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A Skills-Based Human Capital Framework to Understand the Phenomenon of Youth Economic Disengagement

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Abstract

This paper revisits traditional human capital models and proposes a new conceptual framework of human capital accumulation, anchored in skills development, to illustrate the phenomenon and implications of youth economic disengagement. In the framework, youth economic disengagement is defined as a state (temporary or permanent) where individuals stop accumulating human capital due to inadequate access and quality of opportunities for skills development through formal education and employment. Total economic disengagement is a rational choice that individuals make when (i) the formal education system and labor market do not contribute to build skills that are valued by the labor market, and (ii) the costs related to economic engagement (that is, studying and working) surpass its benefits. The phenomenon of economic disengagement has lifelong implications that not only constrain and restrain future earnings, but also undermine prospects for improvements in productivity and economic growth.

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The World Bank [1]

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I. Introduction

There is a consensus in the literature that the process of human capital accumulation is a central determinant of economic growth (Acemoglu and Autor, 2012; Acemoglu, 2009; Goldin and Katz, 2007). Traditional human capital models build upon the assumption that an individual's decision to invest in human capital is based on an examination of the net present value of the costs and benefits of such investments (Becker 1964, Mincer, 1974). In other words, Individuals invest in the development of their skills (i.e., pay to acquire skills and/or forgo earnings) to receive returns to the investments in subsequent periods (Veum, 1995). Individuals make most of their investments in skills when they are young. This feature occurs because forgone earnings are relatively low in early years and because the earlier investments are made, the more extended the period over which they can render returns (Ben-Porath, 1967 and Cunha and Heckman, 2007). As such, investment decisions made by individuals in their youth years are determinant and involve long-lasting consequences.

The processes and factors that determine human capital accumulation have been subject to recurrent study in the literature. While it remains complex to fully understand how human capital forms, there is a consensus that an individual's abilities (innate or acquired) are the result of a series of factor inputs that constitute a human capital technology production function (Acemoglu and Autor, 2012; Acemoglu and Autor, 2010; Ben-Porath, 1967). While many attempts have been made to quantify and qualify such production function, there seems to be consensus in the literature that there are three main channels through which human capital forms: (i) home, especially for children below school-age, (ii) school, for school-aged children, and (iii) the labor market/on-the-job training, for individuals who make a transition from education into employment (Behrman et al., 2014; Keneneth et al, 2011; Acemoglu and Autor, 2012; Hanushek and Woessman, 2008; Veum 1995). In the light of this literature, the number of years of schooling and the number of years of employment experience have often been considered as the standard predictors of human capital endowments for individuals (Krueger and Lindahl, 2001; Barro, 2001; Barro and Sala-i-Martin, 1995).[2]

[2] Human capital has been often measured in the literature as the present value of the expected future labor incomes that could be generated over the lifetime of the people currently living, given their levels of educational attainment and experience (Jorgenson and Fraumeni, 1989, 1992a, 1992b).

Youth economic disengagement has been traditionally understood as the phenomenon of having youth not in school and not in employment (i.e., not accumulating human capital), known as the NEET status (not in education, employment or training). The NEET represent a crisp representation of youth disengagement and a concern of policy makers who see in them a clear symptom of a population that undermines human capital accumulation potential – with significant economic and social exclusion repercussions (De Hoyos et al., 2013; Bynner and Parsons, 2002; Croxford and Raffe, 2000).

Some recent literature, however, has encountered nuisances to the classical wisdom of human capital accumulation and youth disengagement exposed above. Hanushek and Woesman (2008) and Hanuschek and Zhang (2009), for instance, argue that years of schooling is a poor proxy for human capital since it undermines both the quality of schooling received as well as the quality of the skills acquired. Also, while the conventional Mincerian wisdom expects wages to be an increasing concave function of employment experience, recent evidence indicates that some workers (compared to others with seemingly similar characteristics and controlling for the business cycle), are exposed to wage decreases as their employment experience increases due to churning characteristics of modern labor markets (Burdett et al., 2011). In summary, the emerging evidence indicates that access to education and employment, while necessary, is not a sufficient condition to assure human capital accumulation if they do not meet the essential quality requirements and if they do not contribute to build the individual's skills set.

Based on this emerging evidence, this paper revisits traditional human capital models and proposes a conceptual framework of human capital accumulation, anchored on skills development, to understand youth economic disengagement. Economic disengagement is defined, beyond the NEET status, as a state (which could be temporary or permanent) where individuals stop accumulating human capital due to inadequate access and quality of opportunities for skills development and employment. Under these assumptions, the NEET population constitutes only the tip of the iceberg of a broader and far-reaching disengagement problem that affects a population of youth that was thought to be on the right track, and that is often ignored by statistics as well as policy makers.

II. Conceptual Framework

The conceptual framework presented in this section builds upon the previous literature on human capital under competitive markets (Becker 1964, Mincer, 1974). One individual achieves the optimal choice of human capital accumulation when the marginal benefits of investments in human capital equal the marginal costs of such investments. Marginal benefits of investments in human capital are expected to decrease as human capital increases, while the marginal costs are expected to increase. The market's demand for human capital determines the returns of human capital investments, which are not uniform across all domains and skills (i.e., some activities are more skills-intensive than others) (Acemoglu and Autor, 2012). As markets are competitive, an increasing supply of human capital in the economy will tend to increase the relative output of skill-intensive activities and hence reduce the skill premium that educated workers enjoy (Goldin and Katz, 2007).

Human capital augments effective units of labor and makes workers more productive. At the macro level, the aggregate production of the economy (*Y*) is dependent on physical capital (*K*); human capital (*HK*), measured as efficiency units of labor; and technology (*A*) (Goldin and Katz, 2007). The production function is assumed to have constant returns to scale on *K* and *HK*:

$$Y = f(K, HK, A) \tag{1}$$

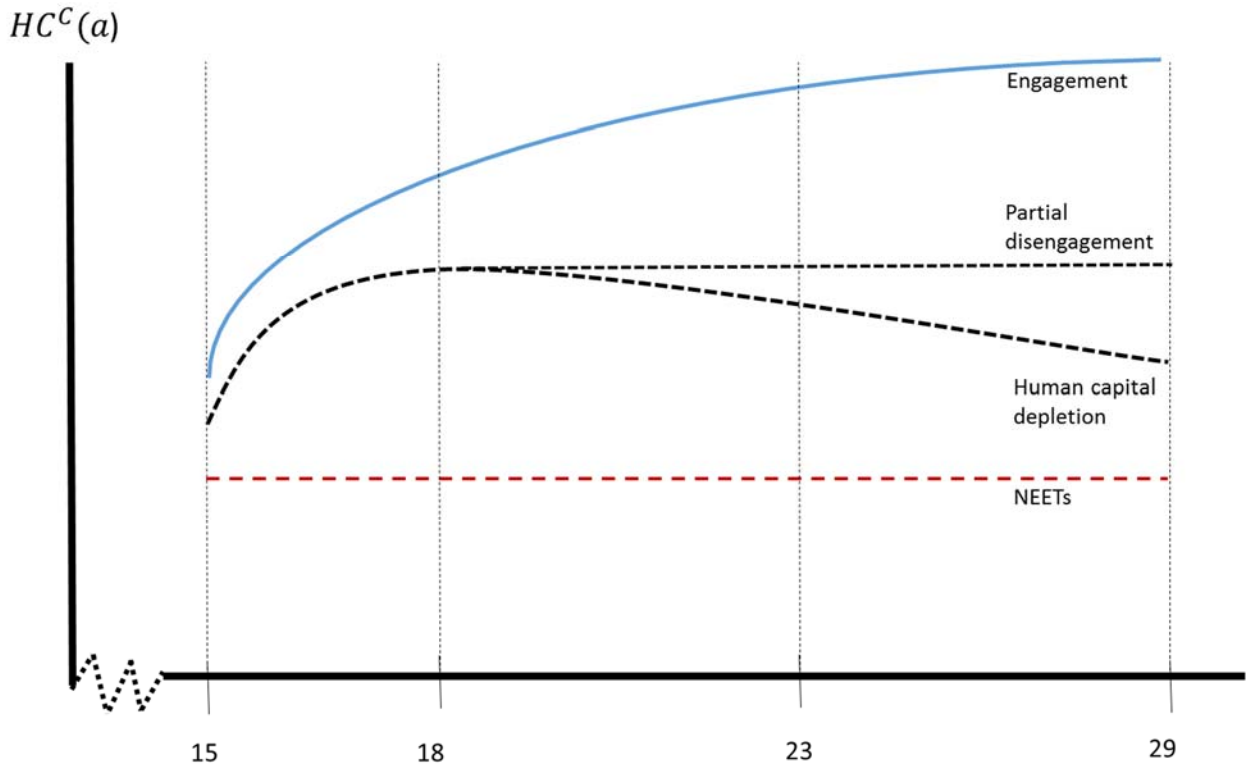
At the micro level, ${HK^C}_a$ denotes the human capital accumulated by an individual at age a. The model assumes that human capital accumulation has a life cycle skill formation (Behram et al. 2014; Cunha and Heckman, 2007). The stock of human capital accumulated at age a, denoted by ${HK^C}_a$ is dependent on the human capital accumulated until age $a-1$ and on the marginal human capital acquired at age a. In other words, investments made in previous years influence the decisions individuals make concerning human capital investments today. Additionally, the framework allows the possibility that human capital depletes at an exogenous rate ρ_a, which can vary with time:

$${HK^C}_a = \rho_a {HK^c}_{a-1} + HK_a \tag{2}$$

$where\ 0 < \rho_a < 1$ if $HK_a = 0$ and $\rho_a = 1$ if $HK_a > 0$.

Youth economic disengagement, defined by $dHK^{C}{}_{a}/d_{a} \leq 0$, reflects a partial or permanent break in human capital accumulation, whereby the stock of human capital remains unchanged and/or depletes (Figure 1).

Figure 1: An illustration of Youth Economic Disengagement



A fully engaged individual follows the trajectory of the upper curve, accumulating human capital throughout his or her life-cycle, representing the aspirational norm. This trajectory may vary in different contexts and by the individual's age, but in general, takes the form of a top performing student who receives high-quality education before joining the labor market in a rewarding and constructive job. On the other end of the engagement spectrum are the NEETs, who are out of school and out of the labor market while their human capital depreciates. There are several intermediate states, however, including students in low-quality institutions, informal sector or temporary workers, or those in a position that does not match or improve their skills. The understanding of these different states and the factors that generated them is crucial to determine the relevant policies that might bring the individual closer to the aspirational norm.

To understand the disengagement phenomenon, we have to study not only the mechanisms that allow individuals to build human capital, but also the decision processes that individuals face to invest in it. In this model, the investment is the time dedicated to study or work. Individuals choose to invest in human capital because they expect to receive the returns to their investments in the form of future earnings. In general, individuals make their decisions considering both their time and monetary restrictions, the expected returns to the investments, as well as the characteristics of the schooling system, the labor market, and the community. The benefit of working is hereby defined not only by the wage but also by the skills acquired on the job (i.e., on-the-job learning).

2.1. Maximizing the Utility Function

Individual wages, denoted by w_a, are determined by the maximum services of human capital that the individual can offer in the labor market at age *a* and by its rental value in the market, denoted by α_a. Individuals need to be employed to render wages.[3]

$$w_a = \alpha_a H K_{a-1}^{C} \tag{3}$$

In every period, individuals can choose to study, work, or stay idle. Let h_a^e and h_a^l denote the number of hours spent in formal education and working, respectively, which are bound by a time constraint *H*. Individuals may also be responsible for domestic activities and house-care, that needs to be outsourced while they study and/or work at an hourly cost, denoted by p_d.

With a discount rate δ, in every period, individuals maximize their utility function determined by a vector of consumption items, C_a, *o*ver their lifecycle, and subject to their maximum disposable income, E_a:

$$Max \sum_{a_{min}}^{a_{max}} \delta^a U(C_a, h_a^l, h_a^e) \;\; s.t. \begin{cases} C_a \leq E_a \\ h_a^e + h_a^l \leq H \end{cases} \quad \text{for every } a \tag{4}$$

Where

$$E_a = y_a - p_d(h_a^e + h_a^l) \tag{5}$$

[3] The value of the parameter α_a depends on contextual variables affecting labor productivity and price, such as labor market regulation, sector of specialization, factor technology, and other macroeconomic conditions.

Individual income, y_a consists on the individual's wage, if employed, plus other income, denoted by y_o, from external sources such as family or intertemporal allocations and government transfers:

$$y_a = w_a h_a^l + y_o \tag{6}$$

Finally, the model assumes that the utility function is increasing and concave with respect to consumption and non-increasing and convex with respect to work, so that $\frac{\partial U}{\partial C_a} > 0, \frac{\partial^2 U}{\partial C_a^2} < 0$ and $\frac{\partial U}{\partial h_a^l}, \frac{\partial U}{\partial h_a^e} \leq 0, \frac{\partial^2 U}{\partial h_a^{l2}}, \frac{\partial^2 U}{\partial h_a^{e2}} > 0$.[4] The individuals also need to consume a minimum to survive, so that $\lim_{C_a \to 0} U(C_a) = -\infty$.

Solving the previous maximization model, we find that:

$$\delta^a \frac{\partial U}{\partial h_a^e} + \sum_{t>a}^{a_{max}} \delta^t \frac{\partial U}{\partial C_t} h_t^l \left(\frac{\partial w_t}{\partial h_a^e} - \frac{\partial w_t}{\partial h_a^l} \right) = \delta^a \frac{\partial U}{\partial C_a} w_a + \delta^a \frac{\partial U}{\partial h_a^l} \text{ for every } a \tag{7}$$

Equation (7) indicates the optimal manner individuals will allocate their time between study and work. The right side of the equation denotes the marginal utility gain that the person obtains when working. For every additional hour worked, individuals get paid more, consume more, and ultimately get utility from such consumption. The model assumes that individuals get disutility from work. The left side indicates that an individual's optimal choice might be to study one extra hour if the expected increase in future wages from doing so is larger than the expected increase in future wages for an extra hour of work.

To better understand the decisions made by individuals, one can use equation (3) to express changes in the individuals' marginal wages as a function of their human capital and its rental value in the market:

$$\frac{\partial w_t}{\partial h_a^j} = \alpha \frac{\partial HK_t^C}{\partial h_a^j} = \alpha \prod_{i=a}^{t} \rho_i \frac{\partial HK_a}{\partial h_a^j}, \text{ where } j = \{e, l\} \tag{8}$$

[4] By including a non-positive utility for hours spent in school and at work, we are admitting that the individual could prefer to do nothing than either of these activities. This is an alternative approach to including leisure in the model and generates similar outputs. There are two main differences. The first is that we do not include a cost associated with hours spent out of school and out of work, as is usual in models that include hours spent on leisure. This admits that there are activities that are free and that anything that is paid is included in the consumption vector. The second and more practical difference is in the number of equations required to determine the results. By limiting the choice to three variables per each period a (C_a, h_a^l and h_a^e), we only need three equations by period to solve the model; equation (9), the time and budget constraints. Lastly, it also leaves the model open to other activities out of education and the labor force, such as the care of children and elderly for instance.

Note that $\frac{\partial HK_a}{\partial h_a^j}$ does not depend on t, so it can be brought out of the summation. Substituting (8) into (7), we have that:

$$\delta^a \frac{\partial U}{\partial h_a^e} + \frac{\partial HK_a}{\partial h_a^e} B = \delta^a \frac{\partial U}{\partial C_a} w_a + \delta^a \frac{\partial U}{\partial h_a^l} + \frac{\partial HK_a}{\partial h_a^l} B \qquad (9)$$

Where $B = \sum_{t>a}^{a_{max}} \left(\delta^t \frac{\partial U}{\partial C_t} w_t \alpha \prod_{i=a}^{t} \rho_i \right)$ represents the discounted present utility of future consumption purchased through future wages. The left-hand side of equation (9) represents the marginal long-life benefits from studying an extra hour, while the right-hand side is the present and long-life benefits of working an extra hour. [5]

The decision to only study

Looking at equation (9), if $\delta^a \frac{\partial U}{\partial h_a^e} + \frac{\partial HK_a}{\partial h_a^e} B > \delta^a \frac{\partial U}{\partial C_a} w_a + \delta^a \frac{\partial U}{\partial h_a^l} + \frac{\partial HK_a}{\partial h_a^l} B$ for $\forall\, h_a^e \in [0, H]$, the individual will choose to study only, this is $h_a^l = 0$. This happens if:

a) The marginal return of human capital from studying is higher than that of working; this is if $\frac{\partial HK_a}{\partial h_a^e} > \frac{\partial HK_a}{\partial h_a^l}$;

b) The individual expects to be rewarded for this investment in the future, where the skills acquired in education will render higher wages when the individual chooses to work in the future (so that $B > 0$); and

c) Individuals can afford their foregone wages today while paying the price of domestic care and consuming (y_0 is large enough).

When the individual is young and has not yet learned essential skills through education, the decision to only study is clearly the best option. The wages offered in the market for such levels of human capital would be meager, as well as the gains in human capital they could acquire while employed. Moreover, if the quality of education is good enough for individuals to increase their human capital, which will be rewarded in the future, and if the transfers, y_0, are enough to provide consumption and bear their costs of care, they will remain only in school. Finally, it is worth noting that that the returns to investments in human capital at age a are conditional on individuals

[5] For simplification, the model does not include limited information. If we consider that the choices individuals make are based on their perceptions of what can be learned at a given job or education institution, or what the returns to these skills might be, the results may vary.

working in the future. As such, there are no incentives for individuals to remain in school if they do not expect to work in the future.

The decision to start working

Equation (9) provides some intuitive information about when individuals choose to join the labor market. According the system of equations presented above, h_a^l can become positive for a few reasons:

a) When the potential future gains from working become more substantial than the benefits from studying one extra hour: when the gains in human capital acquired by staying in school diminish and the gains acquired in the labor market increase, $\frac{\partial HK_a}{\partial h_a^e} < \frac{\partial HK_a}{\partial h_a^l}$;
b) When the immediate gains from working at age a increase. If w_a becomes attractive enough so that the utility brought by the consumption is larger than the disutility of an extra hour of work;
c) When the present restrictions require the individual to enter the labor market. If y_0 becomes insufficient to pay for the minimum consumption and care.

Note that, according to the circumstances the individual faces, the outcome *work-and-study* can fall at different points of the engagement spectrum. When the job provides excellent opportunities to acquire skills and complements those learned in school, the individual is closer to the full engagement trajectory. However, when individuals enter the labor market out of necessity, to a job that does not provide adequate opportunities for skills-development, they are abnegating potential human capital gains from an extra hour in school to work. When comparing time allocation statistics, these two types of individuals can have the same allocation, but completely different outcomes and implications for the society's productivity.

The decision to quit school

Still regarding equation (9), individuals will choose to leave school and stay only in the labor market, that is $h_a^e = 0$, if $\delta^a \frac{\partial U}{\partial h_a^e} + \frac{\partial HK_a}{\partial h_a^e} B < \delta^a \left(\frac{\partial U}{\partial C_a} w_a + \frac{\partial U}{\partial h_a^l}\right) + \frac{\partial HK_a}{\partial h_a^l} B$ for $\forall\, h_a^e \in [0, H]$. This can be a result of the following situations:

a) The marginal gain in human capital from an extra hour of work is higher than from an extra hour of study, $\frac{\partial HK_a}{\partial h_a^e} < \frac{\partial HK_a}{\partial h_a^l}$;

b) The marginal gain in human capital from one extra hour of study is greater than that of an extra hour of work but y_0 is so small, and w_a and p_d are so large that $\delta^a \left(\frac{\partial U}{\partial C_a} w_a + \frac{\partial U}{\partial h_a^l}\right)$ more than offsets this difference; [6]

c) The individual does not receive enough returns in the future from the accumulation of human capital through education to compensate for the foregone consumption today (i.e., B is close to zero). This circumstance happens if market wages w_t are low, if skills gained today in the education system depreciate quickly, if the discount rate is small, and/or the individual does not expect to work in the future.

The decision to become an NEET

After individuals drop-out from school so that $h_a^e = 0$, the solution of the maximization problem becomes as follows:

$$\frac{\partial HK_a}{\partial h_a^l} B - \frac{\partial U}{\partial h_a^l} = \delta_a \frac{\partial U}{\partial C_a} (p^d - w_a) \qquad (10)$$

The left-hand side of equation (10) represents the net marginal long-life benefits from working an extra hour. Individuals will choose to work if these benefits are greater than zero. In other words, individuals will work if:

a) The discounted expected wages are more than enough to pay the expected value of domestic care; this is if $w_a > p_d$;

b) The individual expects to receive enough returns in the future from the accumulation of human capital through employment to compensate for the foregone consumption today (i.e., B is larger than zero);

c) If y_0 is large enough so that individuals can afford to work with wages that are lower than the cost of domestic care while still accumulating human capital. This is if $C_a = y_0 + h_a^l(w_a - p^d)$ is large enough to make $\delta_a \frac{\partial U}{\partial C_a} (p^d - w_a) < \frac{\partial HK_a}{\partial h_a^l}$.

[6] Recall that $h_a^e \leq H - h_a^l$ and $C_a \leq w_a h_a^l + y_0 - p_d(h_a^e + h_a^l)$ for every a, and they are equal when the restrictions are binding.

If at least one of the three conditions above is not satisfied, individuals are better off being NEETs.

Disengaged employment

Individuals may choose to work even if there is not any gain to their human capital from doing so. This outcome will occur if, in any period a, given the individual's human capital, the wages obtained by the individual would allow them to consume more than if they stay idle, that is if $w_a h_a^l > p^d h_a^l + y_0$. In this case, the individual will work an extra hour while the marginal utility of the consumption provided by their net wages is larger than the marginal disutility of being employed, $\delta_a \frac{\partial U}{\partial C_a}(w_a - p^d) \geq \frac{\partial U}{\partial h_a^l}$, not necessarily investing H and staying idle the rest of the time. Potentially, the individual may see his or her human capital deplete and be considered disengaged even while working.

Subsistence employment

A final implication of the framework is that, even if conditions are entirely adverse, individuals may be forced to work. The lower y_0 and the lower p^d, the lower the wage an individual will accept to work to be able to have positive consumption (i.e. subsistence employment).

2.2. The Human Capital Production Function

The production function that individuals face when making human capital investment decisions is a complex system of technical, institutional, and price factors that influence the inputs that contribute to skills development. This framework assumes that human capital is mainly formed through education, acquisition of skills on the job, and intrinsic ability (i.e., to create and enterprise). The returns of these inputs (i.e. their marginal products) depend on several exogenous factors at the individual/family level (e.g. such as health and nutrition), community level (e.g. quality of available infrastructure), and macro level (e.g. government policies, technology, and public spending) (Behram et al. 2014 and Ben-Porath, 1967). In such context, the human capital production function can be described as follows:

$$HK(a) = f(E(h_a^e, \gamma_a), L(h_a^l, \gamma_a),\ U(\gamma_a)) \qquad (11)$$

Where $E(h_a^e, \gamma_a)$ denotes the skills acquired through formal education, $L(h_a^l, \gamma_a)$ denotes the skills acquired through employment experience, and γ_a is a set exogenous factors at the

individual, family, community, and macro levels that influence the skills development process. The model assumes that education and employment are imperfect-substitute factor inputs in the production function. In other words, formal education cannot fully develop the skills individual can acquire while in the labor market and vice-versa. Finally, *U* denotes the individual's intrinsic ability, which is assumed to be age invariant.

Human capital accumulation through formal education

The traditional approach in human capital development models is to assume that human capital accumulation through education is assured if students are enrolled at school (Behram et al. 2014; Barro and Sala-i-Martin, 1995). This proposed framework assumes that being at school is a necessary but not a sufficient condition for human capital accumulation through formal education. As expressed by equation (3), human capital accumulation contributes to increase individual earnings only if education attainment contributes to the improvement of the individual skills set. Based on the literature, we assume such skills sets can be cognitive, technical, or socio-emotional (Cunningham and Villaseñor, 2016; Hanushek and Woessman, 2008; Heckman and Rubenstain, 2001).[7] In other words, human capital accumulation through formal education occurs only if the system has the capacity to produce additional cognitive, technical, and socio-emotional skills, denoted respectively by s_c^e, s_t^e, s_s^e.

$$E(h_a^e, \gamma_a) = f(s_j^e(h_a^e, \gamma_a)) \;\; ; j = \{c, t, s\} \tag{12}$$

As formalized by Glewwe and Kremer (2006) in the context of formal education, skills development follows a production function that depends on the individual's completed years of education, the quality of school inputs, and schooling prices. As such:

$$s_j^e(h_a^e, \gamma_a) = f[YS(a), Q(\gamma_a, EP), I(\gamma_a), H(\gamma_a), P(\gamma_a, EP)]; j = \{c, t, s\} \tag{13}$$

Where *YS* denotes the years of completed education, *Q* represents education quality, *I* and *H* represent student and household characteristics, respectively, and *P* represents the price of schooling. The quality of school inputs is influenced by exogenous factors (γ_a). Additionally, school inputs *Q* and schooling price *P* are also influenced by education-specific policies, denoted by *EP*.

[7] This assumption is not in conflict with the idea that education also contributes to develop other sets of skills that, while more complex to monetize, have a great value to society (OECD, 2007; Feinstein et al, 2004).

Human capital accumulation through employment experience

Traditional models assume that every year of employment experience increases human capital (Becker, 1964; Mincer, 1974). Such increases, however, slow down with age, following a concave pattern throughout the worker's employment cycle (Rubinstein and Weiss, 2007). The classical approach assumes that labor market experience (*l*) could help workers develop firm-specific skills, s_f^l as well as other cognitive, technical, and socio-emotional skills, denoted respectively by s_c^l, s_t^l, s_s^l.

$$L(h_a^l, \gamma_a) = f(s_j^l(h_a^l, \gamma_a)) \;\; ; j = \{f, c, t, s\} \tag{14}$$

Workers move from one job to another and/or to unemployment. A worker's decision to change jobs will occur when, for a similar level of human capital, the new job offers a higher human capital rental value, α_i, where $\alpha_i \sim [\alpha_{min}, \alpha_{max}]$. Workers who enter unemployment and become economically disengaged experience human capital decumulation at an exogenous rate $0 < \rho_a < 1$, because they lose their firm-specific skills as well as socio-emotional skills (Burdett et al, 2011; Krueger and Mueller, 2012). Following standard search theory for labor markets with heterogenous workers and firms (Bontemps et al, 1999 and Burdett et al., 2011), employed and unemployed workers receive offers per a Poisson process with parameter $\tau_E > 0$. Also, job destruction shocks bring individuals into unemployment according to a Poisson process with parameter $\tau_U > 0$. Search is random and job offers are drawn from a distribution of firm job offers, $F(\alpha)$. An individual will change jobs if the offer received values more his skills set than his current job, with a probability $1 - F(\alpha_a)$, where α_a its rental value in the market of the worker's current job.

A job offer with a higher rental value will contribute to increase the worker's wage. Also, moving to a better job is associated with positive skills development, as workers learn from their interactions with new peers, technologies, and work content. This is consistent with empirical evidence suggesting that the highest observed wage increases in a worker's career occur when he changes jobs (Burdett et al., 2011; Rosen 1972).

While jobs provide workers with a wage, having a job may not a be sufficient condition for human capital development if the job does not contribute, over time, to build the worker's skills set. Indeed, unless workers received meaningful training, as workers acquire more experience their

cognitive, technical skills tend to deplete and/or be less valued by the market as technologies change. On-the-job training, if relevant, can contribute to build a worker's technical, cognitive, and socio-emotional skills (Veum, 1995; Mincer, 1988) as well as capital investments in technology that force workers to improve/adapt their skills to these technologies (Autor et al., 2003).

In this context, a worker's capacity to build skills through employment experience can be formalized as follows:

$$s_j^e(h_a^l, \gamma_a) = f[YOE_a, T_a(LP, EP, K), \tau_E^a(\gamma_a, LP), \tau_U^a(\gamma_a, LP, K), IT(\gamma_a, P_{IT}), P_T(EP)] \quad (15)$$

$$for\ j = \{f, c, t, s\}$$

Where *YOE* denotes the worker's years of experience, *T* is a parameter that denotes the quality and relevance of training provided to the worker by the firm; *IT* denotes the firm's investments in technology, P_{IT} denotes the price of technology, P_T denotes the price of providing on-the-job/life-long training, and *K is* a parameter that denotes a worker's contract security (e.g., no contract vs. fixed-term vs. open-ended). *LP* and *EP* denote labor and education policies, respectively. Implicitly, equation 15 suggests that workers' skills development through employment experience occurs (i) when jobs provide adequate training opportunities along their careers, (ii) if workers move up into better jobs, and (iii) if workers are less exposed to job-destruction shocks.

Equation 15 provides other important messages. First, job creation and job destruction shocks can vary over time and are dependent on exogenous factors at the individual, family, community/sector, and macro levels. Second, the quality of training provided by the firms as well as job creation and destruction shocks are influenced by the worker's contract type as well as by labor and training policies, such as labor regulation, minimum wage policy, and TVET/apprenticeship regulation and prices.

2.3. *Policy Relevant Features of the Framework*

There are several features of the framework that seem pertinent to the design and implementation of youth, education, and labor policies. A first important implication of the framework is that economic disengagement can occur even if individuals spend time studying and working. Indeed, individuals can study and work for long periods of time and face a complete

stagnation in their human capital development. This occurs primarily if the formal education system and labor market do not contribute to build skills that are valued by the labor market. Therefore, it is insufficient to observe only the individuals' time allocation to determine their engagement. A population with a low share of NEETs may still be disengaged and face stagnant productivity if the workers and students do not acquire skills.

A second implication is that policies and programs need to be implemented as early as possible in the life of beneficiaries. On the one hand, early investments in their human capital formation have the potential to bring returns for a longer period, throughout their productive lives (output effect). On the other hand, the increased marginal return to one hour invested may change the individual's time allocation, increasing, even more, their human capital (substitution effect).

A third implication of the framework is that, even if studying/working do contribute to develop one's human capital, individuals may choose to drop-out from school/work if the costs related to economic engagement surpasses its benefits. Individuals may drop-out from school (while accumulating human capital) if their level of income and transfers is not enough to cover their basic consumption needs and/or the costs of being out of the household (introduced in the model as a price of care). In such cases, individuals are forced to forgo potential future utility to consume today. The framework also suggests that the NEET state is a rational decision that some individuals make when (given their human capital) returns to employment are low while the transfers available allow them to have more utility than if employed (given that individuals who are employed can have their utility reduced because of the hours worked and may need to bear a cost of care). This result is relevant for women with low levels of human capital, who often account for most of the NEET population. In addition, it applies to teenage and young adults who have ceased to accumulate human capital in school and face a labor market that offers low wages and no learning opportunities, while still counting on transfers from the parents or the government.

This framework shows that the returns to investments in human capital diminish when the individual does not expect to work in the future. Moreover, it shows that individuals chose not to work when wages are low, the cost of care is high, and they have access to enough transfers to cover their consumption and domestic care duties. Considering these two facts, policies that improve the labor market conditions and reduce the cost of care impact the engagement of the current adult population, directly and indirectly, increase the investment in human capital of the younger generation by affecting their choice incentives.

Another important implication is that government policies are fundamental to assure that time allocated to education and employment contributes to human capital development. For the case of education, policies should focus beyond assuring school enrollment, to proper quality of learning, that what is taught is valued by the labor market, and that access to education remains affordable. In the case of employment, policies should encourage firms to deliver meaningful the-job training, access technologies that increase workers' productivity, give workers enough protection from employment risks, and enhance labor mobility.

Finally, the framework also implies that it is crucial to identify the constraints present in the economy and build policies in an integrated way. Providing transfers so that individuals can attend school might be insufficient to retain individuals in the education system if they do not feel they are acquiring skills that are rewarded by the labor market. On the other hand, improving the quality of education will be less effective if students cannot afford to study (if the price of tuition and/or the price to outsourcing care is high). Investments in education will also have lower returns if the skills acquired are not valued by the labor market, if they depreciate fast because there is no connection between school and work, and if individuals do not expect to work in the future. Since choices are made over the perceptions individuals have of the future, policies that raise awareness about the returns to investments in human capital might complement and increase the impacts of other policies.

III. Potential empirical approaches

There are several empirical applications that could be developed using this proposed framework. A first application would be assessing wage determination beyond the standard Mincerian wage regressions (i.e., controlling for years of education and experience) using a skills-based approach, so that:

$$\log w = f(s_j) = \log w_o + [\alpha_j]'[s_j] \quad for\ j = \{c, t, s\} \tag{16}$$

The estimates resulting from equation (16) would provide valuable information about how the market rewards skills, which could be used by policy makers (and firms) to adjust and develop their education and training programs.

A second application could also be the development of skills-based measures of human capital that would allow to monitor, on a periodic basis, if education, training, and employment policies are contributing or not to human capital accumulation:

$$\frac{dHK(a)}{d(a)} = \alpha_e \frac{ds_j^e(h_a^e,\gamma_a)}{d(a)} + \alpha_l \frac{ds_j^l(h_a^l,\gamma_a)}{d(a)} \text{ for } j = \{c, t, s\} \quad (17)$$

This type of measurement of human capital would require the development of periodic skills tests (preferably on a yearly basis) at schools as well as at enterprises to monitor the progress and improvement of the student/worker's skills.

A third application could be to quantify the inputs that contribute most to skills development in production functions:

$$Ln\left(s_j^l|h_a^l\right) = \beta_o \ln(YOE) + \beta_1 \ln(T) + \beta_2 \ln(LP) + \beta_3 \ln(EP) + \beta_4 \ln(K) + \beta_5 \ln(IT) + \beta_6 \ln(\gamma_a) \quad (18)$$

$$Ln\left(s_j^e|h_a^e\right) = \beta_0 \ln(YS) + \beta_1 \ln(Q) + \beta_2 \ln(I) + \beta_3 \ln(H) + \beta_4 \ln(EP) + \beta_5 \ln(P) + \beta_6 \ln(\gamma_a), \text{j} = \{f, c, t, s\}$$

Finally, one could use the framework's assumptions to estimate the optimal time allocation individuals would make (study vs. work) using simultaneous equations techniques:

$$h_a^l = \alpha_a(w_a - p_a^d) + L(h_a^l, \gamma_a) + other\ policy\ variables \quad (19)$$

$$h_a^e = l_a + E(h_a^e, \gamma_a) + other\ policy\ variables$$

$$\log w = \log w_o + [\alpha_j]'[s_j] \text{ for } j = \{c, t, s\}$$

$$h_a^e + h_a^l \leq H$$

Where $E(h_a^e, \gamma_a)$ denotes the skills acquired through formal education, and $L(h_a^l, \gamma_a)$ denotes the skills acquired through employment experience (see equation 11).

Of course, all these proposed empirical approaches would require individual-level data on skills that today are rarely available. Indeed, to develop a skills-based measurement/monitoring of human capital development, such data would need to be collected more systematically by policy makers, employers, education institutions, and researchers.

IV. Conclusions

This paper revisits traditional human capital models and proposes a new conceptual framework of human capital accumulation, anchored in skills development, to illustrate the phenomenon and implications of youth economic disengagement. In the context of the framework, economic disengagement occurs when individuals do not accumulate human capital due to inadequate access and quality of opportunities for skills development through formal education

and employment. Economic disengagement can occur even if individuals spend time studying and working. The phenomenon of economic disengagement has lifelong implications that not only constrain and restrain future earnings, but also undermine prospects for improvements in productivity and economic growth.

Economic disengagement is a rational choice that individuals make when the formal education system and the labor market do not contribute to build skills that are valued by the labor market and when the costs related to economic engagement surpass its benefits. Indeed, individuals can study and work for long periods of time and face a complete stagnation in their human capital development. This occurs primarily if the formal education system and labor market do not contribute to build skills that are valued by the labor market and/or if individuals have low expectations to work in the future, given their human capital accumulation expectations. Under the model assumptions, however, total economic disengagement (i.e. the NEET population) constitutes only the tip of the iceberg of a broader and far-reaching disengagement problem that affects a population of youth studying in low-quality schools and/or working on low-quality jobs, and which are often ignored by statistics as well as policy makers.

There are several features of the framework that are policy pertinent. First, policies and programs to prevent economic disengagement need to be implemented early to prevent negative long-lasting impacts on human capital formation, labor market outcomes, and productivity. Second, government policies can contribute to improve the human capital production function. For the case of education, policies should aim to assure proper quality of learning, relevance of skills taught, and reduced affordability constraints. In the case of employment, policies should promote relevant on-the-job training, access to technologies that increase workers' productivity, and adequate regulation that promotes workers' upward mobility while protecting them in times of transition.

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