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Mr. FAGIN & U

**- Is there any relationship between
Child labour, crime rates and country income per capita?**

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Abstract

Child labour exists in varying degrees in virtually all countries aspiring to reach high income status. The prevalence of child labour and associated criminal activities have been portrayed in the 19th century novels of Charles Dickens, perhaps most vividly in the character 'Fagin' in the novel 'Oliver Twist'. It seems clear that the early years of the industrial revolution in Britain gave rise to demand for increased child labour and also provided fertile ground for criminal activities. However, it is also evident from the experience of the high-income countries that the hallowed peaks of the development process witness an end to such activities representing the dark side of income creation. This paper examines whether there is a definite relationship between country income per capita and the prevalence of crime and child labour. The presumption is that as incomes grow there is an increase in the use of child labour as well as in crime, with a tapering-off after a certain income level. This paper presents evidence for such an inverted 'U' relationship between child labour and income per capita as well as between the crime index and income. These findings may also throw some light on the puzzle of the sudden fall in U.S crime rates in the 1990s.

Keywords: *Income-Child labour, urban inequalities, crime rates, Inverted-U theory.*

JEL Classification Codes: F5, O25, O25, J11

I. Introduction

Despite concerted efforts by international organizations such as the ILO and the promise of the passage of strict laws to ban the scourge by national governments, child labour in economic activities exists to varying degrees in all the developing nations in the low- and middle-income categories. So tenacious is its presence in these countries that very often efforts have been redirected to ameliorating the suffering of child workers, by regulating the conditions and hours of their employment, and ensuring that they do not drop out of school.

Child workers do contribute to the family purse, but their conditions of work are indeed harsh: for the little girl who sells you flowers on the streets and curtsies saying, 'your own girl, sir', as for the nimble-fingered child worker in a matchbox factory. Their lot has changed little from that portrayed vividly in the nineteenth century novels, 'Oliver Twist', 'A Christmas Carol' etc., of the celebrated writer Charles Dickens. Also, it does seem that the same factors that draw children out of their homes and schools to work also serve to provide a fertile soil for the breeding and thriving of criminal activities. Such a phenomenon is personified in the character, Mr. Fagin, the organizer of child pickpockets in Dicken's book. 'Oliver Twist'.

Charles Dickens had been born in the stagecoach era but lived to experience the steamship and railways era. In his lifetime, the industrial revolution was increasing demand for labour, creating urban conglomerates with unsavoury living conditions. Efforts of social reformers such as Robert Owen to improve living and working

conditions of child workers could not make a decisive impact. Owen, a philanthropist industrialist and manager had been pained by the conditions of children in British poorhouses that bred crime and vice, and had tried to pass a resolution in a meeting of manufacturers in 1817 to limit the number or hours of work of children – but to no avail. It would take several decades of industrial expansion that also increased aggregate incomes before the living conditions of the masses improved.

Thus, there seems to be grounds for a premise of a changing relation, as a country industrializes and develops, between income levels and the incidence of child labour as well as that of crime. In this paper we examine this relationship in a cross-section sample of a large number of countries. Specifically, the cross-section data will be examined to see if an inverted ‘U’ relationship exists between income per capita and the extent of child labour, as well as between income per capita and the incidence of crime captured by a crime index.

In the next section we first look at some relationships between phenomena in management and economics that have been shown to have an inverted ‘U’ relation. Then we proceed to present arguments that indicate that such a relation is also likely between income, child labour and levels of crime. Section III examines cross-country data for the presumed income-child labour relation, using an interrupted regression technique, and section IV does the same for the income-crime link. There is a final, concluding section.

II. Inverted 'U' s in economics and allied sciences

As the literature in social sciences contain a number of examples – sometimes untested presumptions as well – of an inverted 'U' relation, it may be appropriate to mention a few of those before proceeding with our tests. It may be added that these relationships have been mostly pinned down with the initial fillip coming from actual observation of the phenomena; that is, as was the case with the Phillips Curve, where actual observation of the phenomena in the British context led to the formulation of the theory and the graphical representation.

In economics, perhaps the most celebrated example of an inverted U relation is the Laffer Curve which shows that as tax rates rise tax revenue rises, but falls after a certain tax rate level – so that then it is a tax cut that would increase revenue further (see Firouz 1989). Another example is economics is that presented by Calmfors and Driffil (1988), who perceive an inverted 'U' relationship between the centralization of wage bargaining and the growth of wages. A similar result is seen in industrial organization theory, with an intermediate level of competition auguring best for innovation (Aghion et.al, 2005). Dating further back is the Kuznets Curve (1955) which presents the hypothesis that a society develops and becomes richer, income inequality first rises, but falls later.

Inverted U relationships have also caught the interest of researchers in other areas of social science. In political science, increasing democracy first increases the chances of

engaging in warfare, but reduces the chance of this possibility at a higher degree of democracy – so that a toddler-democracy is more prone to war than both a dictatorship and a mature democracy (Hegre et.al, 2001). Psychologists have noted such a relation between satisfaction with one's lot, i.e, life satisfaction, and income five to fifteen years later (Oishi et.al., 2007). Extremely satisfied people earned less than the moderately satisfied, and also achieved lower levels of education. A similar result is seen in the area of sports training: Berman et.al.,(2002) studied the training programs and outcomes of the NBA teams and found that while the basketball teams won more when they played together for a number of years, this effect tended to be mitigated after some four years or so. Too much of training in teams or at the same job as an individual may be self-defeating after a certain level; this could be why, for instance, John McEnroe did not wear himself out in training on tennis courts or in the gym – to avoid losing his magic touch (he chose, instead, to play doubles as well, perhaps to be open to varied impulses and stroking angles)!

As mentioned in the beginning of this section, much work on the inverted U has had its triggering motivation in the observation of actual world phenomena. The writings of a novelist two centuries ago gave the initial impulse for this paper, but the same phenomena may be seen now in the newly industrializing nations.

III Factors influencing child labour: a role for income?

Demand-side as well as supply-side factors are seen to influence the extent of child labour used in an economy. And, income growth in developing nations can affect the

extent of usage of child workers can be seen to affect both the demand for, and the supply of. Child labour.

There is a blatantly obvious reason for demanding child labour as children are more obedient, easier to control and manipulate than adults. Family business owners often prefer to employ their own children instead of outsiders. Also, this gives their children a hands-on experience of the business. They don't have to be given regular money payments, unlike outsiders, can be trusted more, and will also be getting trained to carry on the family tradition. Microfinance meant to increase rural family incomes may have the unintended effect of increasing child labour in family businesses, especially where skill is involved, as in tailoring etc. Wyydick (1999) notes that microloans have a negative effect on school attendance and child labour if skilled labour for tailoring is used in the family business. Menon (2005) found negative effects of microfinance on schooling in Pakistan. A \$17 microloan was seen to reduce the likelihood of attending schooling by 9%. And, apart from the advantage of being easy to control, another blatantly obvious reason for employing child workers is their endowment of small, nimble fingers suited for industries manufacturing matchboxes, crackers etc. Thus, there are plenty of arguments in favour of economic growth and rise in incomes increasing the demand for child labour.

On the supply side, child labour fills an important 'consumption smoothing' function, reducing vulnerability to family income shocks. Child labour can be used for consumption smoothing, as it is not affected by the shocks impinging on parents'

income. So, children may be supplied for work during a reduced income period – but may continue to work even when incomes have risen (Guarcellon et.al., 2003). The financial scenario is also important; in developing countries financial markets lag behind income expansion and there are credit constraints. In the presence of credit constraints, parents cannot take credit against the expected future income of their children who are still at school. Hence child labour becomes an alternative for consumption smoothing.

There are a number of other studies in a similar vein. Child labor may reduce with a rise in family income. Nielsen and Dubey (2002) find in a case study of India that covering – low – household expenses is a main reason for the prevalence of child labour. Edmond (2005) gets a similar result for Vietnam. In a study on Ethiopia, Cockburn (2001) finds that ownership of assets like oxen and water is likely to substitute for child labour - perhaps, the necessity to send children out to fetch water and so on is reduced. But child labour could still be involved in the maintenance of such assets. However, there is evidence to the contrary from Pakistan and Ghana (Bhalotra and Heady, 2003): daughters of richer land-owner households are seen to be more likely to work. There are instances of increased child labour and reduced enrolment in Indonesia due to participation in microcredit programs designed to increase family incomes. Islam and Chongwood (2013) find a negative effect, with especially younger children and girls being forced to drop out of school and work.

What transpires from the above analysis of demand and supply factors arising from income expansion translating into actual child labour in the economy is that there is,

indeed, a case for more children being put to work a country industrializes and incomes rise. There are some jobs, besides those requiring small, nimble fingers, such as that of rushing out to clean car windshields at traffic signals, which can be done by children alone. But the verdict rests on actual testing, which is achieved in this paper through a cross-country analysis.

IV. Crime and incomes: the case for a linkage

When the offence is a crime of passion, it is, of course, useless to search for a logical explanation linking it to income or any other variables. But, when such is not the case, it may be amenable to logical analysis. There are two points of view about the effect of income growth on crime. One perspective is that lack of adequate income pushes people into crime. This would be particularly true when there are large inequalities, not when everyone is uniformly poor, with little inequality, as could be the case in primitive societies. The opposing view, which economists tend to favour, is that crime increases with a rise in the general income level; the increased visibility of luxury goods is an incentive for crime, and there could be also a rise in crime linked to drugs and alcohol.

In the literature, more attention has been paid to the effects of crime on output and growth, not vice versa. But there are studies on the determinants of crime both at the individual and the macro-level. Becker (1968) argues that economic incentives have an influence on criminal activities just as they have on law-abiding citizens, and that the probability of detection and the kind of enforcement and punishment also play an important role. At the macro-level, a study by the U.S Department of Justice found that states that were hurt worst by the 2007 -2010 recession experienced the largest fall in crime rates (The Economist, 2011). At an individual country level, Mulok et.al., (2016) find that economic growth in Malaysia has had a positive effect on crime.

Our observations in the introduction about the activities of the “benevolent” (!) Fagin who is portrayed to have lived in the industrialization era of Britain, the first country to

industrialize, is still relevant today for developing and industrializing nations. Economic growth draws people from the villages into large urban centres, the urban – rural wage differential functioning as a catalyst for migration (Harris and Todaro, 1970). The high and institutionalized urban wages rates attract rural labour even when urban unemployment prevails. The ensuing urban inequalities can breed crime; a positive relation between inequalities and crime has been noted by Ehrlich (1973).

Income growth may also lead to increased competition for the available output pie and inter-group conflicts. Ray and Esteban (2017) argue that growth is not ‘a tranquil paradigm’, but is, rather, intrinsically uneven, with winning and losing sectors and groups – so that social conflicts may accompany growth.

Thus, the likelihood of income growth leading to social unrest and crime does loom large. The attempt in this paper is to explore this possibility using a cross-country approach using a sample of eighty-six nations comprising of low income as well as medium and high-income categories.

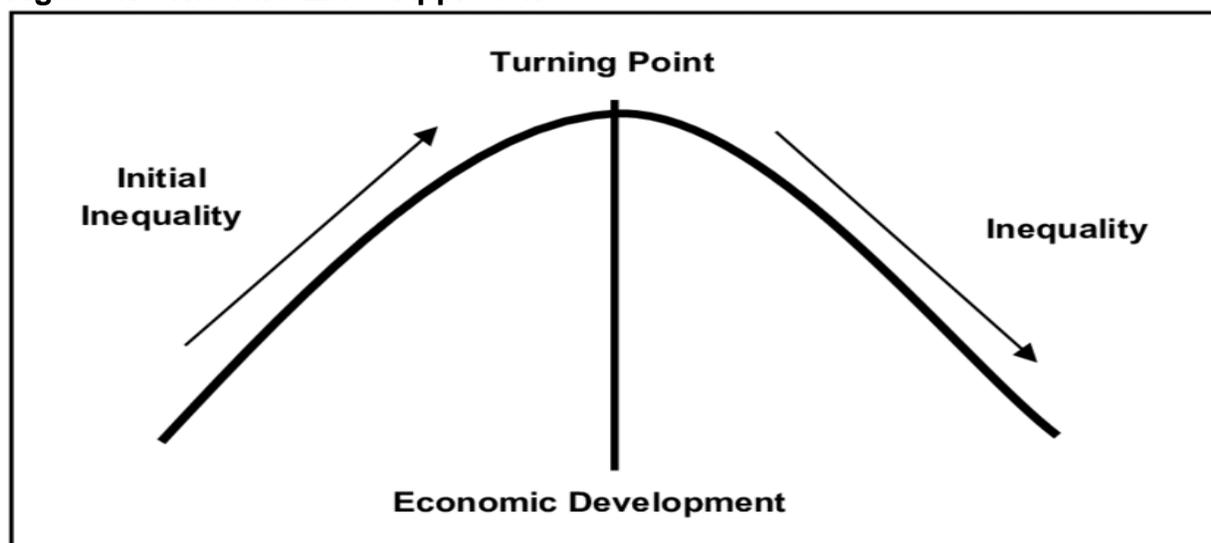
V. Empirical Analysis

V.1 An inverted “U” for child labour

The earlier studies exploring inverted U relationships have tended to rely on the quadratic regression method. But that test in isolation has been now deemed to be insufficient in drawing definite conclusions about such relationships (see Lind & Mehlum, 2010; Simonsohn, 2018). Hence, in this paper the two lines approach proposed by Simonsohn (2018) is used. Since an inverted U or a hump has opposing

slopes on the two sides of the peak or turning point, the slope of a line fitted in the first part of the curve would be positive, turning negative in the part of the curve after the peak. See figure 1 below.

Figure 1. The Two Lines Approach



Thus, it makes sense to estimate two slopes up to the turning point at the peak, in two separate regression tests. But, alternately, as in Simonsohn (2018), an interrupted regression can be run instead of the two separate tests. Such an approach is adopted in this paper, and it is deemed unnecessary to run preliminary tests using a quadratic regression, inasmuch as that provides no conclusive evidence.

To run the interrupted regression, first an appropriate peak should be chosen to run the regression around it, so to say. One obvious choice is the maximum value, x_{peak} , corresponding to the peak value of the dependent child labour variable along the Y axis, in figure 1. Simonsohn (2018) describes the approach to another, perhaps more suitable turning point for the regression if it works well. The choice works like this: fits

run two regressions using the maximum peak up to and beyond that peak. Then the choice of the turning point for the interrupted regression is made using the ratio, $t_2 / (t_1 + t_2)$, of the test statistics; such a procedure is adopted to give additional allocations of observations to the statistically weaker line. For details of the procedure, please refer to Simonsohn (2018).

The databank for this exercise consists of 83 countries, both low income and middle income and a few upper income nations. More high-income nations will not serve the purpose of the study as they have virtually no child workers. The appendix lists the countries in the sample for this estimation. Both the child labour data and the figures for income per capita for all the countries in the sample are from the World Bank databank.

The equation estimated as an interrupted regression is as follows:

$$(1) CL = \alpha_0 + \alpha_1 X_{low} + \alpha_2 X_{high} + \alpha_3 HIGH$$

Where CL = percentage of child labour in total child population 7-14 years of age,

$X_{low} = (X_{peak} - X)$ for $X \leq X_{peak}$ and $X_{low} = 0$ for $X \geq X_{peak}$;

$X_{high} = 0$ for $X \leq X_{peak}$ and $X_{high} = (X - X_{peak})$ for $X \geq X_{peak}$;

HIGH = 0 for $X \leq X_{peak}$ and HIGH = 1 for $X \geq X_{peak}$

An inverted U is seen to be present when the coefficients α_1 and α_2 are significant with differing signs, coming out negative and positive respectively, indicating that a change of slope occurs after the peak.

For the initial estimation, the peak was chosen using the procedure presented in Simonsohn (2018); the corresponding income level was 1409 dollars. The results of the estimation are presented in table 1.

Table 1. Interrupted Regression Estimates of equation (1) for Child Labour

Dependent Variable	Chosen peak	α_0	α_1	α_2	α_3	R_2 adj
(1) CL	At X = 1409	27.1366**	.00144	-.00089**	-11.453*	0.374
(2) CL	At X = 1197.7	22.363***	.0132*	-.00137*	-1..8827*	0.351

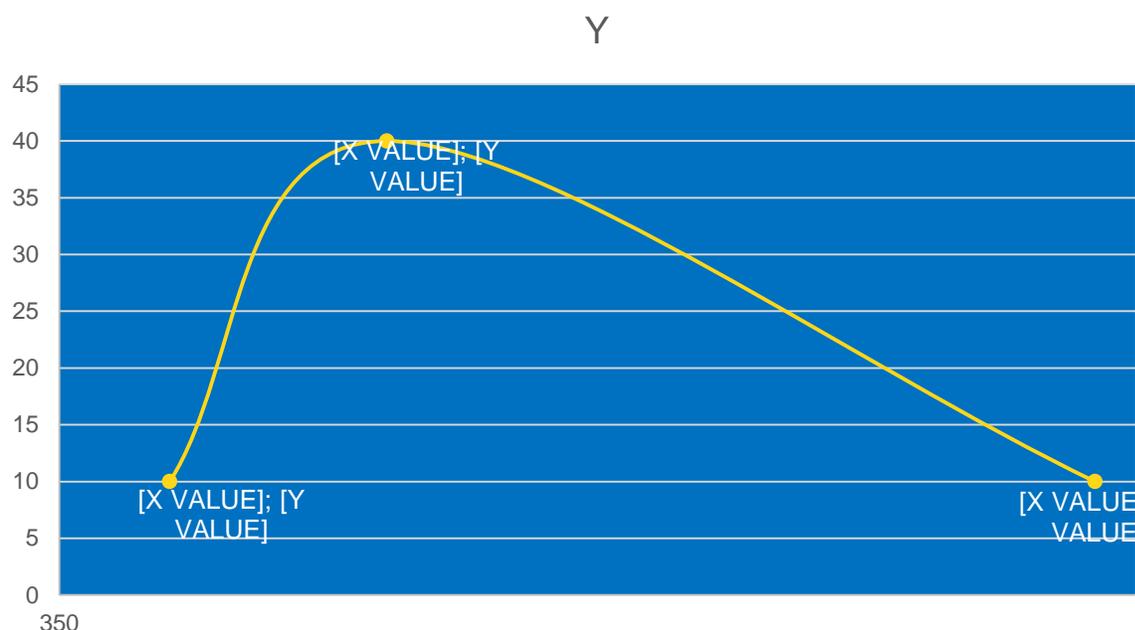
- Three stars represent significance at 1% level for the t statistic and two and one stars at 5 and 10 percent respectively.

In estimation (1) presented in the table, as can be seen, the regression coefficient for X_{high} is significant and negative. But while that for X_{low} has a positive sign, it is not significant. Hence, though the two coefficients have differing signs, are of the same sign, the presence of an inverted U relation cannot be ascertained.

For the second run, the peak chosen was that available in the data itself, a value of 1197.7, corresponding to the highest child labour usage of 45.6% in the sample. When the equation is re-run as (2), a confirmation of the inverted U relationship between child labour and income per capita becomes evident: the coefficients for both X_{low} and X_{high} are, significant at the ten percent level, with a positive and negative sign respectively.

This relationship is depicted in figure 2 below:

Figure 2. Lopsided Inverted U: Child Labour Vs. Country Income per Capita



The curve relating child labour and income per capita for the cross-section sample first rises, up to the income level of 1197.7, and then turns downwards, clearly an inverted U or hump--shaped relation. As child labour use is less in the highest income than the countries in the lowest income category, a *lopsided inverted U* curve is obtained, with the right-side tail longer than the left-side tail.

V.2. Charting the crime rate – income per capita relationship

As the choice of the peak for the analysis using initial t statistics did not compare favourably in eventual results with the choice of the peak directly from data, we proceed with the latter approach here for the crime rate part of the study. The data for the Crime Index for the 88 countries in the sample, obtained from *World Population Review*, is given in the appendix. The sample is not the same as that for the child labour analysis as high-income countries have been added.

Now we proceed to undertake the interrupted regression for the crime rate – incomes relation. The peak used is the income of 16054.5 dollars per capita corresponding to the highest country crime index of 84. The estimation is obtained as follows:

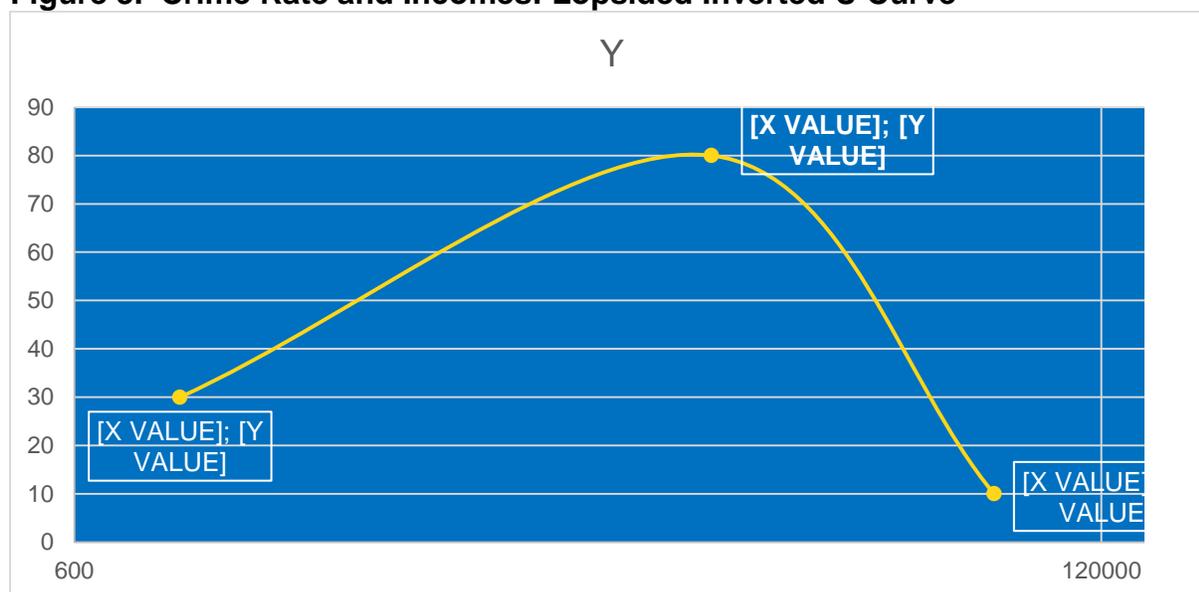
$$(2) \quad \text{CRIME} = 59.22734^{***} + 0.000504^* X_{\text{low}} - 25.5213^{**} X_{\text{high}} - 0.00004 \text{ HIGH}$$

Adj. R_2 for the regression = 0.5133.

It can be seen from (2) that the coefficients for X_{low} and X_{high} emerge with opposing signs as required for an inverted U relation between crime and income per capita. The coefficient for X_{low} is positive and significant at the 10 percent level, while that for X_{high} is negative (indicating a reversed relation, a tapering down after the peak) and significant at the five percent level.

The relation between the variables will, as in the case of the child labour-income relation, takes the shape of a lopsided inverted U. The curve is lop-sided in the sense the right-side tail reaches lower down than the left-side tail, as the crime index in the richest countries tends to be lower than that in the poorest.

Figure 3. Crime Rate and Incomes: Lopsided Inverted U Curve



Thus, our analysis does point to a discernible inverted U relation between crime and country income levels, with a rise in crime up to the higher-income echelons among the middle-income nations.

The insights gained from the multi-country; cross-sectional study conducted here can provide some understanding of individual country experiences as well. Levitt & Dubner (2020) discuss the long-standing riddle of a sudden drop in U.S. crime rates in the 1990s – and come up with an innovative explanation based on changed abortion laws. This paper may be providing an alternative explanation for the sudden drop in U.S. crime rates in the 1990s. Our analysis indicates that crime rates may drop after the country reaches a per capita real GDP level of around 17,000 dollars; in the U.S., crime rates started dropping in the 1990s after reaching a per capita income level of around 24,000 dollars, not too distant from the figure projected by us.

V Concluding observations

The British dilemma of increasing child labor use and crime during the period of rapid economic growth during industrialization has been vividly portrayed in the novels of Charles Dickens, both the vices personified in the character of Fagin in ‘Oliver Twist’. However, such a concomitance between crime and growth is clearly not time-invariant, as crime rates and child labor usage are at historically low levels in the post-industrial Nordic societies – and even in modern Britain. Such an observation leads to the premise that crime rates and income per capita may have an inverted U relationship. The analysis in this paper confirms an inverted U relation, between child labor use as well as crime rates with country income per capita. These inverted ‘U’s are found to be lopsided in shape, with the right-side tail longer than the left. Finally, the analysis in this paper may well provide an explanation for the sudden drop in U.S crime rates in the 1990s, after a steady increase in the previous decades.

APPENDIX

List of 83 countries used for the child labor-income relationship estimation:

Albania, Algeria, Angola, Azerbaijan, Argentina, Belarus, Benin, Bolivia, Bosnia, Brazil, Cambodia, Cameroon, Central African Republic, Colombia, Congo Democratic Republic, Cote D’Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Guatemela, Guinea, Haiti, Honduras, India, Indonesia, Iraq, Jamaica, Jordan, Kazaksthan, Kenya, Kyrgyz Republic, Laos, Madagascar, Namibia, South Africa, Moldova, Pakistan, Syria, Mali, Mauritania, Morocco, Mozambique, Liberia, Nepal, Senegal, Nicaruga, Paraguay, Peru, Philippines, Nigeria, Serbia, Somalia, Sri Lanka, Sudan, Mexico, Lesotho, Uganda, Thailand, Togo, Tunisia, Panama, Tanzania, Uzbekistan, Vietnam, Zambia, Mongolia, Zimbabwe, Turkey, Rwanda, Rumania, Ukraine, Trinidad, Venezuela, Uruguay, Chile, Portugal.

Table A.1: Crime Index*

Country	Crime Index	Country	Crime Index
Venezuela	84.86	Libya	61.26
South Africa	77.02	Malaysia	60.66
Honduras	75.84	Tanzania	59.83
Brazil	69.48	Uganda	56.47
El Salvador	68.63	Guatemala	56.05
Namibia	68.14	Costa Rica	55.77
Jamaica	65.26	Algeria	54.41
Bangladesh	64.98	Bolivia	54.31
Nigeria	64.64	Zimbabwe	53.84
Peru	64.58	Botswana	52.89
Kazakhstan	64.23	Colombia	52.54
Argentina	62.96	Mexico	52.51
Kenya	62.38	Uruguay	52.33
Cambodia	51.8	Greece	39.29
Ghana	51.57	Germany	34.6
Morocco	49.53	Norway	33.51
Ukraine	49.04	Malta	37.73
Iran	49.03	Spain	31.07
Ecuador	48.91	Israel	30.71
Egypt	48.53	Bahrain	30.18
Vietnam	48.22	Luxembourg	30.17
Mauritius	47.34	South Korea	29.24

Country	Crime Index	Country	Crime Index
Sweden	47.21	The Netherlands	28.54
Chile	47.12	Saudi Arabia	28.22
USA	46.73	Singapore	27.7
France	46.45	Czech Republic	25.99
Indonesia	46.26	Denmark	24.72
Ireland	45.43	Austria	23.23
Italy	44.35	Iceland	23.15
The UK	43.64	Finland	22.75
Australia	42.7	Oman	21.55
Belgium	42.5	Switzerland	21.18
India	42.38	Japan	15.9
Russia	41.7	UAE	15.52
Thailand	41.29	Qatar	12.0
The Philippines	41.089	Slovenia	22.01
New Zealand	40.89	Fiji	58.9
Canada	39.48	Somalia	58.5
Mongolia	57.9	Serbia	37.8
Maldives	53.2	Nepal	34.56
Pakistan	44.08	Sri Lanka	40.22
Lebanon	43.36		
Tunisia	41.88		
Nicaruga	44.44		

Jordan	40.83	
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Source: *World Population Review, 2020*, index including all categories of crime

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