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Parental altruism and child labor: examining the historical evidence from the United States

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Abstract Parsons and Goldin (in Econ Inq 637–659, 1989) use the US Commissioner of Labor Survey of (1890) to argue that many American parents sacrificed the future earnings of their children by sending them to work rather than to school. We analyze the same data and argue that parental choices were dictated by constraints rather than the desire to exploit child labor opportunities. We also find significant income effects on child labor supply, indicating that affluence played an important part in the decline of child labor. The coexistence of positive assets with child labor is not inconsistent with parental altruism, indicating instead a failure of perfect two-sided altruism.

Keywords Child labor · Parental altruism · Two-sided altruism

JEL Classifications D13 · J13 · N31

1 Introduction

How altruistic are parents toward their children? Do parents who send their children to work, rather than to school, do so because they are constrained by poverty? Or is it because they pay little attention to the interests of their children and their future? Contemporary commentators typically assume that the former is the case, that is, that parents are altruistic toward their children, and the grinding constraints of poverty dictate their choices. This is true not merely for policy makers in developing countries and in international organizations such as the World Bank, but also underlies most

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economic analyses of child labor [e.g. Basu and Van (1998) and Ranjan (2001), who assume that parents are altruistic]. However, social reformers in the nineteenth century were less charitable, arguing that parents were often selfish and exploited their children. Interestingly, some recent arguments in behavioral development economics echo elements of the nineteenth century view, that the poor are more prone to self-control problems—see, for example, Banerjee and Mullainathan (2010).

Support for the nineteenth century view is found in a provocative paper by Parsons and Goldin (1989) (PG henceforth). They analyze a rich data source, the Commissioner of Labor Survey conducted by Carrol Wright in 1889–1990 and conclude that "the empirical results suggest that parents did not have strong altruistic concerns for their children…working class families apparently sold the schooling and potential earnings of their offspring very cheaply." Indeed, they quote Marx (1867) in this context — "previously, the workman sold his own labor power, which he disposed of nominally as a free agent. Now he sells wife and child. He has become a slave dealer."

Were American parents really selfish? Were their preferences and motivations so different from parents in poor countries today or from textile workers in England after the industrial revolution? And if PG are right and American parents were exploitative and the conclusions have a more general validity, then, is political correctness preventing a hard look at parental motivation today? These questions are of utmost importance in understanding child labor and framing a policy response to it. If parents are altruistic, standard revealed preference arguments imply that a ban on child labor will make poor families (including children) worse off, unless the ban has significant general equilibrium effects on the adult wage (as in Basu and Van 1998). Conversely, if parents are exploitative, a ban on child labor may well make children better off, even absent any general equilibrium effects.

This paper re-examines the question posed by PG, using the same data. PG use a regression framework to estimate a compensating wage differential for the absence of child labor opportunities and find this to be extremely large. They interpret this as indicating a lack of parental altruism. Our approach has computed directly the wage gains that adult males would have made, if they could have chosen jobs in the non-child labor areas. We find that the family income of these males would have been substantially greater if they relocated to areas without child labor opportunities. Thus, their failure to do so is indicative of constraints—that they could not command these jobs—rather than preferences. We also use the data to estimate child labor supply functions and find significant income effects, suggesting that the rise in incomes played an important role in the decline in child labor.

PG also find that parents whose children worked had significant positive assets. They argue that these parents were not subject to credit constraints, and thus, this is not an explanation for the prevalence of child labor. Without questioning their empirical findings, we offer a different interpretation. Following Becker and Murphy (1988) and Baland and Robinson (2000), we suggest that child labor can arise due to the inadequate altruism on *either* side—either because parents are insufficiently altruistic toward their children, or because they anticipate that their children will be insufficiently altruistic toward them. In the latter case, poor and risk-averse parents may save for their old age, rather than investing in their children, since they are unsure that their children will support them in the future.

The remainder of the paper is organized as follows. Section 2 examines whether household employment decisions are better explained in terms of preferences or constraints. Section 3 estimates a model of household child labor supply and finds significant income effects. Section 4 examines the PG argument regarding savings and asset holdings, and the final section concludes.

2 Location choices: preferences or constraints?

Caroll Wright conducted a pioneering large survey as the US Commissioner of Labor in 1889–1890, in order to study the costs of production in nine industries across 24 states. The data consist of wide-ranging cross-sectional information on 6,809 American households, of which 5,900 had at least one child. This was not a random sample, but included workers from the firms that cooperated with the survey and those workers who responded to the survey (Haines 1979). The coverage of industries was uneven, cotton textiles accounting for a disproportionately large share of workers. Despite these limitations, the survey provides valuable information on earnings within a family and prevalence of child work in factory industry. There is detailed information on the number of children in a family, how many worked, their age and earnings. Table 1 presents a summary of evidence related to child work. We exclude boys over seventeen from our calculation of the incidence of child labor (CL). The incidence of child labor was quite large, 23%, in the overall sample, and somewhat higher, at 29%, in households where the father was unskilled. There is a large variation in the incidence of child labor across the father's occupation, ranging from below 5% (coke and pig iron) to 43% (cotton textiles), and the incidence of child labor is negatively correlated with the wage for unskilled labor in the occupation. As we shall see, this negative correlation is the basis for the

Table 1 Incidence of child labor (CL), wages and family size by industry

	CL	CL, unskilled father	Annual unskilled wage, $	# kids, unskilled
All industries	0.23	0.29		
Pig iron	0.05	0.04	469	2.5
Bar iron	0.08	0.13	444	2.4
Steel	0.11	0.15	384	2.2
Coal	0.15	0.10	361	3.4
Coke	0.04	0.05	411	2.3
Iron ore	0.12	0.16	281	2.5
Cotton	0.43	0.46	341	3.5
Wool	0.25	0.25	447	2.5
Glass	0.10	0.18	455	2.5

CL is the proportion of children working in the family and is defined by $\frac{\#\text{kids working} - \text{boys17+}}{\#\text{kids} - \text{kids}(0-3) - \text{boys17+}}$.

Family skill level refers to the skill level of the father

PG argument regarding parental altruism. Note also that those employed in cotton textiles or coke have larger families—approximately one more child than those employed in other sectors.

PG's analysis adopt Mincer's (1978) model of family migration decisions. Employment opportunities for children were localized, with ample opportunities in textile towns, but limited scope for the employment of children in other locations.[1] If male earners value these child labor income opportunities, they will, ceteris paribus, prefer to locate to textile towns. Non-textile occupations must therefore pay a compensating differential for the lack of child employment opportunities. The magnitude of this differential allows PG to infer the extent to which parents valued children's schooling and leisure.

We now set out a simple model of location decisions to make these arguments precise. Suppose that there are two locations, indexed by $i \in \{A, B\}$, where location A offers opportunities for children to work, while location B does not. Let w^i be the adult wage in location i. For simplicity, we assume that adults and children are perfect substitutes, and that one child's labor equals $\lambda < 1$ units of adult labor. A measure μ of families that do not have any children, while a unit measure has one child—each family has one adult.[2] Under these assumptions, the decision for a family with no children is straightforward—it will locate to wherever the wage is higher. For a family with a child, with preference parameter θ, it will locate to A if

$$U(w^A, 0, \theta) \geq \max\{U((1 + \lambda)w^B, 1), U(w^B, 0, \theta)\}. \tag{1}$$

that is, if the utility of earning w^A and the child enjoying leisure (or schooling) are greater than earning wage w^B, and deciding optimally whether children work or not. If U is increasing in income, then it is immediate that $w^A \geq w^B$ in any interior equilibrium where both locations have positive employment. Similarly, if all families value their children's leisure or schooling, then $(1 + \lambda)w^B > w^A$ since otherwise a family would increase both its leisure and income by moving to A. Now let us consider an interior equilibrium where $w^A > w^B$. In any such equilibrium, all childless families must locate to A, and all families who locate to B must send their children to work. For the families that locate to B, the difference between their actual earnings, $(1 + \lambda)w^B$, and their potential earnings w^A provides an upper bound on their valuation of their children's leisure. That is, the earning differential between B and A is the *compensating differential* for the loss of child leisure at B. This is the valuation of child leisure for the marginal family at B, that is, one with the preference parameter θ that is exactly indifferent between the two locations.

PG attempt to estimate this compensating differential. Specifically, their methodology is to estimate a standard earning equation for adult male workers, which is augmented by the addition of an index of child earnings possibility that is area-specific. The coefficient on this index allows them to infer the extent of the compensating differential required for labor market equilibrium, that is, so that the

[1] Goldin and Sokoloff (1982) show that in the first half of the nineteenth century, child work was widespread in agriculture and artisanal production. Within manufacturing industry, cotton and woollen textiles were the main users of child labor. Children constituted 50% of the workforce in cotton textiles, and 41% of the workforce in woolen textiles (among firms employing 16 or more workers).

[2] It is straightforward to generalize these arguments to families with several children or adults.

marginal worker is indifferent between the locations. The estimated coefficient is extremely large. Indeed, PG conclude that for the average family, 90% of the increase in child income that was gained in a location with favorable child labor opportunities was eroded by lower adult (male) wages. In view of other evidence showing that the returns to schooling were very high,[3] PG conclude that parents were selling the future prospects of their children very cheaply.[4]

The underlying assumption in the PG analysis is that the pattern of observed locations reflects choices rather than constraints. That is, it was perfectly feasible for an adult working in cotton textiles to move to a high-wage industry and get a job at the going wage. The fact that they chose not to do so implies that they preferred low-wage jobs in the textile towns, since these allowed for higher child earnings. It is this assumption that allows PG to infer that the compensating differential for child labor is large. We will demonstrate that a large number of families would have been better off by migrating to high-wage industries, even assuming that they did not have any child labor opportunities at the destination industry. This demonstrates that the families who worked in the textile towns, most likely, did not have the opportunity to work in high-wage industries. They might have lacked the requisite skills. The wage differentials between cotton textile and other industries were not determined by arbitrage in the labor market as workers from cotton textiles were not perfectly substitutable for workers in other industries.

We note that there is an alternative explanation for wage differentials between industries based on constraints rather than preferences, even when workers are assumed to have homogeneous skills. This is a nutritionally based efficiency wage mode, as in Leibenstein (1957), Bliss and Stern (1978) or Dasgupta and Ray (1987). Genicot (2005) discusses this specifically in the context of child labor. The idea here is that in localities without child labor possibilities, workers with larger families would need a higher efficiency wage than workers with smaller families. Labor market equilibrium in such a model would result in workers with large families working in localities with child labor and commanding a lower wage than workers with smaller families who would work in locations without child labor opportunities. High-wage employers would be unwilling to employ workers with large families since their efficiency wage would need to be even higher. Wage differentials would not reflect compensating differentials, but rather differences in efficiency wages between locations where child labor is available and those where it is not. Our empirical analysis will also cast some light on the relevance of this explanation.

2.1 Empirical results

We begin our analysis by estimating a simple Mincerian earnings equation for unskilled workers with terms for age (proxying experience) and age squared, with industry dummies, so as to estimate industry wage differentials. This regression is

[3] For example, Goldin and Katz (2008) use the 1915 Iowa census and find that the rates of return to education for men were between 10 and 12%.

[4] Note that PG assume that there is no other source of compensating differentials, apart from child labor opportunities. To the extent that jobs varied in other non-pecuniary characteristics, such as working conditions, the estimated coefficient would also capture this term.

reported in Table 2. We find that the negative linear effect is statistically significant (at 5% level), while the quadratic terms are not significantly different from zero. That is, rather than the familiar pattern, where wages rise initially with experience and then fall, we find that the age effects are always negative. This result indicates significant unobserved heterogeneity in the skill level of workers, within the category of unskilled workers. It is likely that later cohorts are better educated, and this would give rise to negative age effects. This result in itself casts doubt on the PG findings, since if there is unobserved heterogeneity in skill levels, the assumption that workers in textile towns could increase their wages by moving to non-textile towns is incorrect. The wage differentials reflect differences in (unobserved) skill levels in the population in the two places.

However, our main purpose of estimating this earnings equation is to use the industry dummies in order to estimate industry wage premia. Let $B(i)$ denote the estimated coefficient on the dummy for industry i. These coefficients are reported in Table 2. Under the PG assumptions, if a male worker moves from industry i to industry j, the change in his earnings is given by $B(j) - B(i)$. Our estimates imply that a worker in cotton textiles could increase his earnings by \$105 by moving to the woollen textiles industry. Family labor income includes the income of the wife as well as child income. Moving from one industry to another also entails changes in the other components of income. Let us make the following very conservative assumption—on moving to an industry with a higher male wage, all non-male labor income is zero. That is, we are assuming that there are no earning opportunities for the migrating family's wife and children in the destination industry. This is very conservative indeed, since the data show ample child labor in woollen textiles.[5] Under this assumption, the income gain to family$i$ from migrating from industry j to industry k is given by

$$\Delta y_i(j,k) \geq B(k) - B(j) - \text{wifeinc}(i) - \text{kidinc}(i), \tag{2}$$

where wifeinc(i) is the income earned by the wife of family i in our data, and kidinc(i) is child labor income. Clearly, the true income gain for a family must be more than the right hand side above, since wife and child income in the destination can never be negative and are indeed likely to be strictly positive.

Let us now examine what the PG theory predicts about the distribution of the income gain term, $\Delta y_i(j,k)$, in industries with low wages. The key prediction is that the income gain term must always be negative, for *every* family in a low-wage industry. This is for three reasons. First, we are underestimating the income gain, by assuming that non-male income is zero at the destination location. Second, to the extent that parents care about child leisure or schooling (or about the leisure of the wife), they would be happy to accept a loss of income without migrating. Finally, indifference in labor market equilibrium only applies to the marginal household, so that infra-marginal households will be strictly better off at their current locations. Put differently, the Mincer model of location choice, as used by PG, implies that the *utility* of the marginal household is the same across the two locations. Thus infra-marginal households will be strictly better off at their current location, implying that

[5] Twenty five percent of the children of unskilled workers in woolen textiles were employed.

Table 2 Earnings equation (OLS) and industry wage differentials, unskilled males

	Coeff.	SE (robust)
Age	−5.1	2.4
Age^2	0.03	0.03
Pig iron	9.2	12.3
Bar iron	−6.1	15.7
Steel	−66.7	19.8
Coal	−89.1	22.1
Coke	−33.3	25.1
Iron ore	−177.3	14.8
Cotton textiles	−106.5	11.8
Woolen textiles	−1.6	13.9
Constant	613.1	48.5

$N = 2{,}019$. Excluded industry is glass. $R^2 = 0.06$

most low-wage workers are strictly better off by not migrating. To the extent that child leisure or schooling is positively valued and the extent that there are child labor opportunities at the destination, there are additional reasons for the income gain from migration to be negative.

One test of the Mincerian labor market hypothesis would be by taking the destination industry to be that with the highest wage premium. From Table 2, we see that this would be the pig iron industry. A less stringent test would be to assume, for example, that cotton textile workers could move to woolen textiles, but not necessarily to the pig iron industry. This would allow for the possibility that there are specific skills in pig iron, which cotton textile workers would not have. Similarly, one may argue that workers in other heavy industries, such as iron ore, coal or steel, may be able to move to pig iron. Table 3 summarizes our main findings for this more conservative test of the hypothesis. We find that 345 families in the cotton textile industry would have a positive income gain from migrating to work in the wool industry. This number constitutes 43% of the total families in the cotton textile industry with an unskilled male head of household. Furthermore, the mean rise in income for those who would gain is substantial –$96, or almost one third of the wage for an unskilled male worker. Almost identical results are obtained when we use glass or pig iron as the destination industry. Similarly, a very large fraction of the families in the other low-wage industries—iron ore (42 out of 44), coal (22 out of 28), steel (43 out of 52)—would have a positive income gain from migrating, to the pig iron industry, and the mean gain for those who would gain is also very large. Our results have the strong implication that these families failed to migrate to high-wage areas not because they chose to stay, but because they could not do so. The data show that they would have clearly been better off financially by migrating, even taking into account any losses of child income. The fact that they did not migrate suggests that these males may not have been able to get jobs in the high wage areas, most likely because they lacked the requisite skills.[6] In light of

[6] As we have noted before, there could be other sources of compensating differentials, such as unpleasant working conditions. These seem plausibly to be less important than skill barriers to entry, given the magnitude of the wage gains from re-employment in high-wage industries.

Table 3 Estimated income gains by migration, unskilled workers

From/to	#	Male wage gain	# with income rise	Mean gain for gainers
Cotton–wool	805	104.8	345 (43%)	95.7
Iron ore–pig iron	44	186.4	42 (95%)	157.4
Coal–pig iron	28	98.3	22 (79%)	97.0
Steel–pig iron	52	75.9	43 (83%)	75.7

Income gains based on estimated coefficients on industry dummies (Table 2)

these results, the PG conclusion, that these families sacrificed the interests of their children by staying in low-wage areas appears seriously flawed.

Our analysis also casts doubt on the alternative hypothesis that the differentials in wages across industries reflect mainly nutritional efficiency wage considerations. Under the efficiency wage hypothesis, families in low-wage industries would experience a fall in incomes by moving to industries without child labor opportunities, which is why employers would be unwilling to employ the adult male. This is clearly not the case for a substantial number of families in the data.

2.2 Evidence from sex ratios across industries

Although the Wright's data do not provide details on whether individual children were employed or not, Parson and Goldin's use regression analysis to show that boys were significantly more likely to be employed than girls.[7] For example, in the age group 11–13, the employment probabilities of boys were 0.411 in textiles and 0.110 in non-textile industries, while those of girls were 0.345 and 0.014. In the age group 14–15, the corresponding figures for boys are 0.846 and 0.543, while those for girls are 0.734 and 0.141. Thus, boys are more likely to be employed than girls, both in textiles and non-textiles; however, the magnitude of the absolute difference is much larger in non-textiles—for example, coal mining offers little employment for girls as compared to boys.

These facts suggest a natural alternative test for the Mincerian location model. Assuming that the gender composition of children within households is random, and independent of other factors, if families were free to locate and find work wherever the overall remuneration was greatest, one would expect systematic differences in the sex ratio in the age group 11–15 between industries. That is, one would expect male-biased sex ratio in industries with ample child labor opportunities. This effect would tend to be particularly strong for industries such as coal mining where girls had almost no opportunities for finding work.[8]

[7] Their estimates of employment probability by age and sex are obtained by regressing the number of children working upon age and gender composition of the family.

[8] The efficiency wage model has the same qualitative empirical predictions—for industries where child labor can be employed, the required efficiency wage would be lower for families with boys as compared to families with girls, and thus, the former would be employed preferentially, thereby biasing sex ratios across locations.

Tables 4 and 5 show the sex ratio for children by industry of work of the father in various age groups—this ratio is available for age groups 10–12 and above, but not for younger age groups, for the entire sample (4) and for households with an unskilled father (5). There is no significant difference between the number of boys and girls in textiles in the age groups 10–12 or the age group 13–14. This implies that there is no evidence of selection by workers into occupations according to the gender composition of their children below 14.

On the other hand, if we consider the age groups 15–16 and 17 and above, where children have the option of leaving home, we find differences in the sex ratio across industries. This is possibly due to the fact that children in the higher age groups are not tied to their parents and are more likely to remain in the household if the local area has greater employment opportunities. In the case of children over 17, there are twice as many girls as boys in families where the father worked in cotton textiles. This suggests that boys were more likely than girls to leave the household in areas where cotton textile employment was predominant. This is consistent with the idea that while employment in cotton textiles was attractive for a young girl, but not so attractive for a young boy, whose aspirations were to become the primary breadwinner. Wages in cotton textiles were lower than that in other industries, and young boys had the potential for acquiring the skills required for higher-wage industries. Thus, out-migration by boys in the older age groups is entirely explicable, as is the decision of girls to remain in the household.

Conversely, there are more than twice as many boys as girls in the age groups above 15 in households where the father is employed in the coal industry. Historical evidence on the coal industry [e.g. Goodrich (1925) and Fishback (1992)] shows that there was considerable inside-contracting, whereby a skilled worker would employ several unskilled subordinates to work for him.[9] Thus teenage sons would have profitable employment opportunities in the coal industries, but not teenage daughters. Thus, the daughters would have greater incentives to leave the household, resulting in male-biased teenage sex ratio. The opposite is true for cotton textiles.

To summarize, the evidence on sex ratios for children aged 14 and below is consistent with the hypothesis that households did not locate in to maximize child labor opportunities. In particular, there is no evidence of households with more under-14 girls locating to cotton textile areas, or households with more boys locating in coal mining areas, as would be expected under the PG model.

3 Income effects on child labor supply

PG extrapolate beyond their analysis of parental preferences at fixed income levels to argue that parental altruism played very little role in the secular decline in child labor. Whereas much standard analysis (e.g. Basu and Van 1998) attributes the decline in child labor with economic development to rising income, and the

[9] We are grateful to an anonymous referee for bringing this evidence to our attention.

Table 4 Average no. of kids by age group and by industry for all HH

	Age group 10–12		Age group 13–14		Age group 15–16		Age group 17+	
	Male	Female	Male	Female	Male	Female	Male	Female
Pig iron (636)	0.22 (0.46)	0.18 (0.42)	0.12 (0.34)	0.12 (0.32)	0.09 (0.29)	0.10 (0.31)	0.10 (0.34)	0.15 (0.44)
Bar iron (516)	0.23 (0.44)	0.19 (0.43)	0.11 (0.32)	0.18 (0.40)	0.10 (0.31)	0.11 (0.32)	0.09 (0.34)	0.12 (0.38)
Steel (154)	0.14 (0.39)	0.18 (0.46)	0.09 (0.29)	0.13 (0.35)	0.04 (0.21)	0.12 (0.32)	0.13 (0.44)	0.16 (0.48)
Coal (446)	0.28 (0.49)	0.23 (0.46)	0.18 (0.41)	17 (0.39)	0.15 (0.37)	0.13 (0.34)	0.24 (0.56)	0.11 (0.41)
Coke (203)	0.21 (0.45)	0.14 (0.40)	0.12 (0.36)	0.12 (0.34)	0.14 (0.35)	0.07 (0.26)	0.15 (0.45)	0.11 (0.39)
Iron ore (138)	0.16 (0.41)	0.17 (0.39)	0.09 (0.28)	0.09 (0.28)	0.09 (0.29)	0.05 (0.22)	0.07 (0.30)	0.08 (0.32)
Cotton (1,936)	0.25 (0.48)	0.25 (0.48)	0.18 (40)	0.19 (0.42)	0.15 (0.37)	0.18 (0.41)	0.19 (0.46)	0.37 (0.70)
Woollen (911)	0.16 (0.40)	0.15 (0.39)	0.09 (29)	0.10 (0.32)	0.08 (28)	0.10 (0.30)	0.15 (0.45)	0.23 (0.56)
All (5,900)	0.23 (0.46)	0.21 (0.44)	0.14 (0.36)	0.15 (0.37)	0.12 (0.34)	0.12 (0.35)	0.15 (0.43)	0.23 (0.57)

No of firms and SD in brackets

Table 5 Average no. of kids by age group and by industry for all unskilled HH

	Age group 10–12		Age group 13–14		Age group 15–16		Age group 17+	
	Male	Female	Male	Female	Male	Female	Male	Female
Pig iron (437)	0.22 (0.46)	0.18 (0.40)	0.12 (0.33)	0.13 (0.34)	0.08 (0.26)	0.09 (0.29)	0.09 (0.32)	0.15 (0.46)
Bar iron (187)	0.23 (0.44)	0.18 (0.44)	0.11 (0.32)	0.16 (0.36)	0.13 (0.34)	0.10 (0.30)	0.09 (0.31)	0.11 (0.34)
Steel (72)	0.17 (0.38)	0.17 (0.41)	0.04 (0.20)	0.14 (0.35)	0.07 (0.26)	0.10 (0.30)	0.13 (0.37)	0.14 (0.42)
Coal (66)	0.18 (0.43)	0.14 (0.34)	0.08 (0.27)	0.11 (0.31)	0.12 (0.33)	0.08 (0.27)	0.06 (0.24)	0.11 (0.43)
Coke (186)	0.22 (0.46)	0.13 (0.38)	0.12 (0.36)	0.11 (0.33)	0.15 (0.35)	0.07 (0.26)	0.16 (0.47)	0.12 (0.40)
Iron ore (53)	0.19 (0.44)	0.15 (0.36)	0.11 (32)	0.04 (0.19)	0.08 (0.27)	0.06 (0.23)	0.02 (0.13)	0.10 (0.29)
Cotton (982)	0.26 (0.50)	0.27 .50)	0.20 (0.41)	0.22 (0.44)	0.15 (0.39)	0.21 (0.43)	0.18 (0.44)	0.38 (0.72)
Woollen (474)	0.14 (0.39)	0.16 (0.40)	0.09 (29)	0.11 (0.32)	0.11 (0.32)	0.09 (0.30)	0.15 (0.47)	0.21 (0.52)

consequent income effects on child labor supply,[10] PG argue that in the United States child labor declined due to fall in labor demand, rather than a reduction in labor supply. To quote, "the large increases in schooling over time in the US may have resulted, not from the altruistic motives of parents, but from the fact that more advanced industrial technologies find little value in the unskilled labor of children." We now show that the Commissioner of Labor data do allow us to identify income effects, and thereby provide some indication of the role of labor supply versus demand factors in the decline of child labor. The data permit an identification of the effects of parental income effects on children's labor supply. Fix an industry of employment for the father, thereby fixing child labor opportunities. Variations in observed child labor across households can be attributed to variations in labor supply. One can therefore see how this variation in child labor can be related to variation in non-child household income. A crude measure of this is in Table 6, which reports the proportion of children in the household working and male labor income as a function of the category of worker. We see that the extent of child labor declines as we move from the category of cotton unskilled to cotton-skilled to woolen-unskilled workers. Consider the comparison between skilled and unskilled workers in the cotton industries. Since these were in the same location, they face identical child labor opportunities (or demand conditions), but skilled labor earned higher wages. We can therefore attribute the reduction in child labor (the proportion of kids working) from 0.46 to 0.41 to income effect on labor supply. Consider next the comparison between skilled workers in the cotton industry and unskilled workers in the woolen industry. We see that these workers had almost identical male earnings (approximately 445), but they faced different child labor opportunities. Consequently, the reduction in proportion of children working from 0.41 (for cotton-skilled) to 0.25 (woolen-unskilled) can be attributed to labor demand. Thus, in comparing unskilled workers in the cotton and those in woolen industries, about one-fourth of the reduction in child labor can be attributed to income effects on child labor supply. This suggests that it is unlikely that demand factors were solely responsible for child labor.

We now conduct a more systematic analysis of the determinants of child labor supply. One problem with our data is that we have observations only at household level, not at the level of the individual child. That is, we have information on the total number of children working, but not on their identities. We also have information on the total number of children in the family and their composition by age and gender. Furthermore, children aged seventeen and above are included within the categories of children and working children.[11] It would be peculiar to include children aged 17 and above as child labor. Even today, the minimum age for full-time work is below 17 in most advanced countries. Accordingly, our desired measure of child labor is the proportion of children working, aged 16 and below. We

[10] However, Ray (2000) analyses data from Pakistan and Peru and finds mixed results, with weak income effects in Pakistan.

[11] This is consistent with the evidence—in 1850, the median age at which children left home was 22.5 for males and 20.5 for females (see Whaples 2005).

Table 6 Adult wages and child labor

	Cotton unskilled	Cotton skilled	Wool unskilled
Adult male wage income, $	341	447	447
Proportion of children working	0.46	0.41	0.25

Table 7 Proportion of children working, tobit regressions

	CL1	CL2
Adult income	−0.23 (15.8)	−0.27 (15.5))
Children 0–3	−0.03 (2.8)	−0.03 (2.0)
Children 4–8	−0.13 (11.8)	−0.11 (9.6)
Boys 10–12	0.08 (5.1)	0.12 (6.5)
Girls 10–12	0.01 (0.8)	0.05 (2.4)
Boys 13–14	0.36 (18.3)	0.43 (19.5)
Girls 13–14	0.20 (10.0)	0.26 (11.9)
Boys 15–16	0.43 (21.3)	0.51 (22.3)
Girls 15–16	0.25 (12.4)	0.34 (14.8)
Boys 17+	−0.05 (2.9)	−0.07 (3.4)
Girls 17+	0.18 (14.2)	−0.07 (4.2)
Cotton textiles	0.37 (13.3)	0.37 (11.6)
Uncensored obs	1,672	1,391
No. of obs	4,461	4,280

Robust standard errors in parentheses

CL1 = (# children working − # boys 17+)/(# children 4–16 + # boys 17+)

CL2 = (# children working − # children 17+)/(# children 4–16)

Full set of industry dummies included in regressions

can construct two such measures from our data. The first assumes that all children aged 17 and above work and is defined by

$$CL_2 = \frac{\max\{\#\text{kids working} - \text{kids}17+, 0\}}{\#\text{kids} - \text{kids}(0\text{–}3) - \text{kids}17+}, \tag{3}$$

when the denominator is positive (families with a zero denominator do not have any children eligible for work).

Our second measure takes into account the fact that the extent of women's working this period is substantially lower than that of men's. This measure does not automatically assign girls above 17 to work status and is defined by

$$CL_1 = \frac{\max\{\#\text{kids working} - \text{boys}17+, 0\}}{\#\text{kids} - \text{kids}(0\text{–}3) - \text{boys}17+}. \tag{4}$$

These adjustments to the child labor variable also require that we adjust our measures of non-child income. We do this as follows. If a family has any children above seventeen, we estimate their income by dividing total child income by the number of children working. The income of those above seventeen is then added to total non-child income to provide a corrected measure of non-child income.

Table 7 reports the coefficients from a Tobit regressions of the child labor variable. This regression includes a full set of industry dummies, in order to control for sources of demand for child labor—we report only the coefficient on cotton textiles, since this is particularly large. Our focus is on the determinants of child labor supply, given these demand-side controls. The income effects are significant, and the marginal income effect is the same in both specifications, at −0.09.[12] These show that a ten percent rise in income reduces the fraction of children working by just under 0.01 points. The income effects are significant and positive. But they are weaker than the raw data comparison from Table 6. Thus, using the marginal income effects a 30% rise in income would reduce the proportion of children working by 0.03, whereas our raw data calculation from Table 6 (the cotton-skilled versus unskilled comparison) is 0.05 for the same 30% rise in income. This is of course explicable, since the raw data comparison does not control for effects such as family size, and also the marginal effects understate the change for large changes, since in this case, families will be pushed above the threshold where censoring occurs.

Table 7 shows that family composition has a significant effect on child labor. The presence of older children increases the incidence of child labor, as one would expect. Note that the child labor variable includes children aged 4 and above in the denominator. Thus, the number of children aged 4–8 reduces the incidence of child labor, and this is a direct effect. More interestingly, the presence of children in the age group 0–3 also reduces the incidence of child labor. This is an indirect effect, since children in that age group are not included in the denominator of the child labor variable. The indirect effect is consistent with the idea that older children were more profitably employed looking after their younger siblings, than for a wage outside the household [see, for example, Goldin (1979)]. The importance of household production in child labor decisions is also consistent with the greater employment of boys than girls. In each age group, boys are significantly more likely to work than girls. Indeed, boys in the group 13–14 have a stronger positive effect on the extent of child labor than girls two years older in the age group 15–16. These results are consistent with the findings of Goldin (1979) that girls are substitutable for their mothers in household production. Note that the coefficients in the table cannot be interpreted as reflecting the employment probabilities for various age groups, since there may well be spillover effects. Manacorda (2006) finds that an increase in the labor supply of one household member is likely to reduce that of other household members, since their value in household production rises.

The negative coefficient on boys 17+ is what we would expect, since the child labor measure in both specifications assume that all boys of this age automatically work. Thus, any unemployment of older boys would reduce the incidence of child labor by either measure. Similarly, the negative coefficient on girls 17+ in the second column is consistent with the measure used. The results for girls suggest that

[12] Although the coefficients are somewhat different in the two specifications, this difference is offset by the difference in the proportion of uncensored observations. As a result, the marginal effect is 0.086 in the first specification and 0.088 in the second.

the specification of the dependent variable (CL_1) that does not automatically assign girls above 17 to work may be preferable.

To summarize, we find significant income effects upon child labor supply, supporting the assumption made by Basu and Van (1998) that a rise in parental incomes plays a role in reducing the incidence of child labor. This suggests that the rise in incomes at the end of the nineteenth century and in twentieth century played a significant role in reducing the incidence of child labor.

4 Savings and asset accumulation

A second piece of evidence that PG consider is the relation between child labor, parental savings and asset holdings. Whereas capital market constraints have been advanced as a major reason for the prevalence for child labor [see, for example, Ranjan (2001)], PG reject this explanation. They find that many parents with positive assets sent their children to work, implying that the child labor decision did not reflect borrowing constraints. They also estimate a savings equation, considering separately the role of child income and family income other than child income. They find that the propensity to save does not depend upon the source of income, and a coefficient of around 0.33. Since this is substantially lower than one, they conclude that the parents were not intending to offset child labor by equivalent future bequests. They conclude that parents were shifting their children's earnings from the future to the present, since parents could control present income but not that in the future. Given that rates of return to education were high, PG argue that "the empirical results suggest that parents did not have strong (economic) altruistic concerns for their children" (PG, p. 657).

However, recent research on models of two-sided altruism, such as Becker and Murphy (1988) and Baland and Robinson (2000) provides an alternative interpretation of the same evidence. In particular, Baland and Robinson show that an inefficient incidence of child labor can arise, despite parental altruism, if parents believe that their children maybe insufficiently altruistic. This is true even if capital markets are efficient. Suppose that parental welfare is given by

$$W_p = U(c_p^1) + U(c_p^2) + \delta V(c_c^2),$$

where c_p^1 and c_p^2 are parental consumptions today and in the future, c_c^2 is child consumption in the future and $\delta \geq 0$ is the parental altruism parameter, that is, the relative weight of the child in the parental welfare function.[13] Similarly, the child's welfare is given by

$$W_c = V(c_c^2) + \lambda W_p,$$

where $\lambda \geq 0$ measures the extent of the child's altruism toward the parent. Now, in general, unless $\delta = 1/\lambda$, so that the parent and the child place equal relative weights

[13] Following Baland and Robinson, this assumes that the child's consumption is fixed and does not depend upon the child labor decision. Moehling (2005) presents evidence showing that the consumption of children rose with their labor force participation.

on the two consumptions, it will not necessarily be the case that the child labor decision will be chosen efficiently. In particular, even if $\lambda = 1$, so that parents place equal weight on the children's future utility and their own utility from future consumption, inefficient child labor is possible if $\lambda < 1$. Essentially, if children are insufficiently altruistic, parents cannot rely on them for old-age support and must therefore save for their old age. Baland and Robinson show that child labor decisions can be efficient, even if children are insufficiently altruistic, under one of two conditions. Either parental bequests must be positive, or children's transfers to their old parents must be positive. If either type of financial transfer is strictly positive, then Becker's rotten kid theorem applies, and child labor decisions are efficient despite the absence of perfect two-sided altruism. Voluntary bequests are extremely rare among working class households, and obviously, the Wright's data do not have evidence on whether these parents received transfers from their children in the future. Thus, one cannot appeal to the rotten kid theorem in this context.

To summarize, the PG findings that households that held positive assets sent their children to work is evidence against borrowing constraints. However, as Baland and Robinson show, inefficient child labor can arise even without borrowing constraints. Given the high returns to education, the PG findings suggest that either parents were insufficiently altruistic, or that they feared that their children would be insufficiently altruistic. That is, it is indicative of a failure of perfect two-sided altruism, where the relative weights assigned to the two generations are the same for both parents and their children.

As Becker and Murphy have argued, the appropriate policy response to child labor may need to be twin-pronged. Compulsory schooling and a ban on child labor is not sufficient by itself, since if children are insufficiently altruistic, poor parents will be left with inadequate resources in their old age.[14] However, if education is financed by progressive taxation, so that the education of poorer children is subsidized, the problem of inefficient child labor can be solved if parents are altruistic. Goldin and Katz (2008) argue that an impressive feature of American economic development in late nineteenth and early twentieth centuries is the spread of mass education at primary and secondary level. They argue that the main driver is the spread of egalitarian free public schooling and attribute a smaller role to compulsory schooling and child labor laws. Similarly, Moehling (1999) and Lleras-Muney (2002) have examined the efficacy of state child labor laws and compulsory school attendance in the nineteenth and early twentieth centuries and find modest effects.[15] These findings suggest that the spread of free public education had efficiency gains, since it solved the problem of underinvestment in children arising from a failure of perfect two-sided altruism. The modest role that compulsion seems to have played also suggests that parents were altruistic, and that once investments in their children were less costly, they were willing to undertake them.

[14] Indeed, if parents are altruistic, then the public provision of old-age insurance or pensions would be sufficient to induce efficient child labor decisions.

[15] For analyses of child labor during the industrial revolution, see Cuningham (2000), Horrell and Humphries (1995) and Nardinelli (1980).

5 Conclusion

Child labor is an important policy concern and also a focus of recent research in development economics. Theoretical work on child labor (Basu 1998; Baland and Robinson 2000; Ranjan 2001) has examined efficiency or distributional reasons for intervening in order to restrict its incidence. There has also been extensive empirical work on child labor and its determinants. One focus of empirical work is the effect of family income upon child labor supply. Ray (2000) uses data from Pakistan and Peru, and finds weak income effects in Pakistan, with stronger effects in Peru. Bhalotra (2007) also uses household data from Pakistan and finds that for boys with positive hours of work, the own-wage elasticity of child labor supply is negative.[16] This is interpreted as being consistent with child labor being used to meet subsistence requirements. Beegle et al. (2006) use household data from Tanzania and find that shocks to household income have a significant effect upon child labor supply decisions, suggesting that capital market constraints are important. Relatedly, Edmonds (2006) finds that the *timing* of anticipated income has an important effect upon child labor and schooling decisions in South Africa, suggesting that capital market imperfections play an important role.

It is our contention that the contemporary debate on child labor can learn from the historical experience of developed countries. Our focus is on Parsons and Goldin's argument that many American parents were exploitative rather than altruistic, at the end of the nineteenth century. The present paper disputes this contention. Contrary to Parsons and Goldin's claim, we find that constraints rather than preferences dictated the choices made by parents. Our evidence suggests that households where children worked did not choose the "low wage, child labor" option, but were most likely unable to secure high-wage jobs. We find significant income effects on child labor supply, suggesting that the decline of child labor in the US was in part due to rising affluence. In summary, it seems likely that American parents at the end of the nineteenth century were not selfish and exploitative and that many of their choices reflect their constraints and relative poverty. The lesson for developing countries today is that policy options that focus on relaxing the constraints imposed by poverty are more likely to help eradicate child labor than those that assume that parents are selfish and act against the interests of their children.

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