ESSAYS ON CHILD LABOR

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ABSTRACT

ESSAYS ON CHILD LABOR

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This thesis investigates the impact of different policies on child labor. To this aim, the thesis first provides an overview of the definitions and the global outlook of child labor and discusses the recent policy agenda in the fight against child labor. The thesis then presents the conceptual framework guiding the thesis and a review of related literature, followed by three empirical chapters.

The first empirical chapter evaluates the impact of the extension of compulsory schooling from 8 to 12 years in Turkey on child labor. The chapter uses data from the Child Labor Force Survey (CLS) and relies on a difference-in-difference methodology for identification. Comparing the labor market outcomes of children from different age groups and exploiting their exposure to the old or the new compulsory schooling policy, the chapter finds that being subject to higher years of compulsory schooling reduces the probability of working longer hours per week. The policy also reduces the probability of working in certain types of jobs and in specific sectors for different groups of children.

The second empirical chapter investigates the effect of the increase in the minimum wage on the prevalence of child labor in Turkey. Using data from the CLS over a period where the real minimum wage has increased substantially, the chapter compares the labor market outcomes of children from minimum wage-earning families with children from other families before and after the hike in the minimum wage. The chapter finds that the increase in the minimum wage leads to a reduction in the probability of employment of children younger than 15, especially girls, and the probability of working longer hours for children older than 14, primarily boys.

The third empirical chapter evaluates the impact of compulsory schooling policy on child labor in Low-and-Middle-Income countries (LMIC) by integrating the mediating role of the structural factors into the analysis. This chapter uses data from the Multi Indicator Cluster Surveys (MICS) provided by UNICEF. Focusing on a sample of 14 countries that have increased the years of compulsory schooling over the last two decades, the chapter finds that children who are subject to higher years of compulsory education are less likely to work. The chapter also shows that a suite of structural factors ranging from demographics to education infrastructure, from governance to labor market dynamics, from income inequality to the role of women in society, influence the effectiveness of compulsory schooling policy in reducing child labor.

Overall, the thesis provides evidence from Turkey on the impact of household income policies -the minimum wage-, and education policies -the compulsory schooling- on the prevalence of child labor, where the results of the previous empirical literature suggest that the impact could substantially be context-dependent. The findings are also in line with the literature as the estimated impacts are heterogenous for children across age groups, gender, and household characteristics. Moreover, the thesis provides a cross-country causal investigation of the impact of compulsory schooling on child labor in LMICs, integrating the role of structural factors, which has not been addressed previously. The thesis ends with discussing the policy implications and the potential extensions of the theoretical model of child labor supply.

Keywords: Child labor, compulsory schooling, minimum wage, Turkey, LMICs

ÖZ

ÇOCUK İŞÇİLİĞİ ÜZERİNE MAKALELER

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Bu tez farklı politikaların çocuk işçiliği üzerindeki etkilerini incelemektedir. Bu amaçla, ilk olarak çocuk işçiliğine ilişkin tanımlar ve küresel görünüm sunulduktan sonra çocuk işçiliğini azaltmaya yönelik güncel politikalar tartışılmaktadır. Daha sonra, tezin kuramsal çerçevesi, ilgili yazın değerlendirmesi ve çalışmanın ampirik analizleri sunulmaktadır.

İlk ampirik bölüm, Türkiye'de zorunlu eğitimin 8 yıldan 12 yıla uzatılmasının çocuk işçiliği üzerindeki etkilerini incelemektedir. Bu bölümde Çocuk İşgücü Anketi (ÇİA) verileri kullanılırken, ayrıştırma stratejisi farkların-farkı yöntemine dayanmaktadır. Yeni ya da eski zorunlu eğitim politikasına tabi olmalarından kaynaklanan farklılıklarını dikkate alarak, farklı yaş gruplarındaki çocukların işgücü piyasası çıktılarını karşılaştıran bu analiz, 12 yıl zorunlu eğitime tabi olmanın çocukların haftada uzun saatler çalışma olasılığını azalttığını bulmaktadır. Politika ayrıca farklı gruplardaki çocukların belirli işlerde ve sektörlerde çalışma ihtimalini de azaltmaktadır.

İkinci ampirik bölüm, Türkiye'de asgari ücret artışının çocuk işçiliği üzerindeki etkisini analiz etmektedir. Asgari ücretin reel olarak önemli bir oranda yükseldiği bir dönem için ÇİA verileri kullanılarak yapılan incelemelerde asgari ücretli ailelerden gelen çocuklar ile diğer ailelerden gelen çocukların asgari ücret artışından önceki ve sonraki işgücü piyasası çıktıları karşılaştırılmaktadır. Bulgular, asgari ücret artışının 15 yaş altındaki çocukların -özellikle kızların- çalışma ihtimalini, 14 yaşın üzerindeki çocukların -özellikle erkeklerin- ise uzun saatler çalışma olasılığını azalttığına işaret etmektedir.

Üçüncü ampirik bölüm ise düşük-ve-orta-gelirli ülkelerde, yapısal unsurları da dikkate alarak, zorunlu eğitim politikasının çocuk işçiliğini azaltma etkisini incelemektedir. Bu analizde UNICEF tarafından yayınlanan ve düşük-ve-orta gelirli ülkelerde yapılan Çok Göstergeli Küme Anketleri (Multi Indicator Cluster Surveys - MICS) verileri kullanılmaktadır. Zorunlu eğitim politikasında değişiklik yapmış 14 ülkeye odaklanan analizler, daha uzun süreli zorunlu eğitime tabi olmanın çocukların çalışma olasılığını düşürdüğüne işaret etmektedir. Ayrıca, demografiden eğitim altyapısına, yönetişimden işgücü piyasası dinamiklerine, gelir eşitsizliğinden kadınların toplumdaki yerine kadar birtakım yapısal unsurun, zorunlu eğitim politikasının çocuk işçiliğini azaltmadaki başarısını etkilediği gösterilmektedir.

Özetle, bu tez hanehalkı geliri politikaları -asgari ücret- ve eğitim politikalarının -zorunlu eğitim- çocuk işçiliğine etkileri konusunda Türkiye'den elde edilen bulguları paylaşmaktadır. Bu konuda önceki ampirik yazın, etkilerin koşullara göre değişebileceğine işaret etmektedir. Bu çerçevede, bulgular etkilerin farklı yaş grubu, cinsiyet ve hanehalkı karakteristiklerine göre farklılaştığını göstermesi bağlamında önceki yazınla uyumludur. Ayrıca, tez, zorunlu eğitimin çocuk işçiliği üzerindeki nedensel etkilerini, yapısal unsurların rolünü de entegre ederek, düşük-ve-orta-gelirli ülkeler için ilk ülkeler arası analizi sunmaktadır. Tez, tüm bulguların işaret ettiği politika yapımına ve teorik modellemeye ilişkin çıkarımları tartışarak sona ermektedir.

Anahtar Kelimeler: Çocuk işçiliği, zorunlu eğitim, asgari ücret, Türkiye, düşük-ve-orta-gelirli ülkeler

To İnci and all children of the world

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CLS	: Child Labor Force Survey
CPIA	: Country Policy and Institutional Assessment
CSL	: Compulsory Schooling Law
GDP	: Gross Domestic Product
HCS	: Higher Years of Compulsory Schooling
HLS	: Household Labor Force Survey
LMIC	: Low-and-Middle-Income Countries
MICS	: Multi Indicator Cluster Survey
MWF	: Minimum Wage Family
TURKSTAT	: Turkish Statistical Institute
UNICEF	: United Nations Children's Fund
WB	: World Bank
WDI	: World Development Indicators
WGI	: World Governance Indicators

CHAPTER I

INTRODUCTION

The latest global estimates suggest that as of 2020, 160 million child laborers are engaged in works that children are not old enough to perform or are likely to harm children's health and safety (ILO and UNICEF, 2021). This figure amounts to almost ten percent of the children 5-17 years of age globally. With a broader definition of children in employment, 218 million children are estimated to be employed as of 2016 (ILO, 2017). These numbers reveal how significant of an issue the prevalence of child labor is. The outlook is even more severe in less developed countries, where the incidence of child labor exceeds 50% in some cases.

Child labor has attracted the attention of economists and policymakers, considering its potentially adverse effects on children's current and future wellbeing. Several studies provide comprehensive summaries of the earlier and recent work on the economics of child labor. For instance, Brown et al. (2003) review early theories and empirical findings regarding child labor. Edmonds (2008) presents a detailed discussion of the economics of child labor, including the definition and measurement issues and the impacts of earlier intervention policies. Edmonds and Pavcnik (2005) and Edmonds and Theoharides (2021) evaluate the economic analysis of child labor in the context of the global economy and economic development, respectively. Rosati (2022) presents the most recent overview of the theory and policies regarding child labor and discusses the potential avenues for improving the leading theoretical model of child labor.

The thesis's conceptual framework builds on a household decision-making model where the household chooses how to optimally allocate the child's time across activities by maximizing the household utility. The household receives utility from the number of children, schooling per child, the leisure of the parents and the child, and a composite consumption good (i.e., Basu and Van, 1998; Baland and Robinson, 2000; Cigno and Rosati, 2005; Edmonds, 2008; Rosati, 2022). This workhorse model enables the study of the influence of various interventions on child labor by triggering a range of tradeoffs such as those between child's leisure and work, the quality and quantity of children, the returns on education and child's labor income, or by inducing the parents' relative valuation of child's time across various activities.

The analytical model of Edmonds (2008) is used to motivate the channels through which the interventions considered in the thesis -compulsory schooling policy and increase in parental income- could affect the prevalence of child labor. Within the context of the primary model, an extension is also presented, where the efficiency of the compulsory schooling policy in reducing child labor depends on the enforcement capacity of a country, which is a function of structural indicators.

Compulsory schooling law obliges students to remain in school for a predetermined number of years. Thus, it sets a minimum threshold for a child's time allocated to education and induces a decline in the time devoted to other activities, including work. In this respect, compulsory schooling may help eliminate child labor. The limited empirical evidence for the causal effects of mandatory education on child labor is inconclusive as to the significance of the effects changes with the group of observations and the countries considered, as will be discussed in Chapter II. These suggest that compulsory schooling policy leads to heterogenous effects across

different groups within a country and that structural and socio-economic factors might be affecting the success of compulsory schooling in fighting child labor.

In its essence, child labor is a consequence of inadequate household income. The low household income directly influences how the parents value their child's time in different activities, including leisure, schooling, and work. In their pioneering work, Basu and Van (1998) explicitly link child labor to family income and introduce the luxury axiom, which states that parents only send their children to work if the household income generated by the adults falls short of a threshold. The review of empirical studies reveals that poverty-reducing or income-increasing policies do not always reduce the incidence of child labor across all segments concerning age, gender, and area of residence. The evidence is also highly dependent on the context of each country.

Meanwhile, fighting child labor is still a high priority on the international agenda on labor and children's rights in the policy domain. ILO and UNICEF (2021) echo the policy tools for eradicating child labor after presenting the global outlook on child labor and evaluating the status concerning the sustainable development goals. The recommendations include extending social protection to reduce poverty; providing good quality, free and compulsory schooling; promoting initiatives for decent work conditions and wages for working adults; enforcing the laws and regulations protecting the rights of children; and reevaluating the gender norms that mainly increase the workload of girls in unpaid domestic activities.

Chapter II of the thesis provides an overview of child labor focusing on its definition, prevalence, and potentially harmful effects on children, before introducing the conceptual framework of the thesis. The chapter also reviews the related

theoretical and empirical literature and the recent policy debates on child labor, which establish the basis for the empirical work of the thesis.

The review of the empirical literature on the role of policies increasing household income or extending compulsory schooling in reducing child labor, and the policy agenda pushed by ILO and UNICEF (2021), discussed in Chapter II, motivate the empirical design of the thesis. The first empirical chapter -Chapter III- evaluates the impact of the extension of compulsory schooling in Turkey, in line with the "providing good quality, free and compulsory schooling" recommendation. The second empirical chapter -Chapter IV- evaluates the effect of increases in the minimum wage in Turkey and aligns with the "extending social protection to reduce poverty; and improving the work conditions and wages of adults" recommendations of ILO and UNICEF (2021). The third empirical chapter -Chapter V-, on the other hand, focuses on the role of structural factors in mediating the impact of compulsory schooling policy on child labor for a panel of Low-and-Middle-Income Countries (LMIC), in line with "providing compulsory schooling" and "enforcing the laws and regulations protecting the rights of children" recommendations.

Two primary data sources are utilized for the thesis's empirical analysis. First, the empirical chapters on Turkey use the Child Labor Force Survey (CLS) conducted by the Turkish Statistical Institute (TURKSTAT). It is a nationally representative survey specifically designed to monitor the education and work status of the children aged 5-17 (in the 2019 round) and 6-17 (in the 2006 and 2012 rounds). The CLS is administered in tandem with the Household Labor Force Survey, and all the children in representatively selected households are included in the survey. The survey is conducted in the final quarter of the vintage year and has very detailed questions on

the allocation of the child's time across work, education, and house chores, and includes 28978, 27118, and 25190 observations in the 2006, 2012, and 2019 rounds, respectively. Therefore, the survey is the most comprehensive source to investigate the education, work, and contribution to house chores status of children in Turkey. An excellent property of the survey is that child labor-related questions are directly addressed to the child rather than the parents or caretakers.

The empirical chapter on LMICs uses data from the Multi Indicator Cluster Surveys (MICS) provided by UNICEF, which are nationally representative household surveys conducted in LMICs, and are primarily designed to monitor the living standards of women and children. Surveys are nationally representative and comparable across countries regarding the contents and have been conducted in over 100 countries. The chapter uses the data from 33 surveys in total, covering MICS rounds of 2 to 6 and the period of 2000 – 2019 for 14 LMICs. The surveys include a dedicated child labor module containing detailed questions about the child's employment and engagement with house chores. The child labor module covers children of ages 5-14 (in MICS 2 to 4) and children of ages 5-17 (in MICS 5 to 6). The questions in the child module are directed to the child's primary caretaker and ask if the child works in a family business or a market work. The data on the duration of compulsory schooling, school starting age, and the structural indicators considered are retrieved from the World Bank.

Chapter III evaluates the impact of compulsory schooling policy on child labor. Focusing on the lengthening of mandatory schooling from 8 to 12 years in 2012 in Turkey, the chapter extends the previous findings on the effect of compulsory education on child labor by evaluating the latest reform for all children of ages 6-17.

By exploiting the exposure of children to different compulsory schooling policies based on their birth cohorts and by focusing on children in different age groups, the chapter finds that primarily the policy reform reduces the probability of working longer hours for children of ages 6-13 and boys of ages 14-17. The improvement in child labor outcomes mainly comes from a lower probability of working in the agriculture sector (as a wage earner) for children of ages 14-17 (6-13). The policy reduces the likelihood of working in a job that requires no skills, and, in some cases, working on the streets and in open marketplaces. The working children subject to higher compulsory schooling are also more likely to enroll at school than working children subject to the old policy. Despite increasing school attendance, the reform does not eliminate child labor. One potential factor behind this is the possibility of attending a distance learning high school to fulfill the compulsory schooling obligation. The chapter contributes to the limited literature evaluating the effect of compulsory schooling policy on child labor. Further, it suggests that policies reducing the direct cost of schooling should not disincentivize physical attendance at school to benefit from compulsory schooling in reducing child labor entirely.

Chapter IV evaluates the impact of an increase in household income on child labor. The chapter considers the minimum wage increases in Turkey, which provides an ideal setting for several reasons. First, a high proportion of the wage earners receive the minimum wage or a wage close to it, and second, the minimum wage increases in Turkey have surpassed the growth rate of other wages over the last decade. Therefore, the chapter compares the outcomes of the children from the minimum-wage-earning families with children from other-wage-earning families and families without wage income in a difference-in-differences framework. The chapter

finds that the increase in family income through minimum wage hikes significantly reduces the employment probability of children -particularly girls- younger than 15 years of age and the likelihood of working longer hours for 15-17-year-olds, especially boys. The policy also reduces the probability of being an unpaid family worker and working in agriculture across age groups and gender. The findings provide evidence for the relevance of the luxury axiom, as the income increase significantly reduces the incidence of child labor for specific groups. However, the 35% real increase in the minimum wage observed from 2012 to 2019 is not high enough to eradicate child labor. The chapter contributes to the scarce international literature on the causal effects of minimum wage policies on child labor and the literature on country-specific evaluations of the role of parental income in determining child labor. The widespread diffusion of the minimum wage in Turkey, accompanied by recent sizeable real increases, enables the evaluation of an income policy to reduce child labor in a large developing economy.

On the other hand, Chapter V presents a cross-country analysis of the causal impact of compulsory schooling on child labor in the LMICs and focuses on the mediating role of structural factors. Using a similar identification methodology - in this case, extending to a panel of 14 countries- as in Chapter III, the chapter first finds that the higher years of compulsory schooling (HCS) policy reduces employment among 11-17-year-olds by 7-to-13% on average. The chapter then investigates whether several structural indicators influence the role of compulsory schooling in reducing child labor. The chapter finds that among those structural factors, the policy effect is weaker; for instance, if the old age dependency ratio increases, the income inequality is higher, the size of the informal sector is more prominent, and the share

of services in employment is more elevated. Meanwhile, the policy effect is stronger; for instance, if the percentage of government education spending in the GDP is higher or if women participate more in the household or macro-level decision-making. Also, the effect is stronger in more dynamic economies characterized by higher investment and exports as a percentage of GDP, in countries with better human capital quality, and in countries with greater political stability. Therefore, the chapter provides causal evidence on the effectiveness of compulsory schooling in reducing child labor from a panel of LMICs, where cross-country causal investigations are lacking. The chapter also contributes to the literature by explicitly introducing and quantifying the role of structural factors, which has not been directly considered in previous studies. The findings suggest that structural indicators related to demographics, income inequality, employment and social benefits, education infrastructure, business dynamism, and governance can influence the success of compulsory schooling policy in reducing child labor.

Finally, Chapter VI of the thesis revisits the main findings of the previous chapters and provides a discussion of the contributions and the policy implications of the main conclusions of the thesis.

CHAPTER II

CONTEXT, CONCEPTUAL FRAMEWORK, AND RELATED LITERATURE

In this chapter, first, an overview of child labor focusing on the definition and the incidence of child labor, the theoretical underpinnings, the effect of child labor on child's wellbeing, and the policy sphere are presented before introducing the conceptual framework that establishes the basis for the empirical analysis of the thesis. Next, the chapter provides a selected literature review focusing on two different policy areas that the thesis investigates.

2.1. Child Labor: Definition, Effects on Children, Causes, and Policy Agenda

According to the latest global estimates, 160 million children are child laborers, amounting to almost ten percent of the children 5-17 years of age globally, as of 2020 (ILO and UNICEF, 2021). Meanwhile, the previous global estimates, as of 2016, pointed to 152 million in child labor and 218 million children in employment (ILO, 2017), suggesting that the number of working children has even increased lately.

The leading international standards -the Convention on the Rights of the Child, the ILO Minimum Age for Admission to Employment Convention (No. 138), and the ILO Worst Forms of Child Labor Convention (No. 182) determine the legal limits of child labor. Those standards include works that children are not old enough to perform and/or works that are likely to harm children's health and safety in the definition of child labor. This definition excludes children within the permitted age

range working at light works and those older than the minimum working age -set by national laws- and working in safer jobs.

Meanwhile, a broader definition -child employment- points to any form of market production and several non-market productions, including work in formal and informal sectors, performed inside and outside the household, for pay or profit; and paid or unpaid domestic work outside the child's home for an employer (ILO and UNICEF, 2021). Edmonds and Pavcnik (2005) and Edmonds (2008) argue that to understand better the child's time allocation across various activities and the economic aspects of child labor, a broader definition should consider all forms of child work. Therefore, this thesis will treat child labor more generally, capturing all children in economic activity.

Child labor may have detrimental effects on the well-being of the child. The work potentially keeps the child away from formal education, which impedes human capital accumulation. Even if combines school and work, the child may not enjoy the same returns on schooling that children only attending the school enjoy and thus accumulate less knowledge. For instance, Emerson et al. (2017) show that children working while attending school have significantly lower test scores than those not working. Similarly, Zabaleta (2011), using three-year longitudinal data from Nicaragua, finds that working more than three hours per day is linked with school failure. Also, those working in a market job are more likely to face lower schooling outcomes than those engaged in house chores. Kassouf et al. (2020) show that children involved with market work and household production have at least 10 percent lower scores on language and math tests. Lee et al. (2021) also find that working children have significantly lower math and reading scores in a sample of

Western and Central African countries. Thus, the reduction in learning outcomes can be significant even when a child combines work with school. From another perspective, Atkin (2016) finds that children leaving school at the age of 17 to work at a manufacturing job paying a higher wage than other jobs would have been better off if they continued their education. The reason is that those initially higher wages remain flat while children who complete the school enjoy steep wage growth profiles later.

Working as a child can also have detrimental long-term effects on health. For instance, O'Donnell et al. (2005) show that working in agriculture as a child raises the probability of being ill for girls up to five years later in life; the same likelihood increases with the time spent at work for boys. Lee and Orazem (2010) also find that working in childhood adversely affects various adult health outcomes. Moreover, ILO (2011) shows that the detrimental effects are on both physical and psychological health as child workers are subject to a higher risk of psychological distress. Similarly, Gamlin et al. (2015) and Al-Gamal et al. (2013) find that child's work also harms the child's psychosocial well-being.

Brown et al. (2003) review the early theories regarding child labor. The main model that explains the supply of child labor, a version of which will be presented in Section 2.2.a, is a model of household decision-making where the household maximizes utility which depends on the number of children, schooling per child, the leisure of the parents and the child, and a composite consumption good (i.e., Basu and Van, 1998; Baland and Robinson, 2000; Cigno and Rosati, 2005; Edmonds, 2008; Rosati, 2022). This basic model and its extensions enable the study of the influence of several factors on child labor by triggering the tradeoffs such as those

between child's leisure and labor, between the quality and quantity of children, between the returns on education and child's labor income; and by focusing on factors that influence the parents' valuation of child's time across various activities such as household income, poverty, and parental education.

Basu and Van (1998) place the role of household income at the center and argue that parents send their kids to work when their income falls below some subsistence level. Meanwhile, Baland and Robinson (2000) emphasize the tradeoff between human capital accumulation and child labor and show that child labor may exist at the equilibrium if households face credit constraints due to capital market imperfections. Doepke and Zilibotti (2005) integrate child labor laws, and Hazan and Berdugo (2002) discuss the role of technological progress on child labor by inducing the wage difference between parent and the child.

Recently, Basu and Dimova (2021) explicitly model the role of preferences and show that a higher parental discount rate and a higher risk aversion cause an increase in child labor. On the other hand, Mizushima (2021) considers the role of social and human capital accumulation and shows that an economy with no child labor initially may end up with child labor if it fails to accumulate enough social and human capital. Katav Herz and Epstein (2022) investigate the role of social norms regarding child labor. They show that in populations where the social norms lead to a high ideal level of child labor, the prevalence of child labor will be higher; and that a higher adult wage is needed to induce the parents to withdraw their child from work.

In the policy domain, fighting child labor remains a high priority in the international agenda on labor and children's rights. ILO and UNICEF (2021) reiterate the policy tools for eradicating child labor. These include extending social protection

to reduce poverty, providing good quality, free and compulsory schooling at least up to the minimum working age, promoting initiatives for decent work conditions and wages for working adults, enforcing the laws and regulations protecting the rights of children, and reevaluating the gender norms that mainly increase the workload of girls in unpaid domestic activities. Additional policy recommendations discussed by Thévenon and Edmonds (2019) include installing extensive child monitoring systems, improving the financial literacy of the household members, and emphasizing child labor in responsible business conduct measures. Moreover, ILO (2018) adds addressing child labor in supply chains and protecting children in fragile situations and at times of crises to the list of policy responses.

Reviewing the effects of several public policy programs on eliminating child labor, Dammert et al. (2018) argue that policies directed at reducing the financial vulnerability of the households or their exposure to risk help reduce child labor. Meanwhile, they suggest that evaluating the impact of educational programs promoting schooling on child labor outcomes is relatively scarce, despite the abundance of studies investigating their effect on educational outcomes. Also, discussing the policies and interventions related to child labor, Rosati (2022) argues that the reaction of households to incentives can be quite complex and, at times, can lead to unintended consequences. Therefore, Rosati (2022) suggests that policies should be designed by considering potential effects or targeting issues that could reduce the effectiveness of the interventions.

Some of these possible policy avenues constitute the subject of the thesis. Extending social protection to reduce poverty and improving the work conditions and wages of adults manifest themselves in Chapter IV where the effect of increases in

the minimum wage is considered. The provision of schooling links with Chapters III and V, where the role of compulsory schooling in reducing child labor is discussed.

2.2. Conceptual Framework of the Thesis

This section presents the underlying conceptual framework that motivates the empirical analysis in the thesis. The conceptual framework is an analytical illustration of the household decision-making model for allocating a child's time across activities. In addition, an extension of a simpler version of the model that links compulsory schooling, enforcement capacity, and child labor is also discussed.

2.2.a. A Simple Household Decision-making Model for Child's Time Allocation

The conceptual framework regarding the incidence of child labor based on a simple household decision-making model is presented to discuss the role of household income and schooling policies in eliminating child labor and the channels through which they operate. Thus, it builds the motivation for the empirical analysis in chapters III to V. The framework is adapted from the analytical model of Edmonds (2008), which is a condensed version of the earlier models developed, such as by Basu and Van (1998), Baland and Robinson (2000), and Cigno and Rosati (2005).

Consider a household that comprises a parent and a child.[1] There are two time periods regarding the life of the child. In the first period, the child is young, and the parent allocates the child's time. The second period represents the child's future. The parent earns an exogenous wage income Y by supplying labor inelastically and has

[1] This can also be considered as both parents, receiving the same utility from of child's activities, jointly decide on how to allocate the child's time.

no future in the model. The standard of living of the family in the current period, S, and the child's future welfare, V_k, are the main drivers of the utility of the parent, which is represented as $u(S, V_k)$.

The child's time is allocated across four activities: Education, E; work outside home, M; work at home, H; and leisure and play, P. Work outside the home is mainly the market work where the child earns a wage income. The work done at home comprises the production of goods and services either to be sold at the market or to be used at home to satisfy the standards of living. Thus, the unit time of the child is distributed across these four activities, where $E + H + M + P = 1$.

Edmonds (2008) considers a linear homogenous production function that generates the living standard by using purchased inputs c, and the child's time at home production H. The standard of living in the current period is represented as $S = F(c, H)$. Meanwhile, the child's future welfare is the outcome of a production function that uses education and leisure time as inputs: $V_k = R(E, P)$. The welfare increases in both arguments, and the inputs exhibit diminishing marginal returns.

Schooling has a direct cost, e, which increases with the time spent in education. In units of foregone current consumption, the direct cost of education is eE. A child's labor supplied outside of the home is matched in the labor market and gets a wage rate of w, summing to a child's wage income of wM. Overall, the parents' exogenous income and child's labor income are used for purchasing the inputs for producing standards of living and paying for the direct costs of education. That is, $Y + wM = c + eE$.

Substituting the purchased inputs into S, one can write the parent's utility function as $u(S, V_k) = u\big(F(c, H), R(E, P)\big) = u\big(F(Y + wM - eE, H), R(E, P)\big)$. Then, analogous to Edmonds (2008, eq. 1.1), the problem for the parent is to:

$$\max_{E,P,M,H} u\big(F(Y + wM - eE, H), R(E, P)\big)$$

$$\text{s. t. } E + H + M + P = 1 \text{ and } E \geq 0, P \geq 0, M \geq 0, H \geq 0.$$

The first-order condition with respect to education yields:

$$\frac{\partial U}{\partial S}\frac{\partial F}{\partial c}(-e) + \frac{\partial U}{\partial V_k}\frac{\partial R}{\partial E} - \lambda = 0 \; if \; E > 0$$

and

$$\frac{\partial U}{\partial S}\frac{\partial F}{\partial c}(-e) + \frac{\partial U}{\partial V_k}\frac{\partial R}{\partial E} - \lambda \leq 0 \; if \; E = 0.$$

In the interior solution where a child goes to school, the marginal utility of improving child welfare through higher education is equal to the marginal utility of consumption loss due to the direct cost of education and the marginal utility of time. Likewise, a child does not go to school only if the marginal utility of the welfare improvement through education falls short of the marginal cost of schooling and the opportunity cost of time spent in education.

Recalling that the first-order conditions with respect M, H, and P (and assuming interior solutions) are

$$\frac{\partial U}{\partial S}\frac{\partial F}{\partial c}w - \lambda = 0; \; \frac{\partial U}{\partial S}\frac{\partial F}{\partial H} - \lambda = 0; \; \frac{\partial U}{\partial V_k}\frac{\partial R}{\partial P} - \lambda = 0,$$

suggests that the marginal utility of time is equal to the marginal utility of time in home production, leisure time's marginal utility, and the marginal utility of time spent at market work.

One can consider how household income affects child labor in the model. Primarily, household income influences how parents value the child's time in various activities. For instance, in the model, parents get positive utility from the child's time spent either in education or leisure. Therefore, a higher household income can reduce the value of the child's time spent at home production or market work. Next, take the marginal utility of the contribution of the child through wage work and home production:

$$\frac{\partial U}{\partial S}\frac{\partial F}{\partial c}w \ \ and \ \ \frac{\partial U}{\partial S}\frac{\partial F}{\partial H}$$

Edmonds (2008) notes that the marginal utility of the child's contribution through wage work is equal to the marginal utility of the parent's income (through its contribution to the provision of the standard of living) times the wage rate that the child receives. An increase in the parent's income reduces the marginal utility of household income and thus reduces the marginal utility of the child's contribution through wage work. On the other hand, the marginal utility from the contribution of the child's home production depends on the child's productivity in producing the standard of living ($\partial F/\partial H$). Higher household income may enable the family to replace the child's input in home production of standards of living with other inputs (i.e., purchase of a washing machine). In that case, the child's productivity in home production declines as well as the demand for the child's time in home production. Note that this may shift the child's time to wage work, but it reduces the total hours worked if the optimal hours of wage work are zero (the corner solution).

Finally, an increase in the parent's income might affect the marginal contribution of education to the child's welfare by increasing the child's productivity

at school ($\partial R/\partial E$), provided that extra income can be devoted to the purchase of better inputs to support child's education such as a computer.

Any policy, including education policies such as compulsory schooling laws, that affects the relative returns on schooling directly influences the trade-off between a child's education and work. Recall that in an interior solution for education and wage work, i.e., the child both attends school and works as a wage earner, the optimum allocation of time across both activities satisfies the following condition:

$$\frac{\partial U}{\partial S}\frac{\partial F}{\partial c}w = \frac{\partial U}{\partial V_k}\frac{\partial R}{\partial E} - \frac{\partial U}{\partial S}\frac{\partial F}{\partial c}e$$

That is, the marginal utility of the child's contribution in the form of wage income is equal to the net returns on schooling. Therefore, in this model, the relative returns on education determines the supply of labor. The allocation of a child's time between school and wage work is also contingent on the marginal utility of household income, wage rate in the labor market, and net returns on education (marginal utility of the child's welfare induced by education, net of the marginal cost of education in terms of foregone consumption).

Policies such as improvements in school infrastructure, technological progress, changes in local labor market dynamics, and regulations affect child labor by stimulating the returns on education relative to the returns on child's time devoted to other activities. For instance, an increase in the years of compulsory schooling would increase the marginal benefit of schooling ($\partial R/\partial E$) -supposing that studying less than compulsory years does not entail a diploma- and thus increases the marginal utility of future welfare of the child, leading to a rise in schooling and a fall in wage work and home production. In addition, policies targeted at reducing the direct cost of education, i.e., subsidies and grants, also affect the optimal time allocation by

inducing a rise in family income and thus decreasing the marginal utility of the contribution of the child to household income $(\partial U/\partial S)/(\partial F/\partial c)$. This also leads to a reduction in the time allocated to wage work and housework. Meanwhile, with binding compulsory schooling, the direct costs of education might also reduce the household income, which may increase the marginal utility of a child's wage income and may increase the supply of child labor.

Parents' preferences might influence the trade-off between market work and education through its impact on the valuation of a child's time in different activities. Suppose a child works in wage work but does not attend school. As proposed by Edmonds (2008, eq. 1.2), combining first-order conditions with respect to education and wage work implies that

$$\frac{\partial U}{\partial V_k}\frac{\partial R}{\partial E} - \frac{\partial U}{\partial S}\frac{\partial F}{\partial c}e \leq \frac{\partial U}{\partial S}\frac{\partial F}{\partial c}w \quad => \quad \frac{\partial U}{\partial V_k}\frac{\partial R}{\partial E} \leq \frac{\partial U}{\partial S}\frac{\partial F}{\partial c}(w+e),$$

and that the marginal utility of the child's time spent in education is not greater than the marginal utility of the child's contribution, through wage income and foregone education, to the provision of the standard of living. Therefore, parental preferences regarding the relative valuation of the child's time at school and wage work can affect the marginal utility of the child's contribution to home production.

Parental preferences might differ depending on the gender and age of the child. For instance, the marginal contribution of the income generated by a 10-year-old and a 17-year-old child would not be the same as the opportunity cost of not sending a 10-year-old child and a 17-year-old child to school would not. The impact of parental preferences on a child's time allocation might also differ depending on the employment status of the parent, i.e., the sector of employment, whether the parent is a wage earner, self-employed, or unemployed, influencing the tradeoff between

current consumption of the household and the future welfare of the child. Another aspect related to parental preferences is the role of gender in household decision-making. The preference towards the child's work might be different depending on the dominant parent being the mother or the father.

This simple framework has been used and/or extended in various studies. In earlier examples, Basu and Van (1998) discuss the general equilibrium effects by introducing the substitution and luxury axioms; Baland and Robinson (2000) add credit constraints due to capital market imperfections; Doepke and Zilibotti (2005) integrate child labor laws; Hazan and Berdugo (2002) discuss the role of technological progress; Cigno and Rosati (2005) provide a more general model integrating earlier contributions. In recent theoretical contributions, Basu and Dimova (2021) explicitly model the role of preferences; Mizushima (2021) integrates the social capital accumulation in addition to human capital accumulation; Katav Herz and Epstein (2022) introduce the social norms into the model. Providing the most recent evaluation of the household decision-making model of child labor and policies targeted at eliminating child labor, Rosati (2022) notes that most of the theoretical contributions took place in the early 2000s and that the additions to the model have been marginal since then. Rosati (2022) also identifies the major areas of improvement in the theory of child labor as a complete inclusion of domestic activities -including the house chores- and the addition of work specialization by gender. The model has also extensively been used in the empirical studies to be reviewed in sections 2.3.a and 2.3.b.

2.2.b. Compulsory Schooling, Enforcement, and Child Labor

In one extension of the main theoretical model of child labor supply, Bellettini and Ceroni (2004) explicitly link child labor to the compulsory schooling policy. They point to the importance of factors, such as enforcement and institutional quality, influencing the efficiency of compulsory schooling policies in reducing child labor, which motivates the empirical analysis in Chapter V.

Bellettini and Ceroni (2004) consider an economy with a continuum of households, composed of a parent and a child, over two periods. As in the previous model, the parent lives for one period, while the child lives for two periods. The child either works or attends school in the first period. The parent supplies inelastic labor and earns a wage income y, as a linear function of his/her human capital, h: $y = h$, with $h \in [1, \bar{h}]$, and the parent's human capital is distributed with the uniform distribution function $\Phi(h)$. The parent has a linear utility function comprising consumption in the first period, C, and the child's wage income in the second period, y_2; $u(C, y_2) = C + \beta y_2$, where β is the degree of altruism, ranging from 0 to 1. If the child works, his/her wage normalized to 1 is also added to the family income.

Assume that the returns on a child's education are a function of the parent's human capital, and $g(h)$, where $g(0) = 0, g(1) > 1, g'(h) > 0, and\ g''(h) < 0$, with diminishing marginal returns on the parent's human capital. Further, Bellettini and Ceroni (2004) assume that there are strategic complementarities that the future wage income of the child also depends on the share of children attending school. Then, $y_2 = g(h)f(n)$ if the child attended school in the first period, and $y_2 = 1$ if the child did not attend school, where n is the share of children attending school with $f(0) = 1$, $f'(n) > 0$, and $f''(n) < 0$. These complementarities may arise in the

presence of macro-level human capital externalities. For instance, productivity gains may be more significant if a higher share of the population is educated.

Next, assume that two restrictions are imposed: the positive externality is large enough to make parents with the least human capital send their child to school when they expect full attendance, $\beta g(1) f(1) \geq 1 + \beta$; and when no attendance is expected, the parents with the highest human capital prefer not to send the child to school $\beta g(\bar{h}) < 1 + \beta$, where $1 + \beta$ is the contribution of the working child (who did not attend school) to the family income.[2] These restrictions imposed by Bellettini and Ceroni (2004) secure that both the good (full attendance) and the bad (zero attendance) outcomes can occur at the equilibrium. Therefore, the household utility is $y + 1 + \beta$, if the child does not attend school and $y + \beta g(h) f(n)$ if the child attends school.

With the introduction of compulsory schooling law (CSL), now assume that p is the probability of being detected if a parent does not send the child to school -an indicator of enforceability- and that p is a function of the institutional quality. Further, assume that the returns on schooling are lower if the family is obliged to send child to school than in a case where parents send their child to school voluntarily, $\alpha g(h)$, where $0 < \alpha < 1$. Thus, with CSL, the household utility is $y + \beta g(h) f(\tilde{n})$ when the child goes to school ($e = 1$), and $(1 - p)(y + 1 + \beta) + p\big(y + \beta \alpha g(h) f(\tilde{n})\big)$ => $y + (1 - p) + \beta[p \alpha g(h) f(\tilde{n}) + (1 - p)]$ in case the child does not attend school and works ($e = 0$); where $\tilde{n}$ is the expected fraction of children that attend school.

[2] The assumption that parents with the highest human capital (the richest as interchangeably used in the model) do not send their child to school is a crucial assumption for the model to generate multiple equilibria. Given that there is no positive externality of schooling if they expect no attendance, then, putting the child to work generates a higher household utility.

The equilibrium is a set of $(e, \tilde{n})$ pairs such that $\tilde{n} = n$ for all households and given $\tilde{n}$, e solves the following household maximization problem, analogous to Bellettini and Ceroni (2004, eq. 6):

$$\max_{e \in \{0,1\}} \{y + (1-e)(1-p) + e\beta g(h) f(\tilde{n}) + (1-e)\beta[p\alpha g(h) f(\tilde{n}) + (1-p)]\}$$

Next, Bellettini and Ceroni (2004) define a threshold level of institutions, p^*. This level of institutions makes the parents with the highest level of human capital indifferent between sending the child to school or not when they expect none of the parents to send their children to school. That is, p^* solves the following:

$$\frac{f(p)[(1-p\alpha)g(\bar{h})]}{1-p} = \frac{1+\beta}{\beta}$$

Then, the main propositions of the model are:

i) If $p > p^*$, a unique equilibrium exists where all the children attend school, and every parent expects everyone to send their child to school ($e = 1,\ \tilde{n} = 1$). In other words, if the level of enforcement is higher than the minimum level of institutional quality, compulsory schooling eliminates child labor.

ii) If $p \leq p^*$, then there are two self-fulfilling equilibria. One is the same as above ($e = 1,\ \tilde{n} = 1$), and in the second, some parents send their children to school and some to work ($e = 1\ or\ 0$, for some values of h).

iii) If $p < p^*$, then there exists another self-fulfilling equilibrium, where no child goes to school, and everyone expects that only p proportion of the parents will send their child to school ($e = 0,\ \tilde{n} = p$).[3]

[3] When indifferent between sending a child to school or not, parents are assumed to send the child to school. The propositions say that if the institutional quality is higher than the threshold, then there is no child labor. However, if the institutional quality is equal to or less than the threshold, there can be two self-fulfilling equilibria with either all or some children are going to school. Instead, if the institutional quality is strictly lower than the threshold, then there can be a third self-fulling equilibria

The model predicts that if the quality of the institutions is high enough, compulsory schooling works out the coordination problem among the parents and enables a critical mass of children to attend school, given that the returns on education are higher due to complementarities. Suppose the institutional quality is lower than the threshold; thus, compulsory schooling is not fully enforced. In that case, some parents expect that only a small portion of the parents will send their children to school -due to coordination failures- and decide to make their child work instead. A major implication of the model is that countries that are similar in many aspects but differ in institutional quality and enforcement capacity might have different prevalences of child labor. This implication of the model will be tested in the empirical analysis in Chapter V.

2.3. Related Literature

This section presents a review of the related theoretical and empirical literature. The first subsection reviews the studies investigating the role of compulsory schooling and other policies to increase school enrollment in reducing child labor. Next, the studies on the impact of poverty, household income, and minimum wages on child labor are reviewed. The final subsection examines a selection of studies on child labor in Turkey.

where no child goes to school. The distinction between propositions *(ii)* and *(iii)* is that the equilibrium with no one attending the school, $e = 0$, cannot exist if $p = p^*$. The proofs of the propositions are available in Bellettini and Ceroni (2004).

2.3.a. Compulsory Schooling, School Attendance, and Child Labor

Compulsory schooling law is the legislation that requires students to remain in school for a predetermined number of years or up to the completion of a certain level. In principle, a binding compulsory schooling law sets a minimum threshold for a child's time allocated to education. Thus, it reduces the time devoted to other activities, such as home production, market work, house chores, or leisure. Therefore, the compulsory schooling policy might also help eliminate child labor. In one of the earliest works, Weiner (1991) suggests that, in combatting child labor, compulsory schooling might be more beneficial than banning child labor due to ease of monitoring.

A selection of theoretical papers explicitly models the role of compulsory schooling on the presence of child labor. For instance, Hazan and Berdugo (2002) develop a model of fertility, human capital, and child labor; and analyze the effect of particular policies in reducing child labor. They show that the introduction of compulsory schooling -accompanied by redistributive taxation- leads to an equilibrium which Pareto dominates the competitive equilibrium, as compulsory schooling corrects parents' underinvestment in a child's education. Bellettini and Ceroni (2004) argue that the existence of child labor is due to the imperfect enforcement of compulsory schooling laws, as discussed in section 2.2.b above. Lu (2020) develops a three-period overlapping generations model with endogenous growth to investigate the effects of government education policies on economic growth and welfare. Lu (2020) shows that the government's compulsory schooling policy and investment in education can reduce child labor and increase household

welfare, irrespective of the country's level of development. Furthermore, Lu argues that the education sector should be prioritized when allocating public spending.

Among empirical studies, a branch of studies focuses on the link between compulsory schooling and attendance. For example, Oreopoulos (2006) finds that the increase in the minimum age to leave school from 14 to 15 lowered the drop-out rate of 14-year-olds in the UK. Similarly, Brunello et al. (2009) show that extending the minimum age of leaving school increased schooling in 12 European countries. Elsayed (2019) reports that a one-year extension of compulsory education in Egypt increased schooling by as much as 0.8 years. Using macro-panel data of low-income countries, Diaz-Serrano (2020) shows that in countries where compulsory schooling is extended beyond primary education, the policy increases the rate of progressing to secondary education. Meanwhile, Lewis and Nguyen (2020) find that the compulsory schooling policy does not affect the school participation rate in Indonesia.

Harmon (2017) argues that the evidence suggests that the impact of compulsory schooling on education is primarily on the "marginal" students, who would not pursue education further if they were not subject to compulsory education. This partly suggests that other policies may be needed to accompany compulsory schooling to reduce child labor. In this regard, several studies, -for instance, Black et al. (2005), Osili and Long (2008), and Dayıoğlu and Kırdar (2022)- report substantial effects of mandatory schooling on attendance when it is combined with other policies such as investment in education infrastructure through building new schools, increasing school capacities, introducing boarding schools and transport services.

Another branch of the empirical literature consists of studies specifically investigating the impact of compulsory schooling on child labor. In an early example,

Edmonds and Shrestha (2012) examine how the probability of working changes at the age where compulsory schooling turns out to be not binding. For a panel of low-and-middle-income countries, the pooled estimates suggest no effect on paid employment. Tang et al. (2020) study the impact of free compulsory schooling in rural China on children of ages 10-15. They show that an extra semester of compulsory schooling decreases the prevalence of child labor by 8.3 percentage points among boys, but it does not affect girls. The effect is only significant for boys from households with household assets below the median. Meanwhile, the reform did not increase the enrollment rates.

Kozhaya and Martínez Flores (2020) evaluate the impact of an increase in the compulsory hours of schooling (extended school day) on child labor for a sample of children of ages 7-14 in Mexico by exploiting the time lag between the implementation of the full-time schooling across different municipalities. The results show that the reform does not increase school attendance but increases the hours spent at school. Next, Kozhaya and Martínez Flores (2020) find that a one standard deviation increase in the full-time schools' share in a municipality yields a 12% reduction in the incidence of child labor. The policy is more effective in cutting the time boys spend at market work, and girls at domestic work.

Dayıoğlu and Kırdar (2022) investigate the impact of the policy change in 1997, which increased compulsory education from 5 to 8 years in Turkey, using representative child labor surveys and samples of children of ages 7-11 and 12-17. They find that the policy significantly reduces the incidence of child labor, more prominently for girls and those living in rural areas. The reform mainly reduces the probability of being an unpaid family worker and working in the agriculture sector,

while the reduction in wage labor is limited to urban areas. Dayıoğlu and Kırdar (2022) also show that the reform has spillover effects on younger kids.

Two studies evaluate the education reform in 2012, which increased the years of compulsory schooling from 8 to 12 in Turkey. Dinçer and Erten (2015) analyze its impact on children of ages 15-18, using the Household Labor Survey (HLS) from 2014, through a regression discontinuity setup where the outcomes of cohorts born just before and after January 1998 are considered. The reform increases the high school enrollment rate and lowers the probability of child labor in wage work. The school-work tradeoff is smaller for girls, and the policy does not affect the likelihood of working as an unpaid family worker. Meanwhile, using the same methodology, Erten and Keskin (2019) analyze the impact on those aged 15-20. They find that enrollment in high school increases both for boys and girls; the effect on girls' high school attendance is only in more religiously conservative regions, and the probability of boys working as wage earners is lower. However, these studies do not consider the policy's effect on children younger than 15, contrary to this thesis.

Rather than focusing on compulsory schooling, several studies analyze the schooling and child labor tradeoff under cash transfer programs' framework to increase enrollment. For instance, Ravallion and Wodon (2000) examine the impact of a stipend scheme in Bangladesh and show that the policy increases schooling and reduces child labor, albeit at a much lower rate, suggesting that child labor and school are not perfectly substitutable. Similarly, Cardoso and de Souza (2009) evaluate the impact of a program in Brazil on schooling and child labor and find that the program increases schooling much more than it decreases the prevalence of market work. Galiani and McEwan (2013) also find that a conditional cash transfer program in

Honduras significantly affects enrollment more than child work. Meanwhile, Canelas and Ninõ-Zarazúa (2019), investigating the impact of a cash transfer program in Bolivia, and Opoku and Adu Boahen (2021), studying the effects of a capitation grant in Ghana, find that these programs increase school enrollment but do not affect child labor. Conversely, Schady and Araujo (2006), who evaluate a program's impact on enrollment and child labor of poor children in Ecuador, show that the program increases school enrollment while reducing child labor at a larger magnitude.

Other factors such as accessibility of schools, gender, ethnicity, and location-based differences might also affect children's school and work tradeoffs. For instance, Ahmed (2012), by using free textbooks and access to public primary schools as instruments for school enrolment, shows that the policy leads to an increase in school enrollment and a reduction in hours worked in paid employment in Pakistan. The transition from work to school is stronger for boys, those living in urban areas, and those from poorer families. Kondylis and Manacorda (2012) investigate the role of school proximity and find that it increases enrolment but does not reduce child labor in rural Tanzania. Meanwhile, Zapata et al. (2011) study the role of gender and ethnicity in the work-school tradeoff in Bolivia. Considering home chores as a part of work, they show that girls are likelier to drop out of school and engage in housework. Indigenous children are also more likely to work compared to non-indigenous children.

Overall, the empirical evidence for the effects of compulsory schooling and other programs is not conclusive, as the significance of the effects changes with the group of observations and the countries considered.

2.3.b. Poverty, Household Income, Minimum Wage, and Child Labor

Child labor is mainly a consequence of inadequate household income. Its prevalence is higher among the poor in a country and among less developed countries in a cross-country comparison. The low household income directly influences how the parents value the child's time in different activities, including leisure, schooling, and work. The pioneering theoretical model that puts forward poverty as the primary driver of child labor is presented by Basu and Van (1998), which explicitly links family income to child labor. The first pillar of the analysis is the luxury axiom which states that a child is sent to work only if the household income generated by the adults falls short of a threshold. On the other hand, the substitution axiom -the second pillar- emphasizes adult and child labor substitutability. In a basic labor supply and demand setting, the model produces multiple equilibria, either with the child working or not. As a policy analysis, for instance, when a ban on child labor is introduced, the model predicts that the labor supply curve shifts to the left, which increases the market wages, and thus, the parents do not need to send their children to work.

Basu (2000), on the other hand, studies how a rise in the minimum wage influences the incidence of child labor. The model shows that if the adult minimum wage is set above a threshold and child and adult labor are not perfectly substitutable, a good equilibrium -where no child works- can be achieved. Dessing (2004) also presents a model of household labor supply where an increase in the minimum wage pushes the earnings of the household head up so that the secondary workers in the family -such as children- do not need to supply labor anymore. Meanwhile, Rogers and Swinnerton (2004) show a case where high parental income may increase the child labor supply. If the parents with higher incomes believe that their children will

be less willing to support them when they are old, they would be less inclined to invest in their child's education.

Empirical studies mainly focus on household-level survey data to investigate the link between poverty, family income, and child labor. For instance, using data from India, Cigno and Rosati (2002) find that children from poorer families are more likely to work. Edmonds (2005) shows that enhanced per-capita income explains a large portion of the decline in child labor observed in Vietnam in the late 1990s. The effect mainly comes from households who escaped from poverty with rising incomes. Dayıoğlu (2006) also finds that household income and the child's probability of working are negatively correlated in Turkey. Chiwaula (2010) shows that higher household consumption, a proxy for household income, is associated with a lower probability of children engaging in unpaid market work in Malawi. Constructing a model that links child labor to migration and transfers and using data from Tanzania, Dimova et al. (2015) find that transfers that a household receives -including the income from remittances- reduce the probability of child labor.

Several studies consider the wage income and the employment status of the parents. Among those, Ray (2000) focuses on poverty and child's work and education outcomes using data from Peru and Pakistan and finds that, while poverty is only correlated with child labor in Pakistan, man's (woman's) wage is associated with a reduction in the hours of labor supplied by girls in Peru (Pakistan). Wahba (2006) also investigates the link between adult wage income and child labor. Suggesting that the low adult wage is an essential driver of child labor, Wahba finds that the probability of boys and girls working is down by 22 and 13 percent, respectively, following a 10 percent rise in the market wage of illiterate males in Egypt.

Meanwhile, Hong (2013) does not find a significant impact of shadow adult wages on child labor in rural Tanzania. On the other hand, Duryea et al. (2007) analyze the effect of the male household head being unemployed on the incidence of child labor using data from 10 to 16-year-old children in Brazil. They show that if the male household head becomes unemployed, the probability of children entering the labor force increases, suggesting that a temporary reduction in household income is compensated by child labor income.

A set of studies investigates the impact of exogenous shocks to household income on the prevalence of child labor. Beegle et al. (2006) analyze the effect of a transitory negative income shock, captured by crops shock in agricultural production, on the incidence of child labor. They find that such a shock increases the hours worked by children ages 7-15; meanwhile, the availability of households' assets mitigates this negative impact to some extent in Tanzania. Similarly, investigating coffee production in Brazil as a setting, Soares et al. (2012) find that shocks to production increase household income, which is associated with a fall in child labor. Sulistyo and Syafitri (2021), on the other hand, find that the probability of the child to work is higher if the household faces damage from a natural disaster, even after controlling for household assets per capita.

Similarly, another branch of studies considers the role of cash transfer programs as a source of increase in household income. For instance, Edmonds and Schady (2012) evaluate the impact of a random cash transfer program targeting women with children in Ecuador and show that it substantially reduces the probability of both paid and unpaid employment among students. De Carvalho Filho (2012) also analyzes the impact of an exogenous increase in household income, fueled by a social security

reform targeting rural workers, on children's schooling and work outcomes in Brazil. De Carvalho Filho finds that the hike in household income reduces the probability of girls being wage workers. On the contrary, evaluating a conditional cash transfer program in Brazil, Cardoso and de Souza (2009) do not find an effect of the program on a child's paid work. They suggest that the income increase generated by the program is not large enough for the parents to withdraw their children from work.

On the macro level, economic growth and access to credit might also influence the incidence of child labor. Kambhampati and Rajan (2006) analyze the link between household income, economic growth, and child labor in India. They find that household income and state-level per capita net domestic production are negatively associated with child labor. Meanwhile, the correlation between state-level economic growth and child labor incidence is non-linear, as child labor is higher in periods of low growth and is lower if the economic growth is sustained. Dehejia and Gatti (2002) find a significant association between access to credit -proxied by private credit as a share of GDP- and child labor in a cross-country study. Families rely on child labor when faced with income variability. Recently, Edmonds and Theoharides (2021) argue that the employment of children is a consequence of the lack of economic growth. They suggest that higher income increases the ability of families to cope with economic shocks without relying on child labor and induces a higher demand for child's time spent in education and leisure.

Finally, while studies on the effect of the minimum wage on the labor market outcome of adults and young adults -the own-wage effect- are abundant, only a few studies consider the possible impact of minimum wage on child labor -through the family income effect. Dessing (2004) conceptualizes a model where a high minimum

wage reduces the excess labor supply, mainly of the secondary workers (i.e., women and children), due to increased family income of the minimum wage-earning household head. Dessing (2004) further suggests that the lack of comprehensive data on child labor -in the early 2000s- constraints the empirical testing of this channel. Recently, Menon and van der Meulen Rodgers (2018) analyze the impact of the minimum wage on child labor in India. They find that an increase in the minimum wage reduces the probability of children ages 10 to 14 working in household business and house chores in urban areas, suggesting that a higher adult minimum wage reduces the duties on children's shoulders.

Note that the review of studies reveals two points: first, the poverty-reducing or income-increasing policies do not always have a favorable effect on all segments of child labor concerning age, gender, and area of residence. Second, the evidence is highly country dependent. Thus, the overall evidence is unclear, and careful country-specific investigations are needed.

2.3.c. Selected Studies on Child Labor in Turkey

Several studies analyze child labor in Turkey. A set of studies investigate the association between parental education, family income, and child labor. For instance, Tunali (1996) shows that higher parental education is associated with a lower probability of children engaging in market work. Baş (2004) also finds that parental education and child labor are negatively correlated while not reporting a significant association between household income and child labor. Dayioglu and Assaad (2003) analyze the determinants of child labor in urban areas and find that father's wage is negatively associated with the child's probability of working.

Similarly, Dayıoğlu (2006) investigates the relationship between household income and child labor focusing on 12-17 aged children living in urban areas and shows that the probability of a child working is negatively associated with the household income. Kıral and Tıraş (2013) also find that the likelihood of a child participating in the labor market is negatively associated with the father's income. Eriş Dereli (2021), using the 2019 round of CLS, shows that the mother's education and employment are negatively correlated with the probability of a child working.

Several studies investigate the association between child labor and schooling. Using the data from the 1994 and 1999 rounds of CLS, Dayioğlu (2005) finds that the negative association between child labor and schooling strengthened after the extension of compulsory education in 1997. On the other hand, Kanun and Kayaoğlu (2019) show that attending school is negatively associated with working only for children aged 15-17, using the 2012 round. Meanwhile, Susanli et al. (2016) analyze children's participation in house chores; Berigel and Eroğlu (2019) provide a descriptive outlook of child labor in Turkey; Erdoğan and Uyan Semerci (2019) review the studies on child labor in the post-2000 period; Tor (2010) examines the status of child labor as well as the legislation governing the employment of children; and Günöz (2007) reviews the national laws and regulations related to child labor and lists the state entities that are working to fight against it.

In a limited number of causal investigations, Dayıoğlu and Kırdar (2022) evaluate the impact of compulsory schooling reform in 1997 on child labor; Dinçer and Erten (2015) and Erten and Keskin (2019) investigate the effect of 2012 compulsory schooling reform on the labor market and schooling outcomes of older children. Meanwhile, Dayioglu-Tayfur et al. (2020) analyze the impact of the

abolishment of dual minimum wage on the employment probability of 15-16-year-old boys, and Gockaj (2022) studies the effect of migration on native children's labor market outcomes.

Based on the conceptual framework provided and the reviewed literature, the following three chapters present the empirical work carried out in the thesis.

CHAPTER III

COMPULSORY SCHOOLING AND CHILD LABOR: EVIDENCE FROM THE EXTENSION OF COMPULSORY SCHOOLING TO 12 YEARS IN TURKEY

3.1. Introduction

The compulsory schooling policy requires students to stay in formal education for a predetermined number of years or up to the completion of a certain level. A binding compulsory schooling law sets a minimum threshold for the time allocated to the child's education, reducing the time allocated to other activities, such as market work, home production, house chores, or leisure. Moreover, it is easy to monitor whether a child attends school or not. Therefore, a compulsory schooling policy might help eliminate child labor.

The conceptual framework presented in Chapter II discusses the potential channels through which compulsory schooling might affect child labor. In principle, any policy, including education policies such as compulsory schooling laws, that affects the relative returns on schooling has a direct impact on the trade-off between a child's education and work in this framework, as the supply of labor is a determined by the returns on education relative to the returns on child's other activities.

An increase in the years of compulsory schooling would increase the marginal benefit of schooling -in case studying less than that does not entail a diploma- which would raise the marginal utility of the child's future welfare. A higher marginal benefit of schooling would lead to a rise in schooling and a fall in time devoted to

child labor. Meanwhile, binding compulsory schooling might increase the direct costs of education, reducing the household income and increasing the marginal utility from a child's wage income to the household. In this case, compulsory schooling may also increase the child labor supply. Parental preferences might influence the tradeoff between market work and education, which, in essence, induces the tradeoff between the household's current consumption and the child's future welfare. Thus, the impact of compulsory schooling on child labor might differ across children, driven by the preferences based on the age and gender of the child or by the labor market outcomes of the parents. Therefore, compulsory schooling is expected to reduce child labor if the higher marginal utility of completing compulsory education and parental preferences putting more weight on the future welfare of the child outweighs the marginal direct cost of education.

Turkey has changed its compulsory schooling policy twice in its recent history. In 1997, the compulsory education, which previously covered 5-year primary school only, was extended to 8 years. In 2012, on the other hand, it was further extended to 12 years, covering the entire primary and secondary education. Despite the change in the compulsory schooling policy providing a good laboratory to evaluate its impact on the prevalence of child labor, it has only been investigated by a few studies. Dayıoğlu and Kırdar (2022) examine the effect of the 1997 reform on children of ages 7-11 and 12-17 but do not consider the 2012 reform. Dinçer and Erten (2015) and Erten and Keskin (2019) analyze the impact of the 2012 reform, but only on a sample

of individuals of ages 15-18 and 15-20, respectively, without considering younger children and house chores.[4]

Against this background, this chapter aims to evaluate the impact of the policy change that increased the years of compulsory schooling from 8 years to 12 in 2012 on the incidence of child labor by using the latest three rounds of the CLS. The identification is achieved by using the variation in exposure to lower (8 years) or higher (12 years) compulsory schooling of children according to their birth year. Thus, the chapter aims to contribute to the limited number of studies investigating the impact of compulsory schooling on children's labor market and schooling status in Turkey. The main contributions include the use of the most recent round of the CLS, with data up to 2019; the access to additional information, including the total wage income of the household and the age of parents; a difference-in-differences methodology enabling to test whether the impact of the 2012 policy changes lasted longer; and an analysis of the spillovers on younger children. The chapter also contributes to the limited international literature evaluating the effect of compulsory schooling on child labor.

3.1.a. Selected Literature

Among theoretical studies that explicitly model the role of compulsory schooling on the presence of child labor, for instance, Hazan and Berdugo (2002) show that in a model of human capital, fertility, and child labor, compulsory schooling policy -accompanied by redistributive taxation- leads to a Pareto

[4] Both Dayıoğlu and Kırdar (2022) and by Dinçer and Erten (2015) argue that the policies were mainly motivated by political reasons rather than by an agenda to fight with child labor.

improvement on top of competitive equilibrium by solving the parent's underinvestment in a child's education. Focusing on the role of compulsory schooling, Bellettini and Ceroni (2004) argue that child labor exists due to the imperfect enforcement of the compulsory schooling laws. With a three-period overlapping generations model, Lu (2020) shows that the government's compulsory schooling policy and investment in education can reduce child labor.

Studies investigating the impact of compulsory schooling on child labor are relatively scant on the empirical front, as discussed in Chapter II. In the international domain, Edmonds and Shrestha (2012) find no effect on paid employment; Tang et al. (2020) find an effect for boys from less wealthy families only; Kozhaya and Martínez Flores (2020) find a favorable impact of extending the hours of the school day on the prevalence of different activities for boys and girls. Thus, the empirical evidence for the effects of compulsory schooling is not conclusive.

Three studies investigate the effect of compulsory schooling on child labor using the education reforms in Turkey, as discussed in Chapter II. Dayıoğlu and Kırdar (2022) examine the impact of the policy change in 1997, which increased compulsory education from 5 to 8 years in Turkey, using CLS, and for children of ages 7-11 and 12-17. Relying on a difference-in-differences methodology and comparing the children of specific age groups from different birth cohorts, and using the variation in their exposure to different years of compulsory schooling regimes, they find that the policy significantly reduces the incidence of child labor, more prominently for girls and those living in rural areas. The reform mostly reduces the probability of being an unpaid family worker, working in the agriculture sector, being a wage worker only in urban areas, and increases the age of first employment. The

policy reform also has spillover effects on younger kids as the probability of 7-11-year-olds working is lower.

Dinçer and Erten (2015) and Erten and Keskin (2019), on the other hand, evaluate the impact of the education reform in 2012, which increased the years of compulsory schooling from 8 to 12, on education and labor market outcomes. Dinçer and Erten (2015) analyze its impact on children of ages 15-18, using the Household Labor Survey (HLS) from 2014, through a regression discontinuity setup where the outcomes of cohorts born just before and after January 1998 are compared. Considering different bandwidths around the cutoff birth date, they find that the reform increases the high school enrollment rate and lowers the probability of child labor in wage work. The school-work tradeoff is smaller for girls, and the policy does not affect the likelihood of working as an unpaid family worker. Erten and Keskin (2019) analyze the impact on 15-20-year-olds, using HLS data from 2015 and the same methodology. They find that enrollment at high school increases both for boys and girls and that the probability of boys working as a wage worker is lower. However, these studies do not consider the policy effect on children younger than 15, and they use relatively larger bandwidths around the cutoff.[5]

3.1.b. 2012 Education Reform and 12-Year Compulsory Schooling in Turkey

With Law no. 6287, the years of compulsory schooling increased from 8 to 12 years in April 2012, which was effective as of the 2012/13 school year. With the

[5] When measuring the impact on labor market outcomes, Dinçer and Erten (2015) use the optimal bandwidth of 20 months before and after the cutoff date, with robustness checks with bandwidths of 15 (30) months in the narrowest (widest) case; and Erten and Keskin (2019) use the optimal bandwidths ranging from 26 to 69 months for various labor market outcomes.

reform, the structure of education has also changed, and the 12-year compulsory schooling was organized as three 4-year modules comprising primary, middle (junior high), and high schools. The students who completed 8th grade in the 2011/12 school year could drop out, while those completing 7th grade or lower at the same period were subject to 12-year compulsory schooling. Therefore, considering the typical school start age of 6, the children born in or after 1998 needed to complete 12-years of education to receive the diploma.[6]

The reform introduced new features to the system. First, completing the first two 4-year modules does not grant a diploma, which is only awarded after the 12th year. Second, while all other vocational schools start from the 9th grade, students have the opportunity to attend the religious vocational schools from the 5th grade onwards. Third, students who have completed the 8th grade are allowed to continue their education through distance learning schemes. Therefore, the new system directly increases the return on completing 12 years of schooling as nothing below yields a school diploma for the student.[7] Fourth, the policy also enables those completing five years of age (60 months) to start primary school with the parent's consent, earlier than the typical school start age of 6.[8]

[6] As also described in Dinçer and Erten (2015) and Erten and Keskin (2019), this cohort is more likely to comply with 12-year compulsory schooling.

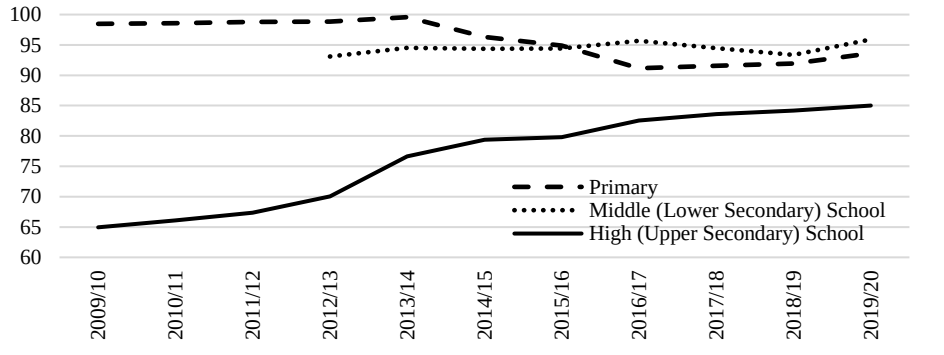
[7] Ministry of National Education (2012) provides detailed answers to the frequently asked questions about the reform.

[8] This policy is also expected to have an impact on outcomes such as the school achievement of those who start school at the age of 5 rather than 6, which could be an interesting area of further research. At the year of the reform, around 35% of the cohort born in 2007 were registered to a grade higher than the children with the typical school start age would have registered, suggesting that around 35% of the students born in 2007 might have started school at the age of 5. Meanwhile, this share has steadily declined afterwards and about 19% of the children born in 2013 might have started school at the age of 5. This policy has been changed as of 2019/20 school year that 60-month-olds are no longer accepted to primary school.

Despite lengthening the years of compulsory schooling, the policy was motivated mainly by countering the previous compulsory schooling reform that prohibited the students from attending religious vocational schools before the 9th grade -postponing it after completing the compulsory school set at eight years. In this regard, the policy was not directly connected with child labor outcomes during the policy change.

As a result of the extension of compulsory schooling, the net schooling ratio in upper secondary education (high school) -the share of students of a theoretical age group who are enrolled at high school in the population of that age group-, which was 67.37% as of 2011/12 school year, has steadily increased after the 2012 reform and reached 85.01% as of 2019/20 school year (Figure 3.1). Also, the gap of 2.4 percentage points between the net schooling ratio of high school-age boys and girls in 2011/12 vanished afterwards. Meanwhile, the transition rate from 8th to 9th grade has increased from 83% in 2011/12 to 95% as of 2014/15 and later came down to 88% as of 2020/21.[9] Therefore, the reform successfully increased both high school transition and net enrollment rates.

Figure 3.1. Net Schooling Ratio in Primary and Secondary School (%)



Note: The net schooling ratio is the share of students of a theoretical age group who are enrolled at school in the population of that age group.
Source: Ministry of National Education National Education Statistics of Formal Education

[9] The schooling ratios and the transition rates are from the Ministry of National Education, National Education Statistics of Formal Education 2011/12 and 2020/21.

3.2. Methodology and Identification Strategy

The strategy employed by Dayıoğlu and Kırdar (2022) is adapted in the empirical investigation, and the impact of changes in compulsory schooling policy on child labor is analyzed through the following specification:

$$Y_{i,a,t} = \beta_0 + \beta_1 P_{i,a,t} + X'_{i,a,t}\beta_2 + \mu_t + \gamma_a + \rho_{ag,t} + \varepsilon_{i,a,t} \quad (3.1)$$

where $Y_{i,a,t}$ is the labor market outcome of the child *i*, aged *a*, and surveyed in year *t*. $P_{i,a,t}$ is the treatment indicator showing whether the child is affected by the policy change -higher years of compulsory schooling (HCS). Therefore, this indicator takes the value of 1 (0) for children subject to 12 (8) years of compulsory schooling. Considering that the reform was effective as of the 2012-2013 school year and that the typical school start age of 6, the cohorts born in 1998 and later are affected by the policy change. Therefore, $P_{i,a,t}$ takes the value of 1 (0) for children born in or after (before) 1998. $X'_{i,a,t}$ is a vector of the child or household-specific control factors, including child's gender, household head's age, a dummy variable indicating whether the household head works, and household head's education. The specification includes survey year fixed effects, μ_t, age fixed effects, γ_a, and age group-specific linear time trends, $\rho_{ag,t}$. While the child and household-related control variables primarily capture child labor supply-related factors, the year fixed effects are assumed to capture all factors common to all the observations in a specific year, including those related to the demand for child labor. The standard errors are clustered at birth year level and all the regressions are weighted by the sampling weights.

Linear probability models are estimated on various sub-samples with alternating outcome variables. Here, β_1 gives the desired treatment effect, which is the impact of the increase in years of compulsory schooling on the probability of observing the child's specific labor market outcome.

3.3. Data

The data comes from the latest three rounds (2006, 2012, 2019) of the Child Labor Force Survey (CLS) conducted by the Turkish Statistical Institute (TURKSTAT), which is a nationally representative survey specifically designed to monitor the education and work status of the children aged 5-17 (6-17 in 2006 and 2012 rounds). The CLS is administered in tandem with the Household Labor Survey, and all the children in representatively selected households are included in the survey. The survey is conducted in the final quarter of the vintage year and has very detailed questions on the allocation of the child's time across work, education, and house chores.

On the work front, employment status, the type of work (paid, unpaid family), time spent at work, the conditions at the workplace (whether it is a hazardous job, whether the child is maltreated at work, etc.), and the sector of employment are among the information available in the survey. CLS also includes detailed information on the house chores the child contributes to. Finally, detailed questions on schooling are available, including the level completed, whether still studying, type of school attended, reasons for never-been to school or for dropping out. The survey includes 28978, 27118, and 25190 observations in the 2006, 2012, and 2019 rounds. Therefore, the survey is the most comprehensive source to investigate the education,

work, and contribution to house chores status of children in Turkey. Given that the theoretical background discussed in Chapter II proposes to optimally allocate a child's time across different activities, working with a dataset that combines school attendance with the time spent at market work or in a family business, as well as the time devoted to house chores is the major advantage of the CLS. An excellent property of the survey is that child labor-related questions are directly addressed to the child rather than the parents or caretakers and that the survey covers children of all relevant ages.[10]

The children's school enrollment and employment rates in the latest three rounds of the CLS are summarized in Table 3.1.

Age group:	**14-17**			**6-13**		
Outcome \ Year:	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**
Enrolled						
2006	0.650	0.477	9175	0.940	0.238	19803
2012	0.785	0.411	9437	0.981	0.137	17681
2019	0.837	0.370	7891	0.975	0.157	15439
Employed						
2006	0.149	0.356	9175	0.017	0.131	19803
2012	0.134	0.340	9437	0.021	0.142	17681
2019	0.129	0.335	7891	0.008	0.091	15439

Table 3.1. Enrollment and Employment Rates of Children by Survey Year

Note: The sample covers 6-17-year-old children from the 2006, 2012, and 2019 CLS. The summary statistics are aggregated with children's sampling weights.

The school enrollment rate of 14-17-year-old children has increased from 65.0% in 2006 to 83.7% as of 2019. Meanwhile, the enrollment rate of 6-13 age group has remained well above 90% in all three survey rounds. The employment rate among children aged 14-17 slightly declined over the survey rounds, from 14.9% in 2006 to

[10] Some studies highlight the possibility of a difference between the rates of child labor when sourced form proxy reports and from child's self-reporting. Janzen (2018) finds that the incidence of child labor is underreported in proxy answers compared to children's own reports in Tanzania. Meanwhile, Dillon et al. (2012), conducting randomized field experiments in Tanzania do not find any significant difference between the responses of children and the proxy reports. Running experiments in Ethiopia, Galdo et al. (2019) show that the underreporting is only relevant for girls, and that there is no underreporting when it comes to work of boys and when the proxy respondent is a male household head.

12.9% in 2019. Despite an increase from 2006 to 2012, the prevalence of child labor has come down to 0.8% as of 2019 for those aged 6-13.

Additional data, which are not available in the standard microdata of CLS, are obtained courtesy of TURKSTAT. These variables include the age of the child, the mother, the father, and the household head; total wage income of the household; whether the household head is employed; the sector of employment of the household head in case employed; and the total number of employed people in the household.

The treatment variable identifies children subject to higher years of compulsory schooling (HCS) and takes the value of 1 for those born in and after 1998, and 0 otherwise. The affected cohorts from the policy are given in Table 3.2.

	Age of Children											
Survey year	6	7	8	9	10	11	12	13	14	15	16	17
2006	*2000*	*1999*	*1998*	1997	1996	1995	1994	1993	1992	1991	1990	1989
2012	*2006*	*2005*	*2004*	*2003*	*2002*	*2001*	*2000*	*1999*	*1998*	1997	1996	1995
2019	*2013*	*2012*	*2011*	*2010*	*2009*	*2008*	*2007*	*2006*	*2005*	*2004*	*2003*	*2002*

Table 3.2. Birth Cohorts Affected by the Policy
Note: The birth cohorts in italics are affected by the policy.

The labor market outcomes investigated are represented by the following dummy variables: Employed, works more than 40 (15) hours per week, wage earner, unpaid family worker, employed in agriculture, employed in manufacturing, employed in the services sector, works in a field/garden, works at a regular workplace, has no fixed workplace, employed at a basic occupation (job requires no skills), employed at qualified occupations (jobs requires specific skills), contributes to house chores, and spends more than 7 hours per week in house chores.[11] The variables, Employed, Hours worked>40, Hours worked>15, Wage earner, Unpaid family worker, Agriculture, Manufacturing, Services, Field/garden, Regular

[11] No fixed workplace refers to children working on the streets or on open marketplaces.

workplace, No fixed workplace, Basic occupations (no skills), Qualified occupations, House chores, House chores hours>7, Enrolled and Higher compulsory schooling take the value of 1 if the child is in that category and 0 otherwise. The reference brackets in the survey for the time spent at work and house chores are used to determine those working longer than 40 (15) hours or in house chores more than 7 hours per week.

The specifications include the following child or household-related control variables: child's gender, household head's age, employment status, and education, number of siblings, household wage income status, as well as age fixed effects, year fixed effects, and age group-specific linear time trends. The employment status of the household head is a dummy variable taking the value of 1 if the household head works. Household head's education takes the values of 1, 2, and 3 for "Less than high school", "High school" and "Above high school", respectively. The age groups capture ages 6-11, 12-14, and 15-17 in the surveys. The household's wage income status takes the value of 1 if the household has wage income and 0 otherwise. The number of siblings is the number of children under the age of 18 living in the same household.

Several subsamples are considered in the analysis due to the potential heterogeneity of the treatment effect across gender and age groups. These samples include All observations; Boys and Girls; Boys aged 14-17; Boys aged 6-13; Girls aged 14-17; Girls aged 6-13.[12] Here, 14-17-year-olds are the immediate targets of the

[12] The children of ages 6-8 are affected from the policy in all three surveys as seen from Table 3.2. However, the policy effect is not identified for 15-17 and 9-13 age groups due to the presence of year fixed effects in the specification. Therefore, we include 14-year-olds and 6- to 8-year-olds in the respective groups to identify the policy effect.

reform that extends compulsory schooling from 8 to 12 years. Meanwhile, the reform might have spillover effects on the labor market outcomes of younger cohorts. One reason for the spillover effects might be the enforcement of the compulsory schooling policy with potential checks at primary and middle school levels. Also, additional options introduced by the change in compulsory policy, such as the possibility of enrolling in religious vocational secondary schools after the fourth grade, might influence the relative returns of education and child labor.

For robustness checks, additional analyses are performed. In the first exercise, regressions are estimated for different samples depending on the availability of wage income in the household.[13] Second, for the sample of children from households with wage income, the relative wage income per household member is also controlled in the regressions to partly capture the effects of household income. In the final robustness check, the household head's employment sector is controlled for, rather than a binary indicator of whether the household head works.

The descriptive statistics of the main variables, aggregated by the sampling weights of the children, are presented in Table 3.3 for ages 14-17 and Table 3.4 for ages 6-13. The incidence of child employment is higher for older kids and boys. Among children ages 14-17, 13.7% are employed, whereas 18.6% of boys and 8.6% of girls work. Meanwhile, only 1.5% of the children ages 6-13 work. More than half of the 14-17-year-old employed children work more than 40 hours per week. The prevalence of wage work is higher in the 14-17 age group, and children in the 6-13

[13] The families with no wage income are those whose adult members are employers, self-employed or unpaid family workers, or those with all adult members are unemployed or out of labor force, details of which are not available to the authors. However, the information available at the parent survey (HLS) shows that, for instance in 2019, 63% of the workers are wage workers, while 20%, 13% and 4% are self-employed, unpaid family worker and employer, respectively.

age group mainly work as unpaid family workers. Looking at the sectors, despite a balanced distribution across 14-17-year-olds, boys are more likely to be employed in services and manufacturing, and the share of girls employed in the agriculture sector is higher. Also, around two-thirds of 6-13-year-olds work in agriculture.

Regarding the workplace characteristics, 4.2%, 8.8%, and 0.6% of 14-17-year-olds work in the field/garden, a regular workplace, and not-fixed workplaces, respectively. Also, among 14-17-year-olds, 3.6% of them work in jobs that require no skill, and 10.1% work in jobs that require some skills. Meanwhile, 61.2% of the children contribute to house chores, where the gender gap is wider as 75.9% of girls contribute to house chores as opposed to 47.3% of boys. Moreover, 34.1% (6.9%) of the girls (boys) spend more than 7 hours per week on house chores. The prevalence of house chores is 41.9% among 6-13-year-olds, and only 6.5% of the children in that age group spend more than 7 hours per week on house chores.

The school enrollment rates are 75.8% and 96.5%, respectively, in the older and the younger age group. Also, %41.5 of the older children and 79.4% of the younger children are affected by the increase in compulsory schooling. The average household size is around 5.5 in both groups, and the average household head is about 46.8 and 42.8 years old in the sample of older and younger children, respectively. 71.4% (76.4%) of the household heads are employed in the sample of children ages 14-17 (6-13). Meanwhile, 59.6% of the 14-17-year-olds come from households with wage income.

Table 3.5 presents the summary statistics for children of ages 6-17 by the survey year. Accordingly, 6.0%, 5.9%, and 4.7% of children are employed in 2006, 2012, and 2019, respectively. The probability of children working longer hours (>40 per

week) has decreased over the years, from 3.2% in 2006 to 1.9% in 2019. 47.0%, 49.2% and 48.4% of children contribute to house chores in 2006, 2012, and 2019, respectively. Finally, Table 3.6 provides the descriptive statistics separately for the treatment (subject to 12 years of compulsory schooling) and control (subject to 8 years of compulsory schooling) groups. Focusing on children of ages 14-17, 11.6% (15.2%) of those in the treatment (control) group are employed; 5.0% (9.5%) of those in the treatment (control) group work more than 40 hours per week. The school enrollment rate is higher in the treatment group (85.0%) than in the control group (%69.3). On the other hand, the control variables are similar across both groups, except that children in the treatment group are about half a year younger than others on average, and the share of households with wage income is slightly higher in the treatment group.

	All					Boys					Girls				
	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Employed	26503	0.137	0.344	0	1	13372	0.186	0.389	0	1	13131	0.086	0.281	0	1
Hours worked>40	26503	0.077	0.266	0	1	13372	0.112	0.316	0	1	13131	0.039	0.194	0	1
Hours worked>15	26503	0.119	0.323	0	1	13372	0.163	0.369	0	1	13131	0.072	0.259	0	1
Wage earner	26503	0.090	0.286	0	1	13372	0.125	0.330	0	1	13131	0.053	0.224	0	1
Unpaid family worker	26503	0.045	0.207	0	1	13372	0.057	0.231	0	1	13131	0.032	0.177	0	1
Agriculture	26503	0.042	0.201	0	1	13372	0.047	0.211	0	1	13131	0.037	0.190	0	1
Manufacturing	26503	0.041	0.199	0	1	13372	0.060	0.238	0	1	13131	0.021	0.144	0	1
Services	26503	0.053	0.224	0	1	13372	0.078	0.268	0	1	13131	0.027	0.163	0	1
Field/garden	26503	0.042	0.199	0	1	13372	0.045	0.208	0	1	13131	0.037	0.190	0	1
Regular workplace	26503	0.088	0.284	0	1	13372	0.128	0.334	0	1	13131	0.047	0.212	0	1
No fixed workplace	26503	0.006	0.076	0	1	13372	0.011	0.105	0	1	13131	0.000	0.012	0	1
Basic occupations (no skills)	26503	0.036	0.185	0	1	13372	0.046	0.208	0	1	13131	0.025	0.156	0	1
Qualified occupations	26503	0.101	0.301	0	1	13372	0.139	0.346	0	1	13131	0.061	0.239	0	1
House chores	26503	0.612	0.487	0	1	13372	0.473	0.499	0	1	13131	0.759	0.428	0	1
House chores hours>7	26503	0.202	0.401	0	1	13372	0.069	0.253	0	1	13131	0.341	0.474	0	1
Enrolled	26503	0.758	0.428	0	1	13372	0.778	0.415	0	1	13131	0.736	0.441	0	1
Higher compulsory schooling	26503	0.415	0.493	0	1	13372	0.415	0.493	0	1	13131	0.414	0.493	0	1
Age	26503	15.493	1.113	14	17	13372	15.502	1.115	14	17	13131	15.483	1.110	14	17
Gender (Female)	26503	0.488	0.500	0	1	13372	0.000	0.000	0	0	13131	1.000	0.000	1	1
Household size	26503	5.442	2.215	1	23	13372	5.356	2.194	1	23	13131	5.532	2.233	2	23
Number of siblings	26503	1.324	1.315	0	10	13372	1.251	1.283	0	10	13131	1.400	1.342	0	10
HH's education	26503	1.342	0.653	1	3	13372	1.334	0.646	1	3	13131	1.351	0.661	1	3
HH's age	26503	46.834	9.068	15	97	13372	46.783	9.031	15	93	13131	46.888	9.108	15	97
HH works	26503	0.714	0.452	0	1	13372	0.718	0.450	0	1	13131	0.709	0.454	0	1
HH works in agriculture	26503	0.144	0.351	0	1	13372	0.145	0.352	0	1	13131	0.142	0.349	0	1
HH works in manufacturing	26503	0.139	0.346	0	1	13372	0.141	0.348	0	1	13131	0.136	0.343	0	1
HH works in construction	26503	0.071	0.256	0	1	13372	0.067	0.250	0	1	13131	0.074	0.262	0	1
HH works in services	26503	0.361	0.480	0	1	13372	0.365	0.481	0	1	13131	0.356	0.479	0	1
HH unemployed/not in labor force	26503	0.286	0.452	0	1	13372	0.282	0.450	0	1	13131	0.291	0.454	0	1
Household has wage income	26503	0.596	0.491	0	1	13372	0.609	0.488	0	1	13131	0.582	0.493	0	1

Table 3.3. Descriptive Statistics for Children of Ages 14-17

Note: The data covers all children of ages 14-17 from the 2006, 2012, and 2019 CLS. The descriptive statistics are weighted by children's sampling weights. Higher compulsory schooling (HCS) refers to children who are subject to 12-year compulsory schooling. Household head's education takes the values of 1, 2, and 3 for "Less than high school", "High school" and "Above high school", respectively. HH stands for the household head. The number of siblings is the number of those under the age of 18.

	All					Boys					Girls				
	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Employed	52923	0.015	0.123	0	1	27037	0.020	0.141	0	1	25886	0.010	0.101	0	1
Hours worked>40	52923	0.002	0.040	0	1	27037	0.002	0.042	0	1	25886	0.001	0.039	0	1
Hours worked>15	52923	0.006	0.075	0	1	27037	0.008	0.088	0	1	25886	0.003	0.059	0	1
Wage earner	52923	0.003	0.056	0	1	27037	0.004	0.067	0	1	25886	0.002	0.041	0	1
Unpaid family worker	52923	0.012	0.109	0	1	27037	0.015	0.124	0	1	25886	0.009	0.092	0	1
Agriculture	52923	0.010	0.101	0	1	27037	0.012	0.111	0	1	25886	0.008	0.091	0	1
Manufacturing	52923	0.002	0.041	0	1	27037	0.003	0.052	0	1	25886	0.001	0.026	0	1
Services	52923	0.003	0.058	0	1	27037	0.005	0.072	0	1	25886	0.001	0.038	0	1
Field/garden	52923	0.010	0.100	0	1	27037	0.012	0.109	0	1	25886	0.008	0.089	0	1
Regular workplace	52923	0.004	0.065	0	1	27037	0.007	0.082	0	1	25886	0.002	0.041	0	1
No fixed workplace	52923	0.001	0.028	0	1	27037	0.001	0.037	0	1	25886	0.000	0.015	0	1
Basic occupations (no skills)	52923	0.006	0.075	0	1	27037	0.007	0.082	0	1	25886	0.005	0.068	0	1
Qualified occupations	52923	0.010	0.098	0	1	27037	0.014	0.116	0	1	25886	0.006	0.076	0	1
House chores	52923	0.419	0.493	0	1	27037	0.373	0.484	0	1	25886	0.467	0.499	0	1
House chores hours>7	52923	0.065	0.246	0	1	27037	0.034	0.182	0	1	25886	0.096	0.295	0	1
Enrolled	52923	0.965	0.184	0	1	27037	0.970	0.170	0	1	25886	0.960	0.197	0	1
Higher compulsory schooling	52923	0.794	0.405	0	1	27037	0.793	0.405	0	1	25886	0.795	0.404	0	1
Age	52923	9.483	2.295	6	13	27037	9.482	2.301	6	13	25886	9.483	2.289	6	13
Gender (Female)	52923	0.489	0.500	0	1	27037	0.000	0.000	0	0	25886	1.000	0.000	1	1
Household size	52923	5.496	2.185	2	23	27037	5.412	2.151	2	22	25886	5.582	2.216	2	23
Number of siblings	52923	1.386	1.289	0	10	27037	1.337	1.262	0	10	25886	1.437	1.315	0	10
HH's education	52923	1.405	0.687	1	3	27037	1.410	0.690	1	3	25886	1.401	0.683	1	3
HH's age	52923	42.779	10.006	16	96	27037	42.819	9.997	18	94	25886	42.737	10.016	16	96
HH works	52923	0.764	0.425	0	1	27037	0.763	0.425	0	1	25886	0.766	0.424	0	1
HH works in agriculture	52923	0.131	0.337	0	1	27037	0.127	0.333	0	1	25886	0.134	0.341	0	1
HH works in manufacturing	52923	0.163	0.369	0	1	27037	0.163	0.369	0	1	25886	0.163	0.370	0	1
HH works in construction	52923	0.078	0.267	0	1	27037	0.080	0.271	0	1	25886	0.075	0.264	0	1
HH works in services	52923	0.393	0.488	0	1	27037	0.393	0.488	0	1	25886	0.393	0.488	0	1
HH unemployed/not in labor force	52923	0.236	0.425	0	1	27037	0.237	0.425	0	1	25886	0.234	0.424	0	1
Household has wage income	52923	0.590	0.492	0	1	27037	0.594	0.491	0	1	25886	0.586	0.493	0	1

Table 3.4. Descriptive Statistics for Children of Ages 6-13

Note: The data covers all children of ages 6-13 from the 2006, 2012, and 2019 CLS. The descriptive statistics are weighted by children's sampling weights. Higher compulsory schooling (HCS) refers to children who are subject to 12-year compulsory schooling. Household head's education takes the values of 1, 2, and 3 for "Less than high school", "High school" and "Above high school", respectively. HH stands for the household head. The number of siblings is the number of those under the age of 18.

	2006					2012					2019				
	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Employed	28978	0.060	0.237	0	1	27118	0.059	0.235	0	1	23330	0.047	0.213	0	1
Hours worked>40	28978	0.032	0.177	0	1	27118	0.027	0.163	0	1	23330	0.019	0.136	0	1
Hours worked>15	28978	0.048	0.213	0	1	27118	0.042	0.200	0	1	23330	0.039	0.192	0	1
Wage earner	28978	0.034	0.180	0	1	27118	0.031	0.173	0	1	23330	0.030	0.171	0	1
Unpaid family worker	28978	0.024	0.153	0	1	27118	0.027	0.162	0	1	23330	0.017	0.130	0	1
Agriculture	28978	0.022	0.146	0	1	27118	0.026	0.160	0	1	23330	0.015	0.120	0	1
Manufacturing	28978	0.018	0.134	0	1	27118	0.014	0.119	0	1	23330	0.011	0.105	0	1
Services	28978	0.019	0.137	0	1	27118	0.018	0.134	0	1	23330	0.022	0.145	0	1
Field/garden	28978	0.021	0.143	0	1	27118	0.026	0.159	0	1	23330	0.014	0.119	0	1
Regular workplace	28978	0.034	0.181	0	1	27118	0.030	0.171	0	1	23330	0.031	0.174	0	1
No fixed workplace	28978	0.004	0.061	0	1	27118	0.002	0.046	0	1	23330	0.001	0.038	0	1
Basic occupations (no skills)	28978	0.016	0.124	0	1	27118	0.018	0.133	0	1	23330	0.013	0.113	0	1
Qualified occupations	28978	0.044	0.204	0	1	27118	0.041	0.197	0	1	23330	0.035	0.183	0	1
House chores	28978	0.470	0.499	0	1	27118	0.492	0.500	0	1	23330	0.484	0.500	0	1
House chores hours>7	28978	0.119	0.324	0	1	27118	0.098	0.297	0	1	23330	0.112	0.315	0	1
Enrolled	28978	0.846	0.361	0	1	27118	0.915	0.279	0	1	23330	0.930	0.255	0	1
Higher compulsory schooling	28978	0.258	0.438	0	1	27118	0.747	0.435	0	1	23330	1.000	0.000	1	1
Age	28978	11.414	3.449	6	17	27118	11.520	3.451	6	17	23330	11.419	3.450	6	17
Gender (Female)	28978	0.489	0.500	0	1	27118	0.490	0.500	0	1	23330	0.486	0.500	0	1
Household size	28978	5.527	2.282	1	21	27118	5.396	2.195	1	23	23330	5.512	2.102	1	17
Number of siblings	28978	1.409	1.332	0	9	27118	1.339	1.312	0	10	23330	1.349	1.247	0	7
HH’s education	28978	1.323	0.632	1	3	27118	1.343	0.648	1	3	23330	1.488	0.734	1	3
HH's age	28978	43.073	9.621	15	96	27118	44.591	10.276	16	97	23330	44.645	9.687	17	94
HH works	28978	0.740	0.439	0	1	27118	0.771	0.420	0	1	23330	0.732	0.443	0	1
HH works in agriculture	28978	0.142	0.349	0	1	27118	0.151	0.358	0	1	23330	0.112	0.315	0	1
HH works in manufacturing	28978	0.147	0.354	0	1	27118	0.151	0.358	0	1	23330	0.167	0.373	0	1
HH works in construction	28978	0.071	0.256	0	1	27118	0.086	0.280	0	1	23330	0.069	0.254	0	1
HH works in services	28978	0.380	0.485	0	1	27118	0.383	0.486	0	1	23330	0.383	0.486	0	1
HH unemployed/not in labor force	28978	0.260	0.439	0	1	27118	0.229	0.420	0	1	23330	0.268	0.443	0	1
Household has wage income	28978	0.525	0.499	0	1	27118	0.606	0.489	0	1	23330	0.645	0.479	0	1

Table 3.5. Descriptive Statistics by Survey Year

Note: The data covers all children of ages 6-17 from the 2006, 2012, and 2019 CLS. The descriptive statistics are weighted by children’s sampling weights. Higher compulsory schooling (HCS) refers to children who are subject to 12-year compulsory schooling. Household head’s education takes the values of 1, 2, and 3 for “Less than high school”, “High school” and “Above high school”, respectively. HH stands for the household head. The number of siblings is the number of those under the age of 18.

Age group:	14-17						6-13					
Treatment group:	Treatment			Control			Treatment			Control		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Employed	10294	0.116	0.321	16209	0.152	0.359	40618	0.013	0.112	12305	0.026	0.159
Hours worked>40	10294	0.050	0.218	16209	0.095	0.294	40618	0.001	0.032	12305	0.004	0.063
Hours worked>15	10294	0.097	0.296	16209	0.134	0.340	40618	0.004	0.064	12305	0.012	0.109
Wage earner	10294	0.077	0.267	16209	0.098	0.298	40618	0.002	0.045	12305	0.007	0.086
Unpaid family worker	10294	0.038	0.192	16209	0.049	0.216	40618	0.011	0.102	12305	0.018	0.133
Agriculture	10294	0.033	0.180	16209	0.048	0.215	40618	0.009	0.096	12305	0.015	0.121
Manufacturing	10294	0.029	0.168	16209	0.050	0.217	40618	0.001	0.037	12305	0.003	0.055
Services	10294	0.054	0.225	16209	0.053	0.223	40618	0.002	0.046	12305	0.008	0.090
Field/garden	10294	0.033	0.179	16209	0.048	0.213	40618	0.009	0.095	12305	0.014	0.118
Regular workplace	10294	0.078	0.269	16209	0.095	0.294	40618	0.003	0.055	12305	0.009	0.094
No fixed workplace	10294	0.004	0.062	16209	0.007	0.084	40618	0.000	0.021	12305	0.002	0.047
Basic occupations (no skills)	10294	0.031	0.175	16209	0.038	0.192	40618	0.005	0.068	12305	0.010	0.098
Qualified occupations	10294	0.085	0.279	16209	0.112	0.316	40618	0.008	0.089	12305	0.016	0.127
House chores	10294	0.614	0.487	16209	0.611	0.488	40618	0.406	0.491	12305	0.468	0.499
House chores hours>7	10294	0.182	0.386	16209	0.215	0.411	40618	0.058	0.234	12305	0.089	0.285
Enrolled	10294	0.850	0.357	16209	0.693	0.461	40618	0.966	0.180	12305	0.960	0.196
Higher compulsory schooling	10294	1.000	0.000	16209	0.000	0.000	40618	1.000	0.000	12305	0.000	0.000
Age	10294	15.184	1.167	16209	15.712	1.018	40618	9.088	2.315	12305	11.002	1.414
Gender (Female)	10294	0.487	0.500	16209	0.489	0.500	40618	0.489	0.500	12305	0.487	0.500
Household size	10294	5.531	2.181	16209	5.379	2.237	40618	5.467	2.154	12305	5.606	2.296
Number of siblings	10294	1.331	1.303	16209	1.319	1.323	40618	1.352	1.277	12305	1.514	1.327
HH's education	10294	1.384	0.677	16209	1.313	0.634	40618	1.431	0.702	12305	1.308	0.616
HH's age	10294	47.170	8.912	16209	46.597	9.171	40618	42.780	10.191	12305	42.773	9.264
HH works	10294	0.714	0.452	16209	0.713	0.452	40618	0.767	0.423	12305	0.754	0.431
HH works in agriculture	10294	0.132	0.338	16209	0.152	0.359	40618	0.127	0.333	12305	0.143	0.350
HH works in manufacturing	10294	0.152	0.359	16209	0.130	0.336	40618	0.167	0.373	12305	0.149	0.356
HH works in construction	10294	0.069	0.254	16209	0.071	0.257	40618	0.078	0.268	12305	0.075	0.264
HH works in services	10294	0.361	0.480	16209	0.360	0.480	40618	0.395	0.489	12305	0.386	0.487
HH unemployed/not in labor force	10294	0.286	0.452	16209	0.287	0.452	40618	0.233	0.423	12305	0.246	0.431
Household has wage income	10294	0.635	0.481	16209	0.568	0.495	40618	0.609	0.488	12305	0.518	0.500

Table 3.6. Descriptive Statistics According to Treatment Status

Note: The data covers all children from the 2006, 2012, and 2019 CLS. The descriptive statistics are weighted by children's sampling weights. Higher compulsory schooling (HCS) refers to children who are subject to 12-year compulsory schooling. Household head's education takes the values of 1, 2, and 3 for "Less than high school", "High school" and "Above high school", respectively. HH stands for the household head. The number of siblings is the number of those under the age of 18.

3.4. Results

Before presenting the estimation results on child labor market outcomes, first, the impact of the policy on school enrollment is analyzed. Estimation results provided in Table 3.7 show that the policy increased the probability of 14-17-year-old children's enrollment at school.

Outcome \ Sample	**All**	**Boys**	**Girls**
Enrolled	0.0741**	0.0632**	0.0854**
	(0.0287)	(0.0261)	(0.0325)
Obs.	26,503	13,372	13,131

Table 3.7. Policy Effect on Enrollment of Children Ages 14-17

Note: The sample covers 14 to 17-year-old children from the 2006, 2012, and 2019 CLS. Each cell shows the results of a separate regression where the outcome variable (row) is regressed on the treatment indicator -Higher Compulsory Schooling (HCS)- and the relevant control variables for a specific sample of observations (column). The control variables include age fixed effects, gender, household head's age, household head's employment status, household head's education, household size, number of siblings, household's wage income status, age group-specific year fixed effects. The standard errors clustered at the birth year level are in parentheses. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

The estimation results of the impact of higher compulsory schooling on the labor market outcomes of children of ages 14-17 (6-13) are presented in Table 3.8 (Table 3.9). Each cell reports the coefficient of the policy variable -HCS-, β_1, in the specification (3.1) estimated for the outcome variable (row) and on the sample of observations (column).

First, consider the 14-17 age group directly affected by the policy change. Overall, extending compulsory education to high school significantly reduces the probability of working longer hours. It also reduces the probability of working in the agriculture sector, a field or garden, and being employed in basic occupations requiring no skills. The reduction in the probability of agriculture and field/garden (basic occupations) is only significant for boys (girls). Meanwhile, the policy increases the probability of girls engaging in house chores, being unpaid family workers, and working in qualified occupations. The policy also increases the

participation of boys in house chores but significantly reduces their probability of spending long hours on house chores.

Outcome \ Sample	**All**	**Boys**	**Girls**
Employed	0.00633	-0.00595	0.0201
	(0.00924)	(0.00911)	(0.0119)
Hours worked>40	-0.0147***	-0.0234***	-0.00472
	(0.00384)	(0.00640)	(0.00386)
Hours worked>15	0.000028	-0.00933	0.0108
	(0.00993)	(0.00896)	(0.0124)
Wage earner	0.00435	-0.000510	0.00919
	(0.0116)	(0.0120)	(0.0113)
Unpaid family worker	0.000908	-0.00586	0.00894**
	(0.00248)	(0.00523)	(0.00290)
Agriculture	-0.00551*	-0.0122**	0.00206
	(0.00253)	(0.00480)	(0.00308)
Manufacturing	0.00530	0.00524	0.00529
	(0.00439)	(0.00647)	(0.00386)
Services	0.00504	-0.000917	0.0117
	(0.00742)	(0.00431)	(0.0116)
Field/garden	-0.00518*	-0.0131**	0.00368
	(0.00260)	(0.00485)	(0.00293)
Regular workplace	0.00821	0.00348	0.0132
	(0.0111)	(0.0106)	(0.0120)
No fixed workplace	-0.000305	-0.000277	-0.00004
	(0.000448)	(0.000861)	(0.00003)
Basic occupation (no skills)	-0.00709***	-0.00103	-0.0131***
	(0.00162)	(0.00218)	(0.00117)
Qualified occupations	0.0119	-0.00681	0.0321**
	(0.00816)	(0.00733)	(0.0121)
House chores	0.0511***	0.0475**	0.0500***
	(0.0140)	(0.0168)	(0.0123)
House chores hours>7	0.00575	-0.00558*	0.0125
	(0.00581)	(0.00274)	(0.0110)
Obs.	26,503	13,372	13,131

Table 3.8. Policy Effect on Labor Market Outcomes of Children Ages 14-17

Note: The sample covers 14 to 17-year-old children from the 2006, 2012, and 2019 CLS. Each cell shows the results of a separate regression where the outcome variable (row) is regressed on the treatment indicator -Higher Compulsory Schooling (HCS)- and the relevant control variables for a specific sample of observations (column). The control variables include age fixed effects, gender, household head's age, household head's employment status, household head's education, household size, number of siblings, household's wage income status, age group-specific linear time trends, and year fixed effects. The standard errors clustered at the birth year level are in parentheses. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

Regarding the impact size, the policy reduces the probability of working longer than 40 hours per week by 19% and 21% for all children and boys, respectively. Being subject to 12-year compulsory schooling reduces the probability of boys working in agriculture and the field/garden by around 13%. The policy also reduces the likelihood of working in basic occupations by 20% (52%) for all children (girls).

Meanwhile, the policy increases the probability of girls working in qualified occupations by 53%, being unpaid family workers by around 28%, and contributing to house chores by 7%. The policy increases the probability of boys engaging in house chores by 10% while reducing their probability of spending long hours in house chores by 8%. Thus, the results reveal that the favorable impact of the policy weighs much more on boys in the 14-17 age group.

Next, consider the 6-13 age group. The policy significantly reduces the probability of children working longer hours (more than 15 and more than 40) per week and working as wage earners. The improvement in wage work is observed for boys, while the probability of working more than 40 hours per week is lower for girls. Being subject to higher compulsory schooling reduces (increases) the probability of boys working in the services (manufacturing) sector. The policy, however, does not have an effect on employment, being an unpaid family worker, and working in the agriculture sector. Higher compulsory schooling also leads to a reduction in the incidence of children working in basic occupations. Meanwhile, the policy increases the probability of boys contributing to house chores while reducing the probability of girls contributing longer hours to house chores.

The policy almost eliminates the employment of girls longer than 40 hours per week and reduces the probability of boys working more than 15 hours by 38%. The policy also effectively reduces the incidence of wage labor, as the probability of all children (boys) being wage workers is down by 44% (49%). The policy almost eliminates the probability of boys working in the services sector but almost doubles their probability of working in the manufacturing sector. Finally, the policy increases

the probability of boys contributing to house chores by 9% and reduces the likelihood of girls contributing longer hours to house chores by 19%.

Outcome \ Sample	**All**	**Boys**	**Girls**
Employed	-0.000141	0.000109	-0.000299
	(0.00214)	(0.00249)	(0.00247)
Hours worked>40	-0.000841*	-0.000448	-0.00122**
	(0.000432)	(0.000525)	(0.000471)
Hours worked>15	-0.00180*	-0.00304***	-0.000581
	(0.000931)	(0.000832)	(0.00156)
Wage earner	-0.00133**	-0.00198*	-0.000743
	(0.000514)	(0.00111)	(0.000610)
Unpaid family worker	0.00140	0.00226	0.000690
	(0.00182)	(0.00205)	(0.00233)
Agriculture	0.000809	0.00207	-0.000455
	(0.00180)	(0.00235)	(0.00209)
Manufacturing	0.00145***	0.00302***	-0.000240
	(0.000371)	(0.000640)	(0.000559)
Services	-0.00240***	-0.00498***	0.000396
	(0.000624)	(0.000893)	(0.000418)
Field/garden	0.000815	0.00165	0.000004
	(0.00191)	(0.00258)	(0.00205)
Regular workplace	-0.000464	-0.00125	0.000424
	(0.000687)	(0.00112)	(0.000550)
No fixed workplace	-0.000276	-0.000499	-0.00008
	(0.000272)	(0.000368)	(0.000340)
Basic occupation (no skills)	0.000127	0.000658	-0.00030
	(0.000945)	(0.00169)	(0.00129)
Qualified occupations	-0.000268	-0.000549	-0.000028
	(0.00168)	(0.00225)	(0.00165)
House chores	0.00911	0.0350**	-0.0159
	(0.0115)	(0.0160)	(0.0124)
House chores hours>7	-0.00802	0.00330	-0.0183**
	(0.00502)	(0.00631)	(0.00871)
Obs.	52,923	27,037	25,886

Table 3.9. Policy Effect on Labor Market Outcomes of Children Ages 6-13

Note: The sample covers 6-13-year-old children from the 2006, 2012, and 2019 CLS. Each cell shows the results of a separate regression where the outcome variable (row) is regressed on the treatment indicator -Higher Compulsory Schooling (HCS)- and the relevant control variables for a specific sample of observations (column). The control variables include age fixed effects, gender, household head's age, household head's employment status, household head's education, household size, number of siblings, household's wage income status, age group-specific linear time trends, and year fixed effects. The standard errors clustered at the birth year level are in parentheses. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

In sum, the higher compulsory schooling policy significantly reduces the probability of working longer hours for 14-17-year-old children -primarily boys-, and the probability of working as a wage earner for children of ages 6-13. The lack of a homogenous decline in the labor market outcomes of all subgroups and all forms of child labor is in line with previous studies. For instance, Dayıoğlu and Kırdar (2022)

find that the 1997 reform reduces the incidence of child employment mostly in rural areas but not in urban areas (except for 12-17-year-old girls); and mainly for those employed as unpaid family workers with limited effect on the probability of being a wage earner (only for those of ages 12-17 living in urban areas). Also, Dinçer and Erten (2015), evaluating the 2012 reform -as done in this chapter-, do not find a robust negative impact of 12-year compulsory schooling on the probability of employment, or unpaid employment, while showing a robust reduction in the probability of participation in paid work and part-time paid work for children of ages 15-18. Erten and Keskin (2019), on the other hand, find that the 2012 reform reduces the probability of total employment, paid employment of males, and unpaid work of females for those ages 15-20.

Regarding the employment sectors, the reduction in the probability of working in the agriculture and services sectors for certain age groups is in line with the findings of Dayıoğlu and Kırdar (2022). While Dayıoğlu and Kırdar (2022) show that the policy reduces the probability of working longer hours for children 7-11-year-olds, this chapter finds that it reduces the probability of working more than 40 hours per week for 14-17-year-olds and 6-13-year-old girls. Dinçer and Erten (2015) do not find a robust reduction in the log of hours worked per week, while Erten and Keskin (2019) show that the policy reduces log hours worked.[14] Similar to Dayıoğlu and Kırdar (2022), this chapter finds spillover effects on younger children who are not the main target of the policy change.

[14] One controversial finding both Dinçer and Erten (2015) and Erten and Keskin (2019) report is that the 12-year compulsory schooling reduces the log wages of those in paid employment. An increase in human capital through higher years of education is expected to increase the wage rate given that the returns on education are shown to be positive in the literature.

Note that, even though Dinçer and Erten (2015) and Erten and Keskin (2019) evaluate the same policy as the current chapter does, the fact that they use the HLS rather than the CLS and that they include those older than 17 as well in their estimation samples complicate a direct comparison of the results. Also, despite using the CLS, a direct comparison with the results of Dayıoğlu and Kırdar (2022) is not quite appropriate as a reform extending the compulsory schooling to middle school, and one that extending it to high school might have different implications on the tradeoff between investing in human capital or earning wage income. For instance, while Dayıoğlu and Kırdar (2022) find that the reduction in the employment of girls is stronger after the extension of the compulsory schooling from 5 to 8 years, this chapter suggests that the extension of compulsory schooling from 8 to 12 years does not affect the overall employment probability of girls.

As discussed in the conceptual framework presented in Chapter II and as summarized in the introduction above, several channels are expected to be at work for the role of compulsory schooling on child labor through the lens of the household decision-making model. Compulsory schooling is expected to reduce child labor if the higher marginal utility of completing compulsory education and parental preferences putting more weight on the child's future welfare outweighs the marginal direct cost of education. In the case of the 2012 reform, the awarding of a diploma only after the 12^{th} grade increases the marginal utility of completing compulsory education compared to studying until any grade lower than that. In addition, the increase in compulsory schooling was also supported by the possibility of studying the additional four years in the distance-learning program -through the open high

school scheme- as an alternative to physically attending the high school.[15] This policy helps households to avoid the direct costs of schooling to a large extent.[16] Therefore, overall, the increase in compulsory schooling is expected to decrease the time of children devoted to economic activity.

Indeed, the results reveal that compulsory schooling reduces labor market involvement of children of ages 14-17 and 6-13 to some extent. One interesting finding is that the policy significantly reduces the probability of 14-17-year-old children working in jobs that require no skills. With the marginal utility of completing the compulsory school now being higher, the marginal utility of wage income generated by jobs requiring no skills is not high enough to compensate for the marginal disutility of the foregone education. This finding aligns with the predictions of the baseline household decision model for allocating the child's time. Instead of working in no-skill jobs, the returns on continuing to school to build up skills are much higher after the policy, so those children are more likely to quit work.

The higher compulsory schooling policy, on the other hand, leads to an increase in several labor market outcomes. First, it increases the probability of 14-17-year-old girls working in jobs that require specific qualifications and that of 6-13-year-old boys working in the manufacturing sector. Also, as seen in Section 3.5, the probability of 14-17-year-old boys from households without wage income to be employed or be

[15] There is no physical attendance requirement in the distance learning scheme for general high schools. Only those attending the distance learning vocational high schools must attend some minimum hours of compulsory face-to-face courses which are mainly provided in the evenings or in the weekends. According to Ministry of National Education National Education Statistics of Formal Education 2019/20, 80.6% (19.4%) the students in distance learning scheme are enrolled in general (vocational) open high school.

[16] In the distance learning scheme, students self-study by themselves, using the freely distributed text books, and they only pay a symbolic registration fee per term, which, for instance, is 50 TL in the spring term of 2021/2022 academic year -around 1.2% of monthly minimum wage at the time of writing.

a wage earner is also higher after the policy change. These findings might point to the role of increased education on the probability of employment in a job requiring qualifications. This result is also in line with what Dayıoğlu and Kırdar (2022) find for boys living in rural areas. Second, the policy also increases the probability of girls (boys) of ages 14-17 (6-13) contributing to house chores and 14-17-year-old girls working as an unpaid family worker. For the older age group, the policy effect increasing the probability that 14-17-year-old girls contribute to house chores and family work might suggest that the policy has adversely affected girls -in favor of boys- as they assume more duties at home production or in the family business.

Despite not being able to significantly reduce the incidence of overall child labor, the policy nonetheless leads to higher school enrollment rates among working children. The policy effects on school enrollment are presented in Table 3.10, where the interaction of the treatment indicator and employment status is also added to the specification (3.1).

Sample:	**All**	**Boys**	**Girls**	**All**	**Boys**	**Girls**
Age group:	**14-17**	**14-17**	**14-17**	**6-13**	**6-13**	**6-13**
HCS	0.0571***	-0.00822*	0.125***	-0.0547*	-0.0595**	-0.0509
	(0.00497)	(0.00457)	(0.00561)	(0.0290)	(0.0278)	(0.0304)
Employed	-0.478***	-0.529***	-0.413***	-0.196***	-0.160***	-0.291***
	(0.0415)	(0.0362)	(0.0557)	(0.0493)	(0.0407)	(0.0835)
HCS*Employed	**0.220****	**0.241*****	**0.234***	**0.130****	**0.124*****	**0.162**
	(0.0786)	**(0.0592)**	**(0.121)**	**(0.0542)**	**(0.0428)**	**(0.0969)**
Observations	26,503	13,372	13,131	52,923	27,037	25,886
R-squared	0.270	0.305	0.252	0.070	0.070	0.078

Table 3.10. Policy Effect on Enrollment of Children

Note: The sample covers children from the 2006, 2012, and 2019 CLS. Each column shows the results of a separate regression where the enrollment status is regressed on the treatment indicator -Higher Compulsory Schooling (HCS)-, the interaction of the treatment indicator with child employment (HCS*Employed), and the relevant control variables, for a specific sample of observations (column). The control variables include age fixed effects, age group-specific year fixed effects, gender, household head's age, household head's employment status, household head's education, household size, number of siblings and household's wage income status. The standard errors are clustered at the birth year level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

The results show that, compared to not-employed children, employed children have benefited more from the increase in compulsory schooling. Employed children of ages 14-17 who are subject to 12-year compulsory schooling have around 22 percentage points higher probability of being enrolled than employed children who are subject to 8-year compulsory schooling -on top of the policy impact on not-employed children. Therefore, the policy manages to keep children longer in education even if they work.

The option to continue with distance education in the high school to fulfill the compulsory schooling requirement introduced by the policy provides an extra incentive for children to continue working without dropping out of school.[17] However, as several studies show, combining work and school already lowers the returns on schooling as the learning outcomes of these children are lower (for instance, Emerson et al., 2017; Zabaleta, 2011; Kassouf et al., 2020). On top of that, if they combine work with distance learning, the students also cannot enjoy the positive complementarities such as learning with peers in the classroom, which might further deteriorate their human capital accumulation, in line with the theoretical framework provided in Chapter II.

3.5. Robustness Checks

This section presents the results of a suite of robustness exercises. The first exercise compares the policy impact separately for children from households with

[17] Unfortunately, the latest CLS does not provide detailed information on whether the children are enrolled at regular high schools or at the distance learning alternative. However, according to Ministry of National Education National Education Statistics of Formal Education 2011/12 and 2019/20, while 19.8% of the students in high school were enrolled at distance learning program in 2011/12, 24.2% of high school students are enrolled at distance learning program in 2019/20.

wage income and children from households without wage income. The households with wage income are those in which at least one adult earns a wage income. Meanwhile, households with no wage income are those whose adult members are employers, self-employed, or unpaid family workers; or those whose all adult members are unemployed/not in the labor force. Despite the lack of detailed information, this group can broadly be classified as those running their own (mostly family) businesses or those who are unemployed/out of the labor force. Several descriptive statistics shed light on the characteristics of these households. For instance, 66.5%, 15.3%, and 26.3% of children working in agriculture, manufacturing, and services sectors come from households with no wage income. Among children living in rural (urban) areas, 60.1% (36.7%) come from households with no wage income.[18] Also, 75.4% of the observations from households with the household head working in the agriculture sector have no wage income. Finally, in 40.0% of the observations from households with no wage income, the household head is unemployed/not in the labor force.

The estimation results for children ages 14-17 are presented in Table 3.11. The findings are mainly in line with the baseline results; therefore, only the differences are highlighted here. In the sample of children from households with wage income, the policy does not reduce boys' employment in agriculture while reducing the probability of girls being employed in agriculture, contrary to the baseline findings. Moreover, the policy increases the probability of working in qualified occupations and contributing to house chores for girls and reduces the probability of working more

[18] The information regarding the area of residence (urban vs. rural) is only available in CLS 2006 and 2012, but not in 2019.

than 40 hours per week for boys only in the sample of households with wage income. In the sample of children from households without wage income, the policy reduces the probability of girls working longer hours, as wage earners, and in the manufacturing sector while increasing their probability of working as unpaid family workers and in the agriculture sector. On the other hand, the policy increases the likelihood of boys working longer hours, as a wage earner and in the manufacturing and services sectors. Therefore, among the families without wage income, the policy has opposite effects on the labor market outcomes of boys and girls, shifting boys' (girls') time more to market work (housework).

For children ages 6-13, estimation results are presented in Table 3.12. In this age group, the policy reduces the incidence of child labor only for boys from households with wage income. Meanwhile, the policy increases the employment probability of boys (girls) from families without (with) wage income. Also, the reduced probability of working longer hours for girls is only significant for children from households without wage income. The policy reduces the probability of being a wage earner only for children from households with wage income. The likelihood of girls working in regular workplaces (no fixed places) is higher (lower) in the sample of children from households with wage income. Overall, the compulsory schooling policy has different effects on labor market outcomes of children from households with or without wage income.[19]

[19] While Dayıoğlu and Kırdar (2022) analyze the heterogeneity based on area of residence (urban vs. rural), such a breakdown is not possible as the area of residence information is not available in CLS 2019. Instead, the chapter carries on an analysis based on the breakdown of households according to whether they are wage earners or not, which provides an alternative dimension for investigation. As several descriptive statistics provided above using the earlier rounds of the CLS reveal, despite, the probability of households living in rural areas having no wage income is higher, these two breakdowns do not overlap perfectly.

	HHs with wage income			HHs without wage income		
Outcome \ Sample	**All**	**Boys**	**Girls**	**All**	**Boys**	**Girls**
Employed	0.00982	-0.00830	0.0334	0.00567	0.00882	0.00297
	(0.0176)	(0.0183)	(0.0189)	(0.00977)	(0.0108)	(0.00947)
Hours worked>40	-0.0196**	-0.0421***	0.00866	-0.00197	0.0150*	-0.0184***
	(0.00755)	(0.00928)	(0.00896)	(0.00402)	(0.00703)	(0.00492)
Hours worked>15	0.00563	-0.0130	0.0297	-0.00438	0.00499	-0.0138
	(0.0181)	(0.0182)	(0.0194)	(0.00842)	(0.0102)	(0.00810)
Wage earner	0.0122	-0.00469	0.0331	-0.00178	0.0174***	-0.0203***
	(0.0182)	(0.0188)	(0.0187)	(0.00333)	(0.00248)	(0.00503)
Unpaid family worker	-0.00154	-0.00176	-0.000205	0.00441	-0.0112	0.0197**
	(0.00305)	(0.00608)	(0.00144)	(0.00689)	(0.00925)	(0.00694)
Agriculture	-0.00512**	-0.00425	-0.00475**	-0.00649	-0.0237*	0.0107*
	(0.00185)	(0.00376)	(0.00159)	(0.00680)	(0.0115)	(0.00579)
Manufacturing	0.00613	-0.00121	0.0151*	0.00771***	0.0206***	-0.00518***
	(0.00808)	(0.0125)	(0.00772)	(0.00202)	(0.00388)	(0.00156)
Services	0.00849	-0.00345	0.0230	0.00155	0.00840**	-0.00487
	(0.0110)	(0.00646)	(0.0180)	(0.00275)	(0.00331)	(0.00431)
Field/garden	-0.00616***	-0.00916**	-0.00157	-0.00488	-0.0199	0.0101
	(0.00197)	(0.00383)	(0.00152)	(0.00693)	(0.0117)	(0.00577)
Regular workplace	0.0119	-0.00421	0.0320	0.00753**	0.0254***	-0.00999
	(0.0175)	(0.0171)	(0.0195)	(0.00331)	(0.00538)	(0.00557)
No fixed workplace	0.000588	0.00130	0	-0.000577	-0.000901	-0.000114
	(0.000976)	(0.00186)	(0)	(0.00125)	(0.00256)	(8.76e-05)
Basic occupation (no skills)	-0.00805*	0.000351	-0.0158***	-0.00478**	-0.00111	-0.00783**
	(0.00374)	(0.00523)	(0.00293)	(0.00192)	(0.00224)	(0.00283)
Qualified occupations	0.0176	-0.00926	0.0492**	0.00755	0.00647	0.00846
	(0.0144)	(0.0136)	(0.0181)	(0.00925)	(0.0111)	(0.00864)
House chores	0.0763***	0.0696**	0.0759***	0.0160*	0.0127	0.0170
	(0.0222)	(0.0225)	(0.0226)	(0.00786)	(0.00843)	(0.0109)
House chores hours >7	0.0150*	-0.00227	0.0280	-0.00334	-0.00918**	-0.00226
	(0.00724)	(0.00351)	(0.0168)	(0.00667)	(0.00413)	(0.00945)
Obs.	15,266	7,911	7,355	11,237	5,461	5,776

Table 3.11. Policy Effect on Labor Market Outcomes of Children Ages 14-17 According to Wage Income Status of Households

Note: The sample covers 14 to 17-year-old children from the 2006, 2012, and 2019 CLS. Each cell shows the results of a separate regression where the outcome variable (row) is regressed on the treatment indicator -Higher Compulsory Schooling (HCS)- and the relevant control variables, for a specific sample of observations (column). The control variables include age fixed effects, gender, household head's age, household head's employment status, household head's education, household size, number of siblings, age group-specific linear time trends, and year fixed effects. The standard errors are clustered at the birth year level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

	HHs with wage income			HHs without wage income		
Outcome \ Sample	**All**	**Boys**	**Girls**	**All**	**Boys**	**Girls**
Employed	-0.000171	-0.00427*	0.00422**	0.00243	0.00829*	-0.00395
	(0.00165)	(0.00218)	(0.00170)	(0.00392)	(0.00454)	(0.00447)
Hours worked>40	-0.000854	-0.000627	-0.00110	-0.000737	-0.000121	-0.00134***
	(0.000542)	(0.000633)	(0.000791)	(0.000465)	(0.000806)	(0.000171)
Hours worked>15	-0.000914	-0.00264***	0.000836	-0.00171	-0.00195	-0.00181
	(0.000787)	(0.000835)	(0.00149)	(0.00145)	(0.00183)	(0.00207)
Wage earner	-0.00142**	-0.00162	-0.00129	-0.00112	-0.00214	-0.000211
	(0.000601)	(0.00127)	(0.000958)	(0.000971)	(0.00183)	(0.000628)
Unpaid family worker	0.00196	-0.00225	0.00652***	0.00318	0.0103**	-0.00431
	(0.00116)	(0.00155)	(0.00144)	(0.00361)	(0.00415)	(0.00419)
Agriculture	0.000512	-0.00307	0.00440**	0.00261	0.00943**	-0.00457
	(0.00140)	(0.00267)	(0.00172)	(0.00339)	(0.00405)	(0.00367)
Manufacturing	0.000778	0.00181*	-0.000353	0.00266***	0.00512***	0.00058
	(0.000523)	(0.00101)	(0.000374)	(0.000816)	(0.00105)	(0.00103)
Services	-0.00146***	-0.00301***	0.000168	-0.00284**	-0.00626***	0.000564
	(0.000469)	(0.000724)	(0.000745)	(0.00103)	(0.00175)	(0.000966)
Field/garden	0.000581	-0.00274	0.00419**	0.00253	0.00802*	-0.00327
	(0.00140)	(0.00273)	(0.00184)	(0.00348)	(0.00430)	(0.00361)
Regular workplace	0.000089	-0.00125	0.00144*	-0.000105	0.000411	-0.000702
	(0.000732)	(0.00132)	(0.000769)	(0.00124)	(0.00215)	(0.000825)
No fixed workplace	-0.000445	-0.000277	-0.000614**	-0.00002	-0.000714	0.000558
	(0.000352)	(0.000603)	(0.000260)	(0.000613)	(0.000983)	(0.000535)
Basic occupation (no skills)	-0.000356	-0.000450	-0.000175	0.00190	0.00343	0.000368
	(0.00116)	(0.00205)	(0.00121)	(0.00145)	(0.00272)	(0.00172)
Qualified occupations	0.000185	-0.00381**	0.00439***	0.000532	0.00486	-0.00432
	(0.000999)	(0.00160)	(0.00106)	(0.00402)	(0.00503)	(0.00374)
House chores	0.0243	0.0350	0.0135	-0.0117	0.0281*	-0.0467***
	(0.0146)	(0.0227)	(0.0146)	(0.0107)	(0.0154)	(0.0143)
House chores hours>7	-0.00816	-0.00908	-0.00621	-0.00511	0.0200**	-0.0269**
	(0.00572)	(0.00577)	(0.00851)	(0.00565)	(0.00888)	(0.0116)
Obs.	30,331	15,566	14,765	22,592	11,471	11,121

Table 3.12. Policy Effect on Labor Market Outcomes of Children Ages 6-13 According to Wage Income Status of Households

Note: The sample covers 6 to 13-year-old children from the 2006, 2012, and 2019 CLS. Each cell shows the results of a separate regression where the outcome variable (row) is regressed on the treatment indicator -Higher Compulsory Schooling (HCS)- and the relevant control variables, for a specific sample of observations (column). The control variables include age fixed effects, gender, household head's age, household head's employment status, household head's education, household size, number of siblings, age group-specific linear time trends, and year fixed effects. The standard errors clustered at the birth year level are in parentheses. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

In the next robustness check, the relative wage income per household member -calculated as the total wage income of the household divided by the household size and adjusted by the mean wage income per household member in the survey year- is also controlled for in the sample of children from households with wage income. The results presented in Table 3.13 reveal that controlling for relative wage income does not alter the results for the sample of children from wage income households, apart from the significant increase in the probability of 14-17-year-old girls working in the manufacturing sector. Controlling for the household head's employment sector does not change the main results, as shown in Table 3.14. Finally, alternative definitions of the cutoff for the treatment indicator also do not alter the main results presented in the baseline specifications.[20]

[20] The results are quantitatively the same if the treatment indicator is changed as (i) taking the value of 1 for those born in and after 1999, or (ii) if the observations with the birth year of 1998 are excluded with the baseline treatment indicator. This can only be checked, however, for the 6-13-year-olds. The policy effect on the 14-17 age group is not identified with these changes in the treatment status, given the presence of year fixed effects in the specifications.

Age group:	14-17			6-13		
Outcome \ Sample	**All**	**Boys**	**Girls**	**All**	**Boys**	**Girls**
Employed	0.00973	-0.00649	0.0323	-0.000194	-0.00447*	0.00424**
	(0.0178)	(0.0186)	(0.0186)	(0.00167)	(0.00221)	(0.00170)
Hours worked>40	-0.0196**	-0.0414***	0.00868	-0.000854	-0.000632	-0.00110
	(0.00755)	(0.00934)	(0.00897)	(0.000541)	(0.000632)	(0.000795)
Hours worked>15	0.00556	-0.0116	0.0289	-0.000917	-0.00269***	0.000821
	(0.0182)	(0.0184)	(0.0191)	(0.000788)	(0.000839)	(0.00149)
Wage earner	0.0121	-0.00344	0.0324	-0.00143**	-0.00166	-0.00128
	(0.0183)	(0.0190)	(0.0184)	(0.000606)	(0.00128)	(0.000958)
Unpaid family worker	-0.00157	-0.00121	-0.000694	0.00194	-0.00240	0.00653***
	(0.00301)	(0.00611)	(0.00145)	(0.00117)	(0.00155)	(0.00144)
Agriculture	-0.00515**	-0.00384	-0.00537***	0.000498	-0.00320	0.00441**
	(0.00181)	(0.00384)	(0.00167)	(0.00141)	(0.00268)	(0.00172)
Manufacturing	0.00612	-0.000810	0.0154*	0.000777	0.00180*	-0.000358
	(0.00810)	(0.0125)	(0.00777)	(0.000524)	(0.00102)	(0.000376)
Services	0.00844	-0.00245	0.0223	-0.00147***	-0.00307***	0.000187
	(0.0111)	(0.00663)	(0.0178)	(0.000473)	(0.000735)	(0.000753)
Field/garden	-0.00619***	-0.00876**	-0.00219	0.000568	-0.00287	0.00420**
	(0.00194)	(0.00392)	(0.00161)	(0.00141)	(0.00273)	(0.00184)
Regular workplace	0.0119	-0.00286	0.0315	8.21e-05	-0.00130	0.00145*
	(0.0176)	(0.0173)	(0.0193)	(0.000731)	(0.00133)	(0.000772)
No fixed workplace	0.000586	0.00135	0	-0.000448	-0.000306	-0.000610**
	(0.000977)	(0.00186)	(0)	(0.000355)	(0.000608)	(0.000261)
Basic occupation (no skills)	-0.00807*	0.000606	-0.0160***	-0.000361	-0.000512	-0.000183
	(0.00376)	(0.00525)	(0.00290)	(0.00117)	(0.00206)	(0.00120)
Qualified occupations	0.0175	-0.00771	0.0483**	0.000168	-0.00396**	0.00442***
	(0.0145)	(0.0139)	(0.0178)	(0.00101)	(0.00161)	(0.00107)
House chores	0.0763***	0.0695**	0.0731***	0.0241	0.0340	0.0147
	(0.0223)	(0.0224)	(0.0227)	(0.0145)	(0.0225)	(0.0146)
House chores hours>7	0.0149*	-0.00186	0.0248	-0.00824	-0.00932	-0.00568
	(0.00723)	(0.00361)	(0.0165)	(0.00575)	(0.00571)	(0.00859)
Obs.	15,266	7,911	7,355	30,331	15,566	14,765

Table 3.13. Policy Effect on Labor Market Outcomes of Children Controlling for Relative Wage Income per Household Member

Note: The sample covers children from the 2006, 2012, and 2019 CLS. Each cell shows the results of a separate regression where the outcome variable (row) is regressed on the treatment indicator -Higher Compulsory Schooling (HCS)- and the relevant control variables, for a specific sample of observations (column). The control variables include age fixed effects, gender, household head's age, household head's sector of employment, household head's education, household size, number of siblings, relative wage income per household member, age group-specific linear time trend, and year fixed effects. The standard errors are clustered at the birth year level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

Age group:	14-17			6-13		
Outcome \ Sample	**All**	**Boys**	**Girls**	**All**	**Boys**	**Girls**
Employed	0.00815	-0.00158	0.0198	-0.000482	-0.000183	-0.000653
	(0.00955)	(0.00986)	(0.0117)	(0.00216)	(0.00261)	(0.00248)
Hours worked>40	-0.0139***	-0.0212***	-0.00494	-0.000874**	-0.000488	-0.00126**
	(0.00367)	(0.00601)	(0.00377)	(0.000417)	(0.000514)	(0.000456)
Hours worked>15	0.00149	-0.00562	0.0105	-0.00191*	-0.00314***	-0.000691
	(0.0102)	(0.00979)	(0.0122)	(0.000923)	(0.000870)	(0.00155)
Wage earner	0.00497	0.00163	0.00898	-0.00135**	-0.00202*	-0.000764
	(0.0117)	(0.0126)	(0.0112)	(0.000513)	(0.00114)	(0.000612)
Unpaid family worker	0.00211	-0.00365	0.00882**	0.00108	0.00201	0.000357
	(0.00250)	(0.00475)	(0.00332)	(0.00185)	(0.00214)	(0.00231)
Agriculture	-0.00382	-0.00805*	0.00180	0.000405	0.00169	-0.000835
	(0.00258)	(0.00408)	(0.00359)	(0.00179)	(0.00254)	(0.00207)
Manufacturing	0.00566	0.00647	0.00521	0.00146***	0.00300***	-0.000229
	(0.00452)	(0.00672)	(0.00391)	(0.000365)	(0.000657)	(0.000552)
Services	0.00479	-0.00195	0.0117	-0.00235***	-0.00487***	0.000412
	(0.00744)	(0.00420)	(0.0116)	(0.000618)	(0.000899)	(0.000419)
Field/garden	-0.00351	-0.00910*	0.00342	0.000421	0.00127	-0.000363
	(0.00263)	(0.00414)	(0.00347)	(0.00188)	(0.00276)	(0.00204)
Regular workplace	0.00838	0.00384	0.0131	-0.000409	-0.00117	0.000450
	(0.0112)	(0.0108)	(0.0120)	(0.000679)	(0.00113)	(0.000561)
No fixed workplace	-0.000358	-0.000325	-0.00004	-0.000270	-0.000493	-0.00007
	(0.000447)	(0.000828)	(0.000024)	(0.000271)	(0.000368)	(0.000338)
Basic occupation (no skills)	-0.00645***	0.000651	-0.0133***	-6.02e-06	0.000538	-0.000451
	(0.00162)	(0.00251)	(0.00105)	(0.000941)	(0.00167)	(0.00135)
Qualified occupations	0.0131	-0.00417	0.0320**	-0.000476	-0.000720	-0.000202
	(0.00842)	(0.00780)	(0.0121)	(0.00170)	(0.00237)	(0.00160)
House chores	0.0509***	0.0461**	0.0498***	0.00944	0.0354**	-0.0155
	(0.0140)	(0.0168)	(0.0122)	(0.0113)	(0.0158)	(0.0124)
House chores hours>7	0.00608	-0.00549*	0.0118	-0.00813	0.00324	-0.0184**
	(0.00579)	(0.00276)	(0.0109)	(0.00499)	(0.00629)	(0.00878)
Obs.	26,503	13,372	13,131	52,923	27,037	25,886

Table 3.14. Policy Effect on Labor Market Outcomes of Children Controlling for Household Head's Sector of Employment

Note: The sample covers children from the 2006, 2012, and 2019 CLS. Each cell shows the results of a separate regression where the outcome variable (row) is regressed on the treatment indicator -HCS- and the relevant control variables, for a specific sample of observations (column). The control variables include age fixed effects, gender, household head's age, household head's sector of employment (base category: those not in employment), household head's education, household size, number of siblings, household's wage income status, age group-specific linear time trend, and year fixed effects. The standard errors are clustered at the birth year level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

3.6. Conclusion

In this chapter, the role of a compulsory schooling policy in reducing child labor is investigated using the reform which increased the years of compulsory schooling from 8 to 12 years in Turkey. From a theoretical perspective, as discussed in Chapter II, compulsory schooling might reduce child labor primarily by increasing the marginal utility of completing compulsory education by awarding the diploma at the end of 12 years and not earlier. It might also increase child labor as the increased direct costs of schooling, which reduces the family income, increases the marginal utility of a child's wage income. However, additional policies that lower the direct cost of schooling can compensate for that effect. These effects, combined with parental preferences regarding the valuation of the child's time in education and labor, determine whether compulsory schooling reduces child labor or not.

The 2012 reform in Turkey increases the marginal utility of completing compulsory school as the diploma awarded after the 8^{th} grade is canceled, and achieving less than the 12^{th} grade entails no diploma. The option to attend a distance learning high school program to fulfill the additional four years of compulsory schooling also reduces the direct cost of education. On the other hand, the option of distance learning provides further incentives to combine school and work. Moreover, since the reform enables children to attend religious vocational schools after the fourth grade. These channels potentially reduce the marginal returns to schooling by reducing incentives to build the capacity to generate higher future income for the child.

The chapter's findings suggest that the increase in the years of compulsory schooling leads to a rise in school enrollment both for boys and girls. The policy

reduces the probability of working longer hours, without significantly reducing the incidence of child labor. The improvement in child labor outcomes mainly comes from a lower probability of working in the agriculture sector (as a wage earner) for children of ages 14-17 (6-13), and from the intensive margin (lower probability of working longer hours). For the older age group, the policy reduces the likelihood of working in a job that requires no skills, and, in some cases reduces the probability of working on streets and in open marketplaces. However, the compulsory schooling policy leads to different outcomes for children depending on whether the household has a wage income or not. Finally, the working children subject to higher compulsory schooling are 22% more likely to enroll at school than working children subject to the old policy.

The reform extends compulsory schooling by an additional four years and comes with the opportunity to attend a distance learning high school program to complete the additional years of compulsory schooling. On the one hand, this option lowers the direct cost of schooling and encourages enrollment. On the other hand, it encourages combining schooling with labor as schooling no longer presents a binding time constraint. This sort of schooling policy, which does not require physical attendance, lowers the efficiency of the policy on reducing child labor, although it increases enrollment. It mainly undermines the ease of monitoring argument that Weiner (1991) puts forward as an advantage of compulsory schooling policy in reducing child labor. Another policy implication is that the option of combining work and school may lower the returns to schooling substantially since no attendance is required if a distance learning program is chosen. This might further impede the accumulation of human capital.

The findings related to basic occupations -jobs that require no skills- suggest that with more years of compulsory schooling, the marginal utility of wage income generated by (or time spent at) jobs that require no skills is not high enough to compensate for the marginal disutility of foregone education. These findings are in line with the predictions of the baseline household model for allocating the child's time.

The chapter contributes to the literature that evaluates the effect of compulsory schooling policy on child labor. First, the chapter expands on the findings of the earlier studies in Turkey by evaluating the policy extending the compulsory schooling to high school, considering 6-17-year-old children. The chapter also contributes to the literature showing that policies combining compulsory school with others that lower direct costs of schooling are more effective from another angle. These policies reducing the direct cost of schooling should not discourage physical attendance to school to fully benefit from compulsory schooling to reduce child labor.

Overall, this chapter suggests that compulsory schooling helps reduce child labor to some extent but does not eliminate it. Compulsory schooling should be enhanced by policies that support household income, as discussed in Chapter IV, and by policies that address the structural issues that lower the effectiveness of compulsory schooling policy, as discussed in Chapter V of the thesis.

CHAPTER IV

HOUSEHOLD INCOME AND CHILD LABOR: EFFECTS OF MINIMUM WAGE INCREASE

4.1. Introduction

Household income is an essential determinant of child work. The framework presented in Chapter II sets up the mechanisms through which poverty and income can affect child labor. In principle, low household income influences how the family values the child's time in leisure, home production, or the labor market. Moreover, how parents value the child's future welfare and the marginal utility of family income may also influence the time allocation of the child's activities.

Theoretically, one might expect a negative association between household income and child work. The luxury axiom of Basu and Van (1998), stating that only if the household income is below a certain subsistence level will the family send the child to work, reflects itself in the conceptual framework in the form of positive utility attached to the child's leisure time by the family. Also, the additional value of the income generated by the child decreases as the family income is higher due to diminishing marginal returns to family income. Furthermore, higher family income might reduce the productivity of children in housework as the family can afford to buy substitutes for child labor, thus weakening the need for child labor. Meanwhile, high family income may also increase the productivity of children in human capital-building activities as the parents can devote more resources to necessary inputs.

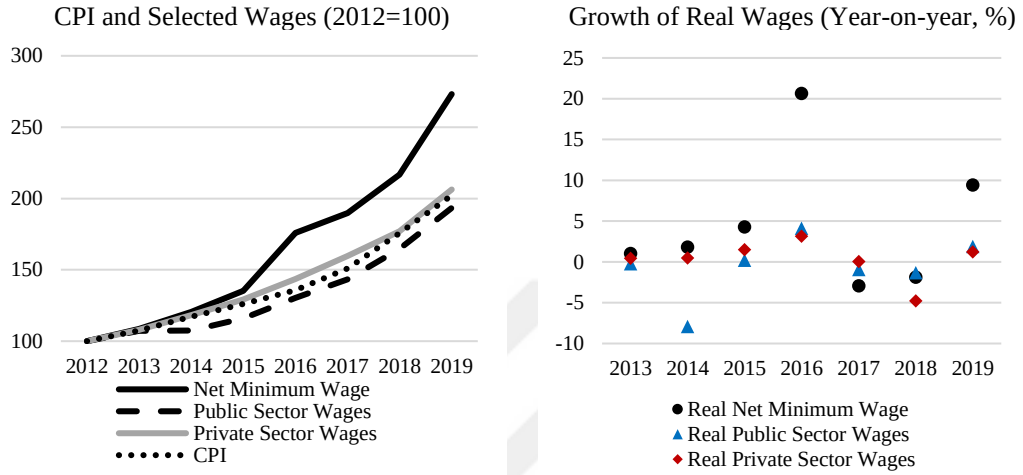
Minimum wage policies, which are partly set to alleviate poverty by increasing household income, might also be a panacea for child labor. However, the impact of the minimum wage on the prevalence of child labor is not theoretically clear, as demonstrated by Basu (2000). In addition, the inconclusive empirical evidence on the link between family income and child labor suggests that the impact should be evaluated separately within each country's context. Studies on the effect of minimum wages on child labor are also scarce, with the recent exemption of Menon and van der Meulen Rodgers (2018) for India.

Turkey explicitly provides an ideal setting to investigate the effects of minimum wage increases. First, the minimum wage is an essential indicator in the labor market since a high proportion of the wage earners receive the minimum wage or a wage close to it. Second, the minimum wage increases in Turkey have surpassed the growth rate of other wages over the last decade, with specific hikes in certain years (Figure 4.1). Such surprisingly high increases in net minimum wage took place in 2016 (30%) and 2019 (26%). With these increases, in real terms (CPI-adjusted), from 2012 to 2019 net minimum wage increased by 35.1%, meanwhile, the public sector wage index has declined by 4.4%, and private sector wages stagnated (up by only about 2%)[21]. Thus, the minimum wage earners have secured sizable real wage increases than other wage earners in the economy. This is not surprising as these substantial minimum wage hikes occurred not based on increasing productivity gains or restoring the diminished purchasing power but primarily based on political

[21] The minimum wage data is published by the Ministry of Labor and Social Security. The public sector wage index is the monthly wage coefficient used in wage calculations by the Ministry of Treasury and Finance. There is no official data on the private sector wages. The increase in private wages are proxied by the annual wage increases provided in the surveys conducted by PERYÖN - People Management Association of Turkey.

incentives and promises offered at the years of elections (general elections in 2015 and the municipal elections in 2019). In that sense, the minimum wage hikes over this period can also be considered exogenous to some extent.

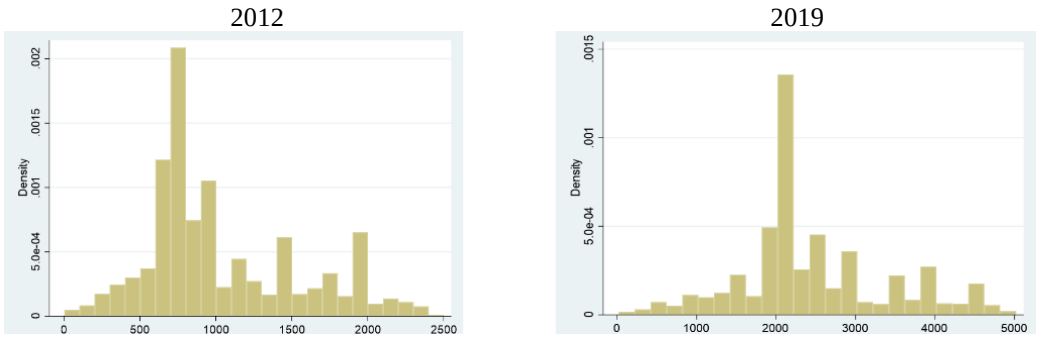
Figure 4.1. Selected Wages, CPI, and Growth of Real Wages



Note: The net minimum wage is the net amount (out of taxes) paid to the employee, available from the Ministry of Labor and Social Security. The public sector wage indicator is the monthly wage coefficient used in wage calculations announced by the Ministry of Treasury and Finance. The private sector wage index is calculated by using the wage increases from the surveys conducted by PERYÖN - People Management Association of Turkey. The Consumer Price Index (CPI) is from TURKSTAT. All real wage indicators are calculated by dividing the nominal figures by year-average CPI.

The relative gains of minimum wage earners are also evident from the wage distribution, given the rightwards shift observed in the position of minimum wage earners. The minimum wage, which stood at the 32nd percentile of the wage distribution in 2012, moved up to the 41st in 2019 (Figure 4.2). In other words, more than 40% of the wage earners receive the minimum wage or lower. The diffusion of the minimum wage is even higher if the immediate observations to the right of the minimum in the wage distribution are considered. Overall, the wide presence and the sizeable real increase of the minimum wage and the quasi-exogenous nature of the rise render the evaluation of the effects of minimum wage in Turkey as close as to an assessment of an economy-wide real income shock.

Figure 4.2. The Distribution of Adult Wages



Note: The first 90th percentile of observations is plotted. The net minimum wage was 740 TL in the second half of 2012 and 2020 TL in 2019.
Source: TURKSTAT HLS 2012, 2019.

In this context, few studies have investigated the effect of minimum wages on young adults in Turkey, but not directly on children. For instance, Bakis et al. (2015) examine the impact of the minimum wage increase in 2004 on the labor market outcomes of 15–19-year-olds; Dayioglu-Tayfur et al. (2020) analyze the effect of the abolishment of a lower minimum wage on those younger than 18 on the employment of 15-16-year-old boys; Gürcihan-Yüncüler and Yüncüler (2016) investigate the effect of the minimum wage increase on the employment probability of 15-24-year-olds. In those studies, however, the minimum wage effect is mainly induced by the labor supply decision of young adults rather than an increase in the family income of minimum wage-earning parents.

By comparing the observations from the 2012 and 2019 vintages of the Child Labor Survey (CLS) and distinguishing the children from minimum wage-earning families as the treatment group, this chapter aims to analyze the impact of minimum wage increases on various labor market outcomes of the children. With this approach, the chapter has several contributions to the existing empirical literature. First, it extends the evidence on Turkey by focusing not only on young adults but also

considering children aged between 5 and 17 and by relying on the latest two rounds of the CLS, with additional information, including the total wage income of the household. Second, the chapter contributes to the scarce international literature on the causal effects of minimum wage policies on the incidence of child labor. Finally, despite evaluating a variation in the minimum wage, this chapter, in its essence, provides evidence of the favorable impact of parental income in reducing the incidence of child labor, which constitutes an addition to the literature on country-specific evaluations of the role of household income in determining child labor.

4.1.a. Selected Literature

In their seminal work, Basu and Van (1998) establish a theoretical framework linking child labor to family income and make a case for the role of interventionist policies such as banning child labor. The two pillars of the analysis are the luxury and the substitution axioms. The luxury axiom states that a child is only sent to work if the household income generated by the adults falls short of a threshold. On the other hand, the substitution axiom refers to the substitutability of adult and child labor. The model produces multiple equilibria either with the child working or not, in a simple labor supply and demand setting. When child labor is banned, the labor supply curve shifts to the left, increasing market wages; thus, the parents do not need to send their children to work.

Basu (2000), on the other hand, explicitly investigates the effect of a rise in the minimum wage on child labor. The model leads to multiple equilibria where the incidence of child labor can either increase or decrease in response to a rise in the adult minimum wage. Suppose the adult minimum wage is set above a threshold, and

adult and child labor are not perfectly substitutable. In that case, it is possible to achieve a good equilibrium where no child works. Dessing (2004) also presents a model of household labor supply -characterized by negative labor supply response at low wages. In the model, an increase in the minimum wage increases the earnings of the household head such that secondary workers -the spouse or the children- do not need to supply labor.

While the empirical literature on the effects of minimum wages on adult labor market outcomes is abundant, studies on its impact on child labor are quite limited. Menon and van der Meulen Rodgers (2018) examine how the minimum wage affects child labor in India. Combining cross-sectional survey data on employment with state-level minimum wage rates and focusing on children aged 10-14 over the 1983-2003 period, they find that a higher minimum wage reduces children's (girls') probability of participating in household work in urban (rural) areas. In their setting, the employment within the household includes own account work, unpaid family work, and house chores. Therefore it is not possible to distinguish whether unpaid family work or house chores drive the results. Meanwhile, the minimum wage does not affect the probability of children working outside of the home in urban and rural areas.

Several empirical studies focusing on the effect of minimum wages on labor market outcomes in Turkey present findings for elderly children. Among those, Bakis et al. (2015) investigate the impact of the minimum wage increase in 2004 on the labor market and education outcomes of young adults -aged from 15 to 19- using the Household Budget Surveys and relying on a difference-in-differences framework. The regional variation in the share of minimum wage earners in all wage employees

is classified into low- and high-impact regions, constituting the control and treatment groups. Bakis et al. (2015) show that the minimum wage increase reduces young adults' labor supply. In their framework, the minimum wage effect is mainly induced by the labor supply decision of young adults rather than an increase in the family income of minimum wage-earning parents.

Dayioglu-Tayfur et al. (2020), on the other hand, analyze the effect of the abolishment of a lower minimum wage for those aged between 15 and 16 on the employment of young males in Turkey. Employing a regression discontinuity framework and comparing the outcomes of 15- and 16-year-olds, the authors find that removing age-specific minimum wage reduces youth employment and labor force participation; increases unemployment and the probability of being neither in employment nor in education. Investigating the impact of an exogenous increase in the wage rate of young adults, the focus of that study is not on the change in family income induced by a rise in the minimum wage. Gürcihan-Yüncüler and Yüncüler (2016) study the wage and hours worked response of young workers (15-24) as well in response to the minimum wage increase -despite covering the entire workforce- by using the Household Labor Surveys in 2003-2004. They find that the minimum wage increase does not significantly impact youth employment.

In the spirit of this chapter, but without a causal investigation, Dayıoğlu (2006) investigates the link between household income and child labor in Turkey. Using the 1994 Household Income Distribution Survey and focusing on 12-17 aged children living in urban areas, Dayıoğlu finds that higher household income -either wage-earnings or non-wage income- is associated with a lower probability of a child working.

4.2. Methodology and Identification Strategy

Low household income and poverty are important drivers of child labor, as depicted in the theoretical model of Basu and Van (1998) in the form of the luxury axiom. Accordingly, an equilibrium with child working is possible if the family income is below a certain threshold. This claim implies that if family income increases, one might expect a reduction in the incidence of child labor, bringing increases in the minimum wage to the table as a potential policy device to fight child labor.

In this framework, the minimum wage increases observed in Turkey provide an exciting setting to investigate their effect on child labor. As presented in the introduction section, sizable hikes in the minimum wage in Turkey (30% in 2016 and 26.1% in 2019, in nominal terms) have led to a 35.1% real increase in the net minimum wage (CPI-adjusted) from 2012 to 2019. Meanwhile, the private sector wages stagnated, and public sector wages declined in real terms over the same period. Therefore, minimum wage earners have secured real returns compared to the rest of the economy. Against this background, one may expect the incidence of child labor in minimum wage-earning families to be lower in 2019 than in 2012. This chapter relies on the difference-in-differences methodology using individual child-level data to evaluate the causal impact. The logic behind a difference-in-differences specification is to compare the treatment and control groups before and after a policy change. Here, the treatment group is the children from households where the average wage income per adult worker is equal to the minimum wage (Minimum Wage Family-MWF), thus subject to substantial real wage increase. Meanwhile, the control

group is the children from all other households. Children from CLS 2012 (CLS 2019) constitute the before (after) treatment observations.

The difference-in-differences specification is as follows:

$$Y_{i,t} = \beta_0 + \beta_1 Y\_2019_t + \beta_2 MWF_i + \beta_3 Y\_2019 * MWF_{i,t} + X'_{i.t}\theta + \varepsilon_{i,t} \quad (4.1)$$

where $Y_{i,t}$ is the labor market outcome of the child *i* at time *t.* Y_2019 takes the value of 1 (0) if the year is 2019 (2012) and thus denotes the period after (before) the treatment. The *MWF* indicates the treatment status and measures whether the child belongs to a minimum wage-earning family (1) or not (0). $X_{i.t}$ is a vector of the child or household-related control variables including child's age, gender, enrollment status, subject to higher compulsory schooling, mother's and father's age, a dummy variable indicating whether the household head works, household head's education, and age group fixed effects. Here, child and household-related control variables are primarily assumed to capture the factors related to the child labor supply. On the other hand, the year fixed effects in the specification capture all the aspects common to all the observations in a particular year, including the factors related to the demand for child labor. The standard errors are clustered at birth year level.

The β_1 coefficient measures the change in the outcome from 2012 to 2019 for the non-MWF children. On the other hand, β_2 measures the difference between the outcomes of children from MWF and non-MWF in 2012, before the treatment. The coefficient of the interaction term, β_3, is the main coefficient of interest, and it measures the difference between the changes in MWF and non-MWF groups before and after the treatment.

The difference-in-differences are evaluated as a Probit model as the outcome variables are all binary response indicators.[22] In the linear case, the coefficient of the interaction term, β_3, would directly give the estimated treatment effect. However, in the non-linear Probit case, that parameter is not directly the treatment effect. Focusing on non-linear difference-in-differences models, Puhani (2012, p.87) demonstrates that the treatment effect –is "a difference of two cross-differences: the cross difference of the conditional expectation of the observed outcome minus the cross difference of the conditional expectation of the potential outcome without treatment"- conditional on control variables can be derived as:

$$Treatment = \Phi(\beta_0 + \beta_1 + \beta_2 + \beta_3 + X'_{i.t}\theta) - \Phi(\beta_0 + \beta_1 + \beta_2 + X'_{i.t}\theta) \quad (4.2)$$

where Φ is the cumulative standard normal distribution. Thus, Puhani (2012) nonetheless shows that the statistical significance of β_3 still points to a significant treatment effect, and as the cumulative normal distribution function is monotonic, the sign of β_3 is also the sign of the treatment effect. To properly test the statistical significance of the interaction term in this nonlinear model, the standard errors are calculated by bootstrapping with 1000 replications. The standard errors are also clustered at birth year level.

[22] One might model this with a Linear Probability Model as well. However, LPM has two major shortcomings compared to non-linear binary response models. First, the standard errors are heteroskedastic, given the nature of the binary response. Second, the predicted values from the LPM do not necessarily lie on the unit interval. Using heteroskedasticity-robust standard errors is a remedy for the first concern. The second concern is more serious as it may lead to LPM producing biased and inconsistent estimates. In this respect, Horrace and Oaxaca (2006) demonstrate that this potential bias increases with the share of predicted probabilities remaining outside the unit interval. In this chapter, once the specifications are estimated with the LPM, around one third of the predicted probabilities lie outside the unit interval. Thus, the non-linear specification is preferred, and the difference-in-differences is modeled as a Probit.

4.3. Data

The primary data comes from the latest two rounds (2012, 2019) of the Child Labor Force Survey (CLS) conducted by the Turkish Statistical Institute (TURKSTAT), which is a nationally representative survey specifically designed to monitor the education and work status of the children aged 5-17 (6-17 in the 2012 round). The CLS is applied in tandem with the Household Labor Survey, and all the children in representatively selected households are included in the survey. The survey is conducted in the final quarter of the vintage year. The survey consists of very detailed questions on the work and education status of the children. On the work front, employment status, the type of work (paid, unpaid family), time spent at work, the conditions at the workplace (whether it is a hazardous job, whether the child is maltreated at work, etc.), and the sector of employment are among the information available in the survey. CLS also includes detailed information on house chores to which the child contributes. Finally, detailed questions on schooling are available, including the level completed, whether still studying, the type of school attended, and reasons for never-been to school and for dropping out. The survey includes 27118 and 25190 observations in the 2012 and 2019 rounds. Therefore, the survey is the most comprehensive source to investigate the education, work, and contribution to house chores status of children in Turkey.

The main question of this chapter is whether minimum wage increases reduce child labor. Thus, additional data, which are not present in the standard microdata of CLS and not used in earlier studies, are obtained courtesy of TURKSTAT. These variables include the age of the child, the mother, the father, and the household head; total wage income of the household; whether the household head is employed; the

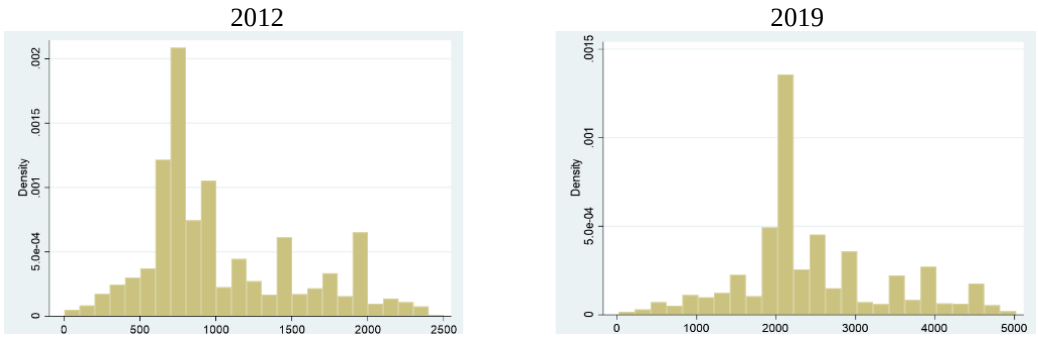
sector of employment of the household head in case employed; and the total number of employed people in the household.

The treatment indicator of whether a child belongs to a minimum wage family is generated by using the available information. Minimum Wage Family (MWF) refers to *"households where the average wage income per adult worker is equal to the minimum wage"*. The "total wage income of the household" data from TURKSTAT includes the wage earnings of all the adults and children aged 15-17 in the household. Thus, the total wage income of the children aged 15-17 is deducted from this sum at the next step. Here, it should be noted that, since the income earned by children are available as income brackets in the CLS, the midpoints of the brackets are used to approximate the wage income generated by 15-17-year-olds. Next, the calculated wage income earned by adults in the household is divided by the number of working adults to generate the *"average wage income per adult worker"*.[23] Finally, the treatment indicator, MWF, takes the value of 1 if the child is from a household where the average wage income per working adult is equal to the minimum wage (plus or minus 5% to account for rounding in the responses), and 0 otherwise.[24] The distribution of the wage income per adult worker calculated from the CLS also resembles the wage distribution observed in the HLS shown before.

[23] The only data available regarding the adult wage income is the total wage income of the household. Therefore, it is not possible to identify the exact wage income of the adults in the household. This is the reason behind the choice of the approximation used in the study.

[24] For instance, in the 2012 HLS, several respondents declare 750 TL, when the minimum wage is 740 TL; or in the 2019 HLS, several respondents declare 2000 TL, when the minimum wage is 2020 TL. Moreover, the calculation of the average wage income per working adult also justifies the description of a range.

Figure 4.3. The Distribution of Wage Income per Adult Worker



Note: The first 90th percentile of observations are plotted. The net minimum wage is 740 TL in the second half of 2012 and 2020 TL in 2019.
Source: TURKSTAT CLS 2012, 2019, author's calculations.

The labor market outcomes investigated are represented by the following dummy variables: Employed, works more than 40 hours per week, wage earner, unpaid family worker, employed in agriculture, employed in manufacturing, employed in the services sector, and the reason to work is to contribute to family income or to help to the family business. In each case, the variable takes the value of 1 if the child is in that category and 0 otherwise. The reference brackets in the survey for the time spent at work are used to determine those working longer than 40 hours per week. For the reason to work variable, "to contribute to family income" and "to help the family business" answers to the question of reason to work are aggregated.

The specifications include the following child or household-related control variables: child's age, gender, enrollment status, subject to higher compulsory schooling, mother's and father's age, household head's employment status, household head's education, and age group fixed effects. The household head's employment status is a dummy variable taking the value of 1 if the household head works. Household head's education takes the values of 1, 2, 3, and 4 for "Illiterate", "Less than high school", "High school" and "Above high school", respectively. Higher compulsory schooling refers to whether the child is subject to mandatory 12-

year education, those who were born in or after 1998. The age groups capture 5(6)-11, 12-14, and 15-17 in the surveys.

Several subsamples are considered in the analysis due to the potential heterogeneity of the treatment effect across gender and different age groups. These samples include All observations; Children aged 15-17; Children aged 5-14; Boys; Girls; Boys aged 15-17; Boys aged 5-14; Girls aged 15-17; Girls aged 5-14. The treatment group is the children from MWF (households where the average wage income per adult worker equals the minimum wage). The main control group is the children from all other households, i.e., those with average wage income other than the minimum wage, or those with no wage income reported. Also, the children from the households in the top 5% of the average adult wage income distribution are omitted.

For robustness checks, additional analyses are performed. First, the control group is alternated with the children from wage-earning families other than the minimum wage and the children from no-wage-income households. Second, according to the luxury axiom, a family does not send the child to work if the household income is high enough. The household income is also positively correlated with the number of adult wage earners in the family. Thus, additional regressions are run on an alternative sample to check whether the treatment effect is valid for households with only one employed adult. Third, the sector in which the household head works is also controlled, rather than a binary indicator of whether the household head works. In the fourth analysis, children aged 5, sampled in CLS 2019 but not in CLS 2012, are omitted from the samples of all children and children aged less than 15. In a final robustness check, the enrollment status of the child, which could

potentially be a joint decision with employment, is omitted from the list of control variables to check whether its omission biases the results.[25]

The descriptive statistics of the main variables are given in Table 4.1, Table 4.2, and Table 4.3 for different samples of observations. All the statistics are aggregated by the survey sample weights. The overall incidence of child labor is 5.1% over the sample period. The incidence of child labor is 1.8% among children younger than 15 years old and 15.6% among those 15 and above. While 6.9% of boys work, only 3.2% of girls work. Among working children, 57% are wage earners, and 42% are unpaid family workers. Regarding the sectors, 2.0%, 1.9%, and 1.2% of the children work in the agriculture, services, and manufacturing sectors, respectively. Around two-thirds of working children below 15 are employed in agriculture.

For the working children, the probability of being a wage earner is relatively higher for boys and those aged 15-17; being an unpaid family worker is relatively higher for girls and children younger than 15. Around 10% of the children come from minimum-wage families. For three-fourths of the observations, the household head works, while this figure stands at 84.5% for households with one employed adult.

Regarding the treatment status, 2.9% (5.3%) of children in the treatment (control) group are employed, and the mean values of the control variables are similar across both groups.[26]

[25] Being enrolled or being employed are not mutually exclusive statuses for children in Turkey. As it is discussed in Chapter III of this thesis, after the introduction of 12-year compulsory schooling, the high school enrollment rate increased even for the children who are employed.
[26] The descriptive statistics comparing 2012 and 2019 for children of ages 6-17 is available in Chapter III, Table 3.5.

Variable/Sample:	All					Boys					Girls				
	Obs.	**Mean**	**St. dev.**	**Min**	**Max**	**Obs.**	**Mean**	**St. dev.**	**Min**	**Max**	**Obs.**	**Mean**	**St. dev.**	**Min**	**Max**
Outcome															
Employed	52308	0.051	0.220	0	1	26632	0.069	0.254	0	1	25676	0.032	0.175	0	1
Hours worked>40	52308	0.022	0.148	0	1	26632	0.034	0.181	0	1	25676	0.010	0.101	0	1
Wage earner	52308	0.029	0.168	0	1	26632	0.041	0.199	0	1	25676	0.016	0.127	0	1
Unpaid family worker	52308	0.021	0.144	0	1	26632	0.027	0.162	0	1	25676	0.015	0.123	0	1
Agriculture	52308	0.020	0.138	0	1	26632	0.023	0.151	0	1	25676	0.016	0.124	0	1
Manufacturing	52308	0.012	0.110	0	1	26632	0.019	0.137	0	1	25676	0.005	0.071	0	1
Services	52308	0.019	0.137	0	1	26632	0.027	0.161	0	1	25676	0.011	0.105	0	1
Reason to work: Contribute/Help	52308	0.033	0.179	0	1	26632	0.045	0.207	0	1	25676	0.021	0.143	0	1
Control variable:															
Age	52308	11.206	3.614	5	17	26632	11.213	3.621	5	17	25676	11.199	3.606	5	17
Gender (Female)	52308	0.488	0.500	0	1	26632	0.000	0.000	0	0	25676	1.000	0.000	1	1
Minimum Wage Family	52308	0.098	0.297	0	1	26632	0.097	0.296	0	1	25676	0.099	0.299	0	1
Household head works	52308	0.752	0.432	0	1	26632	0.751	0.432	0	1	25676	0.753	0.431	0	1
Household head's education	49888	2.361	0.766	1	4	25469	2.365	0.768	1	4	24419	2.356	0.763	1	4
Mother’s age	51015	38.316	6.942	18	89	26004	38.318	7.044	18	89	25011	38.314	6.834	18	89
Father's age	47352	42.173	7.099	20	85	24232	42.169	7.125	20	85	23120	42.178	7.071	21	85
Enrolled	52308	0.889	0.314	0	1	26632	0.891	0.312	0	1	25676	0.887	0.317	0	1
Higher compulsory schooling	52308	0.878	0.327	0	1	26632	0.878	0.327	0	1	25676	0.879	0.327	0	1

Table 4.1. Descriptive Statistics for All Sample and by Gender

Note: The sample covers all observations, all boys, and all girls from CLS 2012 and 2019, respectively. The descriptive statistics are weighted by sample weights. Reason to work variable consists of contributing to family income and helping the family business. Minimum wage family refers to whether a child belongs to a family where the average wage per adult worker is at the minimum wage level, as described in the data section. Household head’s education takes the values of 1, 2, 3, and 4 for “Illiterate”, “Less than high school”, “High school” and “Above high school”, respectively. Higher compulsory schooling refers to whether the child is subject to 12-year compulsory schooling.

Variable/Sample:	Age<15					Age>=15					Single-Adult-Worker Households				
	Obs.	**Mean**	**St. dev.**	**Min**	**Max**	**Obs.**	**Mean**	**St. dev.**	**Min**	**Max**	**Obs.**	**Mean**	**St. dev.**	**Min**	**Max**
Outcome															
Employed	39396	0.018	0.133	0	1	12912	0.156	0.363	0	1	26912	0.032	0.177	0	1
Hours worked>40	39396	0.004	0.060	0	1	12912	0.083	0.276	0	1	26912	0.017	0.130	0	1
Wage earner	39396	0.004	0.066	0	1	12912	0.109	0.312	0	1	26912	0.025	0.155	0	1
Unpaid family worker	39396	0.014	0.116	0	1	12912	0.046	0.208	0	1	26912	0.007	0.084	0	1
Agriculture	39396	0.012	0.110	0	1	12912	0.043	0.204	0	1	26912	0.006	0.075	0	1
Manufacturing	39396	0.002	0.048	0	1	12912	0.044	0.205	0	1	26912	0.010	0.098	0	1
Services	39396	0.004	0.060	0	1	12912	0.069	0.253	0	1	26912	0.017	0.129	0	1
Reason to work: Contribute/Help	39396	0.015	0.120	0	1	12912	0.093	0.290	0	1	26912	0.017	0.130	0	1
Control variable:															
Age	39396	9.719	2.751	5	14	12912	15.997	0.815	15	17	26912	10.887	3.590	5	17
Gender (Female)	39396	0.489	0.500	0	1	12912	0.486	0.500	0	1	26912	0.486	0.500	0	1
Minimum Wage Family	39396	0.100	0.301	0	1	12912	0.091	0.287	0	1	26912	0.141	0.348	0	1
Household head works	39396	0.762	0.426	0	1	12912	0.719	0.449	0	1	26912	0.845	0.362	0	1
Household head's education	37683	2.390	0.777	1	4	12205	2.267	0.721	1	4	26033	2.421	0.769	1	4
Mother’s age	38602	36.990	6.558	18	89	12413	42.667	6.365	18	89	26327	37.186	6.478	19	89
Father's age	35980	40.883	6.754	20	85	11372	46.469	6.503	28	85	25027	40.995	6.532	22	80
Enrolled	39396	0.922	0.268	0	1	12912	0.782	0.413	0	1	26912	0.900	0.300	0	1
Higher compulsory schooling	39396	1.000	0.000	1	1	12912	0.486	0.500	0	1	26912	0.888	0.315	0	1

Table 4.2. Descriptive Statistics by Age and for Children from Single-Adult-Worker Households

Note: The sample covers all children aged less than 15, all children aged >=15, and all children from single adult working households from CLS 2012 and 2019. The descriptive statistics are weighted by sample weights. Reason to work variable consists of contributing to family income and helping the family business. Minimum wage family refers to whether a child belongs to a family where the average wage per adult worker is at the minimum wage level, as described in the data section. Household head’s education takes the values 1, 2, 3, and 4 for “Illiterate”, “Less than high school”, “High school” and “Above high school”, respectively. Higher compulsory schooling refers to whether the child is subject to 12-year compulsory schooling.

Variable/Sample:	Treatment					Control				
	Obs.	**Mean**	**St. dev.**	**Min**	**Max**	**Obs.**	**Mean**	**St. dev.**	**Min**	**Max**
Outcome										
Employed	4875	0.029	0.168	0	1	47433	0.053	0.224	0	1
Hours worked>40	4875	0.013	0.113	0	1	47433	0.023	0.151	0	1
Wage earner	4875	0.026	0.159	0	1	47433	0.030	0.169	0	1
Unpaid family worker	4875	0.003	0.057	0	1	47433	0.023	0.151	0	1
Agriculture	4875	0.002	0.048	0	1	47433	0.021	0.145	0	1
Manufacturing	4875	0.010	0.098	0	1	47433	0.013	0.111	0	1
Services	4875	0.017	0.130	0	1	47433	0.019	0.138	0	1
Reason to work: Contribute/Help	4875	0.010	0.098	0	1	47433	0.036	0.186	0	1
Control variable:										
Age	4875	11.032	3.610	5	17	47433	11.225	3.614	5	17
Gender (Female)	4875	0.494	0.500	0	1	47433	0.488	0.500	0	1
Minimum Wage Family	4875	1.000	0.000	1	1	47433	0.000	0.000	0	0
Household head works	4875	0.789	0.408	0	1	47433	0.748	0.434	0	1
Household head's education	4658	2.196	0.569	1	4	45230	2.379	0.782	1	4
Mother’s age	4781	37.803	6.904	20	68	46234	38.372	6.944	18	89
Father's age	4498	41.482	6.858	23	77	42854	42.250	7.121	20	85
Enrolled	4875	0.897	0.305	0	1	47433	0.888	0.315	0	1
Higher compulsory schooling	4875	0.924	0.265	0	1	47433	0.873	0.333	0	1

Table 4.3. Descriptive Statistics by Treatment Status

Note: The sample covers all children in the treatment and control groups, from CLS 2012 and 2019. The descriptive statistics are weighted by sample weights. Reason to work variable consists of contributing to family income and helping the family business. Minimum wage family refers to whether a child belongs to a family where the average wage per adult worker is at the minimum wage level, as described in the data section. Household head’s education takes the values 1, 2, 3, and 4 for “Illiterate”, “Less than high school”, “High school”, and “Above high school”, respectively. Higher compulsory schooling refers to whether the child is subject to 12-year compulsory schooling.

There is a reduction in child labor incidence from 2012 to 2019. For those aged 6-17, the working children's share decreased from 5.9% to 4.7%. The probability of a child working is also linked with household income. 10.5%, 2.9%, and 2.8% of the children from families with the average adult wage lower than, equal to, or higher than the minimum wage, respectively, are employed. 4.7% of the children from families with no wage income also work.[27]

4.4. Results

The results of the minimum wage increase on labor market outcomes of children are presented in Table 4.4 and Table 4.5. The policy impact on employment, working longer hours, wage earner, and the unpaid family worker are shown in Table 4.4. In contrast, the impact on working in a specific sector and the reason to work are given in Table 4.5. The labor market outcomes are listed on the rows of the tables. Each cell reports the coefficient of the interaction term, β_3 in the specification (4.1), estimated for the outcome variable (row) and on the sample (column); the sample mean value of the outcome variable, and the estimated marginal effect in case the coefficient is statistically significant. Column (1) presents the policy effect for the sample of all observations. Impacts for children younger than 15 are given in column (2), and column (3) presents the results for children aged 15 or above. Columns (4)-(6) show the effects for all boys, boys younger than 15 and 15-17-year-old boys. Similarly, columns (7)-(9) present the results for all girls, girls younger than 15 and 15-17-year-old girls, respectively.

[27] The families with no wage income are those whose adult members are employers, self-employed or unpaid family workers, or those with all adult members are unemployed or out of labor force, as discussed in Chapter III.

On the employment front, despite having a negative coefficient, the minimum wage increase does not significantly impact child labor in the whole sample. However, the minimum wage increase significantly reduces the probability of children under 15 being employed. Given the calculated treatment effect of -0.0022 and the mean child labor incidence of 0.018, the minimum wage increase leads to a decline in the incidence of work among children younger than 15 by 12%. Considering gender and age group breakdowns reveals that the effect is driven by girls younger than 15, where the improvement in child labor incidence is as much as 24%. Thus, in the extensive margin, the minimum wage increase has heterogeneous effects on the children as only the employment of younger girls is significantly reduced in the context of Turkey. The presence of heterogeneous effects is in line with the previous findings of the literature, where mixed results are reported on the impact of parental income on child labor, as discussed in Chapter II.

Next, the effect of the minimum wage increase on the probability of children working long hours (more than 40 hours per week) is analyzed. The impact is statistically significant for all children, 15-17-year-old children and 15-17-year-old boys. The effect is more substantial for 15-17-year-olds, where the minimum wage increase reduces their probability of working longer hours by 14%, and 17% specifically for 15-17-year-old boys. Given that 12.6% of 15-17-year-old boys work more than 40 hours per week, this is a sizable reduction. One can then argue that the impact on older children is more on the intensive margin as the probability of working longer hours is lower.[28]

[28] The results are similar if the probability of working more than 30 hours per week -which may indicate a full-time job- is considered instead.

Among the types of employment, the increase in the minimum wage does not affect the probability of being a wage earner. Still, it reduces the likelihood of working as an unpaid family worker for all age groups by around 10% for children younger than 15 and 15-to 17-year-olds, primarily for girls.

The minimum wage increase significantly reduces the probability of children working in the agriculture sector, which is observed mainly for those younger than 15, at around 10%. The policy reduces the probability of children under the age of 15 working in the manufacturing sector, while it does not affect the probability of working in the services sector.

The minimum wage increase also alters the reason for which the children work. The probability of children working to contribute to household income and help family business is significantly lower across all age groups. The magnitude of the impact is 15% and 14%, respectively, for children younger than 15 and 15-17-year-olds. The impact is strongest amongst the girls younger than 15 (28%).

The main findings reveal that the minimum wage increase -a relative income shock for a specific portion of the workers- produces favorable results on the labor market outcomes of children, more strongly for girls and those younger than 15 years of age. In the light of the luxury axiom, the results suggest that this increase in the minimum wage does not generate enough income to pull all the children out of labor despite being sizeable in real terms. One might also argue that the increase in minimum wage further induces the supply of child labor and, at the same time, reduce the demand for child labor by firms in the economy. These two additional motives do not affect the estimated treatment effects, given the assumption that they apply to all

the children the same and that they are absorbed by the year fixed effects in the specifications.

From the theoretical perspective presented in the conceptual framework, one may track the channels at work in the case of the minimum wage increase evaluated in the chapter. Mainly, the lower probability of younger girls working and older boys working late hours can be considered in line with the diminishing marginal returns to family income. As the family income is higher, the marginal return of the income generated by the employment of girls younger than 15 and by the extra hours of work of 15-17-year-old boys are not high enough, and thus, they are not needed. The sizable decline in the probability of girls working as unpaid family workers yields support for the reduced productivity of children at family business or housework, in addition to diminishing marginal returns to income. The lower probability of working to contribute to household income and help family business supports the view that higher household income increases the utility attached to or strengthens the parents' valuation of the child's leisure.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome \ Sample:		**All**	**Age<15**	**Age>=15**	**Boys**	**Boys, Age<15**	**Boys, Age>=15**	**Girls**	**Girls, Age<15**	**Girls, Age>=15**
Employed	(a)	-0.113	-0.349**	-0.0156	-0.00228	-0.141	0.0582	-0.232	-0.660***	-0.0802
	(b)	(0.168)	(0.166)	(0.215)	(0.158)	(0.262)	(0.133)	(0.292)	(0.175)	(0.433)
	(c)		***-0.0022***						***-0.0028***	
	(d)	*0.0516*	*0.0185*	*0.1565*	*0.0725*	*0.0248*	*0.2194*	*0.0297*	*0.0119*	*0.0876*
Hours worked>40	(a)	-0.345**	-0.265	-0.343***	-0.151	0.105	-0.258**			
	(b)	(0.173)	(0.197)	(0.121)	(0.161)	(0.191)	(0.121)			
	(c)	***-0.0003***		***-0.0108***			***-0.0214***			
	(d)	*0.0217*	*0.0032*	*0.0800*	*0.0346*	*0.0045*	*0.1274*	*0.0173*	*0.0059*	*0.0298*
Wage earner	(a)	-0.0182	-0.162	0.0323	0.0777	0.0191	0.101	-0.208		-0.0602
	(b)	(0.156)	(0.237)	(0.170)	(0.145)	(0.259)	(0.132)	(0.353)		(0.378)
	(c)									
	(d)	*0.0277*	*0.0040*	*0.1028*	*0.0407*	*0.0061*	*0.1470*	*0.0141*	*0.0019*	*0.0545*
Unpaid family worker	(a)	-0.468**	-0.422*	-0.440**	-0.0951	-0.143	0.0838	-0.713***	-0.504**	
	(b)	(0.182)	(0.235)	(0.211)	(0.194)	(0.214)	(0.198)	(0.245)	(0.214)	
	(c)	***-0.0016***	***-0.0015***	***-0.0047***				***-0.0022***	***-0.0018***	
	(d)	*0.0235*	*0.0144*	*0.0522*	*0.0311*	*0.0185*	*0.0699*	*0.0155*	*0.0102*	*0.0346*
Obs.		45,770	34,772	10,998	23,423	17,676	5,747	22,347	17,096	5,251

Table 4.4. Effect of Minimum Wage Increases on Labor Market Outcomes – I

Note: The sample covers the children from the CLS 2012 and 2019. Each cell shows the results of the estimation of specification 4.1 for the outcome variable (row) and for a specific sample of observations (column). The control variables include year fixed effects, age, gender, age group fixed effects, mother's and father's age, a dummy variable indicating whether the household head works, household head's education, household size, enrolment status of the child, a dummy variable indicating whether the child is affected from the compulsory schooling policy change. The standard errors are clustered at the birth year level. The bootstrapped standard errors are obtained with 1000 replications. The marginal effect is calculated at the relevant sample means used in that regression. Only the marginal effects for statistically significant coefficients are reported. (a): Coefficient estimate; (b): Standard error; (c) Marginal effect; (d) Sample mean. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome \ Sample:		**All**	**Age<15**	**Age>=15**	**Boys**	**Boys, Age<15**	**Boys, Age>=15**	**Girls**	**Girls, Age<15**	**Girls, Age>=15**
Agriculture	(a)	-0.497**	-0.661***	-0.233	-0.283	-0.383*	-0.182			
	(b)	(0.209)	(0.226)	(0.161)	(0.185)	(0.224)	(0.205)			
	(c)	***-0.0010***	***-0.0012***			***-0.0009***				
	(d)	*0.0209*	*0.0124*	*0.0478*	*0.0262*	*0.0154*	*0.0595*	*0.0164*	*0.0100*	*0.0370*
Manufacturing	(a)	0.0684	-0.493*	0.267	0.182	-0.240	0.274	-0.212		0.237
	(b)	(0.254)	(0.255)	(0.228)	(0.253)	(0.272)	(0.261)	(0.234)		(0.165)
	(c)		***-0.0002***							
	(d)	*0.0118*	*0.0024*	*0.0416*	*0.0191*	*0.0040*	*0.0656*	*0.0041*	*0.0008*	*0.0152*
Services	(a)	-0.113	0.0418	-0.180	0.00401	0.145	-0.0561	-0.261	-0.0325	-0.340
	(b)	(0.177)	(0.164)	(0.229)	(0.154)	(0.171)	(0.197)	(0.223)	(0.334)	(0.277)
	(c)									
	(d)	*0.0189*	*0.0037*	*0.0671*	*0.0272*	*0.0054*	*0.0943*	*0.0102*	*0.0019*	*0.0373*
Reason to work: Contribute/Help	(a)	-0.477***	-0.471**	-0.423***	-0.227	-0.244	-0.175	-0.948***	-0.657***	
	(b)	(0.152)	(0.231)	(0.131)	(0.193)	(0.258)	(0.163)	(0.245)	(0.219)	
	(c)	***-0.0027***	***-0.0023***	***-0.0134***				***-0.0035***	***-0.0029***	
	(d)	*0.0342*	*0.0151*	*0.0945*	*0.0477*	*0.0197*	*0.1336*	*0.0200*	*0.0103*	*0.0546*
Obs.		45,770	34,772	10,998	23,423	17,676	5,747	22,347	17,096	5,251

Table 4.5. Effect of Minimum Wage Increases on Labor Market Outcomes - II

Note: The sample covers the children from the CLS 2012 and 2019. Each cell shows the results of the estimation of specification 4.1 for the outcome variable (row) and for a specific sample of observations (column). The control variables include year fixed effects, age, gender, age group fixed effects, mother's and father's age, a dummy variable indicating whether the household head works, household head's education, household size, enrolment status of the child, a dummy variable indicating whether the child is affected from the compulsory schooling policy change. The standard errors are clustered at the birth year level. The bootstrapped standard errors are obtained with 1000 replications. The marginal effect is calculated at the relevant sample means used in that regression. The marginal effects are reported only when the coefficient of the interaction term is statistically significant. (a): Coefficient estimate; (b): Standard error; (c): Marginal effect; (d): Sample mean. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

4.5. Robustness Checks

In this section, a suite of robustness checks is done. The results' robustness is tested by alternative control groups, alternative sample of observations, controlling for household head's sector of employment, excluding 5-year-olds from the sample, and excluding the enrollment status from the specification.

4.5.a. Alternative Control Groups

In the baseline specifications, the outcomes of children from the MWF (the treatment group) are investigated compared to all the other children (the control group). Here, two subsets of the original control group are used to check the impacts. The first is the children from families where the average wage-earning per adult worker is different from the minimum wage. The second control group is the children from households with no adult-wage income. Recall that families with no wage income are those whose adult members are employers, self-employed or unpaid family workers, or those with all adult members are unemployed or out of the labor force.

The results presented in Table 4.6 show that the findings are in line with the baseline results, and the minimum wage increase significantly reduces the probability of employment of children younger than 15, and primarily the girls younger than 15, against all control groups. This consensus suggests that the minimum wage earners experienced a relative income gain compared to both other wage earners and those with no wage income.

Control group: Children from Families with Average Wage Income other than the Minimum Wage									
Sample:	**All**	**Age<15**	**Age>=15**	**Boys**	**Boys, Age<15**	**Boys, Age>=15**	**Girls**	**Girls, Age<15**	**Girls, Age>=15**
Employed	-0.156	-0.358**	0.00492	-0.0702	-0.184	0.0381	-0.253	-0.683**	0.00897
	(0.133)	(0.171)	(0.127)	(0.116)	(0.229)	(0.105)	(0.307)	(0.294)	(0.430)
Hours worked>40	-0.200	0.0283	-0.207*	-0.135	0.332	-0.231	-0.575**		-0.249
	(0.200)	(0.184)	(0.120)	(0.248)	(0.302)	(0.157)	(0.291)		(0.225)
Obs.	30,072	22,711	7,361	15,431	11,613	3,818	14,641	11,098	3,543

Control group: Children from Families without Wage Income									
Sample:	**All**	**Age<15**	**Age>=15**	**Boys**	**Boys, Age<15**	**Boys, Age>=15**	**Girls**	**Girls, Age<15**	**Girls, Age>=15**
Employed	-0.0294	-0.353*	0.106	-0.0442	-0.176	-0.00572	0.0415	-0.638***	0.320
	(0.274)	(0.183)	(0.365)	(0.230)	(0.226)	(0.261)	(0.453)	(0.214)	(0.720)
Hours worked>40	-0.311**	-0.215	-0.373***	-0.341**	-0.0249	-0.512***	-0.483		-0.193
	(0.123)	(0.271)	(0.142)	(0.156)	(0.297)	(0.163)	(0.356)		(0.359)
Obs.	23,463	17,797	5,666	11,865	9,109	2,756	11,598	8,688	2,910

Table 4.6. Effect of Minimum Wage Increases on Child Employment: Alternative Control Groups

Note: The sample covers the children from the CLS 2012 and 2019. Each cell shows the results of the estimation of specification 4.1 for the outcome variable (row) and for a specific sample of observations (column). The treatment group is the children from Minimum Wage Families. While the control group in the upper (lower) panel is the children from families with an average adult wage other than the minimum wage (the children from families without wage income). The control variables include year fixed effects, age, gender, age group fixed effects, mother's and father's age, a dummy variable indicating whether the household head works, household head's education, household size, enrolment status of the child, a dummy variable indicating whether the child is affected from the compulsory schooling policy change. The standard errors are clustered at the birth year level. The bootstrapped standard errors are obtained with 1000 replications. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

Note that there is no significant effect in other samples against any of the control groups in employment regressions. Regarding the impact on the probability of working longer hours, the impact on 15-17-year-olds is valid against both control groups. Meanwhile, the policy effect on 15-17-year-old boys comes from comparing MWF against no-wage-income households. Thus, this robustness exercise also helps determine the impact source from another perspective.

The finding that minimum wage increase decreasing the prevalence of child labor among girls younger than 15 might seems questionable at first sight, as the minimum wage earners are more likely to live in urban areas and girls under 15 working in agriculture are more likely to live in rural areas. Unfortunately, the information on the area of residence is not available in the latest round of the CLS. However, additional empirical evidence might shed more light on this issue. As the results in Table 4.6 show, the significant impact of the minimum wage is observed, not only when compared with the sample of children from no wage income families but also against the sample of children from other wage-earning families (who are more likely to live in urban areas, like MWFs). Another evidence is that the impact of minimum wage on the probability of girls younger than 15 being employed is still significant if the observations from households where the household head works in the agriculture sector are omitted. Therefore, the additional evidence suggests that the finding is robust. The main reason behind that finding is that being a MWF does not necessarily mean that the family lives in an urban area, and thus, girls in both the treatment and the control group work in all three sectors of agriculture, manufacturing, and services.

4.5.b. Alternative Sample: Children from Single-adult-worker Households

The central pillar of the luxury axiom posits that a family does not send the child to work if the household income is high enough. It is also realistic to assume that the household income is positively correlated with the number of adult wage earners in the family. Thus, if this is the case, then the treatment effect, if it exists, should be lower for single adult employed families. The impact of the minimum wage increase on the primary labor market outcomes is analyzed in the sample of children from households with a single adult worker to test this claim.

The results, presented in Table 4.7, reveal that the minimum wage does not significantly impact child labor in the extensive or the intensive margin, nor in the type of work, and for any subsample. This finding also strengthens the arguments related to the luxury axiom. The minimum wage increase only reduces the incidence of child labor if enough adults work in the household to secure the subsistence level income pointed out by the luxury axiom.

Children from Single-Adult-Worker Households					
Outcome \ Sample:	**All**	**Boys**	**Girls**	**Age<15**	**Age>=15**
Employed	-0.00147	0.242	-0.336	-0.148	0.0841
	(0.110)	(0.149)	(0.260)	(0.182)	(0.135)
Hours worked>40	-0.323	-0.0166		-0.235	-0.358
	(0.252)	(0.306)		(0.266)	(0.263)
Wage earner	0.0248	0.177	-0.240	-0.0500	0.0464
	(0.130)	(0.154)	(0.308)	(0.264)	(0.131)
Unpaid family worker	-0.0957			-0.124	
	(0.246)			(0.171)	
Obs.	23,077	11,841	11,236	18,014	5,063

Table 4.7. Effect of Minimum Wage Increases on Employment

Note: The sample is the observations from CLS 2012 and 2019, excluding 5-year-olds. Each cell shows the results of the estimation of specification 4.1 for the outcome variable (row) and for a specific sample of observations (column). The controls variables include year fixed effects, age, gender, age group fixed effects, mother's and father's age, a dummy variable indicating whether the household head works, household head's education, household size, enrolment status of the child, a dummy variable indicating whether the child is affected from the compulsory schooling policy change. The standard errors are clustered at the birth year level. The bootstrapped standard errors are obtained with 1000 replications.

4.5.c. Alternative Control Variables/Age Group:

In this robustness exercise, alternative control variables are employed. First, the sector of employment of the household head is included. Note that the number of observations is lower given that this set of regressions does not consider children from households where the household head is not working/not in the labor force. Next, 5-year-old children who are only sampled in the CLS 2019 are omitted from the sample to check whether the results are robust. Finally, the enrollment status of the children is omitted.

The results are presented in Table 4.8 for the inclusion of the household head's sector of employment, Table 4.9 for the omission of 5-year-olds, and Table 4.10 for the exclusion of enrollment status. The main results regarding the impact of the minimum wage increase on the employment probability of girls under the age of 15 and the likelihood of working longer hours for 15-17-year-old boys are intact. The treatment effect is such that the incidence of employment of girls younger than 15 is reduced by 24%-29% in the baseline specification and robustness checks. Similarly, the estimated reduction in the probability of working long hours for 15-17-year-old boys ranges between 13% and 18%.

The results regarding the significant impact of the minimum wage increase on reducing the probability of working in the agriculture sector, being an unpaid family worker, and working to contribute to household income or to help family business are also valid to the checks provided. Moreover, when the household head's employment sector is controlled for, the minimum wage increase significantly reduces the probability of boys younger than 15 working in the manufacturing sector, in addition to the baseline results.

Outcome \ Sample:		All	Age<15	Age>=15	Boys	Boys, Age<15	Boys, Age>=15	Girls	Girls, Age<15	Girls, Age>=15
Employed	(a)	-0.192	-0.370*	-0.104	-0.0669	-0.230	0.0320	-0.320	-0.557***	-0.229
	(b)	(0.158)	(0.195)	(0.237)	(0.157)	(0.302)	(0.155)	(0.228)	(0.184)	(0.256)
	(c)		***-0.0032***						***-0.0037***	
	(d)	*0.0537*	*0.0202*	*0.1656*	*0.0751*	*0.0273*	*0.2300*	*0.0312*	*0.0128*	*0.0949*
Hours worked>40	(a)	-0.388**	-0.326	-0.347***	-0.184	-0.0855	-0.217**			
	(b)	(0.157)	(0.235)	(0.0914)	(0.194)	(0.256)	(0.106)			
	(c)	***-0.0003***		***-0.0100***			***-0.0158***			
	(d)	*0.0208*	*0.0032*	*0.0796*	*0.0333*	*0.0045*	*0.1262*	*0.0171*	*0.0058*	*0.0300*
Unpaid family worker	(a)	-0.523**	-0.364*	-0.766***	-0.201	-0.0803	-0.296	-0.636***	-0.441*	
	(b)	(0.238)	(0.199)	(0.222)	(0.327)	(0.234)	(0.238)	(0.233)	(0.255)	
	(c)	***-0.0033***	***-0.0022***	***-0.0159***				***-0.0038***	***-0.0026***	
	(d)	*0.0272*	*0.0164*	*0.0636*	*0.0363*	*0.0212*	*0.0852*	*0.0178*	*0.0114*	*0.0421*
Agriculture	(a)	-0.568**	-0.595***	-0.451**	-0.341	-0.255	-0.429*			
	(b)	(0.235)	(0.208)	(0.183)	(0.253)	(0.249)	(0.249)			
	(c)	***-0.0021***	***-0.0018***	***-0.0075***			***-0.0155***			
	(d)	*0.0236*	*0.0138*	*0.0562*	*0.0298*	*0.0174*	*0.0702*	*0.0182*	*0.0109*	*0.0431*
Manufacturing	(a)	0.0154	-0.689***	0.254	0.173	-0.526	0.327	-0.263		0.118
	(b)	(0.295)	(0.195)	(0.213)	(0.302)	(0.325)	(0.286)	(0.181)		(0.113)
	(c)		***-0.0001***							
	(d)	*0.0114*	*0.0025*	*0.0413*	*0.0187*	*0.0043*	*0.0653*	*0.0039*	*0.0009*	*0.0149*
Reason to work: Contribute/Help	(a)	-0.500***	-0.462**	-0.487**	-0.269	-0.300	-0.198	-0.841***	-0.569***	
	(b)	(0.181)	(0.190)	(0.228)	(0.260)	(0.236)	(0.190)	(0.258)	(0.214)	
	(c)	***-0.0043***	***-0.0033***	***-0.0234***				***-0.0056***	***-0.0039***	
	(d)	*0.0359*	*0.0166*	*0.1005*	*0.0498*	*0.0220*	*0.1398*	*0.0214*	*0.0110*	*0.0605*
Obs.		36,603	28,175	8,428	18,704	14,291	4,413	17,899	13,884	4,015

Table 4.8. Effect of Minimum Wage Increases on Labor Market Outcomes – Including Household Head's Sector of Employment

Note: The sample covers the children from the CLS 2012 and 2019. Each cell shows the results of the estimation of specification 4.1 for the outcome variable (row) and for a specific sample of observations (column). The control variables include year fixed effects, age, gender, age group fixed effects, mother's and father's age, household head's sector of employment, household head's education, household size, enrolment status of the child, a dummy variable indicating whether the child is affected from the compulsory schooling policy change. The standard errors are clustered at the birth year level. The bootstrapped standard errors are obtained with 1000 replications. The marginal effect is calculated at the relevant sample means used in that regression. Only the marginal effects for statistically significant coefficients are reported. (a): Coefficient estimate; (b): Standard error; (c) Marginal effect; (d) Sample mean. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. Wage earner and services rows are omitted to save space, as none of the interaction terms for any sample are significant, in line with the baseline results.

Outcome \ Sample:		All	Age<15	Boys	Boys, Age<15	Girls	Girls, Age<15
Employed	(a)	-0.113	-0.358**	-0.00283	-0.156	-0.232	-0.665***
	(b)	(0.178)	(0.174)	(0.180)	(0.280)	(0.253)	(0.178)
	(c)		***-0.0025***				***-0.0033***
	(d)	*0.0536*	*0.0194*	*0.0752*	*0.0260*	*0.0309*	*0.0125*
Hours worked>40	(a)	-0.346**	-0.265	-0.152	0.104		
	(b)	(0.161)	(0.211)	(0.160)	(0.227)		
	(c)	***-0.0003***					
	(d)	*0.0225*	*0.0034*	*0.0359*	*0.0047*	*0.0173*	*0.0059*
Unpaid family worker	(a)	-0.473**	-0.427*	-0.0983	-0.148	-0.722***	-0.509**
	(b)	(0.186)	(0.240)	(0.222)	(0.205)	(0.273)	(0.211)
	(c)	***-0.0019***	***-0.0017***			***-0.0025***	***-0.0020***
	(d)	*0.0244*	*0.0151*	*0.0323*	*0.0194*	*0.0161*	*0.0107*
Agriculture	(a)	-0.506**	-0.671***	-0.289*	-0.391*		
	(b)	(0.208)	(0.225)	(0.162)	(0.222)		
	(c)	***-0.0012***	***-0.0014***	***-0.0011***	***-0.0010***		
	(d)	*0.0217*	*0.0131*	*0.0272*	*0.0162*	*0.0170*	*0.0105*
Manufacturing	(a)	0.0685	-0.493**	0.183	-0.242	-0.212	
	(b)	(0.224)	(0.234)	(0.302)	(0.279)	(0.219)	
	(c)		***-0.0002***				
	(d)	*0.0122*	*0.0025*	*0.0198*	*0.0042*	*0.0043*	*0.0008*
Reason to work: Contribute/Help	(a)	-0.485***	-0.479**	-0.235	-0.254	-0.959***	-0.661***
	(b)	(0.167)	(0.188)	(0.200)	(0.253)	(0.205)	(0.215)
	(c)	***-0.0032***	***-0.0027***			***-0.0042***	***-0.0033***
	(d)	*0.0355*	*0.0159*	*0.0495*	*0.0207*	*0.0208*	*0.0108*
Obs.		44,096	33,098	22,586	16,839	21,510	16,259

Table 4.9. Effect of Minimum Wage Increases on Labor Market Outcomes – Excluding 5-Year-Olds

Note: The sample covers the children from the CLS 2012 and 2019 (excluding 5-year-olds). Each cell shows the results of the estimation of specification 4.1 for the outcome variable (row) and for a specific sample of observations (column). The control variables include year fixed effects, age, gender, age group fixed effects, mother's and father's age, a dummy variable indicating whether the household head works, household head's education, household size, enrolment status of the child, a dummy variable indicating whether the child is affected from the compulsory schooling policy change. The standard errors are clustered at the birth year level. The bootstrapped standard errors are obtained with 1000 replications. The marginal effect is calculated at the relevant sample means used in that regression. Only the marginal effects for statistically significant coefficients are reported. (a): Coefficient estimate; (b): Standard error; (c) Marginal effect; (d) Sample mean. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. Wage earner and services rows are omitted to save space, as none of the interaction terms for any sample are significant, in line with the baseline results.

Outcome \ Sample:		All	Age<15	Age>=15	Boys	Boys, Age<15	Boys, Age>=15	Girls	Girls, Age<15	Girls, Age>=15
Employed	(a)	-0.123	-0.317*	-0.0239	-0.0207	-0.0867	0.00895	-0.242	-0.691***	-0.0567
	(b)	(0.163)	(0.163)	(0.177)	(0.174)	(0.245)	(0.155)	(0.259)	(0.183)	(0.391)
	(c)		***-0.0025***						***-0.0035***	
	(d)	*0.0536*	*0.0194*	*0.1565*	*0.0752*	*0.0260*	*0.2194*	*0.0309*	*0.0125*	*0.0876*
Hours worked>40	(a)	-0.278	-0.175	-0.300**	-0.0960	0.230	-0.237**			
	(b)	(0.171)	(0.123)	(0.135)	(0.168)	(0.152)	(0.111)			
	(c)			***-0.0133***			***-0.0233***			
	(d)	*0.0225*	*0.0034*	*0.0800*	*0.0359*	*0.0047*	*0.1274*	*0.0173*	*0.0059*	*0.0298*
Unpaid family worker	(a)	-0.473***	-0.427**	-0.425**	-0.124	-0.147	0.0129	-0.687***	-0.513**	
	(b)	(0.159)	(0.188)	(0.173)	(0.177)	(0.225)	(0.193)	(0.218)	(0.231)	
	(c)	***-0.0019***	***-0.0017***	***-0.0048***				***-0.0024***	***-0.0020***	
	(d)	*0.0244*	*0.0151*	*0.0522*	*0.0323*	*0.0194*	*0.0699*	*0.0161*	*0.0107*	*0.0346*
Agriculture	(a)	-0.500***	-0.660***	-0.255*	-0.307*	-0.388	-0.205			
	(b)	(0.192)	(0.239)	(0.144)	(0.179)	(0.256)	(0.193)			
	(c)	***-0.0013***	***-0.0014***	***-0.0023***	***-0.0012***					
	(d)	*0.0217*	*0.0131*	*0.0478*	*0.0272*	*0.0162*	*0.0595*	*0.0170*	*0.0105*	*0.0370*
Manufacturing	(a)	0.0283	-0.442**	0.237	0.150	-0.145	0.235	-0.264		0.229*
	(b)	(0.205)	(0.176)	(0.241)	(0.260)	(0.218)	(0.258)	(0.220)		(0.121)
	(c)		***-0.0003***							***0.0037***
	(d)	*0.0122*	*0.0025*	*0.0416*	*0.0198*	*0.0042*	*0.0656*	*0.0043*	*0.0008*	*0.0152*
Reason to work: Contribute/Help	(a)	-0.449**	-0.462**	-0.360**	-0.219	-0.225	-0.173	-0.899***	-0.681***	
	(b)	(0.178)	(0.229)	(0.145)	(0.218)	(0.240)	(0.141)	(0.269)	(0.198)	
	(c)	***-0.0033***	***-0.0027***	***-0.0134***				***-0.0043***	***-0.0034***	
	(d)	*0.0355*	*0.0159*	*0.0945*	*0.0495*	*0.0207*	*0.1336*	*0.0208*	*0.0108*	*0.0546*
Obs.		44,096	33,098	10,998	22,586	16,839	5,747	21,510	16,259	5,251

Table 4.10. Effect of Minimum Wage Increases on Labor Market Outcomes – Excluding Enrollment Status

Note: The sample covers the children from the CLS 2012 and 2019. Each cell shows the results of the estimation of specification 4.1 for the outcome variable (row) and for a specific sample of observations (column). The control variables include year fixed effects, age, gender, age group fixed effects, mother's and father's age, household head's employment status, household head's education, household size, and a dummy variable indicating whether the child is affected by the compulsory schooling policy change. The standard errors are clustered at the birth year level. The bootstrapped standard errors are obtained with 1000 replications. The marginal effect is calculated at the relevant sample means used in that regression. Only the marginal effects for statistically significant coefficients are reported. (a): Coefficient estimate; (b): Standard error; (c) Marginal effect; (d) Sample mean. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. Wage earner and services rows are omitted to save space, as none of the interaction terms for any sample are significant, in line with the baseline results.

4.6. Conclusion

This chapter analyzes how an increase in the minimum wage affects the labor market outcomes of children. In the context of Basu and Van's (1998) luxury axiom, a child is only sent to work if the household income is below a certain subsistence threshold. In this regard, an increase in household income is expected to reduce child labor. To this end, the chapter evaluates the impact of a 35% real increase in the minimum wage, observed between two rounds of the CLS, on child labor in Turkey.

Turkey provides an ideal setting to investigate the effects of minimum wage. The share of minimum wage earners is high, and the growth rate of the minimum wage has surpassed the growth rate of other wages over the last decade. Moreover, the earlier studies on the effects of minimum wage on labor market outcomes generally focused on adults, rarely on young adults, but not specifically on children. The international evidence on the link between the minimum wage and child labor is also limited.

The empirical results presented in the chapter point to significant effects on various labor market outcomes in multiple samples by gender and age group. First, the minimum wage increase significantly reduces the employment probability of girls younger than 15 and the probability of working longer hours for 15-17-year-old boys. No impact is observed on the likelihood of being a wage earner, while the probability of working as an unpaid family worker is lower across age groups. The minimum wage increase also reduces the likelihood of working in the agriculture sector but has no impact on working in the services and a limited impact on being employed in the manufacturing. Meanwhile, there is no significant reduction in the extensive or the intensive margin if the child is a member of a single-adult-worker household.

The findings provide evidence for the relevance of the luxury axiom, as the income increase significantly reduces the incidence of child labor for specific groups. The effects are bounded by the size of the minimum wage shocks. It follows that the 35% real increase in the minimum wage observed from 2012 to 2019 is not high enough to eradicate child labor. Another evidence for the potential non-adequacy of the income increase is the lack of impact on children from households where only one adult is working. Nonetheless, it provides a partial cure for the employment of more vulnerable kids younger than 15. Plus, the probability of kids having to work to contribute to the family and help the family business is lower, thanks to the increase in the household income of MWFs. Altogether, the findings related to the luxury axiom support the analysis of Dayıoğlu (2006) that the income increase to eradicate child labor could be substantially high. In a related fashion, for instance, Pellerano et al. (2020) show that cash transfers do not induce the poorest households to invest in child's education, while relatively less poor households respond to the policy. Meanwhile, Balboni et al. (2022) argue that significant pushes are needed to pull families out of a poverty trap.

The chapter also contributes to the limited international literature on the causal effects of minimum wage policies on child labor. Menon and van der Meulen Rodgers (2018), who evaluate the impact of minimum wages on child labor in India, also find a limited effect primarily on the incidence of household work, which is in line with the findings of this chapter on the probability of being an unpaid family worker.

Finally, this chapter provides evidence for the favorable impact of parental income in reducing the incidence of child labor and thus contributes to the literature on country-specific evaluations of the role of household income affecting child labor,

which exhibits mixed results across different countries and settings. Given the widespread diffusion of the minimum wage in Turkey -much higher than those in developed countries- the minimum wage increase constitutes an income shock on a larger scale and enable the evaluation of an income policy to reduce child labor in a large developing economy.

CHAPTER V

COMPULSORY SCHOOLING AND CHILD LABOR: THE ROLE OF STRUCTURAL FACTORS

5.1. Introduction

Compulsory schooling is an important policy tool to keep children in formal education longer and potentially away from work. Therefore, the change in the duration of compulsory schooling observed in countries is used to evaluate its impact on children's work and education trade-off. In this perspective, the related literature reviewed in Chapter II and the evidence provided for Turkey in Chapter III show that compulsory schooling policies can, in general, help reduce the prevalence of child employment and other related labor market outcomes to some extent. The effectiveness of such policies is crucial for low- and middle-income countries (LMICs) where the prevalence of child labor is very high, reaching more than 50% in some LMICs, as will be discussed below. However, the empirical literature linking compulsory schooling and child labor does not offer a clear-cut answer in less developed or developing countries. Meanwhile, the causal studies primarily focus on single countries, and cross-country studies mainly investigate the association between the various variables and child labor, pointing to a lack of causal investigation at the cross-country level.

Regarding the effectiveness of the compulsory schooling policy, the recent theoretical contributions hint at the potential role of structural factors, such as the quality of institutions, income inequality, and the structure of the production sector,

as mediating factors for compulsory schooling and child labor interplay. The conceptual framework presented in Chapter II makes a case for the role of structural issues concerning the effectiveness of compulsory schooling in eliminating child labor by drawing on the enforceability aspect of the mandatory measures, where enforceability is assumed to be a function of structural factors.

This chapter aims to fill the gap in the literature by providing a causal investigation at the cross-country level and incorporating the role of structural factors. Thus, the chapter analyzes the causal impact of compulsory schooling on child labor using detailed household surveys and focusing on LMICs. In this framework, after establishing the presence of the policy effect, the chapter focuses on under which structural and institutional settings the compulsory schooling policy would be more effective, providing a context in which the effectiveness of the policy depends on the level of the structural indicator considered. Given that the cross-country studies using the Multi Indicator Cluster Surveys (MICS) data mainly relied on the association between compulsory schooling and child labor, pursuing a causal investigation, with surveys covering the 2000-2019 period, constitutes the first contribution of the chapter. The second contribution of the chapter is that it brings to the table the potential mediator role of structural indicators on the success of the compulsory schooling policy in eliminating child labor. Besides, the chapter not only reflects on governance-related structural indicators, but also considers structural indicators related to demographics, income inequality, employment and social benefits, education infrastructure, and business dynamism.

5.1.a. Selected Literature

A few studies indicate the relevance of structural issues in mediating the impact of the compulsory schooling policy on reducing child labor. Bellettini and Ceroni (2004) argue that child labor exists due to the imperfect enforcement of compulsory schooling laws -in a game-theoretic setting of an economy with heterogeneous agents and the presence of complementarities- which affects the choice between a child's education and work. The outcome is observed due to a coordination problem among parents. In this setting, with mandatory measures, the coordination failures are solved, and all parents send their children to school, leading to the socially optimal equilibrium as outlined in the conceptual framework provided in Chapter II. But, if legislation enforcement is weak, multiple equilibria emerge where compulsory schooling law is not enough per se to eliminate child labor. Bellettini and Ceroni (2004) assume that the ability to enforce the law depends on the ''quality of institutions'', which covers issues such as the efficiency of administration, social environment, and quality of infrastructure. Therefore, similar countries with different quality of institutions and countries with comparable quality of institutions but with different sociopolitical environments may have a different prevalence of child labor.

In a recent paper, Lu (2020) investigates child labor and compulsory education, focusing on the government's education policy's effects on economic growth and welfare in a framework of an OLG model with endogenous growth. Lu shows that the government's education policy, consisting of compulsory schooling and investment in education, can increase household welfare, arguing that government education policies lessen the problem of child labor. Moreover, the effects are

different for developed and developing economies, which further suggests that the structural differences may influence the effectiveness of the policy.

Dimova (2021), on the other hand, presents an evaluation of the political economy of child labor by linking theoretical underpinnings and analyzing empirical findings. After justifying policy intervention, Dimova further states that the empirical literature on the connection between compulsory schooling and child labor in less developed economies is inconclusive. The study further hints at the possible effects of structural issues on the prevalence of child labor. The role of income inequality, the production structure, the institutional quality, and governance are stated as important structural factors influencing the adoption of and compliance with the compulsory schooling policies.

Motivated by these recent discussions on the potential mediating role of structural factors, the current chapter of the thesis seeks to provide empirical evidence on that matter.

5.2. Methodology and Identification Strategy

In the first part of the empirical investigation, the question analyzed in Chapter III for Turkey -the impact of changes in compulsory schooling policy on child labor- is revisited in a panel-data setting for a sample of LMICs. The following specification, which is a panel data version of the one studied in Chapter III, is considered:

$$Y_{i,c,t} = \beta_0 + \beta_1 P_{i,c,t} + X'_{i,c,t}\beta_2 + \mu_t + \sigma_c + \gamma_a + \rho_r + \varepsilon_{i,c,t} \qquad (5.1)$$

where $Y_{i,c,t}$ is a binary indicator showing whether child *i*, from country *c* and surveyed in year *t* is employed. $P_{i,c,t}$ indicates if the child is affected by the policy change -

higher years of compulsory schooling (HCS). $X'_{i,c,t}$ is a vector of the child or household specific factors including the gender of the child, dummy variables for whether the mother/father is alive, mother's education, household head's age, size of the household, household wealth score, whether the household lives in an urban area. μ_t, σ_c, ρ_r, and γ_a correspond to country, year, region within the country, and age fixed effects, respectively.[29] Also, country by year fixed effects are included in the main specifications.[30] While the child and household level variables mainly control the factors affecting the supply of child labor, specifically, the country by year fixed effects control for all factors common to all the children -including the demand for child labor- in a given country each year. Linear probability models are estimated on various sub-samples. Here, β_1 gives the desired treatment effect: the impact of the increase in years of compulsory schooling on the probability of a child working. The standard errors are clustered at birth year-region level.

In the spirit of the chapter, the main question explored is whether different structural factors strengthen or weaken the link between compulsory schooling and child labor -the main policy effect. To this end, the following specification, which includes the interaction of being subject to increased years of compulsory schooling with structural indicators, is analyzed:

$$Y_{i,c,t} = \beta_0 + \beta_1 P_{i,c,t} + \beta_2 P_{i,c,t} * SI_{c,t} + X'_{i,c,t}\beta_3 + \mu_t + \sigma_c + \gamma_a + \rho_r + \varepsilon_{i,c,t} \quad (5.2)$$

[29] Inserting age fixed effects enables a stricter control for the age effects, in comparison to controlling only for the age of the children. The latter estimates a linear effect at all ages, but the former is more flexible and capable of capturing potential non-linear age effects.

[30] In additional analysis, country by year fixed effects are alternated with world region by survey round fixed effects, where a less stringent control is used as only factors common to all observations from a certain region of the world in a survey round are considered. The advantage of which is the contribution of more countries to the estimation of the treatment effect as will be discussed in the results section.

where $SI_{c,t}$ refers to the structural indicator considered for country *c* in year *t*. The other variables are the same as in specification (5.1) above. In this linear probability model, β_2 indicates whether the structural indicator influences the policy effect in consideration. Thus, if β_2 is not statistically significant, the treatment effect is the same as in (1) and is not influenced by that structural variable. In case of a statistically significant β_2, the treatment effect is now conditional on the level of the structural indicator and is given by $\beta_1 + \beta_2 * SI_{c,t}$, varying across countries and years. That is, a negative (positive) estimate for β_2 shows that the structural factor considered strengthens (weakens) the policy effect.

5.3. Data

The main data source is the MICSs provided by UNICEF, which are nationally representative household surveys conducted in LMICs, and are primarily designed to monitor the living standards of women and children. These surveys provide valuable input for applied researchers as they are nationally representative and comparable across countries in terms of the contents of the surveys.[31] Thus, they have extensively been used in many fields, including child labor.[32]

In this chapter, the data from MICS rounds 2 to 6 and the period of 2000 to 2019 are used. The main interest is in the child labor module available in the survey, which includes detailed questions about the children's employment and their

[31] Khan and Hancioglu (2019) present an overview of the MICS and discuss their role as a valuable and robust data source primarily on children and women across the globe. The surveys have covered 116 countries as reported by Khan and Hancioglu (2019). As of March 2022, MICS host 367 household surveys in total, collected over six rounds.

[32] Moyi (2006), Awan et al. (2011), Edmonds and Shrestha (2012), Webbink et al. (2012), Kondylis and Manacorda (2012), Ahmed (2012), Putnick and Bornstein (2015), de Paoli and Mendola (2017), Kumar and Saqib (2017), and Dayıoğlu et al. (2021) are examples of studies using MICS data when investigating the various aspects of the economics of child labor.

engagement with house chores. The child labor module covers children aged 5-14 up to MICS 4 and children aged 5-17 from MICS 5 onwards. Nonetheless, even in the earlier rounds, the age range is extended to 17 for some countries. The questions in the child module are directed to the child's primary caretaker. In MICS 2 to 4, two separate questions are asked about whether the child works outside of the family or in the family business.[33] In MICS 5 and 6, on the other hand, four separate questions are asked, three related to household business and one on other market work.[34] If the answer is yes to any of these questions, the child is identified as a working child.

The other relevant information comes from the surveys' Household Information Panel and Household Listing Forms. From these data, child and household-specific descriptive and control variables are generated, including the age and gender of the child, mother's education, whether mother/father is alive, household head's age, and household wealth score index. For mother's education, different classifications of education levels across countries are regrouped as 0: None, 1: Primary, 2: Secondary, 3: Tertiary, 4: Non-standard curriculum, and 5: Missing. Information on the region of residence and whether the household lives in an urban area are also collected.[35]

First, the years of compulsory schooling and school start age data for LMIC are gathered from the World Bank to begin constructing the policy variable. Next, the birth cohorts affected by the policy change are identified by using the information on

[33] Specifically, the questions in the survey are: *"during the past week did (name) do any kind of work for someone who is not member of this household?"* and *"during the past week did (name) do any other family work (on the farm or in a business)"*. In MICS 4, the last question also includes *"…or selling goods on the street"*.

[34] These questions ask: *"even for only one hour did (name) worked on plot, farm or food garden, looked after animals; helped in family/relative's business, ran own business; produce/sell articles, handicrafts, clothes, food or agricultural products; engaged in any other activity in return for income in cash or in kind"*.

[35] The definition of the regions is country specific, as the proper segregation of the country across regions are left to the national statistical offices.

the year of the change in compulsory schooling, the school starting age, and the years of mandatory schooling before the policy change.[36] Finally, a dummy variable called HCS is generated, which takes the value of 1 for children born at or later than that birth cohort, and thus are subject to higher years of compulsory schooling.

Among the LMICs, 14 countries where the duration of compulsory schooling has been extended and whose surveys covering observations before and after the policy change are available in MICS rounds are identified. These countries are Bosnia and Herzegovina, Chad, Dominican Republic, El Salvador, Georgia, Ghana, Guinea Bissau, Kenya, Kyrgyzstan, Lao PDR, Lebanon (Palestinian settlements), North Macedonia, Senegal, and Vietnam.[37,38] Overall, data from 33 surveys are used in the study. The information on policy changes, affected cohorts, and MICS rounds available for these countries are presented in Table 5.1.

[36] For illustration, suppose that the compulsory schooling of 5 years is increased to 8 years as of 2010, in a country where the school start age is 6. Then, those attending the 5th grade and earlier, i.e., those who are 11 years old or younger, are subject to the new policy. Thus, children who were born at or later than 1999 will be affected.

[37] Mongolia also has MICS surveys covering long enough periods. However, there have been two close instances of increases in the years of compulsory schooling which makes the identification of the affected cohorts difficult. Thus, Mongolia is not included in the study.

[38] In additional analysis, the region of the world that the countries belong to are classified as: Asia: Kyrgyzstan, Lao PDR, and Vietnam; Africa: Chad, Ghana, Guinea Bissau, Kenya, and Senegal; Latin America: Dominican Republic, and El Salvador; Eastern Europe and others: Bosnia and Herzegovina, North Macedonia, Georgia, and Lebanon (Palestinian settlements).

Country	Policy change	Old / New policy (years of compulsory schooling)	School starting age	Affected cohort (born >=)	MICS Round	Surveys Conducted in:
Bosnia and Herzegovina	2005	8 / 9	6	1991	2, 3	2000, 2006
Chad	2006	6 / 10	6	1994	2, 4, 6	2000, 2010, 2019
Dominican Republic	2010	9 / 15	6	1995	2, 5	2000, 2014
El Salvador	2013	9 / 12	7	1997	5	2014
Georgia	2005	6 / 9	6	1993	3	2005
Ghana	2007	9 / 11	6	1992	3, 5, 6	2006, 2014, 2017/18
Guinea Bissau	2001	6 / 9	6	1989	2, 3, 5, 6	2000, 2006, 2014, 2018/19
Kenya	2013	8 / 12	6	1999	2, 5*	2000, 2013/14
Kyrgyzstan	2014	9 / 10	7	1998	3, 6	2005/06, 2018
Lao PDR	2016	5 / 9	6	2005	2, 3, 6	2000, 2006, 2017
Lebanon (Palestinian S.)	2002	6 / 9	6	1990	3, 4	2005/06, 2011
North Macedonia	2010	9 / 13	6	1995	3, 4	2005, 2011
Senegal	2004	6 / 11	6	1992	2, 5*	2000, 2015/16
Vietnam	2005	5 / 9	6	1994	2, 3, 4, 5	2000, 2006, 2010/11, 2013/14

Table 5.1. Compulsory Schooling, School Start Age, and MICS

Note: The policy change refers to the year in which the years of compulsory schooling increased. The old (new) policy refers to the years of compulsory schooling before (after) the policy change. School starting age is the one at the time of the policy change. MICS rounds capture all the available surveys for the selected country. The years in which the surveys are conducted are provided in the last column. All the surveys are nationally representative; the only exceptions are MICS 5 for Kenya, which is representative of Turkana County, and MICS 5 for Senegal which is representative of the Dakar City region. The data from Lebanon are from the Palestinian settlements.
Source: UNICEF, World Bank, author's calculations.

The third set of data employed in this chapter contains the structural factors whose mediating effect on the impact of compulsory schooling on the prevalence of child labor are investigated. Those indicators are selected from the World Development Indicators, and the World Governance Indicators, available from the World Bank, and are grouped under the following headings: Demography and population characteristics; Women and gender equality; Governance and policy effectiveness; Employment and social benefits; Income and income inequality; Education infrastructure; Business dynamism and infrastructure. The selection of structural factors is determined according to theoretical and empirical discussions. In the spirit of the conceptual framework of Chapter II, these are mainly linked with factors affecting the returns on education, such as education infrastructure or business dynamism, or factors altering the parents' valuation of the child's time, such as income inequality, employment, and social benefits. Also, the indicators cover a more comprehensive range of structural aspects rather than those focusing on the quality of institutions only, motivated by the conceptual framework of the thesis.

The changes in compulsory schooling across the countries in the sample mainly target those in secondary education. In all cases, at least primary education has already been mandatory, and the new policies extend the compulsory education to 9 years or higher. Considering the minimum level of compulsory schooling before the policy change in the sample, which is five years, and the minimum school starting age of 6, the new policies are expected to primarily affect children aged 11 and above. Therefore, the chapter focuses on the 11-17 age group. Nonetheless, to grasp a better picture of the incidence of child labor, employment statistics for this age group and all children are presented in Table 5.2. As seen in Chapter III and Chapter IV, around

5% of the children from 5 to 17 work in Turkey -an upper-middle-income country. While the figures in Table 5.2 suggest that child labor is more of an issue in LMICs, as in some countries, more than half of the children of ages 5-17 (Guinea Bissau); and children of ages 11-17 (Chad, Ghana, Guinea Bissau, Lao PDR) are employed.

	Age group: 5-17			Age group: 11-17		
Country	**Mean**	**Std. dev.**	**Obs.**	**Mean**	**Std. dev.**	**Obs.**
Bosnia and Herzegovina	0.14	0.35	8,026	0.21	0.41	3,076
Chad	0.39	0.49	51,762	0.53	0.50	17,112
Dominican Republic	0.14	0.35	17,199	0.21	0.41	8,130
El Salvador	0.22	0.42	5,966	0.31	0.46	3,233
Georgia	0.31	0.46	5,834	0.37	0.48	2,636
Ghana	0.40	0.49	16,385	0.52	0.50	7,169
Guinea Bissau	0.56	0.50	30,964	0.64	0.48	11,794
Kenya	0.08	0.27	14,601	0.11	0.32	7,207
Kyrgyzstan	0.19	0.39	9,128	0.27	0.45	4,038
Lao PDR	0.40	0.49	36,708	0.59	0.49	15,759
Lebanon (Palestinian S.)	0.04	0.20	14,015	0.07	0.25	7,263
North Macedonia	0.12	0.33	6,888	0.19	0.39	2,498
Senegal	0.32	0.47	20,342	0.38	0.48	7,738
Vietnam	0.23	0.42	32,416	0.37	0.48	16,306

Table 5.2. Child Employment Across Age Groups

Note: The data is from all available MICS rounds for the countries. Child labor statistics are provided both for the entire sample of observations and for the 11-17 age group which is primarily considered in the chapter. The data from Lebanon are from the Palestinian settlements.
Source: UNICEF, author's calculations.

The descriptive statistics of the main variables in the sample used in regressions are presented in Table 5.3. In this sample, 40.0% of the 11-17-year-old children work, and around two-thirds of the children are subject to higher years of compulsory schooling. 6.53 years of compulsory schooling observed on average across the countries before the policy change, was extended by 3.64 years. Note that before the policy change, the minimum and maximum years of compulsory schooling are 5 and 9, respectively, suggesting that either the primary school-age children or the lower-secondary school-age children are primarily affected by the policy, supporting the

choice of age group in this chapter. The average age of children is 13.30.[39] The average household head is around 48 years old, and the average household size is 6.76. The average education of mothers is slightly higher than the primary school level.[40] Across the sample, 97 (92) percent of the children's mother (father) is alive.

Variable	Obs.	Mean	Std. dev.	Min	Max
Employed	88,176	0.40	0.49	0	1
Treated (HCS)	88,176	0.67	0.47	0	1
Change in policy (years)	88,176	3.64	1.13	1	6
Old policy (years)	88,176	6.53	1.62	5	9
Age	88,176	13.30	1.78	11	17
Gender (Female)	88,176	0.49	0.50	0	1
Household head's age	88,176	47.98	12.67	11	99
Household size	88,176	6.76	3.59	1	97
Household wealth score (norm.)	88,176	0.10	1.02	-5.0	6.4
Mother's education	88,176	1.29	1.18	0	5
Mother is alive	88,176	0.97	0.17	0	1
Father is alive	88,176	0.92	0.27	0	1

Table 5.3. Descriptive Statistics of Main Variables

Note: The data is for all 11-17-year-old children from all available MICS rounds for all 14 countries. Treated refers to children subject to higher years of compulsory schooling (HCS). The old policy shows the number of years of compulsory schooling before the policy change. The change in policy measures the increment in compulsory schooling. Household wealth scores, computed in the MICS, are normalized to mean-0 and variance-1 for each survey. Mother's education (0: None, 1: Primary, 2: Secondary, 3: Tertiary, 4: Non-standard curriculum, 5: Missing).

The short descriptions and descriptive statistics of the structural indicators over the sample period (of the survey years of each country) are provided in the Appendix, Table A.1, according to the indicator clusters described before.

[39] The default age group in MICS 2 through MICS 4 is 5-14, while some countries have extended it to 17 years of age. From MICS 5 onwards, all the surveys cover 5-17-year-old children. Given that the surveys are nationally representative across age groups, one would see 14 as the sample mean age provided that all the surveys were conducted by covering children up to the age of 17.

[40] The average education level of mothers is 1.10 if non-standard curriculum and missing observations are not considered.

5.4. Results

First, it is important to check if the compulsory schooling policy leads to an increase in the school enrollment rates. Noting that the question on current school enrollment in the MICS asks if the child has ever attended the school in the current academic year, the compulsory schooling policy leads to an increase in the school attendance in the sample of countries, as seen in Table 5.4.[41] Compared to the effect size observed for Turkey in Chapter III, the increase in school attendance is lower in the sample of LMICS, suggesting that the enforcement capacity might be lower in those countries. The issue of enforcement is also at the heart of the conceptual framework presented in section 2.2.b, which suggests that the compulsory schooling policy can reduce child labor prevalence to the extent of structural factors enabling or hindering its enforcement.

Variables / Sample	**All**	**All**	**All**
HCS	**0.0453*** **	**0.0250*** **	**0.0282*** **
	(0.00903)	(0.00715)	(0.00705)
Observations	69,234	69,234	69,234
R-squared	0.173	0.242	0.237

Table 5.4. Impact of Compulsory Schooling on School Attendance (11-17-Year-Olds)

Note: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. All the specifications include gender of the child, household size, household head's age, dummy variables for whether the mother/father is alive, mother's education, region and age fixed effects, a dummy variable for urban areas. In column (1) county fixed effects are included. In column (2), country and year fixed are included. In column (3), country fixed effects and country specific year trends are included. The sample includes all 14 countries. The standard errors are clustered at region-birth year cohort level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively.

The results concerning the impact of changes in the compulsory schooling policy on child labor in the sample of LMICs are presented in Table 5.5. The first column of the table provides the estimates for the baseline sample of 11-17-year-old children from all 14 countries and all survey rounds available. Accordingly, the

[41] The sample mean of attendance in the sample of 14 countries is 88%, with the lowest (highest) figure of 55% (96) in Kenya (Bosnia and Herzegovina).

impact of the increase in the years of compulsory schooling on the probability of a child working is negative and statistically significant. Considering the sample mean value of 40.0% of children working, the policy reduces the incidence of child labor by around 7%, on average. The control variables are also of the expected sign. Older children, boys, and children from crowded households are more likely to work, while children from less wealthy households and families residing in urban areas are less likely to work. Also, the children of mothers with secondary or tertiary education are less likely to work than those of non-educated mothers.[42]

The following columns of the table present the results of several robustness checks. In the second column, the observations are weighted by the country's population in the survey year. Here, the policy effect is even more substantial, with a 4.87 percentage point reduction in the prevalence of child labor, pointing to an improvement of around 13%. The third column uses the world region by MICS round fixed effects -instead of the country by year fixed effects- to capture the impact of common factors. This approach enables the treatment effect estimation with the contribution of observations from more countries and surveys at the expense of using a looser set of controls. The estimated policy effect is similar to that of the main specification. In the fourth column, the children from those households ranked in the top 5% of the household wealth distribution are excluded. As expected, the policy effect is slightly stronger in this sample compared to the baseline.

[42] The coefficients of age fixed effects are omitted to save space.

	(1)	(2)	(3)	(4)	(5)
Variables / Sample	**All**	**All**	**All**	**All**	**Surveys with both treated and untreated observations**
HCS	**-0.0276*** **	**-0.0487*** **	**-0.0277*** **	**-0.0301*** **	**-0.0368*** **
	(0.00841)	**(0.0139)**	**(0.00825)**	**(0.00847)**	**(0.00978)**
Gender (Female)	-0.0405***	-0.0297***	-0.0404***	-0.0428***	-0.0388***
	(0.00397)	(0.00551)	(0.00398)	(0.00405)	(0.00637)
Household head's age	0.000092	-0.000294	0.000081	0.000112	-0.000246
	(0.000121)	(0.000221)	(0.000121)	(0.000123)	(0.000173)
Household size	0.00336***	0.00644***	0.00360***	0.00353***	0.00391***
	(0.000630)	(0.000902)	(0.000600)	(0.000638)	(0.00134)
Household wealth score (norm.)	-0.0466***	-0.0848***	-0.0457***	-0.0466***	-0.0406***
	(0.00295)	(0.00452)	(0.00295)	(0.00352)	(0.00481)
Mother's education (Primary)	-0.00477	-0.0210*	-0.00875	-0.00839	-0.00636
	(0.00558)	(0.0112)	(0.00560)	(0.00563)	(0.00753)
Mother's education (Secondary)	-0.0383***	-0.0576***	-0.0430***	-0.0385***	-0.0546***
	(0.00671)	(0.0119)	(0.00669)	(0.00684)	(0.00961)
Mother's education (Tertiary)	-0.0717***	-0.124***	-0.0747***	-0.0753***	-0.0933***
	(0.00960)	(0.0148)	(0.00963)	(0.00973)	(0.0124)
Mother's education (Non-Stand.)	0.0232	0.0619	-0.0221	0.0239	-0.0173
	(0.0160)	(0.0428)	(0.0158)	(0.0169)	(0.115)
Mother's education (Missing)	-0.0494***	-0.0952***	-0.0523***	-0.0548***	-0.0688**
	(0.0145)	(0.0312)	(0.0145)	(0.0143)	(0.0269)
Mother is alive	-0.00504	-0.0114	-0.00595	-0.00923	-0.0124
	(0.00906)	(0.0153)	(0.00906)	(0.00921)	(0.0174)
Father is alive	0.00835	0.0116	0.00793	0.0117**	0.0116
	(0.00566)	(0.00978)	(0.00566)	(0.00589)	(0.0113)
Lives in urban area	-0.0796***	-0.0757***	-0.0818***	-0.0768***	-0.0599***
	(0.00497)	(0.00715)	(0.00497)	(0.00504)	(0.00677)
Observations	88,176	88,176	88,176	83,991	31,155
R-squared	0.246	0.194	0.245	0.251	0.342
Sample mean of Child Labor	0.40	0.38	0.40	0.41	0.39

Table 5.5. Impact of Compulsory Schooling on Child Labor (11-17-Year-Olds)

Note: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. The household wealth score is normalized for each survey. For mother's education, the (omitted) base category is 'None'. All the specifications include country, year, country by year, region, and age fixed effects. The standard errors are clustered at the region-birth year cohort level. The full sample includes all 14 countries. In column (2), the observations are weighted by the country's population. (3) includes 'region of the world'*'MICS round' fixed effects rather than country by year. (4) excludes the observations from households in the top 5% of the household wealth score distribution. (5) includes observations from El Salvador, Georgia, Guinea Bissau, Kenya, Lao PDR, Lebanon (Palestinian settlements), North Macedonia, and Vietnam, where both treated and untreated observations are available in the same survey round.

In the final column, only the surveys containing both treated and untreated observations are considered, as they are the main source of identification in the presence of the country by year fixed effects.[43] The policy effect estimated from this

[43] Note that when country by year fixed effects are included in the model, in order the capture the impact of common factors affecting the probability to work -primarily the unobserved factors related

compact sample is also higher than the baseline, with about a 9% improvement in the incidence of child labor. Overall, the robustness checks also confirm the presence of a significant policy effect, with the baseline specification (first column) providing the most conservative estimates. The estimated policy effects are in the range of 7%-to-13% reduction in the prevalence of child labor.[44]

Given the evidence of a statistically significant treatment effect, the following sections investigate whether various structural factors affect this causal link between the increased years of compulsory schooling and child labor. This is an important question to explore, which may offer concrete policy implications provided that several structural issues mediate the impact.

As described in the methodology section and demonstrated in specification (5.2), the interaction term is the primary variable of interest. If the coefficient of the interaction term, β_2, is statistically significant, then the treatment effect is influenced by the structural indicator and is conditional on the level of that indicator. Given that the higher compulsory schooling is expected to reduce the probability of employment, a negative (positive) estimate for β_2 shows that the structural factor considered strengthens (weakens) the policy effect.

5.4.a. The Role of Structural Indicators: Demographics and Population

The first set of structural indicators is related to demographics and population dynamics. These include the age dependency ratios, birth and fertility rates, and life

to demand for child labor-, the policy effect is not identified in surveys with all treated or all untreated observations. The identification comes from surveys containing children that are subject to old and new policy concurrently.

[44] The results are also robust to the inclusion of age group-specific linear time trends or age group by country-specific linear time trends.

expectancy at birth, which may have different impacts on the role of compulsory schooling in reducing child labor. While higher dependency ratios may increase the demand for child labor, higher life expectancy may lower the supply of child labor, given a higher return on investing in own human capital. Population indicators include the population growth rate and density, the share of the rural population, the percentage of the urban population living in slums, and the international migrant stock. An increasing population may increase the competition for jobs. Thus parents may be more willing to invest in a child's education as the negative returns of not investing in a child's education may be substantial.

The estimation results for demography and population-related structural variables are presented in Table 5.6. The old dependency ratio, which is the ratio of people older than 64 to the working-age population (15-64), the international migrant stock as a percentage of the population, and the share of the urban population living in slums weaken the policy effect. For instance, as the old dependency ratio increases, the child labor reduction effect of the change in compulsory schooling becomes more limited. The estimated treatment effects for the 10^{th} percentile, the median**,** and the 90^{th} percentile value of the old-age dependency in the sample are -0.055, -0.047**,** and -0.028, respectively. It is also possible to calculate the threshold value above which the policy effect is insignificant for the observations in the sample. If the old dependency ratio is above 13.5%, the impact of compulsory schooling on child labor is insignificant in the sample investigated. The slums in the urban areas potentially host low-income households and low-quality education infrastructure. Thus, in the slums, the marginal utility from a child's income would be higher due to low household income, and the returns on education would be lower due to inadequate

education quality and high costs of accessing education, weakening the effect of the compulsory schooling policy.

On the other hand, the higher life expectancy of women, higher population growth and density, and a higher share of the rural population strengthen the policy effect. If the expected years of life are higher, the relative returns on human capital investment are also higher. According to the estimates, the compulsory schooling policy reduces child labor in countries with the female life expectancy at birth at or above 69 (the median value is 64.5). Meanwhile, higher population growth and density strengthen the policy effect, potentially through the competition channel.

5.4.b. The Role of Structural Indicators: Women and Gender Equality

Next, structural variables related to the status of women in decision-making processes and gender equality are investigated. In the simple framework presented in Chapter II, the parents jointly decide on the child's labor market and schooling status. More realistically, the optimization might be influenced by the respective bargaining power of each parent, as the objective functions of the mother and the father regarding the child are expected to be different. Basu (2006) presents a theoretical framework where the father and mother have different preferences on the consumption goods, but they share a common disutility from letting the child work. In this framework, the probability of a child working is an inverted-U shaped function of the mother's status in the household. Up to the point where the mother becomes the dominant parent in decision-making, an improvement of the mother's status reduces child labor. This is because the disagreement on spending the child’s wage income turns out to be even stronger. In this perspective, the women’s status in the decision-making processes or

their increased participation in the social and economic activity and gender-equal legislation may influence the policy effect.

The results presented in Table 5.7 suggest that an improvement in the status and participation of the women in decision-making at the household or the macro-level strengthens the child labor-reducing impact of compulsory schooling policy. Among the structural variables considered, the share of seats occupied by women in the national parliament serves as a proxy for the participation of women in the decision-making process at the macro level. The estimation results suggest that, in the sample countries, if the share of women in the parliament is less than 16%, the compulsory schooling policy has no significant effect on child labor. This may be driven by the reluctance of the parliament to pass laws ensuring the enforcement of the policy absent women in the decision process. In an empirical analysis with an instrumental variable approach, Güvercin (2020) estimates the impact of the women's share in the parliament on child labor at the macro level and finds that a one percentage point increase in the former leads to a reduction of 0.36 percentage points in the latter, supporting the findings of the chapter.

The labor force participation of women relative to men and the share of self-employed among working females indicate the mediating impact of the increased involvement of women in economic activity on the effectiveness of the policy. This is consistent with the theoretical framework by de Hoop et al. (2018), where policies targeting strengthening women's economic capacity can reduce child labor by increasing school attendance through the income effect and the augmented power of women in the household. In an empirical analysis, Fatima (2013) finds that an increase in the mother's decision power significantly reduces the probability of a

child working in Pakistan. Considering the descriptive statistics in Table A.1 (in the Appendix), it can be seen that women are not the dominant gender neither in taking decisions at the macro level nor in the labor market in the LMICs analyzed. This suggests that there is room for improvement according to the framework of Basu (2006). At the household level, the participation of women in fertility-related matters is also of great importance. The structural indicator available that may serve as a proxy for that is the share of married women ages 15-49 years with demand for family planning whose demands are satisfied by modern methods. It is expected that the higher the status of women in the household, the higher the probability of modern methods being used. The estimation results suggest that the higher this share, the stronger the policy effect.

Meanwhile, indicators that measure the level of gender equality, the Country Policy and Institutional Assessment (CPIA) gender equality rating -assessing the presence of policies and institutions to enforce laws related to gender equality- and the Women Business and the Law Index Score -measuring the impact of laws and regulations on women's participation in the economy- do not significantly influence the child labor reducing role of compulsory schooling policies. This suggests that de facto indicators weigh more than de jure indicators concerning the role of women in society.

5.4.c. The Role of Structural Indicators: Income and Income Inequality

As discussed in the conceptual framework presented in Chapter II and evaluated in Chapter IV of the thesis, income policies help mitigate child labor. Meanwhile, income inequality exerts extra pressure on the effectiveness of the

policies targeting the elimination of child labor. Dimova (2021) sheds light on the role of income inequality through the lens of political economy models of child labor. For instance, Dessy and Knowles (2008) argue that the time-lapse between investing in education and benefitting from the returns on education is at the center of the bargaining between poor and middle-income households regarding the necessity of introducing policies to tackle child labor. Similarly, Tanaka (2003) proposes a model in which -in the case of high income inequality- investing in education infrastructure and policies targeted at eliminating child labor are not supported by low-income families. Under the majority voting rule, such policies are only supported by the median voter if income inequality is lower. In this framework, the compulsory schooling policy is expected to have a limited effect on the incidence of child labor when income inequality is higher.

The results presented in Table 5.8 provide support for these arguments. First, higher growth of adjusted net national income (Gross National Income minus fixed capital consumption and natural resources depletion) and adjusted net national income per capita strengthens the policy impact. Meanwhile, indicators related to income inequality, i.e., the Gini index, proportion of people living below 50 percent of median income, poverty and multidimensional poverty headcount ratios, suggest that higher income inequality weakens the effectiveness of compulsory schooling in reducing child labor.[45] In a related fashion, equal use of public resources also strengthens the policy effect through their role in reducing income inequality.

[45] The coefficient of the interaction term with the Gini Index is significant when the specification is estimated for the sample of the fifth column of Table 5.5.

5.4.d. The Role of Structural Indicators: Labor Market, Employment, Social Benefits

Labor market and employment-related factors, social transfers, and benefits might impact the household's labor supply decision regarding the child, at least through two channels. First, it may affect the marginal contribution of the child's income to household income as the labor market conditions and the availability of social support programs influence the household income. Second, such conditions affect the parents' relative valuation of the child's time at work and leisure time. In this perspective, Table 5.9 presents the results for the mediating effect of several such structural indicators. The policy effect is stronger in places where the labor force participation of 15-24-year-olds and the share of vulnerable employment (self-employed and contributing family) in total employment are higher. If the parents see that the competition in the labor market will be more challenging due to the higher participation rate, they may be more willing to send the child to school to secure the flow of wage income in the future. Also, the returns on education would be higher in places with a high share of vulnerable employment.

Higher unemployment rates at various levels of disaggregation impede the success of compulsory schooling in reducing child labor, and the policy effect is even weaker in cases of high unemployment among those educated. For instance, in the case of a 10% unemployment among those with basic, intermediate, and advanced education, the estimated policy effect is -0.047, -0.033, and -0.022, respectively. This suggests that parents believe that the returns on education are lower if the unemployment rate of high-educated is high, and that they will be more reluctant to send their child to school, reducing the effectiveness of the policy.

Building on the political economy models of child labor, which predict that a reduction in income inequality is needed to eliminate child labor, Dimova (2021) argues that a high incidence of child labor is still expected to be observed in less-developed countries with a high share of agriculture and services sectors in total employment. Indeed, the results reveal that the policy effect is weaker in places where the share of services in employment is higher. A clear distinction is further observed regarding the children's type of jobs. The policy effect is stronger (weaker) if the share of unpaid family workers (wage workers) among working children is higher. Being a wage worker not only reveals the income needs of the households but also points to stronger ties of the child with the labor market. In this case, breaking the child's links with market work is much more complicated and thus necessitates more potent policy tools.

The generosity of the social support programs might also influence the policy effect. Results suggest that the policy effect is stronger in places with broader coverage of unemployment benefits and alternative labor market programs and in areas with higher social protection ratings. These policies alleviate the income inadequacy of the household as well as decrease the value attached to the child's time at work while increasing the value attached to schooling by the parents.

5.4.e. The Role of Structural Indicators: Education Infrastructure

The conceptual framework discussed in Chapter II suggests that the parents compare the marginal utility of a child's education with the marginal contribution of the child to household income plus the costs of education to be borne. Thus, any structural factor that enhances the marginal utility of schooling is expected to tilt

parents' preference towards sending the child to school. As seen in Table 5.10, the policy effect is stronger when the share of GDP the government spends on education and the expenditure per student is higher. However, the estimates suggest no significant policy effect if the share of the government's education spending in the GDP falls short of roughly 4%.

Selective distribution of the education budget also influences the effectiveness of the policy. Increasing the relative share of education expenditure spent on secondary education (the primary set of pupils that the increased compulsory schooling policy targets) and the share of trained teachers in lower secondary school (as a percentage of trained teachers) strengthens the policy effect, both increasing the returns on schooling for those targeted by the compulsory schooling changes. Apart from the preprimary enrollment rate, enrollment rates and persistence in primary school do not influence the policy effect.

5.4.f. The Role of Structural Indicators: Business Dynamism and Infrastructure

The level of business dynamism might influence the decision of parents whether to send their child to work or school. On one side, it may increase child labor supply as labor demand can be higher in a dynamic economy. On the other side, business dynamism fueled by investment, trade, and exporting strategy may also increase the demand for skills in the labor market and thus may further induce the demand for schooling. The results presented in Table 5.11 suggest that the policy effect is stronger in more dynamic economies (higher investment, merchandise trade, and exports as a percentage of GDP).

The impact of compulsory schooling on child labor is also more substantial in countries with a higher quality of human capital and human resources rating. In such an environment, the opportunity cost of not sending a child to school could be substantially high in terms of future loss of wage income. As in the conceptual framework of Chapter II, compulsory schooling policy has a higher impact on child labor if parents believe that all the other parents are sending their children to school. This belief may be dominant in places where the human capital is of higher quality. In terms of infrastructure, for instance, the policy effect is stronger in countries with a higher share of the urban population having access to electricity and in countries with a higher percentage of mobile phone subscriptions.

The presence of the informal sector in the economy is more likely to lower the going market wage and eventually might decrease the returns on schooling by eliminating the wage premium. In this respect, results show that the policy effect is weaker when the share of the informal sector is higher.

5.4.g. The Role of Structural Indicators: Governance and Policy Effectiveness

Governance may influence the effectiveness of the compulsory schooling policy, primarily through the enforcement of the policy and indirectly through the setting up of the relevant education infrastructure. Political stability, government effectiveness, and the rule of law are relevant governance indicators.[46] The results presented in Table 5.12 reveal that the policy effect is stronger in countries with

[46] As described in the World Governance Indicators, political stability and absence of violence/terrorism measures the perceived probability of political instability, terrorism, and violence. Government effectiveness measures how the quality of public services, policy formulation and the credibility of government is perceived. On the other hand, rule of law, measures the perceptions on how much confidence the citizens have on the rules and to what extent they obey them.

greater political stability, facilitating policy enforcement by creating a safe order. Government effectiveness also has a negative sign, but it is not statistically significant, nor is the coefficient of the rule of law. Next to the enforceability of the rules and regulations, the policies' effectiveness might also enhance the policy effect. Among the indicators considered, better fiscal policy and higher quality of budgetary and financial management rating strengthen the policy effect. In contrast, macroeconomic management rating does not influence the impact of compulsory schooling on reducing child labor.

Variables / SI	Age dependency ratio	Age dependency ratio, old	Age dependency ratio, young	Birth rate, Crude	Fertility rate, total	Adolescent fertility rate	International migrant stock
HCS	-0.095**	-0.078***	-0.025	-0.005	-0.028	-0.037*	-0.005
	(0.044)	(0.015)	(0.027)	(0.025)	(0.023)	(0.019)	(0.016)
SI	0.003	0.187***	0.002	0.004	0.024	-0.017***	0.084***
	(22.537)	(0.069)	(16.133)		(35.931)	(0.006)	(0.026)
HCS*SI	***0.0013***	***0.0048******	***0.0000***	***-0.0012***	***0.0003***	***0.0002***	***0.0063******
	(0.001)	(0.001)	(0.001)	(0.001)	(0.009)	(0.000)	(0.002)
Observations	88176	88176	88176	88176	88176	88176	28254

Variables / SI	Life expectancy at birth, female	Life expectancy at birth, male	Life expectancy at birth, total	Population density	Population growth	Population living in slums	Rural population
HCS	0.140	0.050	0.107	-0.009	-0.010	-0.216***	0.05**
	(0.095)	(0.105)	(0.102)	(0.011)	(0.010)	(0.065)	(0.025)
SI	0.093***	-0.004	-0.007	0.003***	0.042***	0.019	0.029**
	(0.032)		(32.746)	(0.001)	(0.011)	(0.031)	(0.012)
HCS*SI	***-0.0023****	***-0.0011***	***-0.0019***	***-0.0001****	***-0.0177******	***0.0042******	***-0.0014******
	(0.001)	(0.002)	(0.001)	(0.000)	(0.007)	(0.002)	(0.000)
Observations	88176	88176	88176	88176	88176	35119	88176

Table 5.6. The Role of Structural Indicators: Demographics and Population

Note: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. SI refers to the structural indicator in the column. Each column presents the results of estimations of specification 5.2 with different structural indicators for 11-17-year-old children. All the specifications include country, year, country by year, region and age fixed effects, a dummy variable for urban areas, gender of the child, dummy variables for whether the mother/father is alive, mother's education, household size, and household head's age. The models also include the interaction of the policy variable with a structural indicator (depicted in the column title). The main estimate of interest is that of the interaction term. The standard errors are clustered at region-birth year cohort level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. The short description and the summary statistics for structural indicators are available in the Appendix, Table A.1.

Variables / SI	CPIA gender equality rating	Proportion of seats held by women in the parliament	Women Business and the Law Index Score	Ratio of female to male labor force participation rate	Employers, female	Self-employed, female	Tertiary education, female academic staff	Demand for family planning satisfied by modern methods
HCS	0.142	0.021	-0.017	0.05	-0.025**	0.038	-0.077	0.12***
	(0.113)	(0.018)	(0.038)	(0.032)	(0.011)	(0.025)	(0.076)	(0.03)
SI	0.965***	0.057***	-0.015***	0.022***	-0.105***	0.034***	-0.075***	-0.035***
	(0.086)	(0.022)	(0.005)	(0.008)	(0.038)	(0.013)	(0.026)	(0.006)
HCS*SI	***-0.0422***	***-0.0022******	***-0.0002***	***-0.001****	***-0.0029***	***-0.001******	***0.0012***	***-0.0021******
	(0.027)	(0.001)	(0.000)	(0.000)	(0.008)	(0.000)	(0.002)	(0.001)
Observations	58938	88176	88176	88176	88176	88176	56223	32124

Table 5.7. The Role of Structural Indicators: Women and Gender Equality

Variables / SI	GDP growth	Adjusted net national income	Adjusted net national income per capita	Gini index	Proportion of people living below 50 percent of median income	Poverty headcount ratio at national poverty lines	Multidimensional poverty headcount ratio	CPIA equity of public resource use rating
HCS	-0.01	-0.011	-0.015	-0.302	-0.322***	-0.242***	-0.423***	0.184***
	(0.021)	(0.014)	(0.013)	(0.243)	(0.058)	(0.065)	(0.138)	(0.068)
SI	1.48***	-0.011**	-0.006	-0.023***	-0.046***	-0.031***	-0.012**	0.338***
	(0.534)	(0.005)	(0.003)	(0.003)	(0.005)	(0.004)	(0.006)	(0.028)
HCS*SI	***-0.0029***	***-0.0042******	***-0.0042******	0.0071	***0.0201******	***0.0081******	***0.0097******	***-0.0554******
	(0.003)	(0.001)	(0.001)	(0.006)	(0.004)	(0.002)	(0.003)	(0.017)
Observations	88176	71033	71033	29950	29950	17312	11512	58938

Table 5.8. The Role of Structural Indicators: Income and Income Inequality

Note for both tables: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. SI refers to the structural indicator in the column. Each column presents the results of estimations of specification 5.2 with different structural indicators for 11-17-year-old children. All the specifications include country, year, country by year, region and age fixed effects, a dummy variable for urban areas, gender of the child, dummy variables for whether the mother/father is alive, mother's education, household size, and household head's age. The models also include the interaction of the policy variable with a structural indicator (depicted in the column title). The main estimate of interest is that of the interaction term. The standard errors are clustered at region-birth year cohort level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. The short description and the summary statistics for structural indicators are available in the Appendix, Table A.1.

Variables / SI	Labor force participation rate for ages 15-24, total	Vulnerable employment, total	Self-employed, total	Contributing family workers, total	Unemployment advanced education	Unemployment basic education	Unemployment intermediate education	Unemployment total	Unemployment youth total
HCS	0.103***	0.041	0.059*	-0.008	-0.099***	-0.092***	-0.086***	-0.053***	-0.058***
	(0.028)	(0.028)	(0.032)	(0.022)	(0.015)	(0.014)	(0.014)	(0.01)	(0.01)
SI	0.026**	0.03***	0.031***	0.015***	0.099	-0.033**	0.014	-0.071***	-0.032***
	(0.01)	(0.011)	(0.011)	(0.005)	(0.061)	(0.016)	(0.023)	(0.025)	(0.011)
HCS*SI	***-0.0026******	***-0.0011******	***-0.0013******	***-0.0009***	***0.0078******	***0.0046******	***0.0053******	***0.0047******	***0.0026******
	(0.001)	(0.000)	(0.000)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
Observations	88176	88176	88176	88176	38147	38147	38147	88176	88176

Variables / SI	Employment in agriculture	Employment in industry	Employment in services	Children in employment, unpaid family workers	Children in employment, wage workers	Coverage of social insurance programs	Coverage of social safety net programs	Coverage of unemployment benefits and ALMP	CPIA social protection rating
HCS	0.011	-0.004	-0.086***	0.902***	-0.202***	-0.014	-0.089**	-0.012	-0.009
	(0.023)	(0.02)	(0.022)	(0.204)	(0.064)	(0.034)	(0.043)	(0.022)	(0.053)
SI	0.079***	0.13***	-0.046***	-0.079**	0.027**	-0.085***	-0.034***	0.056***	-0.185***
	(0.029)	(0.045)	(0.017)	(0.04)	(0.014)	(0.013)	(0.005)	(0.008)	(0.045)
HCS*SI	***-0.0008****	***-0.0014***	***0.0017******	***-0.011******	***0.015******	***-0.004***	***0.0005***	***-0.0047******	***-0.0101***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.001)	(0.002)	(0.018)
Observations	88176	88176	88176	23246	23246	19365	19365	12195	58938

Table 5.9. The Role of Structural Indicators: Labor Market, Employment, Social Benefits

Note: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. SI refers to the structural indicator in the column. Each column presents the results of estimations of specification 5.2 with different structural indicators for 11-17-year-old children. All the specifications include country, year, country by year, region and age fixed effects, a dummy variable for urban areas, gender of the child, dummy variables for whether the mother/father is alive, mother's education, household size, and household head's age. The models also include the interaction of the policy variable with a structural indicator (depicted in the column title). The main estimate of interest is that of the interaction term. The standard errors are clustered at region-birth year cohort level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. The short description and the summary statistics for structural indicators are available in the Appendix, Table A.1.

Variables / SI	Government expenditure on education, total	Government expenditure per student, primary	Government expenditure per student, tertiary	Expenditure on primary education	Expenditure on secondary education	Expenditure on tertiary education	Pupil-teacher ratio, primary
HCS	0.118***	0.168***	0.108**	-0.235***	0.131**	-0.097***	-0.067*
	(0.029)	(0.051)	(0.043)	(0.06)	(0.064)	(0.033)	(0.038)
SI	-0.125***	-0.039***	0.004	-0.015***	0.019***	-0.219**	0.077***
	(0.035)	(0.005)	(7.016)	(0.002)	(0.002)	(0.094)	(0.027)
HCS*SI	***-0.0365******	***-0.0144******	***-0.0051******	***0.0054******	***-0.0046******	***0.0043****	***0.001***
	(0.008)	(0.003)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	46708	27176	31985	21032	21032	32341	71653

Variables / SI	School enrollment, preprimary	School enrollment, primary	Primary completion rate, total	Persistence to last grade of primary, total	Trained teachers in lower secondary education	Trained teachers in preprimary education	Trained teachers in primary education
HCS	0.075***	0.095	-0.003	-0.064	2.01***	0.017	0.023
	(0.025)	(0.126)	(0.05)	(0.082)	(0.408)	(0.047)	(0.057)
SI	-0.002	-0.006	-0.032***	-0.273***	0.009**	-0.001	0.016**
	(0.003)		(0.002)	(0.073)	(0.004)	(0.002)	(0.008)
HCS*SI	***-0.002******	***-0.0013***	***-0.0003***	***0.0005***	***-0.0212******	***-0.0005***	***-0.0007***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)
Observations	72902	76237	62894	57460	42340	44922	53666

Table 5.10. The Role of Structural Indicators: Education Infrastructure

Note: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. SI refers to the structural indicator in the column. Each column presents the results of estimations of specification 5.2 with different structural indicators for 11-17-year-old children. All the specifications include country, year, country by year, region and age fixed effects, a dummy variable for urban areas, gender of the child, dummy variables for whether the mother/father is alive, mother's education, household size, and household head's age. The models also include the interaction of the policy variable with a structural indicator (depicted in the column title). The main estimate of interest is that of the interaction term. The standard errors are clustered at region-birth year cohort level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. The short description and the summary statistics for structural indicators are available in the Appendix, Table A.1.

Variables / SI	Gross fixed capital formation	Merchandise trade	Exports of goods and services	Liner shipping connectivity index	Foreign direct investment, net inflows	Stocks traded, total value	Oil rents	Coal rents	Arable land/ hectares per person
HCS	0.108***	0.045***	0.089***	0.03**	-0.043**	0.033	-0.007	0.005	-0.054***
	(0.041)	(0.016)	(0.021)	(0.014)	(0.018)	(0.034)	(0.009)	(0.011)	(0.018)
SI	0.014***	-0.005**	-0.005*	-0.002	-0.015***	0.016**	0.03***	-0.031	0.346
	(0.004)	(0.002)	(0.002)	(0.002)	(0.005)	(0.006)	(0.011)	(0.024)	(3029.321)
HCS*SI	***-0.0049******	***-0.0009******	***-0.0023******	***-0.0031******	***0.0021***	***-0.0051******	***-0.0087******	***-0.0413******	***0.1854****
	(0.002)	(0.000)	(0.000)	(0.001)	(0.002)	(0.001)	(0.002)	(0.011)	(0.100)
Observations	80356	88176	80356	44760	88176	18261	88176	80356	81108

Variables / SI	Access to electricity, urban	Fixed broadband subscriptions	Fixed telephone subscriptions	Individuals using the Internet	Mobile cellular subscriptions	CPIA business regulatory environment rating	CPIA building human resources rating	Human capital index	Informal sector
HCS	0.206*	-0.035***	-0.048*	-0.016	-0.004	-0.132**	0.116	0.194***	-0.093***
	(0.123)	(0.009)	(0.028)	(0.017)	(0.014)	(0.063)	(0.113)	(0.048)	(0.014)
SI	-0.132***	-0.01	0.104***	0.005***	-0.001**	1.346***	0.92***	0.894	0.277
	(0.047)	(0.007)	(0.037)	(0.002)	(0.000)	(0.081)	(0.077)		(0.113)
HCS*SI	***-0.0024****	***0.0023***	***0.0014***	***-0.0005***	***-0.0004****	***0.0274***	***-0.0406***	***-0.4914******	***0.0022******
	(0.001)	(0.003)	(0.002)	(0.001)	(0.000)	(0.018)	(0.030)	(0.089)	(0.000)
Observations	87428	73744	86702	86387	88176	58938	58938	26033	77736

Table 5.11. The Role of Structural Indicators: Business Dynamism and Infrastructure

Note: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. SI refers to the structural indicator in the column. Each column presents the results of estimations of specification 5.2 with different structural indicators for 11-17-year-old children. All the specifications include country, year, country by year, region and age fixed effects, a dummy variable for urban areas, gender of the child, dummy variables for whether the mother/father is alive, mother's education, household size, and household head's age. The models also include the interaction of the policy variable with a structural indicator (depicted in the column title). The main estimate of interest is that of the interaction term. The standard errors are clustered at region-birth year cohort level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. The short description and the summary statistics for structural indicators are available in the Appendix, Table A.1.

Variables / SI	Political stability / Lack of terrorism	Government effectiveness	Rule of law	CPIA fiscal policy rating	CPIA macroeconomic management rating	CPIA quality of budgetary and financial management rating
HCS	-0.033***	-0.044**	-0.025	0.073*	-0.014	0.492***
	(0.008)	(0.018)	(0.027)	(0.042)	(0.049)	(0.115)
SI	0.184***	-0.032	0.031	-0.856***	-0.297***	0.494***
	(0.063)	(299.676)		(0.077)	(0.027)	(0.039)
HCS*SI	***-0.0372******	***-0.0519***	***0.0031***	***-0.029******	***-0.0059***	***-0.1431******
	(0.011)	(0.044)	(0.035)	(0.011)	(0.012)	(0.031)
Observations	88176	88176	88176	58938	58938	58938

Table 5.12. The Role of Structural Indicators: Governance and Policy Effectiveness

Note: HCS is the treatment indicator referring to children who are subject to higher years of compulsory schooling. SI refers to the structural indicator in the column. Each column presents the results of estimations of specification 5.2 with different structural indicators for 11-17-year-old children. All the specifications include country, year, country by year, region and age fixed effects, a dummy variable for urban areas, gender of the child, dummy variables for whether the mother/father is alive, mother's education, household size, and household head's age. The models also include the interaction of the policy variable with a structural indicator (depicted in the column title). The main estimate of interest is that of the interaction term. The standard errors are clustered at region-birth year cohort level. ***, **, * refer to statistically significant coefficients at 1, 5, and 10% levels, respectively. The short description and the summary statistics for structural indicators are available in the Appendix, Table A.1.

5.5. Conclusion

This chapter investigates the effect of the lengthening of compulsory schooling on the prevalence of child labor in LMICs, and how this effect is influenced by the structural factors, using detailed household surveys covering the 2000-2019 period. The results first suggest that the extension of compulsory schooling reduces child labor in the LMICs. The chapter reports that the higher years of compulsory schooling (HCS) policy, on average, reduces the incidence of employment among 11-17-year-old children by 7-to-13%, depending on the specification. Given that the sample average incidence of child labor is very high –around 40%, the policy effect is of non-negligible magnitude. This result provides causal evidence on the effectiveness of compulsory schooling in reducing child labor from a panel of LMICs, which directly contributes to the literature, where cross-country causal investigations are lacking.

The second contribution of the chapter is the incorporation of the structural issues into the analysis and the investigation of the structural and institutional settings under which compulsory schooling policy would be more effective. The empirical framework exercised renders the effectiveness of the policy dependent on the level of the structural indicator considered. Accordingly, the chapter provides an empirical evaluation of the recently discussed structural factors in theoretical contributions. This is an important question to investigate, which may give concrete policy implications as the results suggest that various structural factors influence the effectiveness of the compulsory schooling policy in reducing child labor. The chapter contributes to the literature by explicitly introducing and quantifying the role of structural factors, which has not been directly considered in previous studies.

Among those structural factors, the policy effect is weaker, for instance, if the old dependency ratio increases, the level of income inequality is higher, the size of the informal sector is larger, or in countries where the share of services in employment is more elevated. Meanwhile, the policy effect is stronger, for instance, if the share of government education spending in GDP and the relative share of education expenditure spent on secondary education is higher; when the status and participation of the women in decision making in the household or the macro-level improves; in more dynamic economies with higher investment, merchandise trade and exports as a percentage of GDP; in countries with higher human capital quality; and with greater political stability.

In the conceptual frameworks discussed in Chapter II, the structural issues influence the valuation of a child's time at various activities by the parents, where the marginal contribution of the income received by the child to family income, the marginal cost-benefit of sending the child to school, and the gender roles in household decision making play essential roles. On top of that, several structural issues directly influence the enforceability of compulsory schooling policy, making the parents consider the other parents' actions as well.

In this perspective, the main policy implication is that certain structural blocks must be well in place for the compulsory schooling policy to be successful. For instance, if the share of government spending on education in the GDP is not adequate -roughly below 4% of GDP in the sample of countries- the compulsory schooling policy has no significant impact on child labor. Another implication is that if the structural issues persist, other policies, such as income policies, as discussed in Chapter IV, should accompany compulsory schooling to reduce child labor.

CHAPTER VI

CONCLUSION

This thesis, acknowledging the adverse effects of child labor on a child's wellbeing, discusses and evaluates two types of policies that could potentially reduce the incidence of child labor. First, the policies aiming at increasing household income may help get the households out of the poverty/low-income trap and reduce their need to resort to the child's labor income. Second, the compulsory schooling policy limits the child's time to devote to activities other than schooling, such as supplying labor. Despite their potential to eradicate child labor, the earlier empirical evidence suggests that the effectiveness of both the income and compulsory schooling policies are not univocal and are highly context-dependent. This outcome certainly highlights the need for more country-specific evaluations.

In a related fashion, another issue that needs to be considered when evaluating the impact of policies, such as compulsory schooling, is the structural and socio-cultural setting where the policies are administered. Despite recent studies mentioning the potential role of structural issues concerning child labor, this role has not been investigated in a cross-country framework that can reveal the structural differences.

The impacts of these policies on child labor are investigated in the case of Turkey. The effect of extending compulsory schooling to 12 years and the increase in the minimum wage are evaluated in Chapter III and Chapter IV, respectively. The

mediating role of structural factors is also integrated into the analysis when assessing the impact of compulsory schooling policy on child labor in LMICs in Chapter V.

The findings of Chapter III and Chapter IV, to a large extent, align with previous literature reporting heterogeneous effects across age groups, gender, and labor market indicators, as the income and compulsory schooling policies are effective in reducing specific labor market outcomes of children, but only to some extent. For instance, the extension of compulsory schooling leads to a decline in the probability of longer hours per week across age groups, but it reduces the likelihood of being a wage earner only in the 6-13 age group. Meanwhile, compulsory schooling policy even increases some outcomes, such as the probability of 14-17-year-old girls working in qualified occupations. Or the minimum wage increase reduces the employment probability of girls younger than 15 and the probability of working longer hours for 15-17-year-old boys. At the same time, there is no significant reduction in the employment probability of children from households where only one adult is working.

In the case of both types of policies, it is possible to drive implications for the effectiveness of the interventions. For compulsory schooling, it has already been shown in the literature that compulsory schooling policy works better when combined with other policies that reduce the direct cost of education, as discussed in Chapter II. However, the thesis findings further suggest that those additional policies that reduce the direct cost of schooling should not at the same time provide an alternative that circumvents the obligation of physical attendance at school. Those policies, such as the possibility to enroll in distance learning high schools to fulfill the requirement

of mandatory high school education, potentially lower the effectiveness of the compulsory schooling policy in reducing child labor.

Regarding the impact of income policies, the findings suggest that the increase in household income should be high enough to push families out of poverty or low-income status. In the intervention evaluated in the thesis, a roughly 35% real increase in the minimum wage in a country where a large portion of the wage earners receive it -and over a period where all the other wages have almost stagnated in real terms- does not eliminate child labor. These findings are also in parallel with what Rosati (2022) urges for the interventions regarding household income to be: "big pushes" to facilitate households move out of "child labor traps".

The structural and socio-cultural setup of the countries may be one of the reasons for the highly context-dependent findings regarding the impact of similar interventions on the incidence of child labor. Indeed, the results of Chapter V show that a large set of indicators, spanning various structural issues, influence the effectiveness of the compulsory schooling policy in reducing child labor in LMICs. This finding suggests that any structural obstacle that could be eliminated should also be considered to increase the policy effectiveness.

The empirical findings in the thesis univocally point to a significant policy implication regarding the setup of policies targeting the elimination of child labor. When designing programs to fight child labor, the policies need to be combined in a unified framework, where potential general equilibrium effects of different interventions are carefully considered to get the highest impact and reduce unwanted consequences. Any potential structural issue should be addressed -or at least should be incorporated in the design of the intervention- and all the interventions should be

administered in coordination. The need for carefully designed policies is especially of higher importance for less developed countries, where the incidence of child labor is far more severe than in developed countries.

The thesis results also have implications for the definition of child labor and potential additions to the theoretical model. Policies not only induce a tradeoff between schooling and economic activity (market work or home production/family business) but might also influence the child's participation in house chores. From the data perspective, house chores should also be considered a type of child labor. They are currently not included in the United Nations System of National Accounts, and ILO and UNICEF (2021) only consider the participation in the house chores for more than 21 hours per week as a form of hazardous work and include that in child labor statistics. The child's time at house chores is also a foregone time that could have been allocated to education or leisure -the two main ingredients of the child's future welfare in the theoretical model discussed in Chapter II. In this regard, time spent on house chores should also be explicitly incorporated into the workhorse household decision-making model of allocating a child's time. This addition is essential to gauge the optimal time allocation and better characterize the gender roles as girls are more likely to engage with house chores.

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APPENDIX

A1. Short Description and Descriptive Statistics of Structural Indicators

Indicator	Short Description / Unit of Measure	Source	Obs.	Mean	Std. Dev.	Min	Max
Demography and Population							
Age dependency ratio	% of working-age population	WDI	88,176	68.2	20.3	41.4	107.2
Age dependency ratio, old	% of working-age population	WDI	88,176	8.2	3.7	3.6	21.8
Age dependency ratio, young	% of working-age population	WDI	88,176	60.0	22.8	24.7	101.3
Birth rate, crude	per 1,000 population	WDI	88,176	26.9	11.0	9.2	50.9
Fertility rate, total	births per woman	WDI	88,176	3.4	1.7	1.3	7.4
Adolescent fertility rate	births per 1,000 women ages 15-19	WDI	88,176	79.4	52.3	16.2	212.4
International migrant stock	% of population; includes refugees	WDI	28,254	2.9	3.2	0.1	19.0
Life expectancy at birth, female	years	WDI	88,176	68.3	9.9	48.9	80.5
Life expectancy at birth, male	years	WDI	88,176	63.2	8.4	46.5	76.7
Life expectancy at birth, total	years	WDI	88,176	65.7	9.1	47.7	78.5
Population density	people per sq. km of land area	WDI	88,176	142.1	141.1	6.6	508.5
Population growth	annual %	WDI	88,176	1.8	1.1	-0.6	4.9
Population living in slums	% of urban population	WDI	35,119	45.9	29.8	9.7	93.9
Rural population	% of total population	WDI	88,176	57.0	20.6	12.5	80.1
Women and Gender Equality							
CPIA gender equality rating	(1=low to 6=high)	WDI	58,938	3.6	0.9	2.0	4.5
Proportion of seats held by women in national parliaments	%	WDI	88,176	17.0	8.7	0.0	30.9
Women Business and the Law Index	scale 1-100	WDI	88,176	68.1	13.2	40.0	88.1
Ratio of female to male labor force participation rate	%, modeled ILO estimate	WDI	88,176	77.1	18.4	29.2	97.5
Employers, female	% of female employment, ILO estimate	WDI	88,176	1.3	1.3	0.1	6.3
Self-employed, female	% of female employment, ILO estimate	WDI	88,176	69.1	27.3	14.6	99.4
Tertiary education academic staff	% female	WDI	56,223	41.7	8.4	4.6	64.4
Demand for family planning satisfied by modern methods	% of married women 15-49 years with demand	WDI	32,124	50.0	27.9	13.6	84.0

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Indicator	Short Description / Unit of Measure	Source	Obs.	Mean	Std. Dev.	Min	Max
Labor Market, Employment and Social Benefits							
Labor force participation rate (15-24)	total (%), for ages 15-24, ILO estimate	WDI	88,176	50.8	11.7	27.5	70.5
Vulnerable employment	% of total employment, ILO estimate	WDI	88,176	66.0	22.1	22.4	94.8
Self-employed, total	% of total employment, ILO estimate	WDI	88,176	68.4	20.3	27.5	95.0
Contributing family workers	% of total employment, ILO estimate	WDI	88,176	18.2	11.1	1.5	39.5
Unemployment with advanced education	% of total labor force with advanced education	WDI	38,147	7.5	9.3	1.3	46.0
Unemployment with basic education	% of total labor force with basic education	WDI	38,147	7.3	8.3	0.7	37.1
Unemployment with intermediate education	% of total labor force with intermediate educ.	WDI	38,147	8.4	6.3	1.6	31.6
Unemployment, total	% of total labor force, ILO estimate	WDI	88,176	4.8	6.4	0.7	37.3
Unemployment, youth total	% of total labor force ages 15-24, ILO estimate	WDI	88,176	9.8	11.9	1.7	63.2
Employment in agriculture	% of total employment, ILO estimate	WDI	88,176	49.6	23.4	11.3	82.2
Employment in industry	% of total employment, ILO estimate	WDI	88,176	14.3	8.3	1.9	32.9
Employment in services	% of total employment, ILO estimate	WDI	88,176	36.1	16.8	13.6	71.0
Children in employment, unpaid family workers	% of children in employment, ages 7-14	WDI	23,246	77.1	11.2	63.6	92.1
Children in employment, wage workers	% of children in employment, ages 7-14	WDI	23,246	7.2	3.8	1.6	20.4
Coverage of social insurance programs	% of population	WDI	19,365	11.6	6.0	6.2	30.5
Coverage of social safety net programs	% of pop., transfers, social assistance, etc.	WDI	19,365	31.9	11.9	8.1	53.1
Coverage of unemployment benefits and ALMP	% of population, active labor market programs	WDI	12,195	9.1	6.5	1.8	18.4
CPIA social protection rating	(1=low to 6=high)	WDI	58,938	3.0	0.6	2.0	4.0
Education Infrastructure							
Government expenditure on education, total	% of GDP	WDI	46,708	3.2	1.3	1.5	5.7
Government expenditure per student, primary	% of GDP per capita	WDI	27,176	13.2	4.6	7.1	21.8
Government expenditure per student, tertiary	% of GDP per capita	WDI	31,985	92.1	89.5	10.5	216.9
Expenditure on primary education	% of government expenditure on education	WDI	21,032	41.5	9.4	29.0	68.1
Expenditure on secondary education	% of government expenditure on education	WDI	21,032	33.7	6.3	17.4	43.1
Expenditure on tertiary education	% of government expenditure on education	WDI	32,341	18.6	5.7	8.0	28.8
Pupil-teacher ratio, primary	ratio, pupils per teacher	WDI	71,653	31.3	16.2	14.2	68.6
School enrollment, preprimary	% gross	WDI	72,902	41.6	32.5	1.1	116.8
School enrollment, primary	% gross	WDI	76,237	101.2	12.2	63.7	122.4
Primary completion rate, total	% of relevant age group	WDI	62,894	82.5	26.1	22.1	107.2
Persistence to last grade of primary, total	% of cohort	WDI	57,460	79.1	17.5	46.9	98.8
Trained teachers in lower secondary education	% of total teachers	WDI	42,340	89.5	10.0	70.3	100.0
Trained teachers in preprimary education	% of total teachers	WDI	44,922	70.6	20.7	22.7	98.5
Trained teachers in primary education	% of total teachers	WDI	53,666	80.7	15.4	35.1	100.0

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Indicator	Short Description / Unit of Measure	Source	Obs.	Mean	Std. Dev.	Min	Max
Business Dynamism and Infrastructure							
Gross fixed capital formation	% of GDP	WDI	80,356	24.1	6.4	10.6	33.6
Merchandise trade	% of GDP	WDI	88,176	68.7	32.7	32.6	160.1
Exports of goods and services	% of GDP	WDI	80,356	38.9	17.4	12.8	86.4
Liner shipping connectivity	index, maximum value in 2004 = 100	WDI	44,760	21.9	13.0	3.8	48.2
Foreign direct investment, net inflows	% of GDP	WDI	88,176	5.1	2.9	0.2	12.2
Stocks traded, total value	% of GDP	WDI	18,261	10.8	9.2	0.3	26.6
Oil rents	% of GDP	WDI	88,176	4.5	7.1	0.0	21.1
Coal rents	% of GDP	WDI	80,356	0.3	0.5	0.0	2.2
Arable land	hectares per person	WDI	81,108	0.2	0.1	0.0	0.4
Access to electricity, urban	% of urban population	WDI	87,428	80.6	29.7	10.1	100.0
Fixed broadband subscriptions	per 100 people	WDI	73,744	1.9	2.9	0.0	13.6
Fixed telephone subscriptions	per 100 people	WDI	86,702	7.9	7.1	0.0	26.3
Individuals using the Internet	% of population	WDI	86,387	18.8	17.0	0.0	56.7
Mobile cellular subscriptions	per 100 people	WDI	88,176	55.8	47.1	0.0	148.4
CPIA business regulatory environment rating	(1=low to 6=high)	WDI	58,938	3.0	0.6	2.0	4.0
CPIA building human resources rating	(1=low to 6=high)	WDI	58,938	3.4	0.6	2.5	4.0
Human capital index	HCI, scale 0-1	WDI	26,033	0.4	0.1	0.3	0.7
Informal sector	% of GDP, Informal Economy Database	WB	77,736	82.7	115.9	1.8	472.1
Governance and Policy Effectiveness							
Political stability / Lack of terrorism	estimate, ranging approx. from -2.5 to 2.5	WGI	88,176	-0.4	0.7	-1.8	0.4
Government effectiveness	estimate, ranging approx. from -2.5 to 2.5	WGI	88,176	-0.6	0.5	-1.6	0.2
Rule of law	estimate, ranging approx. from -2.5 to 2.5	WGI	88,176	-0.8	0.5	-1.5	0.1
CPIA fiscal policy rating	(1=low to 6=high)	WDI	58,938	3.3	0.7	2.5	4.5
CPIA macroeconomic management rating	(1=low to 6=high)	WDI	58,938	3.6	0.8	2.0	5.5
CPIA quality of budgetary and financial management	(1=low to 6=high)	WDI	58,938	3.1	0.7	2.0	4.0

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Indicator	Short Description / Unit of Measure	Source	Obs.	Mean	Std. Dev.	Min	Max
Income and Income Inequality							
GDP growth	annual %	WDI	88,176	6.0	3.4	-0.9	13.6
Adjusted net national income	annual % growth	WDI	71,033	6.3	6.8	-11.5	27.2
Adjusted net national income p.c.	per capita, annual % growth	WDI	71,033	4.4	7.0	-13.7	25.9
Gini index	World Bank estimate	WDI	29,950	38.8	5.4	27.7	51.5
Proportion of people living below 50 % of median income	%	WDI	29,950	14.1	4.2	3.8	20.8
Poverty headcount ratio at national poverty lines	% of population	WDI	17,312	26.4	7.3	13.5	39.9
Multidimensional poverty headcount ratio	% of total population	WDI	11,512	35.8	8.0	29.2	50.4
CPIA equity of public resource use rating	(1=low to 6=high)	WDI	58,938	3.4	0.8	2.0	4.5

Table A.1. Short Description and Descriptive Statistics of Structural Indicators

Note: The descriptive statistics are for the estimation sample for 14 countries over the survey years. WDI: World Development Indicators, WGI: World Governance Indicators, WB: World Bank.

TÜRKÇE ÖZET

Küresel ölçekte en güncel tahminler 2020 yılı itibarıyla dünyada 160 milyon çocuğun yaşlarına uygun olmayan ya da sağlıklarına zarar verebilecek işlerde çalıştığına işaret etmektedir (ILO ve UNICEF, 2021). Bu sayı, neredeyse dünyadaki 5-17 yaş aralığındaki çocukların yüzde 10'una denk gelmektedir. Daha kapsamlı bir tanımlama ile ele alındığında ise, 2016 yılı itibarıyla dünyada 218 milyon çocuğun çalıştığı tahmin edilmektedir (ILO, 2017). Bu sayılar aslında çocukların çalışmasının ne ölçüde önemli bir konu olduğunu göstermektedir. Bu görünüm, özellikle az gelişmiş ülkelerde çok daha çarpıcıdır.

Çocukların çalışması hem onların refahı hem de beşeri sermaye birikimleri üzerindeki olası olumsuz etkileri nedeniyle hem ekonomistlerin hem de politika yapıcıların ilgisini çekmektedir. Brown vd. (2003) çocuk işçiliğine dair ilk dönem teorileri ve ampirik bulguları özetlemektedir. Edmonds (2008) çocuk işçiliğinin ekonomik bir tartışması ile veri ve ölçüme dair konular ile belirli politikaların etki analizlerini paylaşmaktadır. Edmonds ve Pavcnik (2005) ile Edmonds ve Theoharides (2021) sırasıyla küreselleşme ve iktisadi kalkınma çerçevesinde çocuk işgücünün ekonomik bir analizini yapmaktadırlar. Rosati (2022) ise çocuk istihdamına ilişkin yakın dönemdeki teorik gelişmeleri ve uygulanan politikaları analiz etmektedir.

Bu tezin arka planında yer alan kuramsal çerçeve, hanehalkının refahını maksimize edecek şekilde çocuğun zamanının farklı aktivitelere optimal olarak dağıtılmasını amaçlayan bir hanehalkı karar verme modeline dayanmaktadır. Bu modelde, hanehalkının fayda fonksiyonunda çocuk sayısı, çocuk başına eğitim miktarı, ebeveynlerin ve çocukların boş zamanı ve bir tüketim malı yer almaktadır (örneğin, Basu ve Van 1998, Baland ve Robinson, 2000; Cigno ve Rosati, 2005; Edmonds, 2008; Rosati, 2022). Bu temel model, birtakım ödünleşimleri harekete geçirerek, farklı politikaların çocuk işgücü üzerindeki etkilerinin incelenmesine imkân sağlamaktadır. Bu ödünleşimler arasında, örneğin, çocuğun çalışması ve boş zamanı, çocukların sayısı ve kalitesi, çocuğun eğitiminin göreli getirisi ile çocuğun ücret gelirinin sağladığı marjinal fayda yer almaktadır.

Bu kuramsal çerçeve, tezde etkisi incelenen zorunlu eğitim ve ebeveyn gelirinin artırılması gibi politikaların çocuk istihdamını hangi kanallar üzerinden etkileyebileceğine ışık tutmaktadır. Bu modelin, zorunlu eğitim politikasının etkinliğini yapısal unsurlar ve uygulama kapasitesine bağlayan bir uzantısı da sunulmaktadır.

Zorunlu eğitim politikası öğrencilerin önceden belirlenmiş bir süre boyunca eğitim sisteminde kalmalarını şart koşar. Bu politika, çocukların eğitimi için ayrılan zamana bir alt sınır getirerek çocukların çalışma gibi diğer aktivitelere ayıracakları zamanı kısıtlamayı amaçlar. Bu sayede bu politika çocuk istihdamının azaltılmasına yardımcı olabilecektir. Böyle bir etkinin varlığına ilişkin sunulan sınırlı sayıdaki ampirik bulgu ise tam bir uzlaşma içinde değildir; çünkü zorunlu eğitimin çocukların çalışma ihtimali üzerindeki anlamlı etkileri, analiz edilen gruba ve ülkeye göre değişebilmektedir. Bu da aslında bu politikanın etkisinin farklı sosyokültürel yapıya sahip ülkelerde farklılaşabileceğini ve bir takım yapısal unsurların bu politikanın başarısını etkileyebileceğini ima etmektedir.

Çocukların çalışması en temelinde yetersiz hanehalkı gelirinin bir sonucudur. Basu ve Van'ın (1998) öncü çalışmalarında dile getirdikleri üzere, aileler ancak gelirleri belirli bir düzeyin altına düşerse çocuklarını çalışmaya göndermektedirler. Bu konuya ilişkin ampirik çalışmalar incelendiğinde, fakirliği azaltıcı ya da gelir artırıcı politikaların çocuk işçiliğini azaltmadaki etkisinin ülkeye özgü unsurlardan etkilenebileceği ve her zaman ve her kırılımda çocuk işçiliğini azaltamayabileceği bulgulanmaktadır.

Diğer taraftan, politika düzleminde ise çocuk işçiliği ile mücadele halen ajandanın üst sıralarında yer almaktadır. ILO ve UNICEF (2021), çocuk işçiliğine ilişkin küresel görünümü değerlendirdikten sonra, çocuk işçiliğini azaltacak politikaları tekrar sıralamaktadır. En temel politika önerileri arasında fakirliği azaltmak üzere sosyal güvenliğin genişletilmesi, en azından minimum çalışma yaşına kadar zorunlu, ücretsiz ve kaliteli bir eğitim sağlanması, yetişkinler için daha düzgün iş yeri koşulları ve daha yüksek ücretlerin sağlanması, çocukların haklarını koruyan yasaların uygulanmasının sağlanması ve ev işlerinde kızların yükünü artıran cinsiyet rollerinin yeniden gözden geçirilmesi yer almaktadır.

Bu çerçevede, tezin İkinci Bölüm'ü çocuk işçiliğinin tanımını, yaygınlığını ve çocuklar üzerindeki olumsuz etkilerini tartıştıktan sonra tezin kuramsal çerçevesini sunmaktadır. Bu bölüm ayrıca ilgili teorik ve ampirik yazın ile birlikte güncel politika tartışmalarının da bir değerlendirmesini yapmaktadır.

İkinci Bölüm'de sunulan teorik çerçeve, yazın incelemesi ve ILO ve UNICEF (2021) tarafından öne sürülen güncel politika ajandası çalışmanın ampirik kısmının tasarımına ışık tutmaktadır. İlk ampirik bölüm olan Üçüncü Bölüm'de Türkiye'de zorunlu eğitimin süresinin uzatılmasının etkisinin incelenmesi, "zorunlu, ücretsiz ve kaliteli eğitim sunulması" politikasıyla; Dördüncü Bölüm'de Türkiye'de asgari ücret artışının etkisinin incelenmesi ise "fakirliği azaltmak üzere sosyal güvenliğin genişletilmesi" ve "yetişkinler için daha düzgün iş yeri koşulları ve daha yüksek ücretlerin sağlanması" politika önerileriyle uyumludur. Son ampirik kısım olan Beşinci Bölüm'de düşük-ve-orta-gelirli ülkelerde zorunlu eğitimin çocuk işçiliğini azaltma konusundaki başarısının yapısal unsurlardan etkilenip etkilenmediğinin incelenmesi ise hem "zorunlu, ücretsiz ve kaliteli eğitim sunulması" hem de "çocukların haklarını koruyan yasaların uygulanmasının sağlanması" önerileriyle uyum arz etmektedir.

Tezde yer alan ampirik analizler için iki ana veri seti kullanılmaktadır. Bunlardan ilki, TÜİK tarafından yayınlanan Çocuk İşgücü Anketi'dir. Ülke genelinde temsil gücüne sahip olan bu anket, 5-17 (2019 anketinde) ya da 6-17 (2006 ve 2012 anketlerinde) yaşındaki çocukların eğitim ve istihdam durumlarının detaylı olarak incelenebilmesi için tasarlanmıştır. Bu anket, Hanehalkı İşgücü Anketi kapsamında seçilmiş hanehalklarına belirli yılların son çeyreğinde uygulanmaktadır. Ankette çocuğun eğitimi, istihdamı ve çalışma koşullarına ilişkin detaylı sorular yer almaktadır. 2006, 2012 ve 2019 anketlerinde sırasıyla 28978, 27118 ve 25190 gözlem bulunmaktadır. Anketin önemli avantajlarından biri de işgücüne ilişkin soruların temsilcilerden ziyade doğrudan çocuklara sorulmasıdır.

İkinci ana veri kaynağı ise UNICEF tarafından yayınlanan ve düşük-ve-orta gelirli ülkelerde yapılan Çok Göstergeli Küme Anketleridir (Multi Indicator Cluster Surveys -MICS). Bu anketler özellikle kadın ve çocukların yaşam koşullarının incelenebilmesi için tasarlanmıştır. Ülke çapında temsil gücüne sahip olan ve 100'den fazla ülkede gerçekleştirilen bu anketler aynı zamanda ülkeler arasında da

yapısı ve içeriği itibarıyla uyum göstermektedir. Tezde 14 ülke için, ikinciden altıncı tura kadar yapılan ve 2000-2019 dönemini kapsayan, anketler kullanılmaktadır. Anketlerin içinde çocuk işçiliğine dair özel bir bölüm yer almaktadır. Bu modül ilk dönem anketlerde 5-14, son dönem anketlerde ise 5-17 yaş arasındaki çocukları kapsamaktadır. Ayrıca, anketin diğer kısımlarında hanehalkı özelliklerine ilişkin bilgiler de bulunmaktadır. Zorunlu eğitim, okula başlama yaşı ve yapısal unsurlara ilişkin veriler ise Dünya Bankası'ndan elde edilmiştir.

Üçüncü Bölüm, Türkiye'de zorunlu eğitimin süresinin 8 yıldan 12 yıla çıkarılmasının çocuk işçiliğine etkisini incelemektedir. Çocukların doğum yıllarına göre politikadan etkilenip etkilenmemelerini dikkate alan ve farklı yaş gruplarındaki çocuklar için yapılan incelemeler sonucunda, daha uzun süre zorunlu eğitime tabi olmanın 6-13 ve 14-17 yaş grubundaki çocukların uzun saatler çalışma ihtimalini azalttığı bulunmaktadır. Çocuk işgücü piyasası göstergelerindeki iyileşme büyük ölçüde 6-13 yaş grubu için ücretli çalışma üzerinden, 14-17 yaş grubunda ise tarım sektöründe çalışma üzerinden gözlenmektedir. Bu politika ayrıca çocukların bir yetenek gerektirmeyen işlerde ve bazı durumlarda sokakta-pazarda çalışma ihtimallerini azaltmaktadır. 12 yıllık zorunlu eğitime tabi olan çalışan çocukların okula kayıtlı olma ihtimallerinin ise 8 yıla tabi çalışan çocuklara kıyasla yükseldiği bulunmaktadır. Okula kayıtlılığı ciddi oranda artırmasına karşın zorunlu eğitim politikasının çocuk işçiliğini azaltma etkisi aynı oranda yüksek değildir. Bunun arkasındaki önemli sebeplerden birinin zorunlu eğitimin lise kısmının açık lise vasıtasıyla dışarıdan okunabilmesine imkân sağlanmasının olabileceği değerlendirilmektedir. Bulgulardan yola çıkarak, zorunlu eğitimin çocuk işçiliğini azaltma konusunda başarılı olabilmesi için bu politikayı destekleyici olarak geliştirilen ve okula gitmenin doğrudan maliyetini düşürmeyi amaçlayan politikaların okula devam etme zorunluluğu ortadan kaldırmamasının önemli olduğu çıkarımı yapılabilmektedir. Bu bölüm, özetle, zorunlu eğitimin çocuk işçiliği üzerindeki nedensel etkisini inceleyen az sayıda çalışmanın yer aldığı yazına katkı sunmaktadır.

Dördüncü Bölüm, Türkiye'deki asgari ücret artışlarının, hanehalkı gelirindeki artış kanalıyla, çocuk işçiliğine olan etkisini incelemektedir. Türkiye, bu politikanın etkilerinin incelenmesi konusunda uygun bir platform sunmaktadır. Bunun sebebi hem asgari ücretlilerin çalışanlar içinde önemli bir paya sahip olması hem de son

dönemde asgari ücrette gözlenen, diğer ücretlerin çok üzerinde olan, yüksek reel artışlardır. Bu kapsamda, asgari ücretli ailelerden gelen çocuklar ile diğer ailelerden gelen çocukların asgari ücret artışından önceki ve sonraki işgücü piyasası çıktılarını kıyaslayan bir farkların-farkı ayrıştırma stratejisi ile asgari ücret kanalıyla hanehalkı gelirinde gözlenen artışın çocuk istihdamı üzerinde anlamlı etkileri gösterilmektedir. Bu politika özellikle 15 yaş altı kızların çalışma olasılığını ve 14 yaşından büyük erkek çocukların uzun saatler çalışma olasılığını azalmaktadır. Politika ayrıca tüm yaş grupları için çocukların ücretsiz aile işçisi olması ve tarımda çalışma ihtimallerini düşürmektedir. Bulgular teorik çıkarımları destekler nitelikte olsa da, 2012'den 2019'a kadar asgari ücrette gözlenen yaklaşık yüzde 35 oranındaki reel artış çocuk işçiliğini tamamen ortadan kaldırmak için yeterli olmamaktadır. Bu bölüm, hanehalkı gelirindeki artışın çocuk işçiliğine nedensel etkisini inceleyen çalışmalara Türkiye özelinde bir katkı sağlamaktadır. Ayrıca, asgari ücretin yaygınlığı ve artışın büyüklüğü dikkate alındığında, bu çalışma büyük bir gelişmekte olan ülkede toplumun geniş bir kısmını kapsayan bir gelir politikasının etkilerini inceleyerek de ek bir katkıda bulunmaktadır.

Beşinci Bölüm ise düşük-ve-orta-gelirli ülkelerde zorunlu eğitimin çocuk işçiliği üzerindeki nedensel etkisini, yapısal unsurları da dikkate alarak inceleyen bir ülkeler arası analiz sunmaktadır. Bu bölüm, Üçüncü Bölüm'de kullanılan ayrıştırma stratejisini zorunlu eğitim politikasında değişiklik yapan 14 ülkeden oluşan bir veri seti için genişletmektedir. Bulgular daha uzun süre zorunlu eğitime tabi olmanın 11-17 yaş çocukların çalışma olasılığını yüzde 7 ila yüzde 13 oranında azalttığına işaret etmektedir. Daha sonra yapılan analizler, çeşitli yapısal unsurların zorunlu eğitim politikasının çocuk işçiliğini azaltma gücünü ne ölçüde etkilediklerini incelemektedir. Bulgular çeşitli yapısal faktörlerin etkili olduğunu göstermektedir. Örneğin, yaşlı bağımlı nüfus oranının yüksek olduğu, gelir eşitsizliğinin daha güçlü olduğu, kayıt dışı sektörün payının fazla olduğu ve istihdamda hizmet sektörünün payının yüksek olduğu durumlarda politika etkisi daha zayıf bulunmaktadır. Diğer taraftan, örneğin, hükümet harcamaları içinde eğitimin payının yüksek olduğunda, kadınlar hanehalkı ya da makro düzeyde karar alma süreçlerine daha fazla dahil olduğunda, yatırım ve ihracatın GSYİH içindeki payının yüksek olduğu dinamik ekonomilerde, beşerî sermaye kalitesi yüksek ülkelerde ve politik istikrarın olduğu

yerlerde politika etkisi daha güçlüdür. Özetle, bu bölüm düşük-ve-orta-gelirli ülkelerde zorunlu eğitimin çocuk işçiliğini azaltma yönündeki katkısı üzerine bir ülkeler arası nedensel karşılaştırma sunarak yazındaki bu boşluğu doldurmayı amaçlamaktadır. Bölüm ayrıca bu analize yapısal unsurların katkısını da doğrudan ekleyerek yazına ek bir katkı yapmaktadır. Bulgular, demografik yapı, gelir eşitsizliği, istihdam ve sosyal destekler, eğitim altyapısı, iş dünyasının dinamizmi ve yönetişim gibi yapısal alanlardaki göstergelerin zorunlu eğitim politikalarının çocuk işçiliğini azaltmadaki başarısını etkileyebileceğine işaret etmektedir.

Son olarak, Altıncı Bölüm, tezin temel bulgularını tekrar ele alarak, bu bulgular ışığında tezin yazına katkısı ve olası politika çıkarımları hakkında bir tartışma sunmaktadır.

CURRICULUM VITAE

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Professional Experience

2020/9–2021/11 : Economist, Central Bank of the Republic of Turkey (CBRT), Research and Monetary Policy (R&MP) Department
2019/8–2020/8 : Deputy Executive Director, CBRT, R&MP Dept.
2019/1–2019/8 : Economist, CBRT, R&MP Dept.
2018/1–2018/12 : Economist (secondee), OECD, Economics Dept.
2012/9–2017/12 : Economist, CBRT, R&MP Dept.
2008/7–2012/9 : Assistant Economist, CBRT, R&MP Dept.
2005/2–2008/7 : Researcher, CBRT, R&MP Dept.

Education

MSc. in Economics, Barcelona Graduate School of Economics, Spain, 2009-2010
MSc. in Economics, University College London, UK, 2003-2004
BA in Economics, Dokuz Eylül University, Izmir, Turkey, 1999-2003

Research

Works Under Review

"Heterogeneity in Sectoral Price and Quantity Responses to Exogenous Interest Rate Shocks." *Journal of Macroeconomics, revise and resubmit* (with Mustafa Tuğan)

"The Role of Expectations in the Inflation Process in a Period of Exchange Rate Shock." *International Review of Economics and Finance, under review* (with Ümit Koç and Fethi Öğünç)

"Drivers of Popularity of Online Information: Content, Context and Psychological Processes." *International Journal of Cyber Behaviour, Psychology and Learning, revise and resubmit* (with Eray Yucel)

Publications in Refereed Journals

"Demographical Transition and Inflation in Emerging Economies." *Eastern European Economics,* 2021, 59(1), pp. 51-69 (with Koray Kalafatcılar)

"Foreign Investor Dominance and Liquidity Premium: Implications on Capital Outflows." *International Journal of Finance and Economics,* 2021, 26(3), pp. 4361-4371 (with Özgür Özel and Erdal Yılmaz)

"Cross-country Variation in the Share of National Movies in Total Box Office Revenue." *Journal of Media Economics*, 2018, 31(3-4), pp. 117-132 (published online: 2021)

"Economic Complexity and Sovereign Risk Premia." *Economics Bulletin*, 2019, 39 (3), pp. 1714-1726

"The Impact of Income Distribution on House Prices." *Central Bank Review*, 2019, 19, pp. 45-58 (with Koray Kalafatcılar and Erdal Yılmaz)

"The Impact of Collective Action on Market Prices: Evidence from an Online Agricultural Discussion Forum." *Online Information Review*, 2019, 43(4), pp. 565-583 (with Elif Özcan Tok, Ertan Tok, and Tuba Yılmaz).

"Handling of Online Information by Users: Evidence from TED Talks." *Behaviour & Information Technology*, 2019, 38(12), pp. 1309-1323 (with Eray Yücel).

"Short-term Impact of a Foreign Player Quota Liberalisation Policy on Domestic Player Performance: Evidence from a Regression Discontinuity Design." *International Journal of Sport Policy and Politics*, 2019, 11(1), pp. 39-55.

"In Pursuit of Understanding Mark-ups in Restaurant Services Prices." *Singapore Economic Review*, 2020, 65(6), pp. 1423-1437 (published online: 2018)

"A Disaggregated Analysis of the Impact of Output Gap on Inflation and Implications for Monetary Policy." *Prague Economic Papers*, 2018, 27(6), pp. 668-683 (with Oğuz Atuk and Çağrı Sarıkaya)

"Co-movement of Exchange Rates with Interest Rate Differential, Risk Premium and FED Policy in 'Fragile Economies'." *Emerging Markets Review*, 2017, 33, pp. 173-188 (with Erdal Yılmaz)

"Asymmetric Exchange Rate and Oil Price Pass-through in Motor Fuel Market: A Microeconometric Approach." *The Journal of Economic Asymmetries*, 2017, 15(1), pp. 64-75 (with Fatih Akçelik)

"Firm Strategy and Consumer Behaviour Under a Complex Tobacco Tax System: Implications for the Effectiveness of Taxation on Tobacco Control." *Tobacco Control*, 2017, 26(3), pp. 277-283 (with Oğuz Atuk)

"Marginal Contribution of Game Statistics to Probability of Winning at Different Levels of Competition in Basketball: Evidence from the Euroleague." *International Journal of Sport Science and Coaching*, 2016, 11(1), pp. 98-107

"Price Rigidity in Turkey: Evidence from Micro Data." *Emerging Markets Finance and Trade*, 2016, 52(4), pp. 1029-1045 (with Orhun Sevinç)

"Impact of Oil Price Changes on Turkey's Exports." *Applied Economics Letters*, 2016, 23(9), 637-641 (with Olcay Y. Çulha, Erdal Yılmaz)

"Online Information Retrieval Behaviour and Economics of Attention." *Online Information Review*, 2015, 39(6), pp. 779-794

"Assessment of Post-2003 Crude Oil Price Hike Through Wavelet Coherency Analysis." *Central Bank Review*, 2015, 15(1), pp. 19-38 (with M. Koray Kalafatcılar)

"Import Surveillance and Over-invoicing Imports: The Case of Turkey." *Journal of Economic Policy Reform*, 2014, 17(4), pp. 360-373 (with Zelal Aktaş and Altan Aldan)

"Treatment of Seasonal Products and CPI Volatility." *Central Bank Review*, 2013, 13(1), pp. 51-82 (with Oğuz Atuk and Orhun Sevinç)

"Short-term Inflation Forecasting Models for Turkey and a Forecast Combination Analysis." *Economic Modelling*, 2013, 33(C), pp. 312-325 (with Fethi Öğünç, Kurmaş Akdoğan, Selen Başer, Gülenay Chadwick, Dilara Ertuğ, Timur Hülagü, Sevim Kösem and Necati Tekatlı)

"Filtering Short Term Fluctuations in Inflation Analysis." *İktisat, İşletme ve Finans*, 2012, 27(319), pp. 31-52 (with H. Çağrı Akkoyun, Oğuz Atuk, and N. Alpay Koçak)

"Foreign Player Quota, Experience and Efficiency of Basketball Players." *Journal of Quantitative Analysis in Sports*, 2012, 8(1), pp. 1-18

"How does the Performance of Core Inflation Indicators Differ in Less Stable Times?" *İktisat, İşletme ve Finans*, 2012, 27(313), pp. 9-34 (with Oğuz Atuk and Necati Tekatlı)

"A New Approach to Measuring Core Inflation for Turkey: SATRIM." *İktisat, İşletme ve Finans*, 2009, 24(285), pp. 73-88 (with Oğuz Atuk)

Selected Working Papers

"The Role of Imported Inputs in Pass-through Dynamics." *Central Bank of Turkey Working Papers,* 2020, 20/03 (with Dilara Ertuğ, Pınar Özlü, and Çağlar Yüncüler)

"Upgrading Business Investment in Turkey." OECD Economics Department Working Papers, OECD Publishing, 2019, No: 1532 (with Seyit Mümin Cilasun, Rauf Gönenç, Zahid Samancıoğlu, Fatih Yilmaz and Volker Ziemann)

"Inflation Dynamics in Turkey from a Bayesian Perspective." *Central Bank of Turkey Working Papers,* 2018, 18/10 (with Fethi Öğünç and Çağrı Sarıkaya)

"Disaggregated Evidence for Exchange Rate and Import Price Pass-through in the Light of Identification Issues, Aggregation Bias and Heterogeneity." *Central Bank of Turkey Working Papers,* 2017, 17/08 (with Meltem Topaloğlu)

"Design and Evaluation of Core Inflation Measures for Turkey." 2009, *BIS-IFC Working Papers*, 03 (with Oğuz Atuk)

Other Professional Experience

***Co-Editor*:** CBRT Blog (2019-2020); Research Notes in Economics Series, Central Bank of Turkey (2013-2015)

***Refereeing*:** Economic Modelling, Emerging Markets Finance and Trade, Journal of Economic Asymmetries, International Journal of Finance and Economics, Journal of Asian Economics, Online Information Review, Journal of Foodservice Business Research, Tobacco Prevention and Cessation, The International Trade Journal, New Perspectives on Turkey, PLOS One, Asian Research Journal of Arts & Social Sciences, Central Bank Review, State Bank of Pakistan Research Bulletin, CBRT Working Papers, CBRT Research Notes in Economics, OECD Working Papers.

Courses given: Short-term inflation forecasting, inflation analysis, and inflation targeting (İstanbul School of Central Banking, Central Bank of Russia, Central Bank of Montenegro, Central Bank of Azerbaijan); Applied Time Series Econometrics (TOBB ETU).