The Minimum Wage Poverty Trap: A Theoretical Analysis

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Abstract[1]

This paper develops a theoretical framework for understanding how minimum wage policies may create a “poverty trap” that reduces low-wage workers’ incentives to invest in human capital. While minimum wage increases provide immediate income benefits, beyond a certain threshold they diminish expected returns to education and training, thereby reducing occupational mobility. I formalize this relationship through a utility maximization model incorporating time discounting, opportunity costs, and uncertainty. The framework derives explicit conditions under which an inverted-U relationship emerges between minimum wage levels and human capital investment, including bounded skill premia, education affordability constraints, and wage-dependent present bias. Recent empirical work by Alessandrini and Milla (2024) provides partial support, finding minimum wage increases lead to higher community college enrollment but lower university enrollment, consistent with the model’s predictions. The analysis contributes to minimum wage policy debates by highlighting potential trade-offs between short-term income support and long-term economic mobility, suggesting complementary policies are needed.

Keywords: minimum wage, human capital, occupational mobility, poverty trap, skill acquisition

Introduction

Minimum wage policies remain among the most debated labor market interventions. The policy’s advocates argue such policies reduce income inequality and poverty, while its opponents often warn of potential employment effects and market distortions (Card and Krueger, 1994; Neumark and Wascher, 2008). This paper examines a previously underexplored dimension of the minimum wage effects policy debate: their potential impact on human capital acquisition decisions and the resulting implications for long-term economic mobility.

Although a rich empirical literature examines employment effects of minimum wages (Cengiz et al., 2019; Manning, 2021; see Neumark, Salas, and Wascher, 2014, for a comprehensive review of the debates in this literature), yet far less attention was dedicated to how changes to the minimum wages might shape workers’ decisions to invest in education and upskilling themselves. Some notable exceptions include Neumark and Wascher (2001, 2003), who analyze the minimum wage impact on training and schooling; Schanzenbach, Turner, and Turner (2024), who find that raising state minimum wages lowers community college enrollment; and Smith

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(2021), who studies the minimum wage effects on teen educational attainment. Moreover, Alessandrini and Milla (2024) provide more recent evidence using Canadian data.

The existing literature on education incentives has focused primarily on returns to schooling (Oreopoulos and Petronijevic, 2013), credit constraints (Lochner and Monge-Naranjo, 2012), the timing of educational investments in the van Bezooijen, et al. study (2024), and information barriers (Hoxby and Turner, 2015), as well as the potential for unintended consequences of access policies on educational outcomes (Bedard, 2003), but there has been a limited exploration of how wage policies influence these decisions.

In this paper, I propose a novel conceptual framework: the "minimum wage poverty trap." Specifically, this trap emerges when the minimum wage exceeds a specific threshold that diminishes the perceived returns to human capital investment and knowledge acquisition. My argument builds on insights from behavioral economics regarding time preferences (DellaVigna, 2009), reference-dependent utility (Kőszegi and Rabin, 2006), and rational expectations models of human capital (Becker, 1962; Heckman et al. 2006).

Consider two comparable workers: one earning $11 per hour at a retailer with minimal employment benefits and another earning $22 per hour at a high-end grocer with similar job responsibilities. Despite performing similar tasks, the higher-wage worker faces significantly reduced incentives to pursue educational opportunities like enrolling in community college courses that might otherwise lead to career advancement. This is because the immediate opportunity cost is higher, and the relative wage premium from education is smaller. This paper makes three contributions. First, I introduce a formal economic model of how minimum wage levels might affect human capital investment decisions. Second, I identify a potential non-monotonic relationship between minimum wage levels and upward economic mobility. Third, I explain and discuss the empirical implications and measurement techniques for testing this relationship causally. While the complete inverted-U pattern has not been comprehensively examined empirically, current evidence supports individual mechanisms within the model, and I outline the specific empirical techniques to test the full non-monotonic relationship.

I. Theoretical framework

Basic model design

I develop a formal model to analyze how minimum wage policies might unintentionally lead to a "poverty trap" for the workers exposed to a minimum wage increase. This occurs when an increase in the minimum wage influences individuals' decisions to invest in skills. Following the human capital framework established by Mincer (1974) and expanded by Card (1999), I model workers as making rational decisions about human capital investment based on expected income returns. Recent empirical studies such as Xu and Zhu (2023) and Sabia et al., (2018) further motivates this approach by documenting heterogeneous effects of minimum wage policies on laborer outcomes, and thus suggesting that the investment channel deserves formal theoretical treatment.

Consider a representative worker who must choose between two paths: 1) remaining at their current skill level with a minimum wage job, or 2) through investing in education and acquiring new skills to obtain higher-skilled employment. The worker maximizes lifetime utility as follows:

$$U = \sum_{t=0}^{T} \delta^t u(c_t) \qquad (1)$$

where $\delta \in (0,1)$ is the per-period discount factor representing time preference (with values closer to 1 indicating greater patience), T represents the finite working lifetime horizon, and u(ct) is a strictly increasing, concave utility function of consumption in period t (i.e. reflecting the diminishing marginal utility).

The laborer's consumption in each period is determined by:

$$c_t = w_t - e_t \qquad (2)$$

where $w_t$refers to the wage rate earned in time period t, and e_t represents the quantity of education purchased during that period.

The wage structure is determined by skill level and minimum wage policy as follows:

$$w_t = \begin{cases} w_{min} & if\ unskilled\ and\ w_{min} > w_{market} \\ w_{market} & if\ unskilled\ and\ w_{min} \leq w_{market} \\ w_{skilled} & if\ skilled \end{cases} \qquad (3)$$

with $w_{skilled} > w_{min}\ and\ w_{skilled} > w_{market}$. In this case, w_{min} is the legal minimum wage paid by private firms, w_{market} is the market clearing wage rate for unskilled labor without the minimum wage mandatory policy, and $w_{skilled}$ is the wage for skilled workers.

To address concerns about the model's realism (MaCurdy, 2015), I explicitly incorporate several features. First, I allow for intertemporal savings and borrowing through a budget constraint that permits consumption smoothing. Second, I distinguish between nominal and real variables, where all wages are expressed in real terms adjusted for local price levels. Third, I incorporate time costs of education explicitly, as workers must allocate their fixed time endowment between work and study.

Therefore, a worker faces the following expanded budget constraint:

$$a_{t+1} = (1+r)\, a_t + w_t * h_t \; - \; c_t - \; p_e e_t) \qquad (4)$$

Where a_{t+1} represents assets carried into period t+1 , $h_t \in [0,1]$ is the fraction of time devoted to work (with 1- $h_t$devoted to education if enrolled or leisure), w_t is the wage rate such that $w_t * h_t$ represents labor income, while p_e is the real price of education adjusted for local cost of living, e_t is the quantity of education that is purchased in period t, and r is the real interest rate. This specification allows for both savings and borrowing subject to a no-Ponzi condition where: $\lim t \to \infty \frac{a_t}{(1+r)^t} \geq 0$.

Decision rule for human capital investments

To maintain tractability while preserving the key trade-offs, I assess the value functions under a simplifying assumption where workers consume their net income each period (i.e. hand-to-mouth consumption with $a_t = 0$ for all t). This is a reasonable approximation for minimum wage workers, who typically have limited access to credit markets (Lochner and Monge-Naranjo, 2012). Specifically, based on this assumption, the worker's consumption equals labor income net of education costs.

The worker's human capital investment decision follows a rational choice framework based on lifetime utility maximization. Let I=1 denote the decision to invest in human capital and I=0 represent the decision to remain in unskilled employment, where I is used here, rather than H, to avoid any notational confusion with the time allocation variable h. The worker will choose to invest in human capital if and only if:

$$V(I = 1) \; > \; V(I = 0). \qquad (5)$$

These lifetime utility values are defined formally as:

$$V(I = 1) = \; \sum_{t=0}^{T_e - 1} \delta^t u(w_{min} * h_t^E \; - p_e \; * \; e_t) + \sum_{t \; = T_e}^{T} \delta^t u(\, w_{skilled} \; * \; h_t) \qquad (6)$$

$$V(I = 0) = \sum_{t=0}^{T} \delta^t u(w_{min} \; * \; h_t) \qquad (7)$$

, where h_t^E refers to the reduced number of working hours during the education phase, which satisfies $h_t^E < h_t$ to reflect that students cannot work full time while enrolled in schooling. The parameter T_e represents the duration required to complete the necessary education or skills training, where $0<T_e<T$. This creates two distinct phases in the investment path: an initial investment phase and a subsequent returns phase. During the investment period (from t = 0 to t=$T_e - 1$), the worker earns less labor income $w_{min} * h_t^E$ while simultaneously incurring educational attainment costs expressed as $p_e \; * \; e_t$, which thus reduces an individual's consumption. Upon the completion of training (from $t = T_e \; to \; t = T$), the worker then transitions to more skilled employment and earns the higher wage $w_{skilled} \; * \; h_t$ because he is now working full hours.

This proposed formulation extends the standard human capital investment model (Cahuc et al., 2014) by explicitly incorporating the minimum wage as a policy parameter that directly affects the investment decision calculus. While similar in structure to college enrollment decision models developed by Altonji (1993) and Arcidiacono (2004), the model specifically examines how minimum wage policies influence human capital acquisition decisions through multiple channels.

II. Time discounting and future value perceptions amongst workers Quasi-hyperbolic discounting

Standard economic models typically assume exponential discounting with a constant discount factor. However, evidence from behavioral economics suggests that individuals often exhibit present-biased preferences better represented by quasi-hyperbolic discounting (Laibson, 1997; O'Donoghue and Rabin, 1999). The quasi-hyperbolic framework generates additional testable predictions about how the poverty trap varies with individual characteristics and policy interventions. Specifically, it predicts that workers with greater present bias (lower ß) will exhibit a stronger negative response to minimum wage increases above the threshold, and that interventions reducing present bias could mitigate the poverty trap effect. Under this formulation, the worker's utility function becomes:

$U = u(c0) + \beta \sum_{t=1}^{T} \delta^t u(c_t)$ (8) where:

- $\delta \in (0,1)$ is the standard per-period discount factor, and
- $\beta \in (0,1]$, captures present bias (with $\beta=1$ representing no present bias).

With present bias, the human capital investment condition becomes:

$$u(w_{min} - e_0) + \beta \sum_{t=1}^{T_e - 1} \delta^t u(w_{min} - e_t) + \beta \sum_{t=T_e}^{T} \delta^t u(w_{skilled})$$
$$> u(w_{min}) + \beta \sum_{t=1}^{T} \delta^t u(w_{min}). \qquad (9)$$

1. The immediate period utility: $u(w_{min} - e_0)$ (i.e. refers to the initial consumption after education and upskilling investments),
2. The education period utility: $\beta \sum_{t=1}^{T_e - 1} \delta^t u(w_{min} - e_t)$ (i.e. reflects the present-biased utility during skill acquisition),
3. The skilled period utility: $\beta \sum_{t=T_e}^{T} \delta^t u(w_{skilled}) >$ (i.e. refers to the future benefits from higher wages)

This illustrates that the investment occurs when the combined utility from (1)-(3) exceeds the alternative path of never investing (right-hand side). This present bias has been empirically documented in educational investment contexts (Cadena and Keys, 2015) and may be particularly relevant for low-wage workers facing immediate financial pressures.

Additionally, the quasi-hyperbolic specification captures a key psychological insight: individuals tend to exhibit disproportionate impatience for near-term tradeoffs compared to similar tradeoffs in the future. This creates time inconsistency in decision-making, as workers systematically undervalue future benefits relative to present costs. For human capital investments, I believe this implies that employees may forgo education opportunities that would benefit them in the long run because they overweight immediate costs and underweight future wage premium.

Wage-dependent discount factors

I propose that the present bias parameter may itself be a function of current wage levels:

$\beta = f(w_{min})$ with $f'(w_{min}) > 0$ for $w_{min} < \overline{w}$(i.e. as wage rise toward subsistence, present bias decreases and β increases towards 1, which reflects declining financial stress), and $f'^{(w_{min})} \approx 0\, for\ w_{min} > \bar{\hat{w}}$ (i.e. once wages exceed subsistence, the additional increases have diminishing effects on present bias), whereas $\bar{\hat{w}}$ represents a subsistence or economic sufficiency threshold. In practice, $\bar{w}$ can be approximated by the local poverty line or a fixed proportion (e.g., 60%) of the median regional wage, consistent with standard measures of economic sufficiency used in the poverty literature. More importantly, $\beta = f(w_{min})\ \epsilon$ (0,1] for all $w_{min} >$ 0, and thus ensuring that the discount factor remains economically meaningful across all wage levels. This extension builds on work by Mullainathan and Shafir (2013) on scarcity and cognitive bandwidth, which suggests that poverty-induced financial stress can lead to more short-sighted decision-making.

To formalize the relationship explicitly, I specify:

$$\beta = f(w_{min}) = \bar{\beta} - \beta_1 * exp\,(-\gamma \cdot w_{min} / \bar{w}) \qquad (10)$$

where $\bar{\beta} \in (0, 1]$ is the upper bound of the present bias parameter approached as wages grow large, $\beta_1 \in (0, \bar{\beta})$ governs the maximum reduction in β due to financial stress (with the constraint $\beta_1 < \bar{\beta}$ensuring β remains strictly positive at all wage levels), and $\gamma > 0$ controls the rate at which present bias diminishes as wages rise. At very low wages, β approaches $\bar{\beta} - \beta_1 > 0$, reflecting maximum present bias under financial stress. As wages increase, β rises monotonically toward $\bar{\beta}$, with the steepest gains occurring near $\bar{w}$. This smooth specification ensures $\beta \in (0, 1]$ for all positive wages, avoids the discontinuity introduced by the indicator function, and generates $f'(w_{min}) > 0$ everywhere with $f''(w_{min}$n$) < 0$ for $w_{min} > \bar{w}$, capturing the diminishing marginal effect of wage increases on time preferences. This formulation is consistent with Mullainathan and Shafir's (2013) finding that scarcity effects are strongest near subsistence and diminish at higher income levels.

Note that if β were constant (i.e., $\beta_1 = 0$), the Term A in the proof of Proposition 1 earlier vanishes entirely, and the model predicts only a monotonically negative relationship between minimum wages and human capital investment, and thus the inverted-U disappears. It is therefore precisely the non-linearity in the wage-dependent present bias that yields the rising portion of the curve at low wages, which makes this specification essential to the model's central result.

The relationship between wages and discount factors creates a potentially important mechanism in the model. At very low minimum wages, workers experience financial scarcity that impairs their ability to focus on long-term planning, effectively increasing their present bias. As minimum wages rise toward the subsistence threshold $\overline{w}$, where this cognitive burden diminishes, allowing workers to make more forward-looking decisions. However, once minimum wage levels exceed this threshold, the additional increases begin to reduce the perceived necessity of human capital investment amongst low-skill workers. With basic needs satisfied, the urgency of pursuing higher wages through education diminishes, even as the cognitive capacity for long-term planning improves. This non-monotonic relationship between minimum wages and human capital investment decisions represents a novel contribution to both the minimum wage and human capital literature.

Expected returns under uncertainty

To incorporate uncertainty while maintaining consistency with the utility maximization framework, the value functions are modified to include probabilistic outcomes:

$$V(I=1) = \sum_{t=0}^{T_e-1} \delta^t u(w_{min}\, h_t - p_e e_t) + q * \sum_{t=T_e}^{T} \delta^t u\,(w_{skilled} * h_t) + (1-q) \sum_{t=T_e}^{T} \delta^t u\,(w_{min} * h_t) \qquad (11)$$

where q ∈ (0,1) represents the probability of successfully completing education and securing skilled employment, which may depend on individual ability ∅ q=q (∅), as illustrated by Altonji (1993) and Stange (2012). This formulation incorporates the realistic uncertainty about educational outcomes while maintaining the utility-based decision framework. The risk adjustment is particularly relevant in the minimum wage context because the certainty of current earnings must be weighed against the uncertain returns to education. When the minimum wage rises, the guaranteed income from low-skill work becomes more attractive relative to the probabilistic returns from skilled employment, potentially reducing workers' willingness to invest in human capital acquisition.

III. The Poverty Cliff Effect

Critical threshold model

I further argue that the relationship between minimum wage levels and human capital investment is non-monotonic. This is defined as: $\pi(I = 1|w_{min})$, as the probability that a worker chooses to invest in human capital given a minimum wage level, where randomness arises from heterogeneity in worker characteristics ∅ ~ F(∅) including ability, family background, and access to credit:

w_{min*}

I further hypothesize and propose that there exists a critical threshold as: $w_{\min*}$, where:

$$\frac{\pi(I = 1|w_{min})}{\partial w_{min}} \begin{cases} > 0 \; if \; w_{min} < w_{min*} \\ = 0 \; if \; w_{min} = w_{min*} \\ < 0 \; if \; w_{min} > w_{min*} \end{cases} \quad (12)$$

This creates an inverted-U relationship between minimum wage levels and human capital investment, similar to the pattern observed by Akerlof and Yellen (1990) in their fair wage-effort hypothesis and similar to the backward-bending labor supply curve introduced in labor economics (Pencavel, 1986). The threshold w_{min*} refers to the point at which the incentive effects of minimum wages shift from being positive to negative for a worker. More specifically, at wage levels below this threshold, an increase in the minimum wage alleviates financial pressure and constraints that might otherwise prevent an investment in education. However, once wage rates exceed this critical level, further increases reduce the relative returns to education while simultaneously raising the opportunity cost of time spent in training, which thus creates a "poverty cliff," where skill acquisition incentives dramatically diminish.

Proposition 1 (Inverted-U Relationship): *There is a unique critical threshold that generates an inverted-U relationship between minimum wages and human capital investment when the following conditions hold:*

1. Bounded skill premium: 1 < w_skilled/w_min < p^{-} *w_min* for some finite p^{-}

2. Education affordability: p_e e_t < w_min - c_subsistence

3. Wage-dependent present bias: $\beta'($ *w_min*$)$ >0 for *w_min* < $\overline{\mathrm{w}}$ $and \beta'(w_{min}) \approx 0$ for $w_{min} > \overline{\mathrm{w}}$

4. Sufficient utility curvature: $-u''(c)/u'(c)$ >1(w_skilled - w_min)

Proof. Define the net benefit of investment as the difference in lifetime utility between the two paths:

$$\Delta(w_{min}) = V(I = 1) - V(I = 0) \quad (13)$$

A worker invests if and only if $\Delta(w_{min}) > 0$. The probability of investment in the population is $\pi(I=1 \mid w_{min}) = \Pr[\Delta(w_{min}) > 0]$, where heterogeneity arises from the distribution of worker characteristics. It suffices to show that $d\Delta/dw_{min}$ changes sign from positive to negative as w_{min} increases.

Differentiating the Δ with respect to w_{min} producess three different terms:

$$\frac{d\Delta}{dw_{min}} = A(w_{min}) + B(w_{min}) + C(w_{min}) \quad (14)$$

Term A: Present bias channel. Because $\beta = f(w_{min})$ with $f' > 0$, an increase in w_{min} raises the β (and thus reduces present bias), which increases the weight placed on the future skilled-wage period relative to the present. This effect increases Δ, so $A(w_{min}) > 0$. By Condition 3 and the exponential specification of f, this effect is strongest when $w_{min} < \bar{w}$ and ultimately diminishes toward zero as w_{min} rises above $\bar{w}$, since $f'(w_{min}) \approx 0$ for $w_{min} > \bar{w}$.

Term B: Wage compression and opportunity cost channel. A higher w_{min} reduces the net benefit of investment through two mechanisms or channels. First, by Condition 1 (bounded skill premium), the ratio $w_{skilled}/w_{min}$ is decreasing in w_{min}, compressing the wage premium from education. Second, the opportunity cost of time spent in education (foregone earnings $w_{min} * h_t$) rises with w_{min}. Together, these imply $B(w_{min}) < 0$, and $|B|$ is increasing in w_{min}.

Term C: Refers to the diminishing marginal utility channel. By Condition 4 (i.e. sufficient utility curvature), u is strictly concave, so $u'(w_{skilled} \cdot h_t) < u'(w_{min} \cdot h_t)$. As w_{min} rises, the marginal utility gain from moving to $w_{skilled}$ shrinks. This implies $C(w_{min}) < 0$, and $|C|$ is increasing in w_{min} under Condition 1. Combining those three terms: At low values of w_{min} (below $\bar{w}$), Term A is large and positive while Terms B and C are small in magnitude, this is because the wage premium is large and marginal utility differences are steep. Therefore, $d\Delta/dw_{min} > 0$: raising the minimum wage increases the incentive to invest.

At high values of w_{min} (above $\bar{w}$), Term A vanishes (since $f' \approx 0$), while Terms B and C grow in absolute value due to wage compression and diminishing marginal utility. Hence $d\Delta/dw_{min} < 0$: further increases in the minimum wage reduce the incentive to invest.

By continuity of $d\Delta/dw_{min}$ and the intermediate value theorem, there exists a unique threshold $w_{min}*$ such that $d\Delta/dw_{min} = 0$ at $w_{min}*$, with $d\Delta/dw_{min} > 0$ below and $d\Delta/dw_{min} < 0$ above. Since $\pi(I=1 \mid w_{min})$ is monotonically increasing in Δ, this establishes the inverted-U relationship.

Uniqueness follows from the monotonic decline of A and monotonic increase of |B| + |C|, ensuring a single crossing.

Figure 1. Inverted U relationship between Minimum wages and Human capital investment

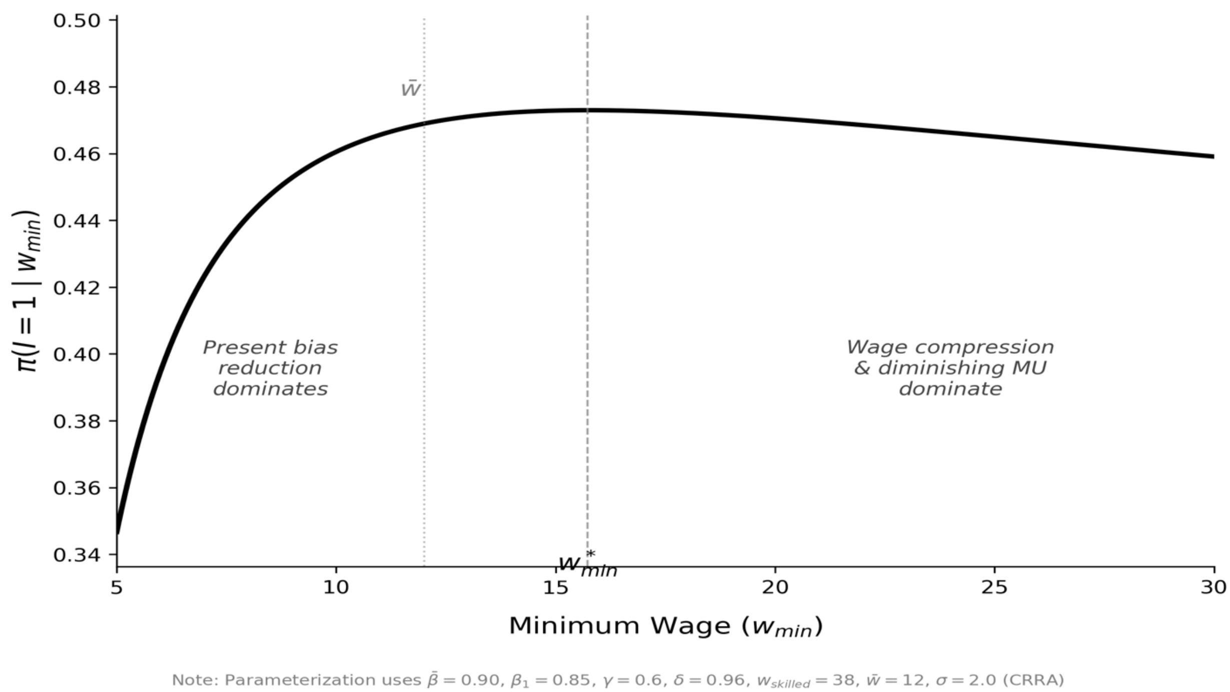

Figure 1 above shows the inverted-U relationship under a numerical parameterization of the model. More specifically, the horizontal axis denotes the minimum wage level, and the vertical axis refers to the probability of human capital investment π(I=1 | w_min). At low wage levels, increases in the minimum wage increase the investment probability as present bias diminishes (Term A dominates). Beyond the critical threshold w_min ≈ 15.7, the wage compression and diminishing marginal utility dominate (Terms B and C discussed earlier), and the investment probability declines. The subsistence threshold w̄ is marked for reference. This pattern is robust to alternative parameter values, but the location of w_min varies and may shift with the skill premium, education costs, and the degree of present bias.

Alessandrini and Milla (2024) provide empirical support for this non-monotonic pattern using Canadian data, finding that minimum wage increases boost community college enrollment while simultaneously reducing university enrollment, which is a pattern consistent with the model's prediction that different education types respond differently based on their position relative to the critical threshold.

Formal mechanisms of the Poverty Trap

The trap operates through four distinct but related channels. First, there is the wage compression effect: As w_{min} rises, the relative wage premium $(\frac{w_{skilled}}{w_{min}} - 1)$ decreases, formally expressed as

$\frac{\partial}{\partial w_{min}} \left(\frac{w_{skilled}}{w_{min}} - 1\right) = -(\frac{w_{skilled}}{w_{min}^2} < 0$ (15)

This relationship demonstrates how higher minimum wages directly diminish the proportional returns to education, building on Acemoglu and Pischke's (1999) analysis of compressed wage structures. Second, the opportunity cost effect makes education relatively more expensive as the minimum wage increases. For instance, with $\frac{\partial OC_t}{\partial w_{min}} > 0$ (16), where OC_t denotes the opportunity cost of education in period t. The time spent in education rather than working becomes increasingly costly, consistent with Becker's (1965) time allocation theory.

Third, the marginal utility effect describes how satisfaction from additional income diminishes once wages exceed a comfort threshold. When $w_{min} > \overline{w}$, I further observe that $\frac{\partial u\prime(w_{min})}{\partial w_{min}} < 0$, which implies that the motivation to pursue even higher wages through more educational attainment and training declines further. This relationship draws from Clark and Oswald's (1996) research on income satisfaction and reference points. Finally, the reference point effect alters how workers evaluate potential wage gains. Following Koszegi and Rabin (2006), if utility depends on consumption relative to a reference point where $r = w_{min}$, then $u(w_{skilled}|r) = v(w_{skilled}) + n[v(w_{skilled}) - v(r)]$. As the minimum wage level increases, the comparison component for workers $n[v(w_{skilled}) - v(r)]$ declines more, which hence makes the skilled wages seem less attractive despite their absolute value remaining unchanged.

IV. Welfare Implications

Individual welfare analysis

Individual welfare can be decomposed into short-term and long-term components with different weights:

$$W_{individual} = \alpha \cdot W_{short-term} + (1 - \alpha) * W_{long-term} \quad (17)$$

where $\alpha \in (0,1)$ is a representation of the relative weight on short-term welfare, and where T_1 denotes the end of the short-term horizon (e.g., the education completion period T_e),

and

$W_{long-term} = \sum_{t=T_1+1}^{T} \delta^t u(c_t)$ (18)

This suggests that a higher minimum wage rate has an opposing impact on these components: $\frac{\alpha W_{short-term}}{\alpha w_{min}} > 0$ (i.e. immediate income gains),

and $\frac{\alpha W_{long-term}}{\alpha w_{min}} < 0$ for $w_{min} > w *_{min}$ (i.e. reduced human capital investment).

This welfare decomposition explains the fundamental policy tradeoff inherent in minimum wage policies. Specifically, although increases in the minimum wage generate immediate consumption benefits for workers, they may simultaneously reduce lifetime earnings potential by diminishing incentives for skill acquisition. More importantly, this welfare loss occurs not because workers are behaving irrationally, but because the combination of present bias and altered incentive structures leads to individually optimal decisions that are nonetheless socially suboptimal when accounting for human capital externalities (captured by γ in the social welfare function below). The parameter α can be interpreted as indicating the social planner's time preference: a planner who values immediate poverty reduction highly would set α close to 1, while a planner more focused on long-run growth would set α closer to 0. The optimal policy depends critically on the weight placed on short-term versus long-term welfare, as well as the location of the current minimum wage relative to the critical threshold $w *_{min}$.

The social planner's optimization problem yields the following first-order condition for the optimal minimum wage:

$$\sin\_\emptyset\ [\alpha * \boldsymbol{u}'\left(\mathrm{c}_{\mathrm{short}(\emptyset)}\right) + (\mathbf{1} + \alpha) * \boldsymbol{u}'(\mathrm{c\_long}(\emptyset)) * \frac{\pi(I = 1|\emptyset, \mathrm{w}_{\mathrm{min}})}{\partial \mathrm{w}_{\mathrm{min}}} * \Delta\mathrm{\_skill}]\ \mathrm{dF}(\emptyset) = 0 \qquad (19)$$

where $\Delta\mathrm{\_skill} = \sum\_\{t = T\_e\}\hat{}T\ \ \delta^t[u(\mathrm{w}_{\mathrm{skilled}} *\ h_t) - u(\mathrm{w\_min} *\ h_t)]$ represents the lifetime utility gain from skill acquisition. This condition reveals that the optimal minimum wage must balance immediate consumption benefits against long-term mobility effects, with the weight α determining whether the optimum lies above or below the critical threshold of w_min.

Social welfare considerations

From a social welfare perspective, one must also take into consideration both 1) direct welfare effects on current workers and 2) dynamic effects on human capital accumulation:

$$W_{social} = \int_{\mathrm{i}\in\mathrm{I}} w_{individual}\hat{}di\ + \gamma * H \qquad (20)$$

,where I represent the set of all individuals in the economy, $H = \int_{\mathrm{i}\in\mathrm{I}} h_i * di$ representing the total human capital stock and $\gamma > 0$ captures the social returns to acquiring human capital (i.e. this includes productivity spillovers and fiscal externalities). This proposed framework here extends traditional welfare analysis of minimum wages (e.g., Lee and Saez, 2012) by incorporating dynamic effects on human capital accumulation. It relates to Heckman et al.'s (2006) lifecycle skill formation models by highlighting how policy interventions can have unintended consequences on skill development trajectories. In addition, the social welfare formulation indicates that minimum wage policies may have broader implications beyond their immediate distributional effects.[2]

V. Empirical implications and causal testable hypotheses

The theoretical model generates several testable implications for empirical research. While I do not conduct empirical tests in this paper, I outline the key variables and relationships that should be examined in future research. Each hypothesis below links directly to specific model parameters and can be tested using the empirical strategies that I propose.

Educational investment outcomes

Hypothesis 1 (derived from Proposition 1 earlier): The model predicts differential enrollment patterns based on minimum wage levels. For community college attendance, regions with minimum wages near but below $\bar{w}$ should show higher enrollment rates compared to regions well below or above this range, with magnitude depending on the local skill premium and education costs. Conversely, in regions with very high minimum wages (i.e. $w_{min} > 1.2\bar{w}$), one would expect to see lower enrollment rates, particularly in programs associated with entry-level career advancement. This prediction can be tested using approaches similar to those employed by Black et al. (2005), who examined how local economic conditions affect college enrollment decisions. Alessandrini and Milla (2024) provide initial support using Canadian data, though I believe a comprehensive test requires examining a wider range of minimum wage levels.

Hypothesis 2 (from the time cost parameter h_t): Regarding certificate program participation, enrollment in short-term, skill-specific certificate programs should be particularly sensitive to minimum wage levels. Programs that lead to immediate wage premiums just above minimum wage should show the strongest negative correlation with high minimum wages. More specifically, the model predicts a negative elasticity for certificate program enrollment with respect to minimum wage increases above w_{min}, but the magnitude of which is an empirical question that depends on the parameters of the utility function and the local wage structure. This relates to research by Jepsen et al. (2014) on returns to community college certificates and diplomas, which found substantial variation in returns across program areas.

For persistence in educational programs, higher dropout rates are expected in high minimum wage regions. Additionally, time-to-completion may extend as the opportunity cost of full-time education increases. These patterns would extend findings by Bound et al. (2012) on factors affecting college completion rates.

Informal skills development

Regarding on-the-job training participation, workers in high minimum wage environments may show lower voluntary participation in unpaid or after-hours skill development opportunities.

[2] This occurs by potentially reducing human capital acquisition among low-wage workers, excessively high minimum wages could constrain long-term productivity growth and economic mobility.

Employer-provided training participation rates may serve as a proxy for worker investment in future career growth. This builds on Acemoglu and Pischke's (2003) analysis of the relationship between wage compression and training provision.

Labor Market mobility measures

For transition rates from low to high-skill occupations, the theoretical model predicts lower transition rates in high minimum wage regions. Longitudinal employment data can track workers' movement between skill-level categories over time. This extends the occupational mobility analysis of Kambourov and Manovskii (2008) by specifically focusing on minimum wage effects.

With regard to career ladder progression, the model suggests examining two key metrics. First, the time spent at each rung of typical career ladders should increase in high minimum wage environments. Second, the probability of advancing to supervisory or management positions from entry-level roles would likely decrease. These measures relate to Baker et al.'s (1994) work on internal labor markets and career dynamics. The model further generates predictions regarding wage growth trajectories and the duration of minimum wage employment, which are developed and tested empirically in a companion paper.

Empirical Identification Strategy

To test the inverted-U hypothesis, future research should employ:

1. Cross-state variation exploiting differences in state minimum wages relative to local subsistence thresholds: Y_ist $=\boldsymbol{\alpha} + \boldsymbol{B}_{1\left(\mathrm{w}_{\min},\frac{\mathrm{st}}{\bar{\mathrm{w}}_{\mathrm{st}}}\right)} + \boldsymbol{\beta}_{2\left(\mathrm{w}_{\min},\frac{\mathrm{st}}{\bar{\mathrm{w}}_{\mathrm{st}}}\right)^2}\boldsymbol{\gamma}\boldsymbol{X}_{ist} + \boldsymbol{\delta}_s + \emptyset_t + \boldsymbol{\varepsilon}_{ist}$
2. Regression discontinuity designs at policy boundaries where minimum wages change discretely, and
3. Event study approaches tracking individual outcomes before and after minimum wage changes, allowing for non-linear effects over time as predicted by the model.

VI. Discussion and Policy Implications

The theoretical framework developed in this paper suggests a more nuanced approach to minimum wage policy than typically considered in policy debates. Although the complete inverted-U relationship still requires and awaits comprehensive empirical validation, I argue that the theoretical framework here offers clear parameter conditions under which this pattern emerges. The model's predictions align with recent empirical findings, including Alessandrini and Milla (2024) on differential effects across education types and MaCurdy (2015) on the complex distributional effects of minimum wage policies when accounting for price level adjustments. While minimum wages provide important income support for low-wage workers, policymakers should be attentive to potential dynamic effects on human capital investment and resulting long-term economic mobility.

Several implications emerge from my analysis. First, complementary human capital policies are essential. Minimum wage increases should be paired with targeted education subsidies, reduced tuition for part-time students, and flexible scheduling options to offset potential disincentive effects on education investment. This approach is consistent with recommendations by Holzer (2009) for complementary workforce development policies. Second, graduated minimum wage structures could be more effective than uniform approaches. Rather than uniform minimum wages, graduated structures based on worker age, experience, or skill certification could maintain incentives for skill development while providing income support. Such approaches have been implemented in countries like the UK (Dickens et al., 2015). Third, employer training incentives could counteract reduced individual investment. Tax incentives or subsidies for employer-provided training could offset reduced worker investment in skills acquisition. This builds on Lerman's (2014) proposals for apprenticeship expansion. Fourth, information interventions could play an important role. Providing clear information about returns to education and training, especially to minimum wage workers, may help counteract present bias and reference-dependent effects. This approach is supported by findings from Hoxby and Turner (2015) on information interventions in college choice.

Finally, the potential existence of a minimum wage poverty trap does not necessarily argue for lower minimum wages. Rather, it suggests that a more comprehensive policy approach is needed to balance immediate income needs with long-term economic mobility goals.

VII. Conclusion

This paper has developed a theoretical framework for understanding how minimum wage policies might unintentionally create a “poverty trap” by reducing incentives for human capital investment among low-wage workers. By incorporating insights from behavioral economics into a formal model of education and training decisions, I have identified a potential non-monotonic relationship between minimum wage levels and economic mobility. The model provides explicit conditions under which this inverted-U pattern emerges, including bounds on skill premia, education affordability constraints, and wage-dependent present bias.

Whilst higher minimum wages provide important immediate income benefits, the model suggests they may have unintended consequences for long-term wage growth and career advancement if not accompanied by policies that specifically address human capital development. The framework generates testable predictions about educational enrollment, occupational mobility, and wage growth patterns that can guide future empirical research.

These findings contribute to the ongoing debate about optimal minimum wage policy by highlighting an underexplored dimension of minimum wage effects. Rather than focusing exclusively on employment effects, policymakers should consider dynamic effects on skill acquisition and resulting implications for economic mobility. By taking a more comprehensive approach that combines income support with human capital development, policies can better address both immediate needs and long-term opportunities for low-wage workers. Lastly, recent empirical studies offer partial support for the model’s theoretical predictions, yet conducting more comprehensive testing of the full non-monotonic relationship remains an important area for future research.

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