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## **The labor gender gap: The effects of exogenous expense shocks on a person's working hours, and the role of gender in this story**

Goes, Kevin

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Kevin Goes, s2042029

# The labor gender gap:

The effects of exogenous expense shocks on a person's working hours,  
and the role of gender in this story

Supervisor: Dr. Max van Lent

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## Abstract

The Dutch minister of economic affairs announced that he is planning to increase full time work participation. He added that he wants to encourage women to work more hours. Aside from wage, concrete measured stayed out of the discussion. This thesis aims to explore the differences between genders, by introducing exogenous expense shocks into the equation. An instrumental variable approach will examine the effects of these shocks, and the differing results between genders will be compared. In short, this thesis finds that exogenous expense shocks do not play a significant role in the intensive labor margin of an individual. Furthermore, increasing wage will not help reducing the gap in working hours between men and women. As men respond more to financial incentives than women, the gender gap would only be increased. The composition of the household is the key explanatory variable to explaining the employment gap between men and women. When a woman finds a partner, they will work less. When a man gives birth to a child, he will work more. These factors increase the gender gap regarding the number of working hours.

## 1. Introduction

The Dutch Minister of Economic Affairs, Eric Wiebes, plans on increasing the part time work participation, as part of a plan to increase the Dutch wealth (Kok & Winterman, 2019a). Instead, full time work would lead to more wealth for the country (Kok & Winterman, 2019b). The Netherlands has a strong part time culture where part time work is often discussed during the job interview (Wielers & Raven, 2013; Jongh, 2019). The Dutch minister aims to change this and wants to stimulate full time work. Currently, only 65% of men work full time and 25% of women (Jongh, 2019). The Dutch welfare system is meanwhile very expensive. The ageing population is mentioned as one example, as well as general healthcare. The minister explains that the strong part time culture makes these rising expenses very difficult to afford (Kok & Winterman, 2019b).

In addition to covering expenses, the minister mentions another element of the problem. Women are increasingly highly educated, but at the same start part time work early in their careers. It is argued by the Dutch minister that this would reduce wealth growth in the long term (Kok & Winterman, 2019b). One way to achieve an increase in working hours, is by increasing wages. As this would make work more attractive (Kok & Winterman, 2019b; Jongh, 2019). However, this is not as simple as it seems as will be further explained in this thesis.

Whereas the previous sources are more journalistic in nature, this thesis will aim to provide an academic approach to the issue including empirical evidence. There is existing literature on the topics of the gender gap in labor participation. This thesis aims to combine the different theories into an answer to the research question that will be formulated. Additionally, the aforementioned journalistic articles address two important concepts for this thesis. First of all, the differences between men and women are complex and require an explanation. Secondly, there are more parameters than wage that influence working hours.

Several elements are present in this thesis. As mentioned, gender is a complex element of the issue and requires an explanation. The existing differences in working hours that are related to gender, cause the individuals to respond differently to instruments. This economic rationale will be further explained in the theoretical framework. The second element of this thesis concerns the additional parameters regarding the intensive labor margin. Which are the unexpected expense shocks. These expense shocks are shocks that are not driven by choice. Furthermore, the shock is exogenous, allowing for an isolated effect. An example would be health related expenses. An individual does not choose to be ill or impaired, but the individual is still presented

with costs. Expenses offer a second parameter in addition to wage. An important note is that the welfare state will reduce these expenses, but the effect will still stand. This will be elaborated upon in the theoretical framework. Additionally, the potential differences between genders will be examined regarding the expense shocks. The research question of this thesis will be:

To what extent do unexpected exogenous expense shocks influence the intensive labor margin of an individual, and to what extent do the results differ between genders?

The research contributes to existing literature by making the effect of unexpected exogenous expense shocks explicit. The papers by Bosch & Jongen (2013), Blundell, Bozio and Laroque (2013) and Meyer (2002) are very relevant for this thesis, as they examine the part time work while taking gender into account. However, Bosch & Jongen (2013) and Meyer specify their research on single mothers. Blundell, Bozio and Laroque (2013) make the more general statement that both gender and family composition play a role.

The second element of the research question poses another contribution to literature. The effects of expense shocks will be examined. Previous literature is mainly concerned with the effects of wage, since this is one of the most direct parameters. This thesis will expand on the existing theory by examining the role of expenses. The theoretical framework as presented by Boeri & van Ours (2013) does provide all the tools to hypothesize the existence of an effect, but it is never explicitly mentioned. Other papers have touched upon the topic as well. Mottaleb et al. (2015) do find evidence for the role of an unexpected expense shock on working hours. However, their case is not generalizable since it concerns a natural disaster. This thesis therefore fills a lagune in literature by adding the effect of expenses into the labor participation decision.

Social relevance follows from the two mentioned sides of the labor participation. The Dutch government aims to increase full time work participation. Not only does wage have an effect on the working hours of an individual. But this thesis aims to explore the effects of expenses on working hours as well. The possibility of a new instrument will be examined. If expenses prove to be an important factor, this would mean that expense promoting policy could increase the working hours. One method would be to reduce tax benefits for part-time workers for example. For example, currently there are two subsidies to help parents with children. A subsidy for daycare and a general subsidy to help with kids. Reducing the daycare subsidy could promote expenses. Another potential method lies in the progressive nature of the tax system. As more income also elevate the individual into a higher tax bracket. The OECD (2019) found

that this current tax climate is one of the main drivers for part-time work. Additionally, the differences between men and women are extensive, as mentioned by the Dutch minister (Kok & Winterman, 2019b; Jongh, 2019). This requires an extensive analysis to be able to provide a targeted policy option. General policy might not be efficient with two apparently heterogeneous groups. Furthermore, the differences are caused by complex mechanisms. Understanding these mechanisms, might lead to more effective and efficient policy ideas in general.

The structure of this thesis is as follows. Chapter 2 will start with a theoretical foundation. The relevant concepts for the research question will be discussed, which allows for the estimation of a statistical model. Following the theoretical foundation, the theoretical concepts will be operationalized in measurable variables. After which the statistical model will be specified in detail. This includes robustness checks and a general explanation to find the most suitable model for this thesis.

The results are extensive and will be split up into two parts. First a general regression to identify the overall effects. After this, the same regressions will be performed again but this time with gender specific subsamples. This means that a total of three regression tables will be presented. First there is a general regression, where gender is included as a covariate. After this, the two remaining regressions will be split by gender. Allowing for analysis of gender differences. This allows for a more detailed answer to the research question. The analysis and the subsequent conclusions will follow the results to answer the research question.

In short, the results of this thesis show that expense shocks are dampened by the welfare state, making them an ineffective parameter for changing the intensive labor margin. This means that people will experience expense shocks, which will not alter the intensive labor margin of an individual. The expense shocks do significantly affect expenditure itself, but this does not translate through to the actual working hours. The role of gender on the other hand is extensive. The male and female subsamples show differing preferences. Household or family composition and education are crucial elements for the intensive labor margin, especially for women. Furthermore, this thesis shows that the “homo economicus” does not exist. This is often the name for the perfectly rational person that is assumed to exist in economic theory. Psychological and social theories will provide a rational answer to an economically irrational outcome.

## 2. Theory

In this chapter, the relevant theoretical concepts will be outlined in a framework. These concepts will produce theoretical causal mechanisms from which hypotheses can be formed. First, the relevant concept will be explained and defined, after which the expectations will be made clear. This chapter will only discuss theory, the operationalization of the concepts will occur in chapter 4. The theoretical framework will be broken down into smaller chapters to make reading easier.

The theoretical framework does not only include causal mechanisms necessary for the statistical model, but also auxiliary theories that contribute to a complete understanding. The expectations of the main variables of interest will be transformed into hypotheses in chapter 2.14.

### 2.1. Extensive- and intensive labor margin

Regarding the labor participation decision, two main elements are prevalent. These are the extensive- and intensive labor margins. The extensive labor margin is the individual decision to enter the labor market. Individuals can decide to enter the labor market and find a job, or abstain and remain unemployed. The decision is dependent on the wage that is offered. Every individual has their own reservation wage. This is the minimum wage that offers a nonnegative surplus (Boeri & van Ours, 2013, p. 8-12). In the case of a nonnegative surplus, the individual can decide to enter the labor market. Otherwise, the individual utility is not maximized (Boeri & van Ours, 2013, p. 8-12). It is therefore unlikely that the individual will enter the labor market. The individual will value leisure time more than working hours in this situation.

The second prevalent element is the intensive labor margin. After an individual decides to enter the labor market, the second decision regards the number of hours. Individual preferences will determine the number of hours an individual is willing to work. When an individual decides to enter the labor market, the hours are not only constraint by law and labor demand, but also preferences. The individual will choose to increase working hours until the marginal benefits of leisure will exceed the marginal benefits of labor (Boeri & van Ours, 2013, p. 8-12). This means that after a certain point, an individual will prefer leisure time over labor time.

An increase in wage therefore has a positive effect on labor participation, regarding the extensive labor margin. Increasing wages will satisfy reservation wages of individuals that have been inactive in the past. These individuals will now enter the labor market. For the individuals

that already work, the effect is more complicated. Depending on personal preferences and marginal benefits of leisure, working hours will change. Two mechanisms influence this decision, but the outcome is often ambiguous (Boeri & van Ours, 2013, p. 8-12).

## 2.2. Income- and substitution effect

The income- and substitution effect both influence labor participation. First, the income effect as a result of a wage change. When income rises as a result of a higher wage, individuals will consume more leisure. This follows from the assumption that leisure is a normal good. Normal goods are consumed more when income rises (McDowell, Thom, Pastine, Frank & Bernanke, 2012). In the case of leisure, this holds true as well. Meaning that the number of hours worked will decrease when wage increases, if the income effect is dominant.

The other mechanism is the substitution effect. Which states that the price of leisure increases with wage. This price change is a result of opportunity costs. Opportunity costs are the costs of the alternative that is not chosen (McDowell et al., 2012). The marginal benefits of leisure do not outweigh the opportunity costs. Therefore, the number of hours worked will increase with wage if the substitution effect is dominant.

Depending on the dominance of either the substitution effect or the income effect, working hours will change. These are the two main mechanisms of the intensive labor margin. In addition to hourly wage, expenses and secondary income have effects as well. The important factor is that income changes with the same number of hours, as this increases the marginal benefits of labor. In that case, the income- and substitution effects are very important elements of the intensive labor margin. Henriques & Borowiecki (2017) mention that income effects become increasingly dominant, when income levels rise. This is due to the reduced marginal benefits of income at a higher level, resulting from the law of diminishing returns. This law will be further elaborated upon in chapter 2.6, but it is important to mention the expected dominance of the income effect for higher income levels.

## 2.3. Dynamic reservation wage

As mentioned, the minimum wage one is willing to work for is called the reservation wage. It is the point where marginal benefits equal or start to exceed marginal costs. If the wage being offered does not meet or exceed the reservation wage, one remains unemployed. This

reservation wage is not static. It is assumed to slowly decline overtime (Sant, 1977). This theory stems from Stigler (1961). The reservation wage is in essence the reservation price on the labor market and it is the price for labor. If an individual is unemployed for a longer period of time, reservation wage might decline (Sant, 1977). This is because marginal benefits of income will be higher for someone that has been unemployed for a longer period of time.

However, there are also factors that might increase the dynamic reservation wage. Someone with a higher education has better alternative options, and therefore would turn down a low paying job, in expectation of a higher wage that a longer job search is expected to result in. In the case of a low wage, the marginal benefits of labor would not exceed the marginal benefits of leisure. Therefore, the individual would prefer to stay inactive. A person with a doctorate in medicine is not likely to apply for a job as a shopkeeper for example. In short, there are many factors influencing the reservation wage. The reservation wage is not constant overtime and is therefore dynamic.

#### 2.4. Part-time work

The dynamic nature of the reservation wage is important to understand the individual inclination to prefer part time work. Boeri and van Ours (2013, p.128-133) state that the reservation wage increases if part time work is impossible. This would discourage people from entering the labor market and lead to higher unemployment figures. If only full time jobs were to be offered on the labor market, the individual could not freely choose the number of hours. Not only will utility not be maximized for the individual, the outcome might not be desirable for the government.

As discussed regarding the intensive labor margin, an individual will choose the number of working hours where marginal benefits of labor are greater than marginal costs. If leisure is valued more than labor, the individual will work less. In general, part time work offers a method of dealing with unemployment if the labor market is rigid (Boeri & van Ours, 201, p. 139-147). By allowing more freedom, labor participation will increase. This freedom can for example be in terms of working hours. This was also confirmed by Visser (2002). The lower reservation wage and increased labor supply also reduce the market wages. Furthermore, Tilly (1990) states that part time workers are in general more affordable and more flexible than full time workers. Therefore, companies benefit from part time work in this regard.

Regarding the labor productivity of individuals, part time work can have several effects. Tilly (1990) explains that workers produce less per hour if they work part time. Which can result in an overall lower output for society. Tilly (1990) published his work in 1990, since then the effects have changed slightly. Garnero, Kampelmann and Rycx (2014), find an increased labor productivity when they take gender into account. When they interact labor productivity with gender, they find that especially male part-time workers cause a positive effect. This reinforces the need for gender specific research. However, there is still a risk of a reduction in labor productivity. If the reduction in labor productivity is excessive, intervention is needed. The working hours must then be increased, which could occur by increasing minimum wages. Depending on the dominance of the income- or substitution effect. Increased minimum wages, would however result in less labor demand which potentially increases unemployment. A possibly more suitable policy instrument could therefore exist at the expense side of the labor participation decision. Which is the novel aspect of this thesis.

## 2.5. Role of expenses

Expenses pose a second instrument to influence the intensive labor margin. However, it is not a direct instrument like wage is. Individuals are constraint by budget (Boeri & van Ours, 2013, p. 128-133). This means that consumption of goods is limited by the income of an individual. Where a change in wage would increase this budget, an increase in expenses would preemptively take a bite out of the budget. Less of the budget would be available for general consumption. For the remainder of this chapter, this reduction in budget will be referred to as a reduced income balance. The individual has less income that can be freely consumed. The income balance is the balance of income and expenses, where a positive balance indicates an income excess. A negative balance indicates an income deficiency.

Rather than expenses directly influencing the number of hours worked, the income balance is the intermediary mechanism. This makes expenses less direct, which might be more beneficial for policy in the long run. This will be further discussed in chapter 2.7. Existing theory is mainly concerned with wage as an instrument to discuss labor participation. In theory, expenses and the income balance would play a similar role. When expenses would rise, the income balance would decrease. The effect on working hours is ambiguous, depending on the dominance of the substitution- or income effect. Similarly to the effects of wage, the income effect becomes

increasingly dominant when income rises (Henriques & Borowiecki, 2017). Meaning that an increase in expenses will lead to an increase in working hours.

This thesis studies the effects of exogenous expense shocks on the intensive labor margin of an individual. These shocks are exogenous, meaning that they are not a result of the actions of a person. Two main types of shocks are taken into account. First, there health related expense shocks that cause expenses to rise. Secondly, there are shocks in wealth. Both shocks are not the product of an individual's actions. Rather, they can occur at random. However, they do differ in terms of their advantages and disadvantages.

Health related expense shocks have the advantage that they can affect anyone. This helps with the random assignment aspect of the research. A disadvantage of health related shocks, is the potential sustained long term effect on leisure quality and working hours. This means that a person that is ill for a longer period of time, will be hindered in labor. Additionally, a person that is ill will not enjoy leisure time the same way that a healthy person will do. This thesis will take both aspects into account, but it is still a disadvantage of health related expense shocks. Fang (2019) discussed the role of health related expense shocks in the intensive labor margin. However, Fang's (2019) dissertation does not aim to explain this relation more in depth, therefore he never did an empirical analysis on the relation.

Wealth shocks do not have the same disadvantages as health related shocks. As changes in a persons wealth will not have similar long term effects on an individual. However, the downside of using wealth related shocks is the fact that only wealthy people are affected. The assignment of the wealth shock still occurs in a random matter, but not the entire population is subject to the shock. To utilize the advantages of both types of shocks, this thesis will take them both into consideration. The relevance of wealth is described by Swanson (2012). He explains that shocks to asset value leads to uncertainty. This leads an individual to absorb the shock, by changing the working hours (Swanson, 2012). In this case uncertainty drives action to generate more income from labor, to offset the loss in wealth. The origin of the uncertainty is a shock to asset value, which is an exogenous shock.

## 2.6. Marginal utility of income

The choice between labor and leisure is in essence a choice between two goods. When individuals allocate a fixed income between two goods, marginal utility plays an important role. As previously discussed one's income functions as the budget line in this case. The substitution-

and income effect both have marginal utility as a key concept. If the marginal benefits of leisure are lower than the marginal costs, the individual will work more.

Marginal utility decreases when the quantity increases. This is called the law of diminishing returns (McDowell et al., 2012, p.114-117). Economic theory states that individuals work utility maximizing. Utility is maximized where marginal benefits of leisure equal the marginal benefits of labor. This is the combination of leisure and labor where individual utility is maximized (McDowell et al., 2012, p.117-119). Changes in the income balance will result in changes in marginal utility.

This statement follows from the law of diminishing returns (McDowell et al., 2012). Excesses in income will result in a positive income balance for the household. The excess will cause marginal benefits of labor to diminish. The marginal benefits are reduced, because the household already has an excess. The marginal utility gets reduced when the income excess increases. Individuals who live in a household with a positive income balance are therefore expected to work less. It should be noted that this portion of the theoretical framework is hypothetical, the formal hypothesis will follow in chapter 2.14.

## 2.7. Indirect and exogenous parameters

The upside of using wages as an instrument to influence labor participation is that it is a more direct measure. A potential downside of exclusively using wage as a parameter, is that it can be endogenously influenced by other factors. An example can be an individual's tenure. People who work at a firm for a long period of time are likely to have a higher hourly wage. Expenses on the other hand are exogenous, which makes them an interesting instrument.

Expenses are theoretically related to the intensive labor margin, through the concept of disposable income and is therefore still related to income. From a policy perspective, more direct measures, such as wage, have less chance of creating unwanted and unexpected side effects (Wagenaar, 1997). However, changing a parameter in a system will not confine change to the desired component (Meadows, 2008). Meadows (2008) calls these parameters leverage points.

These points exist in any system, also in the system deciding labor participation. A simple example following the already described theory would be wage. This wage directly causes changes in working hours, dependent on the dominance of the substitution- or income effect. A

government could impose a policy to increase or decrease this wage, which is a leverage point to change the system (Meadows, 2008). In this case, the change is minimal. The further away the leverage point is in the system, the more extensive the systematic change (Meadows, 2008).

Meadows (2008) state that choosing an indirect leverage point will be the most effective method of creating change. Although a substantial change is not always a suitable option, due to the presence of unexpected and unwanted policy effects (Wagenaar, 1997). It is still an important concept to keep in mind if change is required. To apply this to the case of labor participation, expense related policy is not directly related to labor. Therefore, the systematic change is more substantial (Meadows, 2008).

This statement does require nuancing, as well thought out policy regarding expenses is not expected to be systematically substantial. The important concept is that leverage points influence more components in a system than the desired one. Choosing a leverage point that is indirect, will change the system to a larger extent than a direct leverage point (Meadows, 2008). In the case of individual labor margins, the concept posed by Meadows (2008) is also relevant. As wage is a direct parameter that does not cause a systematic change. The Dutch government aims to increase the labor participation on a more systematic level. Therefore, by exploring less direct parameter, systematic change becomes more prevalent. Expense related instruments might pose such a parameter.

In short, the dilemma for policy in this case is therefore two-fold. On one hand, indirect parameters cause a more systematic change. Which can be beneficial in the long run. On the other hand, indirect parameters are likely to have more unintended side-effects than direct parameters, making direct parameters attractive

## 2.8. Institutional context

The theory regarding the choice between labor and leisure assume income and expenses to be direct parameters. This means that income and expenses are direct components of the labor decision. In reality, welfare states are designed to dampen these shocks. As Barr (2020) mentions throughout his book, governments can choose to intervene for efficiency or equity reasons. Expense shocks fall under the latter category. Unexpected shocks can have severe consequences for lower income households, which leads to an equity problem (Barr, 2020). In the example of health related expense shocks this also holds true. In the Netherlands, mandatory health insurances are imposed to help the weaker individuals in society. With health related

expense shocks come several different expenses, including medical expenses or additional home provisions. Additionally, illness can produce opportunity cost, since the individual is not able to work any longer. The mandatory insurance system helps to mitigate the medical expenses, which are substantial in nature. The medical portion of the expense shock is therefore limited. Although this example concerns the medical expense shock relevant for this thesis, the concept holds true for the welfare state as a whole. Following on chapter 2.7 and Meadows (2008), these mitigating factors pose parameters that are capable of a systematic change.

## 2.9. Uncertainty and personal needs

Maslow (1981) presents a hierarchy of needs. Individuals will tend to fulfill these needs in the hierarchical order. Moreover, Maslow (1981) describes needs as both abstract and concrete. The more fundamental needs come in the form of food, clothing and housing. Individuals will provide for these needs in order to stay alive. After these basic needs, Maslow (1981) presents the needs of safety. One element is presented as employment, as employment provides the income needed to fulfill certain needs. When an individual is unemployed, this will result in to a increased amount of uncertainty. The individual is then expected to search for employment to fulfill the need of security. Conti et al. (2017) find that certainty and security have significant effects on labor participation. Which reinforces the argument derived from Maslow (1981). The mechanism as described by Conti et al. (2017) is similar to the mechanism by Swanson (2012). However, Swanson's (2012) theory regarded the role of a wealth shock in the intensive labor margin of an individual.

After employment, the marginal benefits of income are expected to be reduced. Not only as a result of the aforementioned law of diminishing returns, but also due to the nature of the higher needs. While the basic needs require income to be fulfilled, the higher needs are more abstract. Whereas Conti et al. (2017) find uncertainty to increase the intensive labor margin, employment will reduce it. This is because being employed will decrease the uncertainty of an individual. Maslow (1981) presents concepts as love and friendship as the needs that follow. Which are acquired though social means rather than financial means. Although money might still be required to some degree to fulfill these psychological needs, the extent is less. This concurs with the findings of Conti et al. (2017), who find that the uncertainty resulting from unemployment affects labor participation. Moreover, the uncertainty will reduce the expenses of a household. Further indicating the prioritized fulfillment of the basic needs.

A second important component for this thesis derived from hierarchy of needs by Maslow (1981), is the causal mechanism that causes age to affect the working hours. Kim, Yoon and Zurlo (2012) found that people from different ages respond differently to shocks. In this example specifically health shocks. This is a result of differences in healthcare needs and preferences coming with age. Younger people who study will have different preferences than older workers. Fang (2019) shows that older individuals do in fact have a higher demand for healthcare. In general, age is expected to have a negative effect on the working hours of an individual.

## 2.10. Potential gender differences

As became evident from the statements by the Dutch minister, women are less prone to full time work participation. Bosch & Jongen (2013) as well as Meyer (2002) found empirical evidence to support this claim, although these papers are more concerned with single mothers. Single mothers will tend to respond to financial incentives significantly more than other individuals.

Blundell, Bozio and Laroque (2013) make a more general statement about gender difference. These gender differences have been partially caused by the historical position of women. In the past, women worked less overall. Overtime the economy grew, allowing wages to rise as well. The unemployment gap in their study has been reduced. Meaning that more women started to work. Currently, the numbers are not equal between the genders. Women still decide to work less. This concurs with the earlier mentioned law of diminishing returns. As women used to work fewer hours, their marginal benefits of labor might have been higher than the marginal benefits of men (McDowell et al., 2012, p. 117-119). But in this case the concept of paternalism also plays a role. Blundell, Bozio and Laroque (2013) explain that family composition, gender and age will play important roles. This concurs with the earlier findings regarding single mothers.

Both papers are complementary to each other. It becomes evident that women are expected to respond more to financial incentives than men. This is due to the fact that men already work more, therefore marginal benefits of labor are higher for women. Secondly, parents will respond differently to financial incentives as well. (Blundell, Bozio and Laroque, 2013)

### 2.11. Quality of leisure

As previously discussed, marginal benefits of income are an important element to determine the intensive labor margin. In the intensive labor margin, these marginal benefits of labor are compared with the marginal benefits of leisure (Boeri & van Ours, 2013). Marginal utility diminishes with quantity, which is theorized in the law of diminishing returns (McDowell et al., 2012). But not only quantity has an influence on the marginal utility leisure or labor. The quality also has an important theoretical influence. The quality of leisure directly changes the marginal benefits. This quality can be influenced by a multitude of several factors. Having young kids is hypothesized to have an effect on the quality of leisure (Flood, Meier & Musick, 2020). More general factors are serious leisure activities as researched by Lee and Hwang (2018). These factors determine marginal utility in a different way than quantity does.

If the quality of leisure is low, the marginal utility will also be low. In the choice between leisure and labor, this will lead to an increase in working hours. As the marginal utility of leisure is reduced, while the marginal benefits of labor remain unchanged. Therefore, quality of leisure is an important theoretical factor in the intensive labor margin as well.

### 2.12. Educational level

As mentioned in the introduction, the Dutch minister of economic affairs states that women are increasingly educated but mainly work part time (Kok & Winterman, 2019b, Jongh, 2019). However, the level of education itself does play a role. Aaronson, Lange and Mazumder (2014) found that women with better education also got better jobs. Better, both in terms of intellectual difficulty and income. A higher income would also increase the marginal utility of labor. Although this statement is very theoretical and economical, the causal mechanism is still important. In the statement by the minister, there is no distinction made.

In addition to differences in marginal utility between educational levels, the preferences also play a role. Erosa, Fuster & Kambourov (2016) state that individuals from different educational levels will respond differently to wage shocks. Elasticity of labor determines the degree to which the intensive labor margin responds to a wage change. Not only did the elasticity differ between different types of wage change, but also between different education levels. Furthermore, the preferences of these individuals differ. Erosa, Fuster & Kambourov (2016) found that the inconsistent coefficients between education groups, resulting from differences in

preferences. This again reaffirms that the minister's statement should be nuanced. As highly educated women are expected to work more hours than lower educated women.

### 2.13. Wealth

A final addition to the theoretical framework is necessary for the remainder of this thesis. In the previous chapters, the concept of opportunity costs has already been mentioned. Opportunity costs are the income that could have been realized, if an individual would have made another choice (McDowell et al., 2012). However, general lost income is not always a result of choice. Wealth can create an additional form of unexpected expense shocks. Asset depreciation can lead to lost income. This is not an expense where money will be lost to the individual, but rather through the means of revaluing.

Revaluing assets or general property can lead to a reduction in value, this is called depreciation (Brouwers & Koetzier, 2018). The total wealth of an individual is reduced as a result. But asset depreciation is not an expense in itself. There are two consequences as a result of asset depreciation. First there is the aforementioned lost income, which is the potentially reduced return on investments of the asset in question (Brouwers & Koetzier, 2018). Secondly, the reduction in wealth is a charge. Although depreciation is not an expense, it is a charge (Brouwers & Koetzier, 2018). These elements make asset depreciation another form of an exogenous unexpected expense shock. As one does not choose asset depreciation, but is exposed to the consequences. The shock itself does not require further explanation, as the mechanisms of expenses have been explained in chapter 2.5.

### 2.14. Hypotheses

The subchapters thus far allow for the formulation of explicit hypotheses. The hypotheses are meant to address the main concepts of the research. These concepts are gender and the exogenous expense shocks. Additionally, a hypothesis for hourly wage will also be formulated, as it is a prevalent component of the intensive labor margin.

For this thesis, expense shocks are divided into three different categories. First of all, health related expense shocks. The income- and substitution effects both play a role in determining the hypothesized effect. Following on Henriques & Borowiecki (2017), the income effect becomes dominant when income levels rise. This thesis is aimed at the Netherlands, which is a

relatively wealthy country. The income effect is therefore expected to be dominant. An expense shock will therefore be expected to reduce the disposable income, leading to an increased number of working hours. Which means that health related expense shock will then have a positive effect on the working hours of an individual, translated through the intermediary disposable income. The first hypothesis is therefore as follows:

H<sub>1</sub>: Health related expense shocks will have a positive effect on the intensive labor margin of an individual.

Secondly, the value of an individual's assets will have a similar effect. The effect of the depreciation of asset value will depend on personal preferences. But due to the hypothesized dominance of the income effect, asset depreciation will cause expenses to rise. Again, asset depreciation is not necessarily an expense, but rather a charge. This will then increase the intensive labor margin of an individual. This expectation is also in line with the findings of Swanson (2012), who states that an individual will work more, in order to compensate a shock to asset value. The following hypothesis can be formulated:

H<sub>2</sub>: Asset depreciation will have a positive effect on the intensive labor margin of an individual.

The last concept of this thesis that requires explicit hypotheses is gender. Before the hypothesis can be formulated, first the aim of the hypothesis needs to be clarified. A total of three types of regressions will be performed. The first series of regressions regards a sample consisting of both men and women. The second and third series of regressions will go deeper into the gender differences, providing an explanation for the differences. The hypothesis is aimed at the gender differences.

Based on the lower number of hours that women currently work, women are expected to respond more to financial incentives. Following on chapter 2.10, women are expected to have a higher marginal utility from labor. Women are therefore expected to respond stronger to financial incentives, as discussed in the theoretical framework. This leads to the following hypothesis:

H<sub>3</sub>: The intensive labor margin of women will change more as a result of financial incentives than the intensive labor margin of men.

### 3. Research methodology

To determine the effects regarding labor participation, this thesis will use microdata. More specifically, data from the LISS-panel, which is on an individual level. The dataset is therefore constructed from panel data. This allows for an extensive regression, but also poses several difficulties.

First, an overview of the variables will be presented. This includes the operationalization of the variables and the data description. After this, the type of regression will be explained. After which the theoretical assumptions will be discussed, to maintain robustness of the statistical models.

#### 3.1. Operationalization and data description

Relevant concepts for this thesis were extracted from the LISS-panel data archive. These concepts have been operationalized using variables found in the LISS data. Some variables were not found, but could be constructed. The LISS panel presents an annual survey to a representative group of Dutch citizens. These questions produce variables which are useful for research and policy evaluations. The data that is being used ranges in time from 2008 until 2019. 2020 will be excluded, because this is the first year of the covid crisis. The descriptive statistics of the variables are presented in Table 1. The variables presented are the exact variables that are used in the regressions.

Table 1 Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
WTW	29.732	11.358	0	100
lWage	3.914	.575	-.511	11.025
Age	49.441	17.669	15	100
Partner	.729	.444	0	1
Parent	.495	.5	0	1
Gender	.461	.498	0	1
HighEdu	.28	.449	0	1
Employed	.58	.494	0	1
LeisureQuality	7.106	1.729	0	10
lAssetValue	13.533	6.233	0	23.026
Expenditure	2.786	.773	1	5
HHIncome	7.488	.705	2.398	12.385
SickHH	3.356	1.591	1	5
AfflictedHH	.469	.499	0	1

The main dependent variable measures the number of hours a person is willing to work. The variable is operationalized in a survey question which directly asked how many hours a week

one was willing to work. This is directly the concept of interest for this research. The variable will be visible as “WTW” in the regression tables.

An important variable to examine the intensive labor margin is wage. As discussed in the chapter theory, this is the most direct causal parameter to influence the hours decision. Wage was not measured in the LISS panel, however it is easily constructed. The hourly wage consists of the average working hours a month divided by the average monthly income. This construction produced the average income per hour. Because the interest is on changes in wage, the natural logarithm is included in the regression. Additionally, this dampens the effects of possible outliers.

The exogenous shocks are measured in several different ways. This thesis measured several health shocks in a household, as well as measuring changes in asset value. The health shocks were measured in two different ways.

The first variable is called “SickHH”, indicating the extent to which someone else in the household has been sick. More specifically, how many days they were unable to work due to sickness. This was measured as a survey question, presenting categories. The lowest value is 1, the highest values is 5. The highest value in a household was assigned to every household member, except for the person itself. This way the expense shock comes from another individual, making it exogenous.

The same applies to the second health shock. But this determined whether or not there was someone in the household with long term medical afflictions or diseases. If this was true, the value is 1. If there is no person in the household with long term medical afflictions, the value is 0. This second health shock is called “AfflictedHH” in the regression tables.

The last expense shock is asset depreciation. Which is measuring by taking the natural logarithm of the asset value. This presents relative change, where a positive value indicates appreciation and a negative value indicates depreciation. Individuals who were unable or unwilling to disclose the value of their assets, were assigned a missing value. The value zero would cause problems, as  $\ln(0)$  equals minus infinity. Therefore, individuals with a value of zero have also been assigned a missing value.

Household expenditure is the outcome variable of the first stage in the regressions. This variable is not a straightforward one. It indicates to what extent expenses exceed income on a household level. This is also done in order to make the health related expense shocks exogenous. The LISS

does not provide information regarding exact figures. This approach has the downside of being less straightforward and direct than simply measuring expenses, but it does provide benefits. Small shocks would skew the results, whereas this approach is less sensitive. Large purchases like houses and cars were excluded, which provides a very robust variable. There is a need for controlling for the residual household income as a result of this variable choice. Therefore, the first instrument in every regression will be the income of the other household members. Which is called “HHIncome” in the regression tables.

Several covariates were used to complete the statistical model. Starting with the quality of leisure. Which is measured in a survey question on a scale from 1 to 5. It indicates to what extent a person is happy with the way they spend their leisure time.

A series of dummy variables was used to control for individual characteristics. Gender is the first dummy, where 0 indicates female and 1 indicates male. The second dummy variable indicates whether the individual lives together with a partner. This includes both wedded and unwedded partners. The third dummy indicates if the individual is employed or unemployed.

Whether or not an individual is a parent is also taken into account with a dummy variable. An important note is that this only concerns children that currently live in the household. If the child moves out, this is not counted towards being a parent in this regression. The last dummy is called “HighEdu”, which indicates whether a person finished a degree in higher education.

### 3.2. Instrumental Variable analysis

The regression choice of this thesis is an Instrumental Variable (IV) approach. As the aim is to find an unexpected expense shock that is not driven by choice. In other words, it must be exogenous. This allows the unexpected expense shock to be the instrument in the IV-regression. A key assumption for such a regression is that the instrument is truly exogenous, similarly to the expense shock in the research question.

The IV-regression design allows for measuring the effect of an unexpected expense shock on the outcome variable, through an intermediary variable. The outcome variable in this thesis is the willingness to work of an individual. The intermediary variable is presented in the form of household expenses. This will be the outcome variable of the first stage of the regression. A benefit of the IV-regression design is the possibility of a multitude of exogenous instruments. Not only health related expense shocks can be taken into account, but also asset depreciation.

This possibility of expanding the number of instruments, allows for a more complex and complete statistical model. Addition, this allows the institutional context to be taken into account, as expenses can be dampened by the welfare state.

Concretely, the design of this research is threefold. First, a series of general regressions will examine the effects of exogenous expense shocks. Gender will be implemented as a covariate in these regressions. The second and third series of regressions will make use of gender specific subsamples. This means that the same regressions will be performed, but rather than gender being a covariate it is a selection criterion. The whole sample will be either male or female. This allows for a comparison between genders. If there are indeed differences in the way women respond to financial incentives, as discussed in chapter 2.10, these differences will become visible.

The complexity is further increased by the form of data, namely panel data. Rather than a simple cross sectional or time series design, panel data allows for a combination of both. This combined approach allows for a large number of observations, which helps with the construction of a statistical model.

### 3.3. Instrument validity

Validity of the instruments is not given, even if theory states it. This thesis aims to include a multitude of instruments. In order for instruments to be valid, two requirements need to be fulfilled. First the instruments must be uncorrelated with the error term of the regressors, which makes the instruments exogenous (Wooldridge, 2013, p.534-538). This can be determined by the Sargan-Hansen test (Sargan, 1958; Wooldridge, 2013, p.534-538). The Sargan-Hansen approach is a test of overidentifying restrictions. In the case of this thesis a multitude of instruments is included. The Sargan-Hansen test will present a coefficient that indicates to what extent the instruments correlate to the error term of the regressors. A coefficient higher than 0,05 will indicate an insignificant Sargan-Hansen test, which means that the instruments are valid. If the results are significant, at least one of the instruments is not exogenous (Wooldridge, 2013, p.534-538). This means there can be doubt towards the validity of the instruments.

The second requirement of instrument validity states that the instruments must be correlated with the endogenous explanatory variable (Wooldridge, 2013, p.534-538). This makes the instruments relevant. When the instruments are not significantly correlated with the endogenous regressor, the instrument is weak. The significance can be determined by examining the first

stage of the IV regression. Both the Sargan-Hansen test and the first stages of the regressions will be included in the regression tables.

### 3.4. Individual specific effects

Using panel data will create problems regarding the assumed homogeneity of the data sample. There cannot be characteristics or attributes that differ between individuals (Wooldridge, 2013). Meaning that differences between individuals need to be taken into account. To control for these individual specific effects, either fixed- or random effects must be applied (Wooldridge, 2013). To determine the suitability of fixed- and random effects, Schaffer and Stillman (2010) have implemented an approach that is asymptotically equivalent to the traditional Hausman (1978) test. This is achieved using the artificial regression approach designed by Arellano (1993) and Wooldridge (2002, p. 290-291). The Schaffer-Stillman (2010) test is designed for IV-regressions, whereas the standard Hausman (1978) test is not.

However, several time-invariant variables in this thesis will pose problems if a fixed-effects model proves the most suitable. Hausman & Taylor (1981) describe that fixed effects are not suitable in the case of time invariant variables. If the random effects assumption holds, a random effects model can be implemented. The model would be a Generalized-two-stage-least-squared (G2SLS) model, rather than an ordinary two-stage-least-squared (2SLS) model. This G2SLS model by Balestra and Varadharajan-Krishnakumar (1987) is only suitable under the random effects assumption.

If fixed effects were to be present in the model, Baltagi's (1981) estimator is the most efficient approach. Baltagi's (1981) approach is the error-component two-stage-least-squared (EC2SLS) model. This was proven by Han (2016) who differentiated between both approaches and found that under presence of fixed effects, only Baltagi's (1981) estimator was efficient. In short, the most suitable model will be determined at the start of chapter 4. The suitability is dependent on the Schaffer-Stillman (2010) test, and the potential presence of time-invariant variables.

### 3.5. Autocorrelation and multicollinearity

As mentioned, the complexity of the design produces some potential problems. Several key assumptions must be satisfied in order for the regression to be reliable. First, there is the inherent

problem of autocorrelation as a result of panel data (Wooldridge, 2013). Because the design utilizes both the time series and the cross sectional dimensions, it is likely for observations to correlate. Especially when using micro data on an individual level. The autocorrelation that results from this, will inevitably affect the results. Therefore, standard errors must be clustered to prevent autocorrelation.

In addition to autocorrelation, multicollinearity causes inaccurate results as well. To prevent issues, a correlation test will be presented. In accordance with Allison (1999), every correlation coefficient exceeding 0,8 will cause problems. This will therefore be the cutoff point. The two variables that produce the coefficient cannot be used in the same regression. Values that approach the 0,8 cutoff will be explicitly mentioned.

## 4. Results

This chapter will present the findings of the regressions. Starting with the multicollinearity test, followed by the choice for the statistical model. As outlined in chapter 3, the model of choice is dependent on several factors which will be elaborated upon. After this, the actual results will be presented.

Chapter 4.3 will contain the results of the general regressions. Chapters 4.4 and 4.5 will address gender differences. First a series of regressions will be run for the male subsample, after the which the female subsample will follow.

### 4.1. Multicollinearity

The results of the multicollinearity test are presented in Table 2. As discussed in chapter 3.2., coefficients higher than 0,8 will present issues regarding multicollinearity (Allison, 1980). In which case, those variables cannot be used in the same regression. Table 2 shows that no variables are correlated to such an extent. Therefore multicollinearity will not present problems for the regressions that will follow.

Table 2. Multicollinearity Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) WTW	1.000													
(2) lWage	-0.041	1.000												
(3) Age	-0.164	0.095	1.000											
(4) Partner	-0.098	-0.036	-0.122	1.000										
(5) Parent	-0.039	0.050	0.053	0.074	1.000									
(6) Gender	0.402	0.072	-0.004	-0.018	-0.248	1.000								
(7) HighEdu	0.228	0.296	-0.023	-0.042	0.071	0.061	1.000							
(8) Employed	0.109	0.124	-0.035	-0.023	-0.086	0.057	0.037	1.000						
(9) LeisureQuality	0.104	0.106	0.176	-0.076	-0.149	0.250	0.006	0.165	1.000					
(10) lAssetValue	-0.109	-0.008	0.160	-0.115	0.070	-0.256	0.001	-0.036	0.047	1.000				
(11) Expenditure	-0.011	-0.229	-0.054	-0.076	-0.009	-0.080	-0.071	-0.053	-0.119	0.075	1.000			
(12) HHIncome	-0.230	-0.048	0.002	0.395	0.188	-0.187	-0.030	-0.135	-0.256	0.166	-0.060	1.000		
(13) SickHH	0.117	-0.076	0.063	-0.105	-0.273	0.165	0.029	0.125	0.091	-0.238	0.028	-0.174	1.000	
(14) AfflictedHH	-0.095	-0.058	0.282	-0.110	-0.296	0.091	-0.129	0.115	0.045	-0.140	-0.014	-0.145	0.418	1.000

## 4.2. Statistical model of choice

To determine the most efficient approach as described in chapter 3, several assumptions had to be performed. One problem of this research is the existence of time invariant variables. Not only gender is time invariant, but also education has posed problems during the regressions. Gender has proven to be an important variable for the regressions, which will be further elaborated upon in the following chapters. Therefore, a fixed effects model does not work if the gender variable is present.

Furthermore, a test for suitability of a G2SLS approach with random effects has been performed. The null hypothesis of the test states that random effects are the suitable option. The Schaffer-Stillman (2010) test as mentioned in chapter 4 showed a significant result. The presence of fixed effects in the model means that Baltagi's (1981) EC2SLS model is the most suitable option. For every EC2SLS regression, there will be an ordinary 2SLS version as well.

## 4.3. General regression results

The results of the regressions are presented in table 3, 4 and 5. To keep the tables readable, only the instruments are presented in the first stage. The covariates are included as well, but this would clutter the tables unnecessarily. Additionally, Baltagi's (1981) approach requires a large number of instruments in the first stage, which have been included in the regression. But again, to keep the table readable these additional instruments are not presented. For this first part of the results chapter, table 3 is the one that will be examined. Starting with the first stages of the four models presented in table 3.

Table 3 Results of the general IV regressions

VARIABLES	(1) First Stage	(1) Second Stage	(2) First Stage	(2) Second Stage	(3) First Stage	(3) Second Stage	(4) First Stage	(4) Second Stage
HHIncome	-0.114*** (0.022)		-0.076** (0.034)		-0.182*** (0.032)		-0.091** (0.041)	
SickHH	0.031** (0.013)				0.040** (0.016)			
AfflictedHH	0.041 (0.032)				0.010** (0.041)			
lAssetValue			-0.003 (0.004)				-0.002 (0.004)	
Expenditure		-1.817 (1.819)		-3.575 (2.683)		-1.863 (2.042)		-1.885 (6.474)
lWage		-5.802*** (0.916)		-3.805*** (0.877)		-6.006*** (1.018)		-3.837*** (1.226)
Age		-0.117*** (0.0294)		-0.120** (0.0469)		-0.122*** (0.0327)		-0.125* (0.0668)
Partner		-2.997** (1.237)		-0.0403 (1.806)		-3.264** (1.317)		-0.310 (2.026)
Parent		1.806*** (0.581)		1.326 (0.873)		1.969*** (0.636)		1.119 (1.501)
Gender		9.609*** (0.547)		10.03*** (0.811)		9.731*** (0.579)		10.21*** (0.947)
HighEdu		3.046*** (0.557)		2.231*** (0.840)		3.031*** (0.596)		2.399*** (0.836)
Employed		10.08*** (2.434)		8.594*** (2.131)		11.19*** (2.649)		9.782*** (2.191)
LeisureQuality		0.180 (0.204)		-0.0482 (0.244)		0.236 (0.226)		-0.00433 (0.310)
Constant		48.29*** (8.348)		45.52*** (9.830)		48.20*** (9.189)		40.24* (20.63)
Observations	1688	1688	985	985	1688	1688	985	985
Sargan-Hansen	0,317		0,351		0,574		0,187	
Model	EC2SLS	EC2SLS	EC2SLS	EC2SLS	2SLS	2SLS	2SLS	2SLS

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The variables of interest are the instruments presented in the first stages of table 3. Additionally, gender is included as a covariate for this first regression. Starting the results with the health related expense shocks. The number of sick days of other people in the household does have a significant effect on household expenses. In both model 1 and 3, the significance is at 5% and the effect is positive. Which is to be expected. Being sick causes expenses to rise, which is indeed shown in table 3. The same is not necessarily true for households with long term afflicted

individuals. Significance is only found at 5% in model 3. Model 1 uses the Baltagi (1981) estimator and produces a lower error term, which results in a reduced significance in this case. The effect is therefore not consistently significant. This is likely to be the result of the Dutch welfare state, that aims to reduce expense shocks for individuals with long term health problems.  $H_1$  cannot be accepted or rejected yet.

The second type of expense shock included in this thesis is wealth. Which is measured as the natural logarithm of an individual's asset value in table 3. The direction of the coefficient negative, which is in line with the expectations. As a negative coefficient states that an increase in asset value will lead to a decrease in the expenditure excess. However, the effect is not significant on any relevant scale. The negative coefficient is in fact in line with the household income, which is to be expected. As both indicate a rise in wealth or income, which was mentioned in chapter 2.13  $H_2$  cannot be accepted or rejected from this portion alone.

The last instrument is the income of the other household members. In all four models, the income of the rest of the household has a significant effect on the expenditure variable. In model 1 and 3, the significance is at 1%. In model 2 and 4, significance is at 5%. Furthermore, the coefficient is negative, which is to be expected. The additional income of the household will reduce the excess of expenses. Although the coefficients differ between the four models, the coefficients remain negative. Whether or not  $H_7$  is correct in stating that the additional income has an effect remains to be seen.

One variable that is crucial to determine whether or not  $H_1$  and  $H_2$  can be accepted is the expenditure itself. This leads to the discussion of the second stages of table 3. In all four models, the coefficient of expenditure is not significant. This is not as expected, as expense shocks were hypothesized to have an effect. This means that  $H_1$  and  $H_2$  cannot be accepted on the basis of the results of table 3.

Regarding wage, the results are as expected. The coefficients are significant which reaffirms the theoretical expectations. The direction of the effects was expected to be negative, due to the hypothesized dominance of the income effect. In all four models the coefficients are negative and significant at 1%. This confirms the dominance of the income effect. This would contradict the coefficient of expenditure, but that is not significant in table 3.

Age is consistently significant across all four models. Although the degree of significance differs. The direction of the effect is negative, as the coefficients are consistently negative across all four models. This is according to the expectations.

The family composition is not consistently significant across all models. In model 1 and 3, both being a parent and having a partner are significant. In model 2 and 4, this is not the case. The coefficients are consistent in direction across all models. Due to the larger number of significant instruments and observations in models 1 and 3, the potential existence of an effect cannot be denied. In addition, the direction of the coefficients is consistent across all models making it unlikely to be a coincidence. The variables regarding family composition will be further examined in the gender specific regressions in table 4 and 5.

One of the variables of interest is gender. Gender shows itself to be an important variable. Significance is consistently at 1% across all four models, in addition to having a substantial coefficient. For example, in model 1 the coefficient shows that being male causes the individual to be willing to work 9,609 more.

Being highly educated is also noteworthy, as it is also consistently significant at 1%. The coefficients are positive, indicating the truth of the reasoning in chapter 2.8. The same holds true for the being employed. It was already derived from theory that the extensive labor margin is the first step to determining the intensive labor margin. Although the results are different than expected, the significance is consistent. The effect was expected to be negative as unemployment increases uncertainty. But the effect is more in line with the simple logic of Boeri & van Ours (2013). If the reservation wage is not met for the extensive margin, the individual will remain inactive. This also dampens the intensive labor margin. This effect has therefore proven to be more prevalent than the effect of uncertainty.

The last variable is the quality of leisure. As marginal benefits of leisure are a direct component of the intensive labor margin. Although the coefficients are consistently negative, which is expected, there is no significance at all.

#### 4.4. Results split by gender

In this chapter, the same regressions will be performed as in the previous chapter. Due to the significance of gender in the previous results, and the importance for this thesis, tables 4 and 5 will present additional regressions. Table 4 will contain the results for the male subsample, while table 5 contains the results for the female subsample. The results will be briefly discussed, after which both subsamples will be compared.

Table 4 Regression results for male subsample

VARIABLES	(1)	(1)	(2)	(2)	(3)	(3)	(4)	(4)
		WTW		WTW		WTW		WTW
HHIncome	-0.065*** (0.024)		-0.025 (0.024)		-0.129*** (0.039)		-0.075* (0.045)	
SickHH	0.031** (0.162)				0.055** (0.023)			
AfflictedHH	0.037 (0.040)				0.083 (0.059)			
lAssetValue			0.002 (0.003)				0.003 (0.005)	
Expenditure		-1.189 (2.418)		-5.897** (2.645)		-2.346 (2.916)		3.595 (8.872)
lWage		-6.607*** (1.356)		-4.675*** (1.348)		-7.184*** (1.487)		-4.568** (2.097)
Age		-0.123*** (0.0396)		-0.103* (0.0599)		-0.114** (0.0448)		-0.122** (0.0594)
Partner		-2.511 (2.264)		3.351 (2.309)		-3.450 (2.143)		1.874 (2.472)
Parent		3.402*** (0.774)		2.588** (1.101)		3.416*** (0.872)		0.832 (1.722)
HighEdu		1.870** (0.789)		0.624 (1.252)		1.929** (0.840)		1.824 (1.198)
Employed		10.91*** (3.909)		11.84** (5.608)		11.83*** (4.006)		13.53** (5.926)
LeisureQuality		-0.00178 (0.00209)		-2.87e-05 (0.00389)		-0.00187 (0.00229)		0.000183 (0.00215)
Constant		59.15*** (11.28)		57.83*** (14.01)		64.46*** (12.34)		34.53 (33.16)
Observations	912	912	637	637	912	912	637	637
Sargan-Hansen	0,1		0,785		0,065		0,154	
Model	EC2SLS	EC2SLS	EC2SLS	EC2SLS	2SLS	2SLS	2SLS	2SLS

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5 Regression results for female subsample

VARIABLES	(1)	(1)	(2)	(2)	(3)	(3)	(4)	(4)
		WTW		WTW		WTW		WTW
HHIncome	-0.109*** (0.030)		-0.117*** (0.045)		-0.287*** (0.064)		-0.192* (0.104)	
SickHH	0.024* (0.014)				0.015 (0.021)			
AfflictedHH	0.058 (0.036)				0.122** (0.059)			
lAssetValue			-0.006** (0.003)				-0.011 (0.007)	
Expenditure		-2.097 (2.558)		-1.952 (1.389)		-2.868 (2.331)		-3.168 (3.872)
lWage		-4.643*** (1.177)		-1.195 (1.089)		-3.962*** (1.336)		-1.130 (1.272)
Age		-0.100** (0.0400)		-0.181*** (0.0631)		-0.0859** (0.0410)		-0.142* (0.0842)
Partner		-4.548*** (1.552)		-3.268* (1.730)		-3.724** (1.805)		-4.376** (2.165)
Parent		-0.808 (0.864)		-1.482 (1.077)		-0.178 (0.909)		0.488 (1.808)
HighEdu		4.545*** (0.784)		2.748** (1.304)		4.460*** (0.833)		3.727*** (1.242)
Employed		4.501* (2.447)		3.921 (2.943)		7.722** (3.137)		11.18*** (2.294)
LeisureQuality		0.0510 (0.310)		0.243 (0.226)		0.0672 (0.281)		0.0739 (0.323)
Constant		52.84*** (9.646)		40.64*** (8.654)		47.22*** (10.50)		35.08*** (10.56)
Observations	780	780	351	351	780	780	351	351
Sargan-Hansen	0,86		0,06		0,291		0,784	
Model	EC2SLS	EC2SLS	EC2SLS	EC2SLS	2SLS	2SLS	2SLS	2SLS

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Starting with the income of other household members, which has differing results. For the male subsample, the effect is only significant for model 1, 3 and 4. For women, the results differ in several ways. First of all, the significance is consistent across all models. Additionally, the coefficients are consistently higher than the male counterpart. Both subsamples show negative coefficients, which is in line with the general regressions and the expectations.

The health related expense shocks for men were only significant regarding the number of sick days. In both models the significance was at 5%. For the long term affliction, the results were not significant. For women, no consistent significance was found at all. Sick days only have a

significant effect at 10% in model 1, while long term afflictions are significant at 5% in model 3. Due to the fact that model 3 of table 5 is the only insignificant result for “SickHH”, effect can be accepted. Doubt can be cast on the expectations regarding long term afflictions. Regarding long term affliction, the results are insignificant in the vast majority of the regressions. Again, hinting at the fact that the Dutch welfare state dampens the expenses. This might also be an explanation for the lack of significance for this variable in general.

Regarding the asset value of an individual, the male regression again shows significance. The direction of the coefficient is consistent with the general regression. Only for the female subsample, there is significance in model 2. However, the Sargan-Hansen coefficient shows a close to significant result. Meaning that the relevance of this measure can be definitively rejected.

To be able to accept or reject the hypotheses the variable of expenditure is again important. The results for the male subsample does not differ from the general regression results. There is no consistent significance. Only model 2 in table 4 is significant at the 5% level. But this is not convincing enough to accept  $H_1$ , and  $H_2$ . The same holds true for the female subsample, where no significance is found.  $H_1$  and  $H_2$  are therefore not accepted on the basis of the regression results. A possible reason for the lack of significance is once again the dampening of expenses by the welfare state.

A noteworthy difference occurs in with wages. Where the male subsample is consistently significant with fairly substantial coefficients. This is substantial compared to the female counterpart. Which is again consistently significant, but with lower coefficients. The expectations were different. Following on chapter 2.10, women were theorized to respond stronger to financial incentives. This does not hold true according to the empirical findings of this paper. One reason might be the existing difference in working hours. Table 3 showed us that men worked significantly more hours than women. The large difference in coefficients is therefore partially explained by the relative size compared to the number of working hours. As 6 hours is relatively more for women than it is for men. In addition, the income effect is based on personal preferences. If an individual already works a lot, the marginal benefits of leisure are large. The income effect would then be larger for the male subsample. The results of the regressions reject  $H_3$ .

Age is consistently significant across all four models. This holds true for both the male and the female subsample. The effect is negative, which is in line with the results of the general regression.

The inconsistent significance of the family composition in table 3 is explained in tables 4 and 5. Having a partner is not significant at all for the male subsample. The coefficients are not consistent across the models. For the female subsample, this is not the case. The effect is consistently significant in all four models. The effect is negative, meaning that women with a partner will work less. The coefficient indicates the exact number of hours that is reduced. This means that women will work less if they find a partner, while the men do not change their working hours. This difference between both subsamples explains the inconsistency in table 3.

Being a parent was not consistently significant in table 3. For the male subsample in table 4, results are consistently significant. When a man becomes a father, he will work more. The coefficient indicates the number of hours. For women the same consistency is not true. The coefficients of being a parent and having a partner show a diverting effect. This would further increase the gender labor gap.

Being highly educated is significant in model 1 and 3 for the male subsample. The direction of the effect is positive, which is to be expected. But it is difficult to accept the significance of the effect without caution. For the female subsample the effect is clearly significant. In all models, the coefficient is relatively large and significant at 1%. Except model 2, which is significant at 5%. This shows that highly educated women are willing to work significantly more than lower educated women. Both the direction of the effect and the significance of the effect are in line with the earlier results in table 3. Again, the expectations were different. But the results were explicable, as the role of uncertainty was overestimated.

Being employed shows the similar effects in tables 3,4 and 5. The results are consistent and significant. Although it must be noted, that the coefficients for the male subsample are larger than those of the female subsample.

The quality of leisure is not significant in any model, with the exception of model 2 in table 5. The role of the quality of leisure has therefore been overestimated in the theoretical framework, as no significant effect has been shown in the regressions.

## 5. Analysis

In the intensive labor margin, two sides determine the outcome. As presented in the theoretical framework, these sides are the marginal benefits of labor and the marginal benefits of leisure. The point where the marginal benefits of leisure exceed those of labor, is the point where the working hours will no longer increase. It is therefore unexpected that quality of leisure is not significant on any relevant scale. The results show that the social aspects are very relevant, rather than the economical. It is to be expected that the expense shock drive the expenses of a household. But this does then not translate through to the intensive labor margin of an individual. In short, the income balance does in fact change as a result of exogenous shocks. But this has then no significant effect on an individuals' choices, which is remarkable. Other, more personal factors play an important role. To readdress a point that was made in the introduction, the findings of Mottaleb et al. (2015) are not generally applicable. Their findings indicates the significant role of expenses in the intensive labor margin. But their case was a natural disaster, which makes it not generally applicable. The findings of this thesis disprove the pronounced role of exogenous expense shocks on the intensive labor margin of an individual.

One noteworthy finding is the lack of significance regarding asset depreciation. The significance of expense shocks was concentrated on the actual expenses. The depreciation is not an expense, but rather a charge (Brouwers & Koetzier, 2018). The charge and the lost income did not provide a significant effect on the expenses, let alone the intensive labor margin. Yum (2018) also found that labor participation was irresponsive to wealth shocks. As he found the correlation coefficients to be close to zero, or minimally positive. Correlation is increased when government transfers or capital taxations are increased. Yum (2018) describes that this would then increase the aggregate elasticity. This concurs with the findings of this thesis, where the intensive labor margin was irresponsive to wealth shocks. Although this is not necessarily as expected, as the Dutch welfare state does have government transfers and capital taxation. A possible explanation might be that the current welfare state has been in place for a longer period of time. Yum (2018) describes the role of an increase in transfers and taxes, in relation to a previous situation. This is not necessarily the case in the Netherlands. When a system has been in place for a longer period of time, people will accept it as the status-quo (Lee & Joshi, 2017). This can eventually lead to a new status-quo bias, where the new status-quo is characterized by higher transfers and taxes. With this new status-quo, the elasticity between wealth and labor participation would be reduced. This would offer a logical explanation for the irresponsiveness

of wealth shocks on the intensive labor margin. The causal mechanism provided by Swanson (2012) can still hold true. As Swanson (2012) mentioned uncertainty as a key concept, which would lead to a change in labor participation. This aspect differs from the approach chosen for this thesis.

It is expected that wage is an important variable, as the large body of literature behind Boeri and van Ours (2013) shows strong empirical evidence. But the same does not hold true for a more indirect measure, such as expenses. This casts doubt on the theory formulated by Meadows (2008), regarding the effectiveness of indirect parameters. Although another regression with a more sensitive expenditure variable might yield different results, Meadows' (2008) theory needs to be nuanced. A less direct change might indeed cause a more systematic change. But the indirect nature of the parameter might also negate the actual effect of the parameter.

The statement made in chapter 2.10, regarding the sensitivity to financial incentives has also proven to be false. Men respond more to changes in hourly wage than women. The expectations derived from Bosch en Jongen (2013) and Meyer (2002) were therefore incorrect. This leads to an interesting topic of discussion. Which is the role of wage as a policy instrument. The instrument of wage would indeed reduce the gender labor gap, as men will reduce their working hours more than women. But on the other hand, this stimulates part time work, which is not the goal of the Dutch minister.

Regarding the more social elements, Blundell, Bozio and Laroque (2013) were correct. The family composition has proven to be an important component. But rather than family composition working similarly for all individuals, gender makes a difference. Women do indeed work significantly less than men. However, the composition of a household plays a large role in the intensive labor margin of both genders. If a woman finds a partner, she will work less. If the couple gives birth to a child, the man will work more. This traditional phenomenon was questioned in the theoretical framework, but still holds true. The reasons have their foundation in paternalism and more abstract psychological needs that exceed the scope of this thesis, but Maslow (1981) would provide an explanation for this. Preferences differ per individual and it has become evident that women will stay home, while men tend to provide for the household. The findings of this thesis are in line with the findings of Blundell, Bozio and Laroque (2013).

In addition to the family composition that has proven to be crucial in understanding the role of gender, education is also important. As was predicted in the theoretical framework, highly

educated women are willing to work significantly more than lower educated women. This would then lead to an interesting topic of discussion. The Dutch minister mentioned that highly educated women are not willing to work full time, as mentioned in the introduction. However, since education does cause a significant increase in the willingness to work, this has to be readdressed. This thesis therefore connects to existing literature by confirming the findings of Blundell, Bozio and Laroque (2013). This would however open up possibilities for new policy instruments. As the current institutional setting in the Netherlands targets benefits on a household level. The relative costs of living will be lower for a couple than for a single individual. For example, rent can be shared as well as general groceries. This would also offer an explanation for the reduction in working hours, if a woman has a partner. As the need and therefore marginal benefits, for income are lower. This statement would however require additional research.

The results of this thesis have evidently presented an economic pitfall. As presented by McDowell et al. (2012), the phenomenon of the “homo economicus” assumes a perfectly rational individual. This leads to incorrect expectations when using a purely economical approach. The unexpected results are then still explicable using economic theory, but the importance of psychological theory is clear. The lack of significance regarding the expenses is unexpected from an economical point of view. However, using the approach by Maslow (1981) it can still be rational. Family has proven to be an important component, which is a higher abstract need posed by Maslow (1981).

## 6. Conclusion

Before this thesis can be concluded and the discussion will occur, the research question must be answered. To repeat this question from the introduction:

To what extent do unexpected exogenous expense shocks influence the intensive labor margin of an individual, and to what extent do the results differ between genders?

An explicit answer follows from the analysis. First of all, exogenous expense shocks do not significantly influence the intensive labor margin of an individual. The results were consistently insignificant, for both health and wealth shocks. The shocks do show significance regarding expenditure, but this does not translate through to the working hours. The second part regarding gender is more complicated to answer. Women currently work less than their male counterparts. Meanwhile, several social and psychological aspects influence the number of hours women are willing to work. Whether or not they have a partner is an important factor, in addition to the education level of the individual. These are the most substantial explanatory elements resulting from this thesis. The influencing factors are more social and psychological in nature than they are economical. Furthermore, the role of expenses has become evident. Expenses do not significantly influence the intensive labor margin of an individual. The welfare state dampens the expenses, which makes it difficult to attribute a change in working hours to expense shocks. There might still be significance if a more sensitive variable is chosen, but it is clear that the effect is not as pronounced.

The main takeaway is that individuals make their choices regarding the intensive labor margin in an economically irrational way. Individuals were assumed to be perfectly rational, but the empirics show that this assumption is false. The psychological theories from Maslow (1981) for example, are an important addition to the economic rationale. As the results are still rational from that point of view.

## 7. Discussion

This chapter will build on the conclusions of this thesis. First of all, the potential shortcomings of this thesis will be. After this, policy implications will be made explicit. Not only can the statements by the Dutch minister of economics affairs be readdressed, but also more concrete policy implications can be formulated. Additionally, this thesis has opened up more potential topics for research. These will be presented.

### 7.1. Shortcomings of this research

A potential shortcoming of this thesis regards the measurement of the expenses. As discussed in chapter 4.3, the variable of choice is insensitive. This means that the effects of expense shocks in this thesis were insignificant. However, future research including a more sensitive variable might yield different results. The existence of an effect could be theoretically described, meaning that future research could choose to include a logarithm of the total expenses. Data collection would in this case be difficult however.

In addition, the dataset provided by the LISS-panel proved to be enough. A more extensive dataset, with a larger number of observations might prove beneficial in the future. It is more difficult to find significant effects with a smaller sample size. The sample size of this thesis was still sufficient, but a larger sample might be beneficial in the future. Additionally, the aforementioned role of couples could not be examined in this thesis. The dataset was not large enough to create substantial subsamples.

A final point lies in the choice of instruments. As discussed, both instrument types have advantages and disadvantages. The health related expense shocks can have long term effects that need to be taken into account. But additionally, the welfare state dampens the effect. This makes it very difficult to measure effects. This thesis found that health shocks do in fact significantly affect the household expenses, but this does not translate through to the working hours of an individual. Regarding wealth related expense shocks, the irresponsiveness of working hours makes this a weak instrument.

### 7.2. Policy implications

As mentioned in the introduction of this thesis, the Dutch minister of economic affairs aims to increase full time labor participation. Women generally work less, leading the minister to state

that this prevents highly educated women from being productive. However, as became evident from the empirical findings of this thesis, the statements from the minister need nuancing.

It is indeed true that women work less, but the problem is not solved by simply increasing wages. The difference is mainly caused by social factors. The gap increases both when people get married and when they have children. Additionally, both men and women respond to financial incentives. In fact, the empirical findings of this paper that the reaction of men is stronger. The findings of Bosch & Jongen (2013) discuss that single mothers are the most sensitive subsample. However, in general men respond stronger to an income increase than women as became evident in the results of this thesis. Additionally, the income effect has shown to be dominant in this thesis. Therefore, an increase in wage will lead to a reduction in working hours. Men will reduce more than women, which will help with the gender gap. But full time work participation is not stimulated this way.

The second note regards the statement about highly educated women. The empirical evidence of this thesis presented proof that highly educated women do work more than other lower educated women. The policy implications of this thesis are therefore not aimed at changing policy, but rather at the design of policy. Knowledge about the way men and women respond to influences is lacking at the ministerial level. By designing policy in a non-targeted way, the gender gap will not decrease. The findings of this thesis show that men and women respond differently to financial and social inputs, leading to differences in outcomes. Men and women are two heterogeneous groups that require targeted policy. As untargeted or general policy will not affect both groups in the same way. As mentioned in chapter 5, tax benefits are currently aimed at a household level in the Netherlands. Couples have a relatively lower cost of living than singles, as some costs can be shared. If the subsidies for rent are reduced, this advantage is mitigated. Previously women started to work less, when they found a partner. By reducing tax benefits for couples, the reduction of working hours might be mitigated. This is however speculative, but it is an example of targeted but non discriminatory policy. As men and women cannot receive unequal treatment. Policy must therefore play into existing causal mechanisms. This specific proposal would however require more research.

The introduction suggested the possibility of several expense related instruments. By reducing the expense dampening welfare state, working hours were expected to increase. The effectiveness of such an instrument can be questioned on the basis of this thesis. As the hypotheses regarding the effects of exogenous expense shocks were both rejected.

Finally, the relevance of stimulating full time work is questionable. Garnero, Kampelmann and Rycx (2014) showed that the labor productivity is higher for part time workers. Additionally, Boeri and van Ours (2013, p.128-133) explain that the reservation wage of individuals will increase when part time work becomes impossible. Less people will choose to enter the labor market as a result. Bosch and Jongen (2013) add to this by stating that a rigid labor market in general will prevent people from entering. Discouraging part time work is a complex issue and it is theoretically not beneficial for labor participation. It is therefore not necessarily beneficial to invest time into designing policy to discourage part time work. One upside of full time work from a government perspective, is the overall increase of income. This would then lead to more tax revenue. But from a business perspective, part time work is preferable.

### 7.3. Suggestions for further research

Further research can focus more on the social aspects. Exact parameters regarding family composition can provide new policy instruments. For example, the role of households can be examined following on chapter 5. As mentioned, the relative costs of living are lower for couples. The reasons exceed the scope of this thesis, but would allow for more specific research. But this thesis does find evidence that women will work less, when they start living together with a partner. By mitigating the relative cost reduction of couples, the hours reduction of women could be minimized. Potentially, the effects of exogenous expense shocks might differ between single individuals and couples. For this thesis, there was not a sufficient amount of data to make regressions, while taking both gender and couples into account. But future research might benefit from doing so. This is an example of targeted policy, without treating men and women differently. This is therefore an interesting topic to examine further. As the social mechanisms that drive the gender gap in labor participation, require new targeted policy.

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