employment, respectively) contributed to an increase in the rate of formal joblessness to 44% by 1993 (Lipschitz et al., 1995). Following its inauguration in April 1994, South Africa's first non-racial democratic government inherited a stagnant economy and a labor market grappling with increased labor force participation and an absorption capacity that was outpaced by population growth. In 1995, the official rate of unemployment stood at 28.2%, with the lack of employment opportunities for youths the most pressing - three in five 16-20 years old were unemployed, while the rate of joblessness among those aged 20-25 was double that of the entire population (Banerjee et al., 2007).

Through the cumulative policy-making efforts since 1994[1], the first fifteen years of the post-democratic dispensation was one of economic rebound and expansion. During this period, economic growth averaged over three percent, marking the country's longest episode of economic expansion in the post-World War II period. However, this relatively strong economic performance was insufficient to address the levels of unemployment that had steadily increased in the post-1994 period. With labor force participation rates, particularly among youth and females, outpacing the gains in employment, the general unemployment rate peaked at 31.2 percent in 2003 and was particularly severe for South Africa's young workers. The trend of rising unemployment in the post-1994 period disproportionately affected the youth labor force. Between 2000 and 2006, the unemployment rate for lower and upper youth (i.e., those aged 15-24 and 25-34, respectively) was consistently higher than those of working adults (i.e., labor force aged 35 and above) and exceeded 30%.

Concerned with the failure to address the high rate of joblessness, the South African government implemented various labor market programs to assist young people in finding employment and acquiring skills. These include the Expanded Public Works Program (EPWP), which was launched in 2003 to provide poverty and income relief by creating temporary work opportunities for unskilled, unemployed, poor, and vulnerable individuals. Distributed into four productive sectors—infrastructure, non-state and community work programs, environment and culture, and the social sectors—the EPWP combined skills development training with short-term employment and included two phases. The first phase provided workers with an average of 80 days of employment, while the second phase included mandatory training and skills development component to improve workers' chances of future employment after exiting short-term employment with EPWP (Altbeker et al., 2012; Kelobang and Boon, 2018). In response to constraints of mismatch between the skill set of the unemployed and the skills required in the labor market, supply-side interventions by the government focused on establishing Sector Education Training Authorities (SETA) as well as Learnership and Technical and Vocational Education and Training (TVET) colleges (TVET) to promote and enhance the skill and education of youth workers.

However, the general unemployment rate continued to persist and started to deepen in the aftermath of the 2008 global financial crisis. In 2009 alone, the country lost 870,000 jobs, and the unemployment rate increased to 24.4 percent. Due to job cuts and retrenchments by firms in the labor-intensive sectors - agriculture, mining, manufacturing, and construction,

[1]These include the *Reconstruction Development Plan* (RDP) of 1994; the *Growth Employment and Redistribution* (GEAR) of 1996; the *Accelerated and Shared Growth Initiative* (ASGISA) of 2006 and the *New Growth Path* of 2010. In 2013, the government adopted the *National Development Plan* (NDP) as South Africa's long-term socioeconomic blueprint to eliminate poverty and reduce inequality in South Africa by 2030.

job creation declined by almost 50%. In the decade since 2008, the high unemployment rate has persisted and increased from 27% in 2009 to 32.5% in 2020.

The unemployment rate is concentrated amongst youth workers, with about two-thirds of South Africans below the age of 35 unemployed. Youth unemployment remained high irrespective of education level. The graduate unemployment rate was 40.3% for those aged 15–24 and 15.5% among those aged 25–34 years, while the rate among adults (aged 35–64 years) was 5.4%. What was more concerning is that a nontrivial proportion of young people become discouraged from participating in the labor market and reduce the effort in building their skills through education and training. In 2020, an estimated 8.6 million (or 41.8%) of the approximately 20.5 million persons aged 15 - 34 years were classified as persons not in employment, education, or training (NEET). The youth group in the lower age bracket of aged 15-24 and estimated at 10.2 million, is the most vulnerable, with absorption and unemployment rates at 7.6% and over 63%, respectively. The NEET rate, in conjunction with a high burden of unemployment, suggests that the youth face significant difficulties engaging with the formal labor market in South Africa (Statistics South Africa, 2021).

2.2 Institutional setting and the ETI

The labor market situation in South Africa continued to be an enormous policy challenge for the country as an estimated 1.1 million youths enter the labor force each year. With chronic unemployment, youths unable to find work early in life will likely contend with reduced social mobility and employment chances. Policymakers also become increasingly concerned with the composition of the youth workforce, which has a high number of unskilled and inexperienced young workers facing limited employment opportunities. It is against this backdrop that the government proposed the ETI program.

The merit of wage subsidy programs as a means of addressing South Africa's unemployment challenge has been at the center of policy discussions since the early 1990s (Standing et al., 1996; Heintz and Bowles, 1996; Lewis, 2001; Pollin et al., 2009). In the late 2000s, there were policy discussions and new studies that shed some light on the limited impacts of the existing active labor market programs on youth unemployment, especially the EPWP and SETAs (Banerjee et al., 2007; Levinsohn, 2008). Following the findings and policy discussions, the National Treasury proposed a youth wage subsidy program in a discussion paper published in 2011 (National Treasury, 2011). In the paper, the National Treasury argues that the youth wage subsidy program could complement existing active labor market interventions to narrow the gap between entry-level real wages and productivity for young people. By lowering hiring costs, the wage subsidy mitigates the financial risk firms face

when hiring inexperienced low-skilled youth. It also has the potential to increase the long-term employment prospects of the youth as they gain experience through on-the-job training during the period of subsidized work.

With its passage and approval of the bill in December 2013, the government started to implement the ETI policy in January 2014 and retroactively applied it to new eligible hires since October 2013. The ETI was structured as a tax incentive program with firms registered for the Pay-As-You-Earn income tax scheme and filing to claim tax credits associated with eligible workers, aged between 18 and 29 years, that they hired. Table (1) shows the eligibility criteria to claim the ETI subsidy based on the employee's monthly salary. The subsidy follows a sliding scale as it is phased in for income below R2,000 and is phased out in the region of R4,000–R6,000. The maximum amount of the subsidy is R1,000 and is applicable to earnings between R2,000 and R4,000. For wages above R4,000, the subsidy amount declines at a rate of 50% and reaches zero (or phased out) when income equals R6,000. The subsidy amounts employers can claim is greater for the first 12 months of the employment contract, with the value of the subsidy halved in the second 12 months of the eligibility period.

Table 1 Criteria to claim ETI

Employer criteria	Employee criteria
Employers in the Public sector are ineligible.	Employees need to be between the ages of 18 and 29 years.
-not in the national, provincial, or local sphere of government	Employees are required to be hired after 1 October 2013.
-not a public entity listed in Schedule 2 or 3 of the Public Finance Management Act (PMFA)	Employee wages should be less than R6,000 per month but more than the minimum wage.
-not a municipal entity	Employees need to be South African citizens.
Employers need to be registered, or eligible to register, for Pay-As-You-Earn (PAYE)	Employees cannot be related to the employer.
Employers not disqualified for the displacement of an employee	

3 Data and empirical methods

3.1 Data

The data is from the South African Revenue Services and National Treasury (SARS-NT) collaborative project to make administrative tax data accessible to researchers. The data

covers the period between 2011 and 2018, comprising of a few data sets, two of which are of interest to this study: the Company Income Tax (CIT) panel and the individual income tax filing data (IRP5). We extract the relevant information on eligible individuals and firms for ETI. The three main criteria for claiming an ETI voucher are: i) the worker must be between the ages of 18 and 29, ii) the monthly salary has to be less than R6,000, and iii) work in the private sector. Public sector employees are excluded from the ETI program. We use this criterion to filter out invalid claims and ineligible individuals and firms. If the ETI claim exceeds the specified amount, we flagged the record as wrong and excluded the observation from our data or adjusted it to the correct amount (if requisite information is available), which is the same criteria used in the literature (Marcelin et al., 2019). Table (2) shows the income criteria and claims schedule.

Table 2 Criteria for filtering out ETI claims

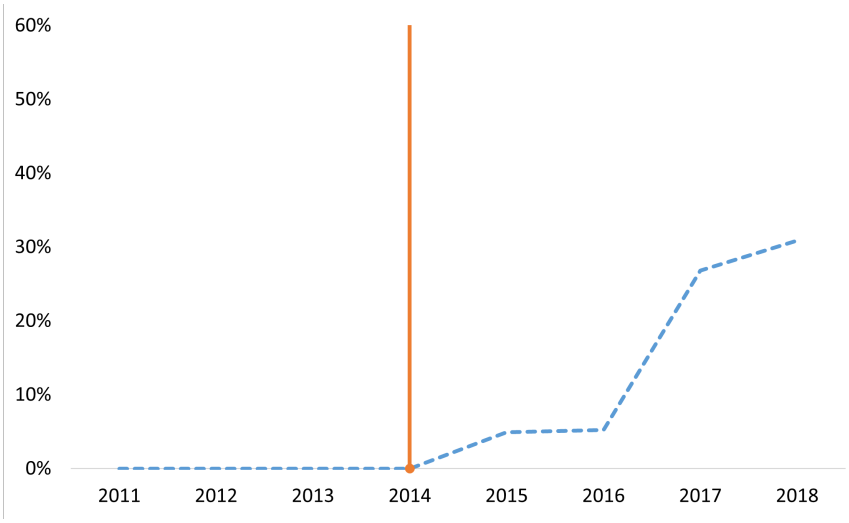
Monthly wage (ZAR)	ETI 1^{st} year annual claim	ETI 2^{nd} year annual claim
0–2,000	50% × income	25% × income
2,001–4,000	1,000	500
4,001–6,000	1,000 − 50% × [income − 4,000]	1,000 − 25% [income − 4,000]

Source: Ebrahim et al. (2017a) and Marcelin et al. (2019). 1 US$ is equivalent to 14.58 ZAR (South African Rand).

After identifying eligible workers in each firm, we aggregate employees' records to the firm level, which is our unit of analysis.[2] The data includes all qualifying firms in the country with at least one employee. The number of qualifying firms varies over time as the age composition and incomes of their workers change. The number of eligible firms was, respectively, 53,836, 59,233, 65,121, 72,909, 81,744, 84,491, 80,701, and 63,766 in 2011, 2012, 2013, 2014, 2015, 2016, 2017, and 2018. This yields an unbalanced panel of about 562,000 firms. It is important to note that the uptake of the ETI program is relatively low. Four years post-implementation, only about a third of eligible firms filed for ETI claims in 2018. See figure (1). The percentage of firms that filed for the claim was below 10% in 2015 and 2016.

[2]Aggregating employee-level variables to firm-level has the empirical advantage of reducing potential bias due to individual heterogeneity. It is akin to integrating over the unobserved individual characteristics that we cannot fully observe and account for

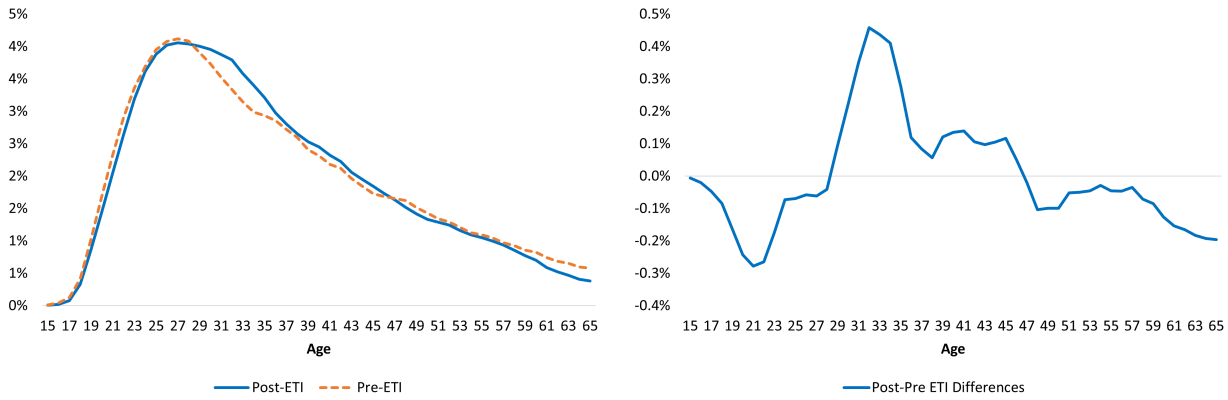
Figure 1 Proportion of eligible firms who filed for ETI claim



(a) Overall

Figure (2) shows the age distribution of the stock of workers before and after the ETI program went into effect. Panel (a) shows the age distribution of workers, whereas panel (b) shows the difference in the distribution between the pre-ETI and post-ETI periods. The pre-ETI distribution corresponded to the pooled average in 2011-2013, and the post-ETI distribution corresponded to the pooled average in 2015-2018. We excluded 2014 from the calculation because the program was implemented in January 2014, and the tax year ended in March 2014. While there is no stark visual difference in the age distribution of workers between the two periods, there is a slight increase in the share of non-youth workers between the ages of 30 and 46. On the contrary, the age distribution shows a decrease in the proportion of youth workers between the ages of 15 and 29 after the implementation of the program, while the proportion of workers above the age of 46 decreased.

Figure 2 Age distribution of the stock of workers before and after ETI implementation



(a) Share of the total stock of workers

(b) Post-pre differences

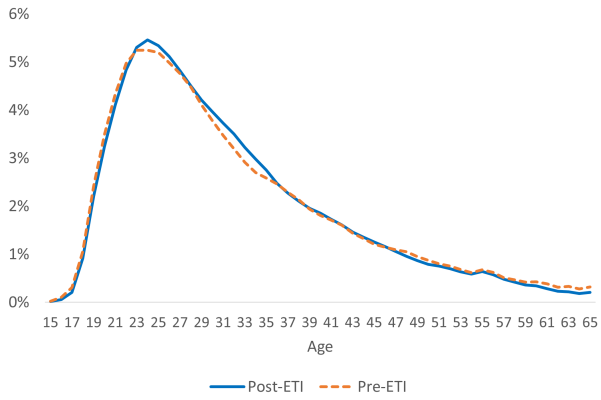
Given that several factors affect the age distribution of workers, it is difficult to attribute the minor gaps observed here to the program. Moreover, while informative, showing the overall age distribution of the stock of workers does not reveal much in employment dynamics through new hires and turnovers.

Figure (3) shows the age distribution of new hires and separation before (panel (a)) and after (panel (c)) program implementation. Panels (b) and (d) show the pre-post differences. The age distribution of new hires and separation is slightly skewed to the left, peaking around age 23-25, showing a relatively high worker flow rate, which is measured by the ratio of new hires plus separations to the total number of employees within the firm. Consistent with the literature, both hire and separation rates are inversely related to age. The figures also show that both hiring and separation rates are low for workers younger than 20 reflecting the overall low labor market participation of this age group due to school and college.

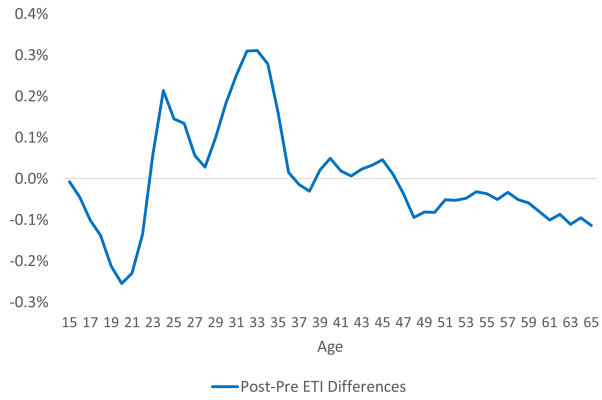
In the age range of 18-24, we see a decrease in hiring rates but a slight increase for the 25-29 age group. Although the ETI program is intended for the youth, the figure in panel (b) clearly shows an increase in hiring rates for workers in the age group of 30-35 after the implementation of the program. Panels (c) and (d) show the age distribution of separation rates and the differences between the post- and pre-ETI periods. We observe that the separation rate for youth decreased in the post-ETI period compared to the rate for non-youth workers. These suggest that, although we do not observe an obvious difference in the overall age distribution of the stock of workers, there is an interesting dynamic when we look at the age distribution of both new hires and separation, i.e., the age distribution of the flow of workers. We see that hiring rates were in favor of the youth in the 25-29 age group, whereas the separation rate among the youth in the age group of 18-24 decreased. It is also suggestive that there is a higher rate of mobility among workers in the 30-35 age group

with higher hiring and firing rates following the implementation of the ETI program. These suggest that there is much more to the effect of the program on the dynamics of worker flows than a simple age distribution of the stock of workers could show. Table (3) also shows the summary of the outcomes for the broader age categories (18-24, 24-29, 30-34, 35-44, 45-54, and 55-64) by ETI participation status and presents the t-statistics of the mean differences between pre-ETI and post-ETI periods. It shows that except for the difference in hiring rates for the 25-34 age group, the differences in hiring and separation rates for all age groups are statistically significant.

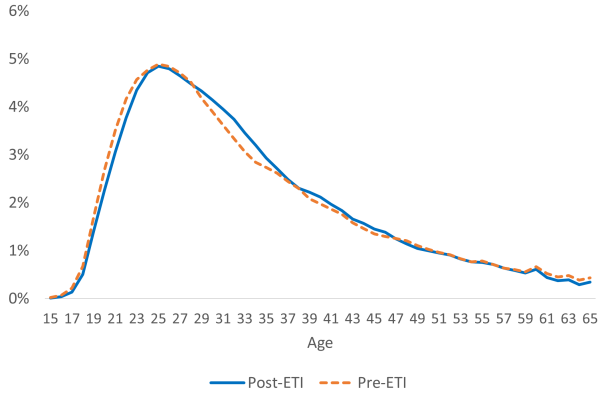
Figure 3 Hiring and separation rates by age before and after ETI



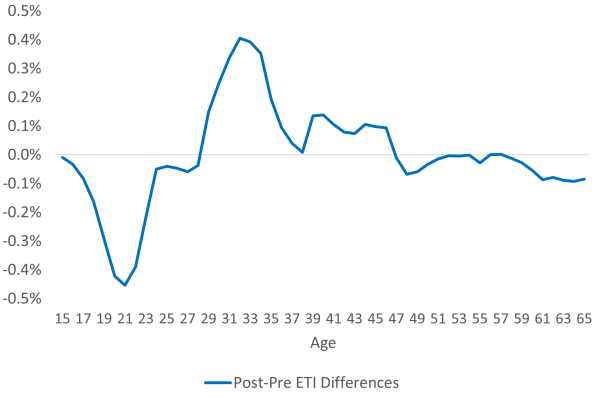
(a) Share of total hire



(b) Post-pre hiring difference



(c) Share of total separation



(d) Post-pre separation difference

Although the figures above are indicative of the patterns in the overall age distribution of workers as well as hiring and firing rates, they do not control for changes in a multitude of possible macroeconomic and sector factors. For instance, the South African economy was growing at a much better rate in the preceding years compared to the years after the program. From 2011 to 2013, the economy grew by more than 2.5 percent compared to the below 2 percent growth in the post-ETI periods. This would impact businesses' hiring

and firing decisions across ages. While it is possible to have similar job losses across the board, firms first could get rid of the less experienced and less skilled workers before sacrificing more productive and experienced workers. In addition to macroeconomic and sectoral factors, observed and unobserved firm- and work-level variables need to be controlled for. Our econometric analysis formally controls for these factors as well as issues of unobserved heterogeneity that potentially bias our estimates.

Table 3 Summary of hiring and separation rates by ETI participation status

Age group	ETI	non-ETI	Difference (t-stat)
	(a) Hires (%)		
18 - 24	29.1	24.4	(-50.111)
25 - 29	24.5	24.3	(-2.089)
30 - 34	16.1	16.2	(0.565)
35 - 44	18.3	19.7	(17.837)
45 - 54	8.5	10.6	(32.916)
55 - 65	3.1	4.5	(32.446)
	(b) Separations (%)		
18 - 24	22.3	17.7	(-50.429)
25 - 29	24.5	23.8	(-7.308)
30 - 34	17.9	18.0	(2.306)
35 - 44	20.4	21.7	(14.363)
44 - 54	9.9	12.1	(29.106)
55 - 64	4.8	6.5	(28.764)
No. of Observations	133,557	335,442	468,999

Given that the data are obtained from administrative records, details on workers' and firms' characteristics are limited (Ebrahim et al., 2017a; Marcelin et al., 2019). However, the data have basic information on employee age, wage, number of years at the firm, sector, gender, pension benefits, medical benefits, and the level of payroll contributions towards unemployment insurance (UIF). At the firm level, the data have information on gross sales, assets, and the number of employees (firm size). Table (4) presents summary statistics and the t-values for mean differences between ETI and non-ETI firms for these variables. The average experience of workers in ETI-claiming firms is 16.5 years which is smaller than the experience of workers in firms that never filed for ETI claims.[3] As shown in the table, the

[3]Given that there is no direct experience variable in the data, we calculate a proxy for general experience

difference in experience is statically significant, implying that ETI-participating firms have a higher proportion of younger employees on their payrolls compared to the non-participating firms. The data also has information on the total wage bill of firms from which we calculate the average wage. The log average wage is higher for firms who claimed for ETI compared to firms who never filed. With regards to non-wage benefits, the data has information on the amount of medical and pension benefits, which has a bearing on firms' and workers' hiring and separation decisions. The table shows that participating firms offer higher non-wage benefits in terms of medical and pension compared to non-participating firms. The same pattern is observed for unemployment insurance fund (UIF) contributions. There is also information on asset values and total sales for each year. Although ETI-participating firms have slightly higher assets, their productivity, as measured by sales per worker, is slightly lower compared to firms that never participated. In summary, the descriptive statistics show participating firms offer better wages and non-wage benefits to their employees, although this is not reflected in terms of productivity (sales per worker).

Table 4 Control variables by eligible firms who filed and not-filed for ETI claims

		non-ETI	ETI	Difference (t-value)
Average employee experience		17.751	16.499	(72.505)
Average employee experience sqr		350.251	295.620	(81.551)
ln(sales per worker)		13.068	12.902	(43.913)
ln(assets)		12.011	12.820	(-45.787)
ln(wages)		3.744	5.848	(-127.627)
ln(medical benefits)		11.706	13.462	(-120.975)
ln(pension benefits)		0.574	1.724	(-116.179)
ln(UIF)		9.144	10.310	(-226.055)
Sector:				
	Agriculture	0.044	0.069	(-37.998)
	Construction	0.103	0.087	(17.202)
	Manufacturing	0.111	0.137	(-26.317)
	Mining	0.009	0.010	(-2.013)
	Services	0.733	0.697	(26.662)
Firm Size:				
	1-4	0.257	0.081	(144.573)
	5-19	0.468	0.297	(114.610)
	20-99	0.236	0.394	(-117.237)
	100+	0.039	0.227	(-222.643)
Observations		148 286	383 142	531 428

by subtracting 18 from the current age.

With regards to sectoral and firm size distributions, the descriptive table shows that a majority of firms in the data are in the services sector, which accounted for 72% of eligible firms. The mining sector, although a significant contributor to South Africa's GDP, accounts for the lowest share of firms in the data at only 1%. The difference in the sector distribution of firms between participating and non-participating firms is statistically significant, suggesting some sort of systematic selection into the program. In terms of firm-size distribution, we classify firms into four categories—micro (1-4 employees), small (5-19 employees), medium (20-99 employees), and large (100+ employees). Microenterprises account for about 21.5% of the firms in the data, although the majority (accounting for about 25% of all firms) are non-participants compared to only 8% in the ETI group. The table also shows that small (5-19) firms represent about 33% of all firms in the data, followed by medium-sized firms. Large firms account for only 6.5% of the data. The mean differences in all the control variables are statistically significant, suggesting that the two groups of firms have different characteristics, which could be a source of bias in our estimation. In our formal empirical analysis, we control for these observed factors and address potential bias from unobserved factors using Fixed Effects model.

3.2 Conceptual framework

In this section, we present a simple canonical model of firm labor demand for workers of different ages to provide a tractable framework for our empirical specification. We draw the model from Saez et al. (2019) and the existing literature on firm labor demand in the presence of age-specific wage subsidies. The demand for labor for a representative firm is derived from the production function, which is assumed to take a Constant Elasticity of Substitution (CES) between young and old workers. The CES production function can be written for two age groups, young (y) and old (o):

$$Y(n_y, n_o) = \left[x_y \gamma_y n_y^{\alpha} + x_o \gamma_o n_o^{\alpha}\right]^{\frac{\beta}{\alpha}}, \tag{1}$$

where β denotes the overall returns to scale, α is the substitution parameter, γ_i denotes the productivity of worker in age group i, x_i is the production weight by worker in age group i, and n_i is labor of worker in age group i, and $i \in \{y, o\}$. Also, it is assumed that $\sum_i x_i = 1$. In the literature, the common assumption is that young workers have lower productivity than old workers, $\gamma_y < \gamma_o$, due to their lower human capital (such as education and experience).

Under competitive market conditions, the firm's demand for labor for a specific age group of workers is derived by equating the marginal product for the specific age group of workers with the corresponding gross wage, which yields the following:

$$\beta x_i \gamma_i n_i^{(\beta-1)} \left[x_j \gamma_j \frac{n_j}{n_i}^{\alpha} + x_i \gamma_i \right]^{\frac{\beta}{\alpha}-1} = (1+\tau_i) w_i, \tag{2}$$

where, τ_i is payroll tax and w_i is wage for age group i. By taking the ratio of the labor demand condition for age group i and age group j, $\frac{n_i}{n_j}$, and plugging it back into equation (2), we obtain the age gradient of firm labor demand equation in terms of the CES production function parameters, wages, and taxes.

$$\frac{n_i}{n_j} = \left[\frac{x_i \gamma_i (1+\tau_j) w_j}{x_j \gamma_j (1+\tau_i) w_i} \right]^{\frac{1}{1-\alpha}}. \tag{3}$$

Equation (3) is the focus of our investigation, which assesses the impact of youth-targeted wage subsidies on firm labor demand for different age groups. Although equation (2) is for two age groups only, it can be generalized for any number of age groups. Accordingly, the age gradient of firm labor demand for age group i can be written as the share s_i, in the total workforce:

$$s_i = \frac{n_i}{n_i + n_j} = \frac{1}{[x_j \gamma_j (1+\tau_i) w_i]^{\frac{1}{1-\alpha}} + 1}. \tag{4}$$

Firm demand for each age group of workers can be linearized by taking the logarithm of equation (4), which can be written as:

$$ln(s_i) \approx \frac{-1}{1-\alpha} \left[ln(x_j) + ln(\gamma_j) + ln(1+\tau_i) + ln(w_i) \right]. \tag{5}$$

Equation (5) expresses the firm's demand for labor in age group i as the share of the total labor force, which is further defined in terms of the production weights of workers in another age group- x_j, and their productivity (γ_j), payroll tax (τ_i) and wage (w_i) in age group i and the degree of substitution among different types of labor. From the equation, the following empirically testable implications can be derived. First, higher levels of productivity and production share of workers in another age group, j, reduce the share of labor in age group i. Second, a higher payroll tax rate for age group i (τ_i) reduces firm demand for labor in that age group. This holds true even when wages are the same for all age groups. In this regard, the ETI program has an effect akin to reducing the firm's payroll tax cost associated with youth workers, i.e., $\tau_i = \tau - \%ETI_i$, where τ can be considered as the average payroll tax that applies to all other age groups and $\%ETI_i$ is the level of subsidy applied for workers of age group i. Hence, we expect that the ETI program will increase the demand for labor in that age group as it artificially lowers the wage bill for group i. Finally, the model predicts that higher wage rates reduce the demand for labor, and a higher degree of substitution

among workers of different age groups decreases the demand for labor as the firm can easily substitute one group of labor with another. These are all testable hypotheses that emerge from the model. But our focus is on estimating the impact of the ETI program on youth employment levels and the intra-firm age distribution of workers. In our formal econometric analysis, we estimate the effect of the ETI program while controlling for a host of other factors that potentially confound the effect.

3.3 Empirical specification

We focus on estimating the impact of the ETI program on the level of employment and age distribution within the firm. Our unit of analysis is the firm. We use the Diff-in-Diff specification to estimate the effect of ETI on employment outcomes of different age groups. The estimated model can be written as follows:

$$s_{it}^{g} = \eta \cdot 1\left[ETI_{it} = 1\right] \times After_{it} + \delta X_{it} + \theta_i + \sigma_t + \epsilon_{it}. \tag{6}$$

where s_{it}^{g} is the share of employment of age group g in the total workforce of firm i in year t. We focus on estimating the effects on two firm-level employment outcomes, which are the share of hiring rates and separation rates for each age group. η is the parameter of interest, ETI_{it} is a dummy variable indicating enrollment of eligible firms in the ETI program, which is a function of wage levels for age group i ($ETI_{it} = 1$ implies that $\%ETI > 0$ in that, the firm is enrolled and receives wage subsidy, whereas $ETI = 0$ implies the firm is not enrolled and do not receive any wage subsidy, i.e., $\%ETI_{it} = 0$). $After_{it}$ is an indicator for the period after the ETI program was implemented (2014-2018), X_{it} is a vector of firm-level control variables, and δ is a vector of the corresponding coefficients. The model also controls for year-fixed effects, denoted by σ_t, which controls for differences in the share of employment of age group i across years, which is common to both the treatment and control groups. The specification also controls for firm-level effect- θ_i, thus controlling for factors that are specific for the firm and are time-invariant. Finally, ϵ_{it} is an idiosyncratic error term that is assumed to be orthogonal to the regressors of interest, i.e., $E\left[\epsilon_{it} \times 1\left[ETI_{it} = 1\right] \times After_{it} | \theta_i, \sigma_t\right] = 0$. The orthogonality assumption could be violated if there are omitted variables. To address such potential issues, we estimate the Fixed Effects model. Lastly, to affirm the use of Diff-in-Diff, we carry out parallel trend tests for the different age groups for both hires and separations. The results are presented in figures (A1) and (A2) in the appendix, with evidence for enough parallel trend between the treatment and control for the age groups of interest.

We estimate equation (6) using different empirical models. The baseline model is a simple

OLS specification using only the pooled data, which ignores the unobserved heterogeneity or assumes that the unobserved heterogeneity is observed in the idiosyncratic error term. However, this assumption often breaks down given that some of the covariates and the unobserved heterogeneity could be correlated, i.e., $E[\theta_i \times X_{it}] \neq 0$. Although not our main specification, a simple OLS specification gives us baseline estimates that help to assess the extent of bias in the main model. The other model estimated is the Fixed Effects (FE) panel data model, in which the unobserved individual heterogeneity term drops out of the equation. The FE model can be written as:

$$\Delta s_{it}^{g} = \eta \cdot \Delta 1 \left[ETI_{it} = 1\right] \times After_{it} + \delta \Delta X_{it} + \Delta \sigma_t + \Delta \epsilon_{it} \tag{7}$$

The problem with a simple OLS estimation of equation (6) and the FE specification in equation (7) is potential bias arising from sample selection. That is, firms selecting themselves into the ETI program could have systematically different characteristics. Depending on the direction and magnitude of the correlation, the bias could either be positive or negative. Finally, averages hide a great deal of variation in the impact of the program. Hence, we also conduct heterogeneity analysis by sector and firm size to assess the extent of heterogeneity in the impact of ETI on employment.

4 Results and discussions

In this section, we present and discuss the results of our regression analysis. Our key outcome variables are hiring and separation rates for different age groups. The outcomes are fractional variables. The first set of results is based on our baseline Diff-in-Diff estimation of equation (6) using pooled OLS method. Given that the OLS estimation does not account for potential endogeneity arising from unobserved heterogeneity, our second set of results presents estimates from firm-level panel Fixed Effects estimation of equation (7). In all specifications, we control for the sector of operation, firm size, and year.

Before we ran the OLS and fixed effects estimation of the Diff-in-Diff specification, we established that pre-ETI trends in hiring and separation rates between participating and non-participating firms are not systematically different. We conducted the test for each outcome and age group that we were interested in. For the sake of brevity, we do not discuss the details of the parallel trend test. However, figures (A1) and (A2) show plots of parallel trends for hiring and separation rates among the different age groups, respectively. As we observe from the figures, for both outcomes, their pre-program trends in outcomes between the two groups of firms are mostly parallel.

4.1 Results from the baseline specification

Table (5) presents the results from the baseline specification. Columns (1) and (2) present the estimates for hiring outcomes for youth (age: 18-29) and non-youth workers (age: 30-64). The coefficient of interest is 1[ETI]×1[After], which is statistically significant at 5% for youth in the 18-29 age group. The magnitude of the coefficient is 0.0038, which is interpreted as probability points given the outcome is a fractional variable. It implies that the ETI program is associated with 0.0038 higher probability points of hiring youth. But the OLS estimation suggests that the program is negatively and significantly associated with the hiring rate of non-youth workers. The results, indeed, show that the program has the intended effect of increasing the youth hiring rate, but it seems that it has an unintended effect of reducing the hiring rate of the non-youth group. Columns (3) and (4) show the results for the separation rate. Similar to the results on hiring rates, the ETI is associated with lower separation rates for the youth and higher separation for the non-youth group. Both coefficients are statistically significant. The results suggest that the program has a statistically significant effect on the target group in terms of new hires and retention compared to the non-youth. But the positive effects on the target group seem to be coming at the expense of the non-youth group.

Table 5 OLS diff-in-diff estimate of ETI impact on hiring and separation rates by broad age group

	Hiring			Separation	
Variable	(1) Age: 18-29	(2) Age: 30-64		(3) Age: 18-29	(4) Age: 30-64
1[After]	0.00122	0.00109		0.00565**	-0.00435
	(0.00272)	(0.00271)		(0.00271)	(0.00271)
1[ETI]	0.00553***	-0.00555***		0.0121***	-0.0126***
	(0.00166)	(0.00165)		(0.00171)	(0.00171)
1[ETI] X 1[After]	**0.00383****	**-0.00389****		**-0.00448****	**0.00466****
	(0.00195)	**(0.00194)**		**(0.00208)**	**(0.00207)**
Average experience	-0.0583***	0.0605***		-0.0711***	0.0723***
	(0.000384)	(0.000382)		(0.000430)	(0.000430)
Average experience Sqr	0.000702***	-0.000746***		0.000993***	-0.00102***
	(0.0000)	(0.0000)		(0.0000)	(0.0000)
ln(wages)	-0.000425***	0.000500***		-0.000425***	0.000446***
	(0.000109)	(0.000108)		(0.000119)	(0.000119)
ln(medical benefits)	0.000163	-0.000264**		0.000339***	-0.000382***
	(0.000113)	(0.000113)		(0.000124)	(0.000124)
ln(pension)	0.00148***	-0.00148***		0.000497***	-0.000501***
	(0.000131)	(0.000130)		(0.000141)	(0.000141)
ln(UIF)	0.0131***	-0.0130***		0.00808***	-0.00783***
	(0.000393)	(0.000391)		(0.000437)	(0.000437)
ln(sales per worker)	0.00586***	-0.00554***		0.000219	2.77e-05
	(0.000428)	(0.000426)		(0.000466)	(0.000465)
ln(assets)	-0.000809***	0.000825***		-0.000474***	0.000461***
	(0.000134)	(0.000134)		(0.000142)	(0.000141)
Constant	1.094***	-0.136***		1.246***	-0.268***
	(0.00648)	(0.00646)		(0.00709)	(0.00709)
Sector dummies	Yes	Yes	Yes	Yes	Yes
Firm size dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Number of Obs.	427 644	427 644		370 827	370 827
R-squared	0.287	0.296		0.306	0.310

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

In addition to the policy variable, the coefficients on key control variables provide some

useful insights into factors that determine hiring and separation rates. The results in table 5 show that the average experience of workers within the firm is an important factor in its hiring and separation decisions. Firms with a higher proportion of experienced workers have a low rate of flow among the youth workers, as they are less likely to hire and, at the same time, have a lower likelihood of separation for this group of workers. The converse is true for non-youth workers, where the average experience of workers within the firm is positively associated with higher worker flow, i.e., higher hiring and separation rates. Moreover, it is important to note that the relationships are non-linear, as shown by the coefficients on the squared average experience. While the shape of hiring and separation rates for the youth is a "U-curve" relative to the origin, it is an inverse "U-curve" for the non-youth group. With regards to wages, we observe a statistically significant relationship with hiring but not separation. Firms that pay relatively higher wages on average to their workers are more likely to hire youth workers but less likely to hire the non-youth. But the level of non-wage benefits, such as medical and pension benefits, have mixed results. Although higher levels of medical benefits are not statistically associated with the hiring rates of the youth, it is associated with lower worker flow for the non-youth group since it is associated with both lower hiring and separation rates. This suggests that employees in firms with better medical benefits prefer to stay, or firms use such benefits as an important incentive device to reduce turnover. We see the same association for pension benefits and payroll contributions towards UIF for non-youth workers, which are statistically significant in all specifications. However, there is a positive and significant association between pension and UIF contributions and both hiring and separation rates for the youth. Besides remuneration and benefits, the level of productivity as measured by sales per worker is significantly associated with a higher (lower) likelihood of hiring the youth (non-youth). The two key firm-level variables—log sales per worker and log assets—have important implications on worker flow for both youth and non-youth groups. Higher sales per worker (also a proxy for labor productivity) is positively and significantly associated with higher hiring rates of youth, despite it being significantly associated with the displacement of non-youth workers. Furthermore, firms with higher levels of assets have a lower rate of turnover in younger workers, with the opposite effect being observed for the non-youth. Each of these variables could provide important insight into the dynamics of firm-level worker flow. This is, however, beyond the scope of this study.

It is important to note that the baseline estimates in table (5) are averages for the broader youth and non-youth age groupings, which might not provide the full picture for various age groups. Table (6) shows the OLS estimates for hiring and separation outcomes for narrower age categorizations: 18-24, 25-29, 30-34, 35-44, 45-54, and 55-64, with panels (a) and (b) showing the results for hiring and separation outcomes, respectively. The program has a

mixed effect on the youth group, with a positive effect on the hiring rate of the youth in the 18-24 age group but a negative effect on the hiring rate of the youth in the 25-29 age group (panel (a)). Similarly, the result shows that the program is associated with a higher rate of separation for the 18-24 age group but a lower rate for the 25-29 age group. What is striking is that the direction of the effect on the older segment of the youth (25-29) is similar to the younger segment of the non-youth groups (30-34 and 35-44). This implies that firms are not only substituting away non-youth workers due to the ETI program, but older youth workers are also being substituted. Another important observation is that the program is associated with higher separation rates for the relatively older workforce in age brackets 35-44 and 45-54. Although these results are informative, it is difficult to draw causal inferences from the OLS estimation of the DIff-in-Diff model due to potential bias arising from non-random selection based on observable and unobservable factors.

Table 6 OLS diff-in-diff estimate of ETI impact on hiring and separation rates by narrow age group

	(1) Age: 18-24	(2) Age:25-29	(3) Age:30-34	(4) Age:35-44	(5) Age:45-54	(6) Age:55-64
			(a) Hiring			
1[ETI] X 1[After]	0.0127***	-0.00519***	-0.00842***	-0.00165	0.00102	0.00135
	(0.00182)	(0.00182)	(0.00153)	(0.00164)	(0.00126)	(0.000859)
Number of Obs.	427,644	427,644	427,644	427,644	427,644	427,644
R-Squared	0.190	0.051	0.022	0.083	0.141	0.171
			(b) Separations			
1[ETI] X 1[After]	0.00439**	-0.00838***	-0.00425**	0.00355*	0.00389***	0.000930
	(0.00171)	(0.00194)	(0.00176)	(0.00187)	(0.00147)	(0.00109)
Number of Obs.	370,827	370,827	370,827	370,827	370,827	370,827
R-Squared	0.202	0.078	0.023	0.071	0.131	0.202

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables included in the regression but not reported are Experience of workers, Experience of workers Squared, logarithm of wage, logarithm of medical benefits, logarithm of pension contributions, logarithm of UIF contributions, logarithm of firm asset, and log sales per worker. We also include dummy variables for sector, firm size, year.

4.2 Results from the fixed effects estimation

Although insightful, the results from the pooled OLS could be biased due to various observed and unobserved heterogeneity. In order to address such potential problems, we estimate a fixed effects model based on the specification in equation (7). Table (7) presents the result for the broader age group categorization. The results show that the ETI program has a negative and significant effect on the likelihood of hiring youth workers, which is in contradiction with the program's objective and with the baseline results above. The effect on separation rates for the youth also changed direction in the fixed effects estimation, with the program now decreasing the likelihood of separation for the youth, although the direction of the effect on non-youth age groups remained the same. The apparent contradictory result warrants further explanation.

Plausible explanations on why the coefficients reversed sign in the fixed effects estimation are unobserved heterogeneity and sample selection. In the OLS estimation, firm-level unobserved factors that potentially correlate with hiring and separation rates and ETI program participation, such as management type, work environment, local economic situation, and cost of capital, are not controlled for. In addition, location often plays a significant role in worker flow in South Africa due to the disparities between metros and non-metros, as well as other historical factors. Some of these unobserved heterogeneities are time-invariant, while others vary across space and time in response to the program. Considering these empirical issues, the fixed effects model has a clear advantage over OLS specification as an unobserved firm, and regional levels factors are differenced out. Given that we control for the sector of operation, firm size, and year fixed effects in both OLS and fixed effects estimations, it is plausible that the difference between the two coefficients is largely attributed to firm-level heterogeneity.

Table 7 Fixed Effects diff-in-diff estimate of ETI impact on hiring and separation rates by broad age group

	Hiring		Separation	
	(1)	(2)	(3)	(4)
Variable	Age: 18-29	Age: 30-64	Age: 18-29	Age: 30-64
1[ETI] X 1[After]	-0.00642***	0.00675***	-0.00536**	0.00554***
	(0.00198)	(0.00197)	(0.00210)	(0.00210)
Average experience	-0.0784***	0.0806***	-0.0872***	0.0885***
	(0.000592)	(0.000589)	(0.000695)	(0.000694)
Average experience Sqr	0.000784***	-0.000819***	0.00103***	-0.00105***
	(1.53e-05)	(1.52e-05)	(1.76e-05)	(1.76e-05)
ln(sales per worker)	0.0107***	-0.0112***	0.00681***	-0.00672***
	(0.000916)	(0.000911)	(0.00102)	(0.00102)
ln(assets)	-0.000810***	0.000813***	-0.000376**	0.000372**
	(0.000157)	(0.000156)	(0.000165)	(0.000165)
ln(wages)	-0.000666***	0.000771***	-0.000565***	0.000597***
	(0.000153)	(0.000152)	(0.000167)	(0.000167)
ln(medical benefits)	-0.000295*	0.000223	0.000175	-0.000201
	(0.000171)	(0.000170)	(0.000191)	(0.000190)
ln(pension)	-0.000205	0.000176	0.000115	-0.000153
	(0.000194)	(0.000193)	(0.000211)	(0.000211)
ln(UIF)	0.00908***	-0.00977***	0.00828***	-0.00845***
	(0.000650)	(0.000646)	(0.000761)	(0.000760)
Constant	1.405***	-0.425***	1.442***	-0.457***
	(0.0162)	(0.0162)	(0.0183)	(0.0183)
Number of Obs.	417,038	417,038	358,228	358,228
R-squared	0.494	0.502	0.513	0.517

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dummies for sector and firm size included.

The second possible explanation for the observed difference between the OLS and fixed effects estimations is potential endogeneity in program participation. Such endogeneity arises when ETI-participating firms have systematically different characteristics from the non-participants, which is expected as program assignment was not random. However, it is challenging to fully account for endogeneity in both OLS and fixed effects estimations. Although in fixed effects, selection based on time-invariant factors are differenced out, providing more reliable estimates in comparison to the OLS estimates. Therefore, we consider

estimates from the fixed effects specification as our main results.

Table 8 Fixed Effects diff-in-diff estimate of ETI impact on hiring and separation rates by narrow age group

	(1) Age: 18-24	(2) Age:25-29	(3) Age:30-44	(4) Age:45-54	(5) Age:55-59	(6) Age:60-64
			(a) Hiring			
1[ETI] X 1[After]	0.00301*	-0.00664***	-0.00476***	0.00241	0.00368***	0.00238***
	(0.00180)	(0.00188)	(0.00161)	(0.00172)	(0.00133)	(0.000897)
Number of Obs.	417,038	417,038	417,038	417,038	417,038	417,038
R-Squared	0.451	0.294	0.258	0.313	0.354	0.380
			(b) Separations			
1[ETI] X 1[After]	0.00132	-0.00638***	-0.00286	0.00417**	0.00309**	0.000760
	(0.00169)	(0.00199)	(0.00182)	(0.00194)	(0.00153)	(0.00115)
Number of Obs.	358,228	358,228	358,228	358,228	358,228	358,228
R-Squared	0.465	0.324	0.277	0.317	0.358	0.401

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables included in the regression but not reported are dummies for sector, dummies for firm size included, dummy for period after ETI, dummy for ETI, experience, experience squared, log wage, log asset, and log sales per worker.

Another potential explanation for why the ETI program appears to have a negative impact on the hiring rate of the youth could be heterogeneity within the youth group. To probe whether this is the case, we estimate the model for the narrow age groups of 18-24, 25-29, 30-44, 45-54, 55-59, and 60-64. The results from the fixed effects specification are shown in table (8). Indeed, the results show heterogeneity in the narrow age grouping, especially for the youth. The effects on the younger workers between the ages of 18-24 are now positive and statistically significant, although we do not find a significant effect on separation rates. On the contrary, we find a negative and statistically significant effect on the hiring rate of youth in the age group of 25-29, which presumably attenuated the average effects on the broader age grouping of the youth (i.e., 18-29 years) toward zero. We also observe that the direction of effect on hiring rates of workers aged 24-29 and 30-44 are similar, suggesting that workers in these two narrow age groups might have similar human capital levels other than experience compared to those in the 18-24 age group. Regardless, an important pattern emerges from

our analysis for the narrow categorization, which clearly shows that the program indeed has heterogeneous effects, increasing the likelihood of hiring youth in the age group of 18-24 but decreasing both the hiring and separation rates of youth in the upper age bracket of 24-29. We also notice that the program has positive impacts on the worker flow of the non-youth group, an indication that firms could be readjusting the age distribution of their workforce in response to the ETI program.

4.3 Heterogeneity and further discussions

There is an important heterogeneity emerging in the effects of the ETI program arising from different dimensions. This section presents the results from our heterogeneity analysis by firm size and sector in hopes of pinning down where the program has the biggest impacts. Tables (9) present results from the fixed effects estimation of hiring and separation rates for four firm-size groupings: micro (1-4), small (5-19), medium (20-99), and large (100+).[4] It shows that the positive effect on hiring rates of the youngest group (18-24) seems to be primarily driven by microenterprises which have the large effects of the program, and to a lesser extent, by the positive effect on medium-sized firms. Specifically, the program is associated with 0.065 probability points higher likelihood of hiring youth in the age group of 18-24 by microenterprises, which is more than ten times the impact on medium-sized enterprises. The result also shows that although the impact is significant and positive on microenterprises' hiring rates of the 18-24 youth group, we find no significant effect on hiring and separation rates for the other age groups. When it comes to medium size firms' hiring and separation rates, the impacts are negative and statistically significant for the youth in the 24-29 and 30-34 age groups, suggesting a pattern of displacement effects. There is no detectable impact on the hiring and separation rates of the youth in small and large firms, which account for almost half of all the firms in the data, presumably attenuating the average effects toward zero.

The strong positive effects on the hiring rate of the youth in the 18-24 age group among microenterprises warrant some discussion. Given that firms with 1-4 employees tend to be family owned—typically referred to as Mom-and-Pop businesses—it is likely that family members could also be the employees. The result also uncovers that the ETI increases hiring rates of the youth in these firms with no displacement effects on older workers who are more likely to be primary owners, hence have a lower likelihood of separation due to the program. Further, given that microenterprises tend to be operating in sectors that do not require specialized skills or experience, such as retail and shopkeeping, hotels and restaurants,

[4]The results from OLS estimation are presented in the Online Supplementary Appendix A, table (A1).

catering services, personal care, and automotive maintenance, the cost of employing youth with little experience could be minimal for the firm. Since we find no evidence of displacement of the non-youth workers in the microenterprises firm-size group, we can also infer that the increase in hiring rates of the youth in the 18-24 age group is due to expansion of the workforce as opposed to re-shuffling the workforce by age.

Table 9 Fixed effects diff-in-diff estimate of ETI impact on hiring and separation for sub-samples by firm size

	(1) Age: 18-24	(2) Age:25-29	(3) Age:30-34	(4) Age:35-44	(5) Age:45-54	(6) Age:55-64	Obs.
				(a) Hiring			
Micro (1- 4)	0.0645***	-0.0178	0.0297	-0.00848	0.00475	-0.00463	36 862
	(0.0180)	(0.0204)	(0.0189)	(0.0174)	(0.0136)	(0.00923)	
Small (5 - 19)	0.00227	-0.00258	-0.00414	-0.00108	0.00573*	0.00829***	167 425
	(0.00440)	(0.00452)	(0.00485)	(0.00418)	(0.00323)	(0.00220)	
Medium (20 - 99)	0.00422*	-0.00788***	-0.00630**	-0.00272	0.00567***	0.00482***	137 405
	(0.00229)	(0.00231)	(0.00261)	(0.00220)	(0.00164)	(0.00110)	
Large (100+)	0.000795	-0.000437	-0.000344	-0.000213	0.00325***	0.00121	46 967
	(0.00194)	(0.00168)	(0.00215)	(0.00160)	(0.00120)	(0.000760)	
				(b) Separation			
Micro (1-4)	0.00355	0.00353	0.00365	0.0142	-0.0155	-0.00376	25 074
	(0.0211)	(0.0263)	(0.0250)	(0.0235)	(0.0191)	(0.0138)	
Small (5 - 19)	-0.00406	-0.000111	-0.00643	-0.00283	0.00930**	0.00603**	145 700
	(0.00421)	(0.00494)	(0.00526)	(0.00485)	(0.00380)	(0.00288)	
Medium (20 - 99)	0.00218	-0.00531**	-0.00195	-0.00177	0.00343*	0.00322**	122 146
	(0.00204)	(0.00236)	(0.00259)	(0.00239)	(0.00183)	(0.00143)	
Large (100+)	0.000898	0.00110	0.00252	-0.00102	0.000135	-0.00166*	41 171
	(0.00159)	(0.00164)	(0.00191)	(0.00160)	(0.00117)	(0.000898)	

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables included in the regression but not reported are dummies for firm sector categories, dummy for period after ETI, dummy for ETI, Experience, Experience Squared, log wage, log asset, and log productivity.

The other source of heterogeneity is the sector of operation. Table (10) presents the results from the fixed effects estimations by sector of operation. Interestingly, the results show that the only sector where the program has a statistically significant effect on the hiring rate of youth in the 18-24 age group is the agricultural sector. The magnitude of the coefficient is 0.013 probability points, which is significant at 5%. However, we find no

significant evidence on either hiring or separation rates for firms in the non-agricultural sectors except the significant negative impact on hiring rates of the youth in the 24-29 age group in firms operating in the services sector. We also find a negative effect on the hiring of non-youth workers in the 30-34 age group. Further, the split sample analysis also sheds some light on which sector drives the average effects. The result suggests that the positive impact on the hiring of the youth in the 18-24 age group is largely driven by firms in the agricultural sector, whereas the negative average impact on the 25-29 age group is driven by the firms in the services sector. We also observe an interesting heterogeneity in separation rates in that the program increases separation rates of the youth in the 18-24 age group in the agricultural sector. This perhaps suggests a higher worker flow rate due to the seasonal and temporary nature of agricultural work, where workers find and separate work from season to season. The significant separation rate for the 25-29 age group in the service sector is also concerning, given that the process of industrialization should be seeing less attrition in this sector, even if we see a decline in other low-productivity sectors.

Table 10 Fixed effects diff-in-diff estimate of ETI impact on hiring and separation rates by industry

	(1) Age: 18-24	(2) Age:25-29	(3) Age:30-34	(4) Age:35-44	(5) Age:45-54	(6) Age:55-64	Obs.
				(a) Hiring			
Agriculture	0.0132**	-0.00300	0.00211	-0.00453	6.62e-05	0.00363	22 065
	(0.00644)	(0.00634)	(0.00729)	(0.00642)	(0.00513)	(0.00337)	
Construction	0.00532	-0.00650	-0.00296	-0.00344	0.00381	0.000331	39 715
	(0.00584)	(0.00624)	(0.00678)	(0.00611)	(0.00472)	(0.00315)	
Manufacture	-0.00341	0.00388	-0.00134	-0.000972	0.00219	0.00380	50 416
	(0.00484)	(0.00489)	(0.00546)	(0.00473)	(0.00372)	(0.00255)	
Mining	0.00757	0.00608	0.0163	0.00498	-0.0137	-0.000607	3 986
	(0.0165)	(0.0167)	(0.0194)	(0.0171)	(0.0144)	(0.00942)	
Services	0.00298	-0.00895***	-0.00830***	0.00470**	0.00469***	0.00184*	296 822
	(0.00226)	(0.00237)	(0.00245)	(0.00212)	(0.00162)	(0.00110)	
				(b) Separation			
Agriculture	0.0128**	-0.000800	0.00914	-0.00379	0.00251	-0.00724	19 261
	(0.00563)	(0.00631)	(0.00716)	(0.00695)	(0.00582)	(0.00467)	
Construction	0.00102	-0.00809	-0.00845	0.00268	0.00998*	0.000152	34 741
	(0.00544)	(0.00658)	(0.00706)	(0.00685)	(0.00533)	(0.00404)	
Manufacture	-0.00981**	0.000931	-0.00811	0.00260	-0.000479	0.00527	44 600
	(0.00441)	(0.00509)	(0.00564)	(0.00535)	(0.00428)	(0.00333)	
Mining	-0.0158	-0.00763	-0.0223	0.0134	0.00687	0.000780	3 472
	(0.0148)	(0.0171)	(0.0194)	(0.0196)	(0.0156)	(0.0125)	
Services	0.00260	-0.00895***	-0.00675**	0.00592**	0.00288	0.000788	252 415
	(0.00214)	(0.00253)	(0.00263)	(0.00240)	(0.00187)	(0.00139)	

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables included in the regression but not reported are dummies for firm size categories, dummy for the period after ETI, dummy for ETI, experience, experience squared, log wage, log asset, and log sales per worker.

There is also an important story in the other industries for which we have not detected a positive impact of the program on hiring youth. For instance, the results show that the ETI increases the likelihood of separation of youth employees in the 18-24 age group in manufacturing firms. Similarly, the program reduced both the hiring and separation rate of youth in the 25-29 age group among firms in the services sector, reducing the worker flow of this particular age group. This suggests the ETI has not assisted South Africa in dealing with

the concerns of premature de-industrialization (Tregenna, 2016). One possible explanation for such impact is that firms are responding to the program by reshuffling the age profile of the workforce, which seems contrary to the aim of the program. Moreover, although the mining sector is prominent in the South African economy, we find no statistically significant impact on youth employment, which is not unexpected given the importance of the sector in terms of employment share. Also, the sector is characterized by unionized workers where entry is difficult and existing workers protected.

Given that the services sector is the most prominent sector in terms of employment share, we further probe how the impacts vary by firm size within the services sector. Table (A3) show results from fixed effects estimation by firm size within the services sector. The results generally mirror the results in table (9), in which the positive impact on hiring youth in the 18-24 age group is largely driven by the positive impact on microenterprises within the services sector. On the other hand, the negative impacts on the hiring rate of the youth in the 25-29 age group are driven by the significant effect on medium and large enterprises. Further probing the heterogeneous effects of the program is potentially an important policy question to better target the program. Given the nature of the data at hand and limited detail on the firm and employee characteristics, there are several questions this study cannot answer.

To sum up, the results suggest that the impact on hiring youth labor market entrants in the 18-24 age group is driven by firms in the agricultural sectors, but the impact on separation rates seems to be driven primarily by firms in the services sector. The positive effect of hiring the youth, however, appears to come at the cost of displacing the non-youth group of workers in the 30-34 age group. While the positive effect on hiring youth in the 18-24 age group is encouraging, the effect is observed in microenterprises and firms in the agricultural sector, which is characterized by relatively low productivity that also pays lower wages. Therefore, the program has a positive impact on youth employment, especially for new labor market entrants in the age group of 18-24, but the impacts are heterogeneous by firm size and sector.

5 Conclusion

With its youthful population, Africa is the youngest continent in the world. However, the youth unemployment rate has become one of the most important socioeconomic challenges in recent years. The problem is pervasive in South Africa, which has persistently recorded one of the highest youth unemployment rates in the continent. Cognizant, the government of South Africa has implemented several active labor market interventions since the early 2000s. One

of the most prominent active labor market policies is the Employment Tax Incentive, a direct wage subsidy, which was introduced in 2014. The evidence on the effect of the program has been largely inconclusive, with some studies finding no detectable impact, while others find a slight positive impact. There is also limited evidence in the literature on the heterogeneity of the impacts. While the studies focus on firm youth and non-youth employees size following a stock approach, the impact on worker flow which is captured by new hires and separation rates across the entire age distribution, capturing the effects on employment dynamics and the possible displacement effect on the non-youth remain scant. This is particularly relevant from a policy perspective, given the vocal opposition from Unions against the ETI program.

Our paper contributes to the literature by investigating the impacts of the program using a flow approach, looking at the hiring and separation rates of workers across the entire age distribution. Using administrative tax panel data from the National Treasury (NT) and the South African Revenue Service (SARS), which have information on matched employer-employee data between 2011 and 2018. We estimate a Diff-in-Diff model using Ordinary Least Square (OLS) and Fixed Effects specifications for hiring and separation rates of workers in age groups: 18-24, 20-29, 30-34, 35-44, and 45-54. We also perform heterogeneity analysis by firm size and sector.

We find that the program is associated with a positive and statistically significant effect on the hiring rate of youth in the 18-24 age bracket but a negative or no effect on the hiring and separation rates of workers in the 24-34 age group, suggesting some displacement effects. We also find that much of the effect on hiring the youth is driven by the large positive impact the program has on microenterprises' hiring rates. Typically called mom-and-pop businesses, this might signal an opportunity for better-targeted policy, with important implications for South Africa's endeavors to formalize this sector and harness the power of microenterprises to engender economic growth. The displacement effects on workers in the 24-29 and 30-34 age groups are driven by the large and significant effect we observed among medium size enterprises that seem to reshuffle their workforce along the entire age distribution. We also find that the program may cause increases in turnover rates in the non-youth group with positive and significant effects on hiring and separation rates. The results also suggest significant heterogeneity by sector. Although the services sector is the largest sector, we could not detect positive effects on youth hiring in the 18-24 age group. However, interestingly, do find positive and significant effects on separation rates of youth in the 24-29 and non-youth in the 30-34 age brackets.

Some key policy implications can be drawn from our findings. First, the ETI program has underwhelming effects on youth employment, particularly those with a few years of experience. The effect is significant and positive on only a small segment of firms, specifically

microenterprises, and to a lesser extent, on firms operating in the agriculture sector. Given that small and medium enterprises and firms operating in the services sector account for more than 70% of employment, the lack of statistically significant effect on hiring and significant displacement effects on the older workers are policy concerns that need to be further probed. This requires subsequent and more nuanced studies to draw a definitive conclusion on the long-term impacts of the program, quantifying the displacement effects on the non-youth group and conducting welfare analysis on whether the positive effects on the hiring rate of the youth outweigh the welfare loss from increased separation rates on the non-youth workers. Such studies could be the basis for re-considering the program in terms of better targeting and reducing displacement.

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A Online Supplementary Appendix

Figure A1 Trend in hiring rates between participating and non-participating firms, by age group

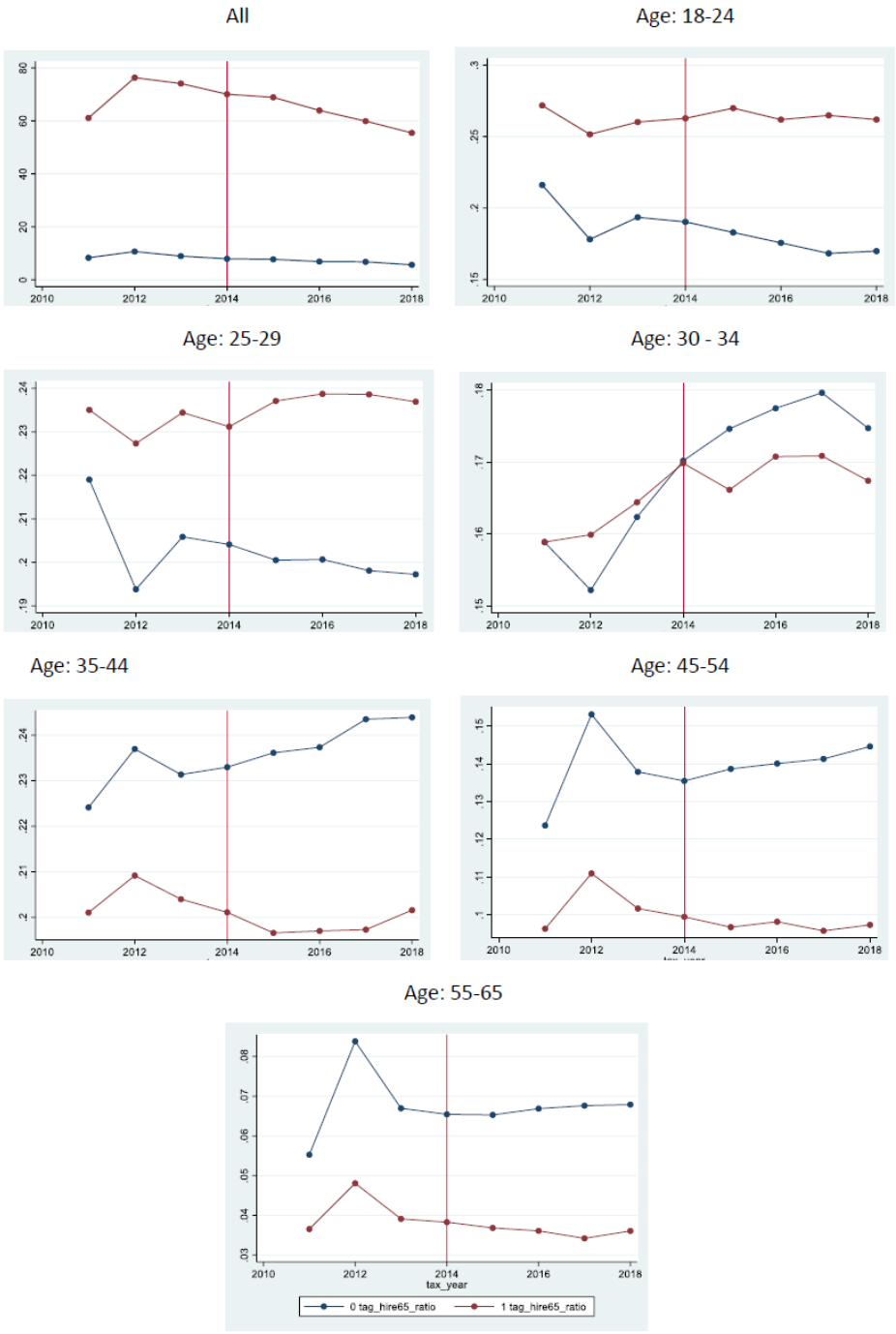

Figure A2 Trend in separation rates between participating and non-participating firms, by age group

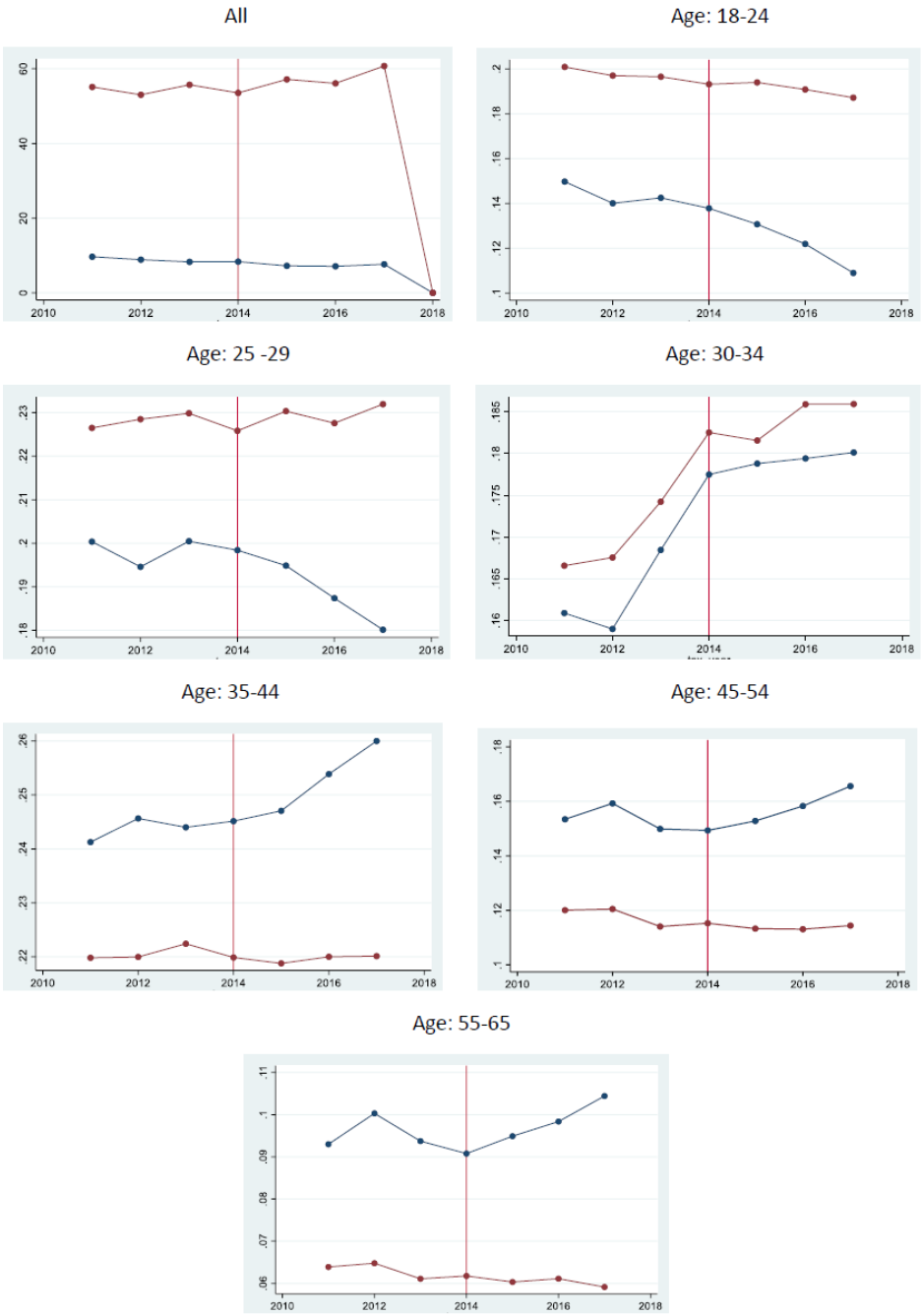

Table A1 OLS Diff-in-diff estimate of ETI impact on **hiring** rates by firm size

	(1) Age: 18-24	(2) Age:25-29	(3) Age:30-34	(4) Age:35-44	(5) Age:45-54	(6) Age:55-64	Obs.
				(a) Hiring			
Micro ($\leqq$ 4)	0.0623***	-0.00906	0.0377***	-0.0133	-0.000802	-0.00135	52 878
	(0.0101)	(0.0113)	(0.0103)	(0.00934)	(0.00731)	(0.00491)	
Small (5 - 19)	0.0149***	0.00218	0.0140***	-0.00869**	0.00289	0.00419**	181 50
	(0.00376)	(0.00370)	(0.00408)	(0.00342)	(0.00265)	(0.00181)	
Medium (20 - 99)	0.00908***	-0.00223	0.00489**	-0.00561***	4.05e-05	0.00236**	144 54
	(0.00221)	(0.00206)	(0.00243)	(0.00195)	(0.00145)	(0.000967)	
Large($\geqq$ 100)	0.00819***	0.000221	0.00766***	-0.00462***	0.000736	0.000206	48 718
	(0.00231)	(0.00170)	(0.00237)	(0.00160)	(0.00116)	(0.000710)	
				(b) Separation			
Micro (1-4)	0.0266**	-0.0268*	0.00160	0.00891	0.00970	0.000695	38 588
	(0.0117)	(0.0143)	(0.0137)	(0.0128)	(0.0104)	(0.00734)	
Small (5 - 19)	0.00817**	-0.00253	0.00350	-0.00585	0.00566*	0.00382	160 11
	(0.00362)	(0.00408)	(0.00445)	(0.00400)	(0.00314)	(0.00236)	
Medium (20 - 99)	0.00626***	-0.00331	0.00405*	-0.00259	-0.000111	0.00134	129 25
	(0.00198)	(0.00212)	(0.00242)	(0.00214)	(0.00162)	(0.00125)	
Large (100+)	0.00607***	0.00142	0.00831***	-0.00378**	-0.000590	-0.00220**	42 874
	(0.00198)	(0.00168)	(0.00211)	(0.00163)	(0.00113)	(0.000858)	

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables included in the regression but not reported are dummies for firm sector categories, dummy for period after ETI, dummy for ETI, Experience, Experience Squared, log wage, log asset, and log productivity.

Table A2 OLS diff-in-diff estimate of ETI impact on hiring rates by narrow age group, with firm sector heterogeneity

	(1) Age: 18-24	(2) Age:25-29	(3) Age:30-34	(4) Age:35-44	(5) Age:45-54	(6) Age:55-64	Obs.
				(a) Hiring			
Agriculture	0.0167***	-0.000430	0.00701	-0.00314	-0.000285	0.000494	22 799
	(0.00626)	(0.00604)	(0.00701)	(0.00601)	(0.00483)	(0.00315)	
Construction	0.0138**	-0.00488	0.00595	-0.00522	-0.000290	9.16e-06	41 727
	(0.00557)	(0.00575)	(0.00633)	(0.00553)	(0.00429)	(0.00286)	
Manufacture	0.00925**	0.00446	0.00981*	-0.00849**	6.03e-05	0.00373	52 220
	(0.00465)	(0.00452)	(0.00518)	(0.00433)	(0.00342)	(0.00236)	
Mining	0.0146	-0.0147	-0.00402	0.0128	-0.0101	0.00444	4 254
	(0.0156)	(0.0156)	(0.0179)	(0.0153)	(0.0126)	(0.00831)	
Services	0.0123***	-0.00688***	0.00228	0.000354	0.00137	0.000879	306 644
	(0.00225)	(0.00225)	(0.00237)	(0.00199)	(0.00152)	(0.00103)	
				(b) Separation			
Agriculture	0.00921*	-0.00301	0.00421	0.000222	0.00545	-0.00477	20 000
	(0.00555)	(0.00609)	(0.00701)	(0.00657)	(0.00558)	(0.00444)	
Construction	0.00336	-0.0116*	-0.00942	0.000572	0.00729	0.00383	36 830
	(0.00519)	(0.00609)	(0.00666)	(0.00627)	(0.00486)	(0.00363)	
Manufacture	-0.00297	0.000116	-0.00203	0.000712	-0.00124	0.00451	46 490
	(0.00426)	(0.00472)	(0.00534)	(0.00494)	(0.00396)	(0.00306)	
Mining	-0.00629	-0.00182	-0.00532	0.00398	0.00826	0.00509	3 737
	(0.0138)	(0.0159)	(0.0180)	(0.0176)	(0.0144)	(0.0111)	
Services	0.00542**	-0.0102***	-0.00536**	0.00486**	0.00416**	0.000443	263 770
	(0.00214)	(0.00242)	(0.00255)	(0.00228)	(0.00177)	(0.00130)	

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables included in the regression but not reported are dummies for firm size categories, dummy for period after ETI, dummy for ETI, experience, experience squared, log wage, log asset, and log productivity.

Table A3 Fixed effects Diff-in-diff estimate of ETI impact on hiring and separation rates (by firm size) in the Services sector

	(1) Age: 18-24	(2) Age:25-29	(3) Age:30-34	(4) Age:35-44	(5) Age:45-54	(6) Age:55-64	Obs.
				(a) Hiring			
Micro (1 - 4)	0.0564**	-0.0272	-0.0158	-0.00726	-0.0104	0.00748	24 043
	(0.0247)	(0.0282)	(0.0226)	(0.0235)	(0.0182)	(0.0123)	
Small (5 - 19)	0.000389	-0.00600	-0.0125**	0.00267	0.00606	0.00925***	105 31
	(0.00642)	(0.00664)	(0.00566)	(0.00601)	(0.00463)	(0.00315)	
Medium (20 - 99)	0.00132	-0.00684*	-0.000982	-0.00117	0.00435*	0.00290*	75 849
	(0.00359)	(0.00365)	(0.00323)	(0.00336)	(0.00245)	(0.00159)	
Large (100+)	0.00307	-0.00566**	-0.00476**	0.000319	0.00523***	0.00248**	22 269
	(0.00314)	(0.00274)	(0.00237)	(0.00251)	(0.00175)	(0.00104)	
				(b) Separations			
Micro (1 - 4)	-0.000536	-0.0305	0.0581*	-0.0145	-0.00325	-0.00744	15 704
	(0.0309)	(0.0387)	(0.0336)	(0.0332)	(0.0266)	(0.0190)	
Small (5 - 19)	-0.00357	0.000198	-0.00630	0.00518	-0.000483	0.00384	88 133
	(0.00617)	(0.00732)	(0.00660)	(0.00696)	(0.00540)	(0.00403)	
Medium (20 - 99)	0.00616*	-0.0101***	-0.00238	0.00241	0.00403	0.000278	64 883
	(0.00321)	(0.00373)	(0.00353)	(0.00366)	(0.00270)	(0.00207)	
Large (100+)	0.00246	0.00314	-0.00343	0.000196	-0.00225	0.000480	18 943
	(0.00257)	(0.00274)	(0.00243)	(0.00254)	(0.00175)	(0.00130)	

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables included in the regression but not reported are dummies for firm size categories, dummy for the period after ETI, dummy for ETI, Experience, Experience Squared, log wage, log asset, and log productivity.