Lisbon School of Economics & Management
Universidade de Lisboa

LISBOA
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Master in Economics

Master's Final Work
Dissertation

Are you a discriminator?
A Lab Experiment: Gift Exchange and the impact of information on the wages of immigrants

Luís Estevão Gonçalves García

December - 2020

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Supervision
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To Margarida, the one and only that taught me to be resilient.
To Albert, for trusting me always. For that, I will always reciprocate.
To Karina and Mauricio, my souls in this and next lives.
To my dearest Robert, an incredible man
who helped me in difficult times. I will be forever grateful.
To my friends who always challenge me to be better.
To all immigrants that even in rough times remain strong
and for those who try to overcome nationalities.
Finally, to my beloved Roman,
who stood by my side until it was done.

GLOSSARY

BS Between-Subjects Design. i, 19, 24, 33

DWT Different Wage Treatment. i, 17, 18, 20, 21, 24, 26–31

ECU Experimental Currency Units. i, 19, 20, 22, 41–43

EWT Equal Wage Treatment. i, 17, 18, 20, 21, 24, 26–31

JEL Journal of Economic Literature. i–iv

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Supervision: Prof. Sandra Marisa Santas Noites Maximiano

Viva voce Examination: 11th May 2021

ABSTRACT

I report a reversed Multi-Employee gift exchange laboratory experiment considering immigrants and local workers. My main goal is to investigate the existence of statistical discrimination. In the experiment, firms make wage offers using the strategy method, while workers choose an effort level. Higher the effort, higher the cost to workers. There is a partial mechanism available to workers for punishing or rewarding firm's offers. Consistent with the gift exchange hypothesis, workers provided more effort at higher wages and performed a task as retribution. Immigrants provide slightly less effort than locals at higher wages, but this is far to be significant. Firms showed a wage-effort positive relation consistent with the Efficiency Wage Hypothesis. Firm's non-binding effort requests were honoured, resulting in increased overall number of tasks performed by workers. Finally, no evidence of statistical discrimination was found in this study

KEYWORDS: Lab Experiments; Multi-Worker Gift Exchange Game; Effort; Wage; Discrimination; Immigrants;

JOURNAL OF ECONOMIC LITERATURE (JEL) CODES: C90; D80; D83; D90; O15; J71.

És um discriminador? Uma experiência de laboratório: troca de presentes e o impacto da informação sobre os salários dos imigrantes

Luís Estevão Gonçalves García

Mestrado em Economia

Orientação: Prof. Sandra Marisa Santas Noites Maximiano

Prova *Viva voce*: 11 de maio de 2021

RESUMO

Este estudo corresponde aos resultados duma experiência de laboratório que usa o jogo de troca de presentes invertido, com dois tipos de trabalhadores, imigrantes e locais. O objetivo principal é investigar a existência de discriminação estatística. Nesta experiência, as empresas fazem ofertas salariais usando o *strategy method*, enquanto os trabalhadores escolhem um nível de esforço. Quanto maior o esforço, maior o custo associado. Existe um mecanismo parcial disponível aos trabalhadores para punir ou recompensar as ofertas da empresa. Consistente com a hipótese da troca de presentes, os trabalhadores esforçam-se mais com salários mais altos e realizam uma tarefa em retribuição. Os imigrantes oferecem menos esforço do que os locais com salários mais altos, mas isto está longe de ser estatisticamente significativo. Para as empresas existe uma relação positiva esforço-salário consistente com a Hipótese da Eficiência Salarial. Os acordos não vinculativos da empresa-trabalhador foram cumpridos, resultando num aumento do número total de tarefas realizadas pelos trabalhadores. Finalmente, nenhuma evidência de discriminação estatística foi encontrada neste estudo.

PALAVRAS-CHAVE: Experiência de Laboratório; Jogo de troca de presentes com vários trabalhadores; Esforço; Salário; Discriminação; Imigrantes;

CÓDIGOS JEL: C90; D80; D83; D90; O15; J71.

¿Eres un discriminador? Un experimento de laboratorio: el intercambio de regalos y el impacto de la información en los salarios de los inmigrantes

Luís Estevão Gonçalves García

Maestría en Economía

Orientador: Prof. Sandra Marisa Santas Noites Maximiano

Prueba *Viva voce*: 11 de mayo de 2021

RESUMEN

Reporto una experiencia de laboratorio usando el juego de intercambio de regalos invertido, con dos tipos de empleados, inmigrantes y locales. El objetivo principal es investigar la existencia de discriminación estadística. En el experimento, las empresas hacen ofertas salariales con el *strategy method*, mientras que los trabajadores eligen un nivel de esfuerzo. A mayor esfuerzo, mayor costo para los trabajadores. Existe un mecanismo parcial para que los trabajadores puedan castigar o recompensar las ofertas de las empresas. De acuerdo con la hipótesis del intercambio de regalos, los trabajadores se esfuerzan más con salarios más altos y realizan una tarea en retribución. Los inmigrantes ofrecen niveles de esfuerzo menor al de los locales a salarios más altos, pero esto está lejos de ser estadisticamente significativo. Las empresas presentan una relación positiva salario-esfuerzo consistente con la Hipótesis de Eficiencia Salarial. Las promesas de esfuerzo no vinculantes con la empresa fueron cumplidas, lo que resulta en un mayor número de tareas realizadas por los trabajadores. Finalmente, en este estudio no existe evidencia de discriminación estadística.

PALABRAS CLAVE: Experimentos de laboratorio; Juego de intercambio de regalos; Esfuerzo; Salarios; Discriminación; Inmigrantes;

CÓDIGOS JEL: C90; D80; D83; D90; O15; J71.

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Are you a discriminator?

A Lab Experiment: Gift Exchange and the impact of information on the wages of immigrants

by

Luís Estevão Gonçalves García

I report a reversed Multi-Employee gift exchange laboratory experiment considering immigrants and local workers. Consistent with the gift exchange hypothesis, workers provided more effort at higher wages and performed a task as retribution. Immigrants provide slightly less effort than locals at higher wages, but this is far to be significant. Firms showed a wage-effort positive relation consistent with the Efficiency Wage Hypothesis. Firm's non-binding effort requests were honoured, resulting in increased overall number of tasks performed by workers. Finally, no evidence of statistical discrimination was found in this study.

1 Introduction

Are you a discriminator? Probably, the first thought as an answer it is that it depends. It is well known that discrimination comes in many colours and flavours. For instance, discrimination could be based on relative beauty, "where attractive people make more money than middle attractive people, who in turn make more money than unattractive people" (Andreoni and Petrie, 2008). Also, suppose gay candidates write down their sexual orientation when sending a curriculum. In that case, they may not be penalised at the first encounter, as found by Bailey et al. 2013 -"little evidence that employers discriminate against gay men and straight individuals in their first contacts with job applicants", but this does not explain discrimination regards equal job conditions as payments, promotions and rewards.

Discrimination exists, and it is not easy to measure. Moreover, some behaviours are considered normal and vary across countries, and it may depend on preferences and beliefs, or racial segregation, that "is not just about race. It is also about access to jobs, good schools, and decent economic prospects in life" (Orfield et al., 2010). Women earn less than men, sometimes, not because there is pure discrimination on the firm side, but

because women show less willingness to compete and negotiate a starting salary. Moreover, there is an effect of widening the overall male salary advantage, and the differential bargaining payoffs explains for approximately 16% of men's final starting salary advantage (Gerhart and Rynes, 1991). However, differences in negotiation abilities are possibly explained by nurture and not nature as pointed out by Andersen et al. 2018, "women do not have an inherent, natural disadvantage in bargaining".

Indeed, if a company see race or gender as a signal of productivity, statistical discrimination could emerge as a result of an optimal choice when maximising profits. Furthermore, this could influence the decisions about assigning resources to human capital investment, where minority groups believe they will not get a fair return on their investments. It could be "explained as a self-confirming prophecy: minority workers are unsuccessful because firms (correctly) believe that they likely have low skills and minority workers invest less in human capital since they (correctly) believe that they will be disadvantaged in the labour market" (Norman, 2003). At the end, everyone is right.

Furthermore, reasons for statistical discrimination point to lack of information or preferences, but even in the face of contradicting evidence and once the relevant information is available, initial perceptions may persist. People may use physical appearance to form impressions or choose associations (Castillo and Petrie, 2010). It leads to misconceptions and the emergence of false ideas mostly target at groups of people from different countries of origin, races, religions, gender or beauty. As there is no way to avoid this behaviour, discrimination is just a consequence 'Made in heaven'.

Keeping in mind that discriminated groups vary across countries, individuals and beliefs, in this thesis, I focus on two groups, locals and immigrants and explore the existence of discrimination on an experimental labour market. More specifically, I used a Multi-worker gift exchange game between a firm (Employer) and workers (Employees), and I ran a Lab Experiment to observe local and immigrant average wages and the level of effort of both types of workers. In case firms offer different wages to locals and immigrants, it is not clear that the gap wage is due to skills or status quo and prejudices. First, if skills play a role, immigrants may get a lower payment because they put less effort or perform worse than local workers, or on the contrary, they are paid more because they put more effort or perform better than local workers. A laboratory experimental analysis allows me to observe both firms and workers' behaviour and check whether firms are rational discriminators by using the average group characteristics to predict individual worker performance, assuming no prejudice or hostile motives. Second, if stereotypes play a role, cultural differences, or a simple segregation phenomenon are in place, we can say we have pure discrimination. This laboratory study aims to study and distinguish pure

discrimination from skills-based discrimination by checking the impact of giving firms ex-ante information about whether a worker is local or immigrant and allowing firms to set different wages while controlling for workers' effort levels.

In my view, understanding discrimination between locals and immigrants can be helpful in two main aspects. On the one hand, immigrant workers can look for less biased employers and improve their professional background profiles.

On the other hand, firms can learn how to avoid discriminatory behaviour due to false ideas about immigrants in order to maximise profits and build more innovative teams. Firms should have in mind that workers with migrant status are expected to introduce more innovations, and they have positive associations to entrepreneurship (Nathan and Lee, 2013).

In section 2, I explore the theoretical and empirical framework and review the literature. Section 3 presents the experimental design, the experimental procedures, and the empirical strategy. Section 4 is devoted to the data analysis and results. At last, I present the conclusions in section 5.

2 THEORETICAL AND EMPIRICAL FRAMEWORK & LITERATURE REVIEW

This section presents critical concepts first and then the related literature review. As such, the literature review is not exhaustive but instead focused on the Gift Exchange Game.

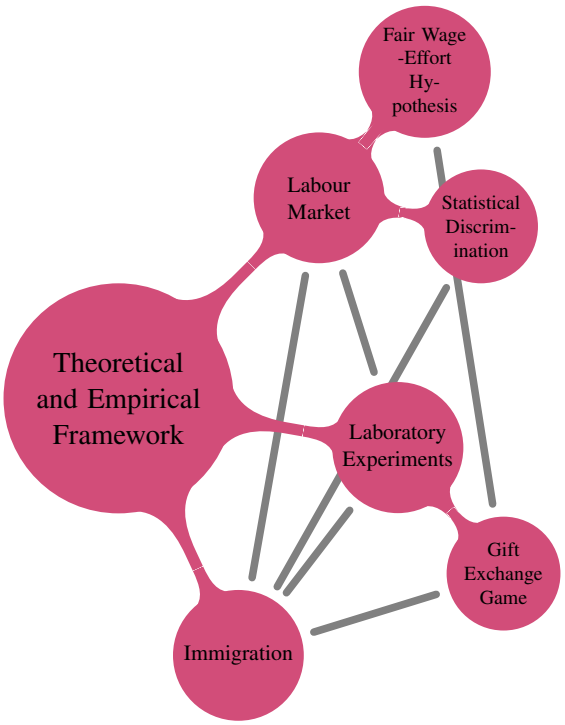
2.1 Theoretical and Empirical Framework

This study explores immigrant discrimination in an experimental laboratory labour market. More specifically, it investigates the impact of revealing the worker's nature (i.e. local or immigrant) to the firm. Figure 1, shows the main elements of the theoretical and empirical framework.

Let's begin with the labour market, which usually is an ideal scenario to find discrimination, especially statistical discrimination with imperfect information (Arrow, 1973). Also, the labour market is where labour contracts involving a payment in exchange for an effort level that depend on workers' abilities exclusively occur. In a context of a labour market, we also need to consider the Fair Wage-Effort Hypothesis (see section 2.1.3), i.e., when workers have a belief of a fair wage and given that "the actual wage is less than the fair wage, workers supply a corresponding fraction of normal effort" (Akerlof and Yellen, 1990).

I recreated a labour market in the Lab using a Gift Exchange Game. This game shows that firms may find it advantageous to pay a premium to acquire labour to get more benefits through workers 'reciprocation attitude, which is costly to them (Akerlof, 1982).

FIGURE 1: Theoretical and Empirical Framework: Immigration, Statistical Discrimination and Gift Exchange Game.



2.1.1 Immigration

Immigration is "an act or instance of immigrating specifically, travel into a country for the purpose of permanent residence there" (Merriam-Webster., 2020) or "the action of coming to live permanently in a foreign country" (Lexico.com, 2020). It leads me to the concept of what is to be an immigrant.

I asked two people *What is for you to be an immigrant?*. Here are their answers, with all the limitations and subjectivity that those imply:

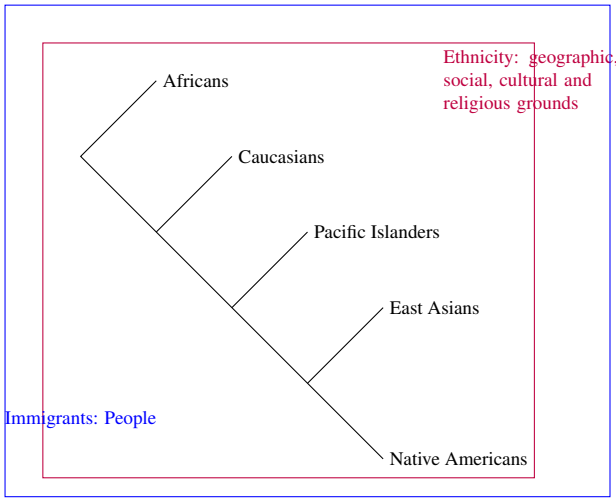
> Being an immigrant is to suffer prejudice against one's nationality. It is to face the unwillingness of public servants as if they were doing us a favour. It is to pay higher rents or to get rent proposal declined. In small gestures, you can perceive the colonising thoughts of people who call themselves siblings but still act like slave's owners. [1]
>
> —MBA and Student in Portugal

[1] See Gomes 2013

> In essence, it is being just a human being like any other, who is motivated either by the desire for better conditions or the quest of achieving their motivations and desires. I believe that an immigrant is, due to his personality and motivated by his need, someone open to new experiences and to novelty, someone who has the will to learn from work and who is open to know other cultures, someone who is persistent, resilient and open to leap out from their comfort zone.
>
> —M.Sc. in Biochemistry and Researcher in Portugal

I guess it is not difficult for the reader to identify the statement of the immigrant. Being immigrant involves beliefs from everyone about several characteristics such as race, ethnicity, gender, sexual orientation or stereotypes. Immigrants make countries more diverse and challenge paradigms about race and ethnicity. Immigration is "making each racial or ethnic group more heterogeneous as well as adding new ones to the mix" (Hochschild et al., 2012).

FIGURE 2: The evolutionary tree of human races, Ethnicity and Immigrants. Adapted from Risch et al. 2002



Indeed, an immigrant can belong to several racial groups, ethnicity and shared values. Figure 2, shows the racial groups based on the main continent of origin (five major groups, from Africans to Native Americans) and ethnicity as a "self-defined construct that may be based on geographic, social, cultural and religious grounds" (Risch et al., 2002). It is critical because people have a preconceived idea of what an immigrant is, creating stereotypes as a result.

Moreover, immigration has consequences that vary across societies, and it is perilous to generalise. For instance, the impact on the labour market depends not only on the volume of immigrants entering the country but also on the level of their qualifications compared to local workers (Borjas, 1999a, 1989).

It is like a ritual that creates an idea, and sometimes fear, that immigrants affect local wages and steal jobs. This idea about the adverse impact of immigrants on native employment opportunities has little evidence but, depending on the ethnic density, may have a relatively small negative impact on local earnings and local employment (Borjas, 1994; Borjas and Tienda, 1987). Other impacts are still on their way and may shape the labour market in the long-run, which could take some decades to be observed. Immigrants flow to many host countries like Germany, Portugal, France, UK, USA, and Brazil. There are weak signals that countries may change the way they perceive immigration in the near future. Conflicts like the one between Greece and Turkey or the USA-China Commercial War may worsen locals' perceptions towards immigrants, and this could happen at any time without previous notice.

Furthermore, immigrants must deal with bureaucracy that is tailor-made to maximise locals' well-being. In contrast, immigration policies, forged under the premise that "admitting skilled immigrants would likely reduce the earnings of skilled native workers, but would increase the earnings of other workers and native-owned firms by more, raising per capita income in the native population" (Borjas, 1999b). This claim was supported somehow, given that immigration led to a small increase on average wages of local workers when immigrant's density is low and after their arrival, they may take jobs or occupations that do not match their skills (Dustmann et al., 2013). Also, new immigrants workers are expected to have a small positive impact on local wages in the long run and negative impact on old immigrant wages, because there is a "small but significant degree of imperfect substitutability between natives and immigrants within education and experience groups" (Ottaviano and Peri, 2012).

Additional, in some European countries, the skills of immigrants are underestimated. This *skill downgrading* is mostly due to language and legal requirements that create natural barriers, forcing new immigrants to accept jobs more suitable for less-skilled locals and cannibalise with previous immigrants that still struggle to fully integrate into the labour market (Peri, 2016).

Under traditional circumstances, immigration is always an issue because there is no unique position about its effects, raising uncertainty feelings. Countries through immigration policies try to minimise negative impacts as well as maximise positive ones. Many policymakers use econometric models[2] to predict the future based on 'processed data'. However, without access to the full 'raw data' and without considering that immigrants

[2]At this point, prudence is invoked, because econometric models are usually really good in explaining the past, but may fail to predict the future. Moreover, good performance yesterday is not always a good indicator of good performance tomorrow unless it survives Lucas' Critique (Lucas, 1976). It seems that the future is a deal for futurists and not for economists.

are people and not only labour inputs, those models will predict biased estimates. It is essential to take into account that this encourages some "immigrants to act in particular ways and that some actions are more beneficial than others" (Borjas, 2018).

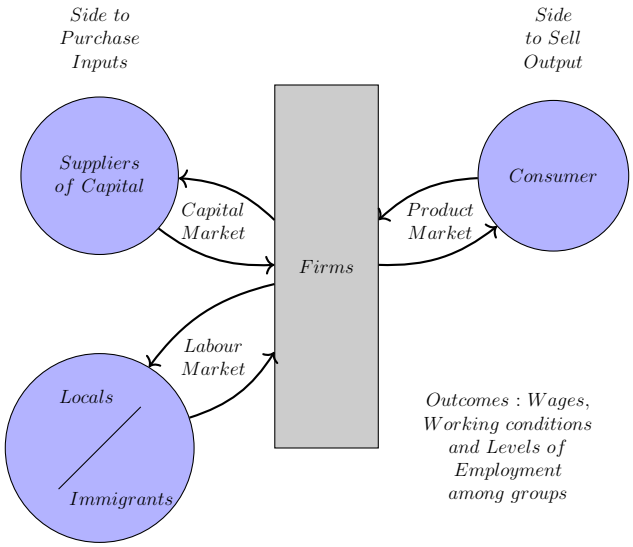
This lead to myopic views and biased results on the impact of immigration. In the end, what we know about immigrants is what had happened after applying policies based on these models. If we think immigrants will endanger the economy, and, as a result, policymakers apply rules to control immigration, they will be happy if there is a negative impact of immigration because that makes their policies right, a classic self-fulfilling prophecy (Merton, 2000). If there is no negative impact, policymakers are also happy because they feel they took the right measures.

Next, I explore the relationship with the labour market and discrimination.

2.1.2 Labour Market and Discrimination

The labour market is one of the economic markets, and it is where workers rent labour services to firms. Labour services are rented due to the impossibility of buying and selling people as in the time of slavery[3]. Nevertheless, the Labour market is where workers are allocated to job positions, and contracts are used to bind these relations (Ehrenberg and Smith, 2018). In Figure 3, it is possible to see the interaction between firms and markets. Local workers play a role in such a world altogether with immigrant workers.

FIGURE 3: Markets to Play. Adapted from Ehrenberg and Smith 2018.



The idea is to get a general picture of how firms must deal with markets to survive. Also, these assertions help to circumscribe the role of immigrants in the labour market. In

[3]Unfortunately, in some cases, we observe a Modern sort of slavery replaced the old one.

this sense, specific issues linked to the firm's operation are seen as a replication of flaws in pulling together the decision making process that involves elements such as wages, working conditions and level of employment itself (Cahuc et al., 2014b). It is important for this study because these flaws are considered the trigger that awakes *The Four Horsemen of the Apocalypse*, this time altogether with a different name: discrimination.

However, discrimination is a challenging and complex concept to tackle. Therefore, I limit the scope of this study to wage discrimination. In this sense, I consider that exists a wage discrimination when workers with the same observed socioeconomic characteristics (i.e. education, IQ, EQ) and physical strength have different wages due to non-socio economic (i.e. race, religion, sex or ethnic) characteristics and the differences are systematically correlated (Stiglitz, 1973).

At some level, personal characteristics such as race, ethnic background and sex, unrelated to productivity, are also valued on the market. Furthermore, "deliberate racial segregation and discrimination in entrance to schools and colleges, deprivation of the right to vote along social and sexual lines, and discriminatory taxation are all examples of nonmarket discrimination" (Arrow, 1973).

There are a large number of theories that discuss discrimination. Table G.1 in Appendix G, presents some of these theories, especially those related to the labour market.

It has come to my attention that racial discrimination has served by far as a reference point to deal with discrimination. To point out, in the United Nations Convention on the Elimination of All Forms of Racial Discrimination,

> The term 'racial discrimination' shall mean any distinction, exclusion, restriction or preference based on race, colour, descent, or national or ethnic origin which has the purpose or effect of nullifying or impairing the recognition, enjoyment or exercise, on an equal footing, of human rights and fundamental freedoms in the political, economic, social, cultural or any other field of public life.
>
> (United Nations, 1966)

Notably, recognising the negative impact of racial discrimination and condemning it is a never-ending fight. Despite good intentions, the focus on racial discrimination has neutral intent and has perverse effects because may lead to structural discrimination and makes vulnerable other groups given the multiple grounds of discrimination (Mercat-Bruns et al., 2016; Pincus, 1996).

Hence, after searching Theories of discrimination, *Statistical Discrimination* offers the best framework, namely because through this lens it is possible to represent how firms may come to discriminate among groups of workers, given the impossibility to observe individual characteristics and with limited information about the individual's groups.

Under those circumstances, firms creatively look for signals. While it is possible to get information about the education level, experience and performance on tests, it is impossible to explain productivity entirely. Consequently, firms must search in secondary sources to rely on, such as supplementary information or beliefs about a particular group of workers' average performance. Whereas the information is accurate or not, this may create a persistent source of discrimination among groups. Accordingly, this affects the decision workers make about investment in education, applying for certain types of jobs or being forced to go into segregated groups to pursue a career (Cahuc et al., 2014a).

Statistical discrimination may also explain the self-fulfilling prophecy. It is vital to realise that, sometimes, if firms are profit maximisers, the discrimination can be the optimal strategy. Even for a policymaker, statistical discrimination can lead to improving welfare. Regardless morality issues, sometimes, discrimination is based on rational economic behaviour. Therefore, we should look for answers in other fields, despite knowing that some questions will remain unanswered (Aigner and Cain, 1977; Schwab, 1986).

With this in mind, I divided the workers into two types, locals and immigrants, and I searched to find (if there is) statistical wage discrimination between them. Thus, being an immigrant is likely to be perceived as belonging to a minority group. For this study, an immigrant summarises non-economic characteristics such as race, religion or sex. Therefore, I approached the potential impact of information [4] on immigrant wages and the behaviour of firms and workers. The focus is on firms' behaviour, when offering a wage to workers, and on workers' behaviour when honouring their word after accepting offers from firms.

Up to now, I have introduced immigration, the labour market, and discrimination as general concepts, albeit a bit conventional, alongside wage discrimination and productivity. Before moving forward, it is key to bring to the front the concept of effort, representing labour productivity. According to the Efficiency Wage hypothesis, either the "services a labourer renders are a function of the wage he receives" (Stiglitz, 1976) or the labour productivity is thought to depend on the real wage paid by firms. It means an effort function takes the form of $e(\omega)$ and firms choose a wage that minimises labour cost per efficiency unit (Yellen, 1984).

2.1.3 Fair Wage-Effort Hypothesis

Amid the abundance of Efficiency Wage Hypothesis models, it exists one enriched from other fields like sociology, personnel management and psychology: *The Fair Wage-*

[4] Reveling Worker's nature, for example, being an 'immigrant' for this study. The firm is likely to consider this fact a signal of productivity when framed to offer different wages

Effort Hypothesis by Akerlof and Yellen 1990. The idea beneath is the aim to observe human behaviour when expectations differ from reality. It could be seen as reciprocation or the representation of the old saying: 'You get what you deserve'.

The centre of the idea emerges the concept of Fair Wage (usually predetermined) and its relation with the effort supplied. The effort e depends on the relation between the actual wage ω and the fair wage ω^*, the fair wage-effort hypothesis says that,

$$e = min(\omega/\omega^*, 1) \tag{1}$$

Equation 1 represents the effort supplied, denoted in units such that 1 is normal effort. Following the same authors, this hypothesis explains the existence of unemployment. Unfortunately, any inference about this topic is beyond the scope of this study. Nonetheless, as a spoiler, when the fair wage ω^* exceeds the market-clearing wage, unemployment occurs.

Keep in mind that the Gift Exchange Game represents The Fair Wage- Effort Hypothesis and that this type of interaction is considered a standard way to represent the Labour Market in an experimental lab. I will come back to this in the Literature Review.

2.1.4 Laboratory Experiments

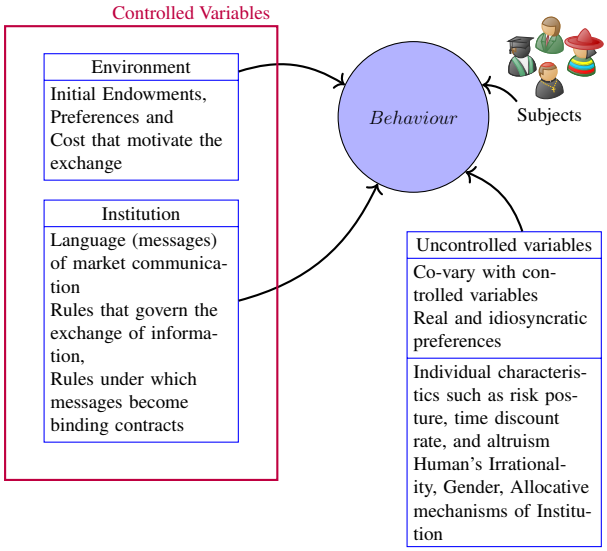
A laboratory experiment has three elements, as in Figure 4. First, an *environment*, where monetary rewards allows to induce a specific value/cost configurations intended; second, uses an *Institution*, defined by the description of messages and procedures of the market as the experimental instructions, which are computerised and third, there is an observed *behaviour* of the participants or subjects, usually as a function of the controlled variables (Smith, 1994).

Thus, the first two elements of an Experiment constitutes the controlled variables. By the same token, there are non-controlled variables such gender, allocative mechanisms of institutions or real and idiosyncratic preferences, that will coexist with the subjects' behaviour that will play a role uncovering issues to understand phenomena better (Davis, 2016).

It is essential to realise that laboratory experiments represents a technique often used for testing theories, when its predictions are sensitive to specific attributes of subjects, such as risk posture and the set of information, which it is hard to observe.

On the positive side, it is possible to design experiments that control these attributes and directly measure them through 'treatments variables'. Likewise, it allows to rec-

FIGURE 4: Elements of an Experiment. Adapted from Smith 1994 & Davis 2016.



oncile theory with empirical data or engage in dialogues to improve such theories or policy-making, that is to say, that experiments resemble mediators among theorists and policymakers (Roth, 1986). On the negative side, there are bad mediators, bad theories and bad policymakers, which at some point in time, like false negatives, made it to pass all security clearance checks.

Thereupon follows some criteria that should be considered in the picture when running lab experiments expecting to predict economic theories. In the foreground, the problem should be simple in itself and framed in a simple way for participants. The background must provide adequate incentives and sufficient time for trial-and-error adjustments (Binmore, 1999). Since this study aims to investigate the existence of statistical wage discrimination, not only the problem of incomplete information on individual characteristics takes place straight-away but also its assessment. Surprisingly, in the light of theories of discrimination, one can measure wage discrimination through the estimation of wage equations, decomposition methods or directly through correspondence and audit studies, methods based on the comparison of differences in variables, and experimentation in the field and on the laboratory (Cahuc et al., 2014a).

Forthwith, I chose to conduct a lab experiment because it offers a suitable way to solve this deadlock and allow me to have more control, create a fictional labour market and facilitates replications. Moreover, estimation tends to overestimate discrimination, not to mention that it may influence explanatory variables (Cahuc et al., 2014a). Decomposition methods, while commonly used to analyse gender and racial discrimination, cannot identify the sources and the problems of discrimination, for instance, they do not allow for setting a clear difference between employment discrimination and wage discrimina-

tion (Chen and Zhang, 2018). Furthermore, audit and correspondence studies involve somehow deception, given actors performing a role or the use of fictitious resumes.

Indeed, lab experiments seems to be a good approach until now, albeit not unique. Fields Experiments, whereas rarely reaches the controlled level attainable by lab experiments, provide better external validity. In some cases, field experiments works as a good complement to lab experiments. Neither field experiments nor lab experiments alone can capture a complete representation of the real world or situation. Nonetheless, both give qualitative insights that help comprehend better phenomena when using treatment variables (Charness, 2015).

To put it another way, I conducted a lab experiment because it allows me to create a labour market and directly estimate the wage discrimination. The Environment and the Institution will be held mainly constant, and only one variable will be changed exogenously for the Institution.

Before moving forward, controlled variables in the Environment will be held constant such as initial endowment, preferences, costs and well-defined incentives. For the Institution, the treatment variable will be the information regarding how a firm can set workers' wage. Immediately, it follows the Efficiency Wage Hypothesis, the theory to be tested under the lenses of the Fair Wage-Effort Hypothesis through the Gift Exchange Game.

Additionally, firm's behaviour indicates whether wage discrimination exists, under statistical discrimination scope. Notice that firms may search, through secondary sources, signals of productivity in order to estimate, on average, the productivity of a subject that belongs to a minority group let us say, immigrants. I shall indicate that the average productivity of a group estimated by a firm, can be the true productivity of that group, and, in these cases, there is no wage discrimination. It is important to recall that effort depends on the wage, and that takes the form of $e(w)$, but also that firms search for productivity signals and, consequently, they offer a fair wage. whether the fair wage offered by the firm matches the worker's fair wage is a matter out from the realms of this study given that my focus is on the statistical wage discrimination.

Finally, the experiment in this study has some limitations. First, there is a trade-off between internal and external validity. Second, the sample size reached is not enough to get significance, and thus I consider the results a pilot. Besides, the empirical results are less robust, although sufficient to get a tendency. Third, the productivity is not real productivity, and there is a risk that in the Lab, the elicitation will not be enough to induce subjects to perceive being an immigrant as a signal of different productivity. Last, the pool of subjects is not composed necessarily by immigrants, and subjects could also hide their true preferences. Notwithstanding these limitations, this study contributes to the

literature on statistical discrimination using a Gift Exchange Game. Next, I show the primary papers I used as a guide to structure this experiment.

2.2 Literature Review

2.2.1 Foundations and On the Lab

Beforehand, the literature search about Gift Exchange Games in laboratory experiments, connected with wage discrimination and immigrants turned to be a dead end. It represents an opportunity and is an Achilles heel, specifically, when it comes to immigrants. With this in mind, and because the goal was to run a lab experiment, literature's quest is focused on the Gift Exchange Game and laboratory experiments.

Therefore, I split the literature into two groups. First, in Table G.2 in Appendix G, I show papers classified as the *Foundations* beneath the Gift Exchange Hypothesis and its relation with the Efficiency Wage theory. Second, Table G.3 is a compilation of papers classified as *On the Lab*, since these are laboratory experiments with Gift Exchange Games as the core of their experimental design.

In general, I found that Gift Exchange Games have been among us at least four decades by now. It could be used to represent a Labour Market in laboratory experiments, mostly because mimics labour contracts, which points out to a relation between terms of exchange and norms, where wages depends on norms of workers' effort, the latter also depends on wages, at least partially, and workers' effort depend on norms of workers' effort (Akerlof, 1982).

Another critical issue of Gift Exchange Games is that incorporates norms of fairness and reciprocity and could generate efficiency gains, making firms and workers better off, if they engage in reciprocal stable behaviour than otherwise (Fehr et al., 1998). In the same way, it matches the efficiency wages theory, especially the *Fair Wage-Effort Hypothesis*.

Similarly, four paradigms: the Dual Labour Markets Theory, Theory of Bureaucracy, Theory of Groups and Equity Theory, all of them as Gift Exchange representations of the Labour market (Akerlof, 1982). Up to this point, I just added reasons in favour of using a Gift Exchange Game.

Despite Gift Exchange Game being an oversimplification of the real world, making a simple game exchange provides more insights than designing a complex gift exchange, whereas the latter suits better the real world, not necessarily leads to achieve more Nash equilibria (Van Der Heijden et al., 2001).

In the opposite side, I shall bring the arguments against using the Gift Exchange ap-

proach. Indeed, nothing is perfect. First, Gift Exchange may lead to different outcomes when small institutional changes are made. If selfish behaviour is induced, behaviour consistent with the *Fair Wage-Effort Hypothesis* may emerge, but it will not be sustained, and there might be outcomes where high level of reciprocal effort do not follow higher wages (Rigdon, 2002). Second, Gift Exchange can be induced by subject' strategic considerations rather than by their social preferences, given that the subject's background strongly impacts their behaviour. Also can be seen as the result of a framing effect or a search for clarity effect that takes place, making replication more difficult if not impossible (Charness et al., 2004).

Nonetheless, the disadvantages, rather than being another Achilles heel, are just a warning to avoid constructing a complex gift exchange, if there is not a clear value-added on doing so, and to choose correctly which institutional changes should be considered, the Environment and the subjects' characteristics, not only to avoid changes in the nature of the Gift Exchange itself but also to avoid unrealistic results that do not match the real world at all.

Next, Table G.3 in Appendix G refer to Gift Exchange Experiments that inspired and guided this design. In this set of experiments, subjects were separated into two roles, and this is likely to be a fixed characteristic, coupled with the relation between wage and effort.

From Hannan et al. 2002, it came the idea of keeping a partial punishment/reward mechanism to consider the importance of subjects background (expected vs real characteristics) and up to what extent nonbinding request is honoured by subjects.

In Abeler et al. 2010, Gift Exchange is analysed as a contract enforcement device. The authors used a condition that elicited less effort and more violation of the norm of equity, the latter as a prerequisite to gift exchange, although it is not clear if this was induced deliberately or if it resulted from the treatment itself.

Perhaps, this experiment is a hybrid of the next three papers. First, I adapted the design of Benndorf and Rau 2015 which uses a reversed Gift Exchange in a multi-employee scenario. Second, Maximiano et al. 2007 uses the strategy method to elicit the wage-effort relationship of every individual, which I also use here for the same purpose. Finally, Jokipalo 2019 added some features such as the *real effort*. Even though it is beyond this study's scope, I used the same task and a similar methodological design. Overall, Gift Exchange Experiments are simple to follow and can be extended to represent different realities and it is widely accepted.

3 EXPERIMENTAL DESIGN, PROCEDURES AND EMPIRICAL STRATEGY

3.1 Overview: Gift Exchange

Reciprocation is a powerful psychological tool used in Negotiation (Siedel, 2014) and the Rule of reciprocation says "we should try to repay, in kind, what another person has provided us" (Cialdini, 2009). It is relevant because offering a wage in exchange for an effort level is a negotiation between firms and workers, it has risks and involves considerations about fairness and moral hazards. In fact, in the labour market what workers tell they will do, may be quite different from reality (Fehr et al., 1993).

I created this experiment by different phases. First, I considered a typical gift exchange game as in seminal papers by Fehr et al. 1998 and Akerlof and Yellen 1990 introducing some adaptations. Second, I considered Maximiano et al. 2007 as a starting point with some changes, and I tried to follow its reporting structure closely. There is a firm and two workers instead of k workers (k>1 and specifically, one and four, in their experiment). The firm has an initial amount of capital or endowment (E) available to make both workers an offer, while workers have an initial value or wealth (W). Third, from Benndorf and Rau 2015, I kept the idea of the reversed order and the cost table for workers. However, the authors used sequential moves in two stages, while in this experiment, firms and workers move almost simultaneously in the first stage, and the sequential move appears in the second stage.

Thus, firms offer wages to workers, w_1 and w_2, but those offers must be multiple of 5 and between 20 and 120. Another key point here is that firms must offer a wage using the strategy method. i.e., firms must choose for each potential effort level, a correspondent wage. It differs from Maximiano et al. 2007 because, in their experiment, workers are the ones that make a contingent effort choice, while in this experiment is the firm. Correspondingly, workers simultaneously decide the level of effort they want to provide as an integer between 1 and 10, at cost $c(e_i)$ according to Table II, for i = 1,2.

An essential piece of information for both firms and workers is that the latter can reject the firm's wage offer in the second stage of this experiment. In Maximiano et al. 2007, workers cannot reject the firm's wage offer. Moreover, workers in the third stage can shirk. Therefore, this is the mechanism workers use to reward/punish the firms if they feel the wage offered by the firm is not fair. More specifically, in my game, the workers can reject the wage offer as punishment or accept, but not honour the deal and shirk in the third stage. Nonetheless, even if workers shirk, there is no real impact for the firms, although, may elicit the notion that if workers shirk, this impact their profits, then firms may be tented to offer better wages in the hope that workers reciprocate.

Four, Jokipalo 2019 introduced the real effort instead of hypothetical effort using the task. As I intended to observe the firm's behaviour, I used hypothetical effort as the variable to analyse the wage- effort relation and the task is used to perceive if workers will honour the deal given they can shirk with no consequences.

Finally, the payoff of firms and workers, adapted from Maximiano et al. 2007, is given by:

$$\pi_i(w,e) = \begin{cases} E + v * (e_1 + e_2) - (w_1 + w_2) & \text{if Wage Offer is Accepted} \\ E + v * e_j - w_j & \text{if Wage Offer is Accepted by } j \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

$$u_j(w,e) = \begin{cases} W + w_j - c(e_j) & \text{if Wage offer is Accepted, with } j \in [1,2] \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

The value of v represent the marginal product of effort and is set equal to 10. The cost of effort function is given by Table II. The initial wealth parameter W and the Endowment E, are set equal to 90, respectively, $W = 90$ and $E = 90$.

Standard theoretical predictions: The 'typical' Gift Exchange Game equilibrium is given in Figure 5, where firms offer low wages and workers low effort. In this experiment, the theoretical predictions remain the same, because firms and workers are assumed as rational money maximisers as in Fehr et al. 1998. Keep in mind that workers should always accept the offers because they will get positive payoffs (see Appendix H).

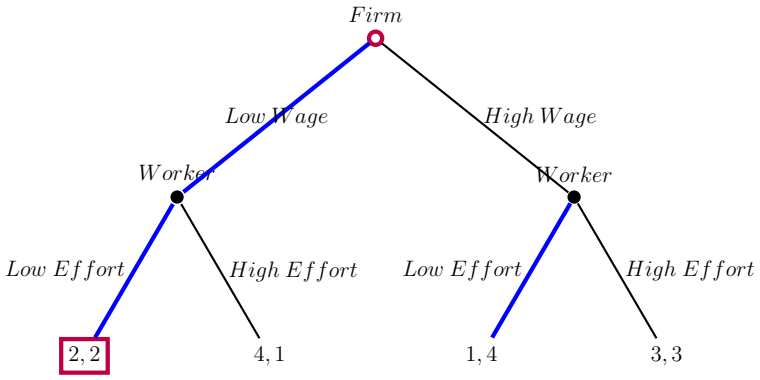
In this experimental game, the theoretical results under selfish, rational money maximisers individuals (especially the workers) should lead to firms' non-discriminatory behaviour. Additional, if the Gift Exchange take place, then, in this case, a difference in wages may result from the relation wage-effort rather than for discrimination due to non-market conditions, let say, being an immigrant.

A relevant point in this experiment lies in testing whether a firm offers a different wage for two workers that supply the same level of effort.

3.2 Experimental Design

I ran a lab experiment, and I used a Gift Exchange Game to represent the strategic interactions between subjects type. The experiment design is based on the reversed Multi-employee gift-exchange game (Benndorf and Rau, 2015; Abeler et al., 2010). A session consisted of one round, with groups of one firm and two workers. Each round had three

FIGURE 5: Example of Gift-Exchange Game in Extensive form



stages. In the first stage, the firm decided on a wage offer using the strategy method. Almost simultaneously, workers decided on the effort level. In the second stage, workers decided whether to accept the offer or not. In the third stage, those who accepted the offer had two minutes to solve up an encryption task adapted from Benndorf et al. 2019 [5].

The encryption task was repetitive and required no previous knowledge. During the two-minute working period, workers (and firms) were free to surf the internet or otherwise relax, given that they did not disturb other participants. Same as in Jokipalo 2019.

In the end, subjects answered an Exit Questionnaire (see Appendix B) that highlighted some background subjects' characteristics and beliefs. More specifically, the Exit Questionnaire was a survey with agree/disagree questions (measured on a scale) and some questions related to the labour market and immigrants' perception. Subjects answered among several nationalities which one they think their role was. The questionnaire was based on questions from the European *Values* Study 2017 (EVS, 2020).

In Table I, I show general features for both treatments and then, I explain some elements of the design.

3.2.1 Control and Treatment

The treatment in this experiment is the condition on how firms must determine worker's wages. Immigrant and local are the only two types of workers. I consider two treatments, namely Equal Wage Treatment (EWT) and Different Wage Treatment (DWT). The first one is referred to as the Control treatment and provides the baseline.

The baseline was given by the control sessions executed on December 2 and 9, while Treatments sessions were executed on days 2, 3, 10 and 11 of December 2020.

[5] Orignal Task coded and freely shared by Benndorf et al. 2019 and available online in https://github.com/vbenndorf/wedr. I only change the number of trials, repetitions and timing, to decrease the overall time, the rest remain the same.

TABLE I: Experimental Design. Adapted from Fehr et al. 1998.

	Control (EWT)	Treatment (DWT)
Parameters (marginal product of effort, Initial wealth, Endowment)	v=10, W=90, E=90	v=10, W=90, E=90
Feasible effort levels	$e \in [1, 10]$	$e \in [1, 10]$
Feasible wages	$w \in [20, 120]$	$w \in [20, 120]$
Wage determination	Firms commit themselves to a wage level using the Strategy Method	Firms commit themselves to a wage level using the Strategy Method
Matching process	Exogeneous and random	Exogeneous and random
No. of firms (F)	One	One
No. of workers Type= L (Local)	One	One
No. of workers Type= I (immigrant)	One	One
Information conditions	v, W, E, N, L, I are common knowledge; identity of subjects is unknown	v, W, E, N, L, I are common knowledge; identity of subjects is unknown
Condition on Wages (i.e. restrictions)	Same ($w_1 = w_2$)	Different ($w_1 \neq w_2$)
Predictions with rational money maximizers	Convergence towards w_1=w_2=20; e_1=e_2=1	Convergence towards w_1 = 20 and w_2= 25 or w_1 = 25 and w_2= 20; e_1=e_2=1
Task	Word Encryption task with Double Randomization(WEDR)	Word Encryption task with Double Randomization (WEDR)
Questionnaire	Yes	Yes

The difference between the control and the treatment is that firms are framed to select a different wage ($w_1 \neq w_2$) for locals and immigrants types in the latter. While, in the control treatment, firms have to give the same wage ($w_1 = w_2$) to each worker type. Given that firms use the strategy method, they may incorporate in their decision-making process that she has to select several wages. It is relevant to mention that participants may be tempted to ignore the condition when setting the wages (i.e. equal in DWT or different in EWT) in each treatment, to avoid this, the experiment has a checker that will prevent any possible attempt to not comply with the conditions.

One challenge that arose was to induce preferences and beliefs regarding being an immigrant. In particular, there is no reason to think that subjects in the Lab will take as a signal of productivity being an immigrant because there is no reason to believe that exists any distinction between local and immigrant workers *a priori*. For instance, subjects get information that they can interpret as a signal of productivity, the gender or the skin

colour, and then, comparisons between men vs women or whites vs blacks, give them a clear signal of whom may have less productivity and this is not necessarily wrong if they get lucky.

To solve this, I included in the instructions that there is two productivity levels Z for workers: lower and higher, which has a Bernoulli distribution such $Z \sim Be(0.5)$, where a success is to get a higher productivity worker ($e \in [6, 10]$), while a failure is to get a lower productivity one ($e \in [1, 5]$). Keep in mind that this does not rule out that firms can get both workers with lower productivity, given that there is 25% probability to get both workers with lower productivity, 50% probability to get one lower productivity worker and other of higher productivity, and 25% probability to get both workers with high productivity.

Another critical information is that the experiment is a Between-Subjects Design (BS) given that allows me to have a clean design and control over it, besides this is a short and simple experiment. However, to avoid learning effects, the experiment consists of a one-shot game. The only explanatory variable is the treatment variable that in this case, i.e., the possibility of setting a different wage for each type of worker.

3.2.2 Earnings

Average earnings were about 107 Experimental Currency Units (ECU) for about 37 minutes approximately. The combination of wage and effort determined outcomes and monetary payoffs for each triplet of subjects in a round. Each firm was given an Endowment of 90 ECU and each worker started with a Wealth of 90 ECU. The payoff functions are adapted from Abeler et al. 2010 and Maximiano et al. 2007 and were given by:

$$\pi_i(w, e) = \begin{cases} 90 + 10 * (e_1 + e_2) - (w_1 + w_2) & \text{if Wage Offer is Accepted} \\ 90 + 10 * e_j - w_j & \text{if Wage Offer is Accepted by } j \\ 0 & \text{otherwise} \end{cases} \tag{4}$$

$$u_j(w, e) = \begin{cases} 90 + w_j - c(e_j) & \text{if Wage offer is Accepted, with } j \in [1, 2] \\ 0 & \text{otherwise} \end{cases} \tag{5}$$

where π_{Firm} represents the firm's Payoff, u_j the Worker's Payoff j, e_j denotes the worker's effort j, w_j is the Wage of Worker j, and $c(e_j)$ is the cost of effort that depends on the effort. Wages were limited to the range of 20 to 120, inclusive and by multiples of 5. Effort was chosen from {1, 2, . . . , 10} and the cost of effort is shown below in Table II:

Effort Level e (units)	1	2	3	4	5	6	7	8	9	10
Cost $c(e_j)$ (ECU)	0	1	2	4	6	8	10	13	16	20

TABLE II: Cost of effort

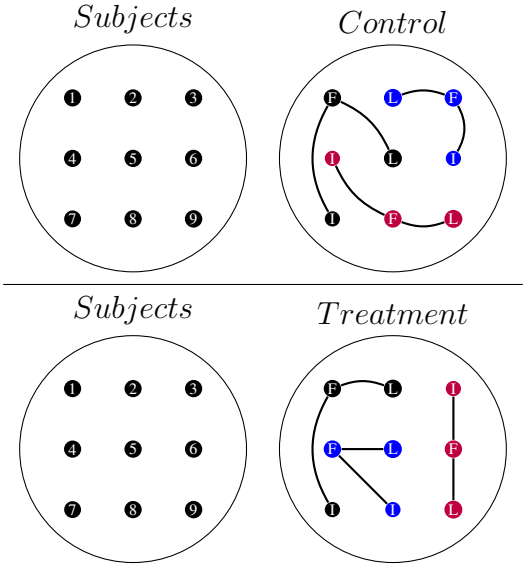
3.2.3 Matching Procedures and Participants' profile

This experiment is a one-shot, using random matching process to avoid self-selection. After the subject's arrival, I created groups in multiples of three. In Figure 6, as one [6] example, there are three groups (black, purple and blue) for both, the Control and the Treatment.

It is relevant to mention that the instructions are neutral for the EWT, but framed for DWT. Recall that in the treatment DWT firms set a different wage to locals and immigrants, while in the control treatment, firms have to set an equal wage. The Experimenter emphasises these conditions when reading the instructions, and there is a checker in the software itself to remind the participants if they do not comply with these conditions.

There was no need to use control questions, but there were examples in the instructions to check if subjects understood the payoff functions and the task activity. Additional, altogether with the fact that this experiment is only a one-shot and supporting the idea of avoiding learning, no trial periods were carried out, except for the task.

FIGURE 6: Matching Process



[6] Using $\frac{n!}{(n-r)!}$, where n is the number of subjects, r is the number of categories, in this case, three for Control and Treatment, no repetitions are allowed and the order matters. Thus, 504 possibilities in this example.

In general, subjects profile for both, Control-EWT and Treatment-DWT, were similar according to Table III. Nevertheless, the percentage of women was higher in treatment DWT, and the average age was higher than in EWT. Participants were mainly Portuguese but Brazilian, Colombian, Indian, Iranian, and Slovakian were among the nationalities.

Also, the education level was more diversified, and the average wage and effort differed from the expected.

TABLE III: Expected vs Real Subject's Profile

Characteristic	Expected	Control (EWT)	Treatment (DWT)
Gender	50% women	47% women	67% women
Age (Y)	$Y \in [20, 40]$	$Y \in [18, 54]$	$Y \in [18, 40]$
Level of Education	50% 2nd Cycle	20% 2nd Cycle and 80% 1st Cycle	33% 2nd Cycle, 57% 1st Cycle and 10% 3rd Cycle
No. of firms (F)	40	5	7
No. of workers Type= L (Local)	40|40	5	7
No. of workers Type= I (Immigrant)	40|40	5	7
First Language	English	93% English	71% English
Second Language	Portuguese and Spanish	80% Portuguese, 7% Spanish and 20% Other	95% Portuguese, 24% Spanish and 10% Other
Religion	50% Roman catholic and 50% Other	33% Roman catholic, 47% Not Religion and 20% Other	43% Roman catholic, 48% Not Religion and 9% Other
Origin	50% Portugal, 30% Brazil, 20% Other	67% Portugal, 13% Brazil, 20% Other	86% Portugal, 9% Brazil, 5% Other
Avg. Wage | Avg. Effort	20 | 1	L: 59 | 7.2; I: 55 | 3	L: 60 | 6.3; I: 67 | 7.2
What about the values* ?			
Impact† on development	3.3	3.9	3.8
Religiosity	1.3	1.7	2.2
Political‡ (Left-Right)	2.1	2.3	2.1
Take Jobs	5.5	7	8
Increase Crime	5.1	7.1	7.4
Stein for Social System	5.2	7.8	8
Traditions	5.2	5.5	5.2

* Expected values from the European *Values* Study 2017 (EVS, 2020)

† From 1 to 5

‡ Converted to 1 to 4 from 1 to 10

3.3 Experimental Procedures

Eight laboratory sessions were conducted at XLAB - Behavioural Research Lab at ISEG-Lisbon School of Economics & Management, Universidade de Lisboa, in December 2020. A total of 36[7] people were recruited mainly from the participant pool of the XLAB through ORSEE (Greiner, 2015). I also sent invitations via email, and I made a Video (see Appendix D). The experimental protocol is single-blind, where only the Experimenter will know the type of each subject.

[7]One participant did not belong to the pool

No participant was allowed to participate in more than one session. After arrival, once participants were seated, groups of three participants were created randomly. One participant was randomly assigned the role of a firm, and the others were randomly assigned the role of workers. In the experiment, subjects earned points expressed as ECU.

The payments procedures are quite simple. At the end of the session, the Experimenter asked subjects to come to receive their payments. In each session, subjects began with an initial value of 90 ECU. It increased if they made profits, and it decreased if they experienced losses in the experiment. Subjects always could rule out the possibility of making losses by their own decisions. Subjects were paid to play a game, to solve a task and to answer a questionnaire. The game was incentivised with ECU, and the questionnaire was a prerequisite to get the payment. While the task was not incentivised, it was an integral part of the experiment.

The conversion rate between ECU and Tickets was 10 ECU = 1 Ticket. The average payment per-subject was 13 tickets, that granted subjects to participate in a Lottery (see Appendix E). The prize was a gift card with 100 EUR. The Lottery was made at the end of all sessions and was public. This prize draw was on the 16 of December at 14:00 at the XLAB.

The experiment used the software z-Tree (Fischbacher, 2007) and the Gift Exchange code was adapted from Siang et al. 2014. Subjects started with on-paper instructions (see Appendix A). The z-Tree codes versions are available under request (see Appendix C).

3.4 Empirical Strategy

The data obtained from this experiment are the wages firms offered to workers and their effort. Additional, it was recorded the number of workers that rejected or accepted those offers. For those workers who accepted the offer, the number of tasks performed indicate if workers honoured the nonbinding contract.

Next, follows the Hypothesis testing, the sample size, and the test's power, relevant elements to answer the research question.

3.4.1 Hypothesis Testing: Null and Alternatives

I defined hypothesis as there are no assumptions on the distributions and variance between the two variables. Therefore, I applied the standard non-parametric test, albeit not exact, Wilcoxon Mann Whitney test (Schlag, 2011). Also, I conducted regression analyses controlling for the impact of demographics on the wages-effort to know if there is any difference regarding sex or education level.

I defined the following hypothesis:

HYPOTHESIS 1: Average wages of immigrants is significantly lower than average wages of locals.

$$H_0 : w_I - w_L \geq 0$$
$$H_1 : w_I - w_L < 0$$

I made a One-sided test. The variable of interest is the wage that firms offered to workers. The main assumption is that exists a gap between the local and the immigrant wage that closes once the immigrant is fully integrated into the labour market, but some immigrants never close the gap (Anderson and Huang, 2019).

HYPOTHESIS 2: Average effort of immigrants is equal to average effort of locals.

$$H_0 : e_I - e_L = 0$$
$$H_1 : e_I - e_L \neq 0$$

I made a Two-sided test. The variable of interest is the effort of each type of worker supplied. Effort in this study is 'productivity'. If efforts levels are different, this could indicate that any difference in wages not necessarily is due to discrimination. Also, there are no reasons to believe that immigrants will offer more or less effort than locals.

HYPOTHESIS 3: Immigrants perform equal number of tasks than locals.

$$H_0 : T_I - T_L = 0$$
$$H_1 : T_I - T_L \neq 0$$

I made a Two-sided test. The variable of interest is the number of tasks performed by workers after accepting a wage offer. Again, there are no reasons to believe that immigrants will perform more or less tasks than locals. If they do, this may explain part of the differences in wages.

HYPOTHESIS 4: Firms offer significantly lower average wages to immigrants than to locals workers, for the same level of effort.

$$H_0 : \mathbb{E}(w_I - w_L | e_I = e_L) \geq 0$$
$$H_1 : \mathbb{E}(w_I - w_L | e_I = e_L) < 0$$

I made a One-sided test. The variable of interest is the Wage that firms offered to workers. This hypothesis is to see if there is Statistical Discrimination. Also, I made a regression to find the relation wage-effort. The story behind this is that some workers with similar levels of education, i.e the immigrants in High-Income Countries, tend to earn less than their local counterparts within the same occupational category (Amo-Agyei, 2020).

3.4.2 Sample and Power-Efficiency

It is crucial mention possible issues related to dependency between observations, given that effort depends on the wages a firm offers and the wage depends on the level of effort a workers offers, nonetheless, each observation is independent because the decision that a triplet makes it does not affect the decision of other triplets.

Also, there is two independent samples, Control and Treatment. The independent observation will be the decision of each individual obtained from each triplets. In the sample of 36 subjects, I get 12 observations for local type, 12 for immigrants, and 240 (12x2x10) for firms, and the latter uses the strategy method to offer a wage for each level of effort. Table IV shows the number of participants n and the observations obtained by each type.

TABLE IV: Data Structure

Type	Variable	Control (EWT)	Treatment (DWT)	Sample
Local (L)	Effort	n=5	n=7	n=12
		Obs=5	Obs=7	Obs=12
Immigrant (I)	Effort	n=5	n=7	n=12
		Obs=5	Obs=7	Obs=12
Firm		n=5	n=7	n=12
	Both	Obs=120	Obs=120	Obs=240
	Wage L	Obs=50	Obs=50	Obs=100
	Wage I	Obs=70	Obs=70	Obs=140

To define the number of participants I used as a point of reference an efficiency power of 80% for a double-sided test with 5% significance level in a BS and in Field Gift Exchange experiments in Bellemare et al. 2016, where the minimal sample size required ranges from 74 to more than 400 subjects with low-noise data, and 130 to more than 400 with high-noise. Also, I used the package for STATA, PowerBBK, which is useful for simulating the minimal necessary sample size to reach the expected level of statistical power or ex-post compute the statistical power of a design. In this experiment with n=36 subjects, the power should reach around 26% approximately. In Figure 7, it is possible to see a statistical power simulation of the BS experiment. I kept the parameters fixed, and I only changed the allocation up to 45% to the control group given that 5 out of 11 sessions were control in this study.

Additionally, another point of reference was to think the size of the sample as if would have a standard normal distribution, in which case the Equation 6 would be handy. This

Summary of the simulation

Random-effects GLS regression

Design parameters		Simulation parameters	
Design simulated:	between	Value constant term:	6.3
Number of rounds:	2	Treatment effect (all rounds):	.1
Budget list	36 72 108 144 180	Variance of individual effects:	.045
	216 252 288 324 360	Variance of noise:	.02
Fractions allocated to control	.45		
Cost of control:	1	Econometric specification	
Cost of treatment:	1	Individual heterogeneity:	yes
Continuous treatment:	no	Treatment heterockedasticity:	no
		Power for a critical value of:	.05

Simulation of a between design
Simulated command: xtreg y dt, i(id)

budget	N	n_ctrl	n_treat	t_ctrl	t_treat	cost	power	s_error
36	18	8	10	2	2	36	.177	.007
72	36	16	20	2	2	72	.258	.003
108	54	24	30	2	2	108	.347	.001
144	72	32	40	2	2	144	.432	0
180	90	41	49	2	2	180	.497	0
216	108	49	59	2	2	216	.587	0
252	126	57	69	2	2	252	.633	0
288	144	65	79	2	2	288	.681	0
324	162	73	89	2	2	324	.768	0
360	180	81	99	2	2	360	.834	0

FIGURE 7: Statistical power of between-subjects in economic experiments Source: STATA PowerBBK (Bellemare et al., 2016)

approach has limitations because it is unlikely to have a normal distribution. After all, the distribution is unknown. Nonetheless, as an example using an α of 5% and a Power of 80%, $t_{\alpha/2}$=1.96 and t_{β}=0.84, indicates that the n needed to detect a change of one (one-half) standard deviation in the outcome variable is n^* = 16 (n^*= 64) observations in each group (List et al., 2011).

$$N = 2(t_{\alpha/2} + t_{\beta})^2 \cdot (\frac{\sigma}{\delta})^2 \tag{6}$$

Equally important is the power of the test. In general, parametric tests such the t-test are preferred for big sample size, but a normal distribution is required. While non-parametric tests are more suitable for the real data without losing much power, for instance, the Mann-Whitney U test:

> If the Mann-Whitney test is applied to data which might properly be analysed by the most powerful parametric test, the t-test, its power-efficiency approaches $3/\pi$ = 95.5% as N increases and is close to 95% even for moderate-sized samples. It is therefore an excellent alternative to the t-test, and of course it does not have the restrictive assumptions and requirements associated with the t-test.
>
> (Siegel, 1956)

4 DATA ANALYSIS AND RESULTS

In the previous section, I defined the Null Hypothesis that is my starting point. Next, I used the Mann-Whitney U Test as the Statistical test because it is appropriate for analysing data with two groups (i.e., local and immigrant) that constitute two independent groups and the variables wage and effort also constitute an ordinal measure at best. Using STATA, I ran the Mann-Whitney U test for the sample distribution using ranksumex ($n \leq 25$). Also, I used the standard significance level $\alpha = 5\%$. At last, I explored the data to get better insights about the participants.

The analysis is carried out separately for workers and firms. Workers control the variables effort and number of tasks performed while firms control variable wage.

4.1 Workers

RESULT 1: Average wages of immigrants is higher than Average wages of locals, but this difference is not statistically significant.

It is possible to observe in Figure 8 that the average local wage offered in treatment EWT is lower (59, n = 5) than the mean wage in treatment DWT (60, n = 6). Similarly, the average wage of immigrant offered in treatment EWT is lower (55, n = 3) than the mean wage in treatment DWT (67, n = 6).

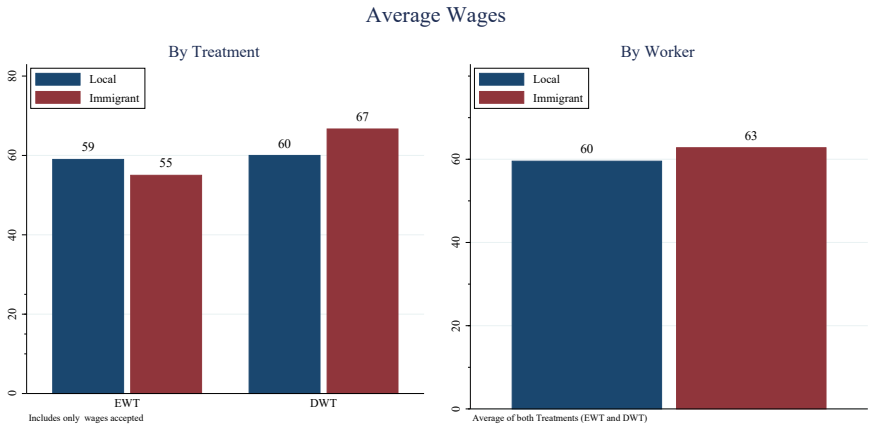


FIGURE 8: Average wages by treatment and worker

The average local wages in both treatments is lower (60, n = 11) than the mean of immigrant wages (63, n = 9). Although, this is not statistically significant (one-sided Mann-Whitney Test, p < 0.46) given the form of the distribution for each type of worker as it could be observed in Figure 9, where the median is the same for both type of workers

in each treatment, and also the wage median in EWT (60, n = 8) is lower than the median in DWT (62.5, n = 12).

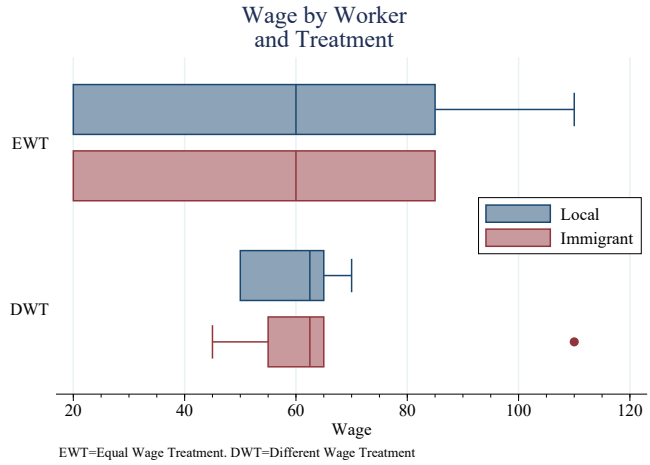


FIGURE 9: Distribution of wages by worker and treatment.

In this case, the test fails to reject the Null Hypothesis at 5% significance level, and within this sample, no evidence supports that immigrants will obtain lower wages than locals. Moreover, the probability of the local's wage being greater than the immigrant's wage is 0.485.

RESULT 2: Average effort of immigrants is lower than Average effort of locals, but this difference is not statistically significant.

Figure 10 shows that the average effort of local in treatment EWT is higher (7.2, n = 5) than the mean effort in treatment DWT (6.3, n = 6). On the other hand, the average effort of immigrant in treatment EWT is lower (3, n = 3) than the mean effort in treatment DWT (7.2, n = 6).

Also, the average local's effort in both treatments is higher (6.7, n = 11) than the mean of the immigrant's effort (5.8, n = 9). However, this is not statistically significant (Two-sided Mann-Whitney Test, p =0.63) given the form of the distribution for each worker as it could be observed in Figure 11. Moreover, the median for locals in EWT (7, n = 5) is higher than the median in DWT (6, n = 6), while for immigrants the median in EWT (1, n = 3) is lower than the median in DWT (7, n = 6).

In this case, the test fails to reject the Null Hypothesis at 5% significance level, and within this sample, no evidence supports that immigrants put lower effort than locals. Although, the probability of local's effort being greater than immigrant's effort is 0.566.

RESULT 3: Immigrants performed higher number of tasks than locals, but this difference is not statistically significant.

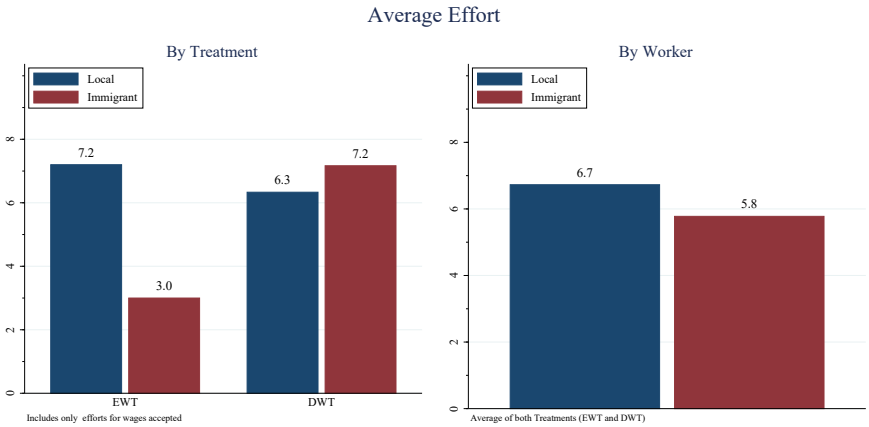


FIGURE 10: Average effort by treatment and worker

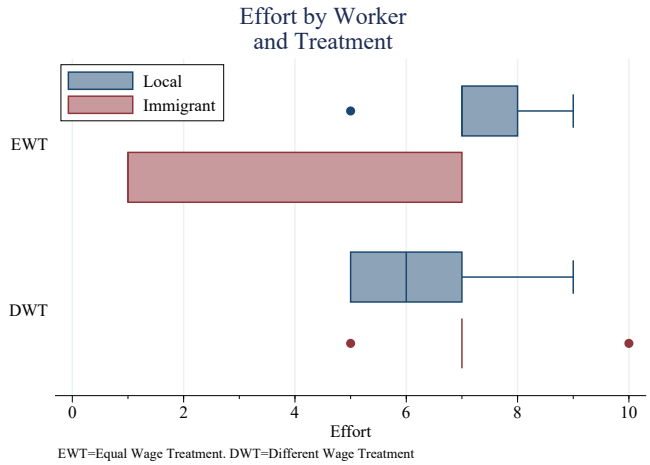


FIGURE 11: Distribution of effort by worker and treatment.

It is possible to observe in Figure 12 that the average number of tasks performed in treatment EWT is lower (5, n = 5) than the mean of tasks performed in treatment DWT (5.7, n = 6). At the same time, the average for immigrant in treatment EWT is lower (5.7, n = 3) than the mean in treatment DWT (5.8, n = 6).

The average number of tasks performed in both treatments for locals is lower (5.4, n = 11) than the mean for immigrants (5.7, n = 9). However, this is not statistically significant (Two-sided Mann-Whitney Test, p = 0.63).

Thus, the test fails to reject the Null Hypothesis at 5% significance level, and within this sample, no evidence supports that immigrants perform a higher number of tasks than locals. Also, the probability for locals to perform a higher number of tasks than immigrants is 0.434.

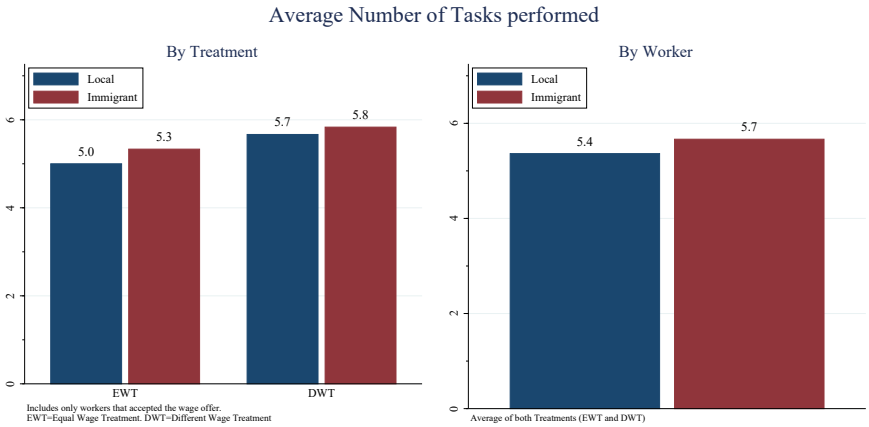


FIGURE 12: Average Task by Worker and Treatment

4.2 Firms

Theoretical predictions state that firms should offer the minimum wage of 20 ECU for both workers in treatment EWT and minimum wage of 20 ECU for one Worker and 25 ECU for the other worker in treatment DWT. Firms that expect higher than the minimum effort by workers and possibly gain in efficiency may pay higher wages.

In general, firms behaviour can be described using a monotonic function. This is supported by the Spearman rank correlation (ρ) between effort and wages that is around 0.68 and highly significant (obs=200, p<0.01). Also this relationship remains true across treatments and types. The ρ is approximately 0.35 (obs=80, p<0.01) for EWT and 0.92 (obs=120, p<0.01) for DWT. By the same token, for locals is around 0.58 (obs:110, p<0.01) and 0.81 for immigrants (obs:90, p<0.01). In EWT ρ is roughly 0.21 for locals but not significant (obs=50, p<0.15), while for immigrants ρ is around 0.61 and significant (obs= 30, p<0.01). In treatment DWT ρ is almost 0.93 for locals (obs= 60, p<0.01) and 0.92 for immigrants (obs= 60, p<0.01).

Thus, firms are entirely reciprocal in this sample. Only one participant offered the minimum wage of 20 ECU for all effort levels, and another participant had an erratic behaviour without a clear pattern, and the minimum wage was likely reached by chance. In these cases, only local workers accepted the wages, while the immigrants rejected it, and both types of workers put the same level of effort.

It is essential to say that only firms' decisions that match a worker acceptance survived the "cleaning process" because if workers reject the wage offer, the effort level is zero and therefore, no wage matches that level. Forty observations from 3 firms were dropped (10 for local and 30 for immigrants). Thus, the erratic firm's wage offers survived the

"cleaning process" and impacted the average wages for the effort levels of 3 (increased) and 7 (decreased) specifically.

The participant with erratic behaviour has an impact in the results, however. The Spearman rank correlation between effort and wages is around 0.68 decrease until approximately 0.47 and still highly significant (obs=240, p<0.01), yet the relationship across treatments and types holds. But the ρ for immigrants in EWT decrease down to 0.23 from 0.61, and not significant (obs= 50, p<0.11).

RESULT 4: Firms offered higher average wages to immigrants than to locals workers, for the same level of effort in 9 out of 10 levels of effort but these differences are not statistically significant.

TABLE V: Summary wages by level of effort

Level of Effort	Local Wage (Mean)	Immigrant Wage (Mean)	Mann-Whitney p<value	Prob. of Local Wage greater than Immigrant Wage
1	26	28	0.03†	0.30
2	31	32	0.54	0.50
3	46	40	0.39	0.54
4	43	44	0.44	0.48
5	50	51	0.46	0.52
6	57	58	0.46	0.49
7	60	71	0.16	0.36
8	72	74	0.43	0.53
9	79	92	0.29	0.42
10	86	97	0.43	0.48
5.5	55	59	0.25	0.45

Note: For each level of effort: Obs=11 for local type and Obs= 9 for immigrant type. Values are rounded for means, p-values and probabilities. †Two sided p-value =0.09

Average wages of immigrants (59, n = 90) are higher than average wages of locals (55, n = 110) for the same level of effort. This result is not statistically significant to support any difference between local and immigrant wages offered by firms (Mann-Whitney: z = -1.145, p = 0.2523) at a significance level of 0.05.

Based on these results, the treatment DWT does not significantly impact wages for locals and immigrants. Therefore, the test fails to reject the Null Hypothesis.

4.2.1 Relationship Wage-Effort and Regression Analysis

The sample in this study shows a pattern for firms that is not consistent with the Efficiency Wage Hypothesis where the goal is to minimise labour cost per efficiency unit, but it is aligned with the worker's belief that exists a function that takes the form $e(\omega)$. In this case, firms do not appear as those types that want to minimise costs but do offer wages that exceed the clearing wage of 20 ECU for both workers in treatment EWT and 20 ECU for one worker and 25 ECU for the other worker in treatment DWT.

Figure 13, shows a positive relationship between wage and effort for locals and immigrants in line with the ρ that is already known to be positive. I included a linear fit and a quadratic fit, and I add some random noise to have a better image of the pattern. The fit for locals is relatively steeper than the fit for immigrants.

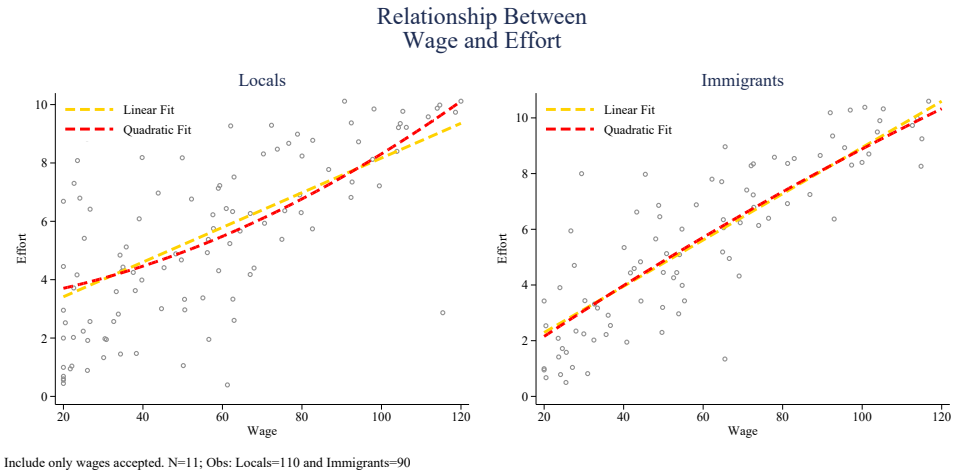


FIGURE 13: Average effort by worker

The regression analysis shows a positive relation wage-effort for both treatments. In Table VI the regression effort-wage results for locals and immigrants gives a R^2 around 0.38 and 0.66, respectively.

TABLE VI: Regression Effort - Wage by type

	Local	Immigrant
Wage	0.0595***	0.0831***
	(0.00731)	(0.00640)
Constant	2.224***	0.632
	(0.458)	(0.416)
Observations	110	90
R^2	0.380	0.657

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Moreover, for locals, the constant is likely to be different from zero. The exciting thing is that for locals changes in their wages only explain around 38% of changes in effort they offered, while for immigrants, wages explain up to 66% of the changes in effort they supply. Table VII, presents a regression on immigrant wages as a dependent variable and local's wage and sex as independent variables. The regression coefficients are statistically significant, indicating that they are different from zero as the constant for undergraduate males. Here I only included the DWT. The EWT treatment has a $R^2 = 1$, but this is not a surprise because wages must be set equal.

	Undergraduate/Female	Undergraduate/Male	Master/Female
Wage Local	0.927***	0.918***	1.007***
	(0.0364)	(0.0397)	(0.0642)
Constant	1.360	5.075*	-1.016
	(2.342)	(2.232)	(4.890)
Observations	30	20	10
R^2	0.959	0.967	0.969

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

TABLE VII: Regression Wage immigrant by Treatment: DWT, Education and Sex

5 CONCLUSION

In this experiment, I used a reversed Multi-Worker Gift Exchange game to find Statistical wage discrimination between two types of workers (locals and immigrants), in two scenarios (Equal Wage Treatment and Different Wage Treatment). The findings replicate results in previous Gift Exchange Games in which a Gift-Exchange occurs, usually for both sides. In average, workers in this study offered more than the minimum effort level and firms more than the minimum wage.

On the worker's side, immigrant's wages are slightly higher than local's wages. The opposite happens for the effort level, where local's effort is slightly higher than the immigrant's effort. However, when I explore the data by treatment, a pattern *higher-effort-higher-wage* emerge. Moreover, the results are not statistically significant neither by type nor by treatment. Regarding the tasks performed by the workers, in both treatments, immigrants performed slightly more tasks than locals, but again this is not statistically significant. I believed that some positive relation between effort and the number of tasks performed by workers would emerge, but after running a regression (constant=5.5 statistical significant, indicating that is likely to be different from zero), the R^2 was zero.

On the firm's side, the strategy method showed to be effective in eliciting the relation effort-wage. The pattern *higher effort-higher wage* emerged, aligned with the Efficiency Wages Hypothesis and the empirical results in several studies (see Table G.2 and G.3) in which firms offered higher wages to higher effort supply.

Also, the mean differences have not statistical significance, and the medians were the same. Then no evidence of statistical wage discrimination was found in this study. Important to say that from the workers' side statistical wage discrimination did not arise either (at an effort level of 5 the probability that the local's wage was Higher than immigrant's wage is 0.75 vs 0.52, and at an effort level of 7 the probability is 0.43 vs 0.36, given the number of observations), as expected given that there is no statistical discrimination from the source of the wages.

All things considered, these results must be interpreted with caution, and some limitations should be highlighted in this pilot:

First, the Bernoulli Distribution was not considered a relevant signal of productivity to differentiate workers. However, in a session, one participant raised a concern about the difference between workers, and after mentioning the Bernoulli Distribution, the participant formed a belief (not sure what was that belief), even with its general failure in triggering subjects to differentiate workers. Another participant asked how to know which workers should get a better wage or what size of the difference should be and what was a correct wage to set. In the same session, another participant said 'He can not tell you that' and my answer was 'Up to you'.

Therefore, it is necessary to put a clear signal. It was also 'too' evident for participants that the experiment is about discrimination, although it was never mentioned. They did not reach to statistical discrimination, but I will speculate that they hid (maybe unconsciously) their true preferences because they did not want to give any signal of discrimination. If discrimination exists, just as a virus, hides in sanctuary sites.

Second, the size of the sample and observations are like a standard limitation. In this study, I still encountered constraints such as lack of participants due to COVID-19 and the timing, on December was almost the end of the academic calendar with final classes and students having mostly online classes. Also, the sample size is related to the power-efficiency, and in this study, the power was around 26% or less, indicating that not rejecting the null hypothesis could be because the lack of size sample. Moreover, because this experiment was a BS, it is more expensive and required a more significant number of participants to get the same power-efficiency as in a within-subject design (Bellemare et al., 2016).

Nonetheless, in future sessions, I would include at least one more period to gather more observations from both sides, and in that period the Bernoulli Distribution should be used to give the firm a signal about the worker's productivity using the number of tasks performed or even after choosing the effort level. This may solve the fact that a one-shot game experiment is likely to be ineffective to find statistical discrimination.

Furthermore, the encryption task was part of the experiment but the goal was to see if workers would honour the non-binding contracts without any impact in their earnings. I would eliminate the possibility of reject offers, if tasks are linked to earnings through the Bernoulli Distribution, it could improve the effectiveness of the signal of productivity. Additional, the strategy method should be used for workers too to get also their relation effort-wage.

It would be interesting to run this study, including these changes and narrowing the nationality for the firm, the locals and the immigrants workers. It would also be interesting to consider different characteristics, such as refugee status, gender and skin colour. I imagine the result may vary depending on how subjects perceive immigrants, and if they are more or less prejudiced against immigrants and what it means to be a national/immigrant from a country or another. Lastly, I would also explore the possibility to introduce the dual labour market hypothesis, then the difference between fair pay and unfair pay between local and immigrant sector jobs can be seen as the difference between wages above market-clearing and wages at market-clearing (Akerlof, 1984). Indeed, the Bernoulli Distribution's primary intention was to allow participants to classify both types of workers.

Finally, sometimes focusing on the optimisation to maximise welfare, forgetting that the production factor called "Labour" consists of people, with feelings, beliefs, preferences and souls. It is good to keep it simple and contribute to harmonise several concepts that should guide an immigration policymaker to reflect a "political consensus that incorporates the conflicting social and economic interests of various demographic, socioeconomic, and ethnic groups, as well as political and humanitarian concerns" (Borjas, 1995).

I hope this contributes to get one more vote for being in pro-immigration not only in the sense of granting permanent residence for the *'Best of the Best'* but investing and growing together as *Citizens of the future*. After all, there is no statistical significance in differences in wages, efforts and tasks among participants and if they did not hide their true preferences, there is no reason to believe that the results should differ from reality nor a model that predicts an immigrant will perform better or worse than a local. Time will tell.

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A INSTRUCTIONS

Welcome to the study!

Please, put your phone on silent mode, and do not communicate with anyone in the room. If you need help, raise your hand, and the experimenter will assist you.

Your role in the study

In this experiment you either act as a *Firm* or as a *Worker* (i.e. local or immigrant). At the beginning of the experiment, you will be randomly assigned one of these roles and it will not change during the experiment. You will earn points expressed as Experimental Currency Units (ECU) that will be converted into Tickets to participate in a Lottery.

Procedures

The experiment consists in one round, where you will be randomly and anonymously matched with other subjects. Each Worker is matched with one Firm and each Firm has two workers (i.e. local and immigrant). You will not know whom you are matched with.

The round has three stages plus a questionnaire.

First stage:

Workers choose an effort level and the Firm will offer a wage for each Worker.

If you are a *Worker* you should know that your decision is independent of the other Worker's decision. There are ten different effort levels workers may choose. The lowest possible effort level is 1 and the highest is 10. Choosing an effort level is costly for workers. The higher the effort level, the higher the corresponding costs. However, the costs only depend on the effort level a Worker chooses for himself. The effort level chosen by the other Worker does not affect your costs.

As a Worker, you must choose which effort level you wish to provide for the possible wage set by the Firm. The effort level should be integers and in between one and ten. The costs (in ECU) for a particular level of effort are reflected as follows in Table A.1:

Effort Level e (units)	1	2	3	4	5	6	7	8	9	10
Cost in (ECU)	0	1	2	4	6	8	10	13	16	20

TABLE A.1: Cost of Effort

If you are a *Firm*, you will offer a wage for each Worker. There are 21 possible wages (ranging from 20 until 120) because wages offers will be multiples of 5, so each Firm has to make ten wages offers.

Keep in mind that workers may have Lower or Higher productivity Z, which has a Bernoulli Distribution $Z \sim Be(0.5)$. This means 25% probability to get both workers with lower productivity, 50% probability to get one lower productivity worker and other with higher productivity, and 25% probability to get both workers with higher productivity.

Second stage:

Workers **Accept** or **Reject** the offer. If s/he accepts, can work by solving a task. If the Worker rejects the offer, s/he will go directly to the Questionnaire.

Third stage:

In the last two minutes *Workers* can:

1. Solve a task
2. Do something else they wish, like browsing the internet or checking their mobiles (without communicating with others in the room or making noise).

Firms can:

Use the two minutes as they wish (without communicating with others in the room or making noise).

Questionnaire

You will be asked to fill in a questionnaire regarding your socio-demographic status and sensitive data. Remark that your data is anonymized.

Earning points

During the experiment you will earn ECU based on the choices you and the participants with whom you are matched made.

After the experiment, the amount of ECU will be converted into Tickets at the following Exchange rate:

10 ECU = 1 Ticket

The Earnings are given by:

- **Firm:**

  Your Profit = 90 + 10*(Effort level Worker1 + Effort level Worker2)-(Wage1 + Wage2), if Wage Offer is Accepted.

  Your Profit = 90 + 10*(Effort level Worker 1 OR Worker2)-(Wage 1 OR 2), if Wage Offer is Accepted only by one worker.

  0, otherwise.

- **Workers:**

  Your Income = 90 + Wage - Cost of worker's Effort, if Wage Offer is Accepted.

  0, otherwise.

For example, each unit of effort exerted by a Worker produces 10 ECU for the Firm. For instance, if the effort level is 1 the Firm will receive 10 ECU, if the effort level is 2 the Firm will receive 20 ECU, and so forth. If the effort level is 10 the Firm receives 100 ECU.

Remark:

1. Cost of worker's Effort is provided in Table A.1.

2. If you are a Firm you begin with an initial Endowment of 90 ECU. If you are a Worker, you begin with an initial wealth of 90 ECU. It increases if you make profits and it decreases if you experience losses in the experiment. Note that you can always rule out the possibility of making losses by your own decisions.

The End

At the end of the session, please introduce the Number of your working station in the form's fields (i.e number C0XX) and wait at your desk until the Experimenter ask you to come to receive your payment. After the experiment, please leave all the documents the Experimenter handed out to you in the place you were assigned.

Please also note that you must not talk to the other participants during the experiment. In this case, we need to abort the experiment immediately and you must leave the room and no fee will be honoured. If you have any questions please raise your hand and the Experimenter will answer them personally.

Thank you for your participation and Success!

B EXIT QUESTIONNAIRE

This is a summary of the Questionnaire.

Page 1: Demographics

1. Sex of respondent; 2. Can you tell me your year (YYYY) of birth, please?; 3. How many children do you have ?; 4. Please select your Race; 5. What is the highest educational level that you have attained?; 6. Please, select the Languages you are fluent or native.

Page 2: Religiosity and Political Preferences

7. Which is your level of religiosity?; 8. Do you belong to a religious denomination?; 9. Which (political) party appeals to you most?.

Page 3: Beliefs and Preferences

10. We would like to know your opinion about the people from other countries who come to live in your country - the Immigrants. How would you evaluate the impact of these people on the development of your country?;

11. Please look at the following statements and indicate where you would place your views on the scale 1 to 10?; 11a. 1-Immigrants take jobs away from the locals-Natives or 10-Immigrants DO NOT take jobs away from the locals-Natives, 11b. 1-Immigrants make crime problems worse or 10-Immigrants DO NOT make crime problems worse; 11c. 1-Immigrants are a strain on a country's welfare system or 10-Immigrants are NOT a strain on a country's welfare system, 11d. 1-It is better if immigrants maintain their distinct customs and traditions or 10-It is better if immigrants DO NOT maintain their distinct customs and traditions.

Page 4: You were a Firm. Who is the immigrant? 12. From where is likely to be the immigrant worker?

C DATASET AND CODE

C.1 Files

- z-Tree code
- STATA Files

Files available under request at:

garciagon.luis@aln.iseg.ulisboa.pt

D COMMUNICATION AND RECRUITMENT CAMPAIGN

D.1 ORSEE

The main recruiting tool was ORSEE. Together, 735 invitations were sent and 39 participants attended in 8 sessions held at XLAB. In total, eleven sessions were scheduled, two were dropped and one session cancelled. The Rate of Response: 5.3%.

D.2 Mail Invitation

Dear All,

I want to invite you to participate in the Experiment related to my Master Dissertation. The purpose of this study is to investigate how people make decisions in a context of wages and efforts.

You will be asked to do some simple tasks and answer some questions. The Experiment will take place at XLAB –ISEG (Room 206, Second Floor 2, Building Francesinhas 2) in December 9, 10 and 11 of 2020 in several daily sessions. It will take approximately 45 minutes and you will receive tickets to participate in a Lottery to win a gift card (Cartão Dá).

You also can watch the video on Youtube! in https://youtu.be/EKbERJbo4-k

To participate: First, please Register yourself as a Participant in the XLAB Site: http://xlabonline.com/participants/ and send an email to passda.xlab@gmail.com to receive your invitation! First, Please Register yourself as Participant in the Second, choose a day and a Group in which you want to participate.

Third, there are a limited amount of places, so make sure to register as soon as possible!

Four, please invite your friends!

If you have any question regarding your participation, you can send me an email to

$$garciagon.luis@aln.iseg.ulisboa.pt$$

I am looking forward to seeing you!

Kind regards, Luís

D.3 Video

To complement the ORSEE recruitment process, I designed a campaign to augment the number of participants and an email invitation. The Invitation video is available on Youtube. Click Here!

E THE PRIZE AND THE LOTTERY

I created a Lottery as the mechanism of reward. Participant received tickets as payment for their performance.

The Tickets were random numbers generated using the site of RAMDOM.ORG.

Remark that Higher the profits, Higher the number of tickets earned, with a minimum of 9 tickets. Also means that Higher the number of tickets, Higher the possibilities to earn the Lottery.

The winner Ticket number was selected using the same site, and the XLAB's Lab Manager informed all participants the date of the prize draw. It was held on December 16 at 14:00 at XLAB. One participant attended, and the Lab Manager acted as witness.

The prize given was a Gift Card of 100 EUR. The gift card brand used was a Cartão Dá and The Winner picked up the card on December 18.

F WHO IS THE IMMIGRANT?

In this sample, Brazilians were considered the immigrant group by participants in 53% of the cases, and the second group was Indians with 14%. Indeed, Brazilian in 2018 represented almost 22% of the foreigner population in Portugal and Indians 2.4%, according to the report "Resident Foreign Population in Portugal" by the Gabinete de Estratégia e Estudos (GEE, 2020).

G TABLES

TABLE G.1: Theories of Discrimination: Overview

Theories of Discrimination		
Author	Type of Discrimination	Characteristics
Becker 1971	Taste for Discrimination	Trait: race, religion, sex, colour, social class and personality. Coefficient of discrimination. Perfect substitutes or perfect complements Existence of non-pecuniary and physics costs. Ignorance may cause discrimination and contact may eliminate it. Employers, Employees, Government, Consumers and Market discrimination.
Arrow 1973	Statistical Discrimination	Trait: racial discrimination. Differences in productivity. Assumptions of utility and profit-maximization. Nonconvexities in indifference surfaces and opportunities. Cost of Adjustment. Imperfect Information.
Pincus 1996	Individual Institutional Structural	Trait: Race, Ethnic and Gender Acts with intention to harm Also by Small Group of individuals Same intentions disguised in social institutions Forced segregation. Different Groups, different perceptions about discrimination Race and gender-neutral in intent Negative impact on minorities
Lang 2007	Prejudice Transaction cost Statistical Discrimination Self-confirming expectations	Trait: race discrimination. Employer discrimination. Employee prejudice. Adjustment cost. Customer prejudice. Prejudice in Imperfect labour market. Social Distance and language. Basic Model, on average, is true. Job matching with comparative and Absolute advantage. Unobserved Investments, connections in the labour market. Stereotypes are true, in the end.
Cahuc et al. 2014a	Taste for Discrimination Statistical Discrimination	Trait: Women and Ethnic Minorities. Perfect Competition: No Discrimination. Imperfect Competition: 1) Monopsony, preferences and limited personal mobility. Lower wages and lower level of employment. Without competition, discrimination persist. 2) labour market with Frictions. Job search is costly. Lower wages and Longer unemployment and Reservation wage decrease. Expectation lead to self-select low-wage jobs. *A priori* estimate of individual productivity Source of individual discrimination. Wage decreasing with proportion of efficient individuals in a group Source of persistent inequality among groups

TABLE G.2: Literature Review: Gift Exchange Foundations

Author	Theory or Main Topic	Subjects	Results
Akerlof 1982	Four paradigms: Dual Labour Market, Search Theory, Partial Gift Exchange and Pure Market Exchange	The Cash Posters and Women	Labour contracts are partial gift exchange. Partially, wages and workers' effort are determined by Norms of workers' effort
Akerlof 1984	Dual Labour Markets	Primary sector Secondary sector	Good Conditions/Pay Poor conditions/Pay Primary sector firms pay wages they 'prefer' in excess of market clearing. Results are not counterintuitive.
	Theory of Bureaucracy	Officials	Well-specified division of labour Productivity depends on Employee loyalty.
	Theory of work groups	Inspectors Operators	*Formal* and *Actual* authority 'Making out at the game'. Exist Direct Methods of Retaliation. Effort is $e = e(\omega; \bar{\omega}, u)$, with ω as real wage, $\bar{\omega}$ as wage of other workers and u as unemployment rate. Busy workers with some degree of freedom. Payment of a Fair Wage and social interactions.
	Equity Theory	Not Qualified Student Qualified Student	Receive anyway the usual rate Usual rate same as market rate. Overpaid, Fewer errors and higher output per hour.
Fehr et al. 1998	Gift Exchange Market (GEM) Complete Contract Market (CCM) Bilateral Gift Exchange (BGE)	Austrian Soldiers Students	Labour contracts are incomplete Labour contracts are complete Norms of Fairness and reciprocity have a persistent effect on wages and employment. Reciprocal behaviour is stable and not only make both firms and workers better off when they relied on it, but also generates efficiency gains.
Van Der Heijden et al. 2001	Simple and Complex Gift Exchange. Repeated Bilateral Gift Exchange	Player 1 and Player 2. Students Tilburg University	Lab Experiment. It looks to examine the impact on the degree to which players are able to achieve simple or complex exchanges through comparing the institutional variables such as matching structure (partners vs strangers) and move structures (simultaneous moves vs sequential moves). Sixteen experimental sessions between March 1995 and April 1996. Higher percentage of NEs in the stranger treatment than in the partner. Few complex exchanges among strangers, whereas partners are able to complete substantially more. Not sufficient condition to interact with the same partner repeatedly. Simple exchanges about the same for both. Structure move has virtually no impact on simple or complex exchange. Although, induces player 1 (make more gifts) and player 2 (make smaller gifts) to change their behaviour, leading to rather uneven gains from gift exchange. Complex requires coordination and are higher to achieve.
Rigdon 2002	Efficiency wage Hypothesis, the Fair Wage-Effort Hypothesis and Gift Exchange	Undergraduates as Buyers (employers) and sellers (workers)	The Author tried to see if under (a) a nontrivial marginal cost to providing effort and (b) increased social distance between subject and experimenter, the behaviour consistent with the Fair Wage-Effort Hypothesis could emerge and be sustained. Also, real effort is not reported and under a double-blind protocol, no one can identify the shirkers. Moreover, Employers at first attempt to achieve more efficient outcomes, but encounter selfish behaviour by the workers. This indicates an important frontier to the efficiency wages hypothesis that could be overcome when small institutional changes are introduced. The labour market in this experiment replicates a natural labour market in several aspects, but high level of reciprocal effort do not follow higher wages.
Charness et al. 2004	Gift Exchange	Managers and Employees. US Undergraduates	Subject characteristics strongly affect behaviour. It was given a Payoff table that made results to change. Authors in this experiment suggests that at least in part, the Gift exchange observed is induced by strategic considerations rather than by social preferences *per se*. Framing effect, clarity effect and marginal effects are the explanation for this behaviour.

TABLE G.3: Literature Review: Gift Exchange On-the Lab.

Author	Theory or Main Topic	Subjects	Results
Hannan et al. 2002	Efficiency wage Hypothesis Partial Gift Exchange Hypothesis	MBAs and Undergraduates	The Authors seek to find to what extend Fehr's results replicate in the United States. Their design includes that workers receive higher than minimum wages without fear of any punishment when minimum effort is provided and subjects partially honoured this nonbinding request. Gift Exchange is replicated. Undergraduates provide less effort than MBAs and may be due to work experience, higher level of cohesion and more strategic mindset.
Maximiano et al. 2007	Gift Exchange	Employer and Worker	The authors investigated whether Bilateral Gift Exchange could generalize to a realistic situation in which the employer has several workers. They compared treatments: 1-1/1-4 (Employer-Workers). Effort levels in 1-4 is marginally lower than in 1-1. Although employers in 1-4 earned much more than the worker does, this indicates that outcome-oriented social preferences by themselves are not enough to account for the gift exchange observed in their experiment and that intention-based reciprocity is a mainspring behind the results. The strategy method is used to elicit the wage-effort relationship of every individual.
Abeler et al. 2010	Gift Exchange and horizontal equity	Principal and Agents	Authors analyzed how the effectiveness of gift exchange as a contract enforcement device change due to horizontal fairness concerns of employees. The used one treatment where the principal pays equal wage to agents and another where can set an individual wage for each one. The first, elicit less effort and more violation of the equity principle. Equal wages are efficiency decreasing and lead to situations where it is considered unfair by the workforce. Adherence to the norm of equity is prerequisite for the gift exchange to take place. Look the benefits and cost of equal wages. Perks and non-monetary benefits could be used to motivates workers when wage discrimination is not possible.
Benndorf and Rau 2015	Fair Wage-Effort Hypothesis and Reversed Gift Exchange Hypothesis and	Employers and workers (coworkers)	The Authors report effects of coworkers in a repeated reversed gift-exchange game to an environment with one worker. Their results replicate Abeler et al. 2010. Thus, Individual-wage achieve a higher level of effort than Equal-Wage treatment. Also, Learning behaviour lead to twofold effects. Low-performing employees learn from payoff information of better-performing employees and increase effort over time. Equal wage lead to norm violation when effort differs from one to another employee, then, better-performing employees learn and over time reduce their effort as a consequence.
Jokipalo 2019	Gift Exchange	Employers and Employees	The Author seeks to investigate the impact of Basic Income (BI) on wages and productivity. She added some features: *real effort*, *real leisure*, and *repeated game format* and she found that BI policy may motivate employees to exert more effort, improving productivity, but this may lead to employers to decrease labour demand or decrease wages.

H EQUILIBRIA PREDICTIONS

In Figure H.1, it is possible to see the profits firms would obtain for all combinations of wage-efforts, if both workers accept their offers. The negative relation, also supported by the derivative of Equation 2, $\frac{\partial \pi_i(w,e)}{\partial(w_1+w_2)} = -1$, helps to predict that firms should offer the lowest possible wage to maximise their profits, independently of the effort workers may offer.

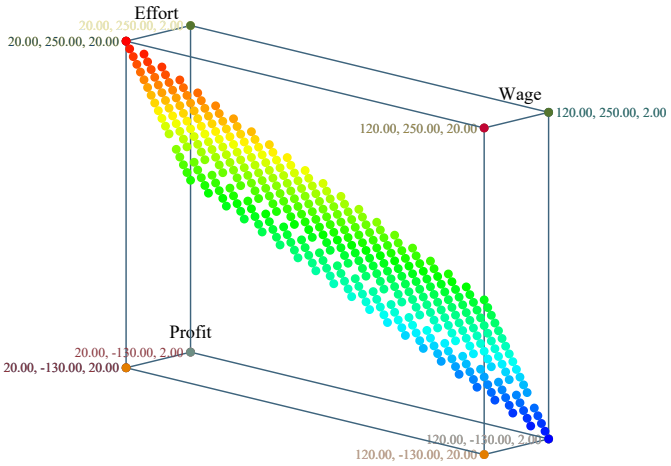

FIGURE H.1: Firm's possible profits, if both workers accept her offer

Figure H.2 shows possible payoffs workers would obtain for all combinations of wage-efforts, if they accept firms' offers. The negative relation, also supported by the derivative of Equation 3, $\frac{\partial u_j(w,e)}{\partial e_j} = -c'(e_j)$, indicates that workers should offer the lowest possible effort to maximise their payoffs. Thus, the best reply for workers is to supply the minimum effort and accept all the offers, given that they always get positive payoffs.

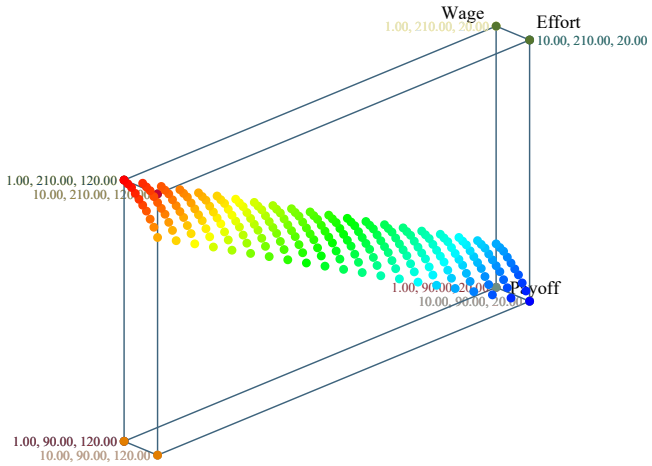

FIGURE H.2: Worker's possible payoffs