Essays on Schooling and Child Labour in Portugal

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ESSAYS ON SCHOOLING AND CHILD LABOUR IN PORTUGAL

ESSAYS OVER ONDERWIJS EN KINDERARBEID IN PORTUGAL

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Acronyms

DETEFP	Statistical Department on Labour, Employment and Training (Portugal)
EEC	European Economic Community
EPIS	Businessmen for Social Inclusion (Portugal)
EU	European Union
GDP	Gross Domestic Product
GIASE	Education's Information and Evaluation Office (Portugal)
GPA	Grade Point Average
ILO	International Labour Organization
INE	National Institute of Statistics (Portugal)
IQ	Intelligence Quotient
IREWOC	International Research on Working Children
IV	Instrumental Variables
NMS	(European) New Member States
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PETI	Plan on the Elimination of Exploitation of Child Labour (Portugal)
PISA	Programme for International Student Assessment
SIETI	System of Statistical Information on Child Labour (Portugal)
TFP	Total Factor Productivity
TIMMS	Trends in International Mathematics and Science Study
UNICEF	United Nations Children's Fund
UNCRC	United Nations Convention on the Rights of the Child

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Abstract

This thesis examines child labour and schooling in Portugal from a historical and contemporary perspective and comprises three essays. Throughout the thesis, I attempt to strike a balance between research of the local context and a comparison with an international context.

The first essay provides an analysis of the evolution of child labour in Portugal. The essay is based on two different sources of information: qualitative—that is, reports by education and labour inspectors, conference proceedings of jurists and lawyers and parliamentary proceedings; quantitative—that is, relying on industrial, labour and household surveys conducted during the 19th and 20th centuries. Child labour was widespread up to mid-20th century, but started declining thereafter, accelerating in the 1960s and particularly in the 1980s. My analysis suggests that the changing needs of the economic structure of the country reduced the interest in children's work and was in turn reflected in the norms and values espoused by its political leaders and their willingness to pass and implement legal measures. The results suggest that the transfer of affordable (or even free) labour-saving technology to developing countries may curb the demand for child labour. In spite of the long-term decline in child labour, at the turn of the millennium, 8-12 per cent of Portuguese children aged 6-15 could still be classified as working.

The second essay studies the patterns of present-day child labour in Portugal and distinguishes between the effects of economic and domestic work on children's educational performance. Distinguishing between labour types is important from a policy perspective as it helps in the construction of tailor-made solutions. I use an instrumental variables approach to address the simultaneous determination of school success and child labour. I find that economic work hinders educational success, while domestic work does not appear to be harmful. It is suggested that this negative association relates to the submissive, non-creative and non-entrepreneurial nature of the activities

performed by children. The results also suggest the relevance of controlling for selection effects.

The third essay focuses on the determinants of present-day school outcomes and on the role of a child's interest in school in determining educational success. The analysis presented in the essay draws on a large body of literature in economics of education and educational psychology. In addition to controlling for the effects of a wide range of individual, family and school characteristics, the unique aspect of this essay is that it focuses on the role of a typically unobserved attribute: a child's interest in school. The empirical work in the essay is based on cross-section and panel data.

The estimates suggest that after controlling for time-invariant unobservable traits and attempts to mitigate the simultaneous determination of interest and achievement, children with high levels of interest in 1998 are 6 to 9 percentage points less likely to fail a grade between 1998 and 2001 as compared to children with low and medium levels of interest. The results show the importance of non-cognitive traits in determining children's educational outcomes and support the idea that the development of non-cognitive skills may serve as an additional and important lever to enhance cognitive outcomes.

Samenvatting

In dit proefschrift worden kinderarbeid en onderwijs in Portugal geanalyseerd vanuit een historisch en hedendaags gezichtspunt. Het proefschrift bestaat uit drie essays. Daarin wordt geprobeerd een evenwicht te vinden tussen onderzoek in de lokale context en een vergelijking met een internationale context.

Het eerste essay bevat een analyse van de ontwikkelingen op het gebied van kinderarbeid in Portugal. Het essay is gebaseerd op kwalitatieve en kwantitatieve informatiebronnen. De kwalitatieve bronnen zijn rapporten van onderwijs- en arbeidsinspecteurs, conferentieverslagen van juristen en advocaten en parlementaire verslagen; de kwantitatieve bronnen zijn de resultaten van enquêtes binnen de industrie, op het gebied van arbeid en onder huishoudens in de 19e en 20e eeuw. Kinderarbeid kwam veel voor tot halverwege de 20e eeuw, maar begon daarna af te nemen. Deze afname ging in de jaren 60 en vooral in de jaren 80 steeds sneller. Dit onderzoek wijst erop dat er door de veranderende behoeften van de binnenlandse economische structuur minder vraag was naar kinderarbeid. Dit kwam ook tot uiting in de normen en waarden die de politieke leiders aanhingen en in hun bereidheid om wettelijke maatregelen te nemen en in te voeren. De resultaten wijzen erop dat het in ontwikkelingslanden beschikbaar stellen van betaalbare (of zelfs gratis) arbeidsbesparende technologie de vraag naar kinderarbeid kan beperken. Ondanks de lange periode van afname van kinderarbeid kon rond het begin van het nieuwe millennium nog 8-12 procent van de Portugese kinderen tussen de 6 en 15 aangemerkt worden als werkzaam.

Het tweede essay behandelt de patronen van de huidige kinderarbeid in Portugal, waarbij een onderscheid gemaakt wordt tussen de effecten van economische activiteiten en huishoudelijk werk op schoolprestaties van kinderen. Het is vanuit beleidsoogpunt belangrijk om een onderscheid maken tussen verschillende typen werk omdat het helpt oplossingen op maat te vinden. In dit onderzoek is een instrumentele variabelen-benadering gebruikt om het verband tussen schoolsucces en kinderarbeid te bepalen.

Economische activiteiten staan schoolsucces in de weg, terwijl huishoudelijk werk niet nadelig lijkt te zijn. Dit negatieve verband zou te maken kunnen hebben met de onderdanige, niet-creatieve en niet-ondernemende aard van de werkzaamheden van kinderen. Uit de resultaten blijkt ook dat het relevant is om rekening te houden met selectie-effecten.

Het derde essay gaat over de determinanten van de tegenwoordige schoolresultaten en over het verband tussen de belangstelling die kinderen voor school hebben en schoolprestaties. Het onderzoek in dit essay is gebaseerd op een grote hoeveelheid wetenschappelijke literatuur op het gebied van onderwijseconomie en onderwijspsychologie. Dit onderzoek houdt rekening met de effecten van een breed scala aan individuele, gezins- en schoolkenmerken, en het unieke ervan is bovendien dat het zich richt op de rol van een doorgaans onderbelichte eigenschap: de belangstelling van kinderen voor school. Het empirisch onderzoek in dit essay is gebaseerd op cross-sectionele en paneldata.

Na correctie voor tijdsonafhankelijke niet-observeerbare kenmerken en pogingen om de gelijktijdige bepaling van belangstelling en prestaties af te zwakken, wijzen de schattingen erop dat kinderen met veel belangstelling voor school in 1998 6 tot 9 procent minder kans hadden om tussen 1998 en 2001 te blijven zitten dan kinderen met weinig of een gemiddelde belangstelling voor school. De resultaten wijzen op het belang van niet-cognitieve eigenschappen voor het bepalen van de schoolresultaten van kinderen en ondersteunen het idee dat de ontwikkeling van niet-cognitieve vaardigheden kan dienen als een extra en belangrijk instrument om cognitieve prestaties te verbeteren.

Publications

Parts or extensions of the first essay have appeared as:

'A History of Child Labor in Portugal' (with Arjun Bedi). In Kristoffel Lieten and Elise van Nederveen Meerkerk (eds.) *Child Labour's Global Past (1650-2000)*, pp. 257-78 (2011). Bern: Peter Lang.

'History of child labor in Portugal'. In Hugh D. Hindman (Volume editor) *The World of Child Labor: An Historical and Regional Survey*, pp. 644-648 (2009). New York: M.E. Sharpe.

'Portuguese Child Labour: an Enduring Tale of Exploitation' (with Martin Eaton), *European Urban and Regional Studies*, 16(4): 439-44 (2009).

'Situation Today with respect to Child Labor in Portugal' (with Martin Eaton). In Hugh D. Hindman (Volume editor) *The World of Child Labor: An Historical and Regional Survey*, pp. 649-51 (2009). New York: M.E. Sharpe.

Parts or extensions of the second essay have appeared as:

'Child Labour and Educational Success in Portugal' (with Arjun S. Bedi), *Economics of Education Review*, 27(5): 575-87 (2008).

Trabalho familiar não remunerado (eds. with Lurdes Pinto), 166 p., PETI, MTSS; ISBN 978-989-95739-0-1, 2008. (in Portuguese).

'Trabalho familiar não remunerado: eu ajudo, tu ajudas, ele não; eu chumbo, tu chumbas, ele não'. In Joaquina Cadete and Teresa Maia e Carmo, *10 anos de combate ao trabalho infantil em Portugal*, PETI, MTSS; 2008, pp. 121-38. (in Portuguese).

1 Introduction

Human capital formation is at the core of the development of nations and individuals.[1] Inspired by the endogenous growth literature, Barro and Lee (2010) and Cohen and Soto (2007) provide the most recent cross-country evidence on the role of human capital in fostering economic growth. Additionally, human capital may contribute to other areas such as institutional development (Glaeser Et al. 2004) or fertility decline (Barro, 2001). Evidence on the benefits of human capital at the micro level goes back to Mincer (1962) and has spawned an impressive theoretical and empirical literature which stresses the importance of human capital for the socio-economic development of individuals.

While there is a large literature on human capital in the form of educational outcomes, in recent years the literature on child labour has also burgeoned. Recent theoretical and empirical literature drawing on household production models has researched the effect of child labor on different outcomes such as future earnings (Emerson and Portela Souza, 2011), present and future health (Guarcello Et al., 2004; O'Donnell Et al., 2005; Rosati and Straub, 2007) and education (Gunnarsson Et al., 2006; Ray and Lancaster, 2005; Beegle et al. 2009).[2].

However, much of the current focus in the child labour and schooling debate centres on developing countries. Nevertheless, there are examples of relatively developed countries that still struggle with the issue of working children and low educational outcomes. Portugal is an example of one such country. After decades of sluggish economic and social development, the country underwent major structural changes and it is now considered a developed country.[3] Despite this transition to developed country status, efforts to achieve educational outcomes matching those of other developed countries and attempts to eradicate child labour have been less successful than expected.

On the educational front, the generalization of education and the enforcement of compulsory education laws are relatively recent phenomena. The dictatorship delayed education expansion until 1950, but later shifts in policy, the implementation of democracy in 1974 and entry into the European Economic Community (EEC) in 1986 promoted education. Expenditure, enrolment and attainment increased and Portugal achieved universal fourth-grade enrolment in the late 1970s and almost universal sixth-grade enrolment in the 1990s. Currently, the intention is to increase compulsory education to 12 years.

Despite progress, Portugal still lags behind most European countries, regardless of which indicator is considered. For instance, the upper secondary school completion rate in Portugal is less than a third of the EU average and functional illiteracy is 48% (OECD, 2000). Indicators focusing on younger generations display a lower but still substantial gap. The school completion rate for youth aged 20-24 is sixty per cent of the EU average, while the share of early school leavers is twice the European average.[4] Average achievement scores of Portuguese students are below most other European countries.[5]

There is a long history of child labour in Portugal. As in other currently developed countries, child labour was widely used in agriculture and was a major part of the industrial labour force, particularly at the beginning of the industrial age. In spite of a decline in the use of child labour during the 20th century, at the turn of the new millennium 8 to 12 per cent of under-16 Portuguese children were involved in some form of work (Goulart and Bedi, 2008).[6]

The continuing use of children in the work force and the less than stellar educational outcomes for Portuguese children is a source of concern. The challenges and risks of social and labour market exclusion faced by working children or poor educational performers in societies where schooling has become essential may be higher than in developing countries. At a time of EU enlargement and of an increasingly competitive environment, both in terms of countries and persons, those who do not reach a minimum threshold of competencies will have limited access to labour markets. Early entry into the work force and/or school failure means not only forgone education, but also an unprepared labour force, particularly when few or none of the tasks done by children will contribute to their future labour market skills. For these Portuguese, lack of education is a handicap for the rest of their lives, leading to lower skilled,

lower paid jobs that will tend to perpetuate their underprivileged status within Portuguese society. Moreover, due to strong regional asymmetries, the phenomenon may severely affect some Portuguese regions.

Against this backdrop, the objective of this thesis is to examine labour and schooling outcomes and their interactions amongst Portuguese youth.[7] The thesis consists of three essays that address complementary issues using a multidisciplinary approach.

The first essay provides a historical perspective and examines the evolution of both schooling and child labour during the 19th and 20th centuries to understand their level and spatial patterns in present-day Portugal. This essay studies the major inflections in patterns of child labour and schooling attainment in the last 150 years and identifies the major forces that have driven the process. The essay is based on two different sources of information: qualitative — that is, reports by education and labour inspectors, conference proceedings of jurists and lawyers and parliamentary proceedings; quantitative — that is, relying on industrial, labour and household surveys conducted during the 19th and 20th centuries.

The second essay examines the effects of child labour on school success. The essay distinguishes between different types of child labour (economic and domestic) and identifies the factors that are responsible for each type of labour. Distinguishing between labour types is important from a policy perspective as it helps in the construction of tailor-made solutions. Furthermore, the effect of different types of labour on school outcomes is examined to investigate whether these have different implications for human capital accumulation. The essay relies on instrumental variables estimation to address the simultaneous determination of school success and child labour.

The third essay focuses on the determinants of present-day school outcomes and on the role of a child's interest in school in determining such outcomes. In addition to controlling for the effects of a wide range of individual, family and school characteristics, the unique aspect of this essay is that it focuses on the role of a typically unobserved attribute: a child's interest in school. The analysis presented in the essay draws on a large body of literature in educational psychology and educational economics. The essay uses cross-section and panel data to explore the school interest - school success relationship.

Notes

[1] Two major lines of reasoning have been at the heart of the discussion regarding education and child labour: a humanitarian and a human capital perspective. In this paper, I focus on a discussion of the latter.

[2] In a typical household production model, child time is allocated to leisure, schooling and work – children can contribute to household income through domestic and economic work. The number of hours allocated to each activity will have an impact on human capital accumulation and consequences for children's future income. It is assumed that the time allocation decision is taken by parents. Preferences for current versus future earnings will depend on whether parents are characterised as altruistic or not (see Basu, 1999).

[3] Syrett (1995), in his chapter 3 'Portugal in transition', and Syrett (2002) present a relatively detailed and accurate characterisation of Portugal's past and recent development.

[4] The level of early school leavers is the share of the population aged 18-24 with less than upper secondary education and not in education or training.

[5] Portugal usually lies at the bottom-end of international comparison exams. As a result, the country withdrew from TIMMS (only observation for 1995) and in the case of PISA results were generally close to the bottom. While PISA 2009 has seen considerable improvements, reducing the distance from the average, the results have led to political polemics but also a cautious suspicion from several reliable academic sources until further confirmation (personal depositions).

[6] Schooling and child labour linkages are recognised in the current laws. Children are now expected to start school at the age of 6 and to continue till they are 15 unless they complete 9 years of compulsory schooling at an earlier age. By law, youngsters under 18 years old with incomplete compulsory schooling should be in school or some training course. Consistent with these educational requirements, minors are only allowed to work if fulfilling three conditions — they are at least 16 years old, they have completed compulsory school and there is medical confirmation of their physical and psychological capabilities for a specified job. There are some exceptions to the minimum age. At 14 and 15 light work is allowed, some additional activities are permitted when the child is 16 and 17 years old and at 18 all types of work are allowed.

[7] The research intends to focus on individuals aged 15 and below. Data constraints limit the analysis to subgroups across the research.

2 A Historical Perspective on Child Labour in Portugal[1]

Abstract

This paper draws on data from censii, labour force and household surveys and qualitative information such as the testimonies of various stakeholders and news articles to provide an analysis of the evolution of child labour in Portugal between the end of the 19th and during the 20th century. The Portuguese experience is set against the backdrop of the country's economic structure and economic growth, demographic changes, educational expansion, schooling and labour legislation, and the changing norms espoused by its elites. The trajectory of child labour and particularly the rapid decline since the 1970s is interpreted in terms of the cascading effect of policies and events that operated synchronously. Our assessment of the Portuguese experience suggests that while legal measures may help reduce child labour, they do not appear to be key determinants. The use of children in the labour market appears to be driven mainly by the needs of the economic structure of the country, which in turn may be reflected in the norms and values espoused by its political leaders and their willingness to pass and implement legal measures.

2.1 Introduction

In recent years there has been a rapid increase in the amount of empirical work on child labour.[2] Despite this explosion, analyses of the historical trajectory of child labour are limited. Indeed, the bulk of the papers that do provide a historical account are limited to the United States and to the core European economies while the evolution of child labour outside the prosperous European core has rarely been investigated.[3]

The aim of this essay is to address this gap by examining the case of Portugal, a peripheral European country for most of the last two cen-

turies. Not long ago, high levels of child labour marked the country and only since the 1970s has there been a rapid and progressive decline in child labour. The relatively recent transition of Portugal to developed country status and the speed with which child labour has declined suggests that in addition to being of interest in itself, a study of the Portuguese case is likely to yield insights on the effectiveness of various policy options currently being pursued by developing countries and indeed at times being pushed by developed countries – for example, international labour standards, minimum-age legislation, trade sanctions - in reducing child labour. Legal-coercive measures may be potentially beneficial in a context of multiple equilibria (Basu and Van, 1998) or by changing the incentives towards human capital accumulation (Dessy, 2000). While their effectiveness has been disputed on the grounds that such actions are (i) protectionist devices to shelter developed country markets (Bhagwati, 1995, Srinivasan, 1996, Basu, 1999); (ii) that they are likely to drive children into worse forms of employment (Fallon and Tzannatos, 1998), and (iii) that there is little support for such an approach amongst those households that such actions seek to help (Grootaert and Kanbur, 1995), they continue to retain their appeal. Against this background, a historical assessment of the evolution of child labour in a recently developed country may be expected to shed light on the role that may be played by different approaches to tackling child labour in developing countries.

To meet its objectives the paper focuses on the evolution of child labour in Portugal between the end of the 19th and during the 20th century and divides this duration into four distinct periods. Each period is characterized in terms of its economic, political and social background and subsequently data from censii, labour force and household surveys and qualitative information such as the testimonies of various stakeholders and news articles is used to provide an assessment of child labour during each period. An assessment of the evolution of child labour set against the wider economic and political background is used to identify the main factors that may have influenced child labour in each period and subsequently to provide an overall understanding of events and policies that shaped the trajectory of child labour in Portugal.

The paper is organised in the following manner. The next section provides a review of the concepts used in the paper and on the basis of a literature review identifies five main drivers of child labour. The third

section deals with each of the four distinct periods of Portuguese history, while the final section synthesises and concludes.

2.2 Concepts and taxonomy

2.2.1 Concepts

First, what is a child? Child and childhood are concepts that vary across time, space and strata and there are disagreements on the precise thresholds between childhood and "adulthood". The general reference for this matter is the 1989 United Nations' Convention on the Rights of the Child (UNCRC), which considers children as individuals who are less than 18 years old.[4] In this paper, for the most part we work with this threshold and provide information on the work participation of individuals in the 10-14 and 15-19 age ranges. Given that our aim is to provide a historical perspective, these categories are used in order to enhance temporal comparability - as for many periods under analysis data is only available for these age intervals.[5] While it is clear that the definition of child and childhood does not remain constant over time, and while one may wish to provide an analysis that allows for period-specific age thresholds, this is unlikely to be a fruitful exercise, hence we opt for a fixed age-based approach.

Second, what is child labour? To distinguish from the popular and pejorative use of child labour, some scholars only employ the term "child labour" when they refer to the detrimental activities performed by the child, while activities which may or may not have harmful consequences are characterized more neutrally as "child work" (Boyden, Ling and Myers, 1998). This has led to the interesting but strenuous task of creating an inventory of what is good or bad for the child by the International Research on Working Children (IREWOC) research institute. Distinguishing between good, inoffensive or harmful child labour especially in the context of a historical analysis, such as this paper, is likely to be a complex exercise (Heywood, 2009a). The changing concept of harmfulness over more than 100 years is likely to be an excruciatingly arbitrary task.

In this paper we use child labour and child work synonymously - reflecting its contribution to the production process, whether in a firm, farm or within the household. There is no overt intention of associating work with a harmful or harmless effect and the aim is to identify the

main activity status of the child. In what follows we divide the main activity of a child into two distinct categories, that is, whether a child is employed (engaged in paid work) or occupied (unpaid work on the family firm/farm/house). In essence, child labour is disaggregated by its position in relation to the labour market, distinguishing between employment and other activities.

2.2.2 Historical analyses of child labour – A review

Contemporary global attempts to prevent child labour such as the 1989 UNCRC and country-specific attempts are likely to draw inspiration from the virtual elimination of child labour in currently developed countries.[6] While the low child work participation rate in developed countries is not disputed, the manner in which these countries have achieved this goal remains a contentious issue.

According to Cunningham and Viazzo (1996), till the early 1970s the "traditional view" of the history of child labour remained undisputed. According to this view, industrialization (the industrial revolution) led to unprecedented use of child labour and children were rescued from their situation by activists and most importantly by the passage of effective child labour (minimum working age) laws (Hammond and Hammond, 1917; Hutchins and Harrison, 1926).[7] The traditional view which focuses mainly on industrial child labour, argues that while children did work before industrialization such work was not exploitative. Furthermore, it gives primacy to a legislative approach driven by socially aware campaigners in reducing child labour.

In the late 1980s and early 1990s a series of studies (Goldin, 1979, Bolin-Hort, 1989, Nardinelli, 1990, Horrell and Humphries, 1995) challenged this traditional view. These papers argued that child labour was widespread in non-industrial settings and may have taken place under more harmful conditions than during the industrial revolution. Since minimum working age laws were applicable essentially to industrial employment it is unlikely that the bulk of working children came under the ambit of such laws and hence unlikely that the widespread disappearance of child labour may be attributed to such laws. These papers offered an alternative assessment of the factors driving the historical decline of child labour in currently developed countries.

Based on an assessment of the literature, five main drivers - demography, technology, household income, labour legislation and activism, and schooling – may be identified. Broadly, demography, fertility and the share of children in the population changes the role of children in society by regulating child abundance and influences child labour practice. The level and type of technology constrains the production system and eventually the contribution of children. Several authors have argued that lack of income forces families to send children to work and once a minimum income threshold is reached the issue would be solved. Societal values like legislation or activism frame the practice and are important in terms of promoting or censoring the practice. Availability (and quality) of schooling is assumed to to be inversely correlated to child labour practice and an increase in schooling is expected to translate into reductions in child labour. Most advocates of each driver do not suggest that there is a monocausal relationship, but highlight one of the factors listed above as the key force driving child labour. The following subsections consider each of these factors in more detail.

Demography

An old hypothesis which has regained prominence in recent work has been the fertility-child labour nexus. The basic argument is that demographic patterns regulate the abundance of children in a society and therefore their relative worth, cost and decisions regarding allocation of their time. Two strands have arisen. One strand argues that households have more children as they are seen as a source of income and labour. Fertility decisions are partly based on the needs and the opportunities households have to send children to work. In this set-up, the spread of female education and greater labour market opportunities for women increases the shadow price of their time (Mincer, 1962; Rosenzweig and Evenson, 1977; Becker, 1992), and increases the opportunity cost of children (Galor and Weil, 1996). Households react to the changes in incentives by reducing the number of children and investing more heavily in the quality of children.

The second strand argues "children work because people have children, rather than people have children because children work" (Dyson, 1991). In a context of limited contraceptive availability and high mortality, household control over fertility is reduced. Instead, the proposed explanation is that eventually death and infant mortality rates decline

through better nutrition and the spread of basic hygiene and medical treatment. Declining death rates create population pressure at the household level until fertility declines, and in turn the decline in fertility translates into a decline in child labour. A balance of the evidence suggests both strands are somewhat unconvincing (White, 1982; Vlassof, 1991) and more recent work has stressed that fertility and child labour decisions interact instead of a one-way causal relationship (Emerson, 2009).

While much of the literature has a micro-focus, several papers (Dessy, 2000; Galor and Weil, 2000; Hazan and Berdugo, 2002; Strulik, 2004) have adopted a macro approach to examine the relationship between fertility and child labour.[8] For example, Galor and Weil (2000) look at the history of the western world and illustrate how the demographic transition is fundamental for the change from a (post-Malthusian) regime where both output and population growth rates are high to a (modern growth) regime where population growth rates have decreased and it is possible to shift from an emphasis on the quantity to the quality of children. Strulik's (2004) two equilibria model motivated by today's developing countries suggests that parents shift to child quality at a per capita income of USD 450, when income and mortality have reached acceptable levels. At USD 1,000 dollars, (child) mortality reaches a trough and is almost constant, while fertility continues to decrease and so does child labour.

Technology

Economists and historians have stressed the role of technology in the evolution of child labour. A reading of the literature suggests two key issues with regard to this driver. The first is the potential difference between the immediate and long run effect of technology and the second is that the effect of technology is not unambiguous and is likely to depend on the type of technology under consideration.

During the initial period of industrialisation, changes in technology may lead to an increase in child labour. This may work through several channels. A direct channel is that "skill saving" technical innovations may reduce the importance of strength and skill and provide a greater incentive for the engagement of women and children.[9] For example, in the case of textiles, labour intensive technology with children in an auxiliary role made children's nimble fingers and small body size an advantage. In this context, children were ideal as cheap and docile labour and,

as a consequence of increased demand, child relative wages increased in the English textile industry between 1830 and 1860 (Tuttle, 2009).

There are also indirect channels. Based on an analysis of industrialization in Catalonia between 1850 and 1920, Camps (1996) points out that in the textile industry mechanization led to a movement away from home production to industrialized production and involved a reduction in the labour force participation of married women and a greater use of children and young adults. Additionally, traditional crafts and home industries may increase the use of children to compete with the mechanization in modernizing agriculture and industry. Based on an analysis of the textile industry in Ghent between 1800 and 1914, De Herdt (1996) argues that in order to compete against ever-lower prices driven by industrial developments, home workers began working longer hours and called for greater work participation from their children.

While in a number of cases an increase in child labour has been recorded following the initial introduction of mechanization, the sustained spread of technological innovations through its effect on increased agricultural and industrial productivity and greater human capital requirements (Schultz, 1964) is likely to translate into a decline in child labour. Abstracting from such interactions for the moment, it is likely that changes in production technology, especially the type of technology being introduced is likely to exert a strong influence on child labour. For example, Rosenzweig (1981) reports that the green revolution in India was associated with a reduction in child labour and an increase in school attendance. Levy (1985) shows that the mechanization of Egyptian agriculture, especially the use of tractors and irrigation pumps reduced the demand for child labour in some specific tasks. Admassie and Bedi (2008) find that in Ethiopia the introduction of agricultural machinery sharply reduced the demand for child labour, however, the impact of land saving technologies such as fertilizers and improved seeds was ambiguous and in the short run the use of such technologies was associated with an increase in the work burden of children.

A final point is that the effect of mechanization and technology on child labour has been interpreted as deterministic by Cunningham and Viazzo (1996). However, it is not clear why this should be the case. At a macro level countries choose policies to promote or dissuade greater use of technology. Similarly, within countries, firms may react to variations in

policy stimuli by choosing amongst a range of production processes with varying capital-labour ratios.[10]

Household income and wages

The income hypothesis suggests that children work because households are poor and the optimal household strategy to sustain household welfare at a given point in time is to work. Once income starts increasing, the family will phase out child labour (Nardinelli, 1990) and substitute schooling in place of labour. This has been suggested in the context of the historical European decline of child labour, for which Fallon and Tzannatos (1998) suggest a per capita GDP cut-off point of USD 1,000 dollars after which child labour stops decreasing. More recent evidence from Vietnam corroborates this reasoning and shows that an increase in household expenditure from 1993-97 explains 80 per cent of the 28 per cent decline in child labour (Edmonds, 2003).

This relatively intuitive argument has been questioned.[11] It has been argued that the increase in the real earnings of adults may not lead to declines in child labour. An increase in family income and wages maybe accompanied by an increase in demand for goods and services which in turn may call for more child labour. Alternatively, an increase in wages may not lead to a substitution of child work by schooling as parents may not recognize education as a useful investment (Cunningham and Viazzo, 1996) The opportunity cost of not working may actually increase if children's wages also go up (Horrell and Humphries, 1995a). The issue here may well be not just increases in wages but the evolution of the ratio between adult and child wages, which maybe seen in terms of the ratio between wages for skilled and unskilled workers as well as the ratio between mother's and child's wage. An increase in the gap between skilled and unskilled wages is likely to lead to a reduction in the attractiveness of child labour and an increase in the attractiveness of education. Similarly, once female wages increase relative to children or the institutional impediments regarding female work participation are resolved, adult female labour force participation may be more attractive, and child work may be substituted by time dedicated to school.[12] Finally, while higher wages may indeed translate into lower levels of child labour a key question is - what drives labour productivity and wage increases?

Rights, labour legislation and activism

As discussed above, the traditional argument is that labour laws have been the key instrument through which child labour has been reduced. Laws setting the minimum working age at 12 were successively introduced in Europe and the United States between 1830 and 1910 with the support of progressive elites or organised male adult labour.[13] These laws which set the threshold(s) between childhood and children, and adults (Hindman, 2009a) were introduced on the back of a discourse, first articulated in Britain in the 1830s that children should have a right *not to work*. According to Cunningham (2001) this notion was "truly revolutionary" as till then it had been assumed that it was the role of the state and parents to find work for their children. Critics have pointed out that a legal approach banning child labour may not be supported by those whom they purport to help and may indeed push children into worse forms of labour. Such laws may be used as protectionist devices to promote the interests of organized labour and in an international context to protect industries rather than being driven by concerns about child labour.

While there is credible evidence that a legal approach is effective in some instances, as in the case of the 1833 Factory Act in Britain which led to a reduction in the use of children in industry (Cunningham and Viazzo, 1996), the argument that legislation has been the key determinant is disputed. First, such laws have most often centred on formal industrial work, while ignoring non-industrial work and the informal sector, where the bulk of child labour is located. Second, most laws were implemented when child labour was already declining, as in England, France and United States, or already at a low level, as in Japan (Brown, Christiansen and Philips, 1992; Heywood, 2009a; Hindman, 2009a). Third, econometric analysis shows no causal relationship between minimum working age laws and child labour. For example, in the context of the late 19th Century and beginning of the 20th Century, Moehling (1999) finds that variations in minimum working age laws across the United States did not exert any influence on the decline in child labour during this period.[14]

Schooling

Implementation of compulsory schooling laws and an increase in the availability of schooling have been suggested by several analysts and in-

ternational organizations to be the key to eliminating child labour. On the former, based on a study of child labour in India, in his influential work Weiner (1991) argues that a firmly enforced policy of compulsory schooling is the most effective way of eliminating child labour. The focus is on schooling laws as it is argued that these are easier to enforce than labour laws as education inspectors are less easily bribed by parents than labour inspectors are by employers (Fyfe, 2009). Without invoking a legal approach, the ILO (1998) argues, "the single most effective way to stem the flow of school-age children into abusive forms of employment is to extend and improve schooling so that it will attract and retain them". The basic argument is that schooling competes with economic activity in the use of children's time. Therefore, policy interventions such as improvements in access to schools, and/or improvements in the quality of schools, may raise school attendance at the expense of child labour.

Both approaches are based on the notion that work and schooling are perfect substitutes. In addition to the obvious concern that implementing compulsory schooling laws without adequate supply of worthwhile schooling is meaningless, it is quite possible, and there is substantial evidence that children can combine work and schooling.[15] A number of recent papers (Ravallion and Wodon, 2000; Hazarika and Bedi, 2003) have shown that educational policies are effective in terms of increasing school attendance but this does not translate into an equivalent reduction in time spent in the labour market.

So far the discussion provided above does not engage with interactions amongst each of the drivers. This is deliberate as the aim has been to highlight the key link between each of the drivers and child labour. However, a number of the drivers interact naturally and may work in similar ways to influence child labour. In fact except for the values driven and legal approaches to tackling child labour (compulsory school and labour laws inspired by activism), the other drivers - technology, availability of schooling, income and demography - are likely to be heavily linked. In what follows we frame the analysis in terms of drawing a distinction between a "values-legal" approach and the rest of the drivers while at the same time probing the interaction amongst these drivers.

2.3 The Portuguese Experience

The Portuguese experience is divided into four distinct periods defined by the character of Portuguese political governance. The first period covers the time of the Constitutional Monarchy (1820-1910) and the Republic (1910-1926). The second period is the early phase of the dictatorship (1926-1950). The third period is defined as the late phase of the dictatorship (1950-1974) which is followed by a fourth period of democratisation (1974-2001).[16]

2.3.1 Early accounts

Economic and Political Background

During the ninety year period of the Constitutional Monarchy, 1820 to 1910, Portugal lost much of its international power and its economic growth began lagging behind the rest of Europe. Portuguese prosperity had been based on the wealth obtained from its overseas colonies and this had meant an under-investment in the country's productive structures. With Brazil's independence in 1822, Portugal's main source of wealth disappeared.[17]

After 1820, as the rest of Europe continued to industrialize, Portugal began lagging behind (see Table 2.1). According to Maddison (2003) between 1820 and 1913, Portuguese per capita GDP declined from 77 per cent of Western European GDP per capita to 36 per cent.[18] In short, Portugal's late industrial take-off meant limited economic progress during the 19th century (Reis, 1993c).[19] Indeed, by the beginning of the 20th century Portugal had become one of the poorest countries in Europe. The Republican period (1910-1926) was a catch-up period and between 1913 and 1925, Portugal's per capita GDP growth was 1.22 per cent as compared to 0.58 per cent for Western Europe. Despite this spurt, in 1925, Portuguese per capita GDP was 39 per cent of Western European levels as compared to 77 per cent in 1820 (see Table 2.1).

As may be expected, the country's economic structure during this period was largely agrarian with about 60 per cent of the population engaged in agricultural activities (1890-1910) and about 18-20 per cent employed in industry (see Figure 2.1). The period was characterised by increasing deployment of resources for agricultural purposes and as shown in Table 2.2 between 1875 and 1920 the amount of land used for agriculture rose from 21 to 36 per cent and consequently so did demand

for labour. Portuguese industry continued to lag behind in terms of technology and labour training (Pedreira, 2005). For instance, in 1881, technological progress in Portugal was still based on introducing innovations from the first industrial revolution.[20] According to Mateus (2005) with regard to horsepower per capita, a measure of the degree of mechanization, in 1914 Portuguese figures for this measure were about 1/3 of the corresponding figure for France, 1/6 as compared to Belgium and Germany and 1/18 as compared to the United Kingdom.

In education, despite the passage of a compulsory education law in 1840, Portugal lagged behind its European counterparts. In 1850, the literacy rate was 15 per cent. By 1900 this figure had risen to 25 per cent, a modest level as compared to the 95 per cent literacy rate in Nordic counties as well as the 40 per cent achieved in Spain, Italy and Poland (see Table 2.3). Consistent with the increase in literacy rates, primary school enrolment rose from 28 to 48 per cent between 1864 and 1890 and rose further to 69 per cent by 1930.[21] While enrolment rates rose, the quality of schooling was often said to be very poor.[22] For example, in 1888 the primary school student teacher ratio was 58 (see Table 2.4). The tardy implementation of timely diagnoses of the need for teachers and schools did not lay in the cost of the implementation (Reis, 1993b).[23]

The Republican period witnessed greater attention being paid to education, such as the creation of a Ministry of Public Instruction and the reinforcement of teacher's pay, but implementation often continued to be poor. Instability in the government — 45 changes — compromised policy implementation. The Ministry of Public Instruction had 49 ministers in 14 years and as a consequence zigzag reforms were quite common.

With regard to legislation, rising social unrest across Europe led to the demand for better working conditions and reinforced the need to regulate child labour. As discussed earlier, legislation designed to prevent child labour in industry spread across Europe propelled by progressive urban elites and unions in the 19th century. In Portugal, after rejecting a proposal on containing child labour in 1881, modern legislation designed to prevent industrial child labour was adopted in 1891. After centuries of "natural" work contribution by children, Campinho (1995) attributes the need to regulate child labour in Portugal to rising social unrest. Proximate causes included a workers revolt in Porto, demanding better working conditions. With a view to pacifying workers and demonstrating sup-

port for their needs the decree passed in 1891 included sentences such as, 'the legislative care in favour of workers continues'—IEFP (1992)—or the decree intended to protect both women and children 'as society has an obligation to protect the weak…'—IGT (1991). Later in the year, the Catholic Church issued an Encyclical in the same vein.[24] As a result of this legislation, the minimum working age for industrial employment was set at 12 years (agriculture was excluded), with an exception of 10 years with completed fourth grade education for metallurgists. A major feature of these laws was their focus on industry while leaving other activities unregulated.

Child labour before 1926

Systematic detailed accounts of the existence and practice of child labour for the pre-1926 period are scarce. The earliest mention of children working comes from ship logs that report children being an important part of vessels' crews during the 16th century (Kassouf and Santos, 2006).

Our search for information revealed that the first quantitative accounts of the extent of child labour are provided by two industrial surveys conducted in 1852 and 1881.[25] In 1852, 3,147 children below the age of 16 were reported working. This corresponds to about 25 per cent of surveyed workers. According to the 1881 survey, the absolute number of working children rose to 5,998 while child participation as a percentage of surveyed workers fell to 7 per cent. In terms of their sectoral distribution, data from both the surveys shows that about 50-55 per cent of the minors worked in the textile and weaving industry — cotton, wool and silk. Other important sectors employing minors were metallurgy with 13 per cent and carpentry with 10 per cent. The dangerous pyrotechnics industry was the most "minor intensive" with minors representing almost 63 per cent of its labour force. Most of the reported child workers in industry were concentrated in Oporto district indicating its early industrial development. In addition, districts specializing in specific products, such as, Guarda and Covilhã in wool weaving, Portalegre in cork, Leiria and Marinha Grande in glass and Santarém in paper, relied heavily on children.[26]

In addition to these industrial surveys, reports by labour inspectors and lawyers are additional sources of information on the work contribution of children in industry. A participant at a national congress of jurists in 1898, Sebastião Centeno, denounced the practice of male and female

children as young as seven years old working for nine or ten hours per day, or three or four hours per night in the industrial centres, especially faraway from Lisbon (Cardoso, 2001). A 1904 report by a labour inspector illustrates the widespread use of child labour:

> it is enough to enter, by surprise, any factory, even humble (and maybe even more in small industrial establishments) to recognize the falseness of the reports; (…) in some of the employment registers of each of the establishments, appear minors who are less than ten years and in one registry there was even the naïve observation: 'In addition to the registered individuals, when there is need of work some women and minors are temporarily called'. (Campinho, 1995)

While these industrial surveys and reports provide useful information, this was a period of a rather incipient industry (Reis, 1993a), and the majority of minors probably worked in agriculture and services. While data to provide a quantitative assessment of the rate of child participation in agriculture and services during this time period (before 1890) is not available several reports suggest the widespread use of children in these sectors. Henriques Carneiro (2003) presents insightful reports written on children's lives in the mid 19th century by Portuguese educational inspectors which suggest the primacy of work in their lives. For example, Francisco Dinis, inspector in a county in Centro noted changes in the school timetable as 'the children needed to walk the cattle'. Another school inspector (António Carvalho) in the same region noted that children's failure to attend school is,

> related to the students' parents poverty and in part to their negligence, very often they see the need of occupying their children in services, either domestic, or rural.

In 1863, a school inspector Manuel Barradas, on an inspection in Alentejo was surprised to find zero enrolment:

> The teacher assured me that after the harvest [of grapes] is finished, maybe some students will apply to come to school (…); before that it would be impossible, because their own mothers would beat them up if they want to attend school.

From 1890 onwards we draw on information collected in various censii conducted by the Portuguese government to provide estimates of child labour force participation. While throughout the paper we aim at

an assessment of the percentage of working children in the age group 10 to 19, the data on activity status for the years 1890, 1900 and 1911 is only available for the age group below 20 years. Based on the assumption that the working age population is 10 to 19 (see Table 2.6a), we compute a child labour rate of 60 per cent. Using the same assumption, we compute employment rates of 48 per cent in 1900 and about 45 per cent in 1911. As shown in Table 2.6a, the census restricts itself to child engagement in paid work and over this time period if there is a shift between paid employment and unpaid work we are unable to capture this movement.

Prima facie, while there seems to be a decline in employment rate (and child labour) amongst 10-19 year olds during this period this should probably not be viewed entirely as a decline in child labour force participation but a general decline in employment amongst all age groups related to measurement issues (Amaral, 2005). As shown in Table A2.1, even amongst workers in the age range 20 to 39 there is a decline in employment rate from 66 to 59 per cent. However, the 15 per cent decline in employment rates amongst the younger age group is larger than the 7 per cent decline in the older age group raising the possibility that some of the change over time may be driven by a genuine reduction in labour engagement amongst the 10-19 year old group. The sharper decline in labour engagement between 1890 and 1900 (12 per cent) as compared to the period 1900 to 1911 (3 per cent) is consistent with the passage of the law restricting child engagement in industry to the age group 12 and above.

However, our aim in this section is not to delve too deeply into the reasons for the decline but to treat the figure of 45 to 48 per cent child engagement in employment at the turn of the century (1900/1911) as a baseline for the evolution of child labour during the rest of the century.

2.3.2 The period 1926-50

Economic and Political Background

A military coup in 1926 led to a conservative dictatorship that kept the country under tight control until 1974. António de Oliveira Salazar was the central figure during most of this period and in 1933 established the *Estado Novo* (New State).[27] The regime that he led idolized a rural and modest life style, and feared modern economic development.[28] The con-

servative philosophy was summed up in the motto 'God, Fatherland and Family'.

Economically, the regime pursued self-sufficiency and until 1950 the Portuguese economy tended to be one of subsistence and closed to external markets.[29] Industrialization slowed down, rural lobbies were strengthened and investments were diverted to agriculture (Mónica, 1978).[30] The industry that did develop was characterized by unsophisticated consumer goods. The mode of production was predominantly artisanal and required intensive use of low-skilled labour (Aguiar and Martins, 2005).

During this period, annual per capita GDP grew at about 1.54 per cent per annum (Table 2.1), somewhat higher than during the previous period (1.22 per cent between 1913 and 1925). Consistent with the focus on agriculture, additional land was brought into agricultural production and the amount of cultivated land rose from 38 to about 54 per cent (Table 2.2). The bulk of the population continued to work in agriculture (about 50 per cent in the 1950s) while the share of industrial employment rose marginally to about 24 per cent (see Figure 2.1). Between 1938 and 1950, real rural wages rose about 1.5 times while real urban wages rose at a much slower pace (1.2). At the same time, a declining death rate and a sticky birth rate meant high natural population growth rates (see Figures 3 and 4).[31] The main picture emerging on the economic front during this period is one of continued reliance on low-tech agriculture and limited structural changes. The increase in land brought under cultivation and increase in rural wages supports the idea that agriculture continued to offer suitable employment opportunities.

On the education front there were several changes. Initially, education was not a priority and the regime acted accordingly (Carvalho, 2001). In 1926, schools that trained secondary school teachers were closed. In 1929, compulsory education was reduced from five to three years, and co-educational schools were forbidden. As a consequence of these restrictive measures, the student-teacher ratio increased and between 1922 and 1932 the ratio rose by about 10 students in primary and secondary schools. More enlightening than these changes were the opinions expressed by some supporters of the regime:

> The more beautiful, stronger and healthier part of the Portuguese soul resides in the 75 per cent of the illiterate; [referring to the rural inhabitants]

> What advantages did they get in school? None. Nothing won. Everything lost.
>
> (…) knowing how to read and write they create ambitions: they want to go to the cities, apprentice store clerk, sales clerk, gentlemen; they want to go to Brazil. They learned to read! What do they read? Criminal relationships; wrong notions of politics; bad books; leaflets of subversive propaganda. They leave the hoe, become uninterested in the land and only have an ambition: to become civil servants — Virgínia de Castro e Almeida, writer (1927);
>
> Portugal does not need schools — João Ameal, writer and historian.

Soon after these changes, and coinciding with the rise of Salazar to Prime Minister, additional measures were introduced to use the school system now as a way of controlling the population. In 1935, the regime "purified" the public system from oppositionists and specially communists. In 1936, the Ministry of Public Instruction became the Ministry of National Education and gave emphasis to nationalism and Christian teaching, namely with the creation of the Portuguese Youth and the reintroduction of the crucifix in classrooms.[32] In the same year, the old official school books were decreed outdated, with new ones based on the example of fascist Italy. The compulsory introduction, in 1932, of 113 sentences from Salazar and Mussolini to Goethe and Comte for the official manuals is illustrative (Carvalho, 2001):

> 'Your motherland is the most beautiful of all: it deserves all your sacrifices'; 'In the family the chief is the Father, in school the chief is the Teacher, in the State the chief is the Government'; 'Obey and you will know how to command'; 'To command is not to enslave: it is to direct. The easier the obedience is, the softer is the command'; 'Do not envy your superiors, as they have responsibilities and duties you ignore'; 'If you knew how difficult it is to command, you would gladly obey all your life'.

A parliamentary discussion of education laws in 1938 provides compelling information on how education was understood (Mónica, 1978; Carvalho, 2001; Henriques Carneiro, 2003). For example,

> Achieving primary schooling through highly intellectualized agents has very serious inconveniences. (…) It would be preferable that it would be good and simple; but, when it is not possible to be good, at least that it is not very scholarly;

> The teachings of abstract things are absolutely in discordance with the environment the student lives in. In a village a boy that becomes distinguished in primary schooling is a boy lost to his family. I can cite an example of a family of my hometown, traditionally dedicated to the craft of locksmith, but where a boy distinguished himself in the primary schooling. This boy had to go to Brazil after committing two embezzlements—Teixeira de Abreu;
>
> Is compulsory schooling commendable to support, in principle? Observe the case of USA, where all know how to read and write, but there are also so many crimes; Looking over our history for the three most brilliant periods of our past, when our nationalist cause rose the highest: the [Christian] reconquering [of Iberia peninsula], the [overseas] discoveries and of restoration [of independence]. The mass of men that was then mobilized was composed by literate or illiterate? Did the companions of [Vasco da] Gama know how to read and write?(…) I have a certain fear of this fetishism of the alphabet (…)—Querubim Guimarães;
>
> (…) I would try to reproduce today the environment that I met fifty years ago in the rural school of my village. (…) We have to take many steps backwards to free the school from the encyclopaedism that distresses the several educational reforms of primary schooling, maybe since 1878—Fernando Borges;

While gross primary school enrolment rose from 69 per cent in 1930 to 99 per cent in 1950, net enrolment rates were lower. Additionally, schooling was characterized as low quality education in crowded classrooms and only enough for a simplistic education (Figure 2). The average years of schooling of the population increased marginally from 0.9 in 1940 to about 1 year in 1950 (see Table 2.4). Higher education was intended for a minority, which included urban and rural elites and a growing urban middle class. Mónica (1978) suggests that for lower classes the opportunity cost of education was high while the perceived future benefits of schooling were low. The rationale was that the family could not afford to spare children's work or salary and there was no room for upward mobility in the regime's rigid social structure: '[i]n an illiterate society, ignorance does not constitute (…) a disadvantage; and it is also not a stigma because illiteracy is the rule, not the exception.'

Unsurprisingly, in terms of literacy rates, by the 1950s Portugal lagged even further behind its European counterparts (Table 2.3). From a literacy rate of 25 per cent in 1900, Portugal recorded a literacy rate of 55 per

cent in 1950. This 30 per cent increase, while not small, pales in comparison with the increase in literacy rates from 25 to 90 per cent in Russia/Soviet Union and other eastern and southern European countries.

Child labour

Politically there was all-round support for child labour. As may be inferred from the attitude towards schooling and the idealization of a rural and simple life, during this period child work was looked upon favourably. While a 1934 law extended the prohibition of work amongst children under 12 years old from industry to commercial enterprises (Campinho, 1995), work performed within the household or in a rural setting continued to be allowed. In 1938, Pacheco de Amorim, a parliamentarian, stated, "[c]hild labour is a good school of responsibility". In contrast to rural labour, the "cruel" industrial working conditions were denounced by an urban elite. For example, newspaper articles in Diário de Notícias, the regime's official newspaper, highlighted cases of 'children of 10/12 years old that earned 11 escudos per week, underfed, and working excessively long hours' (Mónica, 1978). Despite denouncing industrial child labour, new legislation on preventing child labour, introduced in 1934 and 1936, simply confirmed the 1891 law which and retained the minimum working age for industrial employment at 12 years.

The opposition also tended to support child labour, even though it also emphasised education.[33] In 1936, Avante, the journal of the Portuguese Communist Party, pledged that the "Portuguese Communist Party (…) struggles for the liberation of adults and the salvation of children".[34] In 1938 it denounced the differences between children of different classes. While some children were able to go to school, others had to work, selling newspapers or vegetables. Six or seven year old children worked in quarries near Lisbon, "earning painfully their bread, those children that never knew where there was a school". In 1937, it reported a work accident in Aveiro, where stone mines used almost exclusively 7 to 14 year olds as workers, who received salaries varying between one fourth to two fifths of the adult pay.[35] In 1941, the neo-realist novel "Esteiros" written by a communist militant described the harsh life of child workers in a brick factory.[36] However, while the Communist party denounced the use of child labour in "harsher" sectors, it did not comment on the use of child work in agriculture.[37]

In sum, in spite of the growing concern in some sectors of the Portuguese population of the hardship of child labour and particularly the exclusion of schooling, (agricultural) work was seen as normal or at least a necessity, and therefore a lesser evil. Nonetheless, in terms of working conditions, while the situation in agriculture and domestic services may not have been as poor as in industry, they were certainly not harmless. "Colectivo 9° ano (2006) presents the life stories of men and women who lived in Alentejo from 1920 to 1974 and had migrated to Setúbal, a town in the coastal area. According to these life histories,

> children did not stay long in school and girls were worse off because of prejudice and of their usefulness for other tasks. Most children started working when they reached nine years, sometimes sooner. The ones who did not go to school used to work full time while those who did attend school worked after school hours. Girls worked in domestic services for the big landowners, or would go to the nearest village, city or even Lisbon. Often there was no remuneration and the work only assured their meals. Boys started by taking care of cattle, chicken and pigs and by twelve or thirteen, they could try to work in the fields. The tasks were plucking olives and harvesting wheat, and children were always included in large groups of workers, but earned less. The money would go to the family or more likely to the father. Children would usually get up at five o'clock in the morning, eat something before work and then walk many miles to the fields. The work finished at sunset and they reached home nine, ten o'clock in the evening. Girls could still have domestic chores to do.

Children provided agricultural labour throughout the country, but there were regional differences. The Northern region was characterized by ownership of small plots of land, land inheritance from parents to children and high emigration. Typically, such farms drew on labour from their own family or from children in nearby farms. In the South, where farm plots were larger, children were less hierarchically dependent on their household as they rarely worked under parental supervision and also did not expect to inherit land in the future. As a consequence, in 1940, the Northern districts of Bragança, Braga, Vila Real and Viseu had the highest incidence of child labour (Mónica, 1978).[38]

Statistical information on the extent of child labour is available for the end of the period under analysis. We use two *censii*, conducted in 1940 and 1950 to provide an assessment of child labour participation rates. As presented in Table 2.6a and consistent with the attitudes towards child

work and the rural orientation of the economy, child employment in 1940 may be pegged at 15 per cent for children in the age group 10-14 and 43 per cent for the age group 15-19. During the period leading up to the 1950 census the participation of children in the work force increased or was stable and according to the 1950 census, about 22 per cent of children in the younger age group (12-14) and 46 per cent of the children in the older (15-19) age group were employed.[39] Unlike previous censii we now have information on child engagement in unpaid work and as shown in Table 2.6a, in 1940 about 46 per cent of children in the age range 10-14 were involved in either paid (15 per cent) or unpaid work (31 per cent) while the figure for the older age group was about 82 per cent (43 per cent in paid and 38 per cent in unpaid work). By 1950, more than 90 per cent of children in the older age group were engaged in some form of work.

Against the economic and political background of this period, the stability of child employment between 1900 and 1950 (between 43 and 46 per cent for 15-19 year olds) can be readily understood (see Tables 2.6a, 2.6b and 2.7). A reliance on low technology and a rural way of life made child labour possible and necessary (demand). At the same time, demographic growth guaranteed a generous supply of labour. While educational access did increase during this period, limited opportunities for those who did acquire schooling ensured that schooling did not interfere with work. Formal enrolment figures were also distinct from attendance and particularly succeeding at school. From the perspective of rights and laws, minimum working age laws did not change during this period while compulsory schooling laws weakened. Ensuring a steady agricultural labour supply was crucial as rural elites feared labour shortages and this was amply reflected in the politically consensual view on children working in rural areas.

2.3.3 The period 1950-1974

Economic and Political Background

In 1950, the regime began promoting economic and social reforms. After an initial rejection of the Marshall Plan, the regime formalized a development plan for the 1949-51 period (Garoupa and Rossi, 2005). Key aspects of this plan included internationalization, and industrial and agricultural development through upgrading of production technology.[40]

From an emphasis on agriculture, industrial development was promoted and low agricultural wages and low cereal prices were used to transfer surpluses from agriculture to industry—see Confraria (2005) and Soares (2005). Set in the context of a post-WWII European boom, two key economic events during this period were Portugal's entry into the European Free Trade Agreement (EFTA) in 1960 and the signing of bilateral labour supply agreements with France and The Netherlands in 1963 and the German Federal Republic in 1964.

In 1960, Portugal entered the European Free Trade Agreement (EFTA). The subsequent increase in exports to European countries led to industrial specialization and increases in imports of investment goods led to the access and adoption of more advanced production technologies (Mateus, 2005).[41] For example, in agriculture, machines like the thresher, harvester-thresher and tractors became increasingly common. As shown in Table 2.8, the use of tractors in agriculture rose almost 17 fold between 1950 and 1975, the use of threshers doubled and the use of harvester-threshers quadrupled during this period. The continued utilisation of machinery during this period led to a sharp reduction in agricultural labour demand and between 1950 and 1973 the percentage of the work force engaged in agriculture fell from 48 per cent to 27 per cent. The contribution of a technology driven growth path is confirmed by Lains (2003) who shows that between 1947 to 1953 the growth of physical capital was responsible for about 50 per cent of Portuguese annual GDP growth of 5.17 over this period (see Tables 2.9 and 2.10).

In both agriculture and industry, technological innovation meant the adoption of labour saving technologies and a reduction in the demand for labour. The decline in labour demand added to a high birth rate and a steady death rate (see Figures 2.3 and 2.4) may have been expected to lead to a growth in labour supply and a wage squeeze. However, the decline in labour demand was matched by massive emigration flows. A booming European economy urgently needed workers. Portugal signed bilateral labour supply agreements with France and The Netherlands in 1963 and the German Federal Republic in 1964 (Veiga, 2005). Subsequent (legal and illegal) emigration flows meant that more than 1.7 million or about 18-20 per cent of the Portuguese population left the country between 1950 and 1973.[42] The direct effect of mass emigration of youngsters and adults on the country's demographics as well as the indirect effect due to the emigration of the population in the fertile age

group served as a check on population growth and translated into negative total population growth rates in the 1960s, in spite of the historical peak in natural growth rates during this period.[43] Additionally, migration from rural to urban areas across the country accelerated in the 1940s and 1950s (Nunes, 1996). Increases in capital intensity and the decline in growth of labour translated into sharp wage increases in industry and particularly in agriculture. Between 1958 and 1972, wages in urban areas doubled and rural wages trebled (see Figures 2.5b and 2.6b).

On the education front, the focus was on increasing investments in primary schooling and the training of technicians (Carvalho, 2001). Driven by the needs of the modernization strategy and especially the adoption of skill biased technologies, unskilled labour began to be viewed in a considerably different light by employers and the regime.[44] Education was now needed for a prepared labour force and consequently educational expenditure increased in the 1950s. In 1956 and 1960, compulsory education was increased from 3 to 4 years of schooling first for boys and later for girls. In 1964 it was raised to 6 years (Table 2.5). At the same time an increase in school quality as reflected in the pupil-teacher ratio which fell from 43 in 1950 to 31 in 1970 provided further incentive for schooling (see Table 2.4). The average years of schooling which had remained at about 1 year between 1940 and 1950 more than doubled to about 2.1 years by 1970 (Table 2.4). In 1969, the minimum legal working age was raised to 14 years (Campinho, 1995).

Child labour

Information on child labour during this period comes from two sources —census data and labour surveys. As shown in Table 2.6a, census data show that between 1940 and 1960 there is essentially no change in the extent of child participation in employment (remains at 15 per cent for the 10-14 group and 43 per cent for the 15-19 group). Overall, the incidence of child/youth labour remains at 45 per cent for the younger age group and more than 80 per cent for the older age group. Indeed, as displayed in Table 2.7, between 1890 and 1960 there is not much change in the incidence of child labour or the share of children as a percentage of the labour force. However, by 1970 clear changes begin to appear. Between 1960 and 1970 child labour participation for the younger group declines sharply from 43 to 16 per cent while for the older age group it drops from 84 to 74 per cent. Unemployment rate for the 10-14 age

group increased during the period suggesting the decreased interest in this type of labour (Table 2.6a). The main change for the younger age group emanates from reduced engagement in unpaid work.

In addition to census data, we use 14 labour surveys canvassed between 2001 and 2004 by the Portuguese Institute of Statistics (INE) to trace the trajectory of child labour. Each labour survey provides comprehensive information on 45,000-50,000 individuals regarding their relationship with the labour market. In addition, the surveys enquire about their past labour market experiences and their age of entry into the labour market. Using information on these adults and their working patterns while they were children we are able to sketch a picture of the patterns of child labour during the second half of the twentieth century. Based on the response to the question, "When did you start working for the first time", we compute work participation rates for the age group 10-14 and 15-19 (see Figure 2.7).[45] While figures based on the census and the household survey are not directly comparable, the figure does corroborate the finding that in the second half of the 1960s the work engagement of children in the younger age group declines while for the older age group participation rates remained relatively stable.[46]

The sharp decline in child labour force participation amongst the younger group especially in terms of involvement in unpaid work (the main source of decline) is most likely to have been driven by the increased use of mechanization in agriculture and the consequent reduction in (child) labour demand. At the same time, the improvement in educational quality is likely to have increased the opportunity cost of working and provided an incentive to substitute schooling for education especially for the younger age group. The relatively smaller decline for the older age group may be attributed to the effects of the sharp emigration experienced during this time period. An 18-20 per cent decrease in the Portuguese population implies a more than proportionate decrease in the labour force as most emigrants were individuals in the age group 20 to 44 (Valério, 2001). Thus, despite the labour demand decreasing effects of mechanization and increases in rural wages, the effect of the emigration flow is likely to have worked in opposite directions resulting in a smaller decline in labour participation amongst the older age group.

While the interaction between increases in rural wages, better quality education and the greater use of technology is likely to have led to an increase in demand for education and a reduction in the need for child

labour the period also witnessed a decline in gender wage gaps in the late 1960s. While male wages in agriculture were about 1.9 time female wages in 1968, by 1973 the gap had fallen to 1.7 (Table 2.11). A similar pattern was observed in industry.

While it is hard to provide an assessment of the relative weight of the different factors that appear to be correlated with the reduction in child labour during this period our assessment suggests that the decline coincides with the sharp increase in agricultural mechanization and greater use of technology in industry as captured by the sharp increase in the rate of growth of physical capital during this period (see Table 2.9). The reduction in labour demand which could potentially have negative consequences for wage earners was matched by sharp emigration flows occasioned by the signing of bilateral labour supply agreements with Western European countries. It is worth pointing out that both these measures, that is, embarking on a technology driven approach to development and creating a vent for excess labour were policy choices and not deterministic. The subsequent translation of these policies into wage increases is likely to have contributed to the decline in demand for child labour and an increase in demand for education.[47]

A final point is that the passage of legislation increasing the minimum working age to 14 took place in 1969 during a time when child labour amongst the younger age group had already started declining (see Table 2.6a and Figure 2.7). Furthermore, the law dealt with regulating the minimum working age for children involved in industry, (see table 2.6a), while the decline in child labour took place mainly through reduction in child engagement in unpaid unregulated intra-household work. Both the timing and the source of the decline clearly suggest that the passage of the law may have been a consequence of the decline instead of a key factor determining the reduction in child labour witnessed during this period.

2.3.4 The Period 1974-2001

Economic and Political Background

The overthrow of the dictatorship introduced political changes that led to democratization and to decolonization. In the early years of the post-dictatorship period, in a context of greater openness and labour abundance the economy experienced a resurgence of specialization in labour

intensive, low-skilled and low-growth sectors (Lains, 2003). The currency experienced a sliding devaluation from 1977 (Aguiar and Martins, 2005) and trade agreements with EEC in 1973 and 1977, made exports to Europe and subcontracting from European companies more attractive leading to an economic boom in some regions. The influx of population after decolonization and the end of emigration to Europe led to a sharp growth in population in the 1970s (see Figure 2.4). A restrictive governmental policy coordinated with the IMF targeted macroeconomic imbalances in 1979, with the share of social expenditures declining until 1982 and a reduction in real wages witnessed up to the mid-1980s.

In 1986, after 9 years of negotiations, Portugal joined the European Economic Community (EEC) and reached what some called the European bliss (Valério, 2000). The country received substantial flows of European funds which allowed increases in public expenditure, supported further restructuring of the economy, and supported a continuation of the process of technological upgrading. In particular, between 1975 and 1995 the use of tractors in agriculture doubled while the share of labour involved in agriculture continued to decline. While the 1970s and early 1980s had been marked by a return to low-tech manufactures, after EU accession the complexion of Portugal's exports and manufacturing employment became increasingly high-tech (see Table 2.12). After mid-1980s the real wages also started increasing.

Women's rights and (higher) equality regarding the law meant a major shift towards equalisation of pay across gender for the same job – see Table 2.11. This trend had started earlier in some sectors, but democracy boosted and generalised it. Women participation rate increased from 28 per cent in 1970 to 49 % in 1990. In the period fertility declined dramatically from 2.8 children per woman in 1970 to 1.4 in 2001 (see Table 2.11), while the share of population aged below 15 years old and the child dependency ratio had decreased to half of their 1970 values by 2000.[48]

In terms of the overall picture of economic growth during this period, while per capita GDP growth fell as compared to the previous period (1950-1974), the country grew at a faster pace than the rest of Western Europe. From a per capita GDP which amounted to 36 per cent of Western European GDP in 1913, by 2001, Portugal's per capita GDP had risen to 74 per cent of Western European GDP. Lains (2003) shows that during the period 1973-1990, capital stock grew at an annual rate of

5.21 per cent and was responsible for 44 per cent of the country's output growth during this period. A remarkable change as compared to the rest of the century was the increasing importance of human capital in promoting economic growth (41 per cent) and a sharp decline in the contribution of labour, which was almost negligible over this period (see Tables 2.9 and 2.10).

Table 2.12
Industrial exports and employment according to technology, 1988-2006

	(1)	(2)	(1)-(2)
	1988	**2006**	**Diff p.p.**
Share in total exports (%)			
High-technology manufactures	5.7	11.0	5.3
Medium-high technology manufactures	18.2	29.0	10.7
Medium-low technology manufactures	11.5	20.9	9.4
Low technology manufactures	62.0	32.8	-29.2
Share in employment in manufactures (%)			
High-technologies manufactures	2.9	3.7	0.8
Medium-high technology manufactures	10.5	13.9	3.4
Medium-low technology manufactures	21.9	22.5	0.6
Low technology manufactures	64.7	59.9	-4.8

Note: Level of technology is based on OECD technology level classification which ranks industries according to their R&D expenditures.
Source: Alexandre Et al. (2009).

During this period the emphasis on education was enhanced. Educational expenditures rose and in 1976 the educational budget surpassed the military budget. A school milk programme became a powerful weapon against absenteeism and hunger (Silva, 1991). School conditions improved with the pupil-teacher ratio falling from 31 to 14 at the primary level and 19 to 10 at the secondary level. At the same time, increasing returns to educations provided a strong incentive to acquire education - at all education levels net enrolment rates increased until the early 1990s (Figure 2.9).[49] School attainment increased and average years of

schooling of the active population rose from 2.1 in 1970 to 4.3 in 1991 (see Table 2.4).

Compliance with EEC norms led to an increase in compulsory education from 6 to 9 years of schooling in 1986. Consistent with compulsory education requirements, in 1991, the minimum working age was raised to 16.[50] During the late 1980s and 1990s, a now more demanding and internationally aware society began denouncing child labour. Unions and catholic organizations highlighted and disparaged child labour and several reports in the national and international popular press continued to highlight the plight of working children. In marked contrast to the views expressed by parliamentarians in 1938, in 1989 the Portuguese President referred to child labour as a "true scourge" (Williams, 1992). Under increasing national and international scrutiny the government undertook three main measures. Information was collected to place the child labour debate on an informed footing. In co-operation with the ILO, two household surveys especially designed to gather information on working children were conducted in 1998 and 2001. A special programme, PETI, was launched to study and fight child labour. The labour inspection regime was tightened and between 1997 and 2002, the number of labour inspections quintupled (see Figure 2.8).

Child labour evolution

Our assessment of the extent of child labour during this period is based on figures from three censii (1981, 1991, 2001), labour force surveys (for the years 1976 to 1993 and 2001-04) and finally household surveys conducted specifically to identify the extent of child labour in 1998 and 2001.[51] As shown in Table 2.6a, between 1970 and 1980 the employment and activity rates of the younger age group (10-14) remains in the same range as in 1970 (about 9 per cent). Analysis of the labour force surveys (Table 2.13) yield a similar picture and shows that between 1976 and 1982 the employment rate for the younger age group remained steady at about 9 per cent while the activity rate lay in the range of 12-15 per cent (as compared to the census figure of 17 per cent).

For the older age group (15-19 years olds) the evidence is mixed. Between 1970 and 1981, census data (Table 2.6a) show a sharp decline in the employment rate from 55 to 40 per cent and a decline in the activity rate from 74 to 54 per cent). Labour surveys provide a different picture and show that between 1976 to 1982 employment rates remained at

about 50 per cent (higher than the census figure of 40 per cent) while activity rates lays in the range of 59 to 64 per cent (as opposed to the census figure of 54 per cent).[52]

After this period of relative stability in the incidence of child labour, child labour falls sharply in both age groups, independent of the source. The 1991 census reveals a sharp decline in child activity rates. For the younger age group the activity rates falls to about 9 per cent by 1991 and for the older age group it drops to 40 per cent. Just as had been seen for the younger age group between 1960 and 1970, the decline for the older age group may be attributed mainly to the sharp decline in child engagement in unpaid work between 1981 and 1991. Between 1991 and 2001 the downward trend continues and by 2001, child employment in the age group 10-14 is negligible while it is about 22 per cent for the older age group (15-19). To provide a more modern assessment of the extent of child labour we rely on the two household surveys purposively conducted in 1998 and 2001 to assess the extent of child labour. As shown in Table 2.14, for the age group 6-15 in 2001 the activity rate was 8 per cent while the employment rate was about 4 per cent.

Table 2.14
Child Work in Portugal, 1998-2001

	1998		2001	
	Children	***Incidence***	***Children***	***Incidence***
Economic work	33792	3,13	44003	3,70
Outside the household	7342	0,68	8689	0,73
Within the household	26450	2,45	35314	2,97
Both economic and domestic work	9285	0,86	5130	0,43
Domestic work – Within the household	83037	7,68	48165	4,05
Total	126114	11,67	97298	8,18

Notes: Estimates of the absolute number of working children working are based on weighting the sample data to obtain population figures; Incidence is defined as the percentage of all children in the age group 6 to 15 who report at least one hour of work per week.

Thus, the period between 1974 and 2001 may be divided into a period of relative stability in child labour rates up to the early or mid-1980s and then a sharp decline. The stability may be attributed to the trade agreements and the currency devaluation which induced increased demand for Portugal's labour intensive products and child labour demanding industries like textiles, clothes and shoes.[53] In addition to this demand-side effect, the population influx during this period and subsequent wage declines worked towards increasing the labour supply of children. The sharp declines post-1986 are likely to have been driven by a confluence of factors. Indeed the data suggest that the decline during this period are likely to be a result of continued technological upgrading in agriculture and industry, interacting with the effects of educational investments to increase economic growth which in turn reduced the need to rely on child labour (demand reduction). At the same time, the increase in wages, educational returns and declines in fertility are likely to have contributed to a reduction in the supply of labour.

The key difference in this period was of course EU accession which led to an increase in the minimum working age to 16 in 1991 and a renewed commitment by the government through public pronouncements and a regime of increased labour inspections (between 1997 and 2002). While these are likely to have further increased the pressure to reduce child labour, as is evident from Table 2.6a, the reduction in child labour was well under way by 1991 and indeed the bulk of the reduction in child labour for the older age group occurred between 1970 and 1991 (reduction from 74 per cent to 40 per cent) rather than after 1991 (40 to 23 per cent) and it is hard to believe that an increase in the minimum working age law was a key factor responsible for reducing child labour during this period.

2.4 Synthesis and concluding remarks

Setting the changes in patterns of child labour in the last two centuries against the backdrop of the structure of economic growth, educational legislation and quality, labour legislation and the prevailing norms and attitudes towards working children, shows that child labour is amenable to policy. Furthermore, as the post-1950 Portuguese experience shows, when the various pieces are "in sync", the pace of reduction in the incidence of child labour may be viewed as nothing short of astounding. The

cascading effects of changing demography, economic structure, norms, educational and labour legislation led to rapid changes in child labour force participation. However, the patterns also suggest that, similar to other social issues, no single legislation or policy is likely to be effective unless the various pieces come together.

Looking back over the course of the last two centuries there are several points about the Portuguese experience with child labour that should be highlighted. From 1820 to 1910 Portugal lagged behind most Europe in economic and social terms. Until 1950 it would start catching up economically, although lagging further behind in social terms. The second half of 20th century was marked by an economic and social recovery, with an emphasis on economic growth in the first quarter and an emphasis on social achievements in the second quarter. As the data presented in the paper show, child labour has essentially vanished from formal employment and is minimal in other occupations, particularly for younger children. However, this decline should not be viewed as an inevitable outcome of economic growth.

The sharpest changes have occurred only in the last sixty years since 1950, and particularly after 1981. Before that, there was a slow decline. What is likely is that the early period of dictatorship delayed the transition from work to school that occurred in the core European countries and was occurring in the periphery. Concerns over the labour contribution of children often focused on a few sectors, in spite of the overall practice. The general perception that child labour was acceptable particularly in agriculture reflected the agrarian character of the economy of the time and the prevalent lobbies.

It was only in the 1950s and particularly in the 1960s that the demand for child labour began to abate impelled by the desire to modernize and industrialize the economy. Skill biased technologies were adopted and unskilled labour began to be viewed differently by employers and the political regime. Children's labour was less desired and children's unemployment rate increased. At the same time the expansion of schooling led to increases in minimum years of schooling to 4 and 6 years, and later in the minimum working age to 14. The population boom was checked by emigration, and eventually wage increases improved living conditions.

In the late 1970s, labour force participation among younger children had a short period of slow down or even stabilisation as the economy shifted towards labour intensive lower skilled technologies. However, by

the early 1980s the declining trend was reasserted. As (quantity and quality of) education supply and average schooling years increased, its ratchet effect fed into the process by competing with child labour and changing people's perceptions about schooling.

The involvement of all children in the labour force displayed a sharp decline for the rest of the century. The adoption of new technology and competition meant low-skilled labour intensive sectors were disappearing, while children themselves were becoming scarce as fertility declined. Both factors led to a shift in the needs of the country's economy and a further investment in children's quality. The economic structure demanded a more educated workforce and returns to education were high. National and international pressure promoted changes in social norms. Changes in educational and labour legislation promoting schooling and increases in educational quality and eventually labour inspections further contributed to the rapid reduction in child labour. Families also adhered to secondary education and youngsters were moving from workplaces to schools.

While it is difficult to discern a clear policy sequence from the pattern of change in child labour in Portugal, our analysis suggests that while the passage of compulsory schooling and minimum working age laws may have provided additional impetus, they were not the main drivers. These laws are unlikely to be implemented and to yield sustained reductions in child labour in economies that continue to rely on low-skill and low-wage labour to generate economic value. In the Portuguese case, labour laws by themselves were particularly less effective as Portugal often followed the majority of European countries where schooling laws preceded labour laws. In the early 1990s as both compulsory schooling and minimum age labour laws were more sharply articulated their effectiveness seemed to improve.

Instead our findings suggest that the long-run evolution of child labour was determined mainly by the needs of the economic structure of the country which conditioned the pattern of labour demand. While demography regulated labour availability and might have conditioned the range of policy choices, it was the progressive adoption of skill-biased technologies that pushed children away from workplace. Children were less necessary and/or did not fulfill the requirements for the higher-skilled workers needed and child labour declined thereafter. If technology is suggested to have been crucial for the decline of child labour in

Portugal, a potential policy implication relates to the transfer of (affordable) technology to developing countries. Cheap or even free technology could be the key to the acceleration of the decline of child labour throughout the world.

Notes

[1] This paper builds on Goulart and Bedi (2007), Goulart (2009) and a revised version of the paper has been accepted for publication in a book titled "Child Labour's Global Past", edited by K. Lieten and E. van Nederveen Meerkerk and to be published by Peter Lang. The paper has been presented at the following conferences/seminars: Child Labour's Global Past, IISH, November 2006; International CERES/EADI Summer School, UvA, June 2008; Macro-Micro Dynamics of Poverty Research Cluster Workshop, ISS, November 2009; Education Research Cluster Seminar, ISS, March 2010; 35th Economic Business Historical Society, May 2010. The author thanks Andrew Fischer, Ben White, Colin Heywood, Hugh Cunningham, Hugh Hindman, Jaime Reis, John Cameron, Judith Stein, Linda Herrera, Linda McPhee, Luciano Amaral, Lynne Doti, Margarida Chagas Lopes, Michael Grimm, Michael Huberman, Peter Knorringa, Robert Sparrow and Catarina Grilo for helpful comments and suggestions. I particularly thank Arjun Bedi, João Guimarães and Tiago Mata for detailed comments. The author gratefully acknowledges the financial support from Fundação para a Ciência e Tecnologia, Portugal.

[2] According to Edmonds (2007) an Econlit search of keywords "child lab*r" yielded 6 articles in peer-reviewed journals between 1980 and 1990, 65 between 1990 and 2000, and 143 between 2000 and 2005.

[3] For example, historical accounts of the evolution of child labour in the United States are provided by Goldin (1979), Brown, Christiansen and Philips (1992) and Moehling (1999). Bolin-Hort (1989), Nardinelli (1990), Horrell and Humphries (1995a) and Cunningham (1996) analyze the British experience, while studies on Belgium are provided by Scholliers (1995) and De Herdt (1996). Hindman's (2009b) atlas on child labour contains a number of contributions on the topic, however, peripheral Europe comprises a very small fraction of the developed country literature (3 articles and 14 pages out of a total of 54 articles and 203 pages).

[4] While the UNCRC defines a child as 18 and below, the International Labor Organization has established 15 as the minimum age for work in article number 138 in the 1973 Minimum Age Convention, with an allowance for light work after the age of 12. Typically, taking into account compulsory school laws, country-specific legislation builds upon these conventions.

[5] For the first few periods under analysis we have information only for the age group 10-19. Thereafter we can distinguish between children in the age group 10-14 and 15-19 but cannot provide a finer distinction as the data are available only for these age ranges. These two groups may be viewed as children (10-14 years old) and youth (15-19 years old).

[6] According to ILO (2002) the average child work participation rate in developed countries is about 2%.

[7] The industrial revolution originated in England in the 1760s and spread to other European countries thereafter.

[8] Analogously see, for example, the Malthusian hypothesis which links fertility to poverty as population growth depresses real wage rates (Eastwood and Lipton, 2003) or the correlation between real wages and marriages rates in England between 1551-1801 (Wrigley and Schofield, 1981).

[9] The point here is not that there is a net increase in working children, but that the rationale for employing children working is driven by their greater efficiency. This was also noted by Karl Marx in Capital (Heywood, 2009b).

[10] For example, between 1880 and 1920 canneries in the United States could choose amongst a range of technologies which had varying capital-labour ratios (Brown, Christiansen and Philips, 1992).

[11] While this paragraph discusses eventual changes prompted by wage increases, others have suggested that even without wage changes and in very poor settings it is possible to stop child labour. MV Foundation in India uses civil society driven change (by community peer pressure) for children to stop working and joining school (Wazir, 2002).

[12] Horrell and Humphries (1995b) find that the male-breadwinner family may have prolonged children's work as women faced institutional and ideological obstacles in the labour market.

[13] For instance, the United Kingdom introduced legislation banning the employment of children, in industry, below the age of 9 in 1833, this was followed by an 1878 act which raised the minimum age to 10 and then to 12 in 1901. France and Sweden introduced legislation setting a minimum working age in the 1840s, Germany in the 1850s, Denmark, Finland, The Netherlands and Spain in the 1870s and Belgium, Russia in the 1880s (Williams, 1992; Hindman, 2009b).

[14] The key issue with regard to legislation may not be adoption of minimum age employment laws but enforcement. The criticism that using passage/existence of legislation to examine the effect of laws on child labour is not adequate has been pointed out by other analysts as well. For instance, researchers that have used legislation approval (e.g. Moehling, 1999; Huberman and Meissner, 2010) have often been criticized for holding a 'narrow view' of legislation. In the case of Por-

tugal, and more generally, for historical research, the practical possibility of assessing law enforcement is often limited. While acknowledging that passage of legislation and enforcement are clearly two different issues there is little that can be done in the current case and hence the focus here is on passage of legislation. However, as is pointed out later in the text, to the extent that change in political rhetoric is a measure of willingness to enforce laws, in the Portuguese case the rhetoric in the 1930s and 1940s emphasized the importance of labour while by 1989, after substantial declines in child labour, the rhetoric changed in favour of castigating child labour.

[15] For U.S., compulsory schooling laws had modest effects on promoting schooling as schooling was already largely available and free of charge (Goldin and Katz, 2003).

[16] While alternative divisions are possible we choose to work with these four periods as they lend themselves naturally to clear divisions in Portuguese history.

[17] The Portuguese heir, Pedro IV, having spent most of his childhood in Brazil, where the Portuguese royal family had found refuge from Napoleonic invasions, proclaimed Brazil's independence. He renounced the Portuguese throne and became Pedro I of Brazil.

[18] Between 1500 and 1820 annual per capita GDP growth in Portugal averaged 0.13 per cent, a rate similar to that experienced in Western Europe. However, between 1820 and 1870 Portugal grew at 0.11 per cent as compared to the 0.98 per cent growth rate enjoyed in Western Europe. While, between 1870 and 1913, Portuguese economic growth rate picked up (0.58 per cent) it continued to lag behind Western Europe's 1.33 per cent growth rate (see Table 2.1).

[19] Alternatively, some authors suggest a gradual slow growth also through the 20th Century, opposed to a strong surge implied by "take-off". See Manuel Lisboa in Valério (2001).

[20] The major delay was in application rather than theoretical knowledge (Pedreira, 2005).

[21] Enrolment did not mean necessarily attendance. Reis (1993b) reports attendance rates of 50 per cent of the enrolled students in 1867, 67 per cent in 1889 and 87 per cent in 1910.

[22] The literature offers several reasons for the low quality of schooling in Portugal, including poor qualifications of teachers—the primary criteria of choice was moral integrity—, low remuneration—several teachers performed other activities—and lack of infrastructure. The perceived opportunity cost of schooling also certainly played a role.

[23] Reis (1993b) estimates that in the period 1864-1910, the necessary increase in expenditure to catch up with leading European countries in terms of literacy

standards would have been negligible. It would have amounted to 0.5 to 0.75 per cent of the State's expenditure—0.1 per cent of GNP—in the 1864-90 period and 2.8 per cent—0.5 per cent of GNP—in the 1890-1910. Additionally, Mata (1986) reports that in both periods the State's expenditure in education varied between 3 to 5 per cent of the budget while defence and repayment of the debt absorbed 15-19 and 29-54 per cent, respectively. The small amount needed suggests that criteria other than affordability prevailed.

[24] "Finally, work which is quite suitable for a strong man cannot rightly be required from a woman or a child. And, in regard to children, great care should be taken not to place them in workshops and factories until their bodies and minds are sufficiently developed. For, just as very rough weather destroys the buds of spring, so does too early an experience of life's hard toil blight the young promise of a child's faculties, and render any true education impossible." (Encyclical Rerum Novarum of Leo XIII, 15 May 1891)

[25] While both surveys underestimate the use of child labour they are the best sources available. The 1852 survey was an indirect survey — questionnaires were sent to firms — and included factories with ten or more workers. The 1881 survey used a direct and indirect approach and included factories regardless of the number of workers. While the 1881 survey was an improvement over the 1852 survey, some firms did not respond to the queries while others provided responses without always distinguishing between minors and adults or minors and women.

[26] For more details see Goulart and Bedi (2007) and Goulart (2009).

[27] Salazar, a well-known professor of economics at Coimbra University, was finance minister between 1928 and 1932 and was given sweeping powers to manage and transform the Portuguese economy. In 1932 he became prime minister, a position that he held for 36 years. The "rebirth" of the nation through Estado Novo (New State) was based on a corporative state with strong emphasis on nationalism, Catholicism, propaganda and repression. Colonialism and large public works were the other cornerstones of the regime.

[28] This led to the promotion of rural values and the acceptance of poverty, also as a way of controlling the population. In a famous movie song of that time a "typical" Portuguese sang: '[I am] poor but honest/owing to Providence the grace of being born poor'.

[29] At that time, the internal market also included Portugal's colonial territories.

[30] On agricultural lobbies and the conflicts of different lobbies within Estado Novo see Amaral (1994).

[31] Following Galor and Weil (2000), the previous decade certainly contributed for that by easing the Malthusian equilibrium. The 1910s were marked by consider-

able emigration and disease (Spanish flu), which lessened the land constraint as in the 19th century in Western Europe. This launched the seeds for accumulation and, as living standards rose, mortality fell (Galor and Weil, 2000). Life expectancy at birth would increase considerably: from 40 years old in 1920, to 59 in 1950. However, Portugal would follow a slower demographic transition than Spain (Mitchell, 2007).

[32] Portuguese youth or "Mocidade Portuguesa" was created in the image of other fascist youth organizations (Carvalho, 2001). It included youngsters from 7 to 26 years old divided in the following age groups: 'lusitos' — 7 to 10 years old —, 'infantes' — 10-14 —, 'vanguardistas' — 14-17 — and 'cadetes' — 17-26. Enrolment was compulsory for primary and secondary school students, although implementation was poor in the former, while the latter had a low enrolment and only existed in district capitals. In practice, the organization included youth from the middle and upper classes. The crucifix is the main symbol of Christian religion and consists in a representation of Jesus Christ death in the cross.

[33] 'Avante', the journal of the Portuguese Communist Party, was analysed by a search using the following key words: child, labour, child labour. The relevant material was selected. The material was accessed online in November 2009.

[34] However, Avante seemed to find no contradiction in reporting in 1937 that children in USSR had compulsory schooling (7 to 17 years old) and "were free of exploitative work", when one year before it had proudly announced 950 students participated in the construction of a railroad track with 3,400 km in the same USSR.

[35] In 1937 in Lisbon, it refers that girls of 11 to 15 years old were registered at the City Hall as prostitutes.

[36] Interestingly, this novel is still widely read and used in today's school system and still shapes some views on child labour. Its author, Soeiro Pereira Gomes, had it then dedicated to the "children of the men who had never been children" and would die in clandestinity by 1949.

[37] Later this would change. In the 1950s, Álvaro Cunhal, leader of the Portuguese communist party, dedicated a section of his book "Contribuição para o Estudo da Questão Agrária" to the matter.

[38] The first three belong to the region called Norte, while the district of Viseu contains municipalities belonging to Norte and Centro.

[39] The method of data collection changed between the 1940 and the 1950 Census. The introduction of a closed question technique supposedly reduced the subjectivity of self-classification (Torres, 2009). Even if this was the case and part of the increase is simply due to better reporting, given the background provided above, it is unlikely that child labour fell during the period.

[40] Amaral (1994) traces the seminal legislation on post-war industrialisation to 1944-45, following the prevalence of industrialist lobbies.

[41] For example, the textile industry a key employer of children began to modernize and become more capital intensive after the 1960s (Afonso and Aguiar, 2005).

[42] Poor living conditions, the start of a colonial war (1961) and the dictatorship were major push factors, while a booming post-World-War II Europe was the major pull factor. The destination of emigrants was mainly Europe. While in 1957 more than 10% of the legal immigrants went to Europe, by 1963 it had increased to 59%.

[43] An 18 to 20 per cent decrease in the Portuguese population translates into a greater than proportional decrease in the labour force as most emigrants were in the fertile, working age group (20-44 years old). See Tables 2.15 and 2.17 in Baganha and Marques in Valério (2001).

[44] The evolution of productivity during this period and the early period of democracy is contested. See Amaral (2009) for some of the debates.

[45] We use the date of the first work experience that together with the person's age allow us to extrapolate a age group participation rate. In previous work (Goulart and Bedi, 2007), we had computed different figures based on a household survey and the question "At what age did you start working?". However, the trend then found suffered of selection bias by the lack of information about the non-employed in the sample, which these labour surveys also cover.

[46] The computed child labour rates differ due to the way the information is collected. Information based on censii pertain to the main activity at a point in time, while the estimates based on labour surveys also include seasonal work experiences and assume that the child continues to work thereafter. The labour surveys provide therefore an upper limit. The 1970 'census' was based on a 20 per cent sample and is likely a lower margin for the true value.

[47] While the focus here is on wages a comment on wage inequality is also appropriate. It is unlikely that polarization defined as between-group inequality divided by within-group inequality was directly related to the evolution of child labour. Jordi Guilera (Universidaded Barcelona) constructs different inequality measures in addition to the ones proposed in Milanovic, Lindert and Williamson (2007) and Milanovic (2009) for the Portuguese case. His preliminary estimates suggest that polarization rose from 1.2 in 1920 to 2.1 in 1940 and to 2.6 in 1970, while at the same time child labour fell. These numbers suggest that it is unlikely that polarization was responsible for ensuring that child labour becomes a norm, The underlying factors responsible for the increase in polarization and at the same time the decline in child labour is likely to have been changes in the economic structure and increased agricultural mechanization.

[48] The decline in infant mortality rates preceded the decline in fertility. Increased urbanization (intensified from 1980 onwards) and the post-dictatorship diffusion of contraceptive methods contributed to declines in fertility. During this period the health system improved considerably and the number of physicians almost doubled between 1975 and 1985.

[49] A polarization of education premiums from mid-1970s to 1980s — Amaral (2005), citing Sérgio Grácio — may have led to a initial reduction of interest in secondary education, but was soon overturned by increasing returns to education. Several studies have shown that there is a high rate of return to education in Portugal. For example, Pereira and Martins (2001) estimate a rate of return to education of nine per cent in the 1990s. This is at the upper end of the range of educational returns for developed countries. The precise periods of increasing returns to education vary from 1982-95 (Pereira and Martins, 2001)or 1985-91 (Santos, 1995).

[50] Currently, minors are only allowed to work under three conditions: they must be at least 16 years old, they must have completed compulsory school and there must be medical confirmation of their physical and psychological capabilities for that job. However, exceptions allow for a more gradual introduction to work. At 14 and 15 "light work" is allowed, some additional activities are permitted when the child is 16 and 17 years old and at 18 all types of work are allowed.

[51] For an assessment of the evolution of child labour in the textile and footwear sectors in Portugal see Eaton and Pereira da Silva (1998) and Eaton and Goulart (2009)

[52] Censii (Table 2.6a) and extrapolations from labour surveys (Figure 2.7a) are reconcilable by considering the increasing role of (youth) unemployment in that period. These are not included in the activity rate of censii, but are certainly increasing the sporadic work experiences and making our assumption of working since the first work experience less reliable. The figures from the labour survey 1976-82 (Table 2.13) are more representative of a longitudinal study, as there is no replacement of the sample, and may suffer of regional bias of the impact of the structural adjustment plan.

[53] The export share of these traditional sectors increased from 2.86 per cent between 1970-80 to 7.32 in 1980-90, and between 1988-92, their 25 per cent share in exports was as large as the share of Port wine in the previous century (Afonso and Aguiar, 2005).

3 Child labour and Educational Success in Portugal[1]

Abstract

The current debate on child labour focuses on developing countries. However, Portugal is an example of a relatively developed country where child labour is still a matter of concern as between 8-12 percent of Portuguese children may be classified as workers. This paper studies the patterns of child labour in Portugal and assesses the consequences of working on the educational success of Portuguese children. The analysis controls for typically unobserved attributes such as a child's interest in school and educational ambitions and uses geographical variation in policies designed to tackle child labour and in labour inspection regimes to instrument child labour. We find that economic work hinders educational success, while domestic work does not appear to be harmful.

3.1 Introduction

Historically, the development of countries has been associated with a long-run decline in child employment. The economic history of currently developed countries suggests that industrial development is accompanied by an initial increase in the use of child labour while ultimately being associated with a virtual elimination of the practice (Cunningham and Viazzo, 1996; Brezis, 2001). Accordingly, the current focus in the child labour debate is on the conditions faced by children in developing countries. While devoting attention to child labour in developing countries is indeed required and called for by its severity, there are examples of developed countries where a large number of children still participate in the labour force. Portugal is an example of a relatively developed country which is still struggling with the issue of working children.

Since the early 1990s, child labour in Portugal has been a particularly sensitive and high-profile issue that has attracted considerable public at-

tention. A 1992 report by Anti-Slavery International (Williams, 1992) estimated that there were 200,000 working children in Portugal employed mainly in the export-oriented shoe, garment, ceramics and stone-breaking industries in the Northern districts of Oporto and Braga. While the numbers presented in this report are disputed, its publication along with other articles and programmes in the popular press generated social and political debate and, in part, led to the establishment of special commissions and research projects designed to investigate the true extent of child labour in Portugal. [2]

In particular, along with the International Labour Organization, the Government of Portugal decided to carry out two household surveys designed to provide credible and comprehensive information on working children in Portugal. The first of these surveys was conducted in 1998 and the second in 2001. Based on these surveys (see Table 3.1) it is estimated that about 8-12 per cent of Portuguese children in the age group 6 to 15 are involved in some form of economic or domestic work.[3] While this figure is considerably lower than the 20-25 per cent work participation rates suggested by other sources (Williams, 1992), it is higher than the average work participation rates in developed (2 per cent) and transition countries (4 per cent) as estimated by the ILO (2002).

Table 3.1
Child Work in Portugal

	1998		2001	
	Children	***Incidence***	***Children***	***Incidence***
Economic work	33,792	3.13	44,003	3.70
Outside the household	7,342	0.68	8,689	0.73
Within the household	26,450	2.45	35,314	2.97
Both economic and domestic work	9,285	0.86	5,130	0.43
Domestic work – Within the household	83,037	7.68	48,165	4.05
Total	126,114	11.67	97,298	8.18

Notes: Estimates of the absolute number of working children working are based on weighting the sample data to obtain population figures. Incidence is defined as the percentage of all children in the age group 6 to 15 who report at least one hour of work per week.

The resilience of child workers in Portugal despite overall economic progress and considerable efforts to tackle the issue suggests that Portugal's economic and cultural characteristics still generate a favourable environment for child labour. Per se, the fact that about 8-12 per cent of Portuguese children work may not be a matter of concern. However, an issue that is of concern and the primary focus of this paper is whether the work activities of Portuguese children hampers their educational performance? The motivation for our work stems from the potential consequences of the early entry of children into the labour force on their educational success.[4] The importance of education in promoting the growth of individuals and nations is well known and early entry into the labour market is likely to lead to forgone education and an unprepared labour force. For an individual, lower educational attainment translates into a life-long handicap, leading to a lower probability of employment and access to low-paying jobs. In the Portuguese context, several studies have shown that there are high private returns to education and that educational returns rise with the level of education.[5] The high returns to individual investments in education and the persistence of child labour provides additional motivation for our work and raises concerns about the factors that drive child labour. Why is it that despite high educational returns, children are engaged in activities that may prevent them from achieving higher educational levels?[6] Beyond the individual, from a national perspective, and in the context of an enlarged and increasingly competitive environment within the European Union (EU), the ability of Portugal to compete depends on a well-educated and skilled labour force. With functional literacy at about 52 per cent (OECD, 2000) and extremely low levels of educational attainment and cognitive achievement as compared to its EU counterparts, any factor that prevents Portuguese children from attaining their full education potential needs to be highlighted and addressed.[7]

As discussed above, the persistence of child labour and the low educational outcomes of Portuguese children are key issues of concern. In this paper we assess the factors that determine both these outcomes and examine whether the work activities of children has a causal impact on their educational success.

There are several notable features of our study. First, while there is a large literature that examines the link between child work and educational outcomes for developing countries, for obvious reasons there is

little work on developed countries. Examining this issue in the context of a relatively high-income country where child labour still persists may provide guidance on the additional policies (beyond poverty alleviation) which developing countries may need to adopt if they are to tackle the problem of child labour. Second, the bulk of the child work-educational outcome literature focuses largely on the correlation between these two outcomes and does not identify a causal relationship.[8] In our work we attempt to identify the causal effect of child work on educational success. Thus, our paper is similar in approach to the more recent literature on developing (Boozer and Suri, 2001; Beegle, Dehejia and Gatti, 2009; Gunnarsson, Orazem and Sanchez, 2006) and developed (Stinebrickner and Stinebrickner, 2003; Tyler, 2003) countries which uses an instrumental variables (IV) estimation strategy to identify the impact of child work on educational outcomes.[9] We rely on geographical variation in policy responses to reducing child labour and geographical variation in labour inspection regimes to instrument child labour and to identify its causal impact on educational success. Third, in addition to the econometric strategy we have information on unusual educational related measures such as a child's interest in school and educational ambitions (proxies for a child's ability). Such measures allow us to identify the effect of work on educational success after controlling for unobserved qualities that may have a bearing on educational success. Thus, a novel feature of our work is that we are able to control directly for unobserved attributes of children *and* use an IV strategy to control for the correlation between unobserved attributes that may determine educational success and child work.[10] Fourth, we draw a distinction between domestic and economic work and assess the influence of the duration of these two types of work on the educational success of children. Differentiating between these two types of labour is important from a policy perspective as tailor-made solutions will be possible if the reactions of the different types of labour to varied stimulus are known. Apart from Heady's (2003) work there are few studies in the literature that distinguish between the effect of different types of work on educational outcomes.

The following section of the paper provides a discussion of the distinction that we draw between domestic and economic child labour. This discussion is followed by a descriptive and diagrammatic analysis of child labour and educational success in Portugal. Section III discusses our analytical approach, section IV discusses the data and the specifica-

tion of the empirical model. Section V presents estimates and section VI provides concluding remarks.

3.2 A Typology of Child Labour and Educational Success in Portugal

3.2.1 Typology and definition of child labour in Portugal

There is considerable disagreement on which activities truly constitute child labour. There are two discernible approaches in terms of classifying the activities carried out by children as child labour. One approach may be termed the "supervision approach" while the other may be called the "type of work approach".

The supervision approach argues that working on a family farm/ enterprise or carrying out household chores, provides on the job training and equips a child with essential skills that may not be learned elsewhere. Since work on a family enterprise or domestic work is typically executed under the guidance and supervision of parents, it is deemed not to be exploitative and not to harm the healthy development of a child. According to this view, only work that involves an employer-employee relationship and that is remunerated in cash or kind constitutes child labour (Rodgers and Standing, 1981; Bequelle and Boyden, 1988; Blanc, 1994). The "type of work" approach argues that it is the kind of work which determines whether an activity is child labour rather than the nature of its supervision. In addition to work carried out in the context of an employer-employee relationship any work on a family farm or enterprise is also deemed to fall under the rubric of child labour (so-called economic work). While the latter approach is more inclusive, neither approach considers time spent by children on domestic chores as a form of child labour, a feature which is reflected in most of the empirical work on this issue.

In the Portuguese case, while the household surveys collect information on the work activities carried out by children as well as details on the place of work and the type of supervision, a reading of official documents shows that the government adopts a combination of the two approaches to define child labour. As displayed in Box 1, the government does not include domestic work performed by children and supervised by household members in its definition of child labour. At the

same time domestic work done outside the household is included and is treated as economic work.

Box 1:
Work considered child labour by the Portuguese government

	Supervision	
Type of Work	Extra-Household	Intra-Household
Economic work	Yes	Yes
Domestic work	Yes	No

As Table 3.1 shows, the bulk of child labour in Portugal is carried out within the context of the household and under the supervision of household members. Excluding intra-household domestic work from the definition of child labour cuts the number of workers by at least 50 per cent and suggests a child labour force participation of 4 per cent. Whether this is an appropriate restriction and whether domestic work has a different effect as compared to economic work and is benign in terms of its impact on a child's development, as implied by its exclusion from the official definition, are debatable and researchable issues.

In this paper we adopt an empirical approach. We draw a distinction between the government's child labour concept and domestic work carried out within the household and try to discern whether there are any differences between the impacts of these two types of work on the educational performance of children. Such a distinction is desirable to detect whether there is any merit to the argument that these two types of work are different and that they should be treated asymmetrically.

3.2.2 Child Labour in Portugal

In recent years the government of Portugal has taken several steps to curb child labour. These included the creation, in 1998, of a research and statistical framework (SIETI-System of Statistical Information on Child

Labour) to provide accurate information on the extent of child labour in Portugal. A policy team (PETI-Plan on the Elimination of Child Exploitation) was set up to design and develop concrete interventions and measures to prevent the early entry of children into active life. As part of its policy to have a more informed debate on child labour the government conducted two household surveys in 1998 and 2001. We use information from these surveys to construct a portrait of the incidence and distribution of child labour in Portugal.[11]

Our analysis begins with the numbers presented in Table 3.1. The table breaks down the overall incidence of child work and the absolute number of working children in Portugal into four mutually exclusive categories. The absolute numbers for working children are obtained by weighting the sample data to obtain population totals. In 1998 about 12 per cent of Portuguese children (about 126,000) were involved in some form of work (economic, domestic or both) while it fell to about 8 per cent (about 97,000) in 2001.[12] Across the two years, the incidence of economic work does not change sharply (3.1 per cent in 1998 and 3.7 per cent in 2001).[13] However, there is a decline in the number of children involved in domestic work. While the decline seems promising it is an apparent rather than a real decline as there was a change in the information gathering process between the two surveys. In 2001, the question requesting information on child work activities was adjusted from "Do you perform domestic chores?" to "Do you perform domestic chores in ***excess***?", with the definition of excess being left to the subjective judgement of the respondent.[14] Thus, notwithstanding the discussion that government documents do not consider intra-household domestic work as child labour, by definition, the 4 per cent of Portuguese children contributing excess work, should be considered as child workers.

Other features in Table 3.1 are that most of the economic work is carried out in the context of a family farm or enterprise and only a small percentage of the child workers (about 9 per cent of all child workers) work outside the household in a formal employer-employee relationship. There are very few children (about 5 per cent of the child workers) who do both economic and domestic work, and accordingly, in this paper we focus on the two categories of economic and domestic work. There is a clear regional pattern in the incidence of work (see Table 3.2). The incidence of both domestic and economic labour is highest in the Northern and Central parts of the country. Both regions have characteristics that

favour the practice of child labour. Northern Portugal is a rocky, mountainous region characterized by small family farms and vineyards. Typically, families in this region espouse traditional values of hard work and thrift and have lived modestly on their family farms for several generations.[15] While more heterogeneous, the Central part of the country is also characterized by small and medium-sized farms with some mining and light industry. The presence of small family farms and larger and more traditional families, reminiscent of developing countries, promotes child work on farms and in the household while the presence of small and medium sized family owned enterprises promotes economic child labour.

Table 3.2
Incidence of Child Work by Regions (%)

	North	Centre	Lisbon	Alentejo	Algarve	Azores	Madeira
1998							
Economic work	4.3	4.7	1.0	1.5	1.5	n.a.	n.a.
Domestic work	10.0	11.4	3.3	3.3	3.2	n.a.	n.a.
Combined	14.3	16.1	4.3	4.8	4.7	n.a.	n.a.
2001							
Economic Work	4.8	5.8	1.4	2.8	2.3	3.4	0.3
Domestic Work	7.2	3.8	1.0	0.9	1.3	4.4	1.1
Combined	12.0	9.6	2.4	3.7	3.6	7.8	1.4

Notes: The 1998 survey did not cover the Azores and the Madeira regions.

Table 3.3 further characterises child workers in Portugal. The average economically active child in Portugal is male (72-73 per cent are male), is between 12 and 13 years of age and contributes 14 hours of work per week. The work contribution of a child increases with age and there is a convex relationship between age and probability of working/hours of work (see Figures 3.1 and 3.2). The weekly work contribution shows a discernible increase between the age of 12 and 13 with the contribution of 15 year old child workers rising to about 22 hours a week.[16] About

half the economically active children work in agriculture while the remaining workers are spread out across other sectors such as manufacturing, commerce and construction.

In contrast to economic work, the typical child involved in domestic work is female (about 70 per cent are female) is about 12 years old and contributes around 8 hours of excess work per week. The most important domestic tasks are house cleaning, cooking, washing, ironing clothes and looking after younger siblings and elderly members. As discussed above and shown in Table 3.3, economic work is predominantly done by boys while domestic work tends to be dominated by girls. Given this gender-based division of labour, the analysis of economic work may be considered as a proxy for the analysis of male child labour while analysis of domestic work may be considered a proxy for female labour.

Table 3.3
Child Workers in Portugal – A Profile (Standard Deviation)

	1998	2001
Economic work		
Male (%)	72.4	73.5
Age	13.0	12.54
Weekly hours of work	n.a.	14.05 (13.96)
Sector of Work (%)		
Agriculture	55.7	46.73
Industry	12.0	11.15
Restaurants and Hotels	10.5	12.40
Commerce	9.9	14.34
Construction	6.4	10.68
Others	5.5	4.7
Domestic work		
Male (%)	28.8	26.0
Age	12.3	12.2
Weekly hours of work	n.a.	8.36 (8.77)

3.2.3 Education and child labour

The spread of education and the enforcement of compulsory education laws is a relatively recent phenomenon in Portugal.[17] The 48 year long dictatorship in Portugal viewed education as dangerous and did not pay much attention to this sector. Following the end of dictatorship in 1974 considerable efforts have been made to improve the educational sector. There is a stronger enforcement of compulsory education and there has been an expansion of educational facilities at all levels especially pre-school and university education. In the mid-1980s, the government finally extended compulsory education to 9 years and at the moment there is an intention to further increase compulsory education to 12 years.[18]

Despite progress since 1974 and continued expenditure on education (5.5 per cent of GDP-slightly above the EU average), educational attainment and achievement in Portugal lags considerably behind most European countries. For instance, the adult upper secondary school completion rate in Portugal is 20.6 per cent as compared to the EU average of 64.6 per cent and 81 per cent for the New Member States (NMS). While at 47 per cent the school completion rate for youth aged 20-24 is higher amongst more recent generations, reflecting educational progress, it is still quite low as compared to the EU average of 75 per cent and NMS average of 88.3 per cent.[19] A comparison of achievement scores in reading and Mathematics across seven countries shows that Portuguese children do not perform well. Portuguese children are second from the bottom in terms of Mathematical skills and at the bottom of the chart in terms of reading skills.[20] The gap between Portugal and other EU states combined with the importance of human capital acquisition as a means for economic progress suggests the importance of tackling any factors that deter the educational success of children.

We begin our examination of the link between education and child labour by examining the patterns of educational enrolment, attendance and school success by work status. Table 3.4 shows that children who do not work enjoy a 10 percentage point advantage in terms of enrolment and attendance rates as compared with children who do work. The age-specific enrolment pattern displayed in Figure 3.3 shows that till the age of 12 there are limited differences in enrolment rates by work status. However, between 13 and 15 a clear enrolment gap emerges. The 1 percentage point gap in enrolment rates at the age of 12 grows rapidly to a 30 percentage point gap at the age of 15 (96 per cent versus 66 per cent).

The age dynamics of the attendance pattern are similar to the enrolment pattern.[21] The 2 percentage point gap at the age of 12 grows rapidly to a 31 percentage point gap by the age of 15 (93 per cent versus 62 per cent). The speed with which educational differences appear between the two groups is quite remarkable and is matched by the increase in the work effort provided by children in the same age group (see Figures 3.1 and 3.2).

Table 3.4
Educational Indicators by Working Status (%)

	Does not work	Economic Work	Domestic Work	Economic & Domestic Work
Enrolment	99.3	84.9	95.0	90.1
Attendance	97.9	81.1	91.6	86.6
School Success	76.4	48.8	61.0	55.2

Notes: Attendance = 1 if a child misses school less than once a week. School success = 1 if a child has never repeated a grade.

The measure of educational success used in this paper is a binary variable that takes on a value 1 if a child has never repeated a grade in school and 0 otherwise. While information on test scores may be a better measure of educational performance, there is a tight link between test scores and repetition. Usually, based on a child's competencies and scores on formal tests, a school level council determines whether a child should be allowed to proceed to a higher grade or should be made to repeat a grade. Thus, if a child does not achieve the requisite test scores we observe grade repetition. The data show that 76 per cent of non-working children have never repeated a grade in school while the corresponding number for working children is 55 per cent. The age dynamics presented in Figure 3.5 show that while the success gap does increase with age it is not as dramatic as the temporal pattern for enrolment and attendance. The final figure in our diagrammatic analysis shows the link between hours of work and school success. The figure shows that there is an approximately linear relationship between hours of work and educational

success and both economic and domestic work appear to be associated with a reduction in the educational success of working children.

3.3 Analytical approach

There is a growing body of literature that studies the substitutability between children's schooling and labor and the effectiveness of education related policy measures in reducing child labor. This literature may be divided into two broad categories. One approach, which may be termed the indirect approach studies the links between child work and schooling by examining the effects of education related measures such as distance to schools, school fees and school quality on school attendance and on the incidence/duration of child labor (Ravallion and Wodon, 2000; Hazarika and Bedi, 2003). A second approach which may be termed the direct or structural approach gauges the links between schooling and child labour by estimating the effect of incidence/duration of work on children's educational outcomes. These papers recognize the endogeneity between school participation and work and use statistical techniques to control for this possibility (Beegle, Dehejia and Gatti, 2009; Stinebrickner and Stinebrickner, 2003; Tyler, 2003).

Given that our primary aim is to examine the effect of the numbers of hours worked by children on school success it is natural to adopt the direct approach. However, a credible implementation of the direct approach requires that we account for the potential endogeneity between school success and hours of work and accordingly implementation of the direct approach nests the indirect approach.

3.3.1 Framework

The educational success of children is usually measured by their performance on standardized tests. Following the educational production function literature (Glewwe, 2002) we treat the test scores of children (Y^*) as a function of child (C), family (F), socio-economic (SE), educational characteristics (E) and demand for labour characteristics (D). Since we are interested in the link between educational success of children and their work pattern, we extend this basic educational production function by treating test scores as a function of the hours of economic and domestic work (W) contributed by children. That is,

$$Y_i^* = C_i\beta_c + F_i\beta_F + SE_i\beta_{SE} + E_i\beta_E + D_i\beta_D + W_i\beta_W + \varepsilon_i \,. \quad (3.1)$$

In our data set we do not observe the test scores received by children, however, we do observe whether a child has achieved educational success, that is, whether a child has never repeated grades or whether a child has repeated grades.[22] When test scores obtained by a student cross a certain threshold we observe school success *(Y = 1)* . Thus, the probability that a child succeeds is,

$$\Pr ob[Y_i = 1] =$$
$$= \Pr ob[C_i\beta_c + F_i\beta_F + SE_i\beta_{SE} + E_i\beta_E + D_i\beta_D + W_i\beta_W + \varepsilon_i > 0] \,. \quad (3.2)$$

Assuming that the error term is normally distributed allows estimation of (3.2) using a probit model.

The key econometric issue with single-equation probit estimation of (3.2) is that the school outcomes of children and their work status may be simultaneously determined. It is likely that unobserved factors that determine school success and child working hours/work participation may be correlated. If children who work are less likely to succeed in school even if they were not working then probit estimates of (3.2) will exaggerate the negative effects of working on school success. On the other hand if children who work are also more likely to succeed in school then probit estimates of (3.2) will underestimate the negative effects of working.

Our empirical strategy to control for the correlation between unobserved factors that determine educational success and hours of work consists of two parts. First, we are able to include a set of unusual educational related variables in the educational success equation. These include two variables that capture whether a child is very interested or adequately interested in school and four variables which capture the educational ambitions of children. These variables, which are discussed in more detail in the following section, may be viewed as proxies for the educational ability and educational motivation of a child. To the extent that the lower educational ability and motivation drive the working patterns of children, the inclusion of such variables may be expected to reduce the negative effect of work on school success.

In addition to these direct controls for ability we rely on an IV strategy to account for the potential correlation between unobserved factors

that may determine educational success and child work. In particular, we use a two-stage estimation approach developed by Vella (1993). Reduced form expressions for the two types of work may be written as,

$$W_i = C_i\beta_c + F_i\beta_F + SE_i\beta_{SE} + E_i\beta_E + D_i\beta_D + P_i\beta_P + LI_i\beta_{LI} + v_i\,. \quad (3.3)$$

In addition to the variables in (2), this specification includes a set of variables that captures geographical variation in child labour policies *(P)* and in the labour inspection regime *(LI)*. In the first stage we estimate the hours of work equations using tobit models. These first step estimates are used to construct generalized residuals (λ) of the form:

$$\hat{\lambda}_i = -\hat{\sigma}(1-I_i)\{\frac{\phi(X_i\hat{\beta})}{(1-\Phi(X_i\hat{\beta}))}\} + I_i(W_i - X_i\hat{\beta}_i)\,, \quad (3.4)$$

where $\hat{\sigma}$ and $\hat{\beta}$ are tobit maximum likelihood estimates of the parameters in the hours of work equations, X_i represents all the explanatory variables in (3.3), I_i indicates whether a child works or not and $\phi(.)$ and $\Phi(.)$ denote the probability density and cumulative distribution function of the standard normal distribution evaluated at the tobit estimates (Vella, 1993, 1998). In the second stage we include estimates of the generalized residuals in (3.2). This procedure yields,

$$Y_i = C_i\beta_c + F_i\beta_F + SE_i\beta_{SE} + E_i\beta_E + D_i\beta_D + W_i\beta_W + \hat{\lambda}_i\delta + \varepsilon_i\,. \quad (3.5)$$

This augmented probit equation yields consistent estimates (Rivers and Vuong, 1988; Vella, 1993). A test of the null hypothesis that the coefficients on the generalized residuals are zero, is a (Hausman) specification test for the exogeneity of W_i.

The key issue that needs to be confronted is the identification of this two-stage model. There are several possibilities that may be explored. First, since the hours of work equation is estimated as a tobit model and our school success model is a probit equation, we may achieve identification on the basis of differences in functional form. Although feasible, and we do use this approach, differences in functional form are a weak basis for identification as identification is achieved without using any additional information (variables).

In addition to functional form identification we rely on two sets of potential instruments to implement the IV strategy.[23] The first set pertains to geographical variation in the implementation of plans to tackle the problem of child labour. Under the aegis of PETI, which is a programme designed to reduce the supply of child labour, multi-disciplinary teams have been set up across the country. These teams work with children, their families and local authorities to raise awareness, monitor and prevent child labour and more pro-actively, to design tailor-made training programmes to help working children or children considered at risk to acquire certain competencies. These training programmes are delivered through centres (PIEF centres) that are set up in co-operation with the local administration. Despite the desire to set up such centres in all counties, till 2002, about 45 per cent of the children in our sample had access to such centres (see Table 3.5). PETI initially concentrated its efforts on regions with a higher population density (which may not be regions with higher incidence of child labour) and then tried to negotiate with different local entities to set up such centres. Whether a county has set up such a centre or not may be interpreted as a signal of the local administration's attitude towards and willingness to devote resources (transport, classrooms) to tackling child labour. A second variable constructed to capture variation in resources devoted to tackling child labour is the total number of children in a county divided by the number of members in the multi-disciplinary teams (the number of members in the multi-disciplinary teams range from 1 to 8). The idea is to exploit the variation in the number of members per team. A larger number of children per member may be expected to reduce the chances of a prompt intervention while a low ratio should lead to a quicker and consequently more effective intervention. While the presence of a PETI-centre in a county may be negatively correlated with child labour, the ratio of youngsters per PETI member is likely to be positively correlated with child labour. Both these variables may be expected to influence child labour while they should have no direct bearing on educational success.

The second set of instruments pertains to the labour inspection regime in Portugal. All counties in Portugal have labour inspectors who are charged with ensuring that the labour laws are followed in the firms that lie in their territory. We gathered comprehensive information from the labour inspection office on the number of inspectors, number of firms, number of workers, the frequency of the inspection regime, the number

of serious illegalities detected (including child workers) and the total fines charged for labour illegalities. Based on this information we created two variables that capture inter-county variation in the strictness of the labour inspection regime. These are the total number of illegalities detected per worker (the detection rate is about 2 illegalities per 1000 workers) and the average fine per illegality (about Euro 1200).[24] These two variables are expected to reduce the demand for child workers but should not have a direct bearing on educational success. [25]

While it is possible that regional governments respond to educational outcomes by addressing child labour practices, my knowledge of the context suggests otherwise. The entities responsible for educational performance and child labour are different and it is unlikely that their decisions are jointly determined. Educational policy falls under the jurisdiction of the central ministry of education. With regard to the first set of instruments, child labour policies are undertaken by an organization called PETI, which falls under the jurisdiction of the ministry of labour and does not interact directly nor is it concerned with educational outcomes. The second set of instrument relates to regional labour inspection which also falls under the jurisdiction of the ministry of labour and this inspectorate is concerned with implementing labour laws and does not interact directly nor is it concerned with educational outcomes. Statistical tests reported later in the text also support these ideas.

Overall, the availability of the variables that proxy ability as well as the two sets of instruments should allow us to obtain estimates of the effect of child labour on educational success which are purged of unobserved attributes of children which may influence patterns of work and educational success. In our empirical work we conduct a sensitivity analysis to examine variations in the estimates in response to the inclusion of the educational ability proxies and to changes in the identification strategy. We also conduct statistical tests to probe the validity of the instruments.

3.4 Data, specification and descriptive statistics

Our paper relies on information contained in two household surveys. The first of these was conducted in 1998 and the second in 2001, by DETEFP and SIETI, respectively, with the assistance of ILO.[26] The main aim of these surveys was to gather information on the work activities of children aged 6 to 15. The surveys provide detailed information

on the work activities of children and the economic, demographic and family environment in which they are raised. In addition to the quantitative information a relatively unique aspect of the data set is qualitative information on aspects such as a child's interest in school and a child's academic ambitions. [27]

While we have utilised both surveys to provide information on the incidence of child labour, we rely on the more recent 2001 survey for our econometric work. Apart from the advantage of being a more recent survey, the 2001 data has better geographical coverage and additional information on some of the key questions, for instance, on hours of domestic and economic work. In the 2001 survey a total of 19,849 households were interviewed and our study focuses on a sample of about 26,000 respondents in the age group 6 to 15. A final point - in principle it is possible to construct a panel data from these two cross-section data sets. However, this leads to a sharp decline in the number of observations and given the relatively low incidence of child labour it becomes difficult to obtain reliable estimates. Hence, in this essay we persist with the use of the cross-section data.[28]

3.4.1 Specification

The school success and hours of work equations are specified as functions of child, family, socio-economic, education and labour demand characteristics. The tasks carried out by children are often determined by their own characteristics such as maturity and gender. We use age as a proxy for maturity as well as a potential indicator of the labour market contribution of children. To capture the potentially non-linear effect of age we introduce an age-squared term in the specifications. The family characteristics include household size, whether a household is female headed, the educational attainment of the household head and a variable indicating the number of years worked by the household head below the age of 12.

The socio-economic characteristics include variables that capture the level of household income and a dummy indicating whether a household has experienced a reduction in income during the last year. Household wealth is captured by the number of rooms in the household's dwelling and the conditions of the house.

The educational characteristics included are a variable indicating pre-school attendance, the time taken to reach school and two sets of variables that capture a child's interest and educational ambitions.[29] Parents were asked to provide information on their child's interest in school. This variable consists of three categories, namely, whether a child is very interested, shows adequate interest or has no interest in school (the omitted category).[30] In addition to the interest variable, children were asked about their educational ambitions and the educational level that they would like to achieve. This variable consists of four categories – tertiary, upper secondary, compulsory and less than compulsory education. The omitted category consists of children who are not sure about their school ambitions.

In standard economic analyses of educational performance, variables such as interest and ambition fall in the category of unobserved attributes and are often ignored (omitted variable bias). In contrast, sociological examinations of educational success often use measures such as ambition, motivation and interest in their analyses.[31] Given the current level of economic development in Portugal, the persistence of child labour and low educational success we believe that along with the social and economic dimensions, psycho-social factors are important in explaining the observed outcomes. Accordingly, we include these variables in some of our specifications and treat them as proxies for the unobserved academic abilities and motivation of a child. However, an added issue which arises with the inclusion of such variables is that since these are proxies for ability and not measures of inherent academic ability it is likely that a child's educational ambitions (interest) and educational success are simultaneously determined. While this simultaneous formation of success and ambition (interest) does not detract from the ability of such variables to control for unobserved attributes, the coefficients on these variables should be interpreted carefully. Notwithstanding our remarks about the usefulness of controlling for such unobservables, we are sensitive to this additional source of endogeneity and for all our econometric work present estimates with and without these educational attributes.

We include several variables to capture the role of demand side factors in influencing the working patterns of children. Previous studies in Portugal have documented the links between ownership of small landholdings and the use of child labour (Cunhal, 1976; Mónica, 1978). As shown in Portugal and in other agricultural contexts, in situations where

households have small land-holdings they tend to farm intensively and in such situations children are expected to work on the family farm. We use a variable indicating ownership of a backyard or small farm as a proxy for the land-holdings of a household.

Since most economic work takes place on the family farm or firm the occupational status of the household head may be expected to reflect the household demand for labour. We use a set of three variables to capture the potential links between the occupation of the household head and child work. If a parent is self-employed or an employer it is more likely that children will be expected to provide contributions as compared to situations where a household head is a wage labourer. To capture demand for domestic work we include a variable that indicates whether a household employs domestic help. While this variable may also reflect household income and status it should certainly reduce the burden of domestic tasks within the household.

A final set of variables are included to control for variations in child labour practices across different regions. These are indicators for geographical location and the degree of urbanization (urban, semi-urban, rural). We also include regional unemployment and the structure of employment (county level information on the percentage of workers employed in the primary, secondary and tertiary sectors) as a measure of local employment prospects and economic dynamics. [32] While all the variables discussed so far are included in the hours of work and the educational success equation, as discussed in the previous section, we include information on variation in the implementation of child labour policies and the labour inspection regime only in the incidence/hours of work equations.

3.4.2 Descriptive Statistics

Table 3.5 presents descriptive statistics for the variables used in our work while Table 3.6 shows selected descriptive statistics conditional on the working status of the child. As shown in Table 3.6, children who work come from families where the household head has lower educational attainment and where the household head entered the labour market at an earlier age. Consistent with the lower levels of educational attainment, child workers belong to families with lower incomes and poorer housing conditions. There also appears to be a clear pattern across the two cate-

gories of work. In terms of their socio-economic conditions domestic child workers belong to families that are better-off as compared to families where children are doing economic work.

With regard to the educational characteristics, children who work are far less likely to have attended pre-school (about 56-60 per cent versus 74 per cent for non-working children). In terms of interest in schooling there is a clear difference between children involved in economic work and those who do not work. While 60 per cent of non-working children are very interested in schooling, the corresponding number is 42 per cent for children involved in economic work. The interest gap is not as pronounced between non-working children and domestic workers (60 versus 55 per cent). A similar pattern holds for school ambition. Differences in the educational ambitions of non-workers and domestic workers are not as sharp as the differences between non-workers and economic workers. While more than 50 per cent of non-workers/domestic workers aspire to reach a tertiary level of education, less than a third of working children share the same aspirations. Among other reasons, the better educational characteristics of domestic child workers is probably linked to the larger percentage of females involved in this type of work. There is evidence to show that at the primary levels girls are often more interested in studying than boys (OECD, 2003).

The demand side variables show marked differences across work categories. The ownership of small farms is substantially higher among children who provide economic work (67 per cent) as compared to non-workers (43 per cent). The pattern for occupational status shows that while parents of domestic workers and non-workers are equally likely to be employed in wage labour parents of economic workers are clearly more likely to be employers or self-employed.

3.5 Regression results and discussion

We begin our discussion of the regression results by presenting reduced form probit estimates of the probability of working and tobit estimates of the hours worked by children. This is followed by probit estimates of school success. Finally, we present estimates that assess the effect of hours worked on the school success of children. In all the tables we present estimates with and without the educational interest and ambition variables.

3.5.1 Economic and domestic work

Table 3.7 presents probit estimates of the probability that a child works, while Table 3.8 presents tobit estimates of the hours of work. There is a clear difference in the role of gender in determining the type of work provided by children. Male children are more likely to be economic workers and less likely to be involved in domestic work. Being male increases the probability of being an economic worker by 1.2 to 1.8 percentage points while reducing the probability of doing domestic work by 2.5 to 2.7 percentage points. The age patterns are similar across the two categories and show an increase in the working contributions of children as they age.

The education level of the head of household is likely to be associated with household income, the academic abilities of children and the importance that parents attribute to education. The two education variables show that higher educational attainment of parents is clearly associated with a lower probability of working and a lower duration of work. Even though our specification contains parental education and family wealth variables we find that children of parents who worked in their pre-teen years are also more likely to contribute to economic work. This intergenerational persistence leads to a 0.2 percentage point increase in the probability of working.[33]

The income and wealth variables have the expected signs and show that children belonging to households with higher incomes and better housing conditions are less likely to be doing domestic or economic work. Transitory income shocks have little bearing on the incidence or duration of child work. In specifications which did not account for household wealth (housing conditions) the income vulnerability variable displayed a large effect. However, controlling for wealth levels the effect vanishes suggesting that child labour is a structural rather than a transient phenomenon.

Turning to the educational variables, a comparison of the estimates shows that their inclusion does not have a very large effect on the other estimates. The educational characteristics themselves reveal interesting patterns. Pre-school attendance which may reflect parental attitudes towards education as well as availability of such options is negatively linked to both economic and domestic work. The time taken to reach school has no bearing on domestic or economic work. For both economic and

domestic work, children who are interested in school are 0.4 to 0.6 percentage points less likely to work. The educational ambition variables show marked variation across the 4 ambition categories and across the two types of work. Children falling in the lowest educational ambition category are 6 percentage points more likely to provide economic work as compared to those whose educational ambitions are unknown while the marginal effect for those in the highest ambition is about 0.6 percentage points. The effect of these ambition variables is markedly smaller among domestic workers and there are no clear patterns across the ambition levels. Overall, we see that, even after controlling for a variety of socio-economic variables, interest and especially ambition appears to have a direct and large effect on the working patterns of children.[34] The lack of sharp changes in the estimates of the other coefficients suggests that the educational variables are picking up aspects that are not captured by the other variables.

Turning to the demand side characteristics we find that family ownership of a small farm calls for labour effort from children. The marginal effect is about 0.4 to 0.8 percentage points. The role of a small farm in calling for increased domestic work may be linked to the role of domestic child workers in releasing other household workers for agricultural tasks. The effect of the occupational status variables differs across work categories. We find that being self-employed or being an employer is associated with a 2 to 3 percentage point increase in the probability that a child is an economic worker (as compared to wage labourers) while the effect of these variables on domestic work is negligible. The presence of a hired domestic worker reduces domestic and economic work. The presence of such workers probably reflects household wealth and status. Additionally, hired help may release children from domestic chores and may also release adult labour which in turn can lead to a reduction in a child's contribution to economic work.

The effects of the demand for labour variables shows that the incidence of child labour in Portugal is determined not just by the socio-economic background of a family but whether there are work opportunities. Households that operate a small farm or run their own businesses are likely to have a greater demand for labour and are more likely to call on their children to provide (cheap) labour. The presence of work opportunities due to the economic structure prevailing in some parts of the country appears to have led to the persistence of a norm that sanctions

the use of child labour.[35] The labour demand generated by such activities explains the higher reliance of child labour in regions of the country that are not as poor while it is lower in some of the poorer regions of the country. Although not reported in Tables 3.7 and 3.8, consistent with the figures in Table 3.2, the regression results show that, the incidence and duration of child labour is higher in the northern and central parts of the country. We also find that economic labour is more likely to occur in semi-urban and rural areas while domestic work is usually found in semi-urban and urban areas.

The final set of variables in the specification pertains to variations in the implementation of child labour reduction policies across counties and to the variations in the labour inspection regime. Across all specifications the presence of a PETI supported centre is negatively linked to child labour. The coefficient is statistically significant and the effect ranges between 0.6 to 1.7 percentage points. The number of children per PETI member does not have such a clear-cut effect.[36] Consistent with expectations both the labour inspection regime variables are negatively linked to child labour. While the probability of detection does not appear to have a statistically significant effect, the effect of the fine per illegality is stable across specifications and is statistically significant at conventional levels. A Euro 1000 increase in the fine per illegality is likely to reduce child work by about 0.3 percentage points.

Jointly these four variables are expected to capture the local administration's attitude towards the problem of working children (and other labour market illegalities), as well as their ability, willingness and resources available to tackle these problems. We exploit these differences in responses to tackling the problem of working children and in labour market inspections to instrument child labour. To serve as valid instruments these variables need to be correlated with patterns of work while at the same time they should be valid exclusions from the educational success equation. While the individual statistical significance of these variables differs across specifications, jointly they are statistically significant in all the probit and tobit models presented in Table 3.7 and 3.8 (the chi-square test-statistics range between 23 and 134 and the p-values are always less than 0.0001).[37] At the same time there is little reason to expect that these variables should have a direct bearing on educational success. This is also supported by statistical tests. Tests for the inclusion of the child labour policy variables in the educational success equations

which exclude (Table 3.9, spec. 1) or include the educational interest variables (Table 3.9, spec. 3) recorded p-values between 0.92 and 0.95. While, tests for the inclusion of the child labour policy and labour inspection variables recorded p-values between 0.14 and 0.42.

3.5.2 School success[38]

Several specifications (with and without educational and hours of work variables) of the impact of various characteristics on the educational success of children are presented in Table 3.9. The estimates show that male children are 5-10 percentage points less likely to succeed in school as compared to females. As may be expected older children are more likely to have failed at least once in their educational careers. Belonging to a female-headed household reduces the chances of educational success by 2.1-2.6 percentage points. The presence of a well educated household head (more than 9 years) boosts educational performance by about 11-15 percentage points. The large effect of education probably reflects a combination of inherited ability, as well as the greater interest and knowledge of more educated parents who may be help their children with schoolwork. The income and wealth variables show that children belonging to families with higher income and wealth are more likely to succeed. This positive link may reflect the monetary ability of richer parents to send their children to better schools or to buy extra educational inputs for their children.

The inclusion of the educational characteristics leads to several interesting changes in some of the other coefficients. In particular, a comparison of specification 1 and 3 shows that the negative effect of being male is now lower, the effect of parental schooling and household income and wealth is also considerably lower. The interest and aspirations of children is strongly linked to their educational success. Children who are extremely interested in schooling are 24 percentage points more likely to succeed as compared to those who have no interest. Children who aspire to higher educational levels appear to be more successful. For instance, children with educational ambitions up to the compulsory level are 24 percentage points less likely to be successful than those whose educational ambitions are unknown. While those with higher educational ambitions (tertiary level) are 12 percentage points more likely to succeed. Thus, despite controlling for several characteristics (such as income, wealth, education of parents, family structure) that may determine educa-

tional interest and aspirations there is a large direct effect of these variables on educational performance.

As shown by several authors (Otto and Haller, 1979) educational aspirations/ambitions are not just a psychological or internally constructed notion, they are formed and modified in interaction with various influences and depend on social, economic and other innate factors. In this case, exploratory regressions showed that the effects of the ambition/interest variables are 2-3 times larger in the absence of controls for socio-economic characteristics. Despite controlling for a variety of observed characteristics it is likely that unobserved characteristics that determine educational aspirations and educational success are correlated and that the estimates presented here exaggerate the impact of ambition/interest on educational success. While acknowledging this possibility it would be incorrect to ignore such variables considering their potential role in influencing educational and labour outcomes. It is difficult to correct our estimates for this source of endogeneity and we would like to emphasise that these estimates should not be imbued with a causal interpretation. Our aim is to show that in addition to socio-economic factors, psychological factors such as the aspirations of children, however they may be formed, play a large role in determining their educational success. Not only are high aspirations correlated with greater educational success they are also associated with lower levels of labour effort.

3.5.3 School success and work

To explore the link between school success and the work activities of children, Table 3.9 presents estimates of the school success equation including measures of the hours of work contributed by children. The estimates in Table 3.9, specification 2 show that an hour of economic work reduces educational success by 0.4 percentage points while an hour of domestic work has a negative effect of 0.5 percentage points.[39] At the mean value of weekly hours of work provided by children these translate into educational success reductions of 5.6 percentage points for economic work (14 hours of work) and 4 percentage points for domestic work (8 hours of excess domestic work).[40] As discussed earlier, these single-equation probit estimates may be misleading as they do not account for the potential correlation between unobserved characteristics that determine school success and the work activities of children. To account for this correlation we re-estimated the hours of work effect with the

inclusion of the educational interest and ambitions variables. As shown in Table 3.9, specification 4, the inclusion of these controls reduces the negative effect of work. At the mean the effect of economic work is now 4.2 percentage points while that of domestic work is 3.2 percentage points. While the effect of hours of work on educational success is now smaller the effect of the educational interest and ambition variables is almost unchanged.

The second stage of our empirical strategy to identify the effect of work on educational outcomes includes controls for ability *and* uses an IV approach. Table 3.10 presents several sets of estimates based on Vella's (1993) suggested methodology. These specifications include ***all*** the variables used in the school success regressions reported in Table 3.9. Given that the main focus here is on the effect of the hours of work variables we do not present the coefficients on all the other variables. Although the coefficients on the other variables do change in response to the alternative identification strategies they do not show sharp variations. The effects of the other variables are still reflected by the estimates displayed in Table 3.9.

To aid comparison the estimates in column 1 of table 3.10 are the same as those reported earlier in Table 3.9, specification 2, which do not include the educational characteristics of the child. Column 2 presents IV estimates that are based on functional form identification. In addition, column 3 relies on variation in child labour policies to aid identification. While column 4 relies on variation in child labour policies and labour inspection regimes to support identification. Regardless of the identification approach we find that there is a sharp difference in the IV estimates as compared to the single-equation probit estimates. There is a sharp decline in the effect of hours of economic work. The marginal effect is halved from 0.4 to 0.2 percentage points. The effect of hours of domestic work also falls from 0.5 to 0.2 percentage points and it is no longer statistically significant. Across all specifications, the selection correction variables are individually and jointly statistically significant (p-values of about 0.02). The sign on the generalised residuals suggests that unobserved attributes that determine hours of work and educational success are negatively correlated. In other words unobserved characteristics that reduce educational success increase work effort and in the absence of an appropriate empirical strategy we would tend to overestimate the negative effect of work.

Columns 5-8 report estimates that include the proxies for the educational ability of children. Column 5 repeats the estimates presented earlier in Table 3.9, specification 4. Column 6 presents IV estimates that rely only on differences in functional form for identification, while column 7 estimates rely on variation in child labour polices and column 8 on variation in child labour policies and the labour inspection regime. Once again, regardless of the identification strategy, a comparison of the probit and the IV estimates shows that the magnitude of the effect of domestic work on educational success drops sharply and it is no longer statistically significant.[41] On the other hand the effect of economic work is stable across specifications and is unaffected by the change in estimation approach and identification strategy. [42]

Overall, a comparison of the various estimates presented in Table 3.10 shows that regardless of whether we include or exclude proxies for academic ability the story emerging from these estimates remains the same. There are clear differences across the effects of the two types of work. While domestic work does not appear to have a bearing on educational success, economic work does appear to inhibit educational success. From a methodological standpoint, the changes in the effects of work in response to the inclusion of the proxies for ability and especially the use of the IV estimation strategy highlights the importance of correcting for the potential endogeneity between work patterns and educational success. In the absence of this approach the effect of work, especially domestic work, on educational success would have been substantially overestimated. The IV estimates suggest that the entire negative effect of domestic work on educational success displayed in the probit estimates may be attributed to selection effects. In other words the lack of educational success of children may well be driving parents to channel them to domestic work. As far as economic work is concerned, while controlling for selection effects reduces the negative effect of this type of work it still persists. Thus, only a part of the probit estimates of the negative effect of work may be attributed to selection effects (ability bias). In terms of magnitude, the size of the coefficient on hours of economic work implies that the average work contribution of an economic worker (14 hours per week) reduces educational success by 2.8 to 4.2 percentage points. While this is not a trivial effect, neither is it very large as compared to the 27 per cent educational success gap between economic workers and non-workers. Thus, at most, the economic work

contribution of children accounts for about 15 per cent of the educational gap.[43]

The smaller IV estimates and negative selection effects reported in our paper may be contrasted with the results reported for several Latin American countries by Gunnarsson Et al. (2006), and for the United States by Stinebrickner and Stinebrickner (2003) and Tyler (2003). In all three papers the authors find that OLS estimates tend to underestimate the negative effect of work and allowing for the endogeneity of child labour (using IV) leads to a larger negative impact of work on educational outcomes. In other words, unlike the Portuguese case where we find negative selection effects, in these papers, unobserved qualities that lead to better educational outcomes and more hours of work are positively correlated.

As discussed earlier, child labour in Portugal is a structural phenomenon and is concentrated largely in certain families (families with small firms and small businesses) in the Northern and Central parts of the country. Children living in these families are expected to work. However, parents may adjust the hours that their children work based on observing their school performance. Additional work may be demanded from children who are not performing well leading to a negative selection effect which in turn would be responsible for the lower IV estimates of the effect of work on educational success. An interesting point is that the negative selection effect that we detect is consistent with work on educational returns for Portugal. Vieira (1999) and Modesto (2003) find that IV estimates of returns to education are lower than the corresponding OLS estimates and argue that low investment in education may be related to low ability rather than to high marginal costs. In other words, at least for some children their lower educational success may be driving their correspondingly higher work effort. Parents may be making time-allocation decisions on the basis of their perception of the comparative advantages and the expected educational returns for their children, rather than the high average returns to education.

3.6 Concluding remarks

Despite economic growth and development, and various laws and inspection policies promoted by the government, child labour persists in Portugal. The presence of child labour coupled with low levels of educa-

tional success and the high returns to investments in education provided the motivation for our work. This paper assessed the factors that determine child labour and educational success and examined whether the work activities of children hinders their educational success.

There are several aspects of the paper which distinguish it from the existing literature on this topic. First, we study the issue of child labour in a relatively developed country setting. Examining this issue in the context of a relatively high-income country may provide guidance on the additional policies (beyond poverty alleviation) which developing countries may adopt if they are to tackle the problem of child labour. Second, the empirical approach used in this paper recognizes the potential endogeneity between child labour and educational success and combines two approaches to try and obtain the causal effect of work on educational success. We include several controls for typically unobserved qualities. Our estimates of educational success control for a child's educational interest and educational ambitions. While these variables may be interesting in their own right, they also serve as proxies for academic ability and are included to control for unobserved factors that may determine educational success and patterns of work. In addition, we exploit geographical differences in the implementation of policies designed to tackle child labour and in the labour inspection regime to instrument child labour. Finally, our work is one of the few pieces that draws a distinction between domestic and economic work and assesses the influence of the duration of these two types of work on the educational success of children. Differentiating between these two types of labour is important from a policy perspective as tailor-made solutions will be possible if the reactions of the different types of labour to varied stimulus are known.

Regardless of the inclusion of proxies for educational ability and across variations in identification strategy our results highlighted the importance of treating child work as endogenous and distinguishing between types of work before assessing the effect of child labour on educational outcomes. We found sharp differences between the single-equation probit estimates and the instrumental variable probit (IVP) estimates. Treating child labour as exogenous and relying only on probit estimates led to overestimates of the negative effect of work on educational success. While the single-equation estimates suggested that both economic work and domestic work hinder educational success the IVP

estimates revealed that it is only economic work which exerts a negative effect on educational outcomes. The pattern of selection effects, especially for domestic work, suggests that this type of work and the accompanying loss of investment in education (due to this work) may be driven by parental perception/knowledge of the comparative advantages of their children rather than lack of information about the benefits of education. In other words it seems that lack of educational success may be responsible for the pattern of domestic work rather than the other way round.

In contrast, only a part of the effect of economic work on educational success is driven by ability bias, and it seems that economic work does have a negative causal effect on educational success. This negative effect is robust to the inclusion of ability controls as well as changes in identification strategy. Nevertheless, the estimated effect of this type of work on educational success is not particularly large. On average, economic work leads to a 2.8-4.2 percentage point reduction in school success. While this effect is not trivial, it does seem small as compared to the 27 percentage point educational success gap between non-workers and economic workers. While economic work hampers the development of children and should be eliminated, it would at most reduce 15 per cent of the educational success gap. Clearly, increasing the educational success of Portuguese children requires a lot more than just reducing their work effort.

The apparently benign effect of domestic work as compared to the effect of economic work suggests that policy initiatives should focus on trying to eliminate economic work. We found that while increases in income are associated with reduced economic work, variables that capture the household occupational structure play a large role in determining the observed pattern of child labour in Portugal. Child labour in Portugal is concentrated in the Northern and Central parts of the country, precisely those areas that have a strong presence of small and medium sized family enterprises and small land ownership. While the presence of such enterprises and self-employment practices may enhance growth, these features increase child labour in the present and also its resilience in the future. A long tradition of relying on child workers, probably slows the change of habits and mentalities and leads to the persistence of this norm. From the perspective of developing countries the results presented here suggest that, while reductions in poverty are likely to reduce child labour

they should also be accompanied by sensitisation programmes that work towards breaking entrenched norms and traditions.

Although tentative, an interesting aspect of our work was the correlation between qualitative characteristics such as a child's educational ambitions (and interest in schooling) and educational and labour outcomes. We found that higher ambitions were associated with greater educational success while at the same time they lowered the probability and duration of economic work. While a part of the estimated effect of these psychosocial variables is probably simultaneously determined with educational success the magnitude of the coefficients suggests that these types of variables should not be ignored. It is quite possible that parents and teachers have low ambitions for some children regardless of their performance and such prejudices may translate into self-fulfilling prophecies. From a policy perspective these results suggest that standard approaches such as controlling economic work through labour inspecttions/fines, or encouraging school attendance through cash subsidies and boosting educational performance through better educational inputs may need to be supplemented with programmes that attempt to foster higher educational aspirations.[44]

Notes

[1] A shorter version of this essay was published in the Economics of Education Review, 27(5) (2008): 575-587, co-authored with Arjun S. Bedi. The manuscript benefited of useful comments by Margarida Chagas Lopes, Ashwani Saith, Chris Elbers, seminar participants at the Institute of Social Studies and especially two anonymous referees. SIETI and DETEFP graciously allowed the use of the household surveys on the "Social Characterisation of the Portuguese Household with School Age Children".

[2] Child labour was a major issue in two movies. Solveig Nordlund in "Até amanhã, Mário" portrayed Madeira, Portugal and the street children in the city and "Jaime" tells the story of a child in Oporto who had to work.

[3] Domestic labour consists of domestic chores and economic labour refers to paid or unpaid activities performed on the family farm/enterprise or for an employer.

[4] The measure of educational success used in this paper is a binary variable that takes on a value 1 if a child has never repeated a grade in school and 0 otherwise. More details are provided in the following section. We focus on educational success rather than enrolment or attendance as almost all children are formally en-

rolled in school (98.5 per cent) and appear to be attending school regularly (97.8 per cent of children do not miss school more than once a week). In contrast, 25 per cent of students have repeated a grade.

[5] Several studies have shown that there is a high rate of return to education in Portugal (Kiker and Santos, 1991; Kiker, Santos and Oliveira, 1997; Vieira, 1999; Hartog, Pereira and Vieira, 2001). Pereira and Martins (2001) show that in the 1990s the rate of return to education in Portugal was about 9 per cent. This is at the upper end of the range of educational returns for developed countries. They also report that marginal returns increase with the level of education during their period (1982-1995) of analysis.

[6] Botelho and Pinto (2004) use an experimental approach to estimate educational returns and find that the expected returns to college based on the expectations of college students is quite close to the actual rate of return to education. Although in this case limited to Portuguese college students, this line of work suggests that parents may well have a good idea of the expected returns to education that may accrue to their children. If this is true, then the persistence of child labour may even be more puzzling.

[7] Details on educational outcomes and comparisons with other EU countries are provided later on in the text.

[8] Some examples of this first generation literature are Patrinos and Psacharopoulos (1995), Psacharopoulos (1997), Jensen and Nielsen (1997).

[9] Boozer and Suri's (2001) work on Ghana and Beegle Et al.'s (2009) work on Vietnam are arguably the more credible pieces of work on developing countries. Boozer and Suri (2001) rely on geographical variation in rainfall patterns to instrument child labour. Beegle Et al. (2009) rely on crop shocks and variation in rice prices to instrument child labour. Gunnarsson Et al. (2006) also use a credible IV strategy, however their work has a cross-country focus. They pool data from several Latin American countries to carry out a cross-country analysis. They use differences in legal structures across several Latin American countries to instrument child labour. Tyler's (2003) paper on the United States relies on a similar strategy and uses variation in state child labour laws to instrument work. Ray and Lancaster's (2003) identification strategy is questionable as it relies on excluding household income and assets from the schooling equation in order to identify the child labour equation.

[10] Heady (2003) does not use an IV strategy and treats child labour as exogenous. However, he includes controls for the abilities of children to account for the endogeneity between work and educational outcomes. In our paper we are able to include proxies for ability and use an IV strategy to identify the effect of work on educational outcomes.

[11] The instrument gathers information on the activities of children from household heads as well as from children. In our work we use the responses provided by children. Based on their analysis of the 1998 data set, Chagas Lopes and Goulart (2003) conclude that parents tend to understate the work activities carried out by their children. According to Pais (1998), based on the 1998 sample survey and expanded for the population, 43,000 children admit their involvement in economic activity while only 18,000 adults acknowledge that their children work. Our analysis of the 2001 data shows that the total number of children providing labour is similar whether we use the parental or the child responses. In the sample, based on responses from children, 2,152 children may be classified as child workers while the corresponding number according to parents is 2,082.

[12] The survey instrument gathers information on work participation and the hours of work contributed by children during the week prior to the survey, that is, the first week of October. This week is an acceptable reference week and is not plagued by seasonal patterns of work. As shown in Goulart (2003), the incidence of work peaks during July, August and September, while it remains at the same level between October and June.

[13] In both surveys the question used to elicit information on the work activities of children is essentially the same. In particular, children are asked, "What did you do during the last week?" (where the reference week is the first week of October). The possible responses to this question are 10 multiple non-exclusive alternative answers which include responses that allow identification of economic and domestic work. In terms of economic work the relevant responses were "I worked (paid job)", "I helped someone else in my family with work (non-paid)", "I helped someone else with work (non-paid)". Children who indicate that they are working (economic or domestic) are asked to provide details on the type of task, the place of work, and how long they work per day. The question on duration of work is divided into 5 categories. These are less than one hour, 1 to 3 hours, 4 to 6 hours, 7 to 8 hours and more than 8 hours. This information was used to compute the weekly hours of work provided by children.

[14] According to personal communication between one of the authors and SIETI members, in both years the survey manual used the word "excess", although in 1998 it was not (explicitly) written in the survey questionnaire. While this may be the case it is still very likely that the questions for the two years contain different information.

[15] Alves Pinto (1998) points out that for rural families in Northern Portugal, child labour in agriculture and domestic work is part of a strategy of socio-economic continuity, and that it plays an important role in socialising minors into a rural economics mentality. She goes on to add that it will continue due to its strong

cultural roots and that despite being arduous this type of effort is not viewed as work as it is not very visible.

[16] Figures 3.1-3.5 are based on estimating locally weighted sum of squares (lowess) regressions of hours of work, the probability of working and the various education measures on age. Figure 3.6 is based on a lowess regression of school success on hours of work. A bandwidth of 0.8 was used to estimate the smoother.

[17] At the beginning of the 19th Century, as a result of the spread of liberal ideas in Europe, Portugal approved some of the most advanced and progressive legislation in Europe. One of these laws regarded compulsory education which was approved in 1840, but was never implemented.

[18] In Portugal, children are expected to start school at the age of 6 and are expected to continue till they are 15 unless they complete 9 years of compulsory schooling at an earlier age. Consistent with these educational requirements, minors are only allowed to work under three conditions – they are at least 16 years old, they have completed compulsory school and there is medical confirmation of their physical and psychological capabilities for that job. There are some exceptions to the minimum age. At 14 and 15 light work is allowed, some additional activities are permitted when the child is 16 and 17 years old and at 18 all types of work are allowed.

[19] The level of early school leavers, that is, the share of the population aged 18-24 with less than upper secondary education and not in education or training, is 41.1 per cent in Portugal. This is much higher than the EU average of 18.1 per cent or the NMS average of 7.5 per cent.

[20] The comparison countries are Spain, Ireland and Greece, as these countries are similar to Portugal in terms of their later entry into the EU and their low initial development, and 4 NMS – the Czech Republic, Hungary, Poland and Slovakia. A detailed comparison is provided in OECD (2003).

[21] Attendance is a binary variable that is defined as 1 if a child misses school less than once a week.

[22] The school success–child work relationship is based on all the children in our sample and ***not*** a select sample of children who are still enrolled in school. The school enrollment rate in our sample is 98.5 per cent and information on grade repetition is available for all children regardless of whether they are currently enrolled in school or not. School enrollment and regular school attendance are almost universal and accordingly the appropriate concern is the educational performance of children. Test scores are not available and hence we proxy educational success by using a binary variable which captures repetition. The drawback is that such a binary variable clearly does not contain as much informa-

tion as a continuous measure such as test scores. On the other hand the measure is probably less susceptible to measurement/recall error. An additional concern is whether this measure captures absolute or relative failure. It should be pointed out that, in general, Portugal has a top-down education system and school curricula and minimum required standards of achievement are centrally determined (Chagas Lopes and Goulart, 2003). While this does not mean that there is no flexibility at the school level it does suggest that the measure used here may be closer to a measure of absolute rather than relative failure. Also, in contrast to other European countries, the Portuguese school system does not have a system of streaming students into different tracks – that is, scientific versus vocational education - and all children in grades 1 to 9 are expected to achieve a certain minimum standard.

[23] The data to fashion the instruments were obtained from PETI and from the labour inspectorate. The PETI data are for 2002 and the labour inspectorate data are for 2001. We are forced to use 2002 data for the PETI variables as we were unable to get information for 2001 or for earlier years. However, given that our survey data are from October 2001 and the PETI data are for early 2002 the use of these data should not pose a problem.

[24] The idea was to generate variables that capture the probability that an illegality is detected and the fine per illegality. To create the former we would have liked information on the total number of illegalities. However, this is not observed and thus we use the total number of workers in the county as a proxy for the total number of illegalities. Average fine per illegality is obtained by dividing the total provisional fines by the total number of detected illegalities. The actual fine may differ as it depends on the fine imposed by the courts. The fines that may be imposed lie in a range and we use the amount that corresponds to the minimum fine for the illegality.

[25] While merging the county level information with our household survey provides instruments and allows us to control for the potential endogeneity between educational success and child labour, it comes at a cost. Information on the implementation of child labour policies and labour inspection regimes is not available for Azores and Madeira and this reduces the number of observations under analysis from about 26,000 to 24,000.

[26] DETEFP is the statistics department of the Labour and Training Ministry, and SIETI is a recently established government statistics unit focusing on child labour.

[27] Additional details on the survey are available in SIETI (2003).

[28] The panel data set consists of about 1800 observations and with a child labour incidence of about 8 percent, this translates into about 144 children who report that they work..

[29] Unfortunately we do not have information on the availability and quality of school inputs. However, some school inputs, such as textbooks for the 9 years of compulsory schooling are available to all children at reasonable prices or even available free of cost for poorer regions/households. Other indicators of school quality (student-teacher ratios, teacher education) may display substantial cross-country variation. To control for such differences we include controls for the degree of urbanization (urban, semi-urban and rural) and controls for region. While, admittedly crude, these variables may control for some of the variation in school inputs.

[30] Parents and children provide information on the educational interest questions. Children are asked to indicate whether they are very interested in school, adequately interested in school or not interested in school. A comparison of the two sets of responses shows that they coincide for 62% of the children in the sample. In terms of distribution, according to parents, 55.5% of the children are very interested in school, 33.3% are adequately interested while 11.9% are not interested. The corresponding figures based on children's responses are 58.5, 36.9 and 4.6 per cent. Thus, parents are more likely to indicate that their children are not interested in school as compared to the children themselves. This pattern persists for children of all ages and the gap between parental and child responses increases with age. It is likely that time allocation decisions are taken mainly by parents and hence it is their perception of a child's interest in school that matters in terms of determining the time that a child spends on work activities. Accordingly, we use the responses provided by parents in the probit and tobit models of child work. However, we also estimated regressions using the information provided by children. While there are differences, regardless of whether we use parental or child responses in the work and educational success equations, the overall flavour of the results remains unchanged.

[31] The role of educational aspirations in determining attainment and the formation of such aspirations has been a lively area of research in sociology since the work of Kahl (1957). Early examples of empirical work which incorporate such types of information include, Sewell and Hauser (1972), Alexander Et al. (1975), Otto and Haller (1979).

[32] Information on the degree of urbanization, regional unemployment and the structure of employment has been collected from INE (National Statistics Institute).

[33] For more details on the intergenerational persistence of child labour see Chagas Lopes and Goulart (2005).

[34] In specifications where we did not control for socio-economic characteristics (SEC), the marginal impact of a child's ambition and interests were 7-8 times larger than the estimates presented in Tables 3.7 and 3.8. Thus, while a large portion

of the impact of ambition/interest is mediated via these SEC, they still exert a large direct effect.

[35] The employment-distribution variables do have an effect on the duration of child work but their effects are small. This is not surprising given that the specification includes household level variables that capture demand for labour.

[36] We estimated models with interactions between the child labour policy variables and the county-level employment distribution variables. These interacted variables had small coefficients and were statistically insignificant (p-values between 0.71-0.84).

[37] With regard to weak instruments, Bound et al. (1995: 446), Stock et al. (2002: 522) suggest that as a rule of thumb, the first-stage F-statistics should be greater than 10 to avoid problems associated with weak instruments. In this case the test statistics surpass this threshold and hence it is unlikely that the estimates are influenced by weak instrument bias.

[38] Our analysis of educational success is essentially a demand side analysis and does not account for the role of educational inputs and the quality of teaching. We are unable to match the children in our sample with the school that they attend and are unable to say more on the role of such characteristics.

[39] The possibility of a non-linear relationship between work and school success was also examined. Figure 3.6 suggests that there is a linear relationship between hours of work and school success. In the regressions reported in table 3.10, squared values of hours of work were included to allow for non-linearities – these were not statistically significant.

[40] We estimated educational success models for each of the 7 regions separately. The overall negative effect of child work emanates mainly from the Northern and Central regions of the country. That is, regions of the country that have the highest incidence of child work. While it seems that the harmful effects of work are restricted to these two regions, it should be noted that about 60 per cent of the population and children in the school going age of 6-15 reside in the North (40%) and the Centre (20%).

[41] The selection effects are individually statistically significant only for domestic work. However, they remain jointly statistically significant with p-values of about 0.045.

[42] Since we have four instrumental variables and two endogenous variables we estimated school success using OLS and carried out tests for overidentifying restrictions. Regardless of the specification (that is, excluding or including the educational interest variables) none of the four instruments were individually statistically significant and the tests were unable to reject the null hypothesis that all the instruments are not correlated with the error term in the school success equation.

The computed test statistics were 4.88 (excluding the interest variables) and 4.86 (including the interest variables) as compared to the critical value of 5.99 (χ^2_2).

[43] In cases, as in the present context, where some of the regressors include variables with repeated values within groups, ignoring intra-group error correlation may lead to incorrect statistical inference (see Moulton, 1986; Shore-Sheppard, 1996). We ran a series of regressions, replicating the estimates presented in Table 3.10 but now allowing for intra-municipality error correlation. These estimates are provided in Table A3.1 and show that while the standard errors tend to increase, correcting for intra-municipal correlation does not alter the conclusions drawn on the basis of Table 3.10.

[44] While it is not the aim of this paper to discuss the manner in which educational aspirations may be generated, there is a literature on how educational expectations, motivation and aspirations are formed and various sensitising strategies and mentoring programmes that may be used to boost such aspirations (Redd, Brooks and McGarvey, 2002).

4 The Impact of Interest in School on Educational Success in Portugal

Abstract

Notwithstanding increased educational expenditure, Portugal continues to record poor educational outcomes. Underlining the weak expenditure-educational success link, a large body of work in educational economics displays the tenuous relationship between a range of school inputs and cognitive achievement. Among others, the inability to establish a clear link between inputs and success has been attributed to the difficulty of controlling for unobserved attributes such as ability, motivation and interest. Against this background, and inspired by a large body of work in educational psychology which explicitly measures constructs such as educational motivation and interest, this paper examines whether a child's interest in school has any bearing on educational success. We rely on two data sets collected in Portugal in 1998 and 2001 and examine the interest-educational success link using both cross-section and panel data. Our estimates show that after controlling for time-invariant unobservable traits and tentatively for the simultaneous determination of interest and achievement, children with high levels of interest in 1998 are 6 to 9 percentage points less likely to fail a grade between 1998 and 2001 as compared to children with low and medium levels of interest.

4.1 Introduction

Educational attainment in Portugal lags considerably behind most European countries. The level of early school leavers is twice that of the European Union 15 (EU15) average and five times the average in New Member States (NMS).[1] A substantial proportion of the difference in schooling attainment may be attributed to historical delays in educational investment, but even the younger generation appears to be lagging. For

instance, the upper secondary school completion rate in Portugal is about a third of the EU15 average, while for youth aged 20-24 it is half of the European average.[2]

Despite continued public and private expenditure on education, currently 5.6 percent of GDP, which is slightly above the EU average (OECD, 2009), educational success remains elusive.[3] While school enrolment is almost universal, schooling achievement is a source of concern. For example, a comparison of test scores in reading and Mathematics across seven countries shows that, relative to their peers, Portuguese children do not perform well. They are second from the bottom in terms of mathematical skills and are at the bottom of the chart in reading skills.[4] Grade failure and repetition rates are high and our assessment of a nationally representative survey conducted in 2001 shows that at the age of 15, 63 percent of boys and 46 percent of girls have failed at least once during their tenure in school.

As shown in the review by Krueger and Lindahl (2001), there is a strong link between educational attainment and growth at the micro and the macro level. While the literature on the relationship between cognitive achievement and labour market success is relatively limited, there is evidence from the United States (Murnane Et al., 1995; Jencks and Phillips, 1999; Rose, 2006) and internationally (Bedard and Ferrall, 2003) which shows that higher test scores are associated with higher earnings. Hanushek and Wößmann (2007) provide a recent review of the literature and argue that there is a strong link between test scores and individual earnings, income distribution and economic growth.

Conversely, low levels of educational attainment and achievement are likely to have strong negative individual and social repercussions. For example, in the Portuguese context, incomplete compulsory schooling (less than 9 years) makes it impossible to obtain a driving licence and renders an individual ineligible for any form of public employment. Furthermore, increasing globalisation and the enlargement of the European Union has reinforced competitive pressures on the Portuguese economy. The structural backwardness of Portugal, particularly in terms of education, may depress economic growth and condemn large parts of the Portuguese population to low paying jobs or to unemployment (Carneiro, 2008). While the importance of cognitive skills for economic outcomes is clear, in Portugal where the school system is characterized by multiple

failures and limited acquisition of cognitive skills, a pertinent question is, what measures may be taken to increase such skills?

There is a large body of research in education economics which controls for various child and household socio-economic characteristics and examines the effect of educational spending and the provision of additional schooling inputs on cognitive outcomes (test scores, failure, repetition). Typically, research in this genre treats characteristics such as the educational motivation and interest of children and parents as unobserved attributes. In contrast, there is a large body of work in educational psychology that measures and places the role of a child's traits such as motivation, interest and self-perceptions of ability at the centre-stage in terms of determining educational outcomes. This literature also argues that the role of self-perceptions in driving educational success has policy implications as 'perceptions [are] often easier to change than environmental circumstances' (Denissen, Zarrett and Eccles, 2007). In a similar vein, Pajares and Schunk (2002, p.24) add, 'teachers should pay as much attention to students' motivation as to actual competence, for it is the belief that may accurately predict students' motivation and future academic choices'.[5]

While we engage with the conceptualization of such constructs later in the text, it seems fairly common-place to note that characteristics such as a child's motivation and interest should have a bearing on cognitive outcomes. However, it is only relatively recently that economists have started examining the effect of such qualities on a range of socioeconomic outcomes. Some of the early work comes from Boulding (1961), Bowles and Gintis (1976) and Edwards (1976) while Bowles, Gintis and Osborne (2001) provide a survey of the literature on the role of personality traits in determining earnings. More recently, Mueller and Plug (2006) account for a range of econometric concerns and examine the effect of the Big Five inventory of personality traits on earnings.[6] Their analysis shows that returns to personality traits are comparable in magnitude to the earnings effects of cognitive abilities. On a similar note, Heckman, Stixrud and Urzua (2006) study the role of cognitive (test scores) and non-cognitive skills (locus of control and perceptions of self worth) on a range of labour market outcomes – wages, schooling, occupational choice – and conclude that both skills play a role in determining these outcomes (similar findings are reported in Cunha and Heckman, 2009). Heckman and Masterov (2007) go on to show that the effect of

personality and motivation on various socioeconomic outcomes persists over the life cycle of individuals who attended a preschool programme.

In contrast, and as a complement to this emerging economics literature (see Borghans, Duckworth, Heckman, ter Weel, 2008) which draws on insights from personality psychology and focuses on parsing the effect of cognitive and non-cognitive skills on socioeconomic outcomes, the focus of this paper is on the effect of a specific non-cognitive attribute - child's interest in school on a cognitive outcome.[7] The paper's focus on children (aged 9-15) and on cognitive outcomes distinguishes it from the bulk of the emerging literature which tends to deal with adults and labour market and/or other socioeconomic outcomes. It also differs in the sense of drawing inspiration from a related but different branch of psychology – that is, the work of educational psychologists as opposed to personality psychologists. From a policy perspective, a focus on children provides scope for policy intervention during the educational process (see Link and Mulligan, 1996; Heckman and Rubinstein, 2001). For example, if such non-cognitive traits turn out to be important, programmes that attempt to foster educational interest should be an integral component of programmes aimed at improving test scores.[8]

Echoing the psychological literature, Borghans et al. (2008) point out that personality traits are more malleable than cognitive ability and that social policy may be more actively used to develop traits that have a bearing on educational, labour market and other socioeconomic outcomes. However, without evidence on the predictive power and causal effect of non-cognitive traits in influencing children's cognitive outcomes it is premature to raise policy issues, and the investigation of such a link is the main concern of this paper.[9] While, as discussed in section II, there is a body of literature which investigates such a link, typically these papers rely on cross-section data and do not control for parental/family background characteristics in shaping educational outcomes. In this paper we draw on a relatively large body of information on Portuguese children, and use longitudinal data (surveys conducted in 1998 and 2001) to examine the link between interest in school and educational success after controlling for a range of socioeconomic characteristics. The longitudinal data allows us to control for a child's unobserved time-invariant ability and account for the simultaneous determination of interest and success.

This paper is organised as follows: Section 2 briefly reviews the relevant economics and psychology literature. Section 3 discusses an analytical framework and the key econometric concerns, while section 4 discusses the data. Section 5 provides an empirical analysis of the interest-success link, while section 6 concludes.

4.2 Determinants of educational outcomes

4.2.1 The Economics literature

There is a large economics literature which examines the link between school inputs and cognitive achievement after controlling for various child, household, peer and community characteristics. This educational production function literature, the origins of which may be traced to the Coleman Report (Coleman Et al., 1966), has been surveyed by Hanushek (1979), Hanushek (1986), Harbison and Hanushek (1992), Fuller and Clarke (1994), Glewwe (2002), Todd and Wolpin (2003), Hanushek and Wößmann (2007) and Meghir and Rivkin (2011).

An examination of these surveys and individual studies shows that there is a great deal of uncertainty regarding the identification of factors that play a role in determining cognitive outcomes.[10] Based on their review of the literature, Hanushek and Wößmann (2007) conclude that while there are individual studies which display a positive effect of smaller classes, availability of textbooks and improvement of school facilities on cognitive outcomes, the main conclusion that may be drawn is that channeling additional resources along traditional lines such as reductions in class sizes or increases in teacher salaries is unlikely to lead to substantial changes in student performance.

In the Portuguese context, Hanushek and Luque (2003) use 1995 data from the Trends in International Mathematics and Science Study (TIMSS) and find that after controlling for family characteristics, school factors explain 7 percent of the variance in test scores. Similarly, based on the 2000 wave of the Programme for International Student Assessment (PISA) survey which contains information on test scores in reading, Maths and Science for 15 year olds, Carneiro (2008) concludes that the family background of children is the major observable factor driving variation in test scores while school resources have a "very limited role". At the same time he notes that a large proportion (about 55 to 60 per-

cent) of the variance in student achievement may be attributed to unobserved characteristics.

Glewwe's (2002) survey focuses on methodological issues and argues that the bulk of the educational production function studies may not be credible as they do not deal with key econometric concerns. Chiefly, Glewwe (2002) points out that studies which attempt to link school inputs to learning outcomes do not (i) control for a child's innate ability and motivation (ii) parental motivation and ability to help their children (iii) unobserved school inputs such as teacher motivation and finally (iv) measurement error in the regressors.

While IQ tests have been used to measure and control for innate ability, it has been argued that any test which claims to measure a genetic endowment inevitably includes the effect of environmental factors (Glewwe, 2002) or constructed/learned ability (Strauss and Thomas, 1995) casting doubt on whether it is possible to control for inherent ability. An alternative approach to control for innate ability, which is restricted to the few cases where data are available, has been to exploit data on twins (Behrman, Rosenzweig and Taubman, 1994; Card, 1999) or on adoptee samples (Sacerdote, 2002; Plug, 2004). A somewhat more approachable solution has been to use panel data to control for the effect of time invariant unobservables which may include innate ability (Link and Mulligan, 1996; Ballou, Sanders and Wright, 2004; Tekwe Et al. 2004; Rivkin, Hanushek and Kain, 2005).

In contrast to the numerous attempts that have been made to control for ability, the role of motivation and interest - whether it refers to the child, parent or teacher - in shaping educational outcomes has received far less attention in the educational economics literature.[11] In contrast, a focus on such traits has been a key concern in the educational psychology literature.

4.2.2 The Psychology literature

Educational psychologists have intensively studied the effect of motivation in influencing educational outcomes. The focus of the literature is on the motivation of the individual directly engaged in the learning process, and motivational researchers deal with, "what moves people to act" (Wigfield, Eccles and Rodriguez, 1998, p. 73). Typically, educational motivation has been characterized in terms of the choices students make

about whether or not to engage in an academic activity, the desire to persist and re-engage with an academic activity and the degree of effort/time expended on such activities. Consistent with this characterization, in their review of the literature, Maehr and Meyer (1997) argue that the term "personal investment" maybe used as an alternative for motivation. They point out that motivation is "freighted with meanings that are difficult to defend", and that the term investment as seen in the "direction, intensity, persistence and quality" of an individual's actions characterizes motivation.

Motivation in turn is treated as a function of students' beliefs about their ability, their interest in and the value they place on academic activity. In this formulation, interest is referred to as intrinsic motivation, that is, "when individuals are intrinsically motivated, they engage in activities for their own sake and out of interest in the activity" (Wigfield Et al., 1998:77) while engagement in activities driven by their value or the incentives associated with engaging in such activities is termed as extrinsic motivation.[12]

Similar to the notion of motivation as "personal investment", Horn (1982) and Eccles (1983) argue that academic interest drives task choice and the investment of intellectual resources which in turn should translate into higher educational achievement. Predating their writings, Dewey (1913) argued that "if we can secure interest in a given set of facts or ideas, we may be perfectly sure that the pupil will direct his energies towards mastering them" (p.1). Dewey claimed that a strong interest will sustain an individual's attention and lead to sustained effort in accomplishing an academic goal. In terms of a definition, Renninger and Hidi (2002) define interest as 'a psychological state of having an affective reaction to and focused attention for particular content and/or the relatively enduring predisposition to re-engage particular classes of objects, events, or ideas' (Renninger and Hidi, 2002:174).

This characterization of educational interest in terms of attraction to a particular content, the desire to continually engage in a particular activity and the investment of time and effort is very similar to the characterisation of educational motivation. While the literature uses both terms, our reading of the literature suggests that the constructs educational motivation and educational interest are defined and characterized in very similar ways and are often used to express the same idea. Accordingly, for the purposes of this paper we treat the two terms as synonyms.

At least three different self-reported survey based approaches have been used to measure educational interest. The most straightforward is a general single-dimension interest measure based on student responses to a question such as "I am interested in school" (True or False) or "I am satisfied with the way my education is going" (True or False) as used in the well known 'High School and Beyond' surveys (http://dx.doi.org/10.3886/ICPSR07896) or by asking respondents to rate their interest in school on a Likert scale (strongly disagree – strongly agree) in response to statements such as "I like being in school" or "School is interesting" (Huebner, 1994; Huebner and Gilman, 2006). Such single-dimension measures are more likely to be useful at younger ages, as younger children may not always be conscious of their interest in specific activities (Renninger and Hidi, 2002:177).

A more sophisticated approach comprises the collection of domain-specific measures, for example a child's interest in specific academic activities. This may be more relevant for older children. As argued by Wigfield Et al. (1998:85) as children grow and discover their capacities and opportunities, interests tend to be more distinguishable and specific, rather than "universal" interests. Interests in specific academic subjects such as English, Math, Science are measured by asking children to rate their interest in each domain using a Likert scale. Typical statements are framed as "I find (domain X) very boring - very interesting" (for example, see Denissen Et al. 2007).

A third method assesses interest by constructing a composite index of several questions which try and capture different dimensions. For example, the Quality of School Life Scale assesses satisfaction with school on the basis of 5 items and commitment to class work by 11 items (Epstein and McPartland, 1976).[13] Another example is the "attitudes towards school index", which contains 17 items divided into three content areas including attitude towards school assignments, perception of the learning process and perception of school climate (Beers, 1970; Kohr, 1975). Some authors use both domain specific measures and composite multi-dimensional indices (Marsh Et al., 2005).

There is no agreement on the best way to measure interest, apart from the use of a broader measure of academic interest for younger children and the use of domain-specific measures for older children. However, the use of different measures involves trade-offs. The more complex measures - domain-specific and multi-dimensional indices allow a

more nuanced analysis of interest but are time-intensive and this makes them less attractive in large scale surveys.

There are a range of studies which have examined the relationship between interest and persistent attention (Shirley and Reynolds, 1988; Hidi, 1990), academic choice (Holland, 1985), the acquisition of domain-specific knowledge (Alexander Et al., 1997) and most pertinently for this study, academic achievement. The main conclusion from the interest-academic achievement strand of work is that there is a positive relationship between achievement and interest with correlations ranging from 0.25 to 0.35 (Eccles Et al., 1993; Wigfield, 1997; Reeve and Hakel, 2000; Marsh Et al., 2005). On the basis of a meta-analysis, Schiefele, Krapp and Winteler (1992) conclude that the correlation between interest and academic achievement is about 0.30. The link between interest and achievement is unlikely to be static and it has been argued that while interest and achievement may be quite distinct at an early age, due to the interaction between the two constructs they are likely to become increasingly intertwined as children mature (Wigfield and Eccles, 2002). For example, Denissen Et al. (2007) use longitudinal data from Michigan to examine the link between interest and achievement for children between grades 1 and 12. Their analysis supports the strengthening of the link between these two constructs from a correlation of 0.13 in grade 1 to about 0.29 by grade 12.

A recent theme in the educational psychology literature has been a concern about the "causal ordering" between interest and achievement. That is, does interest precede achievement or does achievement precede interest. Marsh Et al. (2005) study this link based on two databases of 7th graders from Germany from whom data was collected at two points in the same academic year. Their analysis shows that while interest in Maths in period 1 is statistically significantly correlated with Maths test scores in period 2 (correlation is 0.09-0.10) there is limited support for the effect of test scores in period 1 on interest in period 2. Köller, Baumert and Schnabel (2001) also work with a sample of German students and find that mathematics interest in grade 7 has no effect on achievement in grade 10, while interest in grade 10 does influence achievement in grade 12. Thus, both these papers provide some support for the idea that interest precedes achievement.

While the educational psychology literature pays considerable attention to the role of a child's motivation in determining educational

achievement, there are two issues about this body of work that need to be highlighted. First, there is little attempt to control for the role of a child's unobserved ability in influencing interest and achievement and second, almost none of the work controls for the role that may be played by individual, household and community characteristics in influencing achievement. Usually, the focus is squarely on the bivariate link between educational achievement and interest. This has not gone unnoticed and in their review of the literature, Maehr and Meyer (1997) point out that negligence of socio-cultural background differences is a "serious deficiency in the motivation literature". Despite raising this concern, there seems to be little attempt even in the most recent empirical work in this genre to control for differences in socio-economic background or to control for unobserved ability (Marsh Et al., 2005; Denissen Et al., 2007).

In this paper, drawing on the educational economics and educational psychology literature we examine the link between a typically unobserved attribute such as a child's interest in schooling and educational outcomes (never failed in school). Our analysis controls for several child, household, school and regional characteristics and is based on two household surveys collected in 1998 and 2001, which are representative of households with children in the age group 6 to 15. In addition, we exploit the panel element of the data to control for time-invariant unobserved heterogeneity. Since the surveys cover a large number of children and collect a considerable amount of information, the statistical agency conducting the survey opted for a general rather than a domain specific measure of interest, that is, a child's self-reported indication of a high, medium or low level of school interest.[14] As we discuss below this measure yields estimates of the achievement-interest link which are consistent with those found in the psychological literature.

4.3 An analytical framework

In principle, credible estimation of a cognitive achievement relationship requires contemporaneous and past information on child, school and household characteristics and information on a child's unobserved abilities. Such detailed information is hard to obtain and a number of approaches may be used to mitigate some of the concerns. In this case, drawing on a well-established education economics literature the unob-

served test scores of children (Y^*) is treated as a function of child demographic (*C*), child educational interest (*I*), household demographic and socio-economic (*H*), school input *(S)* and regional *(R)* characteristics. That is,

$$Y_i^* = C_i\beta_C + I_i\beta_I + H_i\beta_H + S_i\beta_S + R_i\beta_R + \varepsilon_i \,. \quad (4.1)$$

While the dataset does not contain information on children's test scores, we do observe whether a child has achieved educational success, that is, whether a child has never repeated grades.[15] When test scores obtained by a student cross a certain threshold we observe school success (*Y = 1)*. Thus, the probability that a child succeeds is,

$$\Pr ob[Y_i = 1] = \Pr ob[C_i\beta_C + I_i\beta_I + H_i\beta_H + S_i\beta_S + R_i\beta_R + \varepsilon_i > 0] \,. \quad (4.2)$$

assuming a normally distributed error term allows estimation of (2) using a probit model.

The key difference between the specification outlined above and standard educational production function analyses is the inclusion of a typically unobserved attribute such as a child's interest in school as an additional regressor. The aim is to examine whether after controlling for a wide range of observed characteristics, constructs such as interest have a bearing on educational outcomes.

Despite being able to control for an array of parental, household and school input characteristics, there are several econometric issues that need to be dealt with before we may obtain credible estimates of child interest on educational outcomes. First, unobserved factors, such as a child's inherent ability, may be positively correlated with both interest in school and school success. If this is the case, then estimates based on (2) are likely to overestimate the effect of interest on educational success. Second, as discussed in section II, identifying the "causal ordering" of interest and educational success has been a substantial challenge in the psychology literature. Equation (2) treats educational success as a function of interest, however, it is equally likely that a child's interest in education is a function of educational success. In other words, educational success and interest are likely to be simultaneously determined. This notion is implicit in the psychology literature where it is argued that as children age the correlation between interest and achievement tends to increase because "as the children mature cognitively they become better at

regulating their behavioural investments according to their interests" (Denissen Et al., 2007: 430).[16] Estimates which do not account for the possibly simultaneous determination of interest and success are likely to exaggerate the strength of the link.

Our empirical strategy to tackle the two issues outlined above is based on the creation of a panel data set. While details are provided later, we use the two cross-section data sets collected in 1998 and 2001 to create a panel of children living in households who were canvassed in both 1998 and 2001. The resulting sample is substantially smaller than the cross-section data sets but allows us to deal with some of the econometric concerns. With panel data at hand we may adopt a value-added specification, that is, achievement maybe treated as a function of contemporaneous child, school and family input measures and a lagged measure of achievement,

$$Y_{it} = C_{it}\beta_C + I_{it}\beta_I + H_{it}\beta_H + S_{it}\beta_S + R_{it}\beta_R + \beta_Y Y_{it-1} + \varepsilon_{it}\,. \qquad (4.3)$$

The motivation for (3) is that the inclusion of the lagged achievement measure serves as a control for past unobserved inputs and also controls for unobserved abilities. While such a value-added specification may yield some advantages over a contemporaneous specification (see Hanushek, 2003) estimates based on (3) are likely to be inconsistent as the lagged achievement measure will certainly be correlated with unobserved ability - $Cov(Y_{it-1}, \varepsilon_{it}) \neq 0$.

Alternatively, a panel data version of (2) for child *i*, time period *t*, may be written as:

$$Y_{it} = C_{it}\beta_C + I_{it}\beta_I + H_{it}\beta_H + S_{it}\beta_S + R_{it}\beta_R + a_i + \varepsilon_{it}\,, \qquad (4.4)$$

where, a_i denotes unobserved time-invariant child fixed effects. Estimates based on (4) provide an assessment of the link between educational interest and success after controlling for the effect of time-invariant observed and unobserved characteristics that may influence both interest and school success including inherent ability. As long as inherent ability does not change rapidly over time a child fixed effects specification may be used to control for it.

More explicitly, in differenced form (4) may be re-written as,

$$\Delta Y_{it} = \Delta C_{it}\beta_C + \Delta I_{it}\beta_I + \Delta H_{it}\beta_H + \Delta S_{it}\beta_S + \Delta R_{it}\beta_R + \Delta\varepsilon_{it}. \quad (4.5)$$

While (5) controls for time-invariant attributes, if interest and educational success are simultaneously determined then estimates of the interest-educational success link are likely to be inconsistent, as even after controlling for a_i, $Cov(\Delta I_{it}, \Delta\varepsilon_{it})$ is unlikely to be zero.

To control for time-invariant characteristics and to reduce the effects of the simultaneous determination of achievement and success on the estimates, we estimate a version of (5) where change in educational success is treated as a function of lagged interest (interest measured in 1998). That is,

$$\Delta Y_{it} = \Delta C_{it}\beta_C + I_{it-1}\beta_I + \Delta H_{it}\beta_H + \Delta S_{it}\beta_S + \Delta R_{it}\beta_R + \Delta\varepsilon_{it}. \quad (4.6)$$

If educational interest is formed in a manner that is sufficiently independent of contemporaneous educational achievement, then interest in 1998 should have a bearing on educational performance between 1998 and 2001. However, if interest is essentially a function of achievement and the two are simultaneously determined, then, after controlling for child fixed effects, interest in 1998 (I_{it-1}) is unlikely to have a bearing on changes in educational success between 1998 and 2001. While specification (6) is less susceptible to feedback effects, clearly estimates based on this specification should *not* be treated as causal effects as even after controlling for a_i and other time-varying observables, $Cov(I_{it-1}, \Delta\varepsilon_{it})$ is not zero.[17] It should also be noted that (4.5) and (4.6) are not comparable. While (4.5) examines the contemporaneous link between interest and achievement, (4.6) examines the link between interest in 1998 and changes in educational success between 1998 and 2001. Since (4.6) is less susceptible to feedback effects, estimates based on this specification may be preferred.

A final issue that needs to be confronted is the reliability of the interest measures. At least for the 2001 survey we have two reported measures of child interest, that is, responses from children on their interest in school *and* responses from parents on the interest of their child in school. Based on responses to these two questions and assuming the presence of classical measurement error it is possible to provide a sense of the reliability of the measure of child interest used in the paper.[18] This

allows us to gauge the extent to which measurement error has a bearing on the reported estimates. We discuss these effects later on in the text.

4.4 Data, specification and descriptive statistics

The paper relies on information contained in household surveys conducted in 1998 and 2001. These nationwide surveys which are representative of Portuguese households with children of school going age (6 to 15 years old) were canvassed by the Government in co-operation with the International Labour Organization. The 1998 survey covers 21,733 children while the 2001 survey covers 26,429 children.[19] The surveys gathered information on the characteristics of children, their patterns of school attendance and success in school in terms of whether and how often they had failed a grade; information on the education and occupations of their fathers and mothers, household income and wealth. As discussed earlier, a relatively unusual aspect of the data is the availability of information on the educational interests of children in a data set that also has detailed information about individual and family characteristics. Information on educational interests of children was gathered in 1998, only from children, and in 2001 from both children and parents.

These survey data are supplemented with information on schooling inputs obtained from the Ministry of Education. These data are available at the regional level (28 regions) and were merged with the survey data so that we may control for variations in schooling inputs across regions.[20] The school inputs cover several dimensions and include information on teacher characteristics (educational qualifications, type of contract), the number of students per teacher and the number of students per school.

School success is specified as a function of individual child characteristics which include among others, age, sex, child of household head, the time taken to reach school, whether a child attended pre-school and whether a child has a high, medium or low interest in school. The family/household traits are the educational attainment of the father and mother, family structure (single-parent family), household size and variables which capture household income and wealth. In addition, as described above the specification includes a range of school inputs as well as a set of controls for region and indicators for residing in urban, semi-

rural and rural areas. Table 4.1 contains the detailed list of variables along with descriptive statistics for both 1998 and 2001.

At the time of designing the data collection exercise in 1998, the intention was to re-survey households in 2001 if at least one of their children remained in the age group 6 to 15. Based on information from the statistical agency responsible for data collection, a proportion of the households satisfying this criterion were re-surveyed in 2001. While survey invariant individual and household codes which may used to link surveyed units across years were not created it is possible to match households and children across surveys.

Table 4.2 describes the construction of the panel. We began by restricting ourselves to those households interviewed in 1998 who still had children in the age group 6 to 15 in 2001. This leads to a sample size of 13,623 children in 1998 and 18,536 in 2001. Subsequently, we focused on those children who were interviewed in the 2001 survey and who indicated they had lived in the same residence for at least 3 years.[21] Finally, we matched children on the basis of number of rooms in their residence, child age and sex, maternal and paternal age and education.[22] A total of 1,812 children could be matched across the two surveys on these characteristics. Of these, for 1,733 children in 1998 and 1,682 children in 2001 we have relatively complete information and our panel data analysis relies on this sample of children.[23]

An immediate question is whether such a panel data set which represents about 13 percent of the 1998 sample is systematically different from the larger cross-section data sets. For both 1998 and 2001, Table 4.3 provides descriptive statistics for the children who are in the panel data set and the cross-section data sets. In spite of the difference in means of several variables being statistically significant, the similarities in averages are quite remarkable. In 1998, except for two variables (not a child of household head and the dummy for Alentejo region) none of the variables are substantially different between the larger and smaller data set. For 2001, as well, except for a handful of variables (not a child of household head, single-parent family, Alentejo and Algarve region dummies) all the other characteristics are not substantially different across the two data sets. The similarities suggest that children in the smaller data set are not systematically different from those in the larger data set and results based on such a panel data set are not driven by any special feature of the children comprising the panel.[24]

Table 4.2
Construction of panel data

Sam-ples	Description	Observations	
		1998	**2001**
All	All children in survey	21733	26429
Step 1	Restricted to mainland Portugal	21733	24382
Step 2	Restricted to age group 6 to 12 in 1998 and 9 to 15 in 2001	13623	18536
Step 3	Restricted the 2001 sample to those living in the same residence for at least three years	13623	17575
Step 4	Matching children on the basis of municipality, number of rooms in the house, child age and sex, age of mother and father and schooling of mother and father	1821	1821
Step 5	Observations available for all relevant variables	1733	1682

4.5 Educational success and interest - estimates

4.5.1 Success and interest – a bivariate exploration using cross-section data

The measure of educational success used in the paper is a binary variable and takes on a value 1 if a child has never repeated a grade in school and 0 otherwise. In both years, about 25 percent of the students have repeated a grade at least once. In terms of age-specific patterns, there are sharp variations and as shown in Table 4.4, as children age the level of success drops and by age 15 almost half the children have failed at least once.

The key variable in the current analysis is the educational interest of children. This information was gathered in 1998 by asking children to indicate their interest in school and then again in 2001 by asking children to indicate their interest and by asking parents to indicate the interest of their children in school. The responses are sorted into three categories

that is, whether a child is (i) very interested in school – high (ii) medium level of interest in school (iii) is not interested in school - low.

Child responses for 1998 and 2001, displayed in Table 4.5, show that responses across the two years are quite similar. In both years the largest proportion of the responses falls in the category of high level of school interest (66.6 percent in 1998 and 58.5 percent in 2001), followed by medium (28.1 percent in 1998 and 36.9 percent in 2001) and a very small proportion of children indicate that they are not interested in school (5.3 percent in 1998 and 4.6 percent in 2001). A comparison of parental and child responses in 2001 shows a strong similarity in the overall patterns. That is, a small proportion indicates a low level of interest (about 7 percent) while over 50 percent indicate a high level of interest. A concern associated with questions such as interest is that responses may be very unstable. However, as displayed in Table 4.5, across both surveys and across children and parents, the broad patterns appear to be quite steady.

Table 4.4
Age and school success

Age	School success (%) 1998	School success (%) 2001
6	99.24	99.15
7	96.05	94.81
8	87.81	87.03
9	84.68	84.18
10	80.38	77.18
11	75.94	74.59
12	71.43	71.52
13	65.77	65.01
14	59.62	59.85
15	54.38	54.03
Overall	74.99	74.78

Notes: N=21,729 for 1998 and 26,392 for 2001. Success is defined as "never repeated a grade".

Table 4.5
Child interest in school

	Child's response 1998	Child's response 2001	Parent's response 2001
Low interest (%)	5.3	4.6	6.9
Medium interest (%)	28.1	36.9	37.5
Very interested (%)	66.6	58.5	55.5
N	21,729	26,392	26,392

To further probe some of the patterns and differences, Table 4.6 provides a comparison of the responses of parents and children in 2001. About 64 percent of the responses provided by parents and children coincide. The main difference comes from two corresponding changes. About 16 percent of the children who classify themselves as very interested are placed in the medium category by their parents and a slightly smaller percentage (about 13 percent) indicate a medium level of interest but are placed in the highest category by their parents.

Table 4.6
Parent and child responses to child interest in school, 2001 (%)

	Child's response			
Parental response	Low interest	Medium interest	Very interested	Total
Low interest (%)	2.1	3.4	1.5	6.9
Medium interest (%)	1.8	20.2	15.5	37.5
Very interested (%)	0.7	13.3	41.6	55.5
Total	4.6	36.9	58.5	100.0

Note: N=26,392.

A more interesting pattern is provided in terms of age dynamics. As children age the level of interest in school rapidly evaporates. Based on the 1998 sample (see Table 4.7a), from a high level of interest in school of about 88 percent amongst six year olds, the figure falls to 52 percent (a decline of 36 percentage points) for 15 years olds. The share of those with a medium level of interest increases three-fold from 11 to about 37 percent while the share of those with a low level of interest increases about 11 fold. Child responses in 2001 (Table 4.7b) indicate a similar pattern of decline from 78 percent of six year olds indicating a high level of interest which evaporates rapidly and only about 42 percent (a decline of 36 percentage points) of 15 year olds indicate a similar level of interest. There is a high degree of similarity in age-interest dynamics across the two surveys suggesting that the single-dimension interest question does contain useful information and is not unduly unstable.

Table 4.7a
Age and child interest, 1998

Age	Low (%)	Medium (%)	High (%)
6	0.9	11.31	87.81
7	2.05	18.06	79.87
8	2.16	19.22	78.61
9	2.58	22.19	75.22
10	3.29	23.96	72.75
11	4.67	30.03	65.28
12	4.91	31.22	63.85
13	6.05	35.26	58.71
14	8.87	38.65	52.46
15	11.58	36.67	51.80

N = 21,729

Table 4.7b
Age and child interest, 2001 (child response)

Age	Low (%)	Medium (%)	High (%)
6	1.12	20.92	77.88
7	1.98	23.01	75.0
8	2.74	28.55	68.69
9	2.26	31.08	66.65
10	2.63	32.27	65.09
11	3.29	37.58	59.11
12	4.44	42.32	53.23
13	5.72	45.03	49.24
14	7.44	48.17	44.37
15	11.0	46.54	42.41

N = 26,392

Table 4.7c
Age and child interest, 2001 (parental response)

Age	Low (%)	Medium (%)	High (%)
6	0.88	27.66	71.44
7	2.03	32.55	65.41
8	3.34	34.30	62.34
9	3.85	35.96	60.17
10	5.19	36.99	57.81
11	5.07	39.14	55.78
12	6.30	40.39	53.30
13	8.47	40.96	50.56
14	11.92	41.47	46.60
15	17.12	39.87	43.00

N = 26,392

We begin our examination of the link between interest and school success by computing the correlation between the two (Table 4.8). Based on child responses to interest, the correlation lies between 0.33 and 0.38. This figure is comparable to the correlation of 0.30 as reported in

Schiefele's Et al. (1992) meta-analysis. The correlation between educational success and parental evaluation of a child's interest is somewhat stronger (0.45) and suggests that parental responses are more tightly linked to performance as compared to children's reactions.

Table 4.8
School success and interest

	Interest		
	Low	**Medium**	**High**
1998 (child response)			
Success (%)	25.5	59.8	85.3
N	1,152	6,098	14,479
Correlation (p-value)		0.375 (0.000)	
2001 (child response)			
Success (%)	26.6	63.9	85.4
N	1,209	9,735	15,448
Correlation (p-value)		0.333 (0.000)	
2001 (parental response)			
Success (%)	11.7	65.3	89.02
N	1,830	9,906	14,656
Correlation (p-value)		0.454 (0.000)	

Note: Success is defined as "never repeated a grade".

Restricting attention to children's responses, Table 4.9 provides an assessment of the link between school success and achievement for different age groups. The first point to note is that as children age the correlation between interest and school success becomes stronger. In 1998 it rises from a correlation of 0.15 for six year olds to 0.38 for 15 year olds. The corresponding figures in 2001 are 0.05 and 0.40. This pattern of increasing alignment between interest and success suggests that interest and educational success are simultaneously determined. A closer look at the figures, focusing on patterns in 2001, shows that amongst six year

olds, educational success and interest are weakly correlated. This is probably not surprising as tenure at school amongst six year olds has not been very long. However, it also suggests that at the beginning of a child's educational career interest may be independent of achievement. However, within a year, sharp differences begin to emerge. Amongst seven year olds, about a third of those with a low level of interest have already failed at least once and amongst 15 years olds with a low level of interest about 90 percent have failed at least once. The upshot of this exploratory analysis is that the measure of interest used here yields patterns and correlations that are very similar to those found in the educational psychology literature.

Table 4.9
Age, school success and interest

	School success (%) 1998				School success (%) 2001			
Age	Low	Medium	High	Correlation	Low	Medium	High	Correlation
6	86.66	96.92	99.66	0.153	95.8	98.6	99.3	0.049
7	78.37	88.92	98.12	0.224	69.2	89.8	97.0	0.200
8	57.50	76.61	91.39	0.224	37.5	80.0	91.9	0.266
9	30.61	73.80	89.74	0.289	45.6	77.1	88.7	0.206
10	30.88	66.73	87.11	0.312	36.9	64.9	84.8	0.269
11	25.77	67.09	83.60	0.298	32.9	67.3	81.5	0.225
12	27.52	58.52	81.13	0.317	29.4	64.4	80.6	0.256
13	22.14	55.17	76.59	0.311	18.6	56.4	78.2	0.319
14	17.67	48.61	74.83	0.366	25.9	51.4	74.6	0.299
15	18.08	41.86	71.28	0.378	10.1	46.5	73.6	0.399

Notes: N=21,729 for 1998 and 26,392 for 2001. Success is defined as "never repeated a grade". The column "Correlation", indicates age-specific correlation between school success and interest.

4.5.2 Success and interest – a multivariate assessment

So far, the analysis of the interest-school success link has been reminiscent of the approach used in the psychology literature. We now turn to a multivariate assessment. For both 1998 and 2001 we present estimates of the school success-interest link after controlling for child, household and

school inputs. We begin with a parsimonious specification and then extend it to add various sets of variables.

As shown in Table 4.10-column 1, there is a strong link between interest in school and the probability of school success. Without the inclusion of any controls the marginal effect of a high level of interest on school success is 56 percentage points while that for a medium level of interest is 23 percentage points. The inclusion of child demographic characteristics and especially parental schooling, household income and wealth characteristics leads to a sharp reduction in the effects of interest. The marginal effect of high interest drops by 20 percentage points, while that of medium interest falls by 9 percentage points. The final specification which controls for schooling inputs results in an additional, although relatively small reduction in the effect of interest.

The patterns observed in 2001 (Table 4.11) are remarkably similar, which inspires confidence about the quality of the data, and show that starting from a marginal effect of 53 and 27 percentage points for a high and medium level of interest respectively, the inclusion of various controls leads to a fifty percent dissipation in the interest effect. The main point emerging from this exercise is that focusing only on correlations without controlling for various other factors that are likely to have a bearing on the formation of interest and on school success is likely to exaggerate the effect of interest. The close to fifty percent reduction in the magnitude of the estimates, subsequent to the inclusion of covariates suggests that the correlation of 0.3 observed in the psychology literature is likely to be considerably overestimated.

Notwithstanding the reduction in the magnitude, it is still very large and statistically significant and *prima facie* the estimates suggest that a useful way to increase educational success may consist of developing programmes to enhance children's interest in school. As discussed in section III, despite controlling for a number of observed characteristics, estimates based on cross-section data do not account for the role that may be played by unobserved child abilities and the simultaneous formation of interest and school success. To wrestle with these issues we turn to the panel data estimates.

4.5.3 Panel data estimates

Information on school success and interest in school for children who were in the age group 6 to 12 in 1998 and the same children three years later is provided in Table 4.12. As may be expected given the age-specific patterns discussed earlier the level of school success falls from about 87 to 75 percent over the three year span. As shown in more detail in Table 4.13, between the two time periods an additional 13 percent of children who had not failed in 1998, fail in the intervening period.[25] The decline in the level of interest is even sharper than the decline in school success. In 1998, 74 percent of the children expressed a high level of interest in school, however, by 2001 this figure falls to 55 percent. The shift is mainly due to a movement from high to medium levels of interest (27.5 percent).

Table 4.12
School Success and Interest-Panel data

Year	School success %	Low %	Medium %	High %
1998	86.8	2.7	23.6	73.7
2001	74.6	5.5	39.7	54.8

Notes: N = 1733

Table 4.13
School success - 1998 and 2001

School Success, 1998	School Success 2001		
	0	1	Total
0	212	16	228
	12.2	0.9	13.2
1	228	1277	1505
	13.1	73.7	86.8
Total	440	1293	1733
	25.4	74.6	100

Notes: N = 1733

Table 4.14
Child interest in school - 1998 and 2001

	2001			
1998	**Low interest**	**Medium interest**	**High interest**	**Total**
Low interest (%)	0.52	1.5	0.63	2.7
Medium interest (%)	2.3	10.7	10.6	23.6
High interest (%)	2.6	27.5	43.6	73.7
Total	5.5	39.7	54.8	100.0

Notes: N=1733.

To explore the relationship between interest and success which is purged of the effect of time-invariant unobservable heterogeneity we estimate (5), which controls for child fixed effects. Estimates in Table 4.15 (column 2) show that after controlling for child fixed-effects there is a strong link between interest in school and school success. A high or medium level of interest in school is associated with a 16 to 18 percentage point increase in school success. While the fixed-effect specifications yield estimates that are substantially smaller than the corresponding estimates based on pooled data or single-year estimates (at least for high level of school interest) the marginal effects remain substantial.

To account for time-invariant unobserved heterogeneity and mitigate simultaneity effects we estimate (6), where change in school success is treated as a function of interest in 1998 and changes in other time-varying characteristics. The use of a differenced specification controls for the effect of unobserved heterogeneity while the use of lagged interest provides a measure which is determined prior to events which occur between 1998 and 2001. If the formation of interest in school precedes educational success then a high level of school interest in 1998 should have a bearing on educational performance in the intervening period (1998 and 2001).

At first glance, the estimates suggest otherwise (Table 4.16) and indicate that there is no effect of lagged interest on educational success. The effect of a medium level of interest is now negative although not statistically significant while the effect of a high level of interest as compared to a low level of interest is positive (about 4 percentage points) and statistically insignificant. However, this is misleading as there are a very small number of observations with a low level of interest (46 observations) and this makes it difficult to obtain a precise effect of a high level of interest. If we were to compare the effect of a high level of interest in school with a medium level of interest the marginal effect is about 6 percentage points and is statistically significant.[26] To show this effect more transparently, we re-estimate the specifications using medium and a low level of interest as reference categories. See Table 4.16, columns 4 to 6.[27] Overall, the estimates show that after controlling for time-invariant heterogeneity across children and using a lagged interest variable, children exhibiting a high level of interest in 1998 are 6 percentage points less likely to fail between 1998 and 2001 as compared to those with medium and low levels of interest. Since 13 percent of children fail between 1998 and 2001, an alternative assessment is that, on average, a child with a high level of interest in 1998 is 46 percent less likely to fail over the three year duration as compared to a child with low/medium levels of interest. This is a large effect.[28]

A final concern, as discussed in section III is that measurement error in the interest variable is likely to lead to attenuated estimates of the relationship between interest and achievement. The extent of the attenuation depends on the reliability of the observed variables used to measure the unobserved trait child interest. In the current case, assuming classical measurement error, the correlation between the two reported child interest measures available for the 2001 survey provides an estimate of the reliability ratio and using, $\hat{\beta}_1 = \beta_1 \hat{\rho}$, where $\hat{\rho}$ is the correlation between two measures of child interest we may adjust the estimated coefficient on interest (see Table 4.16, column 7), to yield a measurement error adjusted estimate.[29] Accounting for the degree of attenuation yields a marginal effect of 9.9 percentage points. Thus, a high level of interest in school is likely to translate into a 6 to 10 percentage point effect on achievement.

4.6 Concluding remarks

In a series of recent papers Heckman and his colleagues have displayed the importance of cognitive and non-cognitive characteristics in determining a range of labour market and social outcomes. Complementing this literature, and potentially increasing the spotlight on non-cognitive attributes, this paper examined the effect of a child's interest in school on a cognitive outcome.

Motivated by the challenge of identifying and expanding policy-relevant ways of increasing educational success this paper drew inspiration from the differential emphases of the educational economics and educational psychology literature. While the educational economics literature emphasises the role of educational inputs and controls for a wide variety of child, family and community factors which may influence cognitive outcomes it tends to ignore the effect of child, parent and teacher interest and motivation in shaping outcomes. On the other hand the educational psychology literature places the role of constructs such as motivation and interest in influencing school achievement at the centre-stage but does not account for the role of other influences.

This paper drew on both strands of the literature and based on panel data from Portugal examined the effect of a child's educational interest, after controlling for a variety of other influences – socio-economic background, school inputs, time-invariant ability - on a child's educational success. Although data limitations prevent a causal analysis, the most conservative estimates presented here showed that children with a high level of interest in school in 1998 were 6 percentage points less likely to fail by 2001 as compared to those who had medium and low levels of interest. This figure may be compared with the overall failure rate of 13 percent over this time period. Echoing the findings from the literature which focuses on adult labour outcomes, the estimates presented here show the importance of non-cognitive traits in determining children's educational outcomes. They also support the view that not only do non-cognitive traits have a direct bearing on labour market outcomes but they also have an indirect effect though their role in shaping cognitive outcomes and finally, that the development of non-cognitive skills may serve as an additional and important lever to enhance cognitive outcomes.[30]

Notes

[1] EU15 refers to the 15 initial member states of the European Union, while the New Member States refers to recent entrants from Eastern Europe. The "early school leavers rate" is defined as the share of the population aged 18-24 with less than upper secondary education and who are no longer in education or training. The figure for Portugal is 41.1 percent while it is 18.1 percent for the EU15 and 7.5 percent for NMS (see OECD, 2003 for details).

[2] For the population as a whole, the upper secondary school completion rate is 20.6 percent for Portugal as compared to 64.6 percent for the EU 15 and 81 percent for NMS. For individuals in the age group 20-24 the rates are 47 percent for Portugal, 75 percent for the EU15 and 88.3 percent for the NMS (OECD, 2003).

[3] Educational expenditure as a percent of GDP rose from less than 1 percent in the mid-70s to about 3.5 percent in the mid-80s and to about 4.5 percent in the mid-90s (Goulart and Bedi, 2007).

[4] The comparison countries are Spain, Ireland and Greece, as these countries are similar to Portugal in terms of their late entry into the EU and their relatively low levels of development at EU entry, and 4 NMS (Czech Republic, Hungary, Poland and Slovakia). A detailed comparison is provided in OECD (2003).

[5] The three constructs, motivation, interest and self-perceptions of ability are closely linked and in section II we discuss motivation and interest, which are the focus of this paper, in some more detail. To add to the terminological complexity, the terms self-belief, self-concept and self-perceptions are terms used by different authors to communicate similar ideas.

[6] The Big Five factors are often condensed in the form of an acronym – OCEAN. These are *O*penness to experience, *C*onscientiousness, *E*xtraversion, *A*greeableness, *N*euroticism. An alternative is the Gigantic Three dimensions of personality which includes Neuroticism, Extraversion and Psychoticism.

[7] Our examination is similar in spirit to the work by Borghans, Meijers and ter Weel (2008) who use an experimental approach to examine the correlation/marginal effect of various personality traits on cognitive test scores of adults. Their work is based on 128 students at Maastricht University and shows that performance-motivation increases the probability of giving a correct answer by 7 to 10 percentage points. Other papers include Wolfe and Johnson's (1995) work on a sample of 201 psychology students which showed that self-control/self-discipline explains 9 percent of the variance in GPA as opposed to SAT scores which explained 5 percent. Chamorro-Premuzic and Furnham (2003) work with two samples of (N = 70-75) British University students and find that the Big Five and the Gigantic Three set of personality traits explain 10 to 17 percent of the variation in test scores. Duckworth and Seligman's (2005) work with

samples of about 200 eighth-grade students shows that there is a stronger correlation between self-discipline and final GPA as compared to the correlation between IQ and GPA. Similar to the work of educational psychologists, reviewed in section II, typical papers in this area tend to use small samples, rely on cross-section data and do not control for parental or family background characteristics.

[8] According to Holmlund and Silva (2009) most remedial interventions tend to focus on improving educational outcomes by focusing on measures such as additional instruction time, smaller class sizes and the like, however, there are fewer programmes directed at enhancing non-cognitive attributes as a way of enhancing educational outcomes. Heckman (2000) reviews some of these programmes such as the 'Big Brothers Big Sisters' community and school-based mentoring programmes which focus on pairing children ages 6 through 18 with role models in one-to-one relationships as a way to improve student motivation and awareness of education.

[9] For instance, it may be readily argued that educational interest and motivation are a consequence of educational success and do not cause educational success.

[10] For example, Fuller and Clarke (1994) report that only 9 out of 26 primary-school studies find a significant impact of class size on achievement in developing countries. Harbison and Hanushek (1992) examine the effect of teacher-pupil ratios and find that in 16 out of 30 papers with statistically significant effects, eight studies yield positive while eight studies yield negative effects. Hanushek (2003) provides an updated discussion which displays a similar pattern.

[11] Chagas Lopes and Goulart (2005) and Goulart and Bedi (2008) look at interest in school in the context of child labour.

[12] Extrinsic motivation refers to a situation where activities 'are performed not out of interest but because they are believed to be instrumental to some separable consequence' (Deci,Vallerand, Pelletier and Ryan, 1991:328). The intrinsic-extrinsic dichotomy may suggest that intrinsic motivation is immutable. However, this is unlikely and as argued by Deci *et al.* (1991) while external incentives may drive actions initially, it is possible that over time internalization occurs and leads to a breakdown of the dichotomy. Ryan and Stiller (1991) also argue against this dichotomy while Connell and Wellborn (1991) do not draw a distinction between interest and motivation.

[13] Satisfaction with school includes items such as "The school and I are like: Good friends; Friends; Distant relatives; Strangers; Enemies", "I like school very much: True or False" and "Most of the time I do not want to go to school: False or True". Commitment to class work includes, "Work in class is just busy work and a waste of time: Always to Never", "In class, I often count the minutes till it ends: False or True" and "The things I get to work on in most of my classes are: Great stuff – really interesting to me to Trash – a total loss to me".

[14] The question used to capture interest in school is, 'How is or was your relation with school?' The options are (i) Good, very interested (ii) Fair (iii) Not attractive (iv) Bad. Since very few children opted for options (iii) and (iv), we reclassified the information into three categories, High level of interest (good, very interested), medium level of interest (fair) and a low level of interest (not attractive, bad). In the 1998 survey only children were asked to respond to this question while in the 2001 survey parents and children responded to this question.

[15] The school success specification is estimated on the basis of information for all the children in the sample and is *not* a select sample of children who are still enrolled in school. The school enrolment rate in both years for which we have data is 97 to 98 percent and information on grade repetition is available for all children regardless of whether they are currently enrolled in school or not. School enrolment and regular school attendance are almost universal and hence the appropriate concern is the educational performance of children.

[16] Similar ideas may be found in the work of economist Kenneth Boulding (1961) who suggested that "behaviour depends on the image": self-image of a person regulated its behaviour and was altered by external signals or messages. An example could be a message such as success at school changing interest in school.

[17] Estimates based on (4.5) and (4.6) will only be consistent if the assumption of strict exogeneity of the regressors, conditional on the unobserved fixed effect is satisfied. This is unlikely to hold in the current case as interest and achievement are likely to be simultaneously determined. In the current application, as long as the error terms are not correlated, it is probably reasonable to assume that past values of the interest variable are unlikely to be correlated with the contemporaneous error term, that is $Cov(I_{is}, \varepsilon_{it}) = 0$ for $s < t$. With this assumption it would be possible to obtain consistent estimates of (4.5) and (4.6) using I_{t-2} as an instrument for ΔI_{it} or I_{it-1}. However, we only have information for two periods. Alternatively, one could obtain consistent estimates of (4.5) and (4.6) if we could find additional suitable instruments for the formation of interest. Such instruments are not readily available and in the absence of these we focus on a specification, that is, (4.6) where we have been able to control for time-invariant unobservables and use a lagged value of interest to mitigate feedback effects.

[18] Suppose I_p and I_c represent observed measures of child interest as reported by parents and children, respectively. These two measures are designed to measure the unobserved trait child interest (I). Assuming classical measurement error ($I_p = I + e_p$; $I_c = I + e_c$), the reliability of any observable measure may be defined as the ratio of the true variance in I divided by the total variance in an observed measure. That is Var(I)/Var(I_p) or Var(I)/Var(I_c). In this case the reliability ratio is the

same as the correlation between I_p and I_c. In our data the rank (Pearson) correlation between the two measures is 0.40 (0.42) while in 64 percent of the cases, parent and child responses coincide. Additional discussions on measuring unobserved traits and classical measurement error are available in Ashenfelter and Krueger (1994) and Mueller and Plug (2006).

[19] The 1998 survey was restricted to mainland Portugal while the 2001 survey covered the entire country.

[20] While it may seem more appealing to have information at the level of the school, an advantage of regional level information is that it is less likely to be susceptible to household choice of school. Additionally, while we do include a range of school inputs, based on data collected in 2000, Carneiro (2008) shows that there is little variation in school inputs across Portugal. He reports that, hours of schooling per year, number of computers per students in a school, student-teacher ratio and the proportion of teachers with a degree in pedagogy does not differ across paternal schooling levels.

[21] In the 2001 survey, respondents were asked to indicate how long they had lived at the address in which they were currently residing.

[22] Number of rooms in a house is restricted to bedrooms, living and dining rooms. WC, kitchen, corridors, balconies, storerooms are excluded.

[23] In 1998, of the 1,733 children - 1,730 are in school while 3 are not enrolled. In 2001 we are able to identify the same 1,733 children but an additional 40 drop out of school between 1998 and 2001 and for 8 children information is missing for some of the variables. This leaves us with a total of 1,733 – 43 – 8 = 1,682 observations that may be used for the panel data regressions. We do not include children who drop out between 1998 and 2001 as effectively we only have one observation for their level of interest and educational success. Children who drop out of school have a lower success rate compared to those who are still in school (44.2 versus 75.4 percent) and also have a lower level of interest (a high level of school interest for 20.9 versus 55.7 percent). This is likely to lead to an underestimate of the link between educational success and interest. However, since sample attrition is quite low (2.4 percent) it is unlikely to have a substantial effect on the estimates.

[24] Table A4.1 provides regression estimates based on the smaller and larger data sets and as expected while the estimates based on the smaller data sets are less precise the two sets of estimates are not very different from each other.

[25] There are some discrepancies, as 16 children (0.92 percent) who indicated that they had failed in 1998 are found in the category of never failed in 2001. We exclude these children from the regression analysis.

[26] That is, say using the estimates in Table 4.16-column 3, we have 0.057+0.026 = 0.062 with a standard error of 0.021.

[27] In addition to the effect of motivation, the estimates show that municipalities with smaller class sizes and larger schools are associated with an increase in educational success. A decrease in 5 students per class is associated with a 4 percentage point increase in educational success. Additionally, a larger number of pupils per school translates into higher educational success, e.g. an increase in average school size by 50 students is associated with a 4 percentage point increase in educational success. The link between achievement and school size is interesting as in 2010-2011 the Portuguese schooling system underwent a major change. Following demographic and locational changes in the population, around 700, mainly primary schools were closed and 10,000 students moved into larger schools. Although, the mechanism is not clear, our results suggest that such a move may be associated with an increase in educational achievement.

[28] In cases, as in the present context where some of the regressors include variables with repeated values within groups, ignoring intra-group error correlation may lead to incorrect statistical inference (see Moulton, 1986; Shore-Sheppard, 1996). We ran a series of regressions, replicating the estimates presented in Table 4.16 but now allowing for intra-municipality error correlation. These estimates are provided in Table A4.4 and show that while the standard errors tend to increase it does not alter the conclusions drawn on the basis of Table 4.16.

[29] The correlation between the two measures is 0.42 while 64 percent of the parental and child responses coincide. We may thus consider a reliability ratio of between 0.42 and 0.64. Adopting a conservative approach we provide estimates pinning the reliability at 0.6.

[30] In Portugal, in recent years there has been an increase in the number of programmes designed to reduce drop-out amongst school-going students by addressing the development of non-cognitive skills (self-esteem, motivation) among other issues. These programmes mobilise resources to tackle school failure through a range of interventions involving children, parents and teachers. The leading and largest of these projects is Empresários pela Inclusão Social (Businessmen for Social Inclusion), which targets students aged 13-15 years old. Martins (2010) finds a positive impact of this programme. The possibility that this positive effect is due to children feeling they were in an experiment and performing better because of that - the Hawthorne effect – is refuted. EPIS consists of a large bundle of different interventions, which makes it hard to ascribe an increase in achievement to any specific attribute of the programme. Martins (2010) finds that the joint impact of these different measures is a 10 percentage point reduction in grade retention. A finding that is consistent with the upper-bound estimate reported in this chapter.

5 Concluding Remarks

This thesis examined child labour and schooling in Portugal both throughout history and in the present.

The first essay provided an analysis of the evolution of child labour in Portugal between the end of the 19th and during the 20th century. The Portuguese experience is set against the backdrop of the country's economic structure and economic growth, demographic changes, educational expansion, schooling and labour legislation, and the changing norms espoused by its elites. In the last 60 years, Portugal has experienced a major transformation from an isolated agricultural illiterate country to an industrial economy until the early 1980's and more recently a transition to a service economy integrated in Europe.

Child labour was widespread up to mid-20th century, with more than 60 percent of children aged 10-14 working. The decline of child labour since 1945-50, and particularly its rapid decline since the 1970s to current levels, was interpreted in terms of the cascading effect of policies and events that operated synchronously. While the fact that child labour still exists in Portugal today is noteworthy, even more remarkable is the speed with which child labour vanished after being the main activity in which children engaged for several centuries. My assessment suggests that while legal measures may help reduce child labour, these do not appear to be key determinants in the Portuguese experience. The use of children in the labour market appears to have been driven mainly by the needs of the economic structure of the country, which in turn may be reflected in the norms and values espoused by its political leaders and their willingness to pass and implement legal measures. The Portuguese case suggests that a more effective policy prescription may be the transfer of affordable (cheap or even free) technology to developing countries with the objective of curbing their demand for child labour. The introduction of more advanced technology would likely change the societal

role for children and could be the key to the acceleration of the decline of child labour throughout the world.

Shifting to the present, the second essay studied the patterns of child labour in Portugal. While the recent debate on child labour has focused mainly on developing countries, child labour also persists in some developed countries. Portugal is an example of a country where child labour is still a matter of concern as about 8-12 per cent of Portuguese children aged 6-15 may be classified as working at the turn of the millennium. After national and international pressure, a national programme designed to tackle child labour in Portugal was created in 1998, one of its kind in the developed world, with the argument that economic work was endangering children's lives. However, evidence on the effects of different types of labour and/or the intensity of labour on educational outcomes is scarce (Hazarika and Bedi, 2003; Heady, 2003).

Accordingly, the second essay studied the consequences of working on the educational performance of Portuguese children. In particular, I drew a distinction between domestic and economic child work and examined the effect of these two types of labour on school success. I controlled for typically unobserved attributes, such as a child's interest in school and educational ambitions, and used geographical variation in both policies designed to tackle child labour and labour inspection regimes to instrument child labour. I found that the two types of labour had asymmetric effects. While even one hour of economic work hindered educational success, domestic work did not appear to be harmful. According to my estimates, economic work may be responsible for about 15 per cent of the educational success gap between working and non-working children.

Therefore, the results stress the importance of not treating all child labor as the same at least in the Portuguese context. The results are also at odds with evidence from other countries. For example, in the U.S., analysis based on the Longitudinal Youth Development Study suggests that work performed by white adolescent males outside school does not interfere with high-school achievement. Teenagers took time from watching television or "hanging around" to work and were able to ensure they had enough time for schoolwork by negotiating with employers (Mortimer, 2003). However, this type of work is different from the typical type of work done by children in Portugal, which is mostly in the form of unpaid non-creative non-entrepreneurial family work in regions

and families with low educational levels. The motivation for work among Portuguese children is driven partly by economic reasons and partly cultural, with a reproduction of livelihoods in rural (Alves Pinto, 2003) and peri-urban contexts (Sarmento, Bandeira and Dores, 2005; Eaton and Goulart, 2009) where schooling is still poorly valued by children, parents and the environment. In this context, the competition between school and work for children's time is real and, therefore, it is important to treat child labour and schooling as endogenous. Perhaps more importantly, I also find that, after controlling for a host of relevant socio-economic variables, factors such as a child's interest in school and educational ambitions appear to have a direct and large effect on boosting educational success and reducing economic work. Particularly, on educational success, the role of these non-cognitive skills seems far more important than any other factors.

This takes me to the third essay which deals with educational achievement. The essay draws inspiration from the differential emphases of the educational economics and educational psychology literature. While the educational economics literature emphasizes the role of educational inputs and controls for a wide variety of child, family and community factors which may influence cognitive outcomes it tends to ignore the effect of child, parent and teacher interest and motivation in shaping outcomes. On the other hand the educational psychology literature places the role of constructs such as motivation and interest in influencing school achievement at the centre-stage but does not account for the role of other influences.

Benefiting from an usual dataset, the third essay examined whether a child's interest in school (a non-cognitive attribute) has any bearing on educational success after controlling for a host of other variables. Although data limitations prevent a causal analysis, estimates suggest that children with a high level of interest in school in 1998 are far less likely to fail by 2001 as compared to those who had medium and low levels of interest. The estimates presented here show the importance of non-cognitive traits in determining children's educational outcomes. Inferring from the existing literature, these results also suggest that not only do non-cognitive traits have a direct bearing on labour market outcomes but they also have an indirect effect though their role in shaping cognitive outcomes. These results support the increasing number of programmes that aim at bolstering student's interest in school with a view to improv-

ing school outcomes. Nevertheless, additional research is required to shed light on the mechanisms and strategies for improving interest in school.

A final remark must be made on the revealed importance of history and context and the relevance of country studies. Understanding the complexity of phenomena implies understanding the complexity of local circumstances and cautions against unwarranted generalizations, particularly in very under-researched topics where one may end up comparing very different realities. This does not refute the need for including this local context in a wider comparison. By researching the Portuguese case, this thesis attempted to contribute to break the developed/developing countries dichotomy of part of the literature, and instead promote a research driven towards a more continuous development spectrum.

Appendices

Table 2.1
Per capita GDP evolution in Europe

	Per capita GDP (Dollars)				
	(1) Portugal	(2) Spain	(3) Greece	(4) West. Europe*	(1) / (4)
1500	606	661	433	771	79%
1820	923	1008	641	1204	77%
1870	975	1207	880	1960	50%
1913	1250	2056	1592	3458	36%
1925	1446	2451	2140	3706	39%
1950	2086	2189	1915	4579	46%
1973	7063	7661	7665	11416	62%
2001	14229	15659	12511	19256	74%

	Rate of growth of per capita GDP (%)			
	Portugal	Spain	Greece	West. Europe*
1500-1820	0.13	0.13	0.12	0.14
1820-70	0.11	0.36	0.64	0.98
1870-1913	0.58	1.25	1.39	1.33
1913-25	1.22	1.48	2.5	0.58
1925-50	1.54	-0.47	-0.46	0.89
1950-73	5.45	5.6	6.21	4.05
1973-2001	2.53	2.59	1.77	1.88

	Rate of growth of GDP (%)			
	Portugal	Spain	Greece	West Europe*
1500-1820	0.51	0.32	0.39	0.4
1820-70	0.66	0.93	1.56	1.68
1870-1913	1.34	1.77	2.32	2.11
1913-25	1.78	2.29	3.3	0.81
1925-50	2.62	0.47	0.51	1.37
1950-73	5.73	6.6	6.98	4.79
1973-2001	2.95	3.1	2.4	2.21

Notes: Per capita GDP valued at 1990 international Geary-Khamis dollars; Rates of growth are annual average compound growth rates (in percentages); *Western Europe refers to an unweighted average for 29 Western European countries.

Source: Maddison (2003), pages 260, 262 and 263 for Portugal and Spain. Figures for Greece are based on pages 54-57 and 66-69.

Table 2.2
Land use in Portugal, 1875-1995 (%(of total land)

	Agriculture	Forest	Fallow	Non-productive
1875*	21.2	7.2	23.8	44.5
1902*	35.0	22.0	21.7	21.4
1920*	36.3	23.1	18.4	17.8
1929*	36.9	26.2	17.6	19.3
1934*	37.7	28.3	15.0	14.7
1939*	38.0	27.7	16.7	13.3
1951*	53.5	30.9	8.3	5.5
1979	56.3	n.a.	n.a.	n.a.
1989	43.6	n.a.	n.a.	n.a.
1995	42.7	n.a.	n.a.	n.a.

Notes: * Continental Portugal (8,894,000 hectares) until 1951; Continent plus Portuguese islands (9,198,200 hectares) thereafter. The unproductive area includes rocky and sand areas, swamps, rivers and canals. The residual corresponds to social use.

Source: Author's calculations using Agricultural Statistics, Instituto Nacional de Estatística (E. Nunes in Valério, 2001a).

Table 2.3
Literacy rate in Europe, 1850 – 2001(%)

Countries		1850 (%)	1900 (%)	1950 (%)	2001 (%)
Nordic countries, Germany, Scotland, The Netherlands and Switzerland		95	98	98	99
England and Wales		70	88	98	99
France, Belgium and Ireland		55	80	98	99
Austria and Hungary		35	70	98	98-99
Spain, Italy and Poland		25	40	80	98-99
Russia (/Soviet Union)		15	25	90	99
Balkans	Bulgaria, Romania	15	25	85	97-98
	Greece, Yugoslavia			75	96
Portugal		15	25	55	93

Note: Estimates are based on census data, literacy rates of conscripted and condemned individuals and matrimonial records.

Source: Johansson in Candeias Et al. (2004) and http://world.bymap.org/.

Table 2.4
Schooling in Portugal, 1864-2001

	Gross enrolment rate (%)				
	1-4 grade	*5-6 grade*	*7-9 grade*	*10-12 grade*	*Tertiary*
1864	*28				
1878	*48				
1890	*54			**1	
1900	*47			**1	0
1911	*49			**2	0
1920	*54			**2	1
1930	*69			**3	1
1940	85			**4-5	1
1950	99			**6-7	***2
1960	130	23	22	3	***3
1970	137	60	38	6	***8
1981	138	94	60	34	***11
1991	127	120	94	68	***23
2001	125	121	119	105	***52

Table 2.4 *(continued)*

	Pupil-teacher ratio		Average school years	
	Primary	*Secondary*	*School age children*†	*Labour force*
1864				
1878				
1890	1888: *58	1892: **16		
1900		**17		
1911		**22	2.1	
1920		**17	2.3	
1930	*45	**21	2.8	
1940	1939: 44		3.8	0.9
1950	43		4.7	1
1960	34	20	7.0	1.4
1970	31	19	9.7	2.1
1981	22	13	12.7	3.2
1991	16	12	15.9	4.3
2001	14	10		

Notes and sources on the next page.

Notes: Primary school includes 1st to 4th grade. Secondary school includes 5th to 12th grade. * Data for primary schools is restricted to public schools. ** Data for secondary schools is restricted to public schools until 1955. *** After 1949, students at Technical High schools are included in tertiary Education. † The calculations are based on gross enrolment rates in primary and secondary schooling and assumes that students fulfil the level enrolled (i.e. each student enrolled in primary school completes 4 years) and, therefore, should be viewed as an upper limit.

Source: Authors' calculations based on Mitchell (2007) and Lains (2003) for figures before 1960 and Pordata and GIASE (2006) for data after 1960. Information on average school years is from Valério (2001).

Table 2.5
Working age and compulsory schooling laws

Year	Minimum working age	Compulsory schooling age
1890	1891:12	5
1900	12	5
1911	12	1911:3
1920	12	1919:5
1930	12	1929:3
1940	12	3
1950	12	1956:4 (boys)
1960	1969:14	1960:4 (girls) 1964:6
1970	14	6
1981	14	6
1991	1991:16	1986:9*
2001	16	1995:9 (effective*)

Note: * The law was approved in 1986 and the batch entering school in that year was the first to have 9 years of compulsory schooling. By 1995, when this cohort reached 9th grade, the law was universally applicable.

Source: Williams (1992); Campinho (1995).

Table 2.6a
Child and youth labour, 1890-2001

Years	Employed (paid work, %)		Occupied (unpaid work, %)		Activity (%)		Unemployment rate (%)	
	10-14	*15-19*	*10-14*	*15-19*	*10-14*	*15-19*	*10-14*	*15-19*
1890[†]	28 - 60							
1900[†]	22 - 48							
1911[†]	21 - 45							
1920								
1930								
1940	15	43	32	38	46	82		5
1950[‡]	22	45	59	47	81	91	2	4
1960	15	43	28	41	43	84	10	9
1970[*]	11	55	5	19	16	74	18	10
1981[‡]	9	40	8	14	17	54	42	21
1991[‡ b]	6	36	3	4	9	40	17	11
2001[‡ b]	0	22	n.a.	1	4	23		18

Table 2.6b
Child and youth labour, 1890-2001

Years	Occupied (unpaid work, %)			
	Economic		*Domestic*	
	10-14	*15-19*	*10-14*	*15-19*
1940	4	38	28	n.a.
1950[‡]	26	17	33	30
1960	28	41	n.a.	n.a.
1970[*]	n.a.	n.a.	5	19
1981[‡]	2	4	6	10
1991[‡ b]	n.a.	n.a.	3	4
2001[b]	n.a.	n.a.	n.a.	1

Notes:

1. The incidence of child labour is defined as the percentage of children/youth who are employed or occupied in the respective age group. The total is the sum of those who are employed, that is, engaged in paid work and those who are occupied, that is, engaged in unpaid work, including economic and domestic activities. Unemployment rate is the share of unemployed over the active children and youngsters.

2. † Between 1890 and 1911, disaggregation into two age groups is not possible. We provide a lower and upper limit for the incidence of child labour. The upper limit is calculated by dividing the working population under 20 by the population in the age group 10-19. The lower limit is calculated dividing the working population under 20 by the total population in the age group 0-19. As children are more likely to work as they age, it is likely that the 10-19 employment rate is closer to the upper limit.

3. ‡ Figures are for the age group 12-14 and not 10-14. * In 1970, only 20 % of the information collected was analysed. (b) In 1991 and 2001, the employed category includes paid and unpaid economic work while occupied refers to domestic work.

4. Methodological changes in measuring employment occurred over the years: (i) The concept of employment was sharpened during the 1890-1911 period through the adoption of the concept of main employment (1900) and a clearer conceptualization of employment (1911) (Carrilho, 1996). (ii) From 1950 and onwards, the introduction of a close-ended question reduced the subjectivity of self-reported labour status (Torres, 2009).

Source: Authors' calculations based on census data and a 2001 household survey (for the 10-14 age group in 2001).

Table 2.7
Sectoral distribution of child and youth labour in Portugal, 1890-1960

	Boys		Girls		Total		Labour incidence			% in labour force		
	10-14	*15-19*	*10-14*	*15-19*	*10-14*	*15-19*	*10-14*	*15-19*	*10-19*	*10-14*	*15-19*	*10-19*
Agriculture												
1890		244729		115347		360076			37%			23%
1900		268714		83433		352147			32%			23%
1911		257960		56209		314169			26%			21%
1940	44522	112634	10985	23184	55507	135818	7%	18%	12%	4%	11%	15%
1950	65587	167034	14002	38614	79589	203021	10%	25%	18%	5%	13%	18%
1960	94611	152566	6407	13162	101018	203022	12%	27%	17%	7%	14%	18%
Industry												
1890		57333		34791		92124			9%			21%
1900		67595		37951		105546			10%			23%
1911		85546		39902		125448			10%			23%
1940	10184	41230	5916	23886	16100	65116	2%	9%	5%	4%	15%	19%
1950	12747	60016	7538	35650	20285	95666	3%	12%	7%	3%	16%	20%
1960	18266	65954	9819	34769	28085	100723	3%	13%	8%	4%	15%	19%
Others												
1890		74469		68842		143311			15%			24%
1900		43581		19587		63168			6%			14%
1911		84338		21714		106052			9%			19%
1940	27221	71035	22704	52227	49925	123262	6%	16%	11%	5%	12%	17%
1950	17765	66739	21856	63183	39621	129922	5%	16%	11%	3%	11%	15%
1960	20468	64756	18812	54840	39280	119596	5%	16%	10%	4%	12%	15%

Notes: The figures are restricted to those engaged in paid work/employed. Labour incidence is the distribution of children in various sectors and is obtained by dividing the number of persons working in a specific age group by the total number of persons in that age group. Per cent in labour force is calculated by dividing the number of persons working in a specific age group by the total number of persons in a sector.

Source: Authors' calculations based on Censii.

Table 2.8
Technology in agriculture

Year	*(1)* Agricultural land *ha*	*(2)* Thresher *000s*	*(3)* Harvester-thresher *000s*	*(4)* Tractors *000s*	*(5)* Agricultural workers *000s*
1875	1886				
1902	3111				1497.4
1920	3229				1329.6
1929	3283				1330.1
1934	3352				1370.8
1939	3380				1417.8
1950	4762	1951: 3		1951: 3	1522.8
1955		4		4	1455.3
1960		5	1	10	1396.9
1965		6	1	16	1203.5
1970		6	3	28	965.6
1975		6	4	44	863.1
1980	5182	6	5	73	712.3
1985				79	595.0
1990	3978		1989: 4	109	536.7
1995	3925		4	121	1993:518.2

***Table 2.8** (continued)*

	(1)/(5) Land /worker	*(2)/(5)* Thresher	*(3)/(5)* Harvester-thresher	*(4)/(5)* Tractors
		Machines per 1000 workers		
1875				
1902	2.1			
1920	2.4			
1929	2.5			
1934	2.4			
1939	2.4			
1950	3.2	1951: 2.0		1951: 0
1955		2.7		3
1960		3.6	1962: 0.8	7
1965		5.0	0.8	13
1970		6.2	3.1	29
1975		7.0	4.6	51
1980	7.0	8.4	7.0	103
1985				128
1990	1991:7.6		1989: 7.2	1989:197
1995			1993: 7.7	1993:230

Source: Authors' calculations based on E. Nunes in Valério (2001) and A Nunes in Valério (2001).

Table 2.9
Growth of factors and GDP, 1910-1990 (annual growth rates, %)

Period	Labour	Human Capital	Capital	GDP
1910-1934	1.00	2.08	1.25	2.17
1934-1947	1.31	1.14	3.89	2.09
1947-1973	0.70	2.47	7.73	5.17
1973-1990	0.05	4.83	5.21	3.92

Source: Lains (2003).

Table 2.10
Growth accounting for Portugal: sources of growth and output growth, 1910-1990 (%)

Period	Labour	Human Capital	Capital	TFP	GDP
1910-1934	0.33	0.70	0.42	0.72	2.17
1934-1947	0.44	0.38	1.30	-0.02	2.09
1947-1973	0.23	0.82	2.58	1.53	5.17
1973-1990	0.02	1.61	1.74	0.56	3.92

Source: Lains (2003).

Table 2.11
Wage ratio by gender (male/female)

Year	Agriculture		Industry (per sector)					Fertility	Female labour force participation (%)
	General Works	*Harvest*	*Shoe (Shoemakers)*	*Paper (Workers)*	*Plastics (Workers)*	*Rubber (Workers)*	*Sugar (Refiners vs. workers)*		
1920			2.2						
		2.0	(1921)						
1931	1.9	1.8							
1941	1.9	1.7							24
1950	1.8	1.7						3.0	
1960	1.8	1.7						3.1	21
1968	1.9		1.9	2.0	2.1	2.1	1.4		
1969	1.9								
1970	1.9	1.7						2.8	28
1971	1.7	1.7	1.6	1.7	2.1	1.7	1.8		
1972	1.7	1.6	1.5	1.8	2.0	1.8	1.8		
1973	1.7	1.7	1.5	1.7	2.1	1.8	1.8		
1974	1.6	1.5	1.2	1.3	1.5	1.5	1.6		
1975	1.5	1.5	1.2	1.2	1.2	1.4	1.1		
1976	1.5		1.1	1.2	1.2	1.4	1.0		
1977	1.4		1.1	1.3	1.2	1.4	1.0		
1978	1.5		1.1	1.1	1.2	1.3	1.0		
1979	1.5		1.1	1.1	1.1	1.2	1.0		
1980	1.6		1.1	1.1	1.2	1.3	0.9	2.0	
1981	1.5		1.1	1.1	1.1	1.2	0.9		41
1982	1.4		1.2	1.1	1.1	1.3	0.9		
1983	1.5		1.1	1.1	1.1	1.3	0.9		
1984	1.4		1.1	1.2	1.2	1.2	1.0		
1985			1.1	1.2	1.2	1.1	1.0	1.6	
1986			1.1	1.2	1.1	1.2	1.0		
1987			1.1	1.3	1.1	1.2	1.1		
1988			1.1	1.3	1.1	1.2	1.1		
1989			1.1	1.4	1.1	1.2	1.1		
1990			1.1	1.5	1.1	1.2	1.1	1.5	1991:49
1995								1.5	
2000								1.4	

Notes: Wage ratios in agriculture and industry are unweighted district averages for continental Portugal.

Source: Authors' calculations based on Yearly Statistics, INE. Fertility data from United Nations Population Division and data on female labour force participation from Census and Pordata (generic database on Portugal: www.pordata.pt).

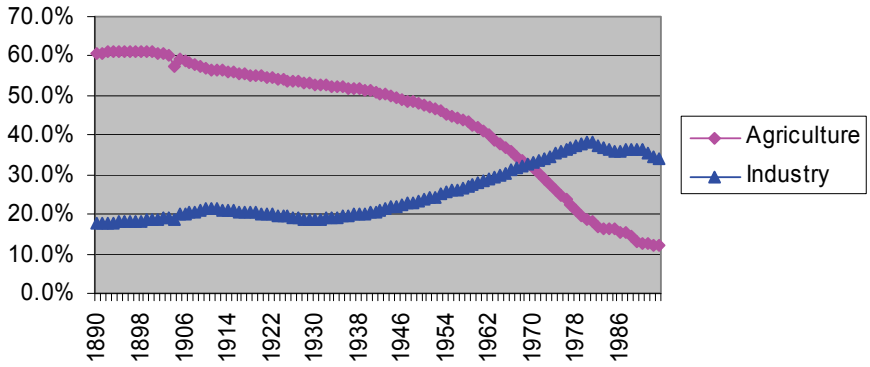
Table 2.13
Main activity (%) by age group, 1976-1987

	Employed				Total active				Students		
	10-14	*12-14*	*12-16*	*15-19*	*10-14*	*12-14*	*12-16*	*15-19*	*10-14*	*12-14*	*15-19*
1976	9			52	15			62	77		31
1977	8			48	14			61	76		31
1978	9			45	15			59	76		31
1979	9			47	14			60	81		29
1980	8	10*		50	11	21*		68	78	74*	30
1981	8			50	12			66	88		31
1982	9			50	12			64	89		33
1983		13				19					
1984		11				16					
1985		11				15					
1986		10				13					
1987		10				12					
1988		9									
1989		8									
1990		8									
1991		7		36*		10*		45*		86*	49*
1992			15				17				
1993			14				16				

Notes: Child labour is defined in terms of incidence in the respective age group. The 1976-82 series is based on a non-rotating panel data sample of around 13,300 households and the data corresponds to the second quarter of each year only in continental Portugal. The 1983-91 series is based on a rotating panel data sample of 36,200 households from Portugal. The 1992-93 series was based on a rotating panel data sample of around 22,000 households and the data correspond to the fourth quarter of the year. For more details on the series see Torres (2009). *From Census.

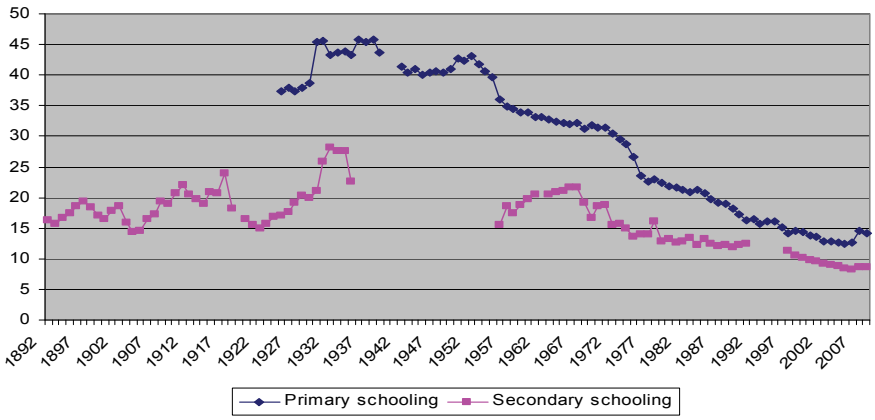
Source: Labours surveys, INE

Figure 2.1
Labour by economic sectors, 1890-1992



Note: Share of employment in agriculture and industry.

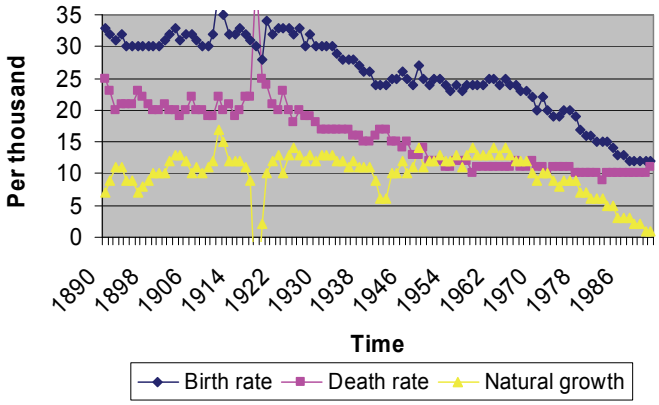
Figure 2.2
Student-teacher ratio, 1892-2007



Notes: Primary school includes 1st to 4th grade. Secondary school includes 7th to 12th grade. Data for primary schooling is restricted to public schools upto 1939. Data for secondary schooling is restricted to public schools upto 1955.

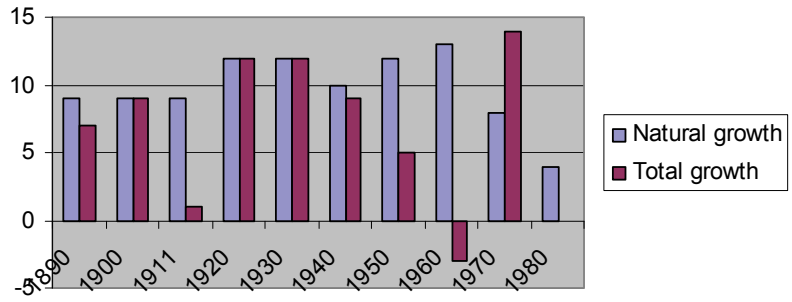
Sources: Up to 1961, data for primary schools is from Mitchell (2007) and from Pordata for the remaining years. Upto 1972, data for secondary school is from Mitchell (2007) and from Pordata for the remaining years.

Figure 2.3
Portuguese demographic transition, 1890-1991



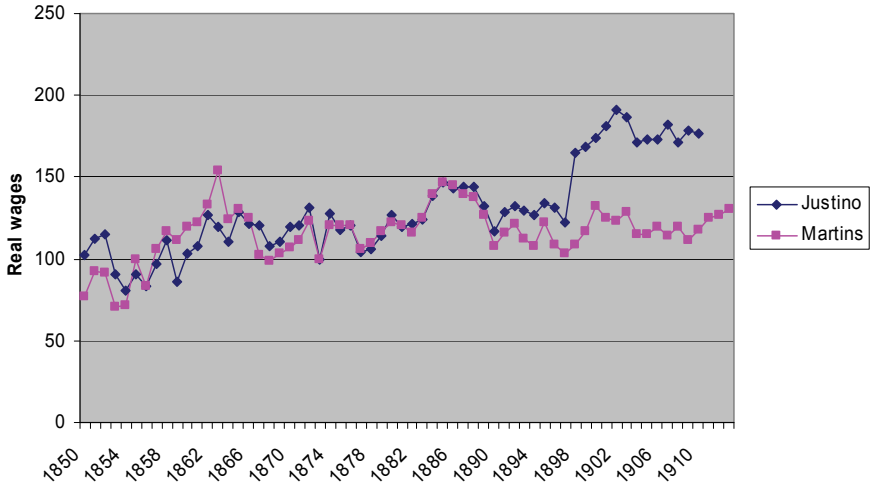
Source: Author's calculations based on Baganha and Marques in Valério (2001:33).

Figure 2.4
Annual average population growth rate by decade, 1890-1990



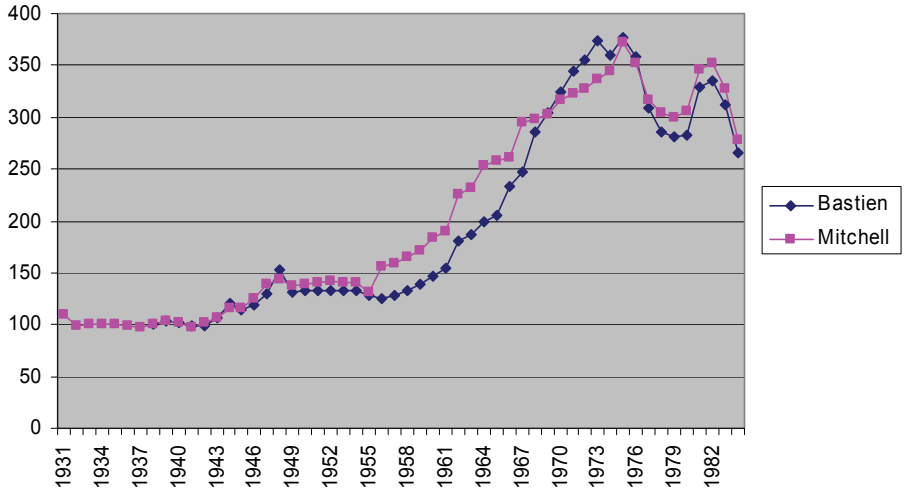
Source: Author's calculations based on Baganha and Marques in Valério (2001:33).

Figure 2.5a
Real rural and agricultural wages, 1850-1913



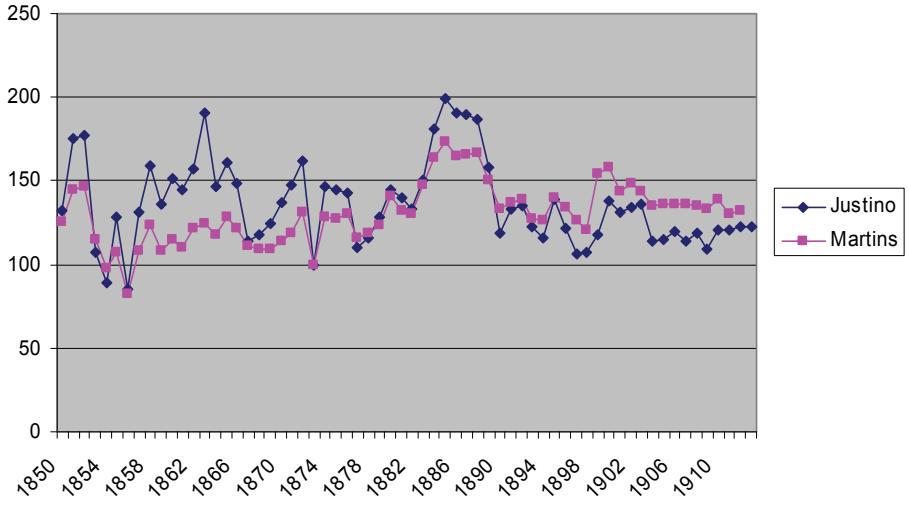
Note: Real wages were obtained by deflating the wage indices by a price index.
Source: Author's calculations based on Bastien in Valério (2001).

Figure 2.5b
Real rural and agricultural wages, 1931-84



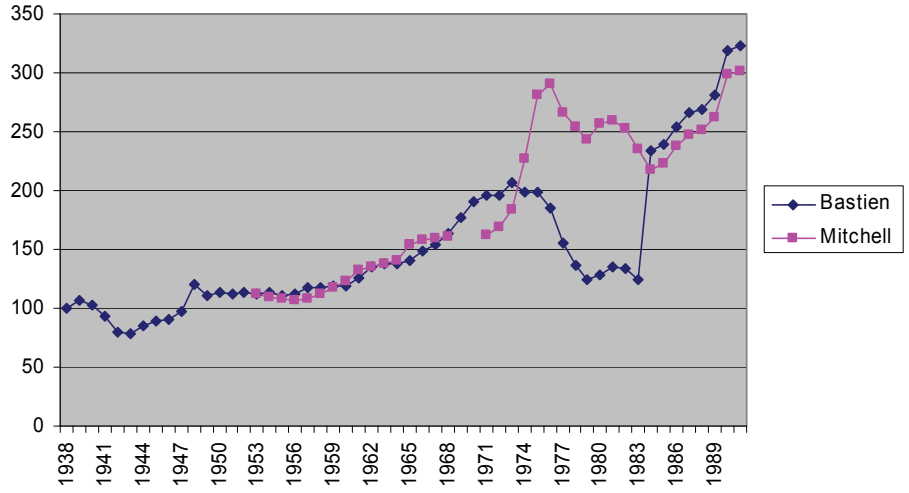
Note: Real wages were obtained by deflating the wage indices by a price index.
Source: Author's calculations based on Bastien in Valério (2001), Mitchell (2007).

Figure 2.6a
Real urban and industrial wages, 1850-1913



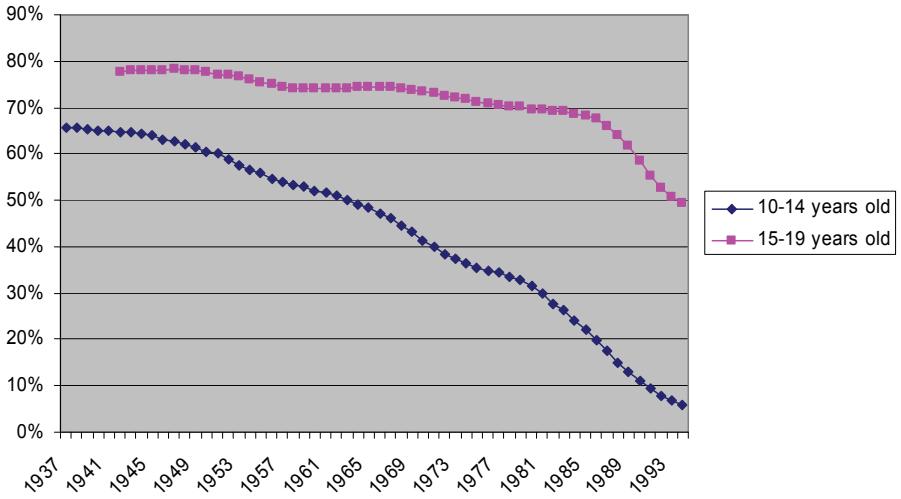
Notes: Real wages were obtained by deflating the wage indexes by a price index.
Source: Author's calculations based on Bastien in Valério (2001:615).

Figure 2.6b
Real urban and industrial wages, 1938-91



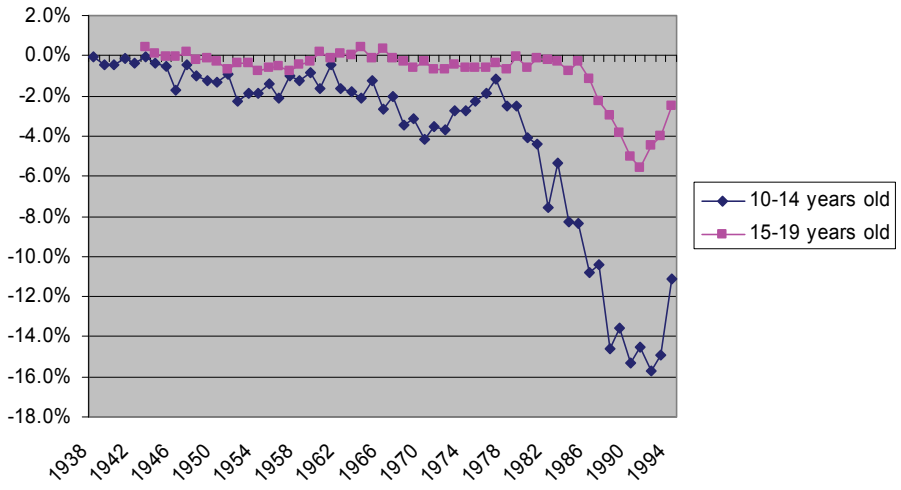
Notes: Real wages were obtained by deflating the wage indexes by a price index.
Source: Author's calculations based on Bastien in Valério (2001:615); Mitchell (2007).

Figure 2.7a
Child labour in Portugal, 1937-94



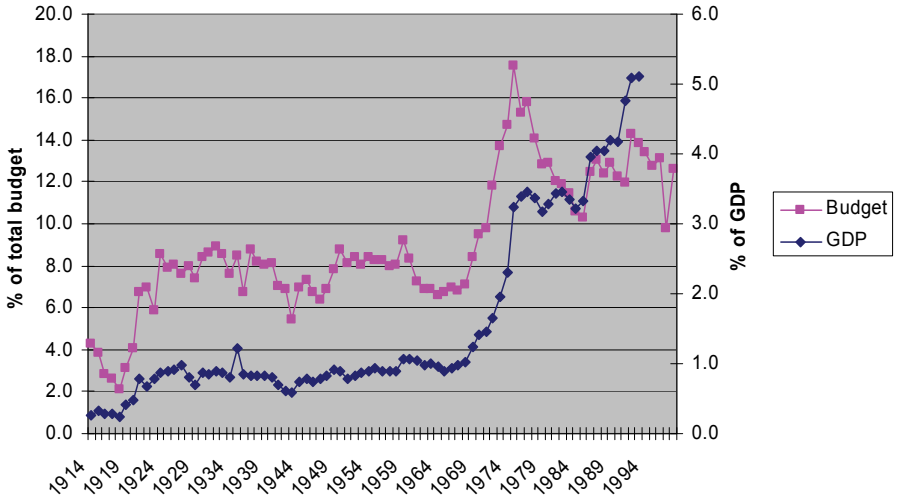
Notes: Based on the response to the question, "When did you start working for the first time", work participation rates for the age group 10-14 and 15-19 are computed.
Source: Author's calculations based on 14 trimester labour surveys from 2001 to 2004.

Figure 2.7b
Child labour growth rate, 1938-94



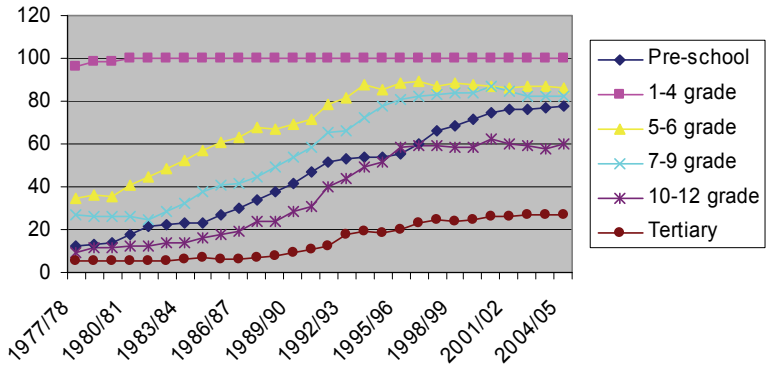
Notes: Annual growth rates based on figure 7a.
Source: Author's calculations based on 14 trimester labour surveys from 2001 to 2004.

Figure 2.8
Budget of the Ministry of Education, 1914-98



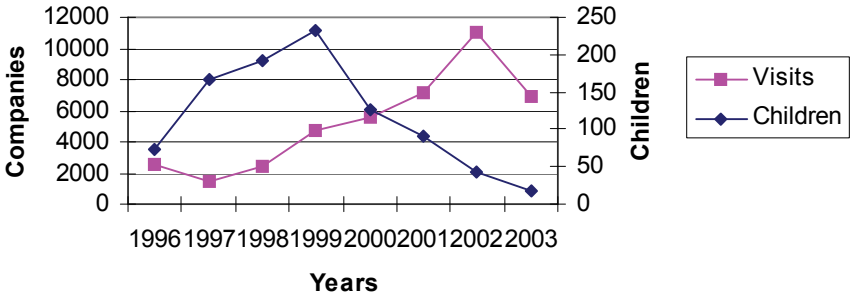
Source: Author's calculations based on N. Valério (505) and E. Mata (670) in Valério (2001: 615); Mitchell (2007).

Figure 2.9
Net school enrolment rate in Portugal, 1977-2004



Notes: Pre-school refers to three years prior to the start of official schooling (3-5 years old); primary school refers to the first four schooling years (6-9 years old); preparatory school is the fifth and sixth grade (10-11 years old); lower secondary includes seventh to ninth grade (12-14 years old); upper secondary includes tenth to twelfth grade (15-17 years old); tertiary education.
Source: Author's calculations based on GIASE, Education Ministry.

Figure 2.10
Labour inspection and child labour in Portugal, 1996-2003
Visits from Labour Inspection and children found illegally working



Note: The author thanks Paula Gaspar for assistance.
Source: Author's calculations based on Labour inspectorate.

Table A2.1
Activity rate, 1890-1911

Census	Age groups (%)		
	Below 20	20-39	All ages
1890	60	66	52
1900	48	61	45
1911	45	59	43

Table A2.2
Social benefit laws in Europe

Country	*Family allowance*	*Other legislation*				
		Retirement	Disability	Maternity	Sickness	Unemployment
France	1932	1910	1910	1930	1930	1905
Germany	1935	1883	1883	1889	1889	1927
Italy	1937	1919	1919	1929	1943	1919
Spain	1938	1919	1919	1929	1942	1919
Portugal	1942	1935	1935	1962	1935	1975
Ireland	1944	1908	1911	1911	1911	1911
United Kingdom	1945	1925	1911	1911	1911	1911
Sweden	1947	1891	1891	1913	1913	1934
Denmark	1952	1891	1921	1892	1892	1907

Source: Pereirinha, Arcanjo and Carolo (2009).

Table A2.3
Child main occupation, 1960-2001

	1960	1970	1980	1991	2001
<14 years	***(10-14)***		***(12-14)***	***(12-14)***	
Total Active	*45%*		*23%*	*10%*	
Urban	28%		10%		
Rural	49%		27%		
Students	*48%*		*74%*	*86%*	
Urban	66%		88%		
Rural	44%		70%		
Neither	*8%*		*3%*	*5%*	
***15-19 years* old**					
Total Active	*88%*		*65%*	*45%*	*28%*
Urban	71%		43%		
Rural	93%		73%		
Students	*11%*		*33%*	*49%*	*66%*
Urban	28%		55%		
Rural	7%		25%		
Neither	*1%*		*2%*	*6%*	*5%*

Note: Exclusive categories for main occupation. The 1960 data pertain to the age group 10-14 years old and the 1980 figures refer to 12-14 years old. Therefore, the latter estimates provide a lower-bound for the changes in child labour and schooling.

Source: Authors' calculations based on Censii.

Table A2.4
Sensitivity analysis to different data sources, 1976-82

	Employed			Total active			Students		
	(1)	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
1976	52			62			31		
1977	48	49		61	61		31	31	
1978	45	47		59	60		31	30	
1979	47	47		60	62		29	30	
1980	50	49		68	65		30	30	
1981	50	50	40	66	66	54	31	31	33
1982	50			64			33		
Source	LS	LS	C	LS	LS	C	LS	LS	C

Notes: Figures are in percentages. We can only use the age group 15-19 for comparisons. (1) Labour survey data (2) Three year average of labour survey data (3) Census data.

Sources: Labour Surveys and Censii, INE

Table 3.5
Descriptive Statistics I

Variables	Mean	Std Dev	Min.	Max.
Child work				
Incidence of economic work = 1	0.037	0.187	.	.
Incidence of domestic work = 1	0.041	0.197	.	.
Hours of economic work in reference week	0.515	3.740	0	56
Hours of domestic work in reference week	0.339	2.410	0	56
Child characteristics				
Demographic characteristics				
Sex (Male = 1)	0.513	0.499	.	.
Age	10.89	2.794	6	15
Educational characteristics				
School success = 1	0.746	0.435	.	.
Pre-school attendance = 1	0.725	0.446	.	.
Time to reach school (in minutes)	13.27	10.17	7.5	60
Motivational characteristics				
Interest in school – adequate = 1	0.375	0.484	.	.
Interest in school – very interested = 1	0.556	0.497	.	.
School ambition, < compulsory = 1	0.018	0.133	.	.
School ambition, compulsory = 1	0.103	0.304	.	.
School ambition, upper secondary = 1	0.206	0.404	.	.
School ambition, tertiary = 1	0.523	0.499	.	.
Household characteristics				
Schooling of household head				
5 to 9 years = 1	0.342	0.474	.	.
> 9 years = 1	0.154	0.361	.	.
Female headed household = 1	0.231	0.421	.	.
Household size	4.412	1.312	2	12
Household income (1 to 7, increase in income)	4.429	1.628	1	7
Reduction in income = 1	0.137	0.344	.	.
Number of rooms in dwelling	3.943	1.209	1	10
Housing conditions				
Adequate = 1	0.291	0.454	.	.
Good = 1	0.623	0.485	.	.
Demand characteristics				
Backyard = 1	0.448	0.497	.	.
Occupational status of household head -			.	.
Wage labour = 1	0.632	0.482		
Self employed = 1	0.125	0.331	.	.
Employer = 1	0.083	0.278	.	.
Household employs domestic worker	0.085	0.278	.	.

Table 3.5
Descriptive Statistics II (Cont.)

Variables	Mean	Std Dev	Min.	Max.
Instrumental variables				
Child labour policies				
Counties with a PIEF centre = 1	0.446	0.497	.	.
Children per PETI member	44464	27145	12580	
Labour Inspection				
Serious illegalities per 1000 workers	1.970	1.470	0	7
Fine per illegality (in Euros)	1177.800	601.410	485	4204

Table 3.6
Selected descriptive statistics

	Child does not work		Economic Work		Domestic Work	
Variables	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Child characteristics						
Sex (Male = 1)	0.517	0.500	0.735	0.442	0.261	0.439
Age	10.76	2.794	12.54	2.387	12.238	2.268
Pre-school attendance = 1	0.738	0.439	0.559	0.497	0.599	0.490
Interest in school						
adequate = 1	0.373	0.483	0.411	0.492	0.383	0.486
very interested = 1	0.567	0.495	0.333	0.471	0.481	0.499
School ambition						
< compulsory = 1	0.012	0.110	0.133	0.340	0.035	0.185
compulsory = 1	0.093	0.291	0.276	0.447	0.150	0.358
upper secondary = 1	0.203	0.402	0.224	0.417	0.228	0.420
tertiary = 1	0.532	0.499	0.306	0.461	0.514	0.500
Household characteristics						
Schooling of household head						
5 to 9 years = 1	0.350	0.477	0.236	0.425	0.263	0.440
> 9 years = 1	0.164	0.370	0.020	0.139	0.063	0.242
Years worked by household head till age 12	0.374	1.034	0.910	1.666	0.586	1.337
Household income (1 to 7)	4.482	1.627	3.704	1.523	3.980	1.504
Reduction in income = 1	0.135	0.341	0.156	0.363	0.161	0.367
Housing conditions						
Adequate = 1	0.287	0.452	0.337	0.473	0.339	0.474
Good = 1	0.633	0.482	0.506	0.500	0.528	0.499
Demand characteristics						
Occupational status of household head						
Wage labour = 1	0.641	0.480	0.444	0.497	0.619	0.486.
Self employed = 1	0.120	0.325	0.257	0.437	0.120	0.325
Employer = 1	0.082	0.275	0.130	0.337	0.064	0.246
Backyard = 1	0.432	0.495	0.674	0.468	0.580	0.493
N	24,006	.	968	.	1,071	.

Note: SD corresponds to standard deviation.

Table 3.7

Probit marginal effect (ME) estimates of the probability of working

Variables	Economic CL		Economic CL		Domestic CL		Domestic CL		Total CL	
	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE
Child characteristics										
Demographic characteristics										
Sex (Male = 1)	0.018*	0.001	0.012*	0.001	-0.027*	0.002	-0.025*	0.002	0.017*	0.003
Age	0.001	0.002	0.004*	0.002	0.018*	0.003	0.018*	0.002	0.027*	0.004
Age squared*10	0.001	0.001	-0.001	0.001	-0.006*	0.001	-0.006*	0.001	-0.008*	0.001
Educational characteristics										
Pre-school attendance	.	.	-0.004*	0.001	.	.	-0.004*	0.002	-0.011*	0.003
Time to reach school	.	.	0.001	0.001	.	.	-0.001	0.001	0.001	0.002
Motivational characteristics										
Adequate interest in school = 1	.	.	-0.001	0.002	.	.	-0.006†	0.003	-0.011*	0.004
Very interested in school = 1	.	.	-0.004†	0.002	.	.	-0.006*	0.003	-0.014*	0.004
School ambition < compulsory = 1	.	.	0.062*	0.019	.	.	0.004	0.009	0.081*	0.023
School ambition, compulsory = 1	.	.	0.028*	0.006	.	.	0.006‡	0.004	0.048*	0.009
School ambition, upper sec. = 1	.	.	0.011*	0.003	.	.	0.005‡	0.003	0.021*	0.006
School ambition, tertiary = 1	.	.	0.006*	0.003	.	.	0.003	0.003	0.013*	0.005
Household characteristics										
Schooling of HH-5 to 9 years	-0.006*	0.001	-0.003*	0.001	-0.004*	0.002	-0.003*	0.001	-0.007*	0.003
Schooling of HH- > 9 years = 1	-0.013*	0.002	-0.009*	0.002	-0.005‡	0.003	-0.004	0.003	-0.014*	0.005
Years worked by HH till age 12	0.002*	0.001	0.002*	0.0004	0.0004	0.001	0.0003	0.001	0.005*	0.001
Female headed household = 1	0.006*	0.002	0.004*	0.002	0.002	0.002	0.003	0.002	0.012*	0.004
Household size	0.003*	0.001	0.003*	0.0005	0.003*	0.001	0.002*	0.001	0.009*	0.001
Household income	-0.003*	0.001	-0.002*	0.0005	-0.002*	0.001	-0.002*	0.001	-0.005*	0.001
Reduction in income*10 = 1	-0.001	0.002	-0.002	0.002	-0.000	0.000	-0.002	0.002	-0.002	0.003

(Continued)

(Continuation)

Variables	Economic CL		Economic CL		Domestic CL		Domestic CL		Total CL	
	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE
Number of rooms in house*100	0.008	0.001	0.040	0.001	-0.002*	0.001	-0.002*	0.001	-0.002	0.001
Adequate housing conditions = 1	-0.012*	0.003	-0.007*	0.002	-0.006*	0.003	-0.004	0.003	-0.018*	0.005
Good housing conditions = 1	-0.006*	0.002	-0.004*	0.002	-0.004*	0.002	-0.003	0.002	-0.012*	0.004
Demand characteristics										
Backyard = 1	0.008*	0.002	0.006*	0.001	0.004*	0.001	0.004*	0.002	0.016*	0.003
HH works as wage labour = 1	0.001	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.004
HH is self-employed = 1	0.025*	0.005	0.023*	0.005	-0.001	-0.001	-0.001	0.003	0.028*	0.006
HH is employer = 1	0.033*	0.006	0.031*	0.006	-0.001	-0.001	-0.001	0.003	0.035*	0.008
Domestic house worker hired = 1	-0.010*	0.002	-0.008*	0.002	-0.008*	0.003	-0.007†	0.003	-0.021*	0.004
Instrumental variables										
Pro-active CL policies										
Counties with a PIEF centre = 1	-0.006*	0.002	-0.006*	0.002	-0.017*	0.002	-0.017*	0.002	-0.034*	0.003
Children per PETI member*100000	0.005	0.003	0.007*	0.003	0.000	0.000	0.000	0.000	0.010†	0.005
Labour Inspection										
Serious illegalities per worker*10	-0.010	0.001	-0.004	0.001	-0.002‡	0.001	-0.001	0.009	-0.024‡	0.001
Fine per illegality	-0.003†	0.001	-0.003*	0.001	-0.003‡	0.002	-0.003‡	0.002	-0.009*	0.003
N	24382		24031		24382		24031		24031	
Log Likelihood	-3171.25		-2811.12		-3517.60		-3369.67		-5457.25	

Notes: Other variables included in the specification are a set of regional indicators for the province of residence, indicators for residing in urban, semi-rural, rural areas, variables capturing county level regional unemployment and the proportion of individuals working in the primary, secondary and tertiary sectors. Standard errors are heteroscedasticity consistent. * Significant at the 1 % level. † Significant at the 5 % level. ‡ Significant at the 10 % level.

Table 3.8

Tobit marginal effect (ME) estimates of hours of work

Variables	Economic CL		Economic CL		Domestic CL		Domestic CL		Total CL	
	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE
Child Characteristics										
Demographic characteristics										
Sex (Male = 1)	0.199*	0.019	0.106*	0.014	-0.220*	0.016	-0.182*	0.015	-0.159*	0.023
Age	-0.023	0.026	0.031	0.019	0.123*	0.020	0.121*	0.018	0.219*	0.037
Age squared*10	0.003*	0.001	-0.003	0.001	-0.004*	0.009	-0.004*	0.008	-0.006*	0.002
Educational characteristics										
Pre-school attendance	.	.	-0.030†	0.013	.	.	-0.024†	0.011	-0.081*	0.025
Time to reach school	.	.	0.007	0.008	.	.	-0.004	0.007	0.004	0.015
Motivational characteristics										
Adequate interest in school = 1	.	.	-0.012	0.019	.	.	0.035†	0.018	-0.083†	0.037
Very interested in school = 1	.	.	-0.046†	0.022	.	.	0.042†	0.021	-0.142*	0.043
School ambition < compulsory = 1	.	.	0.721*	0.231	.	.	0.035	0.062	0.879*	0.258
School ambition, compulsory = 1	.	.	0.294*	0.070	.	.	0.036	0.027	0.441*	0.087
School ambition, upper sec. = 1	.		0.108*	0.037	.	.	0.026	0.022	0.183*	0.057
School ambition, tertiary = 1	.	.	0.063*	0.023	.	.	0.017	0.018	0.122*	0.041
Household Characteristics										
Schooling of HH-5 to 9 years	-0.067*	0.016	-0.021‡	0.013	-0.035*	0.013	-0.025†	0.011	-0.053*	0.024
Schooling of HH- > 9 years = 1	-0.155*	0.020	-0.086*	0.017	-0.045†	0.019	-0.026	0.018	-0.135*	0.037
Years worked by HH till age 12	0.023*	0.006	0.021*	0.004	0.003	0.005	0.001	0.004	0.038*	0.008
Female headed household = 1	0.069*	0.024	0.039*	0.018	0.018	0.015	0.017	0.014	0.099*	0.032
Household size	0.041*	0.006	0.024*	0.005	0.028*	0.004	0.019*	0.004	0.071*	0.008
Household income	-0.030*	0.006	-0.014*	0.004	-0.015*	0.004	-0.013*	0.004	-0.043*	0.008
Reduction in income*10 = 1	-0.050	0.210	-0.142	0.145	0.012	0.016	0.008	0.014	-0.007	0.029

(Continued)

(Continuation)

Variables	Economic CL		Economic CL		Domestic CL		Domestic CL		Total CL	
	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE
Number of rooms in house*100	0.064	0.072	0.272	0.523	-0.021*	0.006	-0.017*	0.005	-0.024*	0.010
Adequate housing conditions = 1	-0.149*	0.033	-0.064†	0.023	-0.053†	0.022	-0.031†	0.018	-0.171*	0.042
Good housing conditions = 1	-0.005*	0.021	-0.038†	0.017	-0.036†	0.017	-0.018	0.016	-0.094*	0.033
Demand characteristics										
Backyard = 1	0.083*	0.019	0.051*	0.014	0.033*	0.013	0.027†	0.011	0.126*	0.025
HH works as wage labour = 1	0.018	0.022	-0.000	0.017	0.014	0.016	0.010	0.014	0.009	0.031
HH is self-employed = 1	0.301*	0.061	0.224*	0.047	-0.006	0.021	-0.011	0.018	0.251*	0.058
HH is employer = 1	0.396*	0.086	0.296*	0.066	-0.020	0.024	-0.015	0.021	0.285*	0.073
Domestic house worker hired = 1	-0.105*	0.027	-0.068*	0.020	-0.060*	0.021	-0.049*	0.019	-0.174*	0.039
Instrumental variables										
Pro-active CL policies										
Counties with a PIEF centre = 1	-0.062*	0.019	-0.052*	0.014	-0.125*	0.015	-0.114*	0.013	-0.276*	0.027
Children per PETI member*100000	0.003	0.003	0.005†	0.002	0.002	0.010	0.008	0.024	0.012†	0.006
Labour Inspection										
Serious illegalities per worker*10	-0.013‡	0.007	-0.007	0.007	-0.008	0.007	-0.006	0.006	-0.023†	0.012
Fine per illegality	-0.036‡	0.020	-0.039*	0.015	-0.026	0.019	-0.021	0.016	-0.098*	0.031
N	24382		24031		24382		24031		24031	
Log Likelihood	-6467.09		-5439.41		-6780.61		-6364.61		-11526.38	

Notes: Other variables included in the specification are a set of regional indicators for the province of residence, indicators for residing in urban, semi-rural, rural areas, variables capturing county level regional unemployment and the proportion of individuals working in the primary, secondary and tertiary sectors. Standard errors are heteroscedasticity consistent. * Significant at the 1 % level. † Significant at the 5 % level. ‡ Significant at the 10 % level.

Table 3.9

Probit marginal effect (ME) estimates of the probability of school success

Variables	Specification 3.1		Specification 3.2		Specification 3.3		Specification 3.4	
	ME	SE	ME	SE	ME	SE	ME	SE
Child characteristics								
Demographic characteristics								
Sex (Male = 1)	-0.108*	0.005	-0.109*	0.005	-0.047*	0.005	-0.049*	0.005
Age	-0.138*	0.008	-0.142*	0.008	-0.161*	0.009	-0.160*	0.009
Age squared*10	0.004*	0.0004	0.004*	0.000	0.005*	0.000	0.005*	0.000
Educational characteristics								
Pre-school attendance	.	.	.	.	0.011	0.006	0.011	0.006
Time to reach school	.	.	.	.	0.009*	0.003	0.009*	0.003
Motivational characteristics								
Adequate interest in school = 1	.	.	.	.	0.116*	0.010	0.116*	0.010
Very interested in school = 1	.	.	.	.	0.237*	0.014	0.237*	0.014
School ambition < compulsory = 1	.	.	.	.	-0.243*	0.037	-0.239*	0.037
School ambition, compulsory = 1	.	.	.	.	-0.162*	0.014	-0.160*	0.014
School ambition, upper sec. = 1	.	.	.	.	0.005	0.009	0.006	0.009
School ambition, tertiary = 1	.	.	.	.	0.119*	0.009	0.120*	0.009
Household characteristics								
Schooling of HH-5 to 9 years	0.090*	0.005	0.089*	0.005	0.063*	0.005	0.064*	0.005
Schooling of HH- > 9 years = 1	0.152*	0.006	0.151*	0.006	0.112*	0.006	0.112*	0.006
Years worked by HH till age 12	-0.007*	0.002	-0.007*	0.002	-0.006*	0.002	-0.006†	0.002
Female headed household = 1	-0.026*	0.007	-0.025*	0.007	-0.021*	0.006	-0.021*	0.006

(Continued)

(Continuation)

Variables	Specification 3.1		Specification 3.2		Specification 3.3		Specification 3.4	
	ME	SE	ME	SE	ME	SE	ME	SE
Household size	-0.039*	0.002	-0.037*	0.002	-0.029*	0.002	-0.028*	0.002
Household income	0.036*	0.002	0.035*	0.002	0.027*	0.002	0.027*	0.002
Reduction in income = 1	-0.027*	0.007	-0.026*	0.008	-0.020*	0.007	-0.020*	0.007
Number of rooms in house*100	0.022*	0.002	0.022*	0.003	0.015*	0.002	0.015*	0.002
Adequate housing conditions = 1	0.106*	0.010	0.103*	0.010	0.076*	0.010	0.076*	0.010
Good housing conditions = 1	0.061*	0.008	0.059*	0.008	0.046*	0.008	0.046*	0.008
Demand characteristics								
Backyard = 1	0.012†	0.006	0.014†	0.006	0.023*	0.005	0.024*	0.005
HH works as wage labour = 1	-0.018*	0.007	-0.019*	0.007	-0.010	0.007	-0.011	0.007
HH is self-employed = 1	0.028*	0.009	0.031*	0.009	0.034*	0.009	0.034*	0.009
HH is employer = 1	0.038*	0.011	0.039*	0.011	0.036*	0.010	0.037*	0.010
Domestic house worker hired = 1	0.055*	0.012	0.054*	0.012	0.036*	0.012	0.036*	0.012
Child work								
Hours of economic work	.	.	-0.004*	0.001	.	.	-0.003*	0.001
Hours of domestic work	.	.	-0.005*	0.001	.	.	-0.004*	0.001
N	26429		26429		26045		26045	
Log Likelihood	-11493.50		-11458.07		-10128.08		-10114.80	

Notes: Other variables included in the specification are a set of regional indicators for the province of residence, indicators for residing in urban, semi-rural, rural areas, variables capturing county level regional unemployment and the proportion of individuals working in the primary, secondary and tertiary sectors. Standard errors are heteroscedasticity consistent. * Significant at the 1 % level. † Significant at the 5 % level. ‡ Significant at the 10 % level.

Table 3.10
School success and hours of work:
Marginal effect probit and instrumental variable probit estimates (Std. Error)

	1	2	3	4	5	6	7	8
	Probit	**IVP [A]**	**IVP [B]**	**IVP [C]**	**Probit**	**IVP [A]**	**IVP [B]**	**IVP [C]**
Hours of economic work	-0.004*	-0.002†	-0.002†	-0.002†	-0.003*	-0.003†	-0.003†	-0.003†
	(0.0006)	(0.001)	(0.001)	(0.001)	(0.0009)	(0.001)	(0.001)	(0.001)
Hours of domestic work	-0.005*	-0.002	-0.002	-0.003	-0.004*	-0.0002	-0.0003	-0.0003
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.0019)	(0.0019)	(0.0019)
Generalised residual – economic work		-0.0007†	-0.0007†	-0.0007†		0.0002	0.0001	0.0001
		(0.0003)	(0.0003)	(0.0003)		(0.001)	(0.0005)	(0.0005)
Generalised residual – domestic work		-0.0013†	-0.0013†	-0.0013†		-0.002†	-0.002†	-0.0016
		(0.0006)	(0.0005)	(0.0006)		(0.001)	(0.001)	(0.0006)
N	26429	26429	24381	24381	26045	26045	24031	24031
Log likelihood	-11458	-11452	-10390	-10390	-10114	-10111	-9185	-9185

Notes:
1. To enable comparisons, the estimates reported in column 1 of Table 3.10 are the same as the estimates in Table 3.9, spec. 2. Estimates presented in columns 2, 3 and 4 of Table 10 include **all** the variables in the specification reported as Table 3.9, spec. 2 and two additional variables to correct for the endogeneity of hours of economic work and hours of domestic work.
2. To enable comparisons, the estimates reported in column 5 of Table 3.10 are the same as the estimates in Table 3.9, spec. 4. Estimates presented in columns 6, 7 and 8 include **all** the variables in the specification reported as Table 3.9, spec. 4 and two additional variables to correct for the endogeneity of hours of economic work and hours of domestic work.
3. [A] Identification is based only on differences in functional form. [B] Identification is based on differences in functional form and the inclusion of the variables that capture the policies of the county towards tackling child labour, namely, whether a county has a PIEF program and the number of children per PETI member. [C] Identification is based on differences in functional form, the policies of the county towards tackling child labour and the labour inspection regime, that is, number of illegalities detected per worker and the fine per illegality.
4. * Significant at the 1 % level. † Significant at the 5 % level. ‡ Significant at the 10 % level.

Table A3.1
Marginal effect probit and instrumental variable probit estimates (Std. Error)

	1	2	3	4	5	6	7	8
	Probit	**IVP [A]**	**IVP [B]**	**IVP [C]**	**Probit**	**IVP [A]**	**IVP [B]**	**IVP [C]**
Hours of economic work	-0.0039*	-0.0023†	-0.0018‡	-0.0018‡	-0.0027*	-0.0033†	-0.0032†	-0.0032†
	(0.0007)	(0.0010)	(0.0010)	(0.0010)	(0.0009)	(0.0016)	(0.0015)	(0.0015)
Hours of domestic work	-0.0055*	-0.0023	-0.0025	-0.0025	-0.0045*	0.0003	0.0003	-0.0003
	(0.0011)	(0.0018)	(0.0017)	(0.0017)	(0.0011)	(0.0024)	(0.0023)	(0.0022)
Generalised residual – economic work		-0.0007†	-0.0008†	-0.0008†		0.0002	0.0001	0.0001
		(0.0003)	(0.0003)	(0.0003)		(0.0005)	(0.0005)	(0.0005)
Generalised residual – domestic work		-0.0013†	-0.0014†	-0.0013†		-0.0017†	-0.0017†	-0.0017†
		(0.0006)	(0.0006)	(0.0006)		(0.0007)	(0.0007)	(0.0007)
N	26429	26429	24381	24381	26045	26045	24031	24031
Log likelihood	-11458	-11452	-10390	-10390	-10114	-10111	-9185	-9185

Notes: * Significant at the 1 % level. † Significant at the 5 % level. ‡ Significant at the 10 % level. Standard errors corrected for intra-municipal correlation.

Figure 3.1
Work participation by age

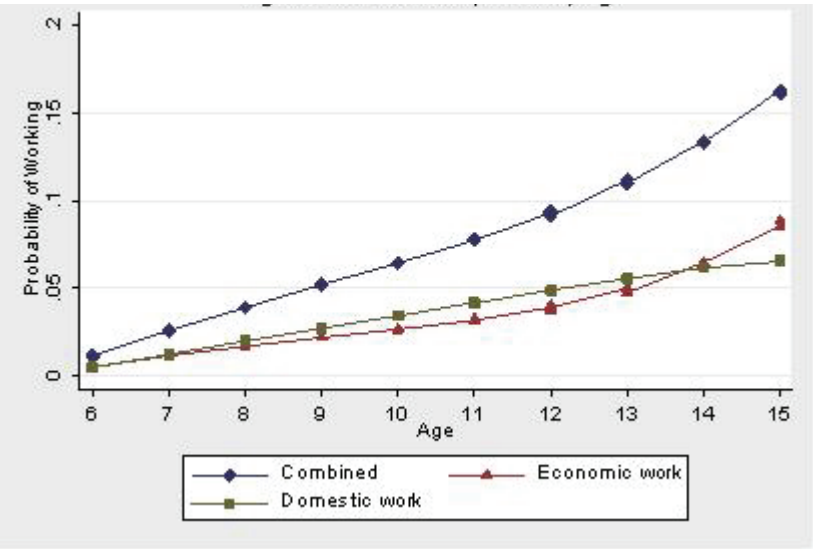


Figure 3.2
Hours of work by age

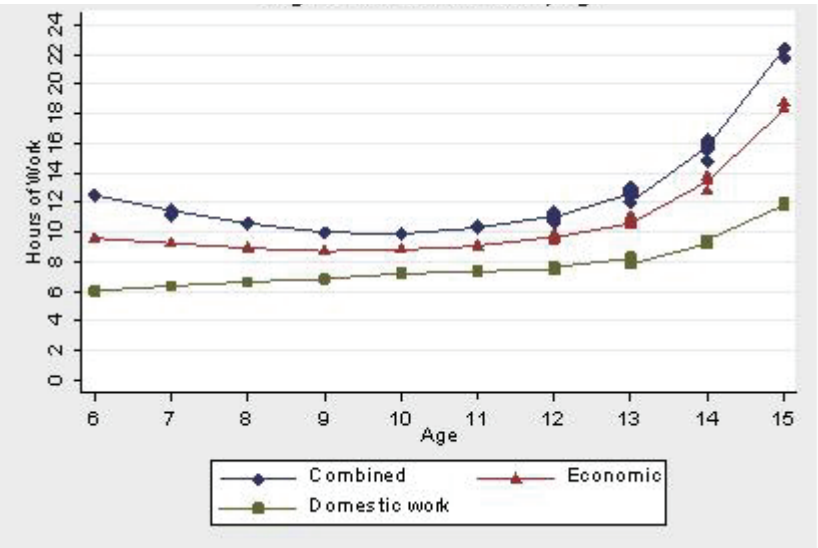


Figure 3.3
Enrolment by working status and age

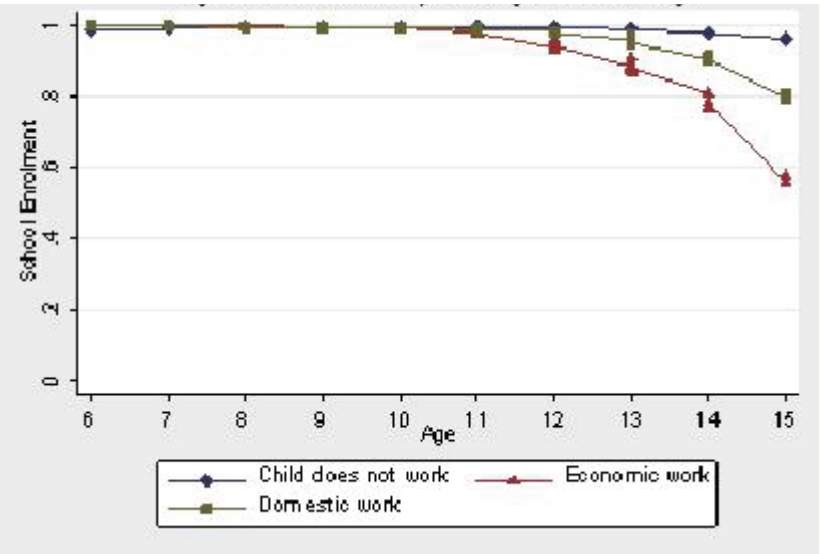


Figure 3.4
School attendance by working status and age

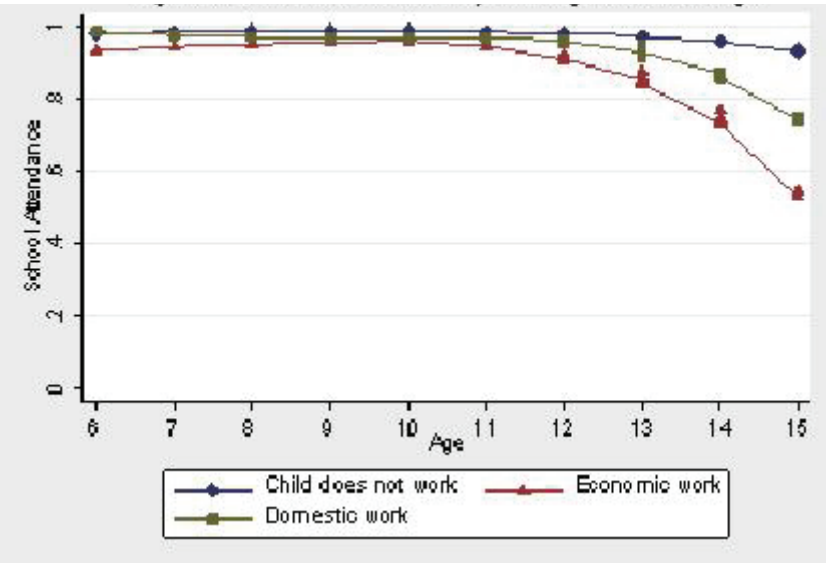


Figure 3.5
School success by working status and age

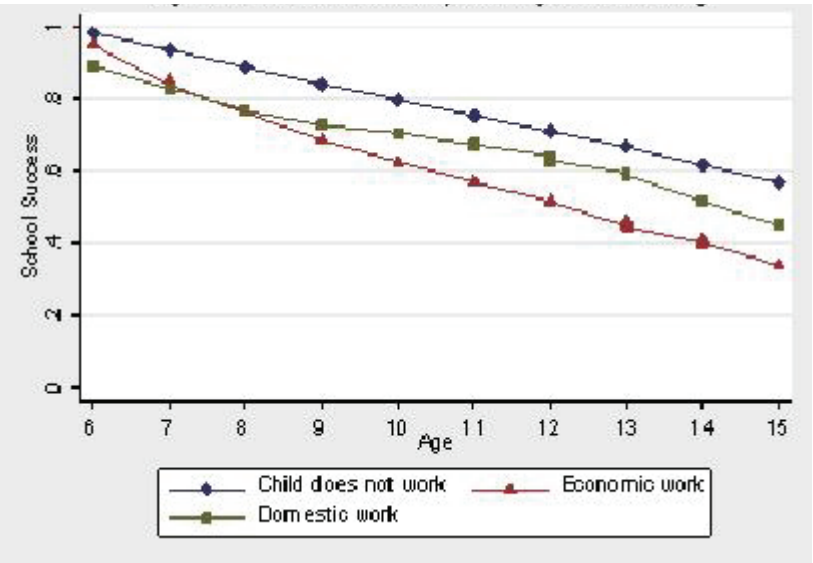


Figure 3.6
School success by hours of work

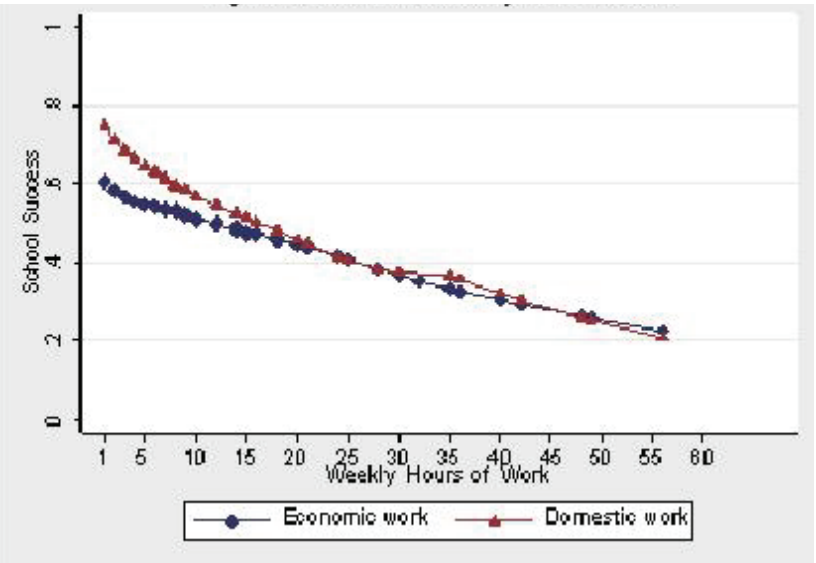


Table 4.1
Descriptive statistics

Variables	1998				2001			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
School outcomes								
School success = 1	0.750	0.433	0	1	0.748	0.434	0	1
Child characteristics								
Sex (Male = 1)	0.511	0.499	0	1	0.513	0.499	0	1
Age	11.001	2.908	6	15	10.90	2.790	6	15
Not child of Hh head = 1	0.079	0.270	0	1	0.072	0.259	0	1
Pre-school attend = 1	.	.	.	.	0.725	0.446	0	1
Time reach school	.	.	.	.	1.369	0.703	0	5
Interest in school								
low	0.053	0.224	0	1	0.046	0.209	0	1
medium	0.281	0.449	0	1	0.368	0.482	0	1
high	0.666	0.471	0	1	0.585	0.492	0	1
Hh characteristics								
Father's schooling								
5 to 9 years = 1	0.273	0.445	0	1	0.316	0.465	0	1
> 9 years = 1	0.144	0.351	0	1	0.143	0.350	0	1
Mother's schooling								
5 to 9 years = 1	0.289	0.453	0	1	0.348	0.476	0	1
> 9 years = 1	0.161	0.367	0	1	0.171	0.376	0	1
Single-parent family = 1	0.088	0.283	0	1	0.104	0.305	0	1
Household size	4.399	1.281	2	12	4.411	1.318	2	12
Household income (1-7)	3.988	1.677	1	7	4.430	1.627	1	7
Reduction in income = 1	.	.	.	.	0.137	0.343	0	1
Number of rooms	3.897	1.215	1	10	3.944	1.209	1	10
Housing conditions								
Adequate = 1	0.294	0.455	0	1	0.292	0.454	0	1
Good = 1	0.593	0.491	0	1	0.623	0.484	0	1
Have small plot land = 1	.	.	.	.	0.448	0.497	0	1

(Continued)

Table 4.1 *(continuation)*

Variables	1998				2001			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
School characteristics								
Teachers characteristics								
with bachelor's or less	0.387	0.275	0.147	0.858	0.305	0.218	0.09	0.79
w temporary contracts	0.174	0.093	0.000	0.390	0.179	0.087	0.00	0.39
Pupils per teacher	12	2.555	8	17	11	4.197	4	18
Pupils per school	217	143.4	16	695	202	124.4	15	547
Regional characteristics								
Norte region	0.417	0.493	0	1	0.413	0.492	0	1
Centro region	0.251	0.434	0	1	0.177	0.382	0	1
Lisboa region	0.219	0.414	0	1	0.175	0.379	0	1
Alentejo region	0.082	0.275	0	1	0.082	0.275	0	1
Algarve region	0.030	0.172	0	1	0.080	0.272	0	1
Rural municipality	0.257	0.437	0	1	0.240	0.427	0	1
Peri-urban municipality	0.344	0.475	0	1	0.368	0.482	0	1
Urban municipality	0.400	0.490	0	1	0.384	0.486	0	1

Note: In 1998, the sample is restricted to children residing in mainland Portugal. School variables are defined at the level of 28 regions, with the exception of pupils per school which is defined at the level of the country (278 counties). In 1998, N = 21,729 for the school interest variables; 21,733 for the rest of the variables except for school characteristics where N = 21,277. In 2001, N= 26,392, with the exception for the schooling variables where N=23,975.

Table 4.3
Descriptive statistics for cross-section and panel data

Variables	6-12 years old (1998)				9-15 years old (2001)			
	Cross-section		Panel data		Cross-section		Panel data	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
School success = 1	0.843*	0.364	0.869*	0.337	0.705*	0.456	0.754*	0.431
Child characteristics								
Sex (Male = 1)	0.512	0.500	0.496	0.500	0.511	0.500	0.496	0.500
Age	9.165	2.000	9.239	1.948	12.109*	1.974	12.239*	1.948
Not a child of Hh head = 1	0.089*	0.285	0.035*	0.184	0.064*	0.244	0.036*	0.186
Educational characteristics								
Pre-school attendance = 1	.	.	.	.	0.702	0.457	0.695	0.460
Time to reach school	.	.	.	.	14.105	10.776	14.237	11.149
Interest in school (child)								
low	0.0295	0.1693	0.027	0.161	0.051	0.220	0.054	0.227
medium	0.228	0.420	0.236	0.425	0.405	0.491	0.398	0.490
high	0.742	0.438	0.737	0.440	0.544	0.498	0.548	0.498
Household characteristics								
Father schooling								
5 to 9 years = 1	0.297*	0.457	0.253*	0.435	0.310*	0.463	0.253*	0.435
> 9 years = 1	0.157	0.364	0.149	0.357	0.142	0.349	0.149	0.357
Mother schooling								
5 to 9 years = 1	0.309	0.462	0.315	0.465	0.342*	0.474	0.315*	0.465
> 9 years = 1	0.176*	0.380	0.160*	0.367	0.167	0.373	0.160	0.367
Single-parent family = 1	0.078	0.269	0.080	0.271	0.103*	0.304	0.080*	0.271
Household size	4.399*	1.270	4.294*	1.222	4.327*	1.215	4.254*	1.200
Household income (1-7)	4.012	1.677	4.002	1.654	4.427*	1.637	4.505*	1.602

(Continued)

(Continuation)

Variables	6-12 years old (1998)				9-15 years old (2001)			
	Cross-section		Panel data		Cross-section		Panel data	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Reduction in income = 1					0.139*	0.346	0.160*	0.367
Number of rooms in house	3.863*	1.220	3.789*	0.998	3.954*	1.186	3.789*	0.998
Housing conditions								
Adequate = 1	0.288	0.453	0.298	0.458	0.293	0.455	0.295	0.456
Good = 1	0.598*	0.490	0.624*	0.484	0.627	0.484	0.628	0.484
Have small plot of land = 1	.	.	.	.	0.444*	0.497	0.471*	0.499
School characteristics								
Teachers' characteristics								
with bachelor or less	0.500*	0.285	0.486*	0.288	0.220*	0.167	0.207*	0.164
with temporary contract	0.142*	0.094	0.146*	0.094	0.206	0.078	0.204	0.074
Pupils per teacher	13*	2.735	12.593*	2.702	9*	3.195	9.242*	2.963
Pupils per school	144*	101.185	148.522*	102.604	243*	114.264	254.624*	112.541
Regional characteristics								
Norte region	0.416*	0.493	0.444*	0.497	0.442	0.497	0.444	0.497
Centro region	0.248	0.432	0.259	0.438	0.200*	0.400	0.259*	0.438
Lisboa region	0.223	0.417	0.212	0.409	0.189*	0.392	0.212*	0.409
Alentejo region	0.081*	0.273	0.055*	0.228	0.091*	0.287	0.055*	0.228
Algarve region	0.031	0.1729	0.029	0.169	0.078*	0.268	0.029*	0.169
Rural municipality	0.251*	0.4340	0.215*	0.411	0.246*	0.431	0.215*	0.411
Peri-urban municipality	0.346*	0.476	0.384*	0.486	0.362*	0.481	0.384*	0.486
Urban municipality	0.403	0.490	0.401	0.490	0.392	0.488	0.401	0.490

Notes: In 1998, N=13,623, with the exception of the school characteristics variables where N= 13,583. In the 2001 survey, N=18,536 with the exception of interest an achievement (N=18,531), time to school (N=18,212) and school characteristics (N=18,163). For the panel data, in 1998, N=1733, except for the school characteristic where N = 1730; in 2001, N = 1733, except for school success and time to school where N=1690 and school characteristics where N=1682. * Difference in mean statistically significant at the 5% level.

Table 4.10
Probability of school success, 1998

Specifications	(1)	(2)	(3)	(4)
Child characteristics				
Interest in school – medium	0.23***	0.20***	0.15***	0.12***
	(0.010)	(0.0095)	(0.0094)	(0.0100)
Interest in school – high	0.56***	0.48***	0.39***	0.33***
	(0.014)	(0.016)	(0.016)	(0.018)
Sex (male = 1)		-0.051***	-0.058***	-0.049***
		(0.0057)	(0.0054)	(0.0053)
Age		-0.14***	-0.13***	-0.19***
		(0.010)	(0.0096)	(0.012)
Family/socio-economic characteristics				
Head of household's schooling 5-9 years			0.061***	0.053***
			(0.0058)	(0.0057)
Head of household's schooling > 9 years			0.13***	0.12***
			(0.0066)	(0.0062)
Single parent family			-0.064***	-0.054***
			(0.011)	(0.011)
Household size			-0.031***	-0.024***
			(0.0022)	(0.0023)
Household income			0.024***	0.019***
			(0.0020)	(0.0020)
Number of rooms in house			0.020***	0.018***
			(0.0025)	(0.0026)
Adequate housing conditions			0.064***	0.047***
			(0.0079)	(0.0080)
Good housing conditions			0.11***	0.083***
			(0.0097)	(0.0096)
Educational inputs				
Teachers with bachelor's degree or less				-0.015
				(0.038)
Teachers with temporary contracts				0.29***
				(0.068)

(Continued)

Table 4.10 *(continuation)*

Pupil-teacher ratio				-0.013***
				(0.0024)
Pupils per school				0.0013***
				(0.000048)
Observations	21,318	21,318	21,308	21,267
Log likelihood	-10522	-9580	-8663	-7,641
Pseudo R2	0.109	0.188	0.2659	0.3514

Notes: Other variables included in the specification are age-squared, an indicator if the child is not the son of the head of the household and another if the household owns a plot, a set of regional indicators for the province of residence, indicators for residing in urban, semi-rural and rural areas. Table provides probit marginal effects with robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 4.11
Probability of school success, 2001

Specifications	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Interest responded by	**Child**	**Child**	**Child**	**Child**	**Parents**
Child characteristics					
Interest in school – medium	0.27***	0.21***	0.16***	0.12***	0.25***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)
Interest in school – good	0.53***	0.40***	0.32***	0.25***	0.50***
	(0.012)	(0.013)	(0.014)	(0.015)	(0.016)
Sex (male = 1)		-0.074***	-0.081***	-0.066***	-0.052***
		(0.0052)	(0.0050)	(0.0047)	(0.0048)
Age		-0.15***	-0.15***	-0.22***	-0.22***
		(0.0085)	(0.0083)	(0.012)	(0.012)
Pre-school attendance		0.080***	0.014**	0.021***	0.023***
		(0.0062)	(0.0056)	(0.0055)	(0.0056)
Time to school (minutes)		-0.0007***	0.00028	-0.0008***	-0.0007***
		(0.0003)	(0.0002)	(0.0002)	(0.0002)

(Continued)

Table 4.11 *(continuation)*

Family characteristics					
Hh head's schooling 5-9 years			0.098***	0.082***	0.071***
			(0.0053)	(0.0051)	(0.0052)
Hh head's schooling > 9 years			0.16***	0.13***	0.11***
			(0.0059)	(0.0051)	(0.0058)
Single parent family			-0.065***	-0.047***	-0.039***
			(0.0099)	(0.0097)	(0.0097)
Household size			-0.040***	-0.026***	-0.024***
			(0.0020)	(0.0021)	(0.0021)
Household income			0.031***	0.020***	0.021***
			(0.0018)	(0.0018)	(0.0018)
Reduction in income = 1			-0.022***	-0.013*	-0.0051
			(0.0073)	(0.0068)	(0.0068)
Number of rooms in house			0.020***	0.020***	0.018***
			(0.0025)	(0.0024)	(0.0024)
Adequate housing conditions			0.055***	0.042***	0.031***
			(0.0082)	(0.0079)	(0.0083)
Good housing conditions			0.093***	0.074***	0.050***
			(0.0098)	(0.0096)	(0.0096)
Family has a plot = 1			0.0097*	0.0019	0.0080
			(0.0052)	(0.0051)	(0.0051)
Educational inputs					
Teachers with bachelors degree or less				-0.11***	-0.12***
				(0.041)	(0.042)
Teachers with temporary contracts				12.6**	8.19
				(5.03)	(5.12)
Pupil-teacher ratio				-0.0076***	-0.0070***
				(0.0014)	(0.0014)
Pupils per school				0.0015***	0.0013***
				(0.00005)	(0.00005)
Observations	26,045	26,045	26,027	23,959	23,959
Log Likelihood	-13,484	-12,101	-10,787	-8,470	-7680
Pseudo R2	0.095	0.166	0.256	0.347	0.408

(Notes on next page)

Notes: Other variables included in the specification are age-squared, an indicator if the child is not the son of the head of the household and another if the household owns a plot, a set of regional indicators for the province of residence, indicators for residing in urban, semi-rural and rural areas. Table provides probit marginal effects with robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 4.15
Probability of school success – Panel data estimates I

Specifications	(1) Pooled OLS	(2) Differenced regression	(3) Differenced regression	(4) Differenced regression
Timing of interest variable	**Contempo-raneous**	**Contempora-neous**	**Contempora-neous**	**Contempora-neous**
Child characteristics				
Interest in school – medium	0.29***	0.17***	0.17***	0.16***
	(0.042)	(0.041)	(0.042)	(0.043)
Interest in school – high	0.37***	0.18***	0.18***	0.18***
	(0.041)	(0.041)	(0.041)	(0.043)
Family characteristics				
Household size	-0.023***		-0.011	-0.0091
	(0.0056)		(0.014)	(0.014)
Household income	0.024***		-0.0030	-0.0072
	(0.0036)		(0.0069)	(0.0069)
Adequate housing conditions	0.062**		0.042	0.044
	(0.030)		(0.036)	(0.036)
Good housing conditions	0.12***		0.029	0.028
	(0.029)		(0.038)	(0.038)
Educational inputs				
Teacher with bachelor's degree or less	0.074			0.13
	(0.081)			(0.089)
Teacher with temporary contracts	0.0043			0.053
	(0.17)			(0.18)
Pupil-teacher ratio	-0.020***			-0.0082*
	(0.0034)			(0.0042)
Pupils per school	0.0014***			0.00089***
	(0.00010)			(0.00013)
Year = 2001	-0.015			
	(0.038)			
Constant	1.28***	-0.12***	-0.12***	-0.20***
	(0.14)	(0.0081)	(0.0089)	(0.040)
Observations	3,412	1,717	1,717	1,666
R-squared/ Pseudo R^2	0.256	0.019	0.021	0.071

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 4.16
Probability of school success – Panel data estimates II

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Timing of interest	**Lagged**	**Lagged**	**Lagged**	**Lagged**	**Lagged**	**Lagged**	**Lagged[a]**
Child characteristics							
Interest in school – medium	-0.026	-0.023	-0.026				
	(0.056)	(0.057)	(0.057)				
Interest in school – high	0.035	0.037	0.036	0.058***	0.058***	0.059***	0.099***
	(0.054)	(0.054)	(0.055)	(0.020)	(0.020)	(0.020)	(0.031)
Family/socio-economic characteristics							
Household size		-0.010	-0.009		-0.010	-0.009	-0.0099
		(0.014)	(0.015)		(0.014)	(0.015)	(0.014)
Household income		-0.0028	-0.0069		-0.0029	-0.0069	-0.0066
		(0.0070)	(0.0070)		(0.0070)	(0.0070)	(0.0066)
Adequate housing conditions		0.046	0.046		0.046	0.046	0.047*
		(0.037)	(0.037)		(0.037)	(0.037)	(0.029)
Good housing conditions		0.036	0.034		0.036	0.034	0.037
		(0.039)	(0.039)		(0.039)	(0.039)	(0.031)
Educational inputs							
Teacher with bachelor's degree or less			0.12			0.12	0.12
			(0.090)			(0.090)	(0.086)
Teacher with temporary contracts			0.013			0.011	-0.0077
			(0.18)			(0.18)	(0.16)
Pupil-teacher ratio			-0.0085**			-0.0085**	-0.0085**
			(0.0043)			(0.0043)	(0.0042)
Pupils per school			0.0009***			0.0009***	0.0009***
			(0.0001)			(0.0001)	(0.0001)
Constant	-0.15***	-0.15***	-0.24***	-0.18***	-0.17***	-0.27***	-0.30***
	(0.053)	(0.054)	(0.068)	(0.018)	(0.019)	(0.044)	(0.044)
Observations	1,717	1,717	1,666	1,717	1,717	1,666	1,666
R-squared	0.006	0.008	0.060	0.006	0.008	0.060	0.064
High interest compared to medium interest	0.061***	0.060***	0.062***				
	(0.021)	(0.021)	(0.021)				

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a] Estimates in column (7) are based on an errors-in-variables regression. The reliability of the "interest in school-high" variable is set at 0.6.

Table A4.1
Probability of school success, 1998 and 2001

Variables	(1) Full sample 1998 (6-12)	(2) Panel sample 1998 (6-12)	(3) Full sample 2001 (9-15)	(4) Panel sample 2001 (9-15)
Child characteristics				
Interest in school – medium	0.067***	0.071***	0.15***	0.19***
	(0.0072)	(0.018)	(0.016)	(0.044)
Interest in school – high	0.24***	0.24***	0.28***	0.28***
	(0.022)	(0.064)	(0.018)	(0.056)
Sex (male = 1)	-0.025***	-0.022*	-0.095***	-0.075***
	(0.0045)	(0.011)	(0.0067)	(0.020)
Age	-0.023	0.022	-0.59***	-0.46***
	(0.015)	(0.041)	(0.037)	(0.12)
Pre-school attendance			0.025***	0.012
			(0.0077)	(0.022)
Time to school			-0.0010***	0.000090
			(0.00032)	(0.00089)
Family characteristics				
Head of household's schooling 5-9 years	0.037***	0.028**	0.11***	0.11***
	(0.0046)	(0.012)	(0.0072)	(0.019)
Head of household's schooling > 9 years	0.072***	0.056***	0.19***	0.16***
	(0.0048)	(0.013)	(0.0079)	(0.022)
Single parent family	-0.029***	-0.063**	-0.076***	-0.10**
	(0.010)	(0.030)	(0.014)	(0.050)
Household size	-0.015***	-0.014***	-0.033***	-0.020**
	(0.0018)	(0.0047)	(0.0032)	(0.0092)
Household income	0.012***	0.0038	0.027***	0.011
	(0.0017)	(0.0045)	(0.0025)	(0.0076)

(Continued)

Table A4.1 *(continuation)*

Variables	(1) Full sample 1998 (6-12)	(2) Panel sample 1998 (6-12)	(3) Full sample 2001 (9-15)	(4) Panel sample 2001 (9-15)
Reduction in income			-0.022**	-0.048
			(0.0099)	(0.030)
Number of rooms in house	0.011***	0.016**	0.026***	0.051***
	(0.0023)	(0.0070)	(0.0035)	(0.013)
Adequate housing conditions	0.024***	0.010	0.062***	-0.0054
	(0.0061)	(0.019)	(0.012)	(0.040)
Good housing conditions	0.055***	0.019	0.10***	0.042
	(0.0081)	(0.022)	(0.014)	(0.041)
Have a plot			0.00079	-0.019
			(0.0074)	(0.023)
Educational inputs				
Teachers with bachelor's degree or less	-0.013	0.026	-0.41***	-0.54**
	(0.032)	(0.084)	(0.066)	(0.21)
Teachers with temporary contracts	0.26***	0.058	12.3*	-29.3
	(0.064)	(0.17)	(7.07)	(20.3)
Pupil-teacher ratio	-0.0080***	-0.013***	-0.010***	-0.0032
	(0.0017)	(0.0051)	(0.0023)	(0.0075)
Pupils per school	0.00095***	0.00095***	0.0020***	0.0017***
	(0.000054)	(0.00014)	(0.000066)	(0.00019)
Observations	13575	1730	18150	1682
Log likelihood	-3748	-447	-7385	-633
Pseudo R2	0.364	0.334	0.321	0.3241

Notes: Other variables included in the specification are age-squared, an indicator if the child is not the son of the head of the household, a set of regional indicators for the province of residence, indicators for residing in urban, semi-rural and rural areas. Table provides probit marginal effects with robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table A4.2
Probability of school success – lagged interest

Variables	(1) OLS	(2) OLS	(3) OLS
Child characteristics			
Interest in school in 1998 – medium	0.30***	0.28***	0.28***
	(0.077)	(0.074)	(0.073)
Interest in school in 1998 – high	0.49***	0.46***	0.47***
	(0.074)	(0.071)	(0.069)
Family/socio-economic characteristics			
Household size	.	-0.035***	-0.030***
		(0.0096)	(0.0096)
Household income	.	0.053***	0.051***
		(0.0061)	(0.0063)
Adequate housing conditions	.	0.17***	0.15***
		(0.050)	(0.051)
Good housing conditions	.	0.24***	0.23***
		(0.049)	(0.049)
Educational inputs			
Teachers with bachelor's degree or less	.		0.0097
			(0.15)
Teachers with temporary contracts	.		-16.9
			(19.5)
Pupil-teacher ratio	.		-0.0058
			(0.0060)
Pupils per school	.		0.00045***
			(0.00012)
Constant	0.32***	0.050	0.029
	(0.073)	(0.10)	(0.14)
Observations	1,690	1,690	1,682
R-squared	0.060	0.157	0.175

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A4.3
Probability of school success – Panel data estimates III

Dependent Variable (2001)	**(1) Achievement**	**(2) Achievement**	**(3) Achievement**
Child characteristics			
Interest in school – medium (1998)	0.20***	0.11	0.084
	(0.045)	(0.071)	(0.063)
Interest in school – high (1998)	0.47***	0.26***	0.22**
	(0.071)	(0.098)	(0.10)
Achievement (1998)		0.76***	0.67***
		(0.023)	(0.043)
Sex (male = 1)			-0.081***
			(0.022)
Age			-0.37***
			(0.11)
Pre-school attendance			0.0082
			(0.024)
Time to school			0.00066
			(0.0010)
Family characteristics			
Head of household's schooling 5-9 years			0.11***
			(0.022)
Head of household's schooling > 9 years			0.14***
			(0.027)
Single parent family			-0.064
			(0.054)
Household size			-0.011
			(0.0096)
Household income			0.019**
			(0.0088)
Reduction in income = 1			-0.041
			(0.031)
Number of rooms in house			0.043***
			(0.014)

(Continued)

Table A4.3 *(continuation)*

Dependent Variable (2001)	(1) Achievement	(2) Achievement	(3) Achievement
Adequate housing conditions			0.044
			(0.038)
Good housing conditions			0.084*
			(0.045)
Family has a plot = 1			-0.012
			(0.025)
Educational inputs			
Teachers with bachelors degree or less			-0.38*
			(0.20)
Teachers with temporary contracts			-17.2
			(23.1)
Pupil-teacher ratio			-0.0081
			(0.0074)
Pupils per school			0.0014***
			(0.00022)
Observations	1690	1690	1,682
Pseudo R^2	0.049	0.2872	0.453

Notes: Other variables included in the specification are age-squared, an indicator if the child is not the son of the head of the household and another if the household owns a plot, a set of regional indicators for the province of residence, indicators for residing in urban, semi-rural and rural areas. Probit marginal effects reported. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table A4.4
Probability of school success – Panel data estimates IV

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Timing of interest variables	**Lagged**	**Lagged**	**Lagged**	**Lagged**	**Lagged**	**Lagged**
Child characteristics						
Interest in school – medium	-0.026	-0.023	-0.026			
	(0.057)	(0.058)	(0.060)			
Interest in school – high	0.035	0.037	0.036	0.058***	0.058***	0.059***
	(0.058)	(0.058)	(0.060)	(0.021)	(0.021)	(0.021)
Family/socio-economic characteristics						
Household size		-0.010	-0.009		-0.010	-0.009
		(0.014)	(0.015)		(0.014)	(0.015)
Household income		-0.0028	-0.0069		-0.0029	-0.0069
		(0.0073)	(0.0074)		(0.0073)	(0.0074)
Adequate housing conditions		0.046	0.046		0.046	0.046
		(0.036)	(0.036)		(0.036)	(0.036)
Good housing conditions		0.036	0.034		0.036	0.034
		(0.037)	(0.036)		(0.037)	(0.036)
Educational inputs						
Teacher charact						
with bachelor's degree or less			0.12			0.12
			(0.096)			(0.096)
with temporary contracts			0.013			0.011
			(0.20)			(0.20)
Pupil-teacher ratio			-0.0085**			-0.0085**
			(0.0042)			(0.0042)
Pupils per school			0.00091***			0.00091***
			(0.00015)			(0.00015)
Constant	-0.15***	-0.15***	-0.24***	-0.18***	-0.17***	-0.27***
	(0.057)	(0.058)	(0.070)	(0.019)	(0.021)	(0.047)
Observations	1,717	1,717	1,666	1717	1,717	1,666
R-squared	0.006	0.008	0.060	0.006	0.008	0.060

Notes: Standard errors in parentheses, allowing for intra-municipality correlations; *** p<0.01, ** p<0.05, * p<0.1.

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