



## Departamento de Economía

Facultad de Ciencias Administrativas y Económicas



# **Economics Lecture Notes**

## An Introduction to the Policy of Employment

Blanca Zuluaga Mateo Duque

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### An introduction to the policy of employment

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#### 1 Introduction

The purpose of this document is to provide an introductory path to the economic theory of the labor market and its application in the formulation of policy of employment. Manzur and Zuluaga [2012] acknowledge that employment, along with price stability, economic growth, and quality of life, are fundamental objectives of economic policy. Therefore, it becomes necessary to understand the origin of unemployment and model its behavior in order to propose measures that bring the economy closer to a desired level of well-being, while recognizing the challenges posed by the income generated from activities in the "underground economy".

This document is divided into six sections. The second section explores various economic theories of the labor market, from the classical and keynesian postulates to more recent ones. Its objective is to explain the origin of unemployment based on labor market imperfections. Here, we briefly go across the neo-keynesian theory of efficiency wages, the theory of insider and outsider workers, implicit contract models, search and matching models, and finally, the theory of duality. The third section provides a characterization of the labor market in Colombia, describing the employed population and the unemployed too. The document also expands on the concept of the underground economy based on the findings of Frey and Pommerehne [1984] and discusses the Colombian case from the perspective of

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Misas et al. [2006]. In the fourth part, results of estimating a Logit model to be found. They show which variables have an effect on the probability of being unemployed. The fifth section brings alternatives on economic policy that aid to address the unemployment. These alternatives may include policies on both the supply and demand sides, as well as some sector-specific policies. Finally, the document concludes with a summary of its findings.

### 2 The economic theory of the labor market

In this section, we analyze some of the main theoretical contributions to the study of the labor market. First, the classical approach is presented, which dominated economics until the emergence of keynesian theory. Subsequently, both approaches have coexisted as the fundamental basis for new theories of the labor market. Second, the neo-keynesian approach is introduced, which emerged in response to the limitations that theorists found in explaining the phenomena that occurred during the great depression based on the classical theory of full employment. Additionally, more recent theories of the labor market are presented, which are grounded in traditional approaches.

#### 2.1 **The classical Economics**

the availability of factors of production and technology:

$$Y = AF(K, L)$$

In the labor market, particularly, wage flexibility allows achieving the full employment. Conversely, unemployment occurs due to an excess supply of labor compared to a scarcity of demand for labor.

When the premise is that "there is unemployment", from their perspective, it should be considered merely a leisure situation that is voluntarily accepted by the workers. This can be because they argue that these workers do not wish to engage in the labor market because: i) they possess other factors of production and can, therefore, live off the income generated by their physical capital (e.g., land, etc.) or the interest from their capital, and/or the profits from their own businesses, ii) they are not interested in working for low wages, iii) they are not willing to incur commuting costs; iv) there are unions where they join forces to resist accepting lower real wages.

This is how classical school models seek to explain what determines the real production, nominal and real wages, inflation (price levels), and interest rates, assuming that all markets clear; economic agents are rational, meaning they use all available information to maximize their profits or utility; the market is perfectly competitive; agents have perfect information about market conditions before entering it; exchanges only occur when the price at which the market clears has been set, and finally, agents have stable expectations [Manzur and Zuluaga, 2012].

Also, a distinction is made between the markets for goods and services and financial markets, in which changes in the quantity of money do not affect real quantities, implying that the quantity of money is neutral. With this neutrality, then, what does determine real production? Heads from the classical school proposed a production function that depends on

$$Y = AF(K,L)$$

where A is the technology, and K and L point out the quantity of capital and labor factors used, respectively.



Figure 1: (a) The aggregate production function and (b) the marginal product of labour. From Snowdon and Vane [2005]

Figure 1 illustrates the relationship between production and the level of labor. Here, (a) the production function is concave increasing on its arguments  $(\partial Y/\partial L) > 0$ ;  $(\partial^2 Y/\partial L^2) < 0$ . And at (b), the labor demand LD is solely determined by the marginal productivity of labor (i.e., Marginal Product of Labor MPL) and has a negative slope because when the level of employment increases, the marginal productivity of labor decreases. Conversely, with an increase in the marginal productivity of labor, the labor demand curve shifts positively

The demand for the number of workers in a company (and the aggregate labor demand) is an inverse function of real wages. This implies that with a lower real wage, the company is encouraged to hire more workers. On the other hand, labor supply has a positive slope with respect to real wages because each individual decides how much to work based on the choice they make between two goods: income and leisure, as we mentioned at the beginning of this section.



Figure 2: (a) Output and (b) employment determination in the classical model. From Snowdon and Vane [2005]

The intuition behind the classical postulate is that with less leisure consumption (choosing to work more), there is a higher income level available to acquire other goods. This makes sense together with the idea that giving up leisure represents a cost, and workers would be willing to do so if the reward (real wage) is greater. Therefore, identifying the role of expectations in the classical school model, when workers believe that their purchasing power W/P is going to increase, they increase their labor supply.

How is the level of employment determined and what causes unemployment for the classical school? Well, the level of employment is determined at the point of equilibrium between the supply  $S_L$  and demand  $D_L$  in the perfect competition labor market, as shown in Figure 2. At this equilibrium, the real wage  $(W/P)_e$  and the level of employment  $L_e$  are established.

If the real wage is higher than the equilibrium wage, there is an excess supply of labor in the labor market, which exerts downward pressure on wages until equilibrium is reached again. And if the real wage is lower than the equilibrium wage, there is an excess demand for labor in the labor market, which leads to an increase in wages until equilibrium is restored.

This phenomenon will always occur except in cases where institutional rigidities such as the minimum wage exist. In the latter case, the wage cannot adjust to the equilibrium level, which is why permanent unemployment arises.

The level of equilibrium employment corresponds to full employment, which is the level of natural unemployment<sup>1</sup>. This latter includes frictional<sup>2</sup> and structural unemployment<sup>3</sup>.

As a result, stabilization policies be not effective in reducing unemployment. On the opposite, structural policies become relevant, such as increasing access to information (to coun-

<sup>&</sup>lt;sup>1</sup>For analysis, in 1968, Milton Friedman introduced this term to refer to the level of unemployment to which the economy converges in the absence of structural shocks in the labor market.

<sup>&</sup>lt;sup>2</sup>Frictonal unemployment is defined as the unemployment that occurs due to the time it takes for workers to move from one job to another.

<sup>&</sup>lt;sup>3</sup>Structural unemployment is defined as the unemployment that arises from a mismatch between the requirements of labor demand that the labor supply does not possess.

teract the characteristics of frictional unemployment) and policies that promote the improvement of the qualifications of the labor supply (to counteract the characteristics of structural unemployment).



Figure 3: Involuntary unemployment. From Snowdon and Vane [2005]

#### 2.2 The keynesian economics

In contrast to the classical model ideas, Keynes ones believed that the labor market does not always clear due to the existence of wage and price rigidities. This inability of wages to adjust quickly to shocks is the origin of involuntary unemployment.

The basic argument of Keynes consists in setting up that the law of  $Say^{4}$  is not achieved, and in contrast to this

premise, Keynes introduces the principle of effective demand, where the functions of aggregate supply and demand differ. Both have a positive slope, but the aggregate demand has a slope less than one due to the marginal propensity to consume. Consequently, aggregate demand becomes an obstacle to increasing employment levels to the point of achieving full employment. Therefore, the free operation of market forces does not guarantee full employment.

Figure 3 illustrates the existence of involuntary unemployment. Starting from the equilibrium e of the labor market, with a level of employment  $L_e$  and a level of production  $Y_F$ , the effects of an adverse shock in effective demand are graphically observed. This generates a negative shift of the aggregate demand curve from  $AD_0$  to  $AD_1$ . If prices are flexible but nominal wages are rigid, then the economy moves to  $e_1$  (observe panel (**b**) from Figure 3), where the supply curve will be  $W_0AS$ . The price will have fallen from  $P_0$  to  $P_1$ , and nominal wages remain at  $W_0$  (a consequence of rigidity), so real wages increase to  $W_0/P_1$  (observe panel (**a**) from Figure 3). Graphically, involuntary unemployment can be represented by the distance  $\overline{cd}$ .

To alleviate the problem of unemployment, Fernandez et al. [2006] agree with Argoti [2013] in the need to increase levels of *effective* aggregate demand by stimulating its components: consumption, investment, government spending, and net exports. For this purpose, the most effective mechanism tends to be the fiscal policy. However, even though the objective of economic policy is to increase aggregate demand, it is also necessary to introduce growth policies that can boost the marginal productivity of labor, while ensuring that the growth of real wages does not exceed that of marginal productivity of labor.

<sup>&</sup>lt;sup>4</sup>The **law of Say** states that demand is determined by production and that only by producing can demand be generated: The more goods - for which there is demand - are produced, the more goods (supply) there will be, which in turn will constitute demand for other goods.

#### 2.3 The neokeynesian economics

The new keynesian school paves a road to a tentative future for keynesian economics, emphasizing its essential role in explaining and understanding a range of past and present observations and experiences that alternative macroeconomic approaches cannot shape. For example, as noted by Gordon [1993], the relevance of keynesian economics arises from the evident lack of satisfaction of workers and firms during recessions and depressions. Workers and firms do not behave as if they are making a voluntary choice to reduce production and working hours. Therefore, based on this scenario, new keynesians argue that a theory of the economic cycle based on market failures is more realistic than the new classical or real alternatives to the economic cycle, where there is still room for considering nominal rigidities.

The essence of the new keynesian approach is to recognize the importance of various real-world imperfections [Stiglitz] 2000]. By scratching into the microfoundations of keynesian economics through the findings from modern microeconomic theory, new keynesian theorists focus their study primarily on two aspects of the labor market: involuntary unemployment and the cyclical behavior of real wages and employment. According to Argandoña et al. [1996], the postulates of the new keynesian school assume that unemployment is the result of a market failure in efficiently allocating resources<sup>5</sup>] Why do firms and workers, who are assumed to act rationally, not accept wage reductions if they lead to an increased social welfare?

#### 2.3.1 The theory of the efficiency wages

The efficiency wage theory is a concept developed by the new keynesian school in the 1980s to explain involuntary unemployment resulting from wage setting above the marketclearing level. This theory is based on the idea that there is a positive relationship between worker productivity or effort and the real wage. If workers receive a relatively higher wage, their effort will increase to maintain their job. Companies unilaterally set wages and choose not to reduce wages to the market equilibrium level due to the detrimental effect it would have on worker effort, productivity, and ultimately, the company's profits [Méndez, 2015].

This raises a key question: why do wages remain above the level that corresponds to full employment, even in times of economic crisis? This makes to become vital to analyze if worker productivity depends positively on their salary, it may not be profitable for the company to reduce it, even in the face of adverse demand shocks. This is because a decrease in wages could reduce the marginal productivity of the worker, causing the wage cost per unit of effort to increase instead of decrease. The employer aims to pay the wage that minimizes labor costs, known as the efficiency wage. The efficiency wage theory suggests that labor costs can be minimized by paying a wage higher than the market equilibrium wage. As a result, when a company faces negative shocks, it may keep the real wage rigid to avoid reducing worker productivity. The resulting wage rigidity can lead to adjustments in employment levels rather than wage fluctuations in response to adverse demand shocks [Argandoña et al., 1996].

Gibbons [1992] also makes an important reflection regarding efficiency wages, in which he contextualizes the situation in both developed and developing countries. For the former, he suggests that higher wages could lead to better nutrition, while for the latter, higher wages could induce more skilled workers to seek employment with the company or motivate the existing workforce to work harder.

For example, Shapiro and Stiglitz [1984] developed a dynamic model in which firms induce workers to work hard by paying high wages and threatening to fire workers caught shirking. As a consequence of these high wages, firms reworking at the prevailing wage

<sup>5</sup>Unemployment is involuntary in the sense that an agent would prefer to be working at the prevailing wage.

duce their demand for labor, resulting in some workers being employed at high wages while others are (involuntarily) unemployed. The larger the group of unemployed workers, the longer it will take for a fired worker to find a new job, making the threat of dismissal more effective.

Yellen [1984] provides a basic description of the rudimentary efficiency wage model. In this one, it is assumed that there is an economy with identical, perfectly competitive firms, each one with a production function of the form:

$$Y = F[e(\boldsymbol{\omega})L]$$

where *L* represents the number of workers, *e* is the effort per worker, and  $\omega$  is the real wage w/p.

**2.3.1.A. The Solow model** Proposed in 1979, it provides much of the structure for efficiency wage models since employers have an interest in preserving wage rigidities. This is because when there be wage cuts, worker productivity is affected, leading to an increase in costs [Snowdon and Vane, 2005]. Additionally, higher wages result in greater worker loyalty and dedication since it raises the opportunity cost they would incur if they were laid off. Consequently, companies are willing to pay higher wages to retain the best workers.

The model assumes an economy consisting of identical firms that are perfectly competitive in the goods market. The effort e is a function that positively depends on the real wage, similar to what was postulated by Yellen in 1984:

$$e = e(w/p) = e(\omega)$$

Here,

 $e'(\boldsymbol{\omega}) > 0$  ;  $e''(\boldsymbol{\omega}) < 0$ 

Remember this indicates that effort is positively related to the real wage, with a positive sign first derivative and a negative sign second derivative.

Each firm has a production function of the form:

$$Y = AF[e(\boldsymbol{\omega})L]$$

A is a parameter that shapes the worker productivity, any shocks to it, and demand conditions. And  $e(\omega)L$  represents effective labor, which is labor adjusted for its quality. Each unit of effective labor is defined as a unit of efficient labor.

The goal of each firm is to maximize its profits  $\Pi$ , defined by the function:

$$\Pi = AF[e(\omega)L] - \omega L$$

subject to the constraint imposed by the production function. To simplify the model, is assumed that the price level is equal to 1.

The first-order conditions of the profit maximization problem are defined as follows:

$$\frac{\partial \Pi}{\partial L} = Ae(\omega)F'[e(\omega)L] - \omega = 0$$
$$\frac{\partial \Pi}{\partial \omega} = ALe'(\omega)F'[e(\omega)L] - L = 0$$

Solving the two previous expressions, can be obtained:

$$\frac{e'(\boldsymbol{\omega})}{e(\boldsymbol{\omega})} = \frac{1}{\boldsymbol{\omega}}$$

or equivalently,

$$\frac{\partial e(\omega)}{\partial \omega} \frac{\omega}{e(\omega)} = 1$$

This determines the optimal real wage  $\omega^{*6}$ . This expression is called the Solow condition. Note that this expression does not depend on the supply and demand conditions of the labor market or the productivity of workers.

<sup>6</sup>The optimal real wage  $\omega^*$  satisfies the condition that the effort-to-wage elasticity is unitary.

wage level [Argandoña et al., 1996].

In Figure 4, panel **a**), the effort curve,  $e(\omega)$ , is depicted, showing a positive relationship between workers' effort and real wages. Initially, the  $e(\omega)$  curve exhibits a segment of increasing returns, where increases in real wages are accompanied by more than proportional increases in efficiency or productivity. Effort per unit of real wage is defined as  $e(\omega)/\omega$ . As for the slope of  $e(\omega)/\omega$ , it represents the inverse of wage costs per efficient unit of work,  $\omega/e(\omega)$ .



Figure 4: The efficiency wage and the Solow condition. From Snowdon and Vane [2005]

When the slope of  $e(\omega)$  increases, so  $\omega/e(\omega)$  does decrease, and vice versa. In panel **b**) from Figure 4, the relationship between  $\omega/e(\omega)$  and  $\omega$  is illustrated. While the  $e(\omega)/\omega$  relationship is maximized at point *M* with an optimal real wage  $\omega^*$ ,  $\omega/e(\omega)$  gets into a minimum value at this

7

Regarding Figure 5, it is worth noting that in response to a demand shock, the firm has no incentives to adjust the nominal price. Additionally, Yellen [1984] concludes that as long as the aggregate demand for labor is less than the aggregate labor supply, and the wage exceeds the reservation wage of labor, the firm will not be constrained by labor market conditions and will continue with its optimal decision, resulting in equilibrium characterized by involuntary unemployment, as illustrated in Figure 5. The unemployed workers strictly prefer working for the real wage to being unemployed, but firms will not hire them at that wage or a lower one. Why not? One of the reasons is that any reduction in the wage paid would reduce the productivity of all employees already on the job. Thus, the efficiency wage hypothesis explains involuntary unemployment through nominal rigidity, leading to cyclical fluctuations.



Figure 5: Involuntary unemployment in the efficiency wage model. From Snowdon and Vane [2005]

**2.3.1.B. The fairness model** Characterized as one of the sociological models that incorporates psychological and social aspects influencing the worker-employer relationship, it emerged due to the absence of considerations of fairness and loyalty in standard economic theory. This is one of the most striking contrasts between this theoretical framework and

other social sciences, as well as between economic theory and lay intuitions about human behavior [Kahneman et al.], [1986].

Note that actions in many domains commonly adhere to standards of decency that are more restrictive than the legal ones: institutions that operate on tips and lost and found offices are examples based on expectations of such actions. However, the standard microeconomic model of profit-maximizing firms essentially assigns no role to generosity, social consciousness, or even goodwill or outrage.

Argandoña et al. [1996], based on the work of Akerlof [1982], 1984] and Akerlof and Yellen [1987], 1988, 1990], argues that wage cuts and "unfair wages" have adverse effects on the worker morale, which in turn affects their productivity. This is well-known to employers, who also have feelings of equality and justice that discourage them from offering very low wages to their workers.

Akerlof [1982] broadly defines fair wages as the "gift" from the firm to the worker (in exchange for the "gift" from the worker of working hard for the firm). This consists in part of a wage that is fair in terms of the norms of this "gift". Using the individual's reference group theory, the fairness of this wage depends on how similarly the worker is treated to others in the worker's reference set. Although people sometimes have reference groups or reference individuals that are different, in terms of fairness, it is probably safe to assume that most people compare themselves to similar individuals. In that case, an argument for the perceived fairness of the wage will be the wages received by similar workers. Such workers, of course, include employed workers, but it also includes reference group workers who are unemployed. Regarding this, Snowdon and Vane [2005] point out that a worker's utility function can be defined as

$$U = U(\boldsymbol{\omega}/\overline{\boldsymbol{\omega}}, e, u)$$

Here,  $\omega/\overline{\omega}$  is the real wage  $\omega$  relative to the perceived "fair" wage  $\overline{\omega}$ , *e* denotes the worker's effort, and *u* refers to the unemployment rate.

There exist another argument that expands the concept of reference wages within the framework of the *equity wage model* and is closely related to human behavior. For psychologists or sociologists, saying that people compare their own behavior with their past behavior is probably not useful or profound. But individuals certainly do that, and some parts of economic theory (for example, Modigliani's income hypothesis) depend on such behavior. Thus, an additional argument to reference wages, in addition to the remuneration of similar employed and unemployed individuals and their respective weights in the worker's reference set, is also past wages [Kahneman et al.] [1986].

The above allows us to summarize a broader discussion about fair wages, assuming that it depends on the effort made above the rules of work, the work rules themselves, the wages of other workers, the benefits of the unemployed workers, as well as the number of such workers, and the wages of the worker perceived in previous periods [Akerlof, [1982]]:

$$\boldsymbol{\omega}_{i,t+1}^f = f(\boldsymbol{\omega}_{i,t}, \boldsymbol{\omega}_0, b_u, u, e_i, e_0)$$

Here,  $\omega_{i,t+1}^{f}$  is the perceived fair wage by individual *i* in *t*+1,  $\omega_{i,t}$  is the current wage of individual *i* in the previous period,  $\omega_{0}$  is the wage paid by others in the individual's reference set in the current and previous period,  $b_{u}$  is the unemployment benefits of people in the reference set in the current and previous period, *u* is the number of unemployed people in the reference set in the current and previous period,  $e_{i}$  is the work rules of the individual in the current and previous period, and  $e_{0}$  is the work rules of the people in the individual's reference set in the current and previous period.

2.3.1.C. The model of the effort regulation Also known as the shirking model, it was initially formulated by Shapiro and Stiglitz [1984]. This model starts from the consideration that the employer's information about the worker's productivity is imperfect and costly [Caraballo, 1996]. This model is based on the idea that there is an agency problem or principal-agent problem because the actions of workers (agents) affect the well-being of employers (principals). Labor contracts are incomplete due to the existence of asymmetric information problems between firms and workers. For this reason, one way to address the problem of shirking in this context is to pay workers an efficiency wage  $\omega^*$ . Note that, unlike efficiency wages, the threat of dismissal is not effective to counteract the problem of shirking in a labor market where workers can quickly find a new job for the same salary. However, if a company pays a higher wage than elsewhere, or if there is unemployment, workers have an incentive not to shirk, as now dismissal has a real cost, and avoiding work becomes riskier for each worker [Snowdon and Vane, 2005].

In this model, the efficiency wage is determined assuming that the number of workers is fixed, and all workers have the same characteristics. Caraballo [1996] proposes a shirking utility function defined as follows:

$$\mathbf{v}_i(\boldsymbol{\omega}_i, \boldsymbol{e}_i) = \boldsymbol{\omega}_i + g(\boldsymbol{e}_i)$$

Here, the effort *e* made by an employee hired by the company *i* can be expressed as follows [Snowdon and Vane, 2005]:

$$e_i = e_i(\omega_i, \overline{\omega}, u)$$

In this last expression,  $\omega_i$  denotes the wage paid by company  $i, \overline{\omega}$  is the wage paid by other companies, and u is the unemployment rate.

The goal of each worker is to choose the level of effort with which they will perform their work, opting for the level of effort that maximizes their utility. They compare the utility they gain from meeting the productivity levels required by the company with the utility they gain from not meeting them.

The problem faced by the employer is to determine a salary that ensures a certain level of worker productivity. The value of the severance pay. or "exit wage," for the worker if they are caught shirking is determined by the formula:

$$g = p(E)\overline{\omega} + [1 - p(E)]b$$

Here, p(E) is the probability of finding a new job,  $\overline{\omega}$  is the prevailing wage, and *b* is an unemployment subsidy. Assuming that p(E) = 1 - u and defining p(d) as the probability of the worker being caught slacking off, the utility of working at a lower intensity  $v_i$  is

$$[1-p(d)]\omega_i + p(d)g$$

which can be defined as

$$[1-p(d)]\omega_i + p(d)p(E)\overline{\omega} + p(d)[1-p(E)]b$$

**Caraballo** [1996] interprets the intuition behind this expression for  $v_i$  as follows: the first term of the sum, it is the probability that the worker is not caught shirking, so they will continue to receive the same salary  $\omega_i$ . In the second term of the sum, it is the probability that the company discovers the worker shirking, determined by the probability that they find a new job with a salary  $\overline{\omega}$ . The third term of the sum indicates the probability that the worker is caught shirking and does not find a new job, measured in terms of the unemployment subsidy *b*. If the utility of not shirking, or working at

 $<sup>^{7}</sup>$ In general, it is possible to consider that the total value is not composed solely of the salary but also includes the income that the employer has to pay to the workerers when they are dismissed or leave their job.

the same intensity, is defined as

 $v = \omega_i - e_i$ 

The employer will set a wage such that  $v_i < v$ . Assuming that all employers pay the same wage  $\omega_i = \overline{\omega}$  [Argandoña] et al., [1996], it follows that

$$\omega_i > b + \frac{e_i}{p(d)u}$$

or

$$\boldsymbol{\omega}^* = \boldsymbol{b} + \frac{\boldsymbol{e}}{p(d)\boldsymbol{u}}$$

Companies, given the level of unemployment and the wages of other companies, find it optimal to offer that wage: they do not increase it because the workers be working without shirking and do not need to be motivated with higher wages. They also do not reduce this wage because then they would have incentives to shrink.



Figure 6: The shirking model. From Snowdon and Vane [2005]

In Figure 6, the wage that clears the market is  $\omega$ . As observed in the figure, full employment u = 0 and the absence of shirking cannot coexist: to prevent this from happening, the company must offer an efficiency wage  $\omega^*$ , such that  $\omega^* > \omega$ . All companies offer  $\omega^*$ , thereby discouraging workers from shirking (due to the risk of becoming unemployed). Figure 6 also shows that the need to pay a wage

above  $\omega$  decreases as unemployment increases, and that  $\omega_1$ and the level of employment  $L_0$  be associated with involuntary unemployment  $L_F - L_0$ , with  $L_F$  being the active population, assumed as given. Since the No-Shirking Constraint (NSC) is located above and to the left of the labor supply curve, there will always be a certain level of involuntary unemployment in equilibrium. If for some reason the *NSC*<sub>0</sub> constraint shifts to the left and becomes *NSC*<sub>1</sub>, the wage needed to stop worker shirking, for each level of employment, will be higher  $\omega_1$ . After the change, the equilibrium is at  $E_1$ , with an increased efficiency wage and the rate of involuntary unemployment [Argandoña et al.] [1996].

Caraballo [1996] holds that the unemployment that arises is involuntary, as mentioned earlier. This can make sense in the way that the unemployed population cannot make a credible promise to work at a lower wage and with the same productivity as other workers. Therefore, the unemployment acts as a disciplinary measure to maintain the worker productivity.

On the other hand, if the intensity of work supervision decreases or unemployment benefits increase, the worker's incentive will be lower, so the employer will raise wages to maintain productivity. The demand for labor will decrease because labor costs have increased, and as a result, the unemployment will increase. The magnitude of the wage increase will depend on the productivity required by the company and the worker's preference for leisure. Conversely, this magnitude will be lower if the probability of catching the worker shirking increases or if the gain from relaxing effort does not compensate for the loss of being fired for it.

When the demand for labor decreases, there will be more unemployment because wages cannot fall enough to offset the shift in demand. The transition to a new equilibrium unemployment will not be immediate: reduction in wages will only be attractive when the unemployment rate has increased, which explains the slow wage adjustment effect. An increase in the aggregate unemployment rate may lead workers to believe they have a higher chance of being fired, making it more difficult to prevent them from working with lower intensity. However, a higher unemployment rate implies a lower probability of finding a job in case of dismissal, leading to a greater incentive to work at the level of intensity required by the company. If the second effect dominates the first, there would be a reduction in wages, so the behavior of the company would be countercyclical. But if the first effect dominates, the wage increase by companies trying to maintain the productivity of their workers would accentuate the depressive phase of the economic cycle.

**2.3.1.D. The model of the adverse selection** In the adverse selection model, companies that offer higher wages attract the best workers. Because the labor market is populated by heterogeneous agents, companies have imperfect information about the productivity characteristics of the ones seeking employment. This is why the labor market is a specific example of a scenario where asymmetric information prevails. When there is asymmetric information, one of the sides of the transaction has more information than the other side. In this case, workers have more information about their own skills, honesty, and commitment than employers before being hired, and they will try to send signals to potential employers.

Of those characteristics that are observable to the employer before hiring, some are subject to manipulation by the applicant, while others are not. Education can be acquired and educational performance improved. Race and gender, on the other hand, are not subject to adjustment. It is important to note that it is possible (and may be desirable in certain cases) to make unobservable characteristics observable and unalterable, such as race and gender. Doing so usually involves an institutional or social decision.

Since some potentially relevant characteristics, such as edu-

cation, are partially or entirely controllable by the job applicant, it is reasonable to assume that the applicant will make adjustments to appear favorable to potential employers. This activity is called signaling, and the characteristics themselves are called signals [Spence, [1974]].

For the purposes of the labor market, the author adds that the equilibrium can be defined as a situation in which the beliefs of the employers about the relationship between productivity (which cannot be known at the time of hiring), education, and work experience of a worker to be confirmed by the outcomes of their hiring. However, these beliefs of employers can take on a vivid sense of the range of possible consequences based on their experience in previous hirings. For example, the incoming worker may turn out to be brilliantly imaginative and creative, merely competent, incompetent, dishonest, punctual or consistently late, frequently absent, etc.

2.3.1.E. The model of the labour turnover Companies can offer an efficiency wage higher than the market-clearing wage to reduce labor turnover costs. The labor turnover models were inspired by the pioneering work of Phelps between 1968 and 1970, in developing explanations for the natural rate of unemployment and job search behavior. The idea here is that the willingness of the workers to quit a job will be significantly reduced if a company pays above the prevailing rate. Since quit rates be a decreasing function of the real wage, companies have an incentive to pay an efficiency wage to reduce costly labor turnover. In the model developed by Salop [1979], the equilibrium in the labor market implies involuntary unemployment because all companies precise to raise their wages to discourage workers from quitting. In situations where the unemployment increases, the wage required to discourage labor turnover will fall Snowdon and Vane, 2005].

Descriptively, the model of Salop [1979] has the following basic structure: the labor market does not contain uncertainty as a whole, although each worker and each company faces some private uncertainty. When a new employee joins a company, they are not sure about the particular set of non-pecuniary characteristics that the company offers, but they learn these through on-the-job experience. Once these characteristics are known, if the employee is dissatisfied and believes they can do better elsewhere, they quit and join the unemployed population to seek alternative employment. Quit rates depend on the dynamics of the labor market, increasing when unemployment is low and decreasing when opportunities are scarcer. The unemployment rates and wages adjust until they balance the costs of turnover for companies and the benefits of quitting for workers.

Turnover is costly for companies through both direct costs like formal orientation programs, supervisor expenses to "train" new employees, and indirect costs like decreased productivity during the adjustment process. Consequently, companies use wage policy to economize on turnover. This concern about turnover occurs independently of external labor market conditions. Even if a lost worker can be immediately replaced by an identical new applicant, the new applicant is less valuable than an experienced worker, as the costs of turnover must be incurred again.

While experienced workers are more valuable to the company, one would expect to see increasing wages with experience and training. However, even with self-selection, there is a limit to the effectiveness of wage differentials in eliminating turnover. If the period during which a worker is "inexperienced" is relatively short, it can be challenging to design an age-wage program that fully compensates for cost differences. In the extreme case, if training is instantaneous at the start of employment, it becomes impossible for the company to pay a differential wage to "experienced" workers, as a worker gains experience the moment they are hired.

Workers may differ in terms of productivity (the likeli-

hood of being absent), turnover, and other variables crucial for determining their value. However, these differences are often difficult to observe and write overly specific contracts for. Each of these variables could lead to an incomplete set of required prices that balances the market.

The insufficiency of wage flexibility to clear the market in the model is a consequence of how the demand function enters the firm's optimization process. The firm faces two interrelated labor markets: an internal labor market for experienced (trained) employees and an external market for new applicants. Since the firm has only a single wage rate with which to economize labor simultaneously in both markets, this wage alone generally cannot clear both markets simultaneously.

The unemployment generated is a permanent state of the market. Macroeconomic stabilization policies cannot eliminate it. Instead, it arises from the structure of the economy: the lack of clearing in external labor markets along with the monopsony power of firms in internal labor markets. It is involuntary in the sense that unemployed workers would be willing to accept a job at the current wage; however, at the prevailing wage, not all unemployed workers receive offers. This effect is described by Salop [1979] as involuntary structural unemployment. This involuntary structural unemployment resulting from workers leaving one job to search for another. Frictional unemployment can be simply measured by new hirings (or resignations).

2.3.2. The model of the insiders-outsiders workers Snower and Lindbeck [2001] acknowledge this model analyzes the behavior of economic agents in markets where some individuals have more privileged positions than others. In other words, in the labor market, incumbent workers (the "insiders") often enjoy more favorable employment opportunities than "outsiders". The reason for this disparity is the costs that firms incur when they replace insiders with outsiders: labor turnover costs. Hiring costs, firing costs, and firm-specific training are some examples of labor turnover costs.

Labor turnover costs hold firms back from hiring when labor demand increases and from firing when labor demand falls. The employment inertia increases, so current firm employment depends more on past employment. After booms, employment will tend to remain relatively high. However, after recessions, employment will tend to stay lower than it would otherwise have been.

However, there is an implicit factor that adds relevance to the analysis of the model, which is related to working hours and the substitution of capital for labor. Since labor turnover costs are generally associated with replacing employees rather than varying their working hours, labor turnover costs tend to encourage variations in working hours rather than in the number of people employed. Furthermore, the higher these labor turnover costs, the greater the incentives for firms to respond to cyclical fluctuations through the substitution of capital for labor instead of hiring and firing. Consequently, productivity variations will be more procyclical.

Additionally, there is a scenario in which companies with high turnover rates offer both job insecurity and limited opportunities for advancement to their employees. Under these circumstances, workers have little or no incentive to build a corporate identity with their employers. As a result, low motivation harms their productivity, representing another cost of high labor turnover [Snowdon and Vane], [2005]].

Like all the efficiency wage theories, the model of internal-external workers can provide useful insights into employment within specific companies and industries, but it provides little basis for understanding the unemployment in the entire economy. Assuming that all sectors of the economy can be represented in this way is a very low realistic scenario. In many occupations, especially those requiring low skill levels, the competence of a worker can be assessed very quickly, and incoming workers can be rewarded with a small increase after a short time on the job [UofT].

#### 2.4 The new consensus

Snowdon and Vane [2005] argue that over the past three decades, there have been various attempts to reconcile keynesian macroeconomic theory with neoclassical microeconomic theory, which have influenced the way economic science is theorized.

George Akerlof and Robert Lucas Jr. did hold that this process revealed the lack of coherent microfoundations in keynesian models. For instance, some of them propositions of market failures and involuntary unemployment within macroeconomics did not easily align with the walrasian theory of general competitive equilibrium. In the latter, the actions of individuals, optimizing rationally, ensure that all markets, including the labor market, clear through flexible prices. However, the orthodox neoclassical microfoundations embraced by the neoclassical school largely ignored, and continue to largely ignore, the significant progress made by economists in modeling the impact of asymmetric information, imperfect competition, and the adoption of assumptions "based on psychological and sociological observation". It is noteworthy that even though the models in the efficiency wage theory, cited in this document, retain the spirit of Keynes, from the perspective of Yellen [1984], they be neoclassical in their assumption of individualistic maximization by all agents. Nevertheless, Solow [1980] argues that the wage rigidity in these models may be more rooted in social conventions and principles of appropriate behavior that are not entirely individualistic in origin.

As a result, sociological models are strongly attributed with the ability to explain phenomena that appear inexplicable in neoclassical terms: why companies do not lay off less productive workers?, why companies set work standards that most workers exceed?, etc.[Yellen, [1984]]. **2.4.1.A. The model of search and matching** It focuses on explaining the frictional unemployment. Companies can create job openings (vacancies), and unemployed workers search for jobs, and the result of a match between a job vacancy and an unemployed worker is productive employment [Bagliano and Bertola] [2004].

However, not all employers seeking to hire find a worker, and not all job seekers find an employer. Therefore, the labor market does not completely empty out in each period, and some job openings remain unfilled at the same time as some job seekers remain unemployed Daly et al. [2012].

The equilibrium frictional unemployment model by Pissarides [2000], through the perspective of Bagliano and Bertola [2004], formally defines the labor force as the sum of "employed" workers plus "unemployed" workers, which are assumed to be constant and equal to L units. Similarly, the total labor demand is equal to the number of filled job positions plus the number of vacancies. The total number of unemployed workers and vacancies can, therefore, be expressed as uL and vL, respectively, where u denotes the unemployment rate, and v denotes the relationship between the number of vacancies and the total workforce. In each unit of time, the total number of matches between an unemployed worker and a vacant job is equal to mL (where m denotes the relationship between newly filled job positions and the total labor force). The matching process is summarized in a matching function, which expresses the number of new job positions created mL as a function of the number of unemployed workers *uL* and vacancies *vL*:

#### mL = (uL, vL)

Job creation requires the presence of agents on both sides of the labor market m(0,0) = m(0,vL) = m(uL,0) = 0. Additionally, for the unemployment rate to remain constant in a growing economy,  $m(\bullet)$  must exhibit constant returns to scale. That is,

$$m = \frac{m(uL, vL)}{L} = m(u, v)$$

The function  $m(\bullet)$  determines the flow of workers who find jobs and cease to be unemployed within each interval of time. Considering the case of an unemployed worker, at any point in time, the worker will find a job with probability  $p = m(\bullet)/u$ . With constant returns to scale for  $m(\bullet)$ , it follows that

$$\frac{m(u,v)}{u} = m\left(1,\frac{v}{u}\right) \equiv p(\theta),$$

letting  $p(\theta)$  to be an increasing function of  $\theta \equiv v/u$ . The instantaneous probability p of a worker to find a job is positively related to the size of the labor market, measured by  $\theta$ , the ratio of total job vacancies to unemployed workers.

On the other hand, the average duration of a period of unemployment is given by  $1/p(\theta)$  and, therefore, has an inverse relationship with  $\theta$ . Similarly, the rate at which a match is made between a job vacancy and a worker can be expressed the way:

$$\frac{m(u,v)}{v} = m\left(1,\frac{v}{u}\right)\frac{u}{v} = \frac{p(\theta)}{\theta} \equiv q(\theta),$$

Note that this is a decreasing function of the vacancy-tounemployment ratio.

An increase in  $\theta$  reduces the probability of a vacancy being filled, and  $1/q(\theta)$  measures the average time it takes for a vacancy to be filled. The dependence of p and q on  $\theta$ captures the double externality between agents in the labor market: an increase in the number of vacancies relative to unemployed workers increases the probability of a worker finding a job  $\partial p(\bullet)/\partial v > 0$ , but at the same time, it reduces the probability of a vacancy being filled  $\partial q(\bullet)/\partial v < 0$ .

The unemployment rate of equilibrium is determined by

the intersection of two curves in the context of the general model proposed by **Pissarides** [2000], the same analyzed in Figure 7 by Daly et al. [2012]. On one hand, there is the Beveridge curve (BC), which represents a negative relationship between job vacancies and the unemployment rate. On the other hand, there is the job creation curve (JCC), which reflects the decisions of the employers to create jobs and can be interpreted as an aggregate labor demand curve. Therefore, equilibrium in this model is defined in terms of vacancies and unemployment, specifically at the intersection of BC and JCC, rather than wages and the level of equilibrium employment.

A movement along the Beveridge curve BC reflects cyclical changes in aggregate labor demand. For instance, as labor demand decreases, job vacancies decrease, and the unemployment rate increases, causing a movement towards the bottom right of the graph. Conversely, a positive shift in the BC curve reflects a decrease in the efficiency of the job search process. For a given level of vacancies, workers have more difficulty finding acceptable jobs, and for a given level of unemployment, firms have more difficulty finding suitable workers. Under equal conditions, a reduction in matching efficiency will raise the frictional or structural level of unemployment, hence the natural rate of unemployment.



Figure 7: Determinants of shifts in equilibrium unemployment. From Daly et al. [2012]

A movement along the Beveridge curve BC reflects cyclical changes in aggregate labor demand. For instance, as labor demand decreases, job vacancies decrease, and the unemployment rate increases, causing a movement towards the bottom right of the graph. Conversely, a positive shift in the BC curve reflects a decrease in the efficiency of the job search process. For a given level of vacancies, workers have more difficulty finding acceptable jobs, and for a given level of unemployment, firms have more difficulty finding suitable workers. Under equal conditions, a reduction in matching efficiency will raise the frictional or structural level of unemployment, hence the natural rate of unemployment.

On the other hand, JCC has a positive slope, implying that firms create more job vacancies when unemployment is higher (as shown in Figure 7). The exact degree of the slope is affected by other factors that may change over time or throughout the business cycle, such as the job separation rate, the level of hiring costs, and the value of jobs (as reflected in worker productivity and production value). In more general terms, the slope of the JCC (i.e.,  $\theta$ ) depends on the structure of product and labor markets in which firms operate and how they negotiate wages, as well as external factors such as the discount or interest rate.

Additionally, changes in the expected value of a job associated with changes in the marginal product of labor can shift the job creation curve (as shown in Figure 7). This is a way through the changes in aggregate demand can affect the unemployment rate even when the efficiency of the job search process does not change. For example, during economic recessions, drops in aggregate demand reduce the marginal product of labor, lowering the value of creating jobs. This causes the JCC to rotate downward, resulting in a higher unemployment rate with no changes in the Beveridge curve. Although this decrease in aggregate demand increases measured unemployment, it does not increase the natural rate of unemployment.

Theoretically, JCC can also change in response to changes

in costs of search of a firm. If the probability of filling a vacancy decreases, for example due to a lack of finding the required skills in a worker, JCC will rotate downward, indicating a lower rate of vacancies posted for a given job value.

However, since this labor market model features search frictions, not all employers looking to hire find a worker, and not all job seekers find an employer. Therefore, the labor market does not completely clear in every period, and some job openings remain unfilled at the same time that some job seekers remain unemployed.

#### 2.4.1.B. The model of implicit contracts Hart and Gross-

man [1983] argues that it focuses on explaining the low variability of wages in the context of a variable labor demand, in terms of optimal risk-sharing agreements between firms and workers. In other words, it explains the motivations that workers and firms have for establishing long-lasting employment relationships [Manzur and Zuluaga, 2012]. Because firms seek to maintain the loyalty of their workforce, they find it necessary to reach unwritten (implicit) agreements with their workers. This "invisible handshake" provides each worker with guarantees about the terms of the employment relationship in a variety of employment circumstances [Snowdon and Vane, 2005].

As companies offer stable real wages over time, workers accept these wages, even if they are, on average, lower than wages with high variability determined by market forces. There is a trade-off between the wage level and variability, and workers prefer stability.

#### 2.5 The theory of the duality

According to De la Cal et al. [2017], the theory the duality and the theory of the labor market segmentation are presented as an extension of the study of the institutional labor market. The factors that lead to labor market segmentation

<sup>8</sup>In the context of power relations, this constitutes a strategy of division.

are diverse. One of them is the continuous technological changes and the complexity of technology, which require skilled and stable labor force and the need for training to adapt to change. Also, economic integration processes and globalization of markets that generate uncertainty and variability in the demand for products in modern economies contribute to labor market segmentation.

Internally, within companies, segmentation<sup>8</sup> equates to the analysis of internal labor markets, as they are identified with a primary segment within the companies and a secondary external segment. In the primary segment, two sub-segments are distinguished: the upper primary segment, where managers and professionals (techno-structure) are inserted, with a high salary level and greater autonomy for individuals; it has more sophisticated promotion systems and job stability conditions prevail. On the other hand, the lower primary segment, which is becoming increasingly smaller, can be identified with the profile of a company worker who advances based on seniority, with a relatively high salary and considerable job security.

In the secondary segment, the salary level of workers is low, professional advancement opportunities are practically nonexistent, and it is characterized by high turnover and worker instability.

Technological change and new technologies bring about changes in the market for goods and services and in the demand infrastructure that go hand in hand with changes in the size of companies and the labor market.

There are several factors that affect the size of companies. Productivity, for example, depends on the division of labor. This latter depends on the size and stability of the demand. The demand for any product can be divided into a stable part and an unstable part, with large companies taking the stable part and leaving the more volatile market segment to small companies.

## 3 A characterization of the labor market in Colombia



Figure 8: Classification of the population of an economy in terms related to the employment (in Spanish)

It is the task of the macroeconomic analysis to also study aggregated measures related to the level of employment of the labor factor. Blanco [2008] provided in the Figure 8 a way to shape the population of an economy, in terms related to the employment. These variables are related to those referring to production since a higher level of the labor factor (employment) leads to a higher level of production.

The Figure 9 provides the state of the art for three of the most common indicators for labor market analysis in a period of nine years: **the unemployment rate** is calculated as the ratio between the *level of unemployment*<sup>9</sup> and the *labour* force<sup>10</sup>. The **employment rate** is defined as the number of people currently employed<sup>11</sup> divided by the adult population<sup>12</sup> (i.e., the population of working age). Finally, the **labour force participation rate** (*LFPR*) is the number of people in the *labour force* divided by the adult population



Figure 9: The unemployment rate, the employment rate and the labour force participation rate (LFPR) Source: Authors, DANE (GEIH)

<sup>&</sup>lt;sup>9</sup>People who are not employed and are actively seeking work. This category does not include those who are not working and are not actively trying to find employment.

 $<sup>^{10}</sup>$ The labour force LF is defined as the number of people of working age who are employed

<sup>&</sup>lt;sup>11</sup>The employed are individuals who, during the reference period, were in one of the following situations: **i**) Worked at least one paid hour during the reference week, **ii**) those who did not work during the reference week but had a job, **iii**) family workers without pay who worked at least 1 hour during the reference week.

<sup>&</sup>lt;sup>12</sup>Made up of people aged 12 and older in urban areas and 10 years and older in rural areas. It is divided into the people currently employed and the people currently not employed

			Total		
Activity	April 2022	April 2023	Distribution % 2023	Absolute Variation	Contribution p.p.
Level of employment (in miles)	21.957	22.742	100	785	-
Accommodation and food services	1.525	22.742	7,6	196	0,9
Agriculture, livestock, hunting, forestry, and fishing	3.081	3.265	14,4	184	0,8
Manufacturing industries	2.382	2.545	11,2	162	0,7
Public administration and defense, education, and human health	2.682	2.800	12,3	118	0,5
Construction	1.516	1.584	7,0	68	0,3
Arts, entertainment, recreation, and other service activities	1.790	1.848	8,1	58	0,3
Real estate activities	223	243	1,1	19	0,1
Professional, scientific, technical, and administrative services	1.729	1.746	7,7	16	0,1
Financial and insurance activities	379	394	1,7	15	0,1
Information and communications	418	427	1,9	8	0,0
Supply of electricity, gas, water, and waste management	586	590	2,6	4	0,0
Transportation and storage	1.638	1.641	7,2	3	0,0
Trade and vehicle repair	3.997	3.940	17,3	-58	-0,3

Figure 10: Distribution %, absolute variation, and contribution to the population variability by activities. Source: Authors, DANE (GEIH)

#### 3.1 The employed population





Figure 10 comes up that in April 2023, the number of employed people in the total national population was 22,742 (miles) people. The sectors that contributed the most positively to the change in the employed population were Accommodation and food services (0.9 percentage points), followed by Agriculture, livestock, hunting, forestry, and fishing (0.8 percentage points), and Manufacturing industries (0.7 percentage points) [DANE, 2023a].



Figure 12: The unemployment rate and the youth-unemployment rate

Source: Authors, DANE (GEIH)

#### **3.2** The unemployed population

Figure 12 comes up that the youth unemployment rate<sup>[13]</sup> remained above the overall unemployment rate except from 2019, where both rates overlapped. Although in the year 2020, the overall unemployment rate reached its highest level in the last decade at 14.4 percentage points, the highest historical rate for youth unemployment was in 2013, reaching 10.7 percentage points.

Datas	February-april 2023			
Kates	Male	Female	Gap in p.p.	
Labour force participation	76,8	52,7	24,1	
Employment	70,4	45,3	25,1	
Unemployment	8,3	13,9	5,6	

Figure 13: Gaps in the LFPR, employment and unemployment by gender Source: DANE, (GEIH)



#### Figure 14: The unemployment rate by gender Source: Authors, DANE (GEIH)

Figure 13 shows that for the total national population in the moving quarter of February - April from 2023, the difference between men and women in the labour force participation rate (LFPR) was 24.1 percentage points (p.p.), the employment rate was 25.1 p.p., and the unemployment rate was 5.6 p.p. [DANE, 2023b].

#### **3.3** The economics of the underground

Frey and Pommerehne [1984] argue that understanding the size and development of the underground economy is important for policy formulation, primarily because decisions

may be misguided if they rely on potentially biased official statistics. Furthermore, they state that the hidden economy can be measured by considering indicators. On the other hand, <u>Misas et al.</u> [2004] consider the cash demand as one of them.

The effort made to consider possible non-linearities in the relationship between cash demand and its traditional determinants, as well as variables that capture technological advancements in payment systems, still results in a considerable forecast error. Hence, there is a need to understand and somehow quantify that omitted variable affecting cash demand [Misas et al.] [2006]. One possible response to this form of "missing money" explored in this study is that these innovations are due to the recent behavior of the informal and illegal economy, which tends to be intensive in the use of cash.

To illustrate the Colombian case, the authors mention that in the late 1980s, poppy crops emerged in Colombia, mainly established in high-altitude moorlands and indigenous territories at an altitude between 2200 and 2800 meters above sea level. In another way, calculating the amount of foreign income resulting from the trade of narcotics poses even more complex problems than those of the harvested area of coca, marijuana, and poppy. Trying to address this question is essential due to the impact that these resources can have on the economy.

According to Frey and Pommerehne [1984], other indicators available for measuring the size of the underground economy may vary between both direct methods based on voluntary surveys and tax audits, as well as other control mechanisms, and indirect estimation methods based on identifying discrepancies in income and expenses, as well as in the labor and monetary markets.

<sup>&</sup>lt;sup>13</sup>In Colombia, a young person is understood to be between 14 and 28 years old (Law 1622 from 2013). Due to the adjustment in the lower age limit of the PET made from February 2022 in the GEIH 2018 framework, the criterion for the young population is adjusted to be from 15 to 28 years of age for 2023.

Type of Activity	Monetary Transactions		Non Monetary Transactions		
ILLEGAL ACTIVITIES	Trade in stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling and fraud		Barter: drugs, stolen goods, smug- gling etc. Produce or growing drugs for own use. Theft for own use.		
	Tax Evasion	Tax Avoidance	Tax Evasion	Tax Avoidance	
LEGAL ACTIVITIES	Unreported income from self- employment; Wages, salaries and assets from unreported work related to legal services and goods	Employee dis- counts, fringe benefits	Barter of legal services and goods	All do-it- yourself work and neighbor help	

Figure 15: A taxonomy of types of underground economic activities. Source: Schneider and Enste [2000]

Dependent variable	Desempleado	Dependent variable	Desempleado	
edad <sub>i</sub>	-0.109***	internet <sub>i</sub>	-0.156***	
	(0.00)	· · · · · · ·	(0,00)	
$edad_i^2$	0.001***	cali <sub>i</sub>	0.318***	
	(0.00)		(0,00)	
hombre <sub>i</sub>	-0.206***	ibague:	0.773***	
	(0.00)		(0,01)	
edu.ninguno <sub>i</sub>	0.366***	bucaramanga;	0.203***	
	(0.01)	enear annangar	(0,00)	
edu bachiller	0.088***	pereira:	0.720***	
eau.bachiiter <sub>i</sub>	(0.00)	perena <sub>l</sub>	(0,01)	
adu tac	0.046***	cucuta	0.253***	
euu.iec. <sub>l</sub>	(0.00)	chentul	(0,01)	
edu.postgrado <sub>i</sub>	-0.603***	nasta	0.464***	
	(0.01)	pusio <sub>l</sub>	(0,01)	
astratal	0.315***	villavicancio	0.218***	
estratori	(0.00)	viitavicencio <sub>l</sub>	(0,01)	
	0.240***	montaria	0.427***	
estrato2 <sub>i</sub>	(0.00)	monteria <sub>i</sub>	(0,01)	
estrato3 <sub>i</sub>	0.164***		0.595***	
	(0.00)	manizares <sub>i</sub>	(0,01)	
	0.099***		0.076***	
$estrato4_i$	(0.01)	cartagena <sub>i</sub>	(0,01)	
$estrato6_i$	-0.175***	1	-0.277***	
	(0.01)	barranquilla <sub>i</sub>	(0,00)	
	-0.597***	1 11.	0.306***	
jefe <sub>i</sub>	(0.00)	medellin <sub>i</sub>	(0,00)	
	-0.299***		0.376***	
pare ja <sub>i</sub>	(0.00)	constante <sub>i</sub>	(0,01)	
Significance: $5\%(*)$ $1\%(**)$ $0.1\%(***)$				
Standard errors in parentheses.				

Table 1: Results of a Logit model

## 4 What can influence the unemployment?

The findings of Manzur and Zuluaga [2012] acknowledge about the variables that influence the probability of being unemployed. They be based on a sample that includes only the adult population (i.e., population of working age), with age restricted to those under 80 years and over 17 years old.

The Logit model follows:

$$Pr(Desempleado = 1|x) = \frac{\exp(x'\beta)}{1 + \exp(x'\beta)}$$

Here, x is a vector of variables that were all found to be significant at the 0.1% level. The table 1 brings the results of the Logit model for unemployment, where the dependent variable equals 1 if the person is unemployed and equals to zero if they are employed. First, it is found that the probability of being unemployed decreases with *edad<sub>i</sub>*.

The variable *pare ja*<sub>i</sub> equals 1 if the person lives with a partner (including common-law unions) and zero if not. The variable *internet*<sub>i</sub> is equal to 1 if the household has internet, zero otherwise.

Regarding the education levels, the probability of unemployment for those without higher education is higher, while having postgraduate studies reduces the risk of being unemployed. Other results include:

• Household heads (where the variable  $(jefe_i)$  is equal to 1 if the individual is the head of the household and zero if they are another member) have a lower probability of being unemployed. This result may be due to the greater need for a household head to have employment, leading them to accept job offers they might not otherwise consider.

- Having internet access in the household reduces the probability of its members experiencing unemployment.
- The probability of being unemployed is lower in Bogotá than in other cities, except in Barranquilla.

#### **5** Policies for the employment

Employment policies can be classified based on various criteria. The most common is to differentiate between policies on the labor demand side and those on the labor supply side. The first includes not only incentives for employers to create jobs but also policies that improve the production structure of the country, thereby fostering a conducive environment for job generation. Nonce, supply-side policies are those aimed at altering the quality or quantity of available labor. These policies can be passive, meaning they aim to maintain or distribute income (such as unemployment benefits), or they can be active, such as reforms to legislation that change the structure of the labor market.

Another classification can be made based on the time horizon in which policies operate, either short or long run. Short run policies are typically implemented during periods of crisis to mitigate the impact of economic slowdown on the hiring rate and firing rate. Long-run policies are aimed at reducing structural and frictional unemployment, while short-run policies address cyclical<sup>14</sup> and seasonal unemployment.

Additionally, policies can be sector-specific, which are applied to job creation in a specific economic sector, or they can be general. In this section, some of the existing proposals for generating employment in the Colombian context will be presented, using some of the possible classifications.

<sup>&</sup>lt;sup>14</sup>The economy goes through cycles of expansion and recession, and cyclical unemployment occurs during economic crises. This type of unemployment arises because there is a decrease in the demand for goods and services, a reduction in private investment, a decrease in production, and consequently, a decline in job creation. It may even lead to an increase in job destruction.

#### 5.1 Policies for the demand of labour

Maintaining a stable macroeconomic environment and promoting positive economic growth rates be necessary conditions to stimulate the pace of job creation, suitable for responding to variations in the available labor supply. Also, the context of the labor market in Colombia requires implementing more active employment policies.

#### 5.1.1 The stability of the real minimum wage

Results a need to maintain the real minimum wage at a stable level and exclude it from annual negotiations, as the current mechanism affects the creation of unskilled employment in the modern sector. It is not an effective tool for reducing poverty, as it has limited coverage among lower-income groups.

Manzur and Zuluaga [2012] provide arguments about the bias of the labor market towards skilled employment. It is said that this is a phenomenon mainly attributed to the technological advancement of production processes, and it is highly likely to persist regardless of the evolution of the minimum wage. It is not possible to isolate, using simple statistical estimations alone, the effect that can be exclusively attributed to the minimum wage in explaining the dynamics of unemployment among unskilled labor. Secondly, they make it clear that the fact that there is low compliance with the minimum wage (MW) in low-income jobs is not a criticism of the minimum wage itself, but rather a critique of the institutional incapacity in the country to enforce labor regulations.

However, it must be acknowledged that a minimum wage that is considered high by employers will inevitably have some impact on the employment of low-skilled workers. In this case, the long-run solution should not be to prevent the minimum wage from evolving to the extent that its amount allows workers to access the basic consumption basket. Instead, the solution should focus on increasing the level of professional, technical, and technological education of the workforce.

The setting of the minimum wage helps to offset the power asymmetry that can exist between employers and workers. However, as long as informality remains high in a country level, this will not be an ideal distributive tool.

#### 5.1.2 The differential minimum wage

Another commonly proposed idea in employment seminars is the implementation of a differential minimum wage, allowing the employers to pay lower wages to young people when starting their careers. Another type of differentiation could be made at the provincial level in the country. Thus, the minimum wage would not be the same across the entire country but would depend on the productivity of workers in each territory or city.

Neither of these two modalities has been implemented or discussed sufficiently in Colombia. However, there is a mechanism for younger populations to differentiate known as "apprenticeship contracts". This mechanism began with the enactment of Law 789 from 2002. According to this law, an apprenticeship contract is "a special form within Labor Law, through which a natural person develops theoretical-practical training in an authorized entity, in exchange for a sponsoring company providing the means to acquire methodical and comprehensive professional training required in the trade, activity, or occupation, and involves them in administrative, operational, commercial, or financial management typical of the ordinary activities of the company, for any specified period not exceeding two (2) years, and for this, they receive monthly sustenance support, which in no case constitutes a salary" (Article 30). The positive effects of this measure on reducing youth unemployment still need to be evaluated, but allowing this type of employment relationship can be one of the suitable strategies, along with greater universal access to quality education, to reduce vulnerability in the labor market for the younger workforce.

#### 5.1.3 Taxation<sup>15</sup>

For several years, the discussion about the negative impact of parafiscal tax contributions on job creation has been an important topic in the academic agenda. In Colombia, Fedesarrollo is one of the research institutions whose associates have promoted the proposal to eliminate parafiscal contributions in order to reduce labor costs and, consequently, reduce unemployment. In the literature, there are proposals to eliminate these taxes and instead to finance the ICBF and the SENA with government tax revenues. Among the less radical proposals is to establish a tax exemption equivalent to the total amount of parafiscal tax contributions paid by the company in the previous year. Fedesarrollo researchers do not endorse this proposal because they believe that the effects on job creation would be very modest compared to what would be expected if parafiscal contributions were eliminated (according to their study, 600,000 new jobs every decade). Previous estimates of the impact on employment of this proposal were only 200,000 jobs as a one-time effect.

"Supressing parafiscal contributions [...] generate 351,000 jobs; reduce unemployment by 0.6%; reduce poverty slightly, but does not have a positive effect on the GINI index.<sup>[16]</sup>".

#### 5.1.4 Health Taxation

López [2010] includes a proposal that consists in financing with general taxes rather than payroll charges to universalize the healthcare. This measure, in addition to being a significant step in improving the quality of life of their people, stimulating job creation and reducing informality.

#### 5.1.5 The launch of SMEs

It is often proposed to support small and medium-sized enterprises by extending the regulation that allows for the gradual payment of parafiscal tax charges during the first three years of the company's operation to also apply to income and industry and commerce taxes. This would also facilitate the formalization of businesses.

#### 5.1.6 The costs of labour turnover

Proposals to generate employment by reducing hiring and firing costs are common. The proliferation of temporary contracts rather than permanent contracts is often attributed to the latter. However, there are serious doubts about the effectiveness of these policies in generating new jobs, as the experience in Colombia over the last decade may indicate that the main impact is on the quality of existing employment—quality is reduced without a significant increase in quantity.

#### 5.1.7 The funding sources

A trained access to credits and microcredits is another common proposal to stimulate employment. The training aspect is crucial because the lifespan of small businesses can be shortened due to the lack of qualification among their owners, especially in financial management.

#### 5.1.8 The enterprise initiative

Promoting entrepreneurship to encourage the emergence of job creators who do not put pressure on the labor supply is another proposed measure. This practice should not become a promoter of low-quality self-employment but rather focus on formal and sustainable production structures.

<sup>&</sup>lt;sup>15</sup>In this case, these refer to parafiscal contributions which are payments that companies must make, equivalent to 9% of the payroll value. 4 percentage points are allocated to Family Compensation Funds to finance family subsidies, 3 percentage points go to the ICBF, and 2 percentage points go to the SENA. <sup>16</sup>The Gini index be a number between 0 and 1, where 0 corresponds to perfect equality (everyone has the same income) and 1 corresponds to perfect inequality (one person has all the income, and others have none).)

#### 5.2 Policies for the supply of labour

#### 5.2.1 The promotion of high school seniors

This can be achieved through the alliance between the SENA and the Ministry of education to coordinate their work in both the formal and non-formal education systems. The possibility can be opened for high school students to work parttime while continuing their technical, technological, or professional studies. The apprenticeship contract should also be regulated in a way that ensures support for sustenance. For example, covering transportation to schools, providing meals, transportation costs, health coverage, and professional risk insurance.

#### 5.2.2 The access to a higher education

Higher education in Colombia only reaches around 30%. This percentage is much lower for lower-income strata. The expansion of coverage can be focused not only at the professional level but also on technical and technological careers.

#### 5.2.3 The law of the first employment

The Law 1429 from 2010 holds that employers who hire new employees under the age of 28 may deduct from the base of income tax and complementary tax: **i**) parafiscal tax contributions, **ii**) the health tax contribution to the solidarity subaccount of the FOSYGA (Solidarity and Guarantee Fund), and the contribution to the minimum pension guarantee fund corresponding to the new jobs.

#### 5.2.4 The migration

There be an interest for discouraging migration to large cities by making the job market in smaller cities and intermediate cities more attractive. This can be achieved by creating economic dynamism in these intermediate cities and small municipalities, which would lead to better-paying job opportunities. Strengthening productive activities in these areas would reduce the pressure on the labor supply in large cities, which often receive both skilled and unskilled labor from individuals who cannot find employment in their places of origin.

#### 5.2.5 The aid for the unemployed population

It urges to promote a permanent program to assist the unemployed population, which includes offering training courses to prevent the deterioration of human capital. One of the most serious problems of the unemployment is that the likelihood of finding a job decreases as the duration of unemployment increases. This is not only due to the loss of social networks that comes with being out of the labor market but also because of the gradual reduction of skills, especially if technology continually transforms the productivity requirements of workers.

#### 5.2.6 The shift to a new communication era

These employment policies are aimed to reduce frictional unemployment because they seek to reduce the time individuals spend without employment by providing more information to both job seekers and employers. The SENA offers a job vacancy dissemination service that all unemployed individuals can access. However, it would be necessary to improve the mechanism for transmitting this information since, according to data from the GEIH, only 1% of the employed population has obtained a job through SENA. It is also important for universities, technical and technological institutes, and even vocational schools to strengthen their job placement services to help their graduates enter the labor market a way faster.

#### 5.3 The sectoral policies

The report from the private council of competitiveness for Colombia in 2010 proposes:

### 5.3.1 The program of the construction sector development

Promote housing demand by establishing competitive mortgage interest rates, with levels equivalent to commercial credit rates. To make this possible, efforts should be made to reduce the risks for financial institutions that offer mortgage loans. Specifically, they propose "creating, within the framework of the National Guarantees Fund, a guarantee fund for housing credit that covers 70-80% of the loan value during the first three years".

This proposal aims to make homeownership more accessible and affordable by providing financial institutions with guarantees that reduce the risks associated with mortgage lending. By lowering the financial risks, it becomes more attractive for banks to offer mortgage loans at competitive interest rates, ultimately stimulating housing demand and the construction sector.

#### 5.3.2 The program of the agro-sector development

It becomes a goal to bring the technology into the rural areas through the promotion of partnership projects among small farmers, with the sponsorship of formal agricultural companies. On the other hand, in order to promote more efficient land use, it is necessary to expedite the process of land forfeiture. Finally, to allow the sector to achieve productivity improvements through economies of scale, it is necessary to regulate the so-called business development zones<sup>[17]</sup>.

#### 5.3.3 The program of the productivity development

A program of a kind that belongs to the Ministry of commerce, industry, and tourism, which, with a modern industrial policy and the promotion of value-added services, allows the promotion of large sectors that generate skilled employment. This involves promoting innovation, offering entrepreneurship training, and establishing effective publicprivate partnerships.

#### 5.3.4 The program of the road network development

Increasing the number of kilometers of dual driveways is another proposal. This not only requires greater public investment but also facilitating private sector share in these projects. This type of sectoral policy stimulates employment directly during the construction of infrastructure and indirectly by promoting economic activity through reduced transport time and costs.

#### 5.3.5 The program of developing small cities

Developing strategies for small cities with fewer than 100,000 (in miles), is another proposal aimed at reducing migration to large cities and improving the competitiveness of rural areas in the country. The strategy involves using royalties to improve infrastructure and public services in small cities. Additionally, it aims to enhance the coverage and quality of education, healthcare, and recreational activities in these areas.

### 6 Conclusions

The economic theory regarding the definition of unemployment (according to the classical school) posits that if there is unemployment, it should be considered a situation of leisure. Later, the neo-keynesian movement argued that unemployment corresponds to a market failure in the efficient allocation of resources. From this arises the concern that if unemployment is involuntary (in the keynesian sense that an agent would prefer to be working at the prevailing wage), why do companies and workers, who are supposed to act rationally, not accept wage reductions, if they increase social welfare with them?

<sup>&</sup>lt;sup>17</sup>The law defines business development zones as "areas where land is established or can be established under conditions of optimal and efficient economic exploitation, proper use of natural resources, and environmental sustainability, generating employment in the municipality, and whose fragmentation would imply a deterioration in current or potential production volumes, employment units, and income generation, will be adopted as such, in order to protect and promote private capital investment." Article 18 from Agreement No. 028 from 1995, which regulates Law 160 from 1994.

The demand for cash turns out to be a timely indicator for estimating the size of the underground economy. However, the work of Frey and Pommerehne [1984] demonstrates that direct research methods such as voluntary surveys, tax audits, among others, allow for an alternative measure of the same.

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