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Recession and child labor: A theoretical analysis

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Working Paper 266

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Sahana Roy Chowdhury

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Recession and child labor: A theoretical analysis

Sahana Roy Chowdhury^{*}

Abstract

Child labor (CL) has been a major concern for the developing world, especially for India with its goal towards 'inclusive growth'. However, impact (or vulnerabilities) of major domestic or external spillovers (policy related or recessionary shocks) on child labor market, in contrary to other labor markets, remain unexplored so far. This paper provides a theoretical model of the impact of recession (income shock) on household's child labor (CL) decision. Parental altruism is endogenized; as their choice of substituting child labor income by their own is endogenous. Interestingly, income shocks have ambiguous effect on CL in general, but a clear positive impact on regions with high cost of living. When wages are inflexible such shocks, depending upon its extent, might be CL inducing as well as poverty enhancing, as in that case there may be dearth of demand for parents' labor supply that support their CL or NCL decisions. It infers that any in-kind transfer or policies such as mid-day meal that essentially reduces cost of living, is always CL reducing.

JEL Classification: J13, J29, D10.

Keywords: child labor; adult labor choice; poverty line; recession.

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1 Introduction

India, a signatory of the UN Convention on the Rights of Child, recognized the gravity of child labor problem and adopted Child Labour Prohibition (And Regulation) Act in 1986 followed by the National Child Labour Policy, 1987. However, despite legislations, child labor continues to flourish in both rural and urban India. The percentage of child labor (CL) in the age group 5-14 stands at 12 for India [Demographic and Health Surveys 2005-06], compared to 14.1 in the World [2004, ILO], 11 in Latin America and Caribbean and 35 in Sub-Saharan Africa [1999-2007, UNICEF]. ILO estimates that there were some 306 million children aged 5 to 17 in world employment in 2008. The estimate for India as per 2001 national census stands at 12.6 million [around 49 lakh as of 2009-10 surveyed by NSSO], an increase from 11.28 million in 1991. Concerns and awareness for children working as child laborers, specifically for those working in hazardous industries, have brought researchers to a common ground to answer a set of queries: basic causes behind? immediate remedies? any long run cure? and more importantly, how effective is the policy of banning child labor indirectly or directly by making it a cognizable offense to employ child labor. Surprisingly, impact of recessionary shocks on child labor market remain unexplored so far.

The paper analyzes probable impacts of recession on CL, where recession manifests as an *effective* fall in unskilled wage² with *two* immediate counter-

²At the time of external shock there may not be an explicit fall in real or nominal wages, as wages often do not adjust as quickly as prices or other variables do; but recession results in large scale job losses, which insists the laid-off workers to take pay cuts in new jobs or settling for part-time work when they get new ones, sometimes taking jobs far below their skill levels. See [http : //archive.chicagobreakingbusiness.com/2011/01/u - s - wages - take - sharp - fall - as - recession - lingers.html](http://archive.chicagobreakingbusiness.com/2011/01/u-s-wages-take-sharp-fall-as-recession-lingers.html) and [http : //www.un.org/esa/socdev/rwss/docs/2011/chapter2.pdf](http://www.un.org/esa/socdev/rwss/docs/2011/chapter2.pdf).

active impacts on CL. First, fall in household's current income incentivizes CL decision that compensates for the income loss. On the other hand, such a fall in wage income, hence in its adult equivalent (child labor income) disincentivizes CL decision via rise in its opportunity cost (net-returns from educational investment). What is the combined effect? Does it depend upon regional characteristics (poverty?)? *The literature on child labor is enormous, but it is scattered across the social sciences and piecemeal, lacking a common theoretical foundation* [Basu (JEL, 1999)]. A general consensus is there: poverty is a major cause behind [Anker, 2000; Basu and Tzannatos, 2003; Edmonds, 2005]³.

Poverty Rates (PR) and Child Work Participation Rates for different age groups (CWPR) in major Indian States are presented in Table 1. High (low) PR - high (low) CWPR connection is not observed for states in highlight. Surprisingly, backward states such as Bihar and Jharkhand though have more than average PRs, have much lower CWPR than India average (and than many advanced states like Maharashtra, Gujarat, Karnataka etc.). The paper tries to re-think the poverty-CL connection in order to interpret the combined effect of recessionary income shocks, and interestingly, it obtains that such exogenous negative income shock (recession being an example) has *ambiguous effect* on CL in general, but a positive impact for regions with *high* cost of living, the paper derives that critical minimum.

It builds a simple model of parental labor choice that in turn determines CL or NCL. Parental altruism is endogenized in the model; as he also makes choice on the possibility of substituting child labor income by his own (and favor a

³More recent literature however, adds: inequality and credit constraint [Ranjan, 2001; Swinnerton and Rogers, 1999; Rogers and Swinnerton, 2001; Tanaka, 2003], parental callousness and social norm [Basu, 1999 cites the statement of Albert Hirschman; Lopez-Calva, 2002; Goto, 2011] as having significant roles in influencing child labor decisions.

no child labor (NCL) decision) in contrast to Basu and Van's (1998) seminal paper, where the child is sent to work only if the non-child labor income is too low [Luxury Axiom].⁴ The parent in this paper incorporates child labor income in household's total income and compares this with the no-child labor case and then makes the choice of NCL or CL by choosing his own labor that maximizes his own utility. Thus the theory also checks LA from a step ahead.⁵ Suppose the non-child labor income falls below subsistence, parent's altruism induces substitution of child labor by his own, to meet the subsistence and at the same time maintain NCL as a rational choice. But given the household's endowment, to what extent is it possible (to substitute) or when does the LA (that the poor take a CL decision) start holding? Under income shocks the adult labor requirements, hence the disutility, for both NCL and CL decisions increase as the households income falls, however, net return from education also increases. The paper shows that the combined effect crucially depends on the cost of living, and the decision gets tilted in favor of CL only for regions with high cost of living.

When wages are rigid, possibilities of compensating the income loss by higher labor supply gets constrained by limited demand for labor. Depending upon its extent, the paper finds that the effect of recessionary shocks might be CL inducing as well as poverty enhancing. The effectiveness of policy interventions such as mid-day-meal (that eases the subsistence constraint) is then analyzed. The basic model has no scope for borrowing, which implies capital

⁴The primary focus of Basu and Van (1998) is to find the implication of a child labor ban on wage, and hence on child labor, when child and adult are substitutes and parental concern for the household's survival rather than parental selfishness, is the prime cause behind mass child labor.

⁵Ray (2000) tested the LA for Pakistan and Peru and found that the Peruvian data failed to detect any significant association between household poverty and child labor.

market imperfection is at maximum. But had there been any credit market where credit is available on the basis of collateral⁶ then also lower endowment implies putting more complementary labor with regard to households' CL or NCL decisions. Thus, the conclusion of the model will not change if capital markets are introduced and degree of capital market imperfection is lessened.

The sections are arranged as follows: Section 2 provides the basic model; Section 3 discusses the impact of recession on CL, Section 4 sheds light on policy implication and Section 5 makes concluding remarks.

2 The basic model

Consider an economy with one good, the *numeraire*, and identical households differing only in wealth (inheritance x). Each household consists of a parent and a child.

The parent maximizes sum of present utility and a discounted value of future utility by choice of his own labor l , and makes decision on CL:

$$\max U = U_1 + \lambda U_2 \quad (1)$$

where λ is the discount factor.

In case of child labor (CL), assuming parent retires in period-2 and the child continues to earn unskilled wage w we have:

$$U_1 = x + wl + \underline{w} - h(l) \quad ; \quad U_2 = w$$

⁶or something like the tracking cost of the lender is present, that drives a wedge between lending and borrowing rate, and hence endowment plays crucial role in getting desired amount of credit,

In case of no child labor (NCL) where he incurs education cost c in first period and the child earns skilled wage v in period-2:

$$U_1 = x + wl - c - h(l) \quad ; \quad U_2 = v$$

We further assume $h(l) = 0$ for $l \leq 0$ and $h'(l) > 0; h''(l) > 0; h''' \geq 0$.

With $\lambda v - c > \lambda w + \underline{w}$ the rational choice, irrespective of x , is NCL, with labor choice at l^* satisfying $w - h'(l) = 0$ obtained by maximizing $U = x + wl - c + \lambda v - h(l)$. But such an unconstrained framework can't explain child labor as a rational choice.

To search for a plausible explanation for CL let us now impose a constraint. Suppose household's first period's total asset must be $Y_1 \geq z$ for sustenance where z is the minimum expenditure required to meet the subsistence - an equivalent of the poverty line; $Y_1 = x + wl + \underline{w}$ for CL and $Y_1 = x + wl - c$ for NCL.

Consider Figure 1 which plots total discounted income and disutility with respect to l in Quadrant-I and present period's income in Quadrant-II. The gap between total discounted income and disutility is the net-utility for a household with an endowment x .

Under no constraint, $\lambda v - c > \lambda w + \underline{w}$ implies $U_{NCL} > U_{CL}$ at the optimal labor choice l^* . Under constrained maximization he prefers NCL to CL only if $U_{NCL} = x + wl_2 - c + \lambda v - h(l_2) > U_{CL} = x + wl_1 + \underline{w} + \lambda w - h(l_1)$ where l_1 and l_2 are respective labor requirements to satisfy the constraint on Y_1 . Obviously $l_2 > l_1$ for all x .

Let us define the utility level of the individual who is indifferent between

NCL and CL as $\hat{U}$ and his inheritance as $\hat{x}$. It can be shown that for all $x > (<)\hat{x}$, $U_{NCL} > (<)U_{CL}$. In Figure 1 we show the case for $x_1 > \hat{x}$. To solve $\hat{x}$ we need to solve $l_{1\hat{x}}$ and $l_{2\hat{x}}$ first where:

$$\begin{aligned} l_{1\hat{x}} &= \frac{z - \hat{x} - \underline{w}}{w} \\ l_{2\hat{x}} &= \frac{z - \hat{x} + c}{w} \end{aligned}$$

By $U_{NCL} = U_{CL}$ we get $\hat{x}$:

$$\lambda(v - w) = h(l_{2\hat{x}}) - h(l_{1\hat{x}}) \quad (2)$$

Eqn. (2) is meaningful only for the non-poor who are wealth-constrained to meet the subsistence either by a choice of NCL or CL. It basically implies that the net gain from NCL (left-hand-side(2)) should match the net loss or disutility (right-hand-side (2)). Note that this $\hat{x}$ is unique as the right-hand-side of (2) decreases in x implying $U_{NCL} > (<)U_{CL} \forall x > (<)\hat{x}$ and also $\hat{x} < z$.⁷

By eqn. (2) we find, the right-hand-side increases in z , implying higher threshold value of x for NCL. In other words, *ceteris paribus*, regions with higher cost of living [or higher regional poverty line] tend to have higher CL.

⁷To make the analysis meaningful to explain CL we assume $h(\frac{c}{w}) \leq c + \underline{w}$. Since $\lambda v - c > \lambda w + \underline{w}$ has to be satisfied to make the choice of NCL incentive compatible for the non poor, this assumption implies, $\lambda(v - w) > h(\frac{c}{w})$ so that at $\hat{x} = z$ right-hand-side(2) < left-hand-side(2) and we get an intersection of the two.

2.1 Aggregate Labor Supply

Following Basu and Van (1998) each firm in our model sets the wage as:

$$\min \left[w, \frac{\underline{w}}{\gamma} \right]$$

where $\gamma < 1$ and $\underline{w}$ is the child labor wage. Only adult labor are employed if $w < \frac{\underline{w}}{\gamma}$ and only child labor are employed if $w > \frac{\underline{w}}{\gamma}$.

To make our analysis meaningful we assume that firms employ both the child labor and adult labor in equilibrium and the child labor gets an adult equivalent wage rate γw . Let A be the adult labor employment and C be employment of child labor.

$A + \gamma C$ = Aggregate labor supply given as:

$$\left[\int_0^{\hat{x}} l_1 g(x) dx + \int_{\hat{x}}^{x^r} l_2 g(x) dx + \int_{x^r}^{\infty} l^* g(x) dx \right] + \gamma \int_0^{\hat{x}} g(x) dx$$

where $g(x)$ is the distribution of x and x^r is defined as the wealth threshold above which people have net-wealth high enough to meet z so that they deliver the unconstrained optimum l^* .

3 Recession and child labor

Let us now suppose recession results in large-scale lay-offs in the labor market and workers are forced to join jobs down the wage-ladder, causing a fall in the *effective* wages. Hereafter we use recession and wage drop interchangeably. Now, how does it impact CL decision?

Note that left-hand-side of (2) rises implying an increasing incentive for

NCL via reduced opportunity cost.

$$\begin{aligned}\frac{d[h(l_2) - h(l_1)]}{dw} &= h'(l_2) \left[\frac{z - x + c}{-w^2} \right] - h'(l_1) \left[\frac{z - x}{-w^2} \right] \\ &= \frac{(z - x)(h'(l_1) - h'(l_2)) - ch'(l_2)}{w^2}\end{aligned}$$

since $h'' > 0, l_2 > l_1$ we find right-hand-side (2) rises as w falls. Also it can be shown that $\frac{d^2[h(l_2) - h(l_1)]}{dzdw} > 0$ by the sufficient condition $h''' \geq 0$.

Consider Figure 2. Any fall in w causes both the right-hand-side (2) and left-hand-side (2) to shift upwards, as a result new $\hat{x}$ denoting the wealth threshold for NCL decision may increase, decrease or remain constant. We have seen that for higher z , above some critical minimum z^* (say) it in fact increases, resulting in an increase in CL. This implies, only regions with higher cost of living or higher regional poverty line (national average adjusted to regional cost of living) have a positive effect of recession on CL.

The intuition is quite obvious: as we discussed, two opposing forces operate under a wage fall, one that increases the incentive for NCL via an indirect rise in its net-return; second, increase in net-disutility under NCL, induced by an increase in labor requirement in order to meet the subsistence constraint. The second force dominates for a region with high cost of living.

Proposition 1 *Recession is not necessarily child labor inducing. It has a positive impact only for regions with a high cost of living, above z^* .*

3.1 Rigid wages

We now suppose wages are rigid by law or government regulation or by some social workfare program, which sets the opportunity cost for labor to some fixed minimum. In the flexible wage scenario, the labor required for each household for his rational decision was assumed to be demanded in market without restriction, though at the cost of a wage fall. But under rigid wages, given the overall fall in labor demand by the firms during recession, it becomes less probable for an individual to get the opportunity to sell the whole of labor he desires in order to meet the subsistence while maintaining the same rational choice as under *status quo* (no recession scenario). Recession here puts a limit on the average household labor demand (availability of work), say at $\bar{l}$.

Consider Figure 3 which plots l^1 and l^2 against x . The dark line segments AN and MST show different labor choices for various x levels. For x high enough ($x \geq x^r$) the optimum choice of labor is same as the unconstrained optimum l^* , so people with inheritance above that choose l^* alongwith NCL. In case of recession the position of $\bar{l}$ decides CL.

Suppose $\bar{l}$ is not that low i.e. at $\bar{l}_1$, then labor choice for those choosing CL does not change but a few of the NCL group ($x \geq \hat{x}$) switch to CL, since they, under the constraint $\bar{l}$, can't anyway meet the subsistence while making NCL a rational choice. Then the labor supply will be AQ HST, adding people with inheritance between $\hat{x}$ and x_3 . If $\bar{l}$ is at $\bar{l}_2$ then it will be EB BP FST adding a few in the group of CL between x_3 and x_4 , and also inducing some people (with inheritances less than x_0) to move below the poverty line even with the choice of CL. *Such an impact of recession is both poverty enhancing and CL inducing unlike the case for $\bar{l}_1$.*

Proposition 2 *When wages are rigid choice of household's labor corresponding to his status quo (no recession) CL decision gets constrained by reduced labor demand during recession. Depending upon its extent, recession may be child labor inducing as well as poverty enhancing.*

3.2 Policy intervention: Mid-day meal

Mid-day-meal program effectively reduces l_1 and l_2 for all x , akin to a fall in z . Hence it reduces $\hat{x}$ and CL unambiguously.

Proposition 3 *Any in-kind transfer to the households, which effectively implies a fall in cost of living is always child labor reducing.*

4 Policy implication

The model has significant policy implications. Complementary policy initiative (in-kind transfers, subsidized food-coupons to cite a few) for selected regions with high cost of living might be one counter-active device to mitigate recession-induced rise in CL.

5 Conclusion

The paper presents a simple model of adult labor choice that determines household's child labor decision. It endogenizes parental altruism and also interprets LA of Basu and Van (1998). While dearth of data on child labor in India for the post-recession period (2008-09) limits an empirical analysis of the impact

of recession on child labor, the paper attempts to provide a theoretical conjecture. Apparently, any adverse shock on household income during recession tilts the parent to favor a CL decision. However, two opposing forces play behind. The negative income effect induces a rise in the net income requirement for meeting the subsistence (hence the disutility from additional adult labor), tilting the incentives to favor a CL decision. On the other hand, such a fall results in a rise in the net-returns to educational investment, strengthening NCL. Interestingly, for any exogenous negative shock on wage (recession is an example) the model has an *ambiguous effect* on CL but a positive impact on CL only for regions with high cost of living; the paper obtains that critical minimum. This is in sharp contrast to Basu and Van (1998) where a wage fall has a clear positive impact on CL (if it already exists).

The paper does not take into account inter-state migration for theorizing child labor. One justification could be that children themselves do rarely migrate for work, households and adult household members migrate- often with family, and the children in that household might end up working as child labor in the destination state. This again reflects how costly the destination city/state (where they migrate) is. The paper only tries to sketch a theoretical model of the household decision on sending the child members in the labor market depending upon where [majority of] the household members live for sustenance. This can be studied only when data on interstate migration of children for work [who send remittances] is available and what the trend is for poorer states.

India with its diverse politico-economic, socio-economic and institutional bases across various decentralized strata, finding a general cause behind a gen-

eral effect is challenging; nonetheless, an analysis of the underlying common premise is undoubtedly a first step towards finding a ground root for policy designing.

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UNICEF Child Labor Data webpage: http://www.childinfo.org/labour_countrydata.php.

Table 1: Poverty Line, Poverty Rate and Child Work Participation Rates (2004-05) for major Indian States

<i>States</i>	<i>Poverty Line*</i> (Rs.)	<i>Poverty Rate*</i> (HCR)	<i>CWPR</i> (%)
<i>Delhi</i>	591.95	14.25	33.21
H.P.	563.05	14.8	52.35
<i>Kerala</i>	561	19.3	39.33
<i>Punjab</i>	593	20.4	41.65
<i>Haryana</i>	577.9	23.6	40.11
<i>Goa</i>	640	25.15	35.03
<i>Andhra Pradesh</i>	498.3	27.85	50.48
<i>Tamil Nadu</i>	500.75	28.6	48.58
<i>Assam</i>	539	29.1	38.55
Gujrat	580.4	29.6	46.79
Uttaranchal	544.3	30.65	43.9
West Bengal	508.95	31.3	38.04
<i>Karnataka</i>	502.95	31.7	49.32
Rajasthan	523.1	32.75	43.32
India	512.75	33.75	42.02
Maharastra	558.35	36.75	46.63
Jharkhand	468.05	37.7	40.71
U.P.	483.6	38.4	36.29
<i>Chhattishgarh</i>	456.3	41.75	48.65
<i>M.P.</i>	470.35	44.35	43.3
<i>Orissa</i>	452.55	49.2	43.64
Bihar	479.8	49.7	31.15

Sources:

- National Commission for Protection of Child Rights (Derived from Unit Level Records of NSS 2004-05)
- Himanshu, 2010. Towards New Poverty Lines for India. *Economic and Political Weekly* 45(1), special article.

*: Rural Urban Average

Figure 1

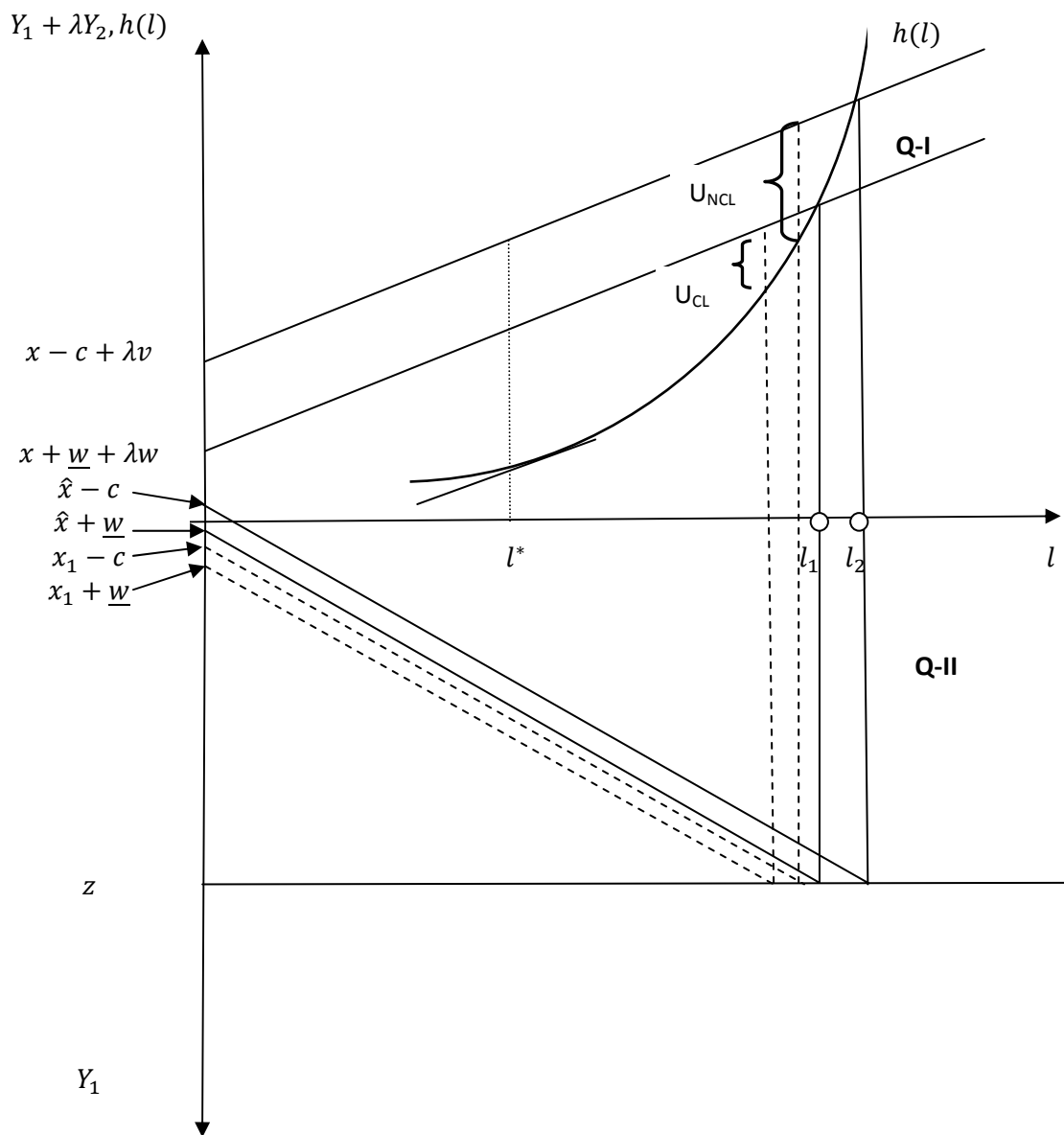


Figure 2

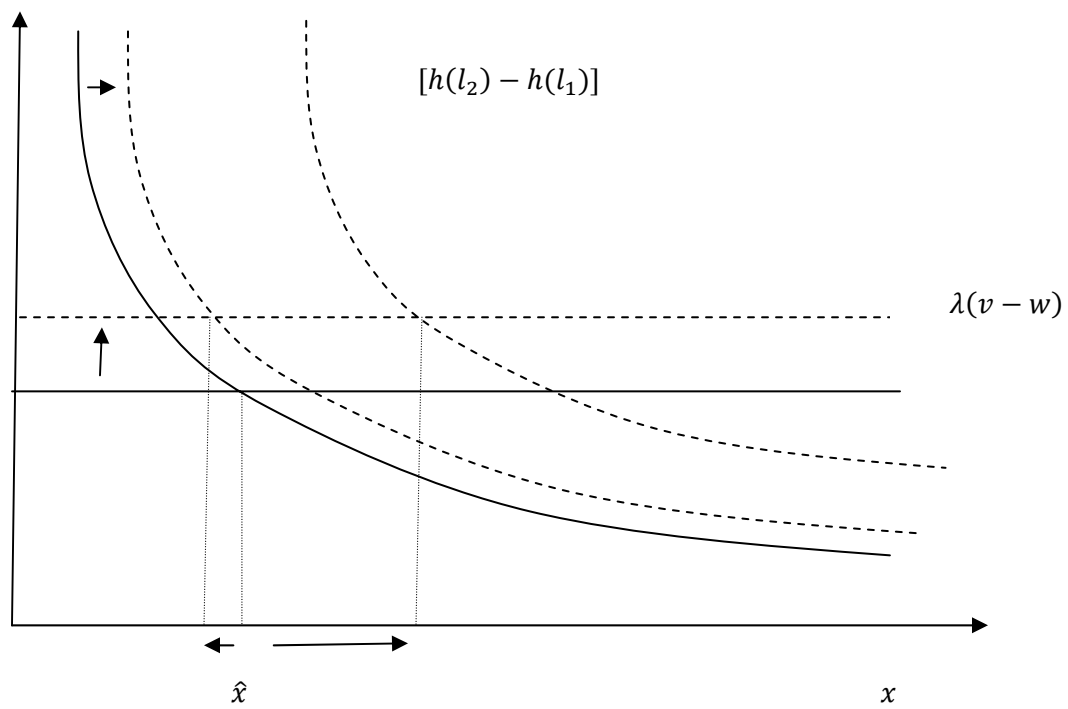
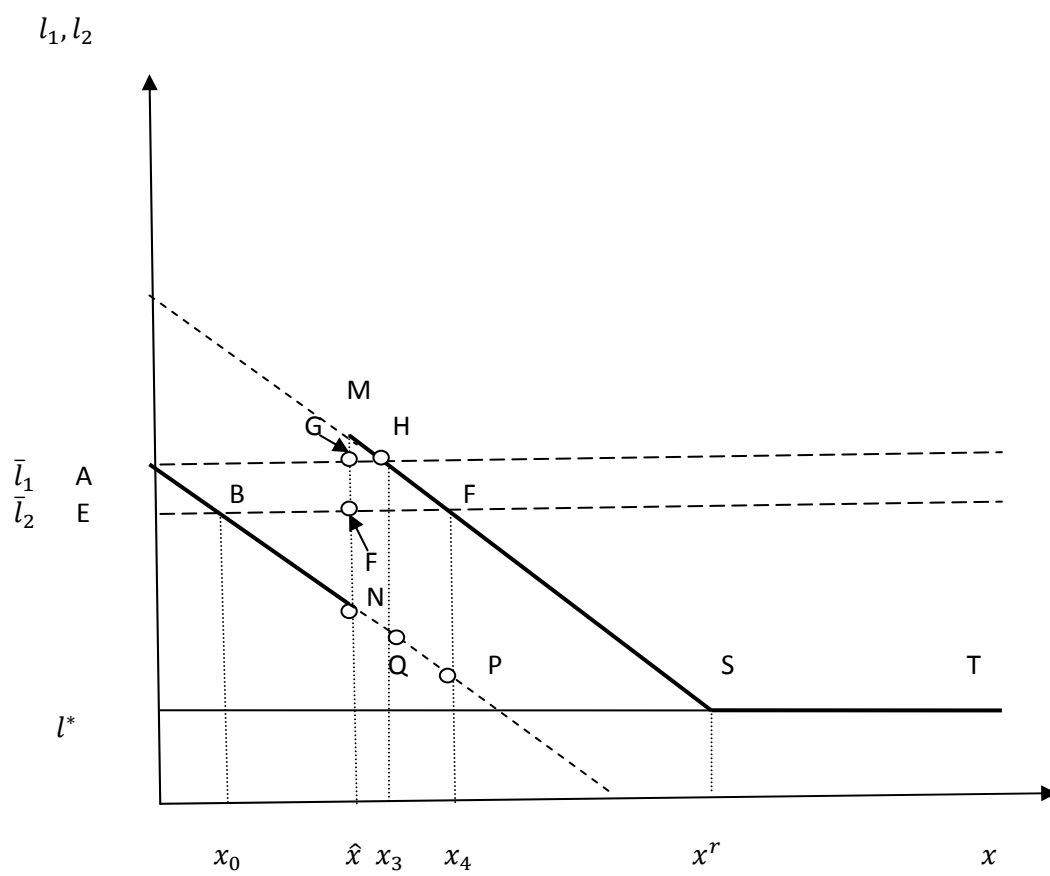


Figure 3



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