1 Introduction

In a multilinguistic society with historically favored and dominant local or international language, it is not clear whether the introduction of mother tongue instruction (MTI) leads to beneficial outcomes in economic development. Learning in one's mother tongue can potentially enhance labor market outcomes if it improves human capital accumulation. Yet, the link between MTI and success in the labor market is not theoretically certain, nor empirically well-established, largely because the relationship depends on unobserved factors that could spur it in contradictory ways.

While education is the key channel through which MTI could impact job market outcomes, it is not evident what the educational effects of MTI are, since the mediating factors "can either facilitate and optimize access to the content of the curriculum or block learning, preventing both access and equity" (Heugh et al, 2007). Different linguistic theories identify several variables that work in complex ways to influence the association between MTI and educational outcomes. Whereas sociolinguistic views highlight the relevance of relationships "between language and power" and the presence of significant variations in how "linguistic communities make use of and manage the linguistic rights and resources at their disposal"; applied-linguistic theories focus on the significance of "heterogeneity of experiences in language teaching methodologies, design of language teaching programmes, and availability of textbooks and other learning materials" (Heugh et al, 2007). These views imply that the impact of choice of language of instruction on human capital development varies according to the social context in which it is implemented.

A growing number of empirical studies have documented that mother tongue instruction in early schools leads to better learning outcomes (see, for instance, Walter and Chuo, 2012; Taylor and Von Fintel, 2016), with a few making the opposite case that the scheme results in reduction in schooling and literacy (e.g., Angrist and Lavy, 1997; Chicoine, 2019). Hence, learning in native languages can potentially increase participation in the labour market by raising educational attainment; however, gains in human capital associated with MTI may not necessarily lead to gains on the job market. For instance, people from less-favoured linguistic groups, who are schooled in their native languages, could face an undue penalty on the job market – notwithstanding their qualifications – because of market imperfections which includes biases in favour of those with sufficient mastery of the dominant language.

Indeed, while there are studies that show that early mother tongue education might help in mastering international languages better at a higher grade (e.g., Seid, 2019), several empirical studies show that MTI may hamper fluency in dominant languages, and this may in turn affect employment and earnings negatively (e.g., Chiswick and Miller, 2002). Further, in a country like Ethiopia, where the current study is based and there is a pre-existing dominant domestic language and a history of ethnic-based horizontal conflicts and discrimination (Henze, 1992)[1], the adoption of MTI by the speakers of less-favoured native languages can be a source of inbuilt biases and discrimination on the job market, thus adversely affecting the occupational and life

[1]Henze, Paul B., The defeat of the Derg and the establishment of new governments in Ethiopia and Eritrea. Santa Monica, CA: RAND Corporation, 1992. https://www.rand.org/pubs/papers/P7766.html. Also available in print form.

outcomes of individuals obtaining their education in their native languages.

Overall, there are two primary transmission mechanisms through which learning in non-dominant native languages affects employment and wage outcomes. The channels appear to generate contrasting effects – a positive effect through school performance, and a negative one by hampering proficiency in prominent languages and due to discrimination . Hence, whether mother-tongue instruction affects labour market outcomes is an empirical research question which calls for rigorous analysis in different contexts. In this paper, we strive to conduct a coherent empirical investigation on the subject, aiming to provide some answers to a research question that is still largely underexplored.

Identification of the labour market impacts of MTI is a non-trivial undertaking, because the observed associations between MTI and labour market outcomes are influenced by a number of unobserved factors, in ways that are not straight-forward to accurately identify. To overcome the endogeneity of MTI in job market outcomes, we rely in this study on a major policy shift that introduced MTI in Ethiopia in 1994, following a regime change that installed ethnic federalism in the country. Prior to this change, Ethiopia had a dominant language, Amharic, which served as the official language of the Ethiopian state and the language of instruction in primary schools.

The regime change created a number of ethnolinguistic regional states which – in accordance with the new national policy pertaining to languages of instructions in primary and middle schools – proceeded to adopt MTI in their schools *with different rates of intensity* [2]. There are significant differences in how the different local states in the Ethiopian federation implemented the 1994 language of instruction policy, and it is this aspect of the scheme that we utilize to correctly gauge the economic impacts of MTI. Since the possible effects of mother tongue instruction on labour market outcomes are largely mediated through education, our initial task is to pin down the consequences of the policy on two different indicators of education, which we treat as intermediate outcomes. By so doing, we seek to contribute to the research on the likely payoffs of mother tongue instruction.

The spatial variation in the take up of the policy at the state level generates differences in the distribution of native tongue instruction, and we conjecture that the disparity in the diffusion rates of MTI might have led to different rates of human capital accumulation and labour-market outcomes across the country. This presents a unique opportunity to test the research question using an IV-2SLS empirical framework, where the instrumental variable is defined based on an attribute of the students assigned by nature – their ethnicity. To be more precise, the IV in this study is an index variable constructed using a unique interaction of student ethnicity and regional state policy re: MTI , thus it is exogenously determined in the empirical model.

The evidence on the impact of MTI on labour market outcomes is mixed. While it increased the probability of salary employment by about 5%, it did not seem to have any effect on wage employment. The conclusion that the introduction of MTI in Ethiopia has had a positive effect on the probability of gaining salaried jobs but no effect on wage employment is consistent with the prevailing social infrastructure in the country. We also find that mother tongue education enhances human capital accumulation; it improves student test scores in Mathematics and

[2] FN here regarding a map of Ethiopia divided into ethnic regions. The map should be included as an appendix.

verbal comprehension.

The introduction of MTI in Ethiopia has thus proven to be a double-edged sword for its beneficiaries. Mother Tongue Instruction's labour market advantages associated with the increase in human capital are limited only to salaried jobs which are mostly in the public sector, where employees have legal right to work in their native tongues. In the private sector, where mastery of the dominant language, Amharic, is still considered useful for gaining wage employment, the human capital benefits accruing from MTI appear to be offset by the unique disadvantages it imposes in terms of employability, perhaps due to its likely unintended adverse consequences on the mastery of the still somewhat dominant Amharic language.

To verify if the exclusion restriction implied by our IV-2SLS identification strategy holds, we conduct a test à la (Angrist, 1990), and rule out the existence of discernible correlations between the outcome variables (salary employment, wage employment and test scores) and the instrument in a sample where there is no obvious reason for association between the causal and the outcome variables. Additionally, we conduct a test that nullifies the possibility that there may be unobserved differences in state-level characteristics driving the results, providing another evidence corroborating our main findings.

The rest of the paper proceeds as follows: Section two summarizes the empirical literature that is closely related to the current study. In section three, we describe the data as well as the institutional setting and the policy shock that made this study possible. After spelling out our key identification strategy in section four, we proceed to discuss the main findings in section five, contextualizing them with the social environment in which MTI was implemented. After demonstrating that our key findings remain robust by conducting some tests in section six, we conclude by examining the study's prominent policy implication.

2 Related Literature

Empirical studies exploring the impact of mother tongue instruction on labour market outcomes are rare and their conclusions are markedly mixed. Generally, the effectiveness of a mother-tongue literacy program is highly sensitive to choices of inputs and outcome measures as well as implementation details (Kerwin and Thornton, 2020). Studies that have found that learning in native languages improves the employment and earnings of the beneficiaries link those gains to the positive effects of MTI on human capital accumulation (e.g., Eriksson, 2014; Seid, 2017).

Despite the dearth of sufficient rigorous evidence demonstrating that gains in schooling due to MTI translate into gains in employment and earnings as might be expected, several studies show that mother tongue instruction has positive impacts on various measures of educational outcomes in different contexts (e.g., Alidou et al., 2006; Walter and Chuo, 2012; Eriksson, 2014; Taylor and von Fintel, 2016; Seid, 2016; Ramachandran, 2017; Laitin et al., 2019). In general, MTI is observed to increase participation in schools, and reduce grade repetition and dropouts (Benson, 2000, 2005; Bender et al., 2005). One channel for these results is better access: students could be more likely to enter school because they can understand the language. Moreover, mother tongue instruction in the formative years of education can raise the chances

of building non-language cognitive skills such as literacy and numeracy (Eriksson, 2014; Trudell, 2012).

On the other hand, there are studies that show that learning in a well-developed second language (usually international) instead of a local language improves outcomes (e.g., Angrist and Lavy, 1997; Munshi and Rosenzweig, 2006; Shastry, 2012; Casale and Posel, 2011; Parinduri and Org, 2018). Angrist and Lavy (1997) found that elimination of compulsory French instruction in Morocco led to a marked decline in French-language skills and reduced earnings among affected groups. More recently, Parinduri and Org (2018), using data from Malaysia, have shown that having English as a medium of instruction improves English proficiency and educational attainment, but has a weak link to later labour market outcomes. In a study conducted in Ethiopia, Chicoine (2019) asserts that the shift to mother tongue instruction has led to a reduction in schooling and had no impact on literacy, with the negative impact being concentrated in regions that made the switch from an Amharic script to Roman script.

Where mother-tongue instruction may have resulted in less desirable labour market outcomes, reduced proficiency in a dominant national and international language appears to be the main culprit (e.g., Angrist and Lavy, 1997). In several studies, having greater proficiency in the dominant language is shown to be the key factor for success in the labour market (Chiswick and Repetto, 2000; Chiswick and Miller, 2002; Bleakley and Chin, 2004; Lang and Siniver, 2006; Aldashev et al., 2009). According to Kahn et al. (2019), being fluent in the dominant language enhances job seeking outcomes (through better access to information, for example), productivity on the job, and promotion to higher paying positions. Hence, early mother-tongue instruction, by hampering fluency in the dominant language, could negatively affect employment and other economic opportunities in the long-term, although it is unclear why there is a trade-off between learning in mother tongue and mastery of dominant languages.

Most of the evidence on the effects of mother-tongue education is based on reforms or interventions comparing instruction in mother tongue education against an international (usually former colonial) language, such as English, French, Portuguese, etc. (e.g., Benson, 2000; Angrist and Lavy, 1997; Eriksson, 2014; Taylor and von Fintel, 2016; Laitin et al., 2019). Eriksson (2014) examined the effect of mother-tongue vs. English or Afrikaans instruction using the Bantu Education act of 1955 in South Africa as a natural experiment. She finds that increasing mother-tongue instruction for black students from four to six years positively affected wages, literacy, educational attainment, and English-speaking skills. Taylor and von Fintel (2016), also using data from South Africa, have found that mother tongue instruction in the early grades significantly improves English acquisition in later grades.

Laitin et al. (2019) conducted a randomized evaluation of a local language schooling program in Cameroon and found that students that were exposed to three years of the local language (Kom) in early grades scored significantly higher than untreated students, who were instructed solely in English, in math and English tests. In contrast to these findings, Angrist and Lavy (1997) found that the shift in the language of instruction in Morocco from French to Arabic had negative effects on French writing skills and earnings. However, we should be careful to extrapolate such results to developing countries since the degree of exposure to the international language in day-to-day life is different in the two contexts (Ramachandran, 2017; Laitin et al.,

2019).

In Ethiopia, the shift occurred from a dominant local language to a number of other ethnic languages. Amharic has been the only official language Ethiopia has had in all of its recorded history. And given that Ethiopia has never been officially colonized by European powers, there is an economic premium in favour of Amharic instead of a foreign language (e.g., English), unlike what is the case in most other African countries (Seid, 2019). One might rightly expect the behavioural responses of a shift in the language of instruction from a dominant local language to other ethnic languages to be different from those resulting from an international language to a domestic one. This is because a change in the language of instruction is not a politically neutral innovation. As Cummins (2009) rightly notes, "Use of a language as a medium of instruction confers recognition, status, and often economic benefits (e.g., teaching positions) on speakers of that language. ...It is also a socio-political phenomenon that is implicated in the ongoing competition between social groups for material and symbolic resources."

3 The Setting and Data

Ethiopia is an ethnic federation of 83 different ethnolinguistic groups, where the three major groups – the Amhara, the Oromo, and the Tigray groups – constitute about 70 percent of the country's population.[3] The Amhara – which according to the most recent Census constitute slightly over 25 percent of the population – have played the dominant role politically until the early 1990's, when the then government was militarily defeated and replaced by the so-called Ethiopian People's Revolutionary Democratic Front (EPRDF) – a coalition of different ethnic-based liberation movements, in which the Tigray People's Liberation Front (TPLF) played a significant role (Henze, 1992).

Before this sea change took place in the country's political landscape, Amharic – the language spoken by the Amhara people – was by far the most dominant language, serving as the official working language of the Ethiopian state as well as the language of learning in all primary schools (cite). With English being used as a medium of instruction for all subjects, Amharic was also taught as a subject in secondary schools in all corners of the country. The learning and dissemination of Amharic was enforced by state policy, and, for all practical reasons, proficiency in the language was essential for success in the job market.

With the ascension to power of the TPLF-led EPRDF government, the status of Amharic as the dominant language in the social and political life of the country diminished significantly. The EPRDF instituted ethnic federalism and issued a new language of instruction national policy in 1994, empowering the ethno-federal units that constitute the country to establish mother tongue instruction in primary and middle schools under their jurisdiction (MoE document).

Interestingly, member states of the federation adopted the new language of instruction policy creatively and *differently* to meet their specific needs, with some implementing it fully (up to and including the first eight grades of schooling, consistent with the policy), while others executed it only partially. The spatial variations in the take up of the policy at state level generate

[3]These numbers come from the country's most recent Census which was conducted in 2007.

significant differences in the rate of students' exposure to native language education, and the differences in the rates of diffusion of MTI are expected to have resulted in variations in human capital accumulation and labour market outcomes across the country.

Data and Descriptive Figures

We utilize the Young Lives Survey (YLS)[4] conducted in Ethiopia for the study. The YLS is a longitudinal dataset in which a random sample of about 800 young people and their families – in four different regional states of Ethiopia (Amhara, Oromia, Southern Nations and Nationalities, and Tigray) and in the country's capital – were followed and surveyed in five rounds every four years, beginning in 2001 when the subjects were eight-years old. A significant proportion of the surveyed subjects obtained their primary and middle school education in their mother tongue. The latest round of the YLS was conducted in 2016 when the subjects were 24, the majority of whom had completed their schooling and are in some form of employment or seeking employment. The middle rounds and the most recent round of the Young Lives Survey contain data on the outcome variables used in the current study – math and verbal scores (intermediate outcomes) and wage and salary employment (final outcomes). All four rounds contain rich sets of information pertaining to the characteristics of the subjects and their families.

Table 1 presents descriptive statistics for the variables used in the econometric analysis. The first three columns present summary statistics for the sample from the four regions included in the YLS, while the last three columns describe the sample from the capital, Addis Ababa. As will be explained later in some detail, mother tongue instruction is expected to be orthogonal to human capital accumulation and job market outcomes in Addis Ababa. We thus use the Addis Ababa sample for robustness check. The table clearly demonstrates that students in Addis Ababa have higher maths and language test scores compared to the rest of the country. Moreover, employment outcomes are better in Addis Ababa, which is in line with our expectation. Focusing on the non-Addis Ababa sample, we observe that about half have some sort of wage employment, whereas around 16% are engaged in salaried employment by the fifth round. Consistent with the overall distribution of the Ethiopian population, approximately 73% of the overall sample is constituted by rural households.

Figure 1 displays the percentage of pupils that were wage and salary employed by the last round. The region of Tigray outperforms the other regions in terms of both employment outcomes, closely being followed by Oromia. SNNRS and Amhara appear to have the lowest wage and salary employment rates, with the Amhara region and the SNNRS faring the worst in terms of salary employment and wage employment respectively. It is notable that the two regional states with higher rates of salary and wage employment, Tigray and Oromia, are those that implemented the 1994 language of instruction policy fully, whereas the underperformers – the Amhara and the SNNRS – implemented MTI in their curriculums only partially. Figure 2, on the other hand, is a kernel density estimate of standardized maths and language test scores in each region. Standardized language test score displays more variability across the regions,

[4]The YLS is a longitudinal survey of 12,000 children in four developing countries: Ethiopia, India (Andhra Pradesh and Telangana), Peru and Vietnam. It is administered by Young Lives, based at University of Oxford, Department of International Development.

with students in Tigray and Amhara performing better than their counterparts in SNNP and Oromia. In contrast, the standardized maths test scores appear to be more stable.

4 Identification Strategy and Empirical Framework

As described earlier, Oromia and Tigray implemented the 1994 language of instruction policy issued by the Ethiopian Ministry of Education fully, whereas the Amhara state and the Southern Nations and Nationalities Regional State (SNNR) implemented it only partially.[5] Hence, the overwhelming majority of students attending schools in Oromia and Tigray (about 45% of the country's population live in the two states), take all subjects (except the Amharic language class) up to grade eight in their respective mother tongues. In the Amhara state, Amharic is the language of instruction for all subjects up to grade six, and all key subjects are taught in English beginning in grade seven, with the exception of the Awi and the Oromo zones.[6] In the Southern Nations and Nationalities Regional state with about 18% of the country's population, mother tongue instruction is offered only up to grade four, and all subjects are taught in English starting in grade five. In the capital city — Addis Ababa — which is home to all of Ethiopia's ethnic groups, Amharic is the language of instruction up to grade six, and all key subjects are taught in English beyond grade six.

We exploit these differences in how the language of instruction policy was implemented in the four regional states, to assess the impact of mother tongue education on educational and labor market outcomes. Based on a conjecture that the policy-induced disparity in the *intensity of mother tongue instruction* (iMTI) across different states might have resulted in differences in human capital accumulation and labor-market outcomes, an IV-2SLS empirical strategy is implemented to explore the research question under consideration.

Equation [1] is the key (2nd stage) regression equation, with the instrumental variable defined based on ethnicity as described below.

[5] In this study, a regional state is said to have fully implemented the policy if students are provided the opportunity to study all subjects in their mother tongue in grades one through eight; states that implemented the policy only up to grade N where N is less than eight, are considered to have implemented the national policy partially.

[6] The Amhara state allows students in the Awi and Oromo special administrative zones of the region to learn in their respective native tongues.

Tables and Figures

Table 1: Summary Statistics

	Non AA Sample			AA Sample		
	N	Mean	sd	N	Mean	sd
	(1)	(2)	(3)	(4)	(5)	(6)
Dummy for male child	728	0.544		130	0.492	
Highest grade completed	723	9.264	3.143	130	11.26	2.813
Maths test Score (Raw)	725	13.12	5.77	130	17.03	4.905
Language test Score (Raw)	728	13.88	4.306	130	17.48	3.344
Dummy for wage Employment	310	0.497	0.501	86	0.605	0.492
Dummy for salaried Employment	487	0.162	0.369	88	0.386	0.49
BMI-for-age z-score	673	-1.682	1.82	128	-0.971	1.407
Dummy for stunting	700	0.213		128	0.18	
Dummy for female caregiver	727	0.978		130	0.985	
Caregiver's age	727	35.17	8.998	130	36.59	9.709
Caregiver's highest grade	719	2.73	5.899	129	4.403	5.269
Household size	727	6.399	2.082	129	6.07	2.312
Wealth index	724	0.343	0.168	129	0.576	0.107
Housing quality index	726	0.327	0.195	129	0.417	0.14
Consumer durables index	727	0.257	0.197	129	0.492	0.157
Household has access to electricity	726	0.482	0.5	129	0.977	0.151
Household owns land where house is on	728	0.779	0.415	130	0.154	0.362
Household resides in a rural area	727	0.726				
Dummy for Amhara	728	0.236				
Dummy for Oromia	728	0.238				
Dummy for SNNP	728	0.268				
Dummy for Tigray	728	0.258				

Note: The standard deviations for proportions is not presented.

Table 2: Estimates Excluding the Addis Ababa Sample

	Dependent variable:			
	Maths Score	Language Score	Wage Employ I	Wage Employ II
	(1)	(2)	(3)	(4)
Panel A: First Stage[†]				
E_{is}	3.684***	3.665***	3.721***	3.641***
	(0.257)	(0.257)	(0.297)	(0.388)
Panel B: 2SLS[‡]				
IMTI	0.333*	0.284**	0.043***	0.029
	(0.175)	(0.131)	(0.016)	(0.027)
Observations	654	656	437	279
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 3: Estimates for Addis Ababa Sample

	Dependent variable:			
	Maths Score	Language Score	Wage Employ I	Wage Employ II
	(1)	(2)	(3)	(4)
Panel A: First Stage[†]				
E_{is}	8.000***	8.000***	8.000***	8.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: 2SLS[‡]				
IMTI	−0.200	−0.152	0.0002	0.000
	(0.328)	(0.174)	(0.031)	(0.000)
Observations	49	49	41	39
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 4: Reduced Form Estimates for Addis Ababa Sample

	Dependent variable:			
	Maths Score	Language Score	Wage Employ I	Wage Employ II
	(1)	(2)	(3)	(4)
E_{is}	3.273	0.084	−0.313	0.000
	(2.413)	(1.373)	(0.200)	(0.000)
Observations	49	49	41	39
R^2	0.555	0.505	0.755	0.513
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 5: Robustness Check: Oromia vs. Tigray

	Dependent variable:			
	Maths Score	Language Score	Wage Employ I	Wage Employ II
	(1)	(2)	(3)	(4)
Tigray	−0.416	0.903	0.113	0.086
	(1.099)	(0.705)	(0.099)	(0.147)
IMTI	0.373***	1.271***	−0.002	−0.017
	(0.124)	(0.127)	(0.012)	(0.018)
Observations	331	283	227	130
R^2	0.255	0.446	0.127	0.276
Note:				*p<0.1; **p<0.05; ***p<0.01