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Contents

List of Figures

List of Tables

1 Introduction

The labor market, especially the field of unemployment, is is an area of special interest of social policy in Austria. Analyzing the expenditures which flew into unemployment, unemployment does not seem to be a very big topic. The budget allocated to unemployment only accounted to 4.7 percent in 1990 and similarly 5.8 percent in 2005[1].[2] In the public eye and due to media coverage, anything related to unemployment is perceived to be an important social issue. The majority of the population, the labor force, is exposed to the risk of unemployment. The share of accounted labor force was 71.3 percent in 2004, 72.4 percent in 2005 and 73.7 percent in 2006 according to the labor force concept.[3] In politics the issue of unemployment is a popular focus of election campaigns, as it is an easy target to emotionalize the voter. The negative effects of unemployment have been widely analyzed. Not only psychological and social aspects like resignation, despair and being viewed as lazy or incompetent[4] play an important role. But also economic consequences such as loss of income and consumption, recurrent unemployment, lower re-employment wages and destruction of human capital inflict the society. Dynarski and Sheffrin (1987) found that "unemployment is associated with significant decreases in consumption."[5] Experiencing unemployment leads to a decrease in domestic food expenditure, which is used as a proxy for permanent consumption. It reduces expenditures by about 8 Dollars per week for white collar workers and by about 2 Dollar per week for blue collar workers. The difference between blue and white collar workers stems from the tendency of white collar workers to have less, but longer unemployment spells. On top of that, even insecurity about one's job decreases consumption, no matter whether it is felt subjectively or measured objectively using individual and job characteristics.[6]

Current labor income is cut off by unemployment spells, but also re-employment wages

[1] Statistik Austria (2008), p. 219.
[2] See Figure A.1 and Table B.1 in the appendix for more details on social expenditures.
[3] Statistik Austria (2008), p. 199.
[4] cf. Jahoda, Lazarsfeld, and Zeisel (2004); Warr (1987).
[5] Dynarski and Sheffrin (1987), p. 123.
[6] cf. Benito (2006).

are negatively correlated with unemployment. Using data on British men over the period from 1991-1997, Arulampalam (2001) estimated a wage penalty of about 5.7% in the first re-employed year, which increases to about 13.5% in the following three years. The penalty is largest for the first employment interruption, 21.5%, but subsequent experience of unemployment also contributes a penalty. This can be explained by a couple of reasons, including employers using information of foregone unemployment as an indicator for the employees productivity. To some extent this is right, since unemployment causes losses in general human capital, as well as, in industry, occupation and firm specific human capital.

Böheim and Taylor (2002) investigated whether unemployed individuals find stable and sustained jobs by using an independent competing risk framework. Their empirical findings suggest that "individuals who enter a job from unemployment are [...] more likely to (re)enter unemployment than those entering from another job"[7], but this effect is declining with respect to the unemployment duration. Better job matches of those, who have longer unemployment spells and a longer searching duration, might explain this effect.

A further negative consequence of unemployment is poverty. 34 percent of unemployed people are at-risk-of-poverty[8]. 14 percent of short-term unemployed people (less than 6 months) are considered to be at-risk-of-poverty, compared to 51 percent of long-term unemployed people (more than 12 months) are at-risk-of-poverty. Long-term unemployed people without the social transfers have an even higher risk of 81 percent. A large fraction of unemployed people is affected by poverty and the poverty gap[9] for this risk group is relatively large with 23 percent for short-term and 28 percent for long-term unemployed.[10]

None of the above described consequences of unemployment are favorable for a society. One could further investigate whether different population subgroups are more prone to those consequences or whether a particular subgroup, due to an increased probability of becoming unemployed, has to face them disproportionately.

There are "disadvantages" to enter the labor market for women because of domestic responsibilities and childbearing. Hotchkiss (2006) found significantly negative effects

[7] Böheim and Taylor (2002), p. 733.

[8] People whose equivalized household income is below the at-risk-of-poverty threshold, which is 60 percent of the median income are at risk of poverty.

[9] The poverty gap is defined as the average deviation of the risk groups median equalised income from the at-risk-of-poverty threshold in percent of the threshold. Thus it is a measure of the intensity of poverty.

[10] cf. Statistik Austria (2007)*a*.

of the number of children and being married on women's probability to enter the labor force. But after the women's decision to enter the labor market there is clear evidence that women are discriminated at the active side or employment side of the labor market. There exists a large amount of literature concerning sex-wage differentials. Commonly reporting discrimination against women. Weichselbaumer and Winter-Ebmer (2005) reviewed 263 articles, which empirically analyzed the sex wage gap all over the world. The mean total wage gap in these articles accounted for about 33% and the mean unexplained wage gap accounted for about 20%. The unexplained wage gap is commonly interpreted as being the result of discrimination. This view has been criticized, because at least parts of the unexplained wage gap can be accounted to productivity differences observed by the employer but not by the researcher. From the 1960s to the 1990s the mean total wage gap decreased significantly from about 65% to about 30% (0.8% per year), whereas the mean unexplained wage gap only declined from 23% to 19%. Hence the narrowing of the wage gap is almost entirely due to the better endowments of women over time. A similar picture is drawn for the Austrian labor market by Böheim, Hofer, and Zulehner (2007). They found that the mean wage gap accounted for 23.3% in 1997 and 25.5% in 1983. 61% (67%) of this gap were unexplained in 1997 (1983), when using the male wage as reference.
As already mentioned, one part of women's discrimination arises from occupational (e.g. only 30 percent of Austrian managers are female[11]) and industrial segregation. With respect to the latter, construction and transportation are usually male dominated whereas education, health and social services, and hotels and restaurants are mainly female dominated. The observed segregation can be partly explained by self-selection, but especially the phenomenon of such a small percentage of female managers seems to be the result of a glass ceiling effect. A glass ceiling is an "unseen, yet unbreachable barrier that keeps minorities and women from rising to the upper rungs of the corporate ladder, regardless of their qualifications or achievements"[12]. Weichselbaumer (2004) found that occupational segregation is partly the result of discrimination.

The purpose of this work is to investigate whether there is also evidence for discrimination on the passive or the unemployment side of the labor market. In more detail the aim is to investigate whether men and women face different probabilities of being unemployed after controlling for individual and job characteristics and therefore whether

[11]cf. European Commission (2007).
[12]Federal Glass Ceiling Commission (1995), p. 4.

women are more likely to be affected by the consequences of unemployment. A higher probability for women being unemployed can then result differences in labor income as well.
Azmat, Guell, and Manning (2006) analyzed several OECD countries (including Austria) with respect to the corresponding sex gaps in unemployment rates. The authors estimated the probability of being unemployed for each country using a probit model and they found a significantly positive effect of being female. The effect in magnitude is about 0.5 percentage points, after controlling for age, education, martial status and number of children. The study neglected to control for industry and occupation effect, nor occupational position. Since there is a strong segregation in industries, as well as occupations, and occupational positions, and because the categories of these control variables differ in their unemployment rates, it would be useful to control for them. This controlling can certainly mask a glass ceiling effect, which in fact is discrimination, but I am not primarily interested in estimating such an effect, but in estimating whether women are facing higher probabilities given the same characteristics as men.

The rest of this study is organized in 3 chapters. The next chapter provides an overview of theories why women could have higher probabilities or higher unemployment rates compared to men and gives information on unemployment in Austria. The thirds chapter introduces the data source for the estimations, the Austrian Labor Force Survey. The estimation techniques, linear probability model, probit model and logit model, are presented in the same chapter. My goal is to estimate the effect of being female on the unemployment risk given the same characteristics as a male correspondent. In order to check wether the estimated models hold for both, men and women, I run a Chow Breakpoint test and add interaction terms to the regression. Both the Breakpoint test and the interaction terms indicate different models for men and women. Therefore I also estimate sex separated regressions. As the last point of the empirical analysis I decompose the female-male-risk-differential into an explained and an unexplained part. In contrast to the regressions this method allows a different distribution of characteristics for men and women and decomposes the risk-differential in differences due to characteristics and differences due to different risk returns for men and women. Finally in the last chapter I draw my conclusion from the findings in chapter 3.

2 Theoretical Background

This chapter provides an overview of theories aiming to explain why women might have higher probabilities of being unemployed than men. In addition a detailed description of unemployment in Austria is given. It gives a brief introduction to demand and supply sided theories about sex differentials in unemployment and discusses the different concepts of unemployment used in Austria, as well as, the Austrian labor market policy.

2.1 Literature Review

There is a large amount of literature on the gender wage gap and the gap in employment. Although it is evident, that the female-male unemployment differential is quiet large in many countries[1], little research is dedicated to the sex related differences in the unemployment probability (unemployment rates respectively). Few theories attempt to explain the observed sex differences. Those theories can be categorized into 5 different approaches: supply sided approaches, demand sided approaches, institutional approaches, discrimination approaches and methodological approaches. These five categories are not exclusive. The impact of labor market institutions, for example, covers both the demand and the supply side, since institutions influence labor supply, as well as, labor demand. Discrimination usually occurs on the demand side. One can think of discrimination by female or male employees against counter-sexual employers job offers, or refusals related to the sex distribution within a specific firm. The literature regarding supply sided discrimination is quite scarce and therefore not discussed here. Methodological approaches are strongly related to supply sided arguments. Even supply and demand sided approaches are not clearly cut. In general, many arguments are interchangeable between supply and demand sided approaches.
The main supply side argument is that the labor supply of women, especially the elasticity of labor supply, differs from the men's labor supply. Niemi (1974), analyzing U.S data mainly of the 1960s, argues that women are more immobile regarding intra-labor

[1] cf. Azmat, Guell, and Manning (2006).

force flows, i.e. geographical, occupational or industrial moves, than men. This is caused by the shorter working life of women. Geographical or occupational moves are costly and the rational decision maker does move if, and only if, the expected gain of the move is at least as high as its costs. The duration of female labor market participation is not only shorter, but also more often interrupted than the male participation. Thus the gain period of a move for women is shorter, leading to less mobility among women compared to men. This higher immobility cuts down job opportunities of women by lowering their flexibility to react to regional or occupational labor market conditions. Therefore unemployment among women increases . On the contrary, women have a higher inter-labor force[2] mobility, which leads to frictional unemployment for women. For intra-labor force flows there is a possibility to switch directly from one job into another without any spell of unemployment. But a period of job searching is typical for inter-labor force flows. Since women tend to have more frequent inter-flows than men, there is more frictional unemployment with respect to these flows among women. A more recent Study by Hakim (1996) found that the argument of the higher occupational mobility of men does not hold in Great Britain in the 1970s. But Hakim confirms Niemis results concerning the more frequent inter-flows of women.

These higher labor market entry and exit rates are partly the results of women's higher labor supply elasticity. The higher elasticity of labor supply leads to stronger reactions of the female labor supply to labor market related changes. For instance, the prospect of landing a high-paying job, has a bigger influence on the labor market entry decision of women as it has on the men's decision. Or in the other direction, decreasing wages increase the exit rates of women, while it has little effect on the exit rates of men. This is the link to methodological arguments. By applying different techniques and methodologies to distinguish employed, unemployed and economically inactive people, i.e. by applying different concepts of unemployment, the female unemployment rate changes. The labor force concept[3], for example, considers home-makers - usually women - to be out-of-labor force, if they are not searching for a job, whereas they are classified as unemployed, if they are looking for work. Again assuming that wages increase, then women, due to their higher elasticity of labor supply, suddenly start looking for a job, which changes their classification from economically inactive to unemployed and the female unemployment starts to increase. But not only willingness of women to accept a job changes, also does labor demand. Due to the increase in wages, labor

[2]Flows between out-of-labor force and in-labor force.
[3]Cf. Section 2.2.1.

demand decreases and it becomes harder to find a vacancy. Consequently, these now job seekers will not find a job and will stay unemployed. Applying a benefits orientated concept of unemployment in this situation may increase the overall unemployment rate because of the declining labor demand, but does not affect women and men differently.[4] Johnson (1983) suggested to adjust the definition and methodology of calculating unemployment rates. She considered the predominantly female - especially married female - home-maker to be a market occupation. In other words, she considered home-makers to be employed. Johnston used the US Current Population survey, which applies the labor force concept. She found that while from 1968 to 1979 the actual female unemployment rate was above the male rate, when looking at the revised rate, which classifies home-work as employment, the opposite is true. In 1975 the actual female rate was 8.0 percent, compared to the male rate which was 6.7 percent, but the revised female rate of 4.3 percent was even below the male rate. In 1979 the revised female rate of 3.1 percent was again below the actual female rate (5.7 percent) and the male rate (4.1 percent).
The arguments on the demand side are strongly related to labor market institutions, especially in Europe. But let's start by an economy that lacks to absorb new entrants. This was investigated by Myatt and Murrell (1990). They investigated the effect of bottlenecks in the capacity of an economy to take in new labor market entrants on the Canadian male/female unemployment rate differential. If the initial labor force of any country is almost purely male and the economy has a lack of ability to absorb new entrants - women[5] -, that new group will have a higher unemployment rate, even if it has the same skills and preferences as the initial group. This is simply because the new entrants automatically are unemployed. Suppose an economy with 10 male and 1 female workers and 100 male and 100 female economically inactive people. Assuming that both, men and women, increase their labor force participation by 1 percentage point, then the new economy consists of 11 male and 2 female workers. Since the economy can not absorb any new entrant[6], both entrants are unemployed. Hence the male unemployment rate is 10 percent, but female rate is 50 percent. While Myatt's and Murrell's (1990) empirical results suggest that the bottleneck effect can only explain a small part of the differential, they found that it is highly affected by minimum wages. Minimum wages contributed 3 percent on average to the unemployment rate differential.

[4] As long as we assume a wage increase that is not limited to certain industries or occupation, which may be correlated with sex and therefore affects men and women in different ways.
[5] Most of the male working age part of the population is already employed.
[6] A temporary 0-labor demand and labor contracts fixing the wages for a certain time are assumed, such that adjustments of labor prices, labor supply and labor demand can be neglected.

And further, "if it were not the impact of minimum wages mature females would have had an unemployment rate 1.5 percentage point *below* that of men."[7] Similar conclusion were drawn by Acemoglu (2002), who analyzed why wage inequality in the U.S. increased over the 1980s, whereas in Europe there was almost no change. He developed a simple model to explain this different behavior by differences in the relative demand for skills. He concluded that, due to the minimum wage laws in Europe, technological shocks raising investment costs of firms increase the unemployment of unskilled workers, as long as, firms open separate vacancies for skilled and unskilled jobs. Assuming that a new technology can be adapted with skilled workers without training them, but the adoption with low skilled worker is associated with training costs, then adopting the new technology with the low skilled worker would decrease her marginal product, i.e. her wage. Due to minimum wage laws, the wage of many low skilled workers is prevented to decrease and thus the new technology is adopted with the high skilled worker only. This of course leads to higher unemployment among low skilled workers. Assuming women being more unskilled compared to men, technological shocks increasing the unemployment rate of unskilled workers relative to skilled workers, indirectly raise the female rate to a higher extent. Bertola, Blau and Kahn (2002) researched the impact of collective bargaining and coordination of wage-setting on different age and sex groups using data of 17 OECD countries from 1960 to 1996. Their theoretical model suggested that the impact of these labor market institutions on the labor market outcome is different for groups with different labor supply elasticities and different labor demand elasticities. "Unions-or, more generally, policies and institutions aimed at improving workers' welfare - raise the relative pay (and lower the relative employment) of groups with more elastic labour supply schedules."[8] These groups are younger and elderly people, as well as, women. In contrast to market insiders[9], these outsider groups are more likely to make decisions between employment and school, employment and retirement, and home production and market work. A less elastic labor demand leads to a higher wage mark up - bargained by unions - and to a lower union employment relative to non-union employment. The more wage-setting is centralized and the greater the unions coverage, the greater the impact on (un-)employment is. The extreme case of a totally unionized economy with a centralized bargaining process yields a relatively high wage compression and a relatively lower employment for groups with less inelastic labor supply. Due to the fact that almost all jobs are covered by the union, individuals,

[7] Myatt and Murrell (1990), p. 318.
[8] Bertola, Blau, and Kahn (2002), p. 9.
[9] Prime age men.

who lose their jobs will not be able to find a non-union alternative. Thus in such an environment the model predicts higher unemployment for outsiders. While the authors did not find a significant impact of union wage-setting institutions on the male-female employment differentials,a significant effect on the male-female unemployment differential was found. The impact of union wage-setting institutions lower the unemployment rate of men by 4.4 to 6.2 percentage points relative to the female rate. "The results are consistent with women being drawn into labour force by the prospect of landing a high-paying union job in countries where strong wage centralization tends to price them out of work."[10]

A well known fact is that additional education lowers unemployment. Mincer found, that "unemployment gets smaller as the level of education in the group increases."[11] According to the human capital theory one makes decisions about human capital investments, especially educational investment, with respect to future income streams. If the marginal cost of a one unit increase in schooling exceeds the marginal gain in future income, a rational individual will choose to work over education. Vice versa if the gain of schooling exceeds the expected income gain, then the rational individual will choose additional education over working. Clearly, the present value of future income depends on the duration of active work cycles. The work duration of women is usually shorter than that of males due to baby pauses and household responsibilities. This again leads to a lower expected income and less investment in human capital, consequently to higher unemployment. Little evidence shows that females investment into formal education is that for their male counterparts, but firms invest more into male on-the-job training. The reason can be found in the shorter and more interrupted work life of women. Firms expect the gain period of investing in men to be longer than the female gain period. The more specific the training is, the less women are likely to attend this training. If women receive less on-the-job trainings, the unemployment rate of women should be more cyclical than the mens rate, because due to the investment firing a man is associated with higher costs. Women could anticipate this behavior of firms and concentrate in cyclical and seasonal insensitive industries and occupations such as education, finance and public administration. And that is where we usually find women, especially in education.

So far all of these theories suggested that it is some kind of decision made by women themselves or other economic forces that cause sex differentials in unemployment. The following considerations will turn to discrimination. There are different ways through

[10] Bertola, Blau, and Kahn (2002), p. 29.
[11] Mincer (1991), p. 4.

which discrimination can be channeled. An employer can discriminate by taste and refuse to hire women or tend to fire women who have already been employed in this firm. This is consistent with Beckers (1975) taste-based discrimination, which assumes that discrimination is some distaste of the employer. Discriminatory actions in this frame work must be related to costs such as the employees productivity traits. In the unemployment context this means firing and hiring must be associated with costs covered by the employer, and this in fact is true. For example, a firm's searching time for an adequate employee may take longer, if the firm refuses to hire women. Another way of discrimination is statistical discrimination (Phelps [1972] and Arrow [1973]). From the employer's perspective, hiring an employee is a situation of imperfect information. Many productivity related characteristics are unknown to the employer, thus the hiring decision is based on expectations about the groups average characteristics. Weichselbaumer (2004) conducted a field experiment in Austria to investigate whether sex discrimination in the hiring process for typically male (network-technician and computer programmer) and female occupations (accountant and secretary) has its sources in statistical discrimination or in taste-based discrimination. Job applications were sent out by a fictive man signalizing typically male attributes and personality characteristics, by a fictive woman signalizing typically female attributes and personality characteristics and by a second fictive women with male personality attributes. Even after controlling for personality, Weichselbaumer found discrimination in the hiring process in favor of men when the occupation is typically male and in favor of women when the occupation is typically female.

2.2 Unemployment in Austria

"Unemployment is a clear theoretical concept, but it cannot be translated easily into a measurable concept."[12] The main question that arises is when to call somebody unemployed. Can a person be unemployed, even if she works but on a non-regular basis? What about part-time workers preferring a full-time job, but not getting one? They are indeed rationed at the labor market, but are they unemployed? The distinction between out-of-labor force and being economically active is not that clear, since this decision can depend on labor market conditions or the employment status of a person respectively. Are discouraged workers[13] unemployed or out-of-labor force?

[12] Rosner (2003), p. 201.

[13] A working age person who gives up looking for work because of no success

The first part of this section overviews which concepts of unemployment are used in Austria. The purpose is to highlight some of their advantages, drawbacks and to describe the resulting unemployment rates arising from these concepts. The second part describes the entitlement to benefits, labor market policy and institutions in Austria.

2.2.1 The Unemployment Rate

The simplest unemployment measure is the rate of unemployment (u). It is defined as the ratio of unemployed people (U) to labor force (L)

$$u = \frac{U}{L}$$

and therefore depends on who is counted in each group. Thus, one has to be careful in interpreting and comparing unemployment by accounting for differences in counting methods.

In Austria there are three main definitions of unemployment, which differ in their ways of dividing the population into the groups employed, unemployed and economically inactive. The first one follows the national definition and is calculated and published by the Public Employment Service (PES). This concept is usually referred to as the national statistic.The other two concepts are calculated and provided by the Statistics Austria. Statistics Austria uses the labor force concept (LFC) of the International Labor Organization (ILO) and the subsistence concept (Lebensunterhaltskonzept (LUK)).

National definition. According to the national definition the unemployment rate is the ratio of unemployed, who are registered at the PES, to labor force, which is the sum of unemployed people and all compulsorily social insured employment relationships registered at the Main Association of Austrian Social Security Institutions (HV - Hauptverband).
A few aspects need to be mentioned here. The first aspect is that unemployed people, who participate in a training scheme, and people who receive advance pension payments are neither counted in the nominator nor in the denominator. Secondly, the data concerning non self-employed people, coming from the Main Association of Austrian Social Security Institutions, refers to employment relationships and not to employed people, which means that somebody holding two or more jobs is counted twice or more often. Thirdly, on the one hand not all of the registered unemployed people are looking for

work (mainly seasonal workers and people who have already found a new job without starting it yet) and on the other hand there are job seeking people, who are not registered (mostly because they are not entitled to claim unemployment benefits, e.g. people entering the labor market for the first time or women re-entering after a long break). Finally, unemployed people who are registered at the PES, are allowed to work a minimal amount if their earnings do not exceed a specific threshold (monthly EUR 341.16 in 2007) without losing entitlement.

$$u_{PES} = \frac{\text{unemployed registered at PES}}{\text{unemployed at registered PES} + \text{employment relationships registered at HV}}$$

Subsistence Concept. People assign themselves into one of the following groups: employed, conscripts or on community service, parental leave, unemployed, pensioners, permanently disabled, housekeeping, in education, and others. Here, 'conscripts or on community service' and 'parental leave' are counted as employed and 'all others' except for 'unemployed' are considered to be out of labor force. The calculation of the unemployment rate is based upon data from the Austrian Labor Force Survey (LFS) or from the micro census, respectively.
Similar to the national definition, individuals can work up to 12 hours per week without being counted as employed. Since respondents assign themselves to these groups, a clear distinction may be problematic. The group 'pensioners' for instance, contains people whose main subsistence is capital income, even though they might work more than 12 hours a week as an employee, or a part time working student, who assigning herself as a student.
In 2003 the subsistence concept lost its importance due to the implementation of the continuously LFS in the micro census, but it is still reported.

$$u_{LUK} = \frac{\text{unemployed according to LUK}}{\text{unemployed according to LUK} + \text{employed according to LUK}}$$

Labor Force Concept. The calculation of the unemployment rate, according to the labor force concept, is based upon data from the LFS. People are considered to be employed, if they worked for at least one hour in the reference week or are temporarily absent (parental leave, holiday, illness, ...). People are considered to be unemployed, if they are not employed, are actively looking for work and able to take up work within two weeks or have found work to start within the next three months.
Two main points constitute the big difference between the LFC to the LUK and es-

pecially to the PES: Classifying individuals actively seeking for work as unemployed (actively-seeking-work condition) and a very low threshold of one working hour per week necessary to be classified as being employed. The actively-seeking-work condition lets re-entering women and newly entering students to be classified as unemployed, while seasonal workers, who did not have a job in the reference week, are not necessarily classified as unemployed. Working one hour per week might not lead to an income, which is high enough to cover living costs. But one can argue that those individuals are additional workers in a household with two or more members, that they receive additional public benefits, e.g. unemployment benefit; or that further capital income counts as their major earnings source.

$$u_{LFC} = \frac{\text{unemployed according to LFC}}{\text{unemployed according to LFC} + \text{employed according to LFC}}$$

The LFC unemployment rate is the relation of people, who do not work at all, but are looking for work, to unemployed people in this sense plus everyone who is working only one hour per week, even if she is an unpaid family worker . Figure A.2 in the appendix gives a detailed overview on how people are classified according to the LFC.

Figures 2.1 to 2.3 show intra-concept sex differences in the yearly and quarterly unemployment rates from 1995 to 2006 and from the first quarter of 2004 to the third quarter of 2007[14]. Looking at the yearly PES rate, figure 2.0(a), two major features stand out. Firstly, there is an expected cyclical behaviour of unemployment: in 2000, which is the year with the second highest growth rate of real GDP[15] (about 3.4 percent) in this period, the unemployment rate reaches its lowest value of about 6 percent. Secondly, up to the year 2000 the female unemployment rate was above the male rate. From 2000 onwards, the male rate was above the female one. Three reasonable non-exclusive explanations are available for the reversion of the unemployment gap: Due to the relatively good economic conditions throughout the year more women entered the labor market from home production. Also the sharp increase in part time jobs for women. Women persistently profit by the high GDP growth rate. The quarterly data, figure 2.0(b), indicates a strong seasonal pattern for men, with peaks in the first quarters mainly driven by the male dominated construction industry. In contrast, there is less evidence for seasonality in the female unemployment rate, with smoother peaks in the

[14]In case of the LUK the quarterly series begins with the second quarter of 2006.
[15]See table B.2

fourth quarters. The male unemployment rate decreases by about 4 percentage points from the first to the third quarter and increases again by about 4 percentage points from the third to the first quarter.
The yearly LUK-data, figure 2.1(a), differs. From 1995 to 2002 differences between women and men are observable, with women having a higher rate. From 2002 onwards the male and the female rate are almost the same. In 2003 there is a relatively large increase in both rates of more than one percentage points. Interpreting the quarterly data is more difficult for the LUK rates, since only six observations were available. Still it seems that men are facing a stronger seasonal pattern than women.
In terms of dynamics the yearly unemployment rate in case of the LFC is relatively similar to that of the PES, but it differs in the level. Excluding 2002 and 2003, the female rate was above the male one. From 1995 to 2003 the gap seemed to narrow, but from 2003 onwards it widened again. Looking at the quarterly data, figure 2.2(b) is quite interesting. Although one would expect almost no seasonality, there is evidence for it, even though much weaker than in the PES case. The most interesting feature being the counter-male-seasonal behaviour of the female rate. In the first quarters there is virtually no difference between the men's and the women's rate. But while the male rate becomes lower in the second and third quarters, the female rate increases. In the fourth quarters, the male rate rises again and the female rate decreases. The first quarter of 2007 is the only exemption. In this quarter the two rates do not equal each other as in the former first quarters, which seems to be the result of a relatively high decrease of the male rate in the third quarter of 2006.

Differences. The results from above show, that the three concepts strongly differ with regards to the total exclusiveness of the states employed and unemployed in the labor force concept, being the sharpest cut between the definitions. In contrast, the public administration allows an overlap of employment and unemployment because of social security purposes. As already mentioned, an one-hour-a-week job might not generate sufficiently large income to cover living costs. Another difference is the comparability of countries. The LFC is designed to facilitate international comparisons and can be applied to nearly all countries. The national concept is in fact national and depends mainly on the unemployment insurance system of each country. Thus cross-country comparisons suffer from the mentioned heterogeneity and partly lose their meanings as the unemployment insurance systems diverge.
The PES calculates using "real" numbers covering almost the whole labor force, while the

LFC and the LUK version use statistical projections, thus the LFC and the LUK include some relatively small errors. In contrast to the national definition in both, the labor force concept and the subsistence concept employees, self employed and unemployed are summed up to the labor force. The PES only uses employees and unemployed individuals. Consequently the denominator of the LFC and the LUK are bigger. The amounts of people in the labor force according to the LFC and the LUK are quite similar to each other. Because of the one-hour threshold and the actively-seeking-work condition, the amount of unemployed people is the smallest under the labor force concept. The biggest amount of unemployed people can be found using the PES. Therefore the LFC yields the lowest and the PES the highest unemployment rate. Figure 2.4 and figure 2.5 show that the unemployment rate according to the LFC is constantly beneath the PES rate, yearly as well as quarterly. During the whole period the yearly LUK rate for men is between the LFC and PES rate, but approaches the PES rate from 2003 onwards. The female LUK rate already exceeds the PES rate in 2004 and is above it in 2005 and 2006. In general, the concepts exhibit almost the same dynamics for the yearly data, but on different levels. Due to their different sensitivity to seasonal unemployment, the greatest differences occur in the quarterly data.

2.2.2 Labor Market Policy

Besides employment policy, which will not be discussed here, a state can use active and passive labor market instruments to to deal with unemployment. In Austria two institutions are responsible for this: the Federal Ministry of Economics and Labor (BMWA - Bundesministerium für Wirschaft und Arbeit) and the Public Employment Service (PES). The legal framework of Austria's labor market policy is stipulated by several laws, in general by the Labor Market Promotion Act (AMFG - Arbeitsmarktförderungsgesetz), the Public Employment Service Act (AMSG - Arbeitsmarktservicegesetz), the Unemployment Insurance Act (ALVG - Arbeitslosenversichungsgesetz), the Labor Market Finance Act (AMPFG - Arbeitsmarktpolitik-Finanzierungsgesetz) and the Act Governing Employment of Foreign Nationals (AuslBG - Ausländerbeschäftigungsgesetz). The main objective of labor market policy is to prevent and reduce unemployment and to ensure a functioning labor market.
In 2000 the governmental areas of economics and labor were combined in one agency, the Federal Ministry of Economics and Labor. It has a broad-ranged agenda containing economic policy, innovation and technology, enterprise, foreign trade policy, labor market (including labor law and Labor Inspection), energy and mining and tourism. The Labor

Market Promotion Act forces the ministry "to use all available resources to achieve and maintain full employment and ensure an optimally functioning labour market."[16] In 1994 the Public Employment Service Act was enacted and partly repealed and replaced the AMFG from 1969. The major change was to devolve the labor market management from the Federal Ministry to a new separate institution, the Public Employment Service. Since then the ministries main tasks concerning the labor market (excluding labor law and Labor Inspection) are defining policy goals, approving financial decisions, supervision, evaluation and monitoring.
In 1994, under the Public Employment Service Act, the Public Employment Service was established and took over labor market responsibilities from the Federal Ministry of Economics and Labor. The PES is a service agency under public law dealing with private and public-sectors matters. The active labor market policy duties are promoted from the more private-sectors laws AMFG and AMSG. Passive duties are developed by AMSG and are regulated by the the Unemployment Insurance Act, which regulates the liability to unemployment insurance and qualifications for unemployment benefits and unemployment assistance. The PES has a more decentralized organisation than the BMWA, containing one Federal office, 9 Länder offices and 99 regional offices, which leads to more flexibility in reacting to regional labor market issues. A close relationship to the social partners is prominent at all levels. The two major functions of the PES are the provision of services to job-seekers and to employers. Services for job-seekers include active and activating services such as information, counseling, guidance, training, supervision and support and passive services in form of benefit claims. Active services for employes are information, counseling, guidance, filling vacancies and securing employment.

2.2.2.1 Active and Activating Labor Market Policy

Active labor market policy is supposed to enhance allocative efficiency at the labor market and to support disadvantaged people.
The BMWAs active duties are to define policy goals, supervise, evaluate and monitoring to improve the quality and sustainability of measures, and to enhance labor market transparency. Along with these general duties of the BMWA, active labor market policy focuses on four main areas of measures: 1. skill training schedules (education and training programmes, subsistence allowance during training, allowances to cover ancillary course costs), 2. employment subsidies (company integration subsidy, subsidies to

[16]BMWA (2005), p. 8.

employment in socioeconomic enterprises and community projects), 3. support measures (counselling and guidance centres, childcare subsidies, business start-up schemes) and 4. activating measures. Activating policy measures include the allowance for benefits used for active purposes, but are not intended as income support benefits such as unemployment benefit and assistance. Such measures are part-time allowance for older workers, unemployment benefit or assistance during training, unemployment benefits for rehabilitation, et cetera). Austrian active labor market policy mostly focuses on skill training, measured by the total number of participants and measured by the expenditures. In 2004 245,278 out of 302,300 program participants, or 81 percent of participants, were enrolled in skill training programs. Programs promoting education and training (141,496 individuals), subsistence allowances during training (159,954 individuals) and allowances to cover ancillary course costs (139,002 individuals) being the most important ones. Employment subsidies which were given to 40,183 people (13 percent of all participants) and support measures were received by 60,085 individuals (20 percent of all participants) play a minor role. Analyzing the total number of program participants, the share of women is about 55 percent, but varies partly by the different measures. The fraction of women involved in employment subsidies is about 49 percent, in skill training about 55 percent and about 53 percent in support measures.

Table 2.1: Program participants in 2004

	Total	Women
Employment subsidies	40,183	19,578
Skills training	245,278	135,887
Support measures	60,085	31,727
Total	302,300	165,107

Table 2.1 presents the number of total and female participants of active labor market programs in 2004.
Source: BMWA (2005)

2.2.2.2 Passive Labor Market Policy

Passive labor market policy includes providing income support during unemployment spells which lies in the responsibility area of the PES. At the moment a registered unemployed can be entitled for one of the following five payments: unemployment benefit, unemployment assistance, advance pension payment, temporary assistance and transition benefit. The entitlement to those income supports is regulated by the ALVG.

In order to be eligible to receive benefit one has to be registered at the PES, be able and willing to work, which means being ready to take up a job, participate in a labor market policy scheme or seeking work on your own, and having paid unemployment contribution for a specific period. This period depends on whether a person has been unemployed previously with receiving unemployment benefit during this unemployment spell and whether a person is older than 25 years old. For those who are unemployed for the first time and have passed the age of 26, it applies that they must have been employed for at least 52 weeks within the last 24 month. If somebody has already received benefits, the period nearly halves to 28 weeks of contributory employment in the last 12 month. Individuals who have not reached the age of 25 yet, must have been working for 26 weeks within the last 12 month.
The unemployment benefit is about 55 percent of last years net income[17] with a maximum of EUR 40.14 per day. Benefits below the equalisation supplement reference rate (EUR 726.00 in 2007 for singles) are supplemented up to the reference rate, except for the case that the equalisation supplement reference rate exceeds 60 (80) percent of net income of a person without (with) family supplements. Then those individuals get 60 (80) percent of their net income.
The minimum duration of unemployment benefit is 20 weeks, the maximum depends on the weeks of contribution and age. The maximum duration for 156 weeks of contribution within the last five years is 30 weeks, 312 contributing weeks within the preceding 10 years and an age of at least 40 years yields to a maximum of 39 weeks. Finally an unemployment spell can last for 52 weeks if a person is at least 50 years old and was in contributory employment for 468 weeks during the past 15 years. The duration can even be extended under certain conditions like participation in a training scheme.
If a person quits employment by herself voluntarily, she will not get any benefit for four weeks. If a beneficiary refuses a suitable job offer or a training scheme, the benefit payment gets suspended and the benefit duration is reduced. Whether a job is suitable or not depends on the length of unemployment already experienced. Within the first 100 days a job is suitable if placement in jobs, other than the previously held, is considered as unreasonable. The placement is considered as unreasonable "if such placement makes it much more difficult for the job-seeker to find in the future a job in his/her previous occupation."[18] After 120 days a job is already suitable, if it is in another field of work and if it is part-time, where a part-time job is reasonable if the contributory pay is at

[17] net income = gross income - social security contribution - income tax
[18] BMWA (2007)*b*, p. 2.

least 75 percent of the last pay used for calculating the benefit.
One can apply for unemployment assistance, after the entitlement for unemployment benefits is expired, but the eligibility requirements are much stricter than for the benefit. Additionally to the necessary conditions of ability and willingness to work, the affectedness of unemployment, a person must be financially distressed. The criterion of financial distress does not only depend on her income (rental income, orphan's pension), but also on the income of the spouse or cohabitant living in the same household.
The amount of unemployment assistance depends on the economically situation of the household and on the duration for which an unemployed person received unemployment benefit. It accounts for up to 95 percent of unemployment benefit, if it does not exceed the equalisation supplement reference rate and 92 percent, otherwise. For individuals, who received unemployment benefits for 20 weeks the maximum monthly amount is equal to the equalisation supplement reference rate. For those with a benefit duration of 30 weeks the maximum monthly amount is equal to the subsistence level (EUR 847.00 in 2007). The unemployment assistance is not limited to a certain duration, but the claim has to be renewed every 52 weeks of receipt.
In contrast to unemployment benefits, one must take up an offered job, even if it is not equal or related to the former field of work or does not fit the qualification of the beneficiary.

Table 2.2: Recipients of unemployment benefit and assistance

Year	Unemployment benefit			Unemployment assistance		
	Men	Women	Total	Men	Women	Total
2000	63,987	43,969	107,956	40,002	34,925	74,927
2001	70,952	46,899	117,851	39,154	32,540	71,694
2002	80,039	52,637	132,676	47,852	34,998	82,850
2003	77,367	50,856	128,223	53,198	36,903	90,101
2004	75,011	50,712	125,723	55,950	39,050	95,000
2005	76,563	52,839	129,402	57,082	39,430	96,512
2006	71,264	49,705	120,969	54,503	37,404	91,907

Table 2.2 presents annual averages of unemployment benefit and assistance recipients by gender and in total.
Source: Statistics Austria (2008)

Table 2.2 gives an overview of unemployment benefit and assistance recipients by sex. In most years, we observe less women receiving unemployment benefit and unemployment assistance. The differences between the total number of female recipients and

the total number of male recipients is greater for the unemployment benefit recipients. Relative to all recipients the female fraction of unemployment benefit recipients is about 41 percent (2006) and about 40 percent (2006) of all unemployment assistance recipients were female. The fraction of women receiving unemployment benefit is relatively stable through out the years, ranging from about 40 to about 41 percent. The picture is different for unemployment assistance. In 2000 about 47 percent of the recipients were women, which almost steadily decreased to about 41 percent.

Applicants to pension, old-age or disability, can claim advance pension payment, during the applications process. Everyone who is entitled either for unemployment benefits or for assistance is eligible for such payment. The criteria of ability and willingness to work and availability must not be fulfilled. The amount is equal to the unemployment benefits and assistance, but reaches its maximum at the mean of the applied pension. The transition benefit was designed during the pension reform in 2004, which enhanced the statutory early retirement age. Unemployed people who would have reached the pre-reform early retirement age in the years 2004 to 2009 are entitled to transition benefits. Temporary assistance is provided to civil servants, who were not covered by a compulsory unemployment insurance, but are not eligible for "Ruhe- oder Versorgungsgenuß" and fulfill all other criteria.

2.2.2.3 Expenditure on Labor Market Policy

In 2006, active and activating labor market policy expenditure accounted for 1,788 Mio. EUR, which was the highest value until 2006 and an increase of 15 percent compared to 2005. This enormous growth is mainly due to the increase in the active and activating PES fund, needed for the governmental initiative "Unternehmen Arbeitsplatz". Table 2.3 gives the expenditure on active, activating and passive labor market policy expenditure without employer-related labor market support for 2001 to 2007. Expenditure for passive labor market policy accounted for EUR 2,868 Mio. in 2006, mainly unemployment benefit and unemployment assistance accounting for about three-fourths of total passive expenditure.

Table 2.3: Labor market policy expenditure PES/BMWA in Mio. EUR

	2001	2002	2003	2004	2005	2006	2007
	active labor market policy						
PES	626	628	700	711	712	847	846

Table 2.3: continued

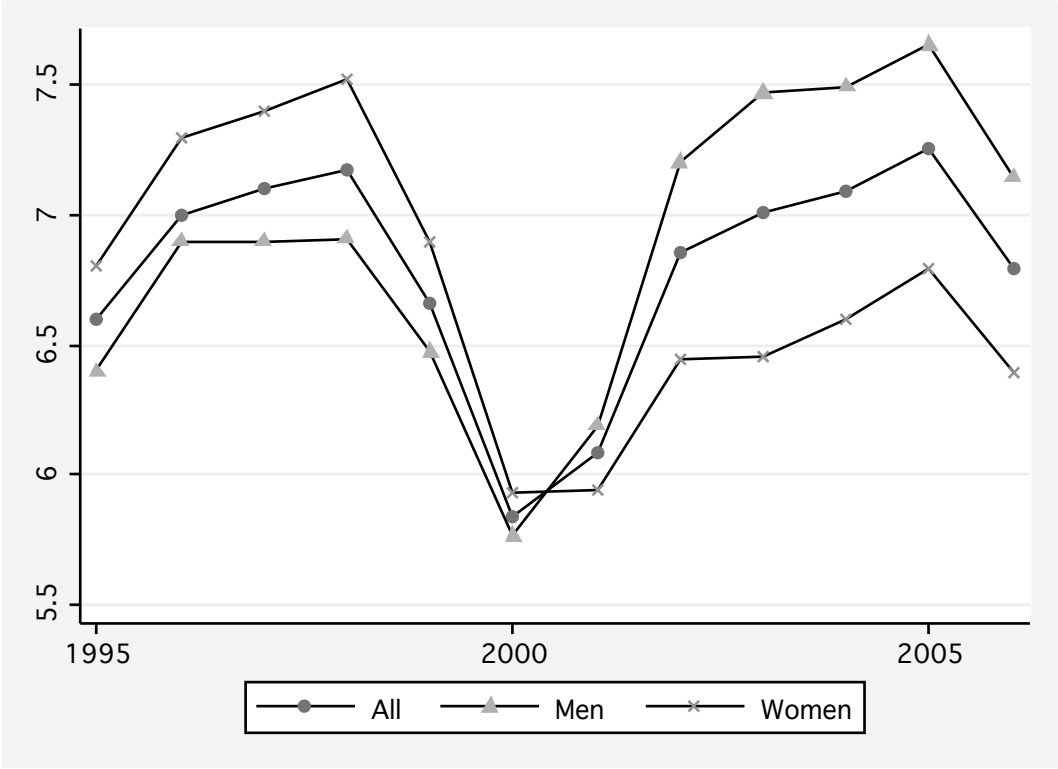
	2001	2002	2003	2004	2005	2006	2007
BMWA	42	38	66	82	73	80	61
Subtotal active LMP	667	666	767	793	785	927	907
	activating labor market policy						
PES	243	400	629	747	770	860	790
BMWA-IAF[a]	-	-	85	120	125	132	139
Sum active and activating LMP	910	1,066	1,481	1,660	1,680	1,920	1,836
	passive labor market policy						
Unemployment benefit	1,016	1,192	1,226	1,225	1,274	1,267	1,193
Unemployment assistance	533	624	723	779	806	813	761
Sum passive LMP	2,683	2,434	2,516	2,599	2,813	2,868	2,759

Source: BMWA

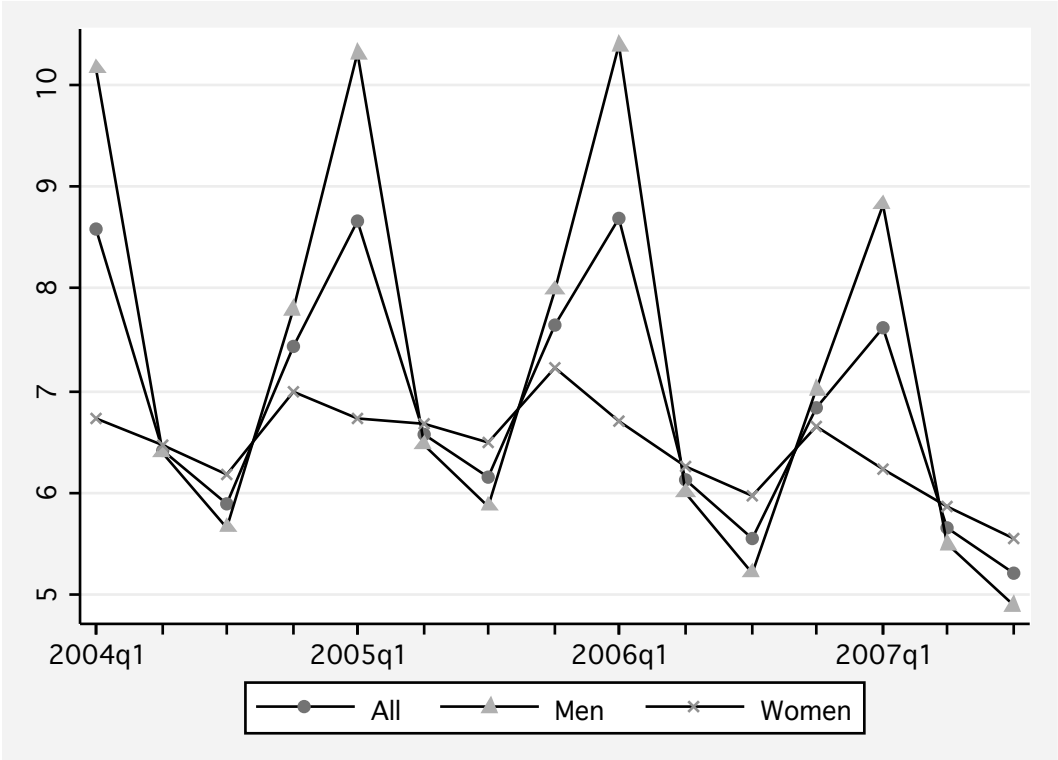
[a] Apprenticeship training bonus

2.2.3 International Comparison

Figure 2.6 shows that Austria among the countries with the lowest unemployment rates according to the labor force concept within the European Union and the OECD. Within Europe, Austria has got the sixth lowest rate in 2006, only Norway, the Netherlands, Cyprus, Ireland and Denmark had even lower rates. When analyzing the expenditures on active and activating labor market policy Austria is in the mid-range of all OECD countries. Active and activating LMP accounted for 0.62 percent of GDP according to EU and OECD definition in 2005, which is very close to the unweighted OECD average of 0.61 percent. Normalised to 1 percent of the unemployment rate gives 0.12 percent and improves Austria's position to the upper mid-range of the OECD countries.

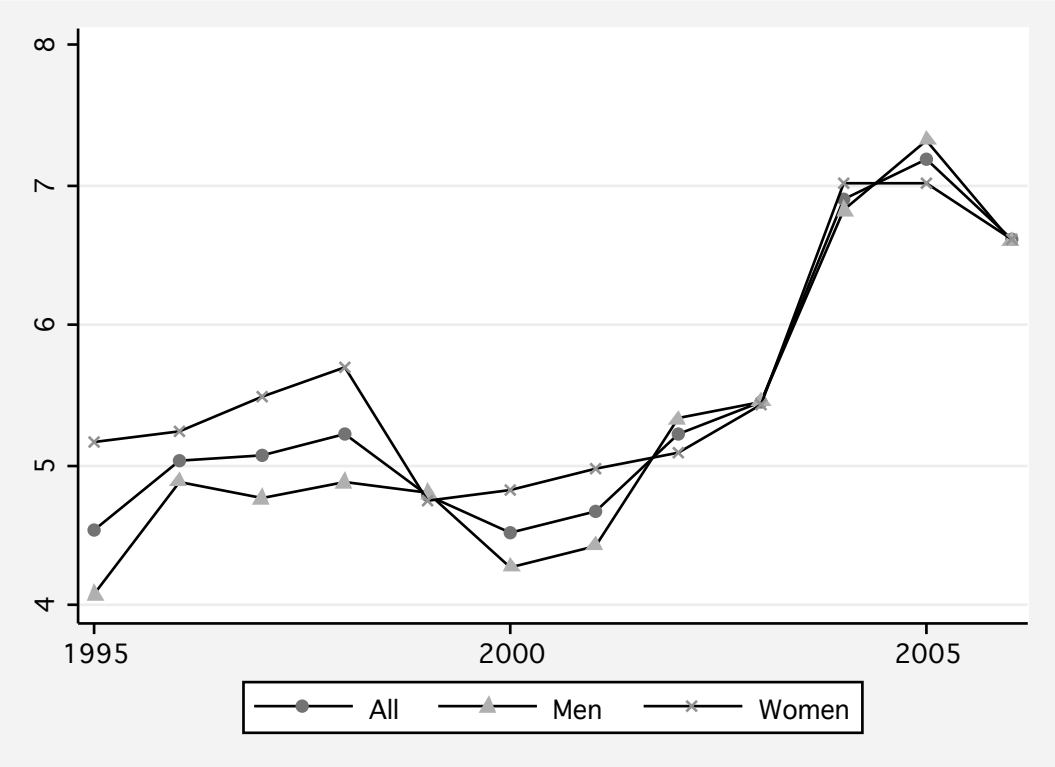


(a) Yearly

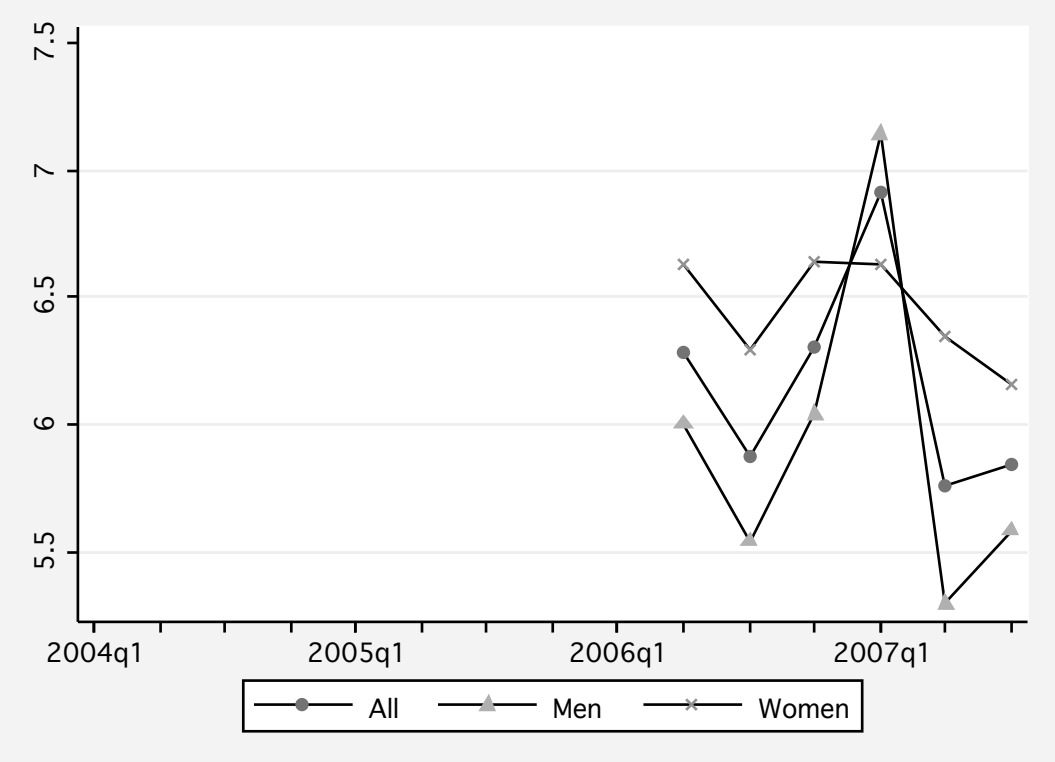


(b) Quarterly

Figure 2.1: Unemployment rate - PES

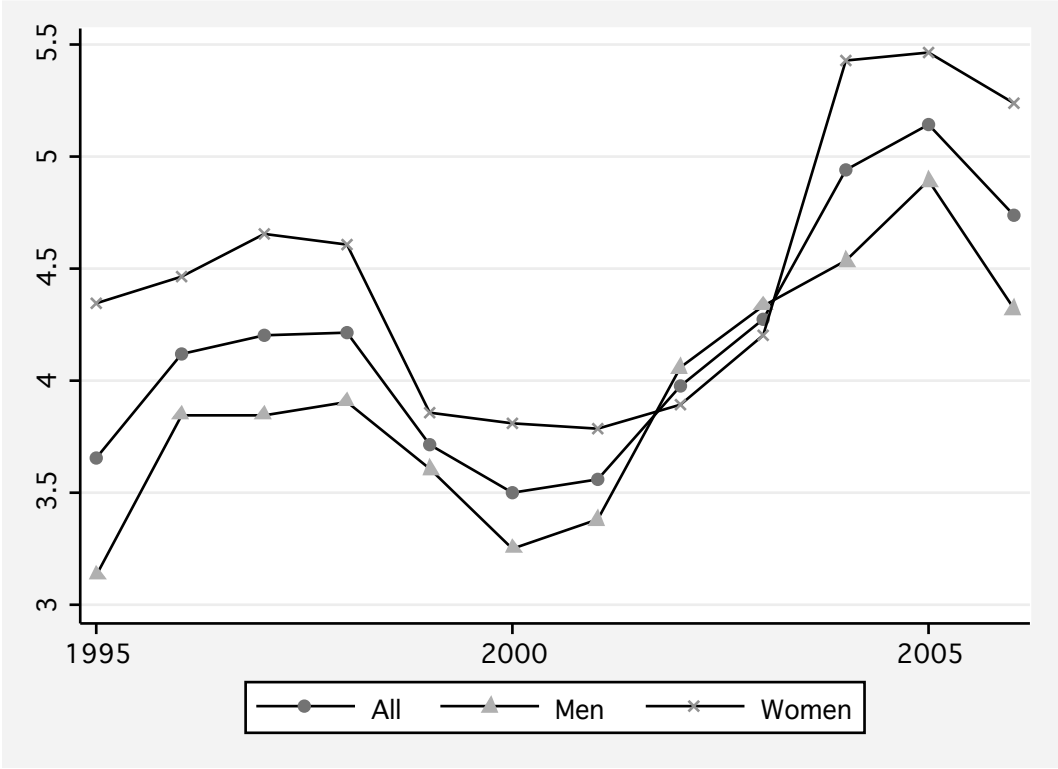


(a) Yearly

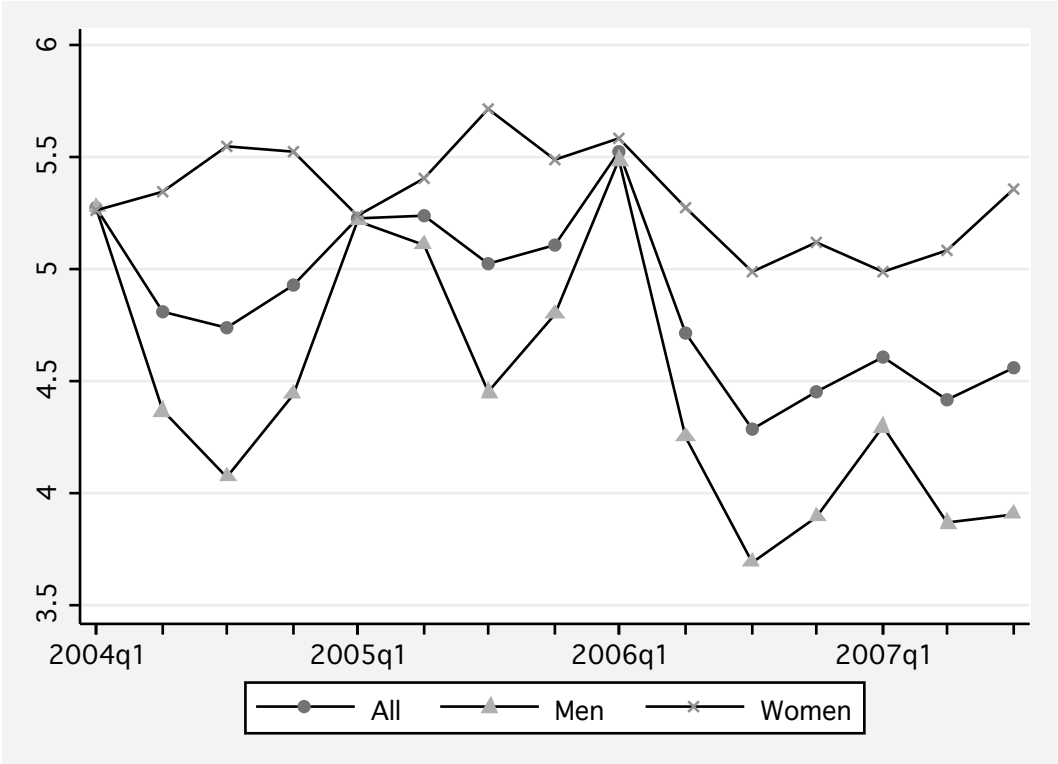


(b) Quarterly

Figure 2.2: Unemployment rate - LUK

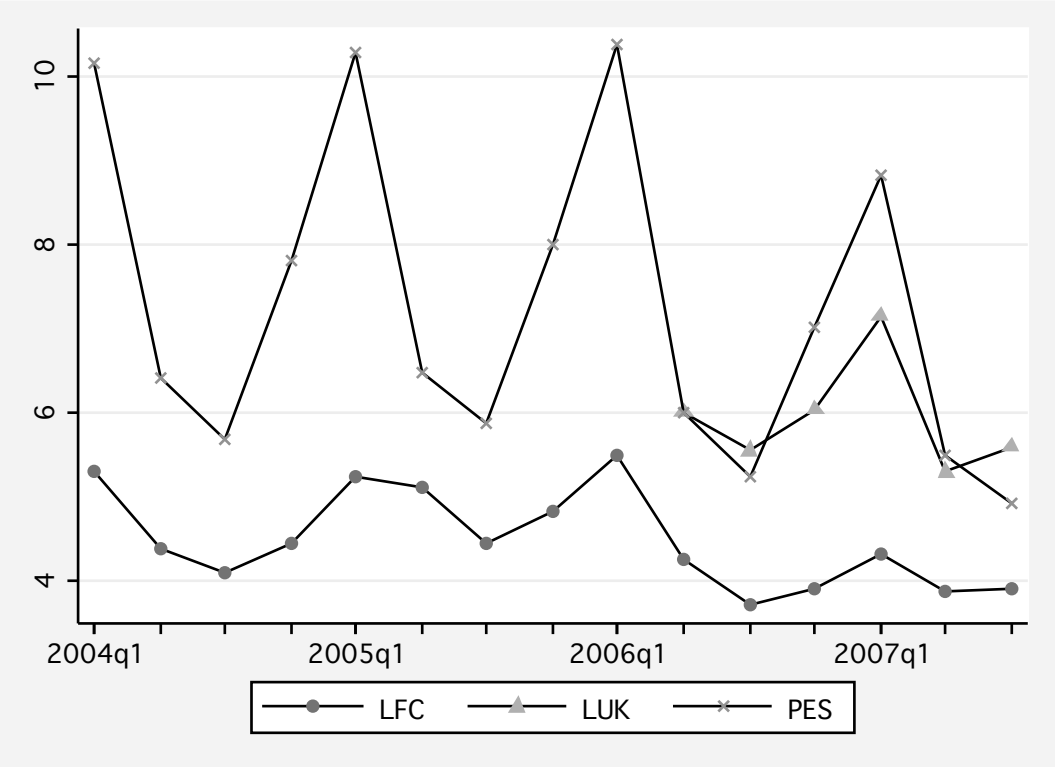


(a) Yearly

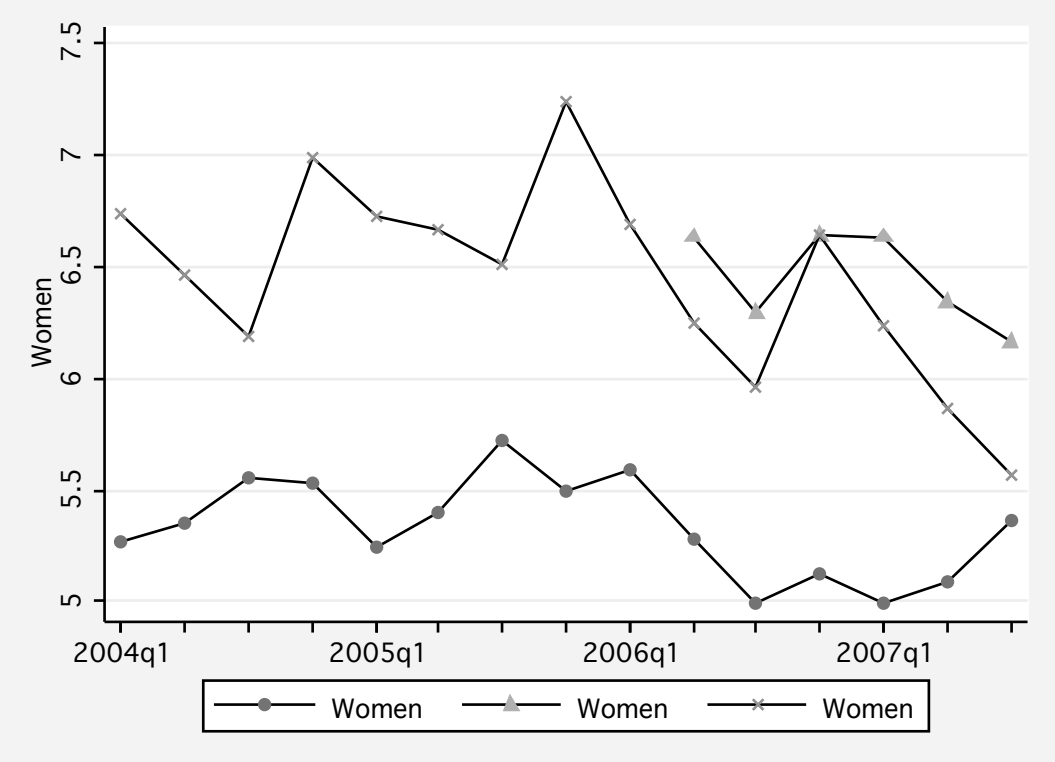


(b) Quarterly

Figure 2.3: Unemployment rate - LFC

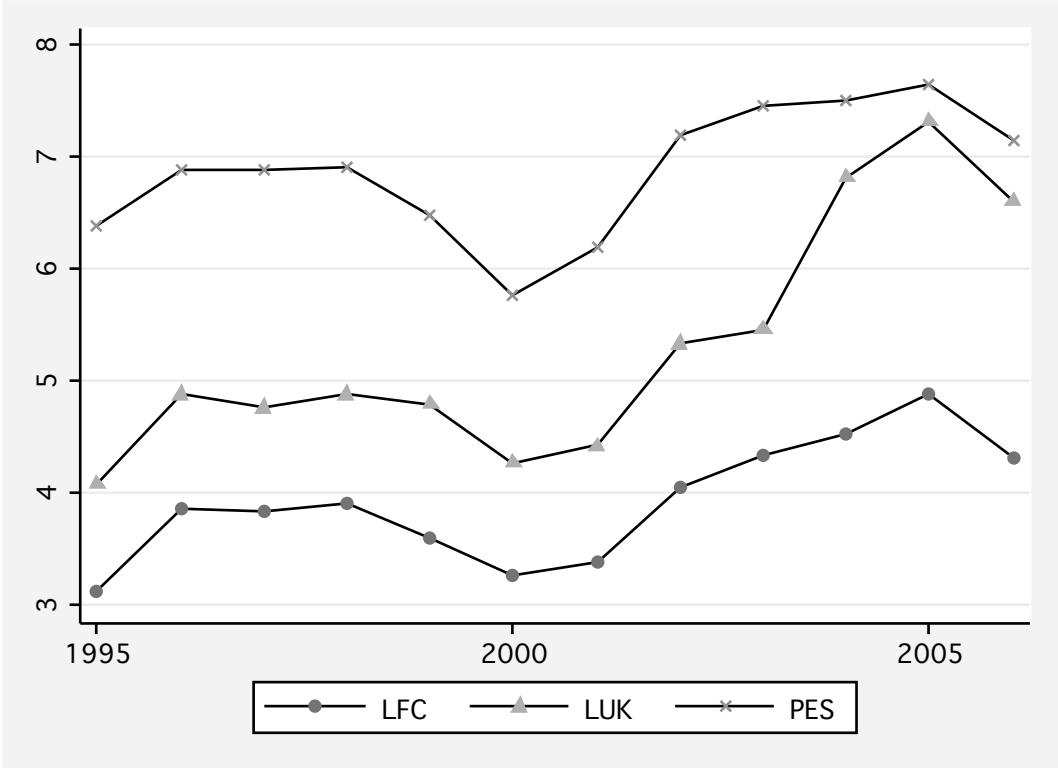


(a) Men

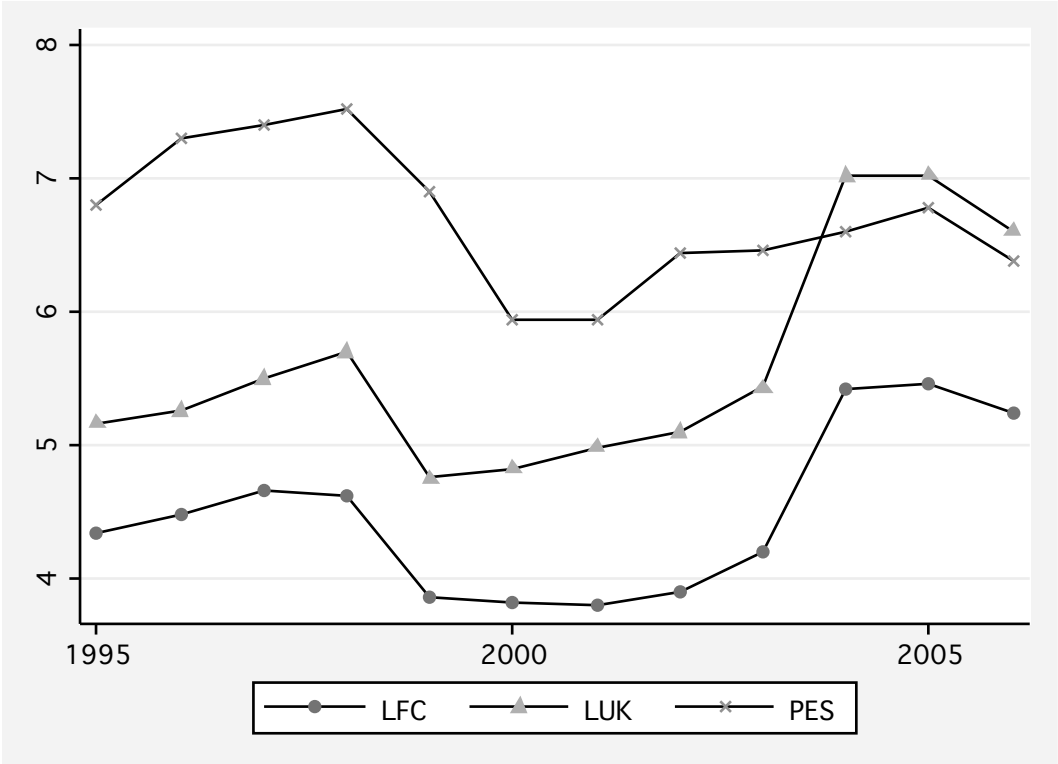


(b) Women

Figure 2.4: Quarterly unemployment rates - comparison PES, LUK, LFC



(a) Men



(b) Women

Figure 2.5: Yearly unemployment rates - comparison PES, LUK, LFC

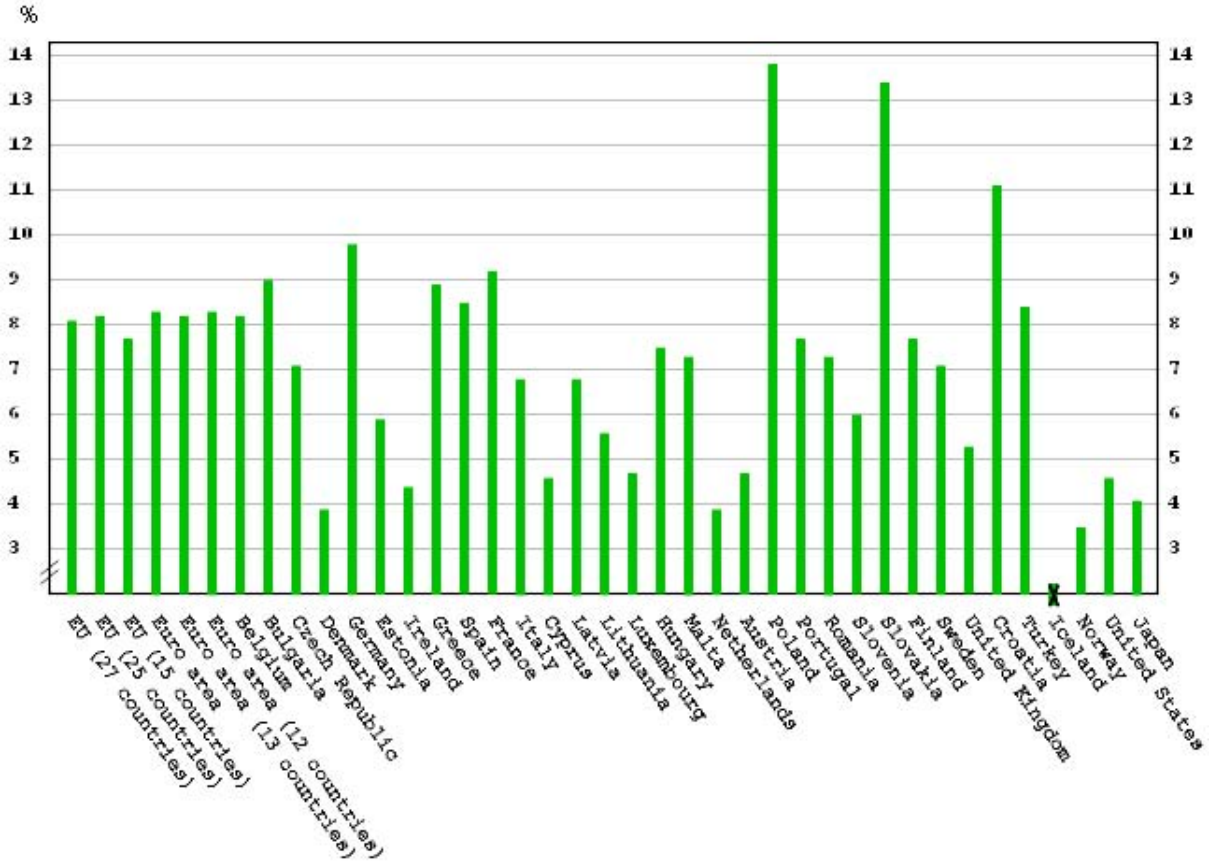


Figure 2.6: International unemployment rates - EUROSTAT 2006

3 Empirical Analysis

This chapter provides an overview of the data source for the estimations and the methods. It presents and discusses the estimation results, as well as, further analyses.

3.1 Models[1]

The proposed method is to use a limited dependent variable model, where the response is binary coded. A limited dependent variable (LDV) is a dependent variable whose values are restricted in some way, in the present case it is restricted to the values zero and one. Not every LDV needs special treatment. For example hourly wage, is restricted to be positive, but since it can take many different values, it can be treated as approximately continuous. For binary dependent variables there are three models available - the linear probability model, the probit model and the logit model. In order to check the robustness of the outcomes, each of these models will be estimated. The specification of these models, their advantages and caveats will be discussed below.

3.1.1 Linear Probability Model

The linear probability model describes the probability of success - the binary dependent variable taking the value one - as linear function of the explanatory variables. The multiple regression model is

$$y_i = \beta_0 + \beta_1 x_{i1} + ... + \beta_k x_{ik} + u_i \quad \forall\ i = 1 \ldots, n \tag{3.1}$$

For simplicity, I will continue dropping the index i of the observations and use $\mathbf{x}\beta$ instead of $\beta_0 + \beta_1 x_{i1} + ... + \beta_k x_{ik}$, where $\mathbf{x}$ is a $1 \times k$-vector and β is a $k \times 1$-vector.

[1] cf. Wooldridge (2006).

Assuming that $E(u|\mathbf{x}) = 0$[2], leads to the following expression

$$E(y|\mathbf{x}) = \mathbf{x}\beta \tag{3.2}$$

Since it is always true that $P(y = 1|\mathbf{x}) = E(y|\mathbf{x})$[3], one can write

$$P(y = 1|\mathbf{x}) = \mathbf{x}\beta, \tag{3.3}$$

where $P(y = 1|x)$ is the probability of success or the response probability.
Since $P(y = 1|x)$ is a linear function, also $P(y = 0) = 1 - P(y = 1|\mathbf{x})$ is a linear function of the x_j $(j = 1, \ldots, k)$.
What about the error term? We already know that $P(y = 1|\mathbf{x}) = \mathbf{x}\beta$. So if $y = 1$, rearranging $y = \mathbf{x}\beta + u$ and inserting $y = 1$ then yields

$$u = 1 - \mathbf{x}\beta = 1 - P(y = 1).$$

Thus the error term can take two values, it can take the value $1 - \mathbf{x}\beta$ with a probability of $\mathbf{x}\beta$ or it can take the value $-\mathbf{x}\beta$[4] with a probability of $1 - \mathbf{x}\beta$. The expectation and variance of a discrete random variable are defined as

$$E(X) = \sum_{i=1}^{n} x_i p_i$$
$$Var(X) = \sum_{i=1}^{n} x_i^2 p_i - E(X)^2$$

where p_i is the probability of the event x_i. Thus

$$E(u|\mathbf{x}) = (1 - \mathbf{x}\beta)\mathbf{x}\beta + (-\mathbf{x}\beta)(1 - \mathbf{x}\beta) = 0 \tag{3.4}$$

[2] See equation (3.4) for a proof.
[3] $E(y|\mathbf{x}) = 1 \cdot P(y = 1) + 0 \cdot P(y = 0) = P(y = 1)$
[4] Inserting $y = 0$ instead of $y = 1$.

and

$$\begin{aligned} Var(u|\mathbf{x}) &= (1-\mathbf{x}\beta)^2\mathbf{x}\beta + (-\mathbf{x}\beta)^2(1-\mathbf{x}\beta) \\ &= \mathbf{x}\beta - 2(\mathbf{x}\beta)^2 + (\mathbf{x}\beta)^3 + (-\mathbf{x}\beta)^2 + -\mathbf{x}\beta^3 \\ &= \mathbf{x}\beta - (\mathbf{x}\beta)^2 \\ &= \mathbf{x}\beta(1-\mathbf{x}\beta) \end{aligned} \tag{3.5}$$

Equation (3.5) shows that the variance of the errors depends on $\mathbf{x}$. Which does not bias the OLS estimates, but the usual t- and F statistics are invalid - one should use heteroskedasticity robust errors for statistical inference.
I use the heteroskedasticity-robust variance matrix estimator of $\hat{\beta}$ introduced by White (1980)

$$\hat{V} = (X'X)^{-1}\left(\sum_{i=1}^{n}\hat{u}_i^2 x_i' x_i\right)(X'X)^{-1}. \tag{3.6}$$

The greatest advantage of the LPM is that one can apply OLS, which is a quiet easy procedure. After applying OLS the estimated parameter β_j measures the change in the response probability, when x_j changes cet.par.

$$\Delta P(y=1) = \beta_j \Delta x_j \tag{3.7}$$

For example assume

$$\hat{y} = 0.5 + 0.1x_1 - 0.2x_2 \tag{3.8}$$

then $\hat{\beta}_1 = 0.1$ must be interpreted as: holding everything else constant in (3.8), a one unit increase in x_1, increases the response probability by 0.1. If say x_1 is a dummy variable, the interpretation is similar, holding everything else constant, the group of interest has a 0.1 percentage points higher probability of success than the base group.
Now assume that for any given observation $x_1 = 1$ and $x_2 = 4$, then the predicted probability is -0.2, or $x_1 = 7$ an $x_2 = 1$, which yields a predicted probability of 1.1. This is one of the drawbacks of the LPM, it can lead to probabilities larger than one and smaller than zero. Then the results are not interpretable as probabilites.
Anther problem is that "a probability cannot be linearly related to the independent variables for all their possible values."[5] But nevertheless it usually works well near the sample means of the explanatory variables.

[5]Wooldridge (2006), p. 255.

3.1.2 Binary Choice Models: Probit and Logit

Probit and logit models overcome the drawbacks of probabilities outside the unit interval and the constant partial effect of any independent variable of the LPM. Both models can be motivated by an underlying latent variable model.
Assume

$$y^* = \beta_0 + \mathbf{x}\beta + \epsilon \tag{3.9}$$

where y^* is a unobserved latent variable. The observed variable y equals one if $y^* > 0$ and zero otherwise.

$$y = 1, \text{ if } y^* > 0$$
$$y = 0, \text{ if } y^* \leq 0$$

ϵ is assumed either to have a standard normal distribution or the standard logistic distribution and thus is symmetrical distributed around zero, meaning that $1-G(-z) = G(z)$ for all $z \in \mathbb{R}$. The response probability for y is then

$$\begin{aligned} P(y = 1|\mathbf{x}) &= P(y^* > 0|\mathbf{x}) \\ &= P[\epsilon > -(\beta_0 + \mathbf{x}\beta)|\mathbf{x}] \\ &= 1 - G[-(\beta_0 + \mathbf{x}\beta)] = G(\beta_0 + \mathbf{x}\beta) \end{aligned}$$

where $G(\beta_0 + \mathbf{x}\beta) = G(z)$

$$\begin{aligned} G :&\mathbb{R} \to (0, 1) \\ &z \mapsto G(z) \end{aligned}$$

In most applications G is either the standard normal cumulative distribution, leading to the probit model (see equation (3.10)), or the the logistic function, leading to the logit model (see equation (3.12)).

$$G(z) = \Phi(z) = \int_{-\infty}^{z} \phi(\nu)d\nu \tag{3.10}$$

where $\phi(z)$ is the standard normal density

$$\phi(z) = \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-z^2}{2}\right) \tag{3.11}$$

$$G(z) = \frac{\exp(z)}{[1 + \exp(z)]} \tag{3.12}$$

The advantage to restrict the estimated probabilities to (0,1) is not costless. Because of the non-linear nature of G, it is not as easy to calculate the partial effect of x_j as in the case of the LPM.
If x_j is approximately continuous, then the partial effect of x_j on $P(y = 1|\mathbf{x}) = p(\mathbf{x})$ can be derived, as in the case of the LPM, by calculating the partial derivative

$$\frac{\partial p(\mathbf{x})}{\partial x_j} = \frac{dG}{dz}(z) = g^6(\beta_0 + \mathbf{x}\beta)\beta_j \tag{3.13}$$

G is strictly increasing in both the probit and logit case and thus $g(\beta_0 + \mathbf{x}\beta) > 0$ for all $\beta_0 + \mathbf{x}\beta$. Therefore the sign of the partial effect of x_j only depends on the sign of β_j.
The partial effect of a binary explanatory variable x_j is simply the difference, when changing x_j form one to zero cet.par.

$$\begin{aligned} &G(\beta_0 + \beta_1 x_1 + \ldots + \beta_j + \ldots + \beta_k x_k) \\ &\quad - G(\beta_0 + \beta_1 x_1 + \ldots + \beta_{j-1} x_{j-1} + \beta_{j+1} x_{j+1} + \ldots + \beta_k x_k) \end{aligned} \tag{3.14}$$

A quiet similar difference method can be used for any other discrete variable x_j

$$\begin{aligned} &G(\beta_0 + \beta_1 x_1 + \ldots + \beta_j(x_j + 1) + \ldots + \beta_k x_k) \\ &\quad - G(\beta_0 + \beta_1 x_1 + \ldots + \beta_j x_j + \ldots + \beta_k x_k) \end{aligned} \tag{3.15}$$

Equation (3.13 to 3.14) show, that the partial effect of x_j depends on all other explanatory variables. So to estimate the magnitude of the partial effect, one must plug in certain values for all x_j and evaluate it at those values. The partial effects often are evaluated at the means, medians, maxima, minima, et cetera of the explanatory variables. An alternative way is to take the mean of the partial effect calculated for every observation, which is sometimes called the average partial effect in contrast to the partial effect at the average.

Since G is a non-linear function, OLS is not applicable. Although one could use non-linear least squares, it is more convenient to use maximum likelihood estimation[7]. "Because maximum likelihood estimation is based on the distribution of y given $\mathbf{x}$, the

[6]Note that g is a probability density function, because G is cumulative distribution function.
[7]For a discussion of maximum likelihood estimation see for example Wooldridge, J.M., *Econometric Analysis of Cross Section and Panal Data.* Cambridge, MA: MIT Press.

heteroskedasticity in $Var(y|\mathbf{x})$ is automatically accounted for."[8]

3.2 Data

The data consists of four subsamples of the Austrian micro census of 2004, 2005, 2006 and 2007 containing only respondents who were in the survey for the first time. This has three advantages: first, I do not have to worry about individuals who were interviewed more than once, second, I do not have to choose a particular interview and third, people tend to give the same answers as in previous interviews when they are asked more than once. Using only data on first interviews eliminates the difficulties resulting from repeated interviews.

3.2.1 Labor Force Survey

From 1995[9] until 2003 the Labor Force Survey, which is a standard questionnaire of the European Union and serves as a base for establishing an international comparable data on employment and unemployment, was conducted yearly as a march supplement of the micro census by Statistics Austria. In 2004 the concept changed to a continuous survey. Since 2004 the LFS is not restricted to one month (March), but is conducted referring to reference weeks through out a whole year, which mainly increases the ability to capture seasonal fluctuation. Since the presented data ranges from 2004 to 2007, it does not cover this structural break.
The LFS contains a lot of questions about the employment status of a respondent, the industry and occupation she belongs to, her occupational position, working time, et cetera, beside the standard demographic characteristics (age, sex, educational attainment, nationality, et cetera). The major concept is the labor force concept, but the subsistence concept is still part of the LFS and also questions related to the PES are asked. The sample, which is randomly drawn from the Central Register of Residence Registrations, consists of nine relatively equal-sized "province-samples" with exception of Vienna (larger sampler) and Burgenland (smaller sample). The total number of households per quarter is about 23.000, where data on all household members, are collected. The rate of non response is relatively small, since all people aged 18+ are subject to

[8] Wooldridge (2006), p. 586.
[9] Austria's accession to the European Union.

the duty of disclosure[10] and are penalized with a fine up to EUR 2.180 when refusing to participate. A household drops out of the sample after 5 quarters or 5 interviews respectively.

3.2.2 Restrictions

The pooled sample containing all four years consists of 40,407 observations and more than 200 variables - most of them not useful to my research question. After dropping people aged less than 15 years and older than 69 years, which is plausible since people younger than 15 years are considered to be out-of-labor according to all concepts and people older 69 years not out-of-labor force are quiet rare in Austria[11] (28.07 percent of the sample), 29,063 observations remain. I created a sample for each of the concepts. The division into employed, unemployed and out-of-labor force for the LFC and the LUK is quite simple, a variable is already provided in the sample, but it turned out to be very difficult to apply the PES definition. A detailed description of the transition to a PES conform sample can be found in the appendix.
Because of very few respondents reporting being employed or have been employed[12] in the industries mining and quarrying, private households and extra-territorial organizations and activities of households bodies, I used two versions. One where the industries mentioned above were dropped and another one, with female industries, defined as industries with a large fraction of female employees, where these industries are included. Furthermore, the sample is restricted to (former) employees, due to several problems arising when self-employed are included in the sample (multicollinearity between industry and occupation or professional position, rarely self-employed reporting to be unemployed). The last restriction was made upon the class of worker. Usually civil workers can not be unemployed, although some reported to be, which seldomly can happen, but made me wonder whether they were civil workers or Vertragsbedienstete[13]. Just to be on the safe side, I only used private sector workers.

[10] Erwerbs- und Wohnungsstatistikverordnung (EWStV), BGBl. II Nr. 549/2003.
[11] The statutory retirement age for men (women) is 65 (60) years.
[12] When using yearly samples instead of the pooled sample of all years those industries perfectly predicted being employed in almost all years.
[13] Individuals, who are working in the public sector, but do have contracts as blue or white collar workers.

3.2.3 Descriptive Statistics

The pooled LFC-sample contains 14,396 observations of which 6,669 are female and 7,727 are male. The overall unemployment rate is 4.83 percent, which is close to the reported rates in section 2.2.1, the female unemployment rate is 5.22 percent and the male rate is 4.50 percent. In each age group except for 55-69 years the fraction of men is larger then the fraction of women. About 15.56 percent of the sample reported that they were born in another country than Austria. In higher educational groups the fraction of men and women is relatively equal. About 7.11 percent of men attained an academic degree at university or at a Fachhochschule[14] and about 6.21 percent of women finished their academic career. Women attend post secondary technical/vocational education (HLA - Hochschulverwandte Lehranstalt) more than twice as much as men. The share of women in higher-level technical/vocational colleges (BHS - Berufsbildende höhere Schule) almost equals the share of men. The overall share of people in five-year BHS (BHS5) is 8.88 percent and 9.03 percent in one-to-three-year BHS (BHS3). Upper-secondary academic school (AHS - Allgeinbildende höhere Schule) is again more frequent among women, with a share of 6.24 percent among women and 3.79 percent among men. In lower educational groups men tend to attain apprenticeship as highest formal education - 53.68 percent of all men, but only 33.45 percent of all women. Among women medium-level technical/vocational school (BMS - Berufsbildende mittlere Schule) is more poupular than among men, 19.79 percent of all women attended a medium-level technical/vocational school but only 7.64 percent of all men did. About one half of the men are white collar workers and 71.64 percent of the women. Applying a 70-30 rule for industries, defining a female industry as an industry with a fraction of female workers greater than 70 percent and a male industry as an industry with a fraction of female workers less than 30 percent, mining and quarying, manufactoring of wood, paper, furniture, metal and machinery, electricity, gas and water supply, construction and repair of cars/motorcycles are male dominated industries, while retail trade, hotels and restaurants, education and health and social work are female dominated.

Table 3.1: Summary statistics for the labor force concept

Variable	All	Men	Women
Number of observations	14,396	7,727	6,669
Unemployed	0.0483	0.0450	0.0522
Female	0.4633	0.0000	1.0000

[14]In the following university refers to university and Fachhochschule.

Table 3.1: continued

Variable	All	Men	Women
Age			
15-19	0.0661	0.0723	0.0588
20-24	0.1092	0.1048	0.1143
25-29	0.1104	0.1082	0.1131
30-34	0.1264	0.1241	0.1291
35-39	0.1556	0.1532	0.1583
40-44	0.1541	0.1531	0.1552
45-49	0.1257	0.1211	0.1309
50-54	0.0871	0.0859	0.0885
55-69	0.0654	0.0771	0.0519
Not born in Austria	0.1556	0.1584	0.1523
Highest Formal Education			
Compulsory school	0.1970	0.1774	0.2197
Apprenticeship	0.4431	0.5368	0.3345
BMS	0.1327	0.0764	0.1979
AHS	0.0492	0.0379	0.0624
BHS5	0.0888	0.0841	0.0943
BHS3	0.0090	0.0083	0.0099
HLA	0.0132	0.0080	0.0192
University	0.0669	0.0710	0.0621
White collar worker	0.5979	0.4955	0.7164
Industry			
Mining and quarrying	0.0033	0.0054	0.0009
Manufacturing			
Food, beverages and tobacco	0.0270	0.0290	0.0246
Textiles and leather	0.0144	0.0100	0.0196
Wood, paper, furniture	0.0501	0.0690	0.0282
Coke, petroleum, chemicals, plastics	0.0210	0.0273	0.0138
Metal, machinery	0.1271	0.1843	0.0609
Electricity, gas and water supply	0.0089	0.0119	0.0054
Construction	0.1100	0.1800	0.0289
Repair of cars/motorcycles	0.0265	0.0392	0.0118
Wholesale	0.0499	0.0568	0.0418
Retail trade	0.1125	0.0549	0.1792
Hotels and restaurants	0.0745	0.0405	0.1138
Transport, storage, communication	0.0611	0.0786	0.0408
Financial intermediation	0.0420	0.0369	0.0480
Real estate, renting, business activities	0.0797	0.0698	0.0912
Public administration and defence; compulsory social security	0.0340	0.0280	0.0411

Table 3.1: continued

Variable	All	Men	Women
Education	0.0268	0.0141	0.0415
Health and social work	0.0870	0.0333	0.1493
Other community, social and personal service activities	0.0441	0.0312	0.0591
Professional position			
No formal skills (manual and non-manual)	0.0944	0.0660	0.1273
Apprenticeship contract	0.0496	0.0594	0.0382
Low skilled (manual)	0.2073	0.2072	0.2074
Medium skilled (manual)	0.1954	0.2650	0.1147
Medium skilled (non-manual)	0.2509	0.1614	0.3546
High skilled	0.0949	0.0928	0.0973
Highly qualified (non-manual)	0.0383	0.0437	0.0321
High skilled (manual)	0.0200	0.0339	0.0039
Managers (non-manual)	0.0492	0.0705	0.0244
Region			
Burgenland	0.0796	0.0771	0.0825
Northern Austria	0.2386	0.2443	0.2320
Southern Austria	0.2160	0.2217	0.2095
Western Austria	0.3527	0.3485	0.3576
Vienna	0.1130	0.1083	0.1185
Household size	3.2619	3.3325	3.1801
Single parent	0.0901	0.0664	0.1176
Married	0.5143	0.5140	0.5146
Owning an apartment	0.0902	0.0849	0.0963
Owning a house	0.5208	0.5390	0.4996
Quarter			
First	0.2453	0.2437	0.2473
Second	0.2485	0.2539	0.2423
Third	0.2572	0.2525	0.2626
Fourth	0.2490	0.2499	0.2479
Year			
2004	0.2452	0.2467	0.2435
2005	0.2458	0.2483	0.2428
2006	0.2524	0.2496	0.2555
2007	0.2567	0.2553	0.2582

Table 3.1 presents means of personal, job, household and time characteristics of men, women and all people in the labor force concept sample.

After applying the subsistence concept 14,522 observations remain. The resulting sample contains 46 percent women, who have an unemployment rate of 6.7 percent.

The unemployment rate among men is 6.9 percent. The overall unemployment rate in the pooled LUK-sample with 6.81 percent is about 2 percentage points above the LFC-rate with a smaller and reversed gap between the female and the male rate. Most characteristics including the (fe)male industries are quite similar to those of the LFC (see Table B.3).
The PES conform sample contains 13,727 observations of which 43.38 percent are female. The overall unemployment rate is 6.61 percent. As in the case of the LFC the female rate, 7.11 percent, is above the male rate, 6.23 percent. Again most of the characteristics are very similar to the LFC and the subsistence concept (see Table B.4). While male industries are the same as for the LFC and the LUK, female industries are reduced to retail trade and health and social work. Remembering the unemployment rates introduced in chapter 2, the construction of a PES conform sample seems to have failed. Although the male unemployment rate in the PES sample should be above the female one, it is the other way around. The female unemployment rate is about 0.87 percentage point higher than the male unemployment rate. The causes of this reversion cannot be identified, but there are some explanations for this. The data set lacks information on marginal work, thus it is not possible to exactly distinguish marginal work from part time. The share of female part timers is larger than the share of male part time workers. My construction of the PES sample may push part time workers out of the labor force, because they are assumed to be marginal workers, who would have been in the labor force according to the national definition. This misclassification increases the observed unemployment rate in the PES sample and affects the female rate more than the male rate. Another explanation could be that men have a higher tendency to lie about their unemployment experience, because of social pressure to fit in the role of the male bread-earner.

3.3 Results

When using female as the only explanatory variable, a significant positive effect for the LFC and the national concept, for the linear probability model, the probit model and the logit model is observable. Female increases the probability of being unemployed by about 0.7-0.9 percentage point. These numbers may seem small, but relating them to the relatively low unemployment in Austria, this effect is not so small. For the labor force concept women have a 15.9 percent higher unemployment probability than men. In the case of the national concept, women's probability exceeds that of men by 14

percent. According to the subsistence concept, female has a negative but insignificant impact on the unemployment probability.

Table 3.2: Results on female

Model		Coeff.	Std.Err.	Marg.Eff.
LFC	LPM	0.0071*	0.0037	0.0071
	Probit	0.0710*	0.0356	0.0071
	Logit	0.1548*	0.0777	0.0071
LUK	LPM	−0.0026	0.0043	−0.0026
	Probit	−0.0197	0.0319	−0.0026
	Logit	−0.0409	0.0662	−0.0026
PES	LPM	0.0087**	0.0043	0.0087
	Probit	0.0676*	0.0332	0.0087
	Logit	0.1405*	0.0470	0.0087

Table 3.2 presents the estimation results, when the dummy variable female is the only explanatory variable. The reported coeffiecients, standard errors and marginal effects are those of the dummy variable female.

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

Ignoring any other explanatory variables causes an omitted variable bias, because effects that systematically vary with sex are captured by the female dummy variable. For example the different distribution concerning education and industry are partly captured by female and partly enter the residuals. Moreover, we are interested in the effect of being female given a certain age, educational attainment et cetera. Thus I control for these characteristics step by step. After controlling for age education, land of birth, white collar workers, industries or female industries respectively, region and domestic variables, being female loses its impact according to all definitions of unemployment (Table 3.3). The full regression outputs are provided in Appendix B. Besides the probit estimate in the PES sample, none of the estimated coefficients on female are significant. Interestingly, though statistically insignificant, the coefficient on female in the LFC sample when using the linear probability model now is negative.

Table 3.3: Results on female controlled

Model		Coeff.	Std.Err.	Marg.Eff.
LFC	LPM	−0.0004	0.0045	−0.0004
	Probit	0.0379	0.0445	0.0031

Table 3.3: continued

Model		Coeff.	Std.Err.	Marg.Eff.
	Logit	0.0493	0.0950	0.0017
	LPM	−0.0073	0.0051	−0.0073
LUK	Probit	−0.0296	0.0409	−0.0031
	Logit	−0.0862	0.0835	−0.0039
	LPM	0.0047	0.0051	0.0047
PES	Probit	0.0779*	0.0427	0.0079
	Logit	0.1320	0.0874	0.0059

Table 3.3 presents the estimation results for thethe dummy variable female, controlled for age, education, land of birth, white collar worker, industries, professional positions, regions, single parent, married, owning a house or an appartment and quarters. The reported coeffiecients, standard errors and marginal effects are those of the dummy variable female.
* p<0.05, ** p<0.01, *** p<0.001

Age does not play an important role except for the age groups 15-19 years and 55-69 years. Being 15-19 years old significantly decreases the probability of being unemployed in all concepts. Which is consistent with Austria's traditionally low unemployment among young people. The age group 55-69 has an increasing effect on the unemployment probability in the subsistence and the national concept. Reflecting the harder labor market conditions for elderly people, since firms tend to hire young people. The insignificant negative effect in the labor force concept might be explained by two factors: First, people in this age group being marginal workers are considered as employed even though they already entered the advanced or the regular pension system and thus are classified as out of labor force in the other two concepts. Second, since the labor market for these people is tighter than for other age groups, the probability ending up as a discouraged worker waiting to enter the pension system is higher. Discouraged workers are considered to be out of labor force according to the LFC, but dependent on being registered at the PES are unemployed according to the national concept. When considering the LUK, it depends on whether discouraged workers tend to report themselves as unemployed. Almost every additional education to compulsory schooling decreases the probability of unemployment. The educational effect is present in each of the concepts, but the LPM found those effects to be more significant than the probit and the logit model. For example holding an academic degree has a negative but insignificant effect

in the LFC when estimating the probit and the logit models. Furthermore, there are no differences in the magnitude of the effects. An apprenticeship has the same decreasing effect as an academic secondary school and an academic degree. The country of origin has an increasing impact in the LFC and the LUK, but is insignificant in the PES. One has to be careful in interpreting this as discrimination against workers with migration background. The data, for example, does not provide any information about language skills, which of course play a major role in hiring migrants. The insignificant PES estimate may be due to lacking eligibility of benefits. Industries with strong seasonality are found to be significantly positive. In all concepts and models retail trade, construction and hotels and restaurants have an increasing effect[15], although controlling for quarters. The most influential group of explanatory variables is professional position. Every additional skill level decreases the unemployment probability throughout all concepts and models. The linear probability model estimates decreases of more than five percentage points. The partial effects of the probit and the logit model are smaller with decreases of more than 2 percentage points in the probit case and even smaller estimates in the logit case. Regions are important in determining the unemployment probability. Except for Burgenland all other regions have a highly significant negative impact. Unfortunately, it is not clear what these region variables measure exactly. One part of their impact is due to different labor market conditions in different regions, but there may well be industrial effects of industries concentrated in those regions and mobility effects. Being married decreases the probability in all concepts. This could be the result of decreasing firms reputation,when firing a married person, or that married individuals, especially men, are more productive, due to a relatively stable life style and less household responsibilities. In contrast, a single parent has a significantly higher probability in the LFC and the LUK case. An explanation could be the lower productivity as it is not possible to share household and child caring responsibilities with their partners. Less flexibility because of the closing hours of kindergartens or school holidays could be an additional explanation. As expected the quarters do not have importance in the LFC sample, but in the LUK as well as in the PES sample. The probability of unemployment is lowest in the third quarter and reaches its maximum in the first quarter. It is about 2-3 percent lower in the third quarter than in the first quarter depending on the applied concept and model. But some of the seasonal effects are captured by the industry dummies,

[15]Due to climatic conditions constructions and hotels and restaurants face a strong seasonality. While during the cold winter construction is almost shut down, hotels and restaurants has the skiing season. During the summer hotels and restaurants has its second shorter season and construction has its main season.

especially for construction and hotels and restaurants.
In order to check the poolability of the four years, I allowed the intercept to vary over time. Since in all regression they were jointly insignificant, I dropped them. Female and male industries were not significant and thus these results are not reported.
The interesting point is, when the female variable becomes insignificant in the LFC and the PES version - after controlling for industry or professional position. Two possible explanations for this result are: First, every skill level lowers the unemployment probability, but the fraction of women having no formal skills is larger than the male fraction. Second, the fraction of highly skilled women (manual and non manual), is lower than the fraction of men. The decreasing impact of professional position is strongest for highly skilled individuals. Consequently, taking professional position into account lowers the higher female unemployment probability down to a level of no significance. The sex separated regressions also indicate, that men and women have different marginal effects with a higher decrease for men. Thus controlling for professional position might mask another discriminatory process such as glass ceiling effects[16]. The same seems to be true, when using occupations instead of professional position with a larger equalizing effect between men and women. Omitting industry and professional position in estimating the female impact one obtains a highly significant positive effect, no matter whether the linear probability, the probit or the logit model is used and no matter whether the LFC or the PES concept is applied. But one has to be aware of the omitted variable bias which occurs due to ignoring industry or professional position.
The sex separated regressions also indicate that the impact of some other variables varies with respect to sex. For example, none of the regional dummy variables, except for Burgenland, is significant in the female regression, contrary to the male regression. The same is true for quarters, which are insignificant in the female sample, but significant in the male sample. Comparing the female, male and overall sample it seems, that the significance in the overall sample is almost always driven by one of the subgroups.
To evaluate whether the determinants of the unemployment probability vary with sex, I run a Chow test for the linear regressions, which verifies the consideration of differences in the male and the female model.
In order to analyze, which of the explanatory variables widen and which of them narrow the initial gap, for the specification with female as the only regressor, a Cotton decomposition is done.
It seems that the LPM captures the main features. Thus I only use the linear probabil-

[16]Cf. Cotter, David A. et al. (2001), p. 657.

ity model for all further analyses, because its underlying linearity makes it much easier to handle. For example, see Farilie (1999) for a Blinder Oaxaca-style decomposition in a non-linear world. While the linear version introduced by Blinder and Oaxaca uses only some basic calculations, the decomposition proposed by Fairlie needs a matching process for the subgroups and a reordering procedure for the regressors without any guarantee that convergence is achieved. Adding interaction terms to compare the male and female results is not straight forward in the case of non-linear functions, if partial effects are of interest. The interaction effect could be different from zero even if the interaction coefficient is equal to zero, the interaction effect can have different signs for different observations and statistical inference can not be based on the coefficient but on the whole derivate.

3.3.1 Chow Breakpoint Test

A Chow test is an F-test testing for structural breaks in the coefficients of a linear regression or in other words testing whether the coefficients of two linear regressions on different subgroups of a sample or different data sets are equal to each other.
The unrestricted model is

$$y_i = \beta_{10} + \beta_{11}x_{1i} + \beta_{12}x_{2i} + \ldots + \beta_{1k}x_{ki} + \epsilon \tag{3.16}$$

where $i = 1, \ldots, n_1$ and

$$y_i = \beta_{20} + \beta_{21}x_{1i} + \beta_{22}x_{2i} + \ldots + \beta_{2k}x_{ki} + \epsilon \tag{3.17}$$

where $i = 1, \ldots, n_2$.
The restricted model is

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki} + \epsilon \tag{3.18}$$

where $= 1, \ldots, n = n_1 + n_2$.
We want to test

$$H_0 : \beta_{10} = \beta_{20} \wedge \beta_{11} = \beta_{21} \wedge \beta_{12} = \beta_{22} \wedge \ldots \wedge \beta_{1k} = \beta_{2k}$$

against

$$H_1 : \beta_{10} \neq \beta_{20} \vee \beta_{11} \neq \beta_{21} \vee \beta_{12} \neq \beta_{22} \vee \ldots \vee \beta_{1k} \neq \beta_{2k}$$

This can be done by a F-test

$$F = \frac{RSSR - USSR}{USSR} \frac{p}{n - 2p} \tag{3.19}$$

where RSSR is the sum of squared residuals from the restricted model, USSR is the sum of squared residuals from the unrestricted model, which is simply the sum of the sum of squared residuals from (3.16) and (3.17), n is the number of observations and p is the number of parameters. Equation (3.19) holds in the absence of heteroskedasticity. "Unfortunately, as with any F test based on sums of squared residuals or R-squared, this test is not robust to heteroskedasticity."[17] A robust version of the Chow test cannot be computed by using the sum of squared residuals. Alternatively one can use a heteroskedasticity robust Wald statistic

$$W = (\mathbf{R}\hat{\beta} - \mathbf{r})\prime(\mathbf{R}\hat{\mathbf{V}}\mathbf{R}\prime)^{-1}(\mathbf{R}\hat{\beta} - \mathbf{r}) \tag{3.20}$$

where $H_0 : \mathbf{R}\beta = \mathbf{r}$, $\mathbf{R}$ is a $q \times k$ matrix with q being the number of restrictions and $rank(\mathbf{R}) = q \leq k$, $\mathbf{r}$ is a $q \times 1$ vector and $\hat{\mathbf{V}}$ is the heteroskedasticity robust variance matrix estimator[18]. Under the null hypothesis the Wald statistic is asymptotically χ^2_q distributed.

Using the heteroskedasticity robust Wald test, one estimates the fully interacted model, allowing the intercept and the slope to vary with the groups (here sex), and tests all the interactions jointly against zero. This procedure restricts the variance of the residuals to be equal in the groups when pooling the data. But since there are no big differences in any of the concepts it is not necessary to apply a technique without constraining the variance.

The null hypothesis is clearly rejected at 5 percent in each concept. Thus the model for men differs from the model for women.

Table 3.4: Wald statistics and p-values

Concept	Wald statistic	p-value
LFC	1.42	0.0259
LUK	1.56	0.0069
PES	1.68	0.0018

Table 3.4 presents the Wald statistics and corresponding p-values for the fully

[17] Wooldridge (2006), p. 454.
[18] Equation (3.6).

Table 3.4: continued

Concept	Wald statistic	p-value

interacted model.

3.3.2 Interaction terms

In section 3.3.1 the evidence for the differences in the female and the male model has been shown. Now, I investigate these differences more detailed, which is done by blockwise testing, adding separately all age variables, all educational variables, et cetera and test them separately. The results are reported in Table 3.5. While the impact of age, education, country of origin, white collar worker, industry and owning an appartment does not vary with sex, all other blocks show at least a weak tendency to be different for women with all of them indicating a higher female probability within the blocks.

Table 3.5: Wald statistics and p-values for the blockwise interacted models

Block	LFC		LUK		PES	
	Wald	p-value	Wald	p-value	Wald	p-value
Age	1.20	0.2933	1.02	0.4184	1.71	0.0897
Education	1.66	0.1146	0.94	0.4772	0.67	0.6969
Not born in Austria	0.01	0.9394	1.15	0.2843	0.54	0.4618
White collar worker	0.27	0.6020	0.00	0.9925	0.01	0.9120
Industry	1.15	0.3074	0.78	0.6903	1.36	0.1611
Professional position	1.76	0.0799	2.88	0.0034	2.53	0.0096
Region	2.67	0.0303	4.51	0.0012	1.60	0.1725
Single parent	0.44	0.5066	4.92	0.0266	2.45	0.1161
Married	1.38	0.2398	2.96	0.0855	0.99	0.3190
Owning an apartment	0.06	0.8108	0.19	0.6649	0.05	0.8289
Owning a house	6.56	0.0104	13.41	0.0003	2.78	0.0958
Quarter	1.58	0.1919	2.65	0.0474	5.55	0.0008

Table 3.5 presents the Wald statistics and corresponding p-values for the blockwise interacted modell. Each block (age, education, et cetera) is separately added to model with female being the only explanatory, and is separately tested.

The subsistence concept contains most differences with 6 blocks being significant at least at a 10 percent level. The effect of professional position, region, single parent, married, owning a house and quarter are different for women. The impact of professional position varies with sex in all of the concept. While the female interactions with

region and owning an apartment are found to be significant in the labor force and the subsistence concept, there is no evidence that women have different coefficients in the national concept. The interaction effect of single parent and married is found to be significant in the subsistence concept only. The concept with the lowest seasonality - the labor force concept - does not show any differences of the seasonality concerning sex. When the seasonality becomes stronger as in the case of the subsistence and the national concept one can indeed find sex differences.

3.3.3 Decomposition

The interpretation of the estimation results presented in Section 3.3 is that $\hat{\beta}_j$ is the effect of a one unit change of x_j on the dependent variable, holding all other variables fixed. According to this the female coefficient has to be interpreted as the effect of being female given the same characteristics as men. It is already known from Section 3.2 that (on average) women are not endowed with the same characteristics as men. The decomposition of the unemployment risk differential allows to explicitly incorporate differences in endowments into the analysis.
Using the fact that the means of the explanatory variables and the dependent variable lie on the estimation plane, one can decompose the unemployment risk differential of two groups into two parts. One part of the differential is due to differences in endowments, and thus explained, and the other part is due to differences in the risk returns of the groups. The latter part is commonly interpreted as discrimination but captures the effects of omitted variables as well.
A special case of such an decomposition was introduced by Blinder (1973) and Oaxaca (1973). Assuming a linear model

$$y_i = \beta_0 + \sum_{j=1}^{k} \beta_j x_{ji} + \epsilon_i \qquad i = 1, \ldots, n \tag{3.21}$$

estimate (3.21) for both groups separately:

$$y_i^H = \beta_0^H + \sum_{j=1}^{k} \beta_j^H x_{ji}^H + \epsilon_i^H \qquad i = 1, \ldots, n^H \tag{3.22}$$

$$y_i^L = \beta_0^L + \sum_{j=1}^{k} \beta_j^L x_{ji}^L + \epsilon_i \qquad i = 1, \ldots, n^L \tag{3.23}$$

where the superscripts H and L indicate either the high-probability/high-risk group or the low-probability/low-risk group.[19]
A property of the ordinary least squares estimation is that

$$\bar{y} = \beta_0 + \sum_{j=1}^{k} \beta_j \bar{x}_j$$

and thus the raw differential of the average probability can be written as

$$\bar{y}_H - \bar{y}_L = \bar{\mathbf{x}}_H \beta_H - \bar{\mathbf{x}}_L \beta_L, \tag{3.24}$$

where $\bar{y}_i$ is the mean of the dependent variable, $\bar{\mathbf{x}}_i$ is a row vector containing the means of the explanatory variables and $\beta_\mathbf{i}$ is a vector containing the β_j's ($i = H, L$). Equation (3.24) can be extended to

$$\begin{aligned} \bar{y}_H - \bar{y}_L &= \left(\bar{\mathbf{x}}_H - \bar{\mathbf{x}}_L\right) \beta_\mathbf{L} + \bar{\mathbf{x}}_L \left(\beta_\mathbf{H} - \beta_\mathbf{L}\right) + \left(\bar{\mathbf{x}}_H - \bar{\mathbf{x}}_L\right) \left(\beta_\mathbf{H} - \beta_\mathbf{L}\right) \\ &= E + C + CE \end{aligned}$$

E is that part of the raw differential, which is caused by differences in endowments. Differences in the coefficients are described by C. The third part, CE, is the interaction between endowments and coefficients.
Using

$$\begin{aligned} \bar{\mathbf{x}}_H \beta_H - \bar{\mathbf{x}}_L \beta_L &= \bar{\mathbf{x}}_H \beta_H - \bar{\mathbf{x}}_L \beta_H + \bar{\mathbf{x}}_L \beta_H - \bar{\mathbf{x}}_L \beta_L \\ &= \left(\bar{\mathbf{x}}_H - \bar{\mathbf{x}}_L\right) \beta_H + \bar{\mathbf{x}}_L \left(\beta_H - \beta_L\right) \end{aligned}$$

equation (3.24) can then further be rewritten as

$$\bar{y}_H - \bar{y}_L = \left(\bar{\mathbf{x}}_H - \bar{\mathbf{x}}_L\right) \beta_H + \bar{\mathbf{x}}_L \left(\beta_H - \beta_L\right) \tag{3.25}$$

Equation (3.25) is a high-probability group based decomposition of the raw differential in average probability, the left-hand side of (3.25), into an explained part, i.e. differences in endowments, the first term on the right-hand side, and an unexplained part, i.e differences in coefficients, the second term on the right-hand side.

[19] Probability and risk are used interchangeably.

A low-probability group based decomposition has the form

$$\bar{y}_H - \bar{y}_L = (\bar{\mathbf{x}}_H - \bar{\mathbf{x}}_L)\,\beta_L + \bar{\mathbf{x}}_H\,(\beta_H - \beta_L)\,. \tag{3.26}$$

The difference of (3.25) and (3.26) can be found in their assumption about the non-discriminatory world. The high-probability based version assumes that in the absence of discrimination the high-probability group's risk return would prevail. Vice versa the low-probability group's risk return structure would prevail in the low-probability based version. In other words, (3.25) presumes pure nepotism toward the low-probability group, while (3.26) presumes pure discrimination of the high-probability group. Which one is true or whether both are true depends on the taste of the discriminator. "The true nature of discrimination may be empirically indiscernible."[20] Furthermore, when applying $W = I$ oder $W = 0$ actual differences in the risk returns are evaluated either at the high risk groups characteristics or the low risk characteristics, which ignores that the groups do not have the same characteristics. More generally the decomposition can be written as

$$\bar{y}_H - \bar{y}_L = (\bar{\mathbf{x}}_H - \bar{\mathbf{x}}_L)\,[W\beta_H + (I - W)\beta_L] + [\bar{\mathbf{x}}_H(I - W) + \bar{\mathbf{x}}_L W]\,(\beta_H - \beta_L)\,, \tag{3.27}$$

where W is a diagonal weighting matrix and I is the identity matrix. Setting $W = I$ yields the high-probability based version. If W is the nullmatrix one gets the low-probability based decomposition. Several weighting matrices are proposed in the literature by different authors mainly with respect to the decomposition of wage differentials. Reimers (1983) proposed to use the unweighted mean between the low-groups and the high-groups coefficients or setting the diagonal elements of W equal to 0.5 respectively. Cotton (1988) proposed to use the relative group size for weighting the coefficients, i.e. $W = f_H I$, where f_H is the relative frequency of the high-risk group. Using the coefficients from a pooled model was suggested by Neumark (1988).
For this analysis I choose Cotton's decomposition. This means I implicitly make two presumptions. Firstly, there is nepotism, as well as, discrimination. Secondly, in absence of nepotism and discrimination the risk returns equal the weighted means of the current returns, where the weights are the groups relative frequency. Hence in absence of discrimination the risk returns are between the current risk returns of both groups, but closer to that of the larger group.

[20] Neumark (1988), p. 285.

Table 3.6: Cotton decomposition

	LFC	LUK	PES
Prediction men	0.0450	0.0693	0.0623
Prediction women	0.0522	0.0667	0.0711
Difference (R)	0.0071	0.0026	0.0087
due to endowments (E)	0.0130	0.0060	0.0080
due to coefficients (C)	0.0090	0.0140	0.0100
due to interaction (CE)	−0.0150	−0.0180	−0.0090
f_H	0.4630	0.5400	0.4340
Explained (E)	0.0060	−0.0034	0.0039
Unexplained (U)	0.0012	0.0059	0.0049
E/R as %	83.5000	−129.5000	44.1000
U/R as %	16.5000	229.5000	55.9000

Women are the high-risk group in the LFC and the PES decomposition

Men are the high-risk group in the LUK decomposition

For the labor force concept the raw sex differential of the unemployment risk is 0.72 percentage points. 83.5% of this difference is due to differences in characteristics. The unexplained or discriminatory part accounts for 16.5%. When looking at the PES the raw differential, 0.87 percentage points, is somewhat higher than in the labor force concept. The unexplained part accounts for 55.9%, while the explained part accounts for 44.1%. The interpretation of the results in the LUK case is not so straight forward, since the explained part exceeds 100% and the unexplained part is negative. The raw differential is 0.03 percentage points, with men facing the higher risk. If men and women had the same characteristics, the male risk would be 0.06 percentage points higher than the female one. Or in other words, if men and women had the same endowments, then the new differential would be 2.29 times of the actual differential or the actual differential would increase by 129%. According to that, women are better off than men.
When comparing these results to other choices of W, the results are highly sensitive to a particular choice. The only concept which draws a clear picture, is the PES. Independently from the choice of W, i.e. independently whether one assumes that there is nepotism or discrimination or both, one can find discrimination or at least unexplained differences, which causes women to have a higher unemployment risk. Nevertheless the LFC decompositions tend to find a higher unexplained risk for women, and the LUK decompositions tend to find a higher unexplained risk for men.

4 Summary and concluding remarks

I analyzed whether women have a higher probability of being unemployed using data from the Austrian labor force survey for 2004, 2005, 2006 and 2007. Ignoring other characteristics women have a 0.7-0.9 percentage points higher probability of being unemployed than men, when applying the labor force concepts and the national concept. These findings are somewhat smaller than the results of Azmat, Guell and Manning (2006), who found that women's unemployment probability is one percentage point higher. Although this difference is relatively small in absolute terms, it means that the unemployment risk of women is 14-16% higher than that of men. Applying the subsistence concept yields a negative but statistically insignificant impact for women. After taking into account other observables such as age, education, industry, professional occupation, et cetera, the female-male gap virtually disappears. The main equalizing effects are those of professional position and industries, which were not taken into account by Azmat, Guell and Manning (2006). It is very likely that controlling for professional position masks a glass ceiling effect, a discriminatory process against women to prevent them to reach higher career levels.

Sex separated regressions indicate different male and female models. This is verified by a Chow test and adding interactions with the female dummy in the pooled regression. The impact of professional position varies with sex in all concepts. While the female interactions with region and owning a house are found to be significant in the labor force and the subsistence concept, there is no evidence that women have different coefficients in the national concept. The interaction effect of single parent and being married is found to be significant in the subsistence concept only. The concept with the lowest seasonality - the labor force concept - does not show any differences in seasonality with respect to sex. In the case of the subsistence and the national concept, the seasonality effect becomes stronger, and one can indeed find sex differences. The sex separated regressions suggested an effect of female interacted with industries. This effect was not confirmed.

Using a Cotton decomposition, I decomposed the raw sex difference in the mean unem-

ployment probability into an explained and an unexplained part. The unexplained part is usually interpreted as discrimination. I found an unexplained part of 16.5% of the raw differential in the LFC case and 55.9% in the PES case. I found the lowest difference in the LUK case, where men have a higher probability of about 0.3 percentage points. If men and women had the same characteristics, this difference would double. Comparing these results to other coefficient weighting schemes, showed that the results are highly sensitive to the choice of the weighting matrix.

The effect of the probably higher labor supply elasticity of women was not taken into account. This possibly causes a selection bias in all of the results. Theoretically, assuming that women with worse labor market prospect - usually lower educated, lower skilled women - , do not join the labor market at all, decreases the sex gap in the unemployment probability and perhaps lowers a discrimination effect. This could be overcome by using a Heckit procedure in estimations and to incorporate the Mills ratio in the decomposition[1]. Since the data set does not provide many additional variables which can be used in the selection equation of the Heckit procedure, another approach may be to include out-of-labor force women as unemployed women under certain circumstances.

In general, the analysis points out that the impact of being female depends on the applied concept. Not only the effect of being female is different when applying various concepts of unemployment, but also the differences between men and women differ, when using other definitions of unemployment. The analysis lacks a correction for sample selection, which is assumed to dampen the actual unexplained part or discriminatory effect.

In sum there seems to be a tendency that women face a higher risk of being unemployed due to discrimination or some unexplained differences between men and women, when applying the labor force concept and the national concept. In contrast, using the subsistence concept this tendency reversed. The unemployment risk of men is unexplainable higher than that of women. The exact causes of this reversion, i.e. the interconcept differences, remain unanswered and are open to further investigations.

[1] Cf. Reimers (1983).

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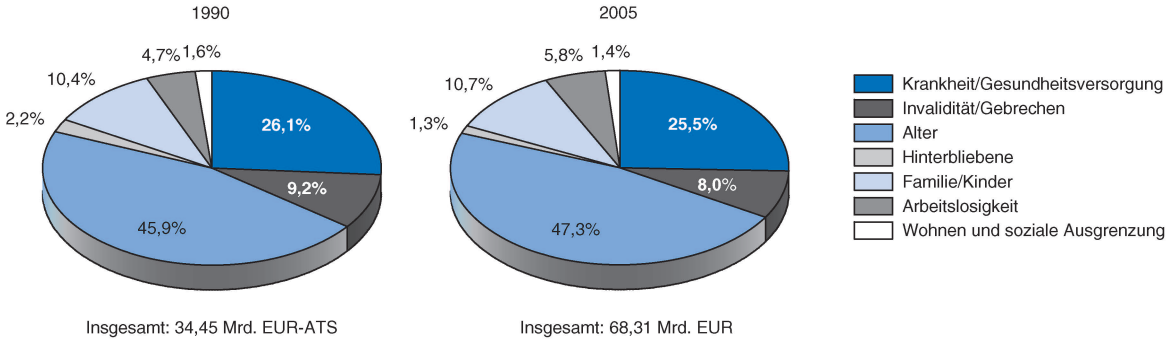
A Figures



Source: Statistik Austria - Statistisches Jahrbuch 2008

Figure A.1: Structure of social expenditure by function in 1990 and 2005

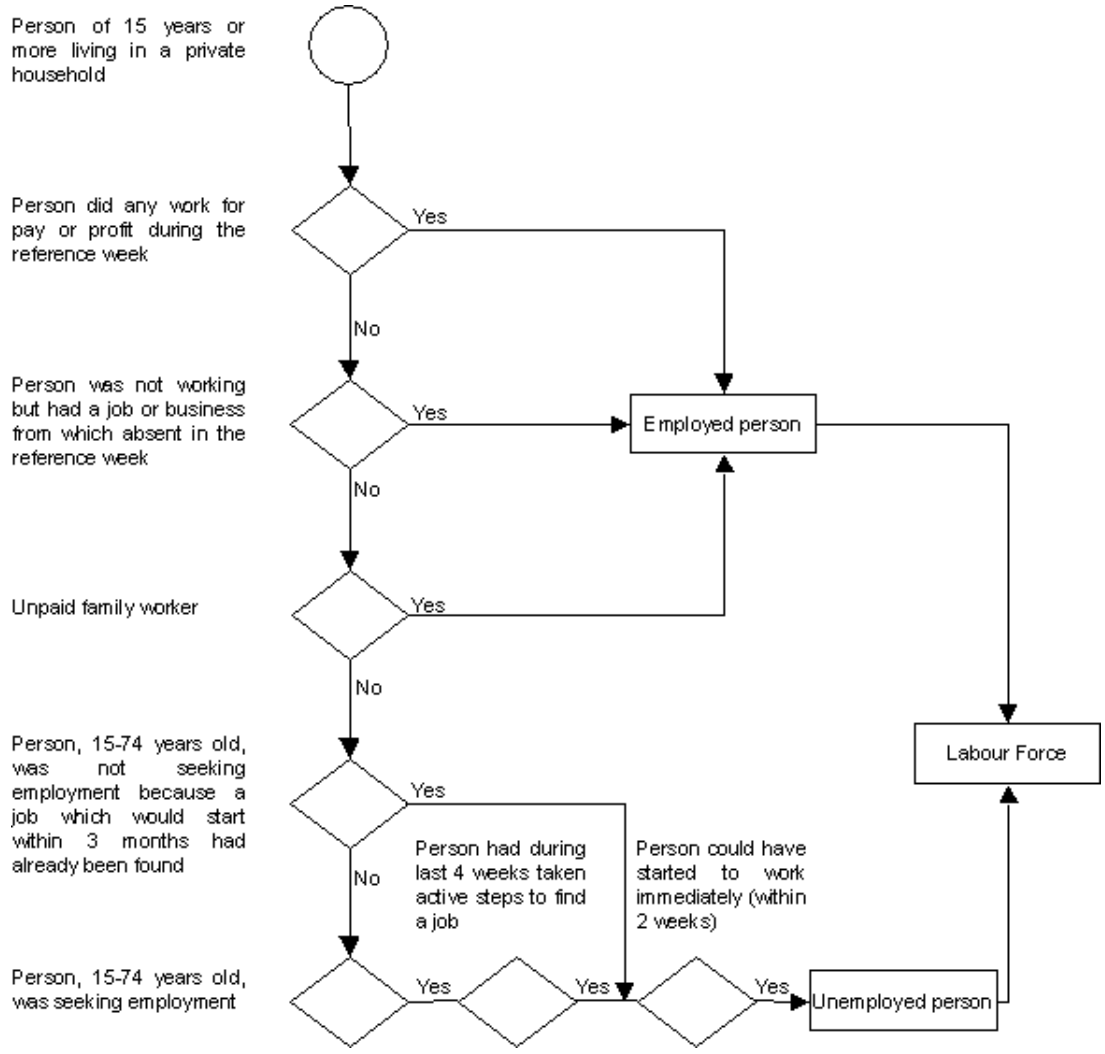


Figure A.2: Labor force concept

B Tables

Table B.1: Social expenditure for unemployment in Mio. EUR

	2001	2002	2003	2004	2005
Unemployment benefit[a]	947.20	1,115.25	1,120.47	1,100.50	1,136.90
Unemployment assistance and special unemployment assistance[a]	529.14	593.87	661.28	712.09	713.51
Special benefit and transitional allowance	44.85	42.61	40.59	56.63	88.25
Early retirement pension for unemployed	160.30	156.14	142.44	101.17	60.12
Bankruptcy contingeny fund	197.54	224.91	305.75	259.09	227.34
Active and activating labor market policies - Public Employment Service[b]	889.97	1057.92	1372.02	1539.43	1514.41
Labor market support schemes - Ausgleichstaxfonds, "Behindertenmilliarde"	105.42	113.35	128.04	150.45	147.70
Other social benefits[c]	37.24	51.88	40.73	41.73	51.19
Total	2,911.66	3,355.92	3,811.31	3,961.09	3,939.43

[a] Without activated passive funds.

[b] Skill training measures, measures to improve occupational/regional mobility, (re-)employment measures, unemployment benefit and assistance while on training, part-time benefit for older workers, ...

[c] Labor market support schemes of the "Länder", exemptions from charges, bad weather compensation, short-time working support.

Table B.2: Growth rate of real GDP

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Growth	1.9	2.6	1.8	3.6	3.3	3.4	0.8	0.9	1.2	2.3	2.0	3.3

Source: EUROSTAT

Table B.3: Summary statistics for the subsistence concepts

Variable	All	Men	Women
Number of observations	14,522	7,836	6,686
Unemployed	0.0681	0.0693	0.0667
Female	0.4604	0.0000	1.0000
Age			
15-19	0.0635	0.0701	0.0558
20-24	0.1072	0.1018	0.1135
25-29	0.1125	0.1064	0.1197
30-34	0.1292	0.1254	0.1336
35-39	0.1552	0.1529	0.1579
40-44	0.1534	0.1540	0.1527
45-49	0.1248	0.1220	0.1282
50-54	0.0882	0.0883	0.0881
55-69	0.0659	0.0790	0.0506
Not born in Austria	0.1627	0.1628	0.1626
Highest Formal Education			
Compulsory school	0.1997	0.1794	0.2235
Apprenticeship	0.4491	0.5435	0.3385
BMS	0.1312	0.0759	0.1961
AHS	0.0452	0.0342	0.0582
BHS5	0.0868	0.0812	0.0935
BHS3	0.0089	0.0082	0.0097
HLA	0.0125	0.0079	0.0179
University	0.0665	0.0697	0.0627
White collar worker	0.5889	0.4862	0.7092
Industry			
Mining and quarrying	0.0034	0.0056	0.0009
Manufacturing			
Food, beverages and tobacco	0.0270	0.0288	0.0248
Textiles and leather	0.0149	0.0101	0.0205
Wood, paper, furniture	0.0508	0.0696	0.0289
Coke, petroleum, chemicals, plastics	0.0210	0.0271	0.0139
Metal, machinery	0.1266	0.1835	0.0600
Electricity, gas and water supply	0.0089	0.0117	0.0055
Construction	0.1133	0.1863	0.0277
Repair of cars/motorcycles	0.0267	0.0393	0.0120
Wholesale	0.0499	0.0560	0.0426
Retail trade	0.1116	0.0537	0.1795
Hotels and restaurants	0.0771	0.0405	0.1201
Transport, storage, communication	0.0610	0.0784	0.0407

Table B.3: continued

Variable	All	Men	Women
Financial intermediation	0.0408	0.0362	0.0462
Real estate, renting, business activities	0.0783	0.0678	0.0906
Public administration and defence; compulsory social security	0.0333	0.0274	0.0401
Education	0.0261	0.0137	0.0407
Health and social work	0.0851	0.0329	0.1463
Other community, social and personal service activities	0.0441	0.0314	0.0591
Professional Position			
No formal skills (manual and non-manual)	0.0947	0.0673	0.1268
Apprenticeship contract	0.0496	0.0587	0.0390
Low skilled (manual)	0.2098	0.2094	0.2103
Medium skilled (manual)	0.1992	0.2694	0.1170
Medium skilled (non-manual)	0.2468	0.1584	0.3504
High skilled	0.0930	0.0909	0.0956
Highly qualified (non-manual)	0.0384	0.0431	0.0329
High skilled (manual)	0.0200	0.0336	0.0042
Managers (non-manual)	0.0483	0.0693	0.0238
Region			
Burgenland	0.0794	0.0771	0.0821
Northern Austria	0.2385	0.2434	0.2327
Southern Austria	0.2203	0.2237	0.2163
Western Austria	0.3466	0.3458	0.3474
Vienna	0.1153	0.1100	0.1214
Household size	3.2648	3.3258	3.1934
Single parent	0.0909	0.0669	0.1191
Married	0.5161	0.5167	0.5154
Owning an apartment/	0.0890	0.0835	0.0954
Owning a house	0.5127	0.5339	0.4879
Quarter			
First	0.2482	0.2485	0.2480
Second	0.2476	0.2523	0.2420
Third	0.2536	0.2483	0.2598
Fourth	0.2506	0.2509	0.2502
Year			
2004	0.2429	0.2469	0.2383
2005	0.2451	0.2481	0.2415
2006	0.2538	0.2499	0.2585
2007	0.2582	0.2551	0.2617

Table B.3 presents means of personal, job, household and time characteristics of men, women and all individuals in the subsistence concept sample.

Table B.4: Summary statistics for the national concept

Variable	All	Men	Women
Number of observations	13,687	7,749	5,938
Unemployed	0.0661	0.0623	0.0711
Female	0.4338	0.0000	1.0000
Age			
15-19	0.0670	0.0703	0.0626
20-24	0.1078	0.1026	0.1147
25-29	0.1047	0.1062	0.1027
30-34	0.1208	0.1258	0.1142
35-39	0.1550	0.1532	0.1573
40-44	0.1573	0.1537	0.1620
45-49	0.1301	0.1223	0.1401
50-54	0.0894	0.0867	0.0930
55-69	0.0679	0.0791	0.0534
Not born in Austria	0.1553	0.1600	0.1490
Highest Formal Education			
Compulsory school	0.1977	0.1791	0.2220
Apprenticeship	0.4523	0.5423	0.3350
BMS	0.1309	0.0755	0.2033
AHS	0.0462	0.0352	0.0605
BHS5	0.0864	0.0819	0.0923
BHS3	0.0088	0.0084	0.0093
HLA	0.0119	0.0076	0.0175
University	0.0658	0.0699	0.0603
White collar worker	0.5861	0.4872	0.7152
Industry			
Mining and quarrying	0.0036	0.0055	0.0010
Manufacturing			
Food, beverages and tobacco	0.0274	0.0285	0.0259
Textiles and leather	0.0143	0.0101	0.0199
Wood, paper, furniture	0.0517	0.0694	0.0286
Coke, petroleum, chemicals, plastics	0.0214	0.0272	0.0138
Metal, machinery	0.1311	0.1844	0.0615
Electricity, gas and water supply	0.0092	0.0119	0.0057
Construction	0.1176	0.1870	0.0269
Repair of cars/motorcycles	0.0276	0.0396	0.0120
Wholesale	0.0500	0.0565	0.0416
Retail trade	0.1078	0.0532	0.1792
Hotels and restaurants	0.0747	0.0404	0.1194
Transport, storage, communication	0.0625	0.0785	0.0418

Table B.4: continued

Variable	All	Men	Women
Financial intermediation	0.0408	0.0361	0.0470
Real estate, renting, business activities	0.0763	0.0667	0.0888
Public administration and defence; compulsory social security	0.0334	0.0277	0.0408
Education	0.0249	0.0134	0.0399
Health and social work	0.0829	0.0328	0.1484
Other community, social and personal service activities	0.0427	0.0310	0.0579
Professional Position			
No formal skills (manual and non-manual)	0.0909	0.0667	0.1224
Apprenticeship contract	0.0511	0.0581	0.0421
Low skilled (manual)	0.2080	0.2111	0.2039
Medium skilled (manual)	0.2024	0.2684	0.1162
Medium skilled (non-manual)	0.2429	0.1577	0.3540
High skilled	0.0946	0.0916	0.0985
Highly qualified (non-manual)	0.0386	0.0431	0.0328
High skilled (manual)	0.0205	0.0336	0.0035
Managers (non-manual)	0.0509	0.0697	0.0264
Region			
Burgenland	0.0794	0.0776	0.0818
Northern Austria	0.2385	0.2433	0.2322
Southern Austria	0.2188	0.2240	0.2120
Western Austria	0.3498	0.3479	0.3523
Vienna	0.1135	0.1072	0.1216
Household size	3.2434	3.3313	3.1288
Single parent	0.0894	0.0658	0.1201
Married	0.5099	0.5165	0.5013
Owning an apartment	0.0892	0.0840	0.0960
Owning a house	0.5202	0.5388	0.4960
Quarter			
First	0.2474	0.2480	0.2465
Second	0.2475	0.2520	0.2417
Third	0.2544	0.2492	0.2612
Fourth	0.2507	0.2507	0.2506
Year			
2004	0.2453	0.2467	0.2435
2005	0.2464	0.2484	0.2439
2006	0.2516	0.2487	0.2555
2007	0.2566	0.2562	0.2572

Table B.4 presents means of personal, job, household and time characteristics of men, women and all individuals in the national concept sample.

Table B.5: Estimation results labor force concept

Dependent variable: unemployed Number of observation: 14,437 Variable	LPM		Probit		Logit	
Female	−0.0004	(0.004)	0.0379	(0.045)	0.0493	(0.095)
15-19	−0.0345	(0.015)*	−0.3200	(0.127)*	−0.6731	(0.273)*
20-24	0.0089	(0.008)	0.0703	(0.077)	0.1543	(0.160)
25-29	0.0130	(0.008)	0.1149	(0.073)	0.2567	(0.153)
30-34	0.0055	(0.007)	0.0523	(0.072)	0.1143	(0.152)
35-39	−0.0008	(0.006)	−0.0020	(0.070)	−0.0213	(0.149)
45-49	−0.0039	(0.006)	−0.0453	(0.075)	−0.0883	(0.161)
50-54	−0.0135	(0.007)*	−0.1800	(0.088)*	−0.3654	(0.192)
55-69	−0.0058	(0.008)	−0.0511	(0.094)	−0.1044	(0.204)
Not born in Austria	0.0197	(0.007)**	0.1824	(0.052)***	0.3269	(0.109)**
Apprenticeship	−0.0268	(0.007)***	−0.2012	(0.054)***	−0.4199	(0.112)***
BMS	−0.0249	(0.008)**	−0.2097	(0.073)**	−0.4161	(0.155)**
AHS	−0.0347	(0.010)***	−0.2747	(0.100)**	−0.5775	(0.212)**
BHS5	−0.0328	(0.009)***	−0.2643	(0.088)**	−0.5680	(0.194)**
BHS3	−0.0424	(0.015)**	−0.4023	(0.254)	−0.8836	(0.598)
HLA	−0.0231	(0.015)	−0.1395	(0.194)	−0.2844	(0.436)
University	−0.0281	(0.010)**	−0.1741	(0.104)	−0.3563	(0.226)
White collar worker	−0.0046	(0.006)	−0.0562	(0.058)	−0.1196	(0.123)
Food, beverages and tobacco	0.0297	(0.014)*	0.3059	(0.119)*	0.6276	(0.247)*
Textiles and leather	0.0244	(0.018)	0.2944	(0.152)	0.5759	(0.319)
Wood, paper, furniture	0.0150	(0.009)	0.2008	(0.106)	0.3968	(0.230)
Coke, petroleum, chemicals, plastics	0.0056	(0.013)	0.0997	(0.145)	0.1724	(0.314)
Metal, machinery	0.0042	(0.007)	0.0720	(0.087)	0.1299	(0.192)
Construction	0.0242	(0.008)**	0.2667	(0.086)**	0.5695	(0.185)**

Table B.5: continued

Dependent variable: unemployed Number of observation: 14,437 Variable	LPM		Probit		Logit	
Repair of cars/motorcycles	0.0081	(0.011)	0.1127	(0.137)	0.2284	(0.298)
Wholesale	0.0103	(0.009)	0.1431	(0.110)	0.2626	(0.241)
Retail trade	0.0233	(0.007)**	0.2619	(0.083)**	0.5477	(0.178)**
Hotels and restaurants	0.0462	(0.010)***	0.4041	(0.084)***	0.8220	(0.177)***
Transport, storage, communication	0.0060	(0.008)	0.0949	(0.103)	0.1961	(0.224)
Financial intermediation	0.0108	(0.009)	0.1554	(0.122)	0.2717	(0.275)
Real estate, renting, business activities	0.0134	(0.008)	0.1921	(0.089)*	0.3734	(0.191)
Health and social work	−0.0062	(0.006)	−0.1144	(0.102)	−0.2669	(0.230)
Apprenticeship contract	−0.0397	(0.019)*	−0.1937	(0.132)	−0.3491	(0.278)
Low skilled (manual)	−0.0506	(0.010)***	−0.3096	(0.061)***	−0.5992	(0.121)***
Medium skilled (manual)	−0.0589	(0.010)***	−0.4059	(0.073)***	−0.8125	(0.151)***
Medium skilled (non-manual)	−0.0571	(0.011)***	−0.4008	(0.080)***	−0.7990	(0.166)***
High skilled	−0.0680	(0.011)***	−0.5772	(0.108)***	−1.2484	(0.241)***
Highly qualified (non-manual)	−0.0693	(0.012)***	−0.6456	(0.158)***	−1.4149	(0.372)***
High skilled (manual)	−0.0731	(0.013)***	−0.6275	(0.182)***	−1.3660	(0.431)**
Managers (non-manual)	−0.0582	(0.012)***	−0.4537	(0.130)***	−0.9580	(0.293)**
Burgenland	−0.0046	(0.011)	0.0556	(0.081)	0.1067	(0.163)
Northern Austria	−0.0373	(0.008)***	−0.2888	(0.066)***	−0.6023	(0.135)***
Southern Austria	−0.0339	(0.008)***	−0.2527	(0.067)***	−0.5100	(0.137)***
Western Austria	−0.0428	(0.008)***	−0.3453	(0.060)***	−0.7289	(0.122)***
Single parent	0.0261	(0.008)**	0.1928	(0.060)**	0.3841	(0.120)**
Married	−0.0133	(0.005)**	−0.1821	(0.047)***	−0.3864	(0.099)***
Owning an apartment	−0.0195	(0.006)***	−0.2124	(0.078)**	−0.4746	(0.176)**
Owning a house	−0.0159	(0.004)***	−0.1812	(0.045)***	−0.4077	(0.098)***

Table B.5: continued

Dependent variable: unemployed						
Number of observation: 14,437						
Variable	LPM		Probit		Logit	
Second	−0.0024	(0.005)	−0.0218	(0.053)	−0.0549	(0.111)
Third	−0.0084	(0.005)	−0.0899	(0.053)	−0.1835	(0.112)
Fourth	−0.0059	(0.005)	−0.0495	(0.053)	−0.1109	(0.112)
Constant	0.1607	(0.015)***	−0.9215	(0.115)***	−1.4430	(0.240)***

Table B.5 presents detailed estimation results for the linear probability, the probit and logit model when using the LFC sample. Marginal effects of the probit and logit estimates are presented in Table B.8.

* p<0.05, ** p<0.01, *** p<0.001, standard errors in parantheses

Table B.6: Estimation results subsistence concept

Dependent variable: unemployed						
Number of observations: 14,522						
Variable	LPM		Probit		Logit	
Female	−0.0073	(0.005)	−0.0296	(0.041)	−0.0862	(0.083)
15-19	−0.0401	(0.017)*	−0.2850	(0.116)*	−0.5630	(0.240)*
20-24	0.0085	(0.009)	0.0620	(0.070)	0.1412	(0.139)
25-29	−0.0023	(0.008)	−0.0022	(0.069)	0.0113	(0.140)
30-34	−0.0017	(0.007)	−0.0184	(0.067)	−0.0147	(0.136)
35-39	−0.0048	(0.007)	−0.0409	(0.065)	−0.0902	(0.134)
45-49	0.0010	(0.007)	0.0122	(0.068)	0.0263	(0.139)
50-54	0.0072	(0.008)	0.0577	(0.073)	0.1287	(0.148)
55-69	0.0576	(0.011)***	0.4135	(0.073)***	0.8332	(0.142)***
Not born in Austria	0.0226	(0.008)**	0.1689	(0.048)***	0.2930	(0.094)**
Apprenticeship	−0.0290	(0.008)***	−0.1680	(0.048)***	−0.3257	(0.095)***

Table B.6: continued

Dependent variable: unemployed Number of observations: 14,522 Variable	LPM		Probit		Logit	
BMS	−0.0238	(0.009)**	−0.1495	(0.065)*	−0.2645	(0.132)*
AHS	−0.0375	(0.011)***	−0.2352	(0.097)*	−0.4578	(0.199)*
BHS5	−0.0335	(0.010)***	−0.2144	(0.083)**	−0.4342	(0.177)*
BHS3	−0.0309	(0.020)	−0.1827	(0.210)	−0.2946	(0.436)
HLA	−0.0384	(0.014)**	−0.3611	(0.223)	−0.8100	(0.522)
University	−0.0360	(0.011)***	−0.2199	(0.103)*	−0.4738	(0.221)*
White collar worker	−0.0161	(0.007)*	−0.1236	(0.053)*	−0.2484	(0.107)*
Food, beverages and tobacco	0.0175	(0.015)	0.1524	(0.111)	0.3075	(0.221)
Textiles and leather	0.0239	(0.020)	0.2004	(0.137)	0.4002	(0.271)
Wood, paper, furniture	0.0185	(0.011)	0.1684	(0.092)	0.3428	(0.187)
Coke, petroleum, chemicals, plastics	−0.0032	(0.015)	0.0042	(0.132)	−0.0104	(0.272)
Metal, machinery	−0.0066	(0.008)	−0.0575	(0.078)	−0.1248	(0.163)
Construction	0.0428	(0.010)***	0.2988	(0.074)***	0.5993	(0.150)***
Repair of cars/motorcycles	−0.0057	(0.012)	−0.0697	(0.127)	−0.1440	(0.265)
Wholesale	0.0025	(0.010)	0.0206	(0.101)	0.0079	(0.212)
Retail trade	0.0235	(0.009)**	0.2029	(0.075)**	0.3874	(0.153)*
Hotels and restaurants	0.0561	(0.012)***	0.3744	(0.075)***	0.7248	(0.150)***
Transport, storage, communication	−0.0011	(0.009)	−0.0044	(0.092)	−0.0062	(0.192)
Financial intermediation	−0.0064	(0.009)	−0.1157	(0.125)	−0.3121	(0.283)
Real estate, renting, business activities	0.0168	(0.010)	0.1755	(0.080)*	0.3144	(0.162)
Health and social work	−0.0139	(0.007)	−0.2012	(0.094)*	−0.4363	(0.202)*
Apprenticeship contract	−0.0785	(0.022)***	−0.3634	(0.123)**	−0.6823	(0.251)**
Low skilled (manual)	−0.0692	(0.012)***	−0.3138	(0.055)***	−0.5845	(0.103)***
Medium skilled (manual)	−0.0802	(0.012)***	−0.4026	(0.064)***	−0.7730	(0.125)***

Table B.6: continued

Dependent variable: unemployed Number of observations: 14,522 Variable	LPM		Probit		Logit	
Medium skilled (non-manual)	−0.0843	(0.012)***	−0.4590	(0.074)***	−0.9074	(0.148)***
High skilled	−0.1037	(0.013)***	−0.7682	(0.106)***	−1.5889	(0.233)***
Highly qualified (non-manual)	−0.0975	(0.014)***	−0.6921	(0.146)***	−1.4195	(0.329)***
High skilled (manual)	−0.1191	(0.015)***	−0.8424	(0.173)***	−1.7463	(0.398)***
Managers (non-manual)	−0.0926	(0.014)***	−0.6051	(0.123)***	−1.1986	(0.268)***
Burgenland	−0.0182	(0.012)	−0.0573	(0.076)	−0.0989	(0.147)
Northern Austria	−0.0484	(0.009)***	−0.3170	(0.060)***	−0.6265	(0.117)***
Southern Austria	−0.0353	(0.010)***	−0.2054	(0.060)***	−0.3875	(0.116)***
Western Austria	−0.0582	(0.009)***	−0.3969	(0.055)***	−0.8061	(0.107)***
Single parent	0.0183	(0.009)*	0.1158	(0.056)*	0.2209	(0.109)*
Married	−0.0270	(0.005)***	−0.2474	(0.042)***	−0.4939	(0.084)***
Owning an apartment	−0.0259	(0.007)***	−0.2221	(0.072)**	−0.4652	(0.153)**
Owning a house	−0.0212	(0.005)***	−0.1767	(0.041)***	−0.3843	(0.084)***
Second	−0.0252	(0.006)***	−0.1990	(0.048)***	−0.4154	(0.095)***
Third	−0.0297	(0.006)***	−0.2372	(0.048)***	−0.4808	(0.095)***
Fourth	−0.0197	(0.006)**	−0.1437	(0.047)**	−0.2933	(0.092)**
Constant	0.2476	(0.017)***	−0.4810	(0.104)***	−0.6302	(0.205)**

Table B.6 presents detailed estimation results for the linear probability, the probit and logit model when using the LUK sample. Marginal effects of the probit and logit estimates are presented in Table B.8.

* p<0.05, ** p<0.01, *** p<0.001, standard errors in parantheses

Table B.7: Estimation results national concept

Dependent variable: unemployed						
Number of observations: 13,687						
Variable	LPM		Probit		Logit	
Female	0.0046	(0.005)	0.0779	(0.043)	0.1317	(0.087)
15-19	−0.0413	(0.017)*	−0.2836	(0.120)*	−0.5798	(0.250)*
20-24	0.0082	(0.009)	0.0691	(0.073)	0.1514	(0.146)
25-29	0.0051	(0.009)	0.0697	(0.073)	0.1419	(0.147)
30-34	0.0059	(0.008)	0.0499	(0.070)	0.1093	(0.141)
35-39	0.0014	(0.007)	0.0251	(0.066)	0.0239	(0.137)
45-49	0.0003	(0.007)	0.0140	(0.070)	0.0177	(0.143)
50-54	0.0066	(0.008)	0.0571	(0.076)	0.1242	(0.155)
55-69	0.0416	(0.011)***	0.3331	(0.077)***	0.6618	(0.153)***
Not born in Austria	0.0118	(0.008)	0.1014	(0.051)*	0.1563	(0.100)
Apprenticeship	−0.0346	(0.008)***	−0.1989	(0.050)***	−0.3906	(0.098)***
BMS	−0.0298	(0.009)**	−0.1834	(0.068)**	−0.3395	(0.137)*
AHS	−0.0492	(0.011)***	−0.3213	(0.103)**	−0.6731	(0.215)**
BHS5	−0.0446	(0.010)***	−0.3158	(0.089)***	−0.6527	(0.192)***
BHS3	−0.0317	(0.021)	−0.1544	(0.212)	−0.2585	(0.439)
HLA	−0.0351	(0.016)*	−0.2174	(0.209)	−0.5046	(0.474)
University	−0.0413	(0.011)***	−0.2459	(0.108)*	−0.5472	(0.234)*
White collar worker	−0.0149	(0.007)*	−0.1220	(0.055)*	−0.2434	(0.112)*
Food, beverages and tobacco	0.0143	(0.015)	0.1436	(0.116)	0.2652	(0.234)
Textiles and leather	0.0138	(0.020)	0.1332	(0.149)	0.2581	(0.296)
Wood, paper, furniture	0.0140	(0.011)	0.1506	(0.097)	0.2723	(0.200)
Coke, petroleum, chemicals, plastics	−0.0178	(0.014)	−0.1466	(0.148)	−0.3390	(0.315)
Metal, machinery	−0.0059	(0.008)	−0.0454	(0.081)	−0.1391	(0.171)
Construction	0.0473	(0.010)***	0.3536	(0.077)***	0.6957	(0.156)***

Table B.7: continued

Dependent variable: unemployed Number of observations: 13,687 Variable	LPM		Probit		Logit	
Repair of cars/motorcycles	0.0062	(0.013)	0.0595	(0.126)	0.0833	(0.262)
Wholesale	0.0075	(0.010)	0.0905	(0.103)	0.1257	(0.217)
Retail trade	0.0234	(0.009)**	0.2091	(0.078)**	0.3951	(0.160)*
Hotels and restaurants	0.0690	(0.012)***	0.4444	(0.078)***	0.8261	(0.155)***
Transport, storage, communication	0.0071	(0.010)	0.0830	(0.093)	0.1602	(0.192)
Financial intermediation	−0.0076	(0.009)	−0.1297	(0.133)	−0.3991	(0.310)
Real estate, renting, business activities	0.0107	(0.010)	0.1327	(0.085)	0.2125	(0.174)
Health and social work	−0.0213	(0.007)**	−0.2867	(0.101)**	−0.6658	(0.224)**
Apprenticeship contract	−0.0919	(0.021)***	−0.4865	(0.130)***	−0.9135	(0.270)***
Low skilled (manual)	−0.0681	(0.012)***	−0.3116	(0.057)***	−0.5850	(0.107)***
Medium skilled (manual)	−0.0831	(0.013)***	−0.4269	(0.067)***	−0.8219	(0.130)***
Medium skilled (non-manual)	−0.0855	(0.013)***	−0.4629	(0.077)***	−0.9103	(0.154)***
High skilled	−0.1019	(0.013)***	−0.7205	(0.108)***	−1.4870	(0.234)***
Highly qualified (non-manual)	−0.0982	(0.015)***	−0.7145	(0.154)***	−1.4868	(0.355)***
High skilled (manual)	−0.1117	(0.016)***	−0.7313	(0.166)***	−1.5342	(0.377)***
Managers (non-manual)	−0.1013	(0.014)***	−0.7927	(0.141)***	−1.6582	(0.326)***
Burgenland	−0.0194	(0.012)	−0.0743	(0.080)	−0.1387	(0.156)
Northern Austria	−0.0485	(0.009)***	−0.3320	(0.063)***	−0.6731	(0.125)***
Southern Austria	−0.0295	(0.010)**	−0.1713	(0.062)**	−0.3214	(0.121)**
Western Austria	−0.0529	(0.009)***	−0.3697	(0.058)***	−0.7421	(0.112)***
Single parent	0.0160	(0.009)	0.0969	(0.059)	0.1744	(0.115)
Married	−0.0235	(0.005)***	−0.2249	(0.044)***	−0.4426	(0.088)***
Owning an apartment	−0.0156	(0.007)*	−0.1125	(0.071)	−0.2386	(0.149)
Owning a house	−0.0190	(0.005)***	−0.1628	(0.043)***	−0.3603	(0.088)***

Table B.7: continued

Dependent variable: unemployed Number of observations: 13,687 Variable	LPM		Probit		Logit	
Second	−0.0224	(0.006)***	−0.1817	(0.049)***	−0.3716	(0.099)***
Third	−0.0307	(0.006)***	−0.2423	(0.050)***	−0.5043	(0.100)***
Fourth	−0.0197	(0.006)**	−0.1470	(0.048)**	−0.2964	(0.097)**
Constant	0.2394	(0.018)***	−0.5563	(0.108)***	−0.7435	(0.215)***

Table B.7 presents detailed estimation results for the linear probability, the probit and logit model when using the PES sample. Marginal effects of the probit and logit estimates are presented in Table B.8.

* p<0.05, ** p<0.01, *** p<0.001, standard errors in parantheses

Table B.8: Marginal effects for probit and logit

Dependent variable: unemployed	LFC		LUK		PES	
Variable	Probit	Logit	Probit	Logit	Probit	Logit
Female	0.0031	0.0017	−0.0030	−0.0039	0.0079	0.0059
15-19	−0.0202	−0.0180	−0.0240	−0.0208	−0.0232	−0.0205
20-24	0.0060	0.0056	0.0067	0.0068	0.0073	0.0071
25-29	0.0100	0.0097	−0.0002	0.0005	0.0073	0.0066
30-34	0.0044	0.0041	−0.0019	−0.0007	0.0052	0.0050
35-39	−0.0002	−0.0007	−0.0041	−0.0040	0.0026	0.0011
45-49	−0.0035	−0.0030	0.0013	0.0012	0.0014	0.0008
50-54	−0.0127	−0.0110	0.0062	0.0062	0.0060	0.0057
55-69	−0.0040	−0.0035	0.0569	0.0534	0.0423	0.0382
Not born in Austria	0.0165	0.0126	0.0192	0.0147	0.0108	0.0072
Apprenticeship	−0.0159	−0.0143	−0.0171	−0.0147	−0.0197	−0.0170

Table B.8: continued

Dependent variable: unemployed	LFC		LUK		PES	
Variable	Probit	Logit	Probit	Logit	Probit	Logit
BMS	−0.0147	−0.0125	−0.0141	−0.0111	−0.0165	−0.0134
AHS	−0.0178	−0.0158	−0.0203	−0.0174	−0.0253	−0.0228
BHS5	−0.0176	−0.0159	−0.0191	−0.0169	−0.0256	−0.0228
BHS3	−0.0228	−0.0209	−0.0163	−0.0118	−0.0137	−0.0102
HLA	−0.0100	−0.0087	−0.0278	−0.0263	−0.0183	−0.0179
University	−0.0123	−0.0107	−0.0194	−0.0181	−0.0207	−0.0196
White collar worker	−0.0046	−0.0042	−0.0130	−0.0116	−0.0125	−0.0110
Food, beverages and tobacco	0.0318	0.0288	0.0177	0.0161	0.0161	0.0131
Textiles and leather	0.0305	0.0260	0.0242	0.0219	0.0149	0.0128
Wood, paper, furniture	0.0190	0.0162	0.0197	0.0180	0.0169	0.0134
Coke, petroleum, chemicals, plastics	0.0087	0.0064	0.0004	−0.0005	−0.0131	−0.0129
Metal, machinery	0.0061	0.0047	−0.0057	−0.0055	−0.0044	−0.0059
Construction	0.0259	0.0244	0.0372	0.0340	0.0444	0.0395
Repair of cars/motorcycles	0.0100	0.0087	−0.0068	−0.0062	0.0063	0.0038
Wholesale	0.0129	0.0101	0.0022	0.0004	0.0097	0.0058
Retail trade	0.0253	0.0232	0.0238	0.0203	0.0241	0.0201
Hotels and restaurants	0.0441	0.0399	0.0499	0.0441	0.0606	0.0507
Transport, storage, communication	0.0082	0.0073	−0.0005	−0.0003	0.0089	0.0075
Financial intermediation	0.0142	0.0106	−0.0109	−0.0126	−0.0118	−0.0150
Real estate, renting, business activities	0.0179	0.0150	0.0204	0.0162	0.0146	0.0102
Health and social work	−0.0085	−0.0083	−0.0181	−0.0170	−0.0236	−0.0231
Apprenticeship contract	−0.0134	−0.0105	−0.0286	−0.0239	−0.0340	−0.0284
Low skilled (manual)	−0.0213	−0.0178	−0.0280	−0.0231	−0.0270	−0.0223
Medium skilled (manual)	−0.0265	−0.0228	−0.0343	−0.0291	−0.0350	−0.0296
Medium skilled (non-manual)	−0.0273	−0.0234	−0.0396	−0.0345	−0.0386	−0.0333

Table B.8: continued

Dependent variable: unemployed	LFC		LUK		PES	
Variable	Probit	Logit	Probit	Logit	Probit	Logit
High skilled	−0.0311	−0.0283	−0.0483	−0.0434	−0.0453	−0.0404
Highly qualified (non-manual)	−0.0309	−0.0283	−0.0424	−0.0378	−0.0418	−0.0374
High skilled (manual)	−0.0297	−0.0271	−0.0451	−0.0406	−0.0412	−0.0370
Managers (non-manual)	−0.0255	−0.0228	−0.0399	−0.0349	−0.0447	−0.0402
Burgenland	0.0047	0.0038	−0.0057	−0.0044	−0.0071	−0.0058
Northern Austria	−0.0204	−0.0182	−0.0287	−0.0250	−0.0290	−0.0257
Southern Austria	−0.0180	−0.0155	−0.0193	−0.0161	−0.0159	−0.0131
Western Austria	−0.0257	−0.0232	−0.0374	−0.0336	−0.0342	−0.0301
Single parent	0.0179	0.0154	0.0129	0.0110	0.0104	0.0082
Married	−0.0148	−0.0135	−0.0258	−0.0229	−0.0228	−0.0197
Owning an apartment	−0.0147	−0.0138	−0.0197	−0.0180	−0.0105	−0.0096
Owning a house	−0.0147	−0.0143	−0.0183	−0.0177	−0.0165	−0.0161
Second	−0.0017	−0.0019	−0.0189	−0.0173	−0.0169	−0.0151
Third	−0.0070	−0.0061	−0.0223	−0.0199	−0.0221	−0.0200
Fourth	−0.0039	−0.0037	−0.0140	−0.0126	−0.0139	−0.0123

Table B.8 presents marginal effects of the probit and logit estimates in Table B.5-B.7.

Table B.9: Estimation results for the linear probability model of the male samples

Dependent variable: unemployed						
Variable	LFC		LUK		PES	
15-19	−0.0156	(0.025)	−0.0198	(0.029)	−0.0268	(0.026)
20-24	0.0129	(0.011)	0.0037	(0.013)	−0.0028	(0.012)
25-29	0.0020	(0.010)	−0.0103	(0.011)	−0.0155	(0.011)

Table B.9: continued

Dependent variable: unemployed						
Variable	LPM		LUK		PES	
30-34	0.0052	(0.009)	0.0071	(0.010)	0.0071	(0.010)
35-39	−0.0035	(0.008)	−0.0086	(0.009)	−0.0101	(0.009)
45-49	0.0034	(0.008)	0.0100	(0.010)	0.0058	(0.010)
50-54	−0.0092	(0.009)	0.0147	(0.011)	0.0014	(0.011)
55-69	0.0049	(0.010)	0.0608	(0.014)***	0.0377	(0.013)**
Not born in Austria	0.0102	(0.009)	0.0146	(0.011)	0.0086	(0.010)
Apprenticeship	−0.0309	(0.011)**	−0.0387	(0.012)**	−0.0422	(0.012)***
BMS	−0.0181	(0.013)	−0.0288	(0.015)	−0.0393	(0.014)**
AHS	−0.0248	(0.017)	−0.0412	(0.019)*	−0.0473	(0.018)**
BHS5	−0.0325	(0.013)*	−0.0423	(0.015)**	−0.0511	(0.014)***
BHS3	−0.0328	(0.024)	−0.0362	(0.028)	−0.0324	(0.028)
HLA	−0.0420	(0.020)*	−0.0451	(0.026)	−0.0622	(0.021)**
University	−0.0383	(0.013)**	−0.0506	(0.015)***	−0.0534	(0.014)***
White collar worker	−0.0011	(0.008)	−0.0091	(0.009)	−0.0092	(0.008)
Food, beverages and tobacco	0.0337	(0.018)	0.0212	(0.020)	0.0012	(0.018)
Textiles and leather	−0.0136	(0.020)	−0.0058	(0.029)	−0.0251	(0.023)
Wood, paper, furniture	0.0098	(0.011)	0.0108	(0.014)	0.0031	(0.013)
Coke, petroleum, chemicals, plastics	−0.0118	(0.013)	−0.0172	(0.017)	−0.0338	(0.014)*
Metal, machinery	0.0024	(0.008)	−0.0086	(0.010)	−0.0099	(0.010)
Construction	0.0265	(0.009)**	0.0442	(0.012)***	0.0481	(0.012)***
Repair of cars/motorcycles	0.0107	(0.013)	−0.0013	(0.015)	0.0100	(0.016)
Wholesale	0.0092	(0.011)	−0.0042	(0.013)	0.0036	(0.013)
Retail trade	0.0176	(0.013)	0.0208	(0.016)	0.0152	(0.015)
Hotels and restaurants	0.0480	(0.018)**	0.0521	(0.020)*	0.0518	(0.020)*
Transport, storage, communication	0.0038	(0.010)	−0.0057	(0.013)	−0.0035	(0.012)

Table B.9: continued

Dependent variable: unemployed						
Variable	LPM		LUK		PES	
Financial intermediation	0.0176	(0.013)	0.0005	(0.014)	0.0037	(0.013)
Real estate, renting, business activities	0.0236	(0.012)	0.0159	(0.014)	0.0087	(0.013)
Health and social work	−0.0033	(0.011)	−0.0168	(0.014)	−0.0207	(0.012)
Apprenticeship contract	−0.0940	(0.031)**	−0.1593	(0.035)***	−0.1660	(0.032)***
Low skilled (manual)	−0.0744	(0.017)***	−0.1079	(0.020)***	−0.0926	(0.019)***
Medium skilled (manual)	−0.0877	(0.017)***	−0.1244	(0.020)***	−0.1181	(0.019)***
Medium skilled (non-manual)	−0.0845	(0.019)***	−0.1286	(0.021)***	−0.1206	(0.021)***
High skilled	−0.0987	(0.019)***	−0.1489	(0.021)***	−0.1340	(0.021)***
Highly qualified (non-manual)	−0.0965	(0.020)***	−0.1429	(0.023)***	−0.1303	(0.022)***
High skilled (manual)	−0.0957	(0.019)***	−0.1563	(0.021)***	−0.1412	(0.021)***
Managers (non-manual)	−0.0914	(0.019)***	−0.1398	(0.022)***	−0.1372	(0.020)***
Burgenland	−0.0193	(0.015)	−0.0284	(0.018)	−0.0230	(0.017)
Northern Austria	−0.0556	(0.012)***	−0.0740	(0.014)***	−0.0600	(0.013)***
Southern Austria	−0.0490	(0.012)***	−0.0539	(0.014)***	−0.0428	(0.014)**
Western Austria	−0.0591	(0.012)***	−0.0794	(0.013)***	−0.0645	(0.013)***
Single parent	0.0292	(0.013)*	0.0374	(0.014)**	0.0293	(0.014)*
Married	−0.0175	(0.006)**	−0.0344	(0.007)***	−0.0316	(0.007)***
Owning an apartment	−0.0244	(0.008)**	−0.0322	(0.009)***	−0.0169	(0.010)
Owning a house	−0.0228	(0.006)***	−0.0307	(0.007)***	−0.0214	(0.007)**
Second	−0.0102	(0.007)	−0.0389	(0.008)***	−0.0401	(0.008)***
Third	−0.0146	(0.007)*	−0.0396	(0.008)***	−0.0460	(0.008)***
Fourth	−0.0148	(0.007)*	−0.0314	(0.008)***	−0.0394	(0.008)***
Constant	0.2146	(0.024)***	0.3304	(0.027)***	0.3120	(0.026)***
Number of observations	7,727		7,836		7,749	

Table B.9 presents the results of estimating a linear probability model for each of the concepts male sample.

Table B.9: continued

Dependent variable: unemployed			
Variable	LPM	LUK	PES

* p<0.05, ** p<0.01, *** p<0.001, standard errors in parantheses

Table B.10: Estimation results for the linear probability model of the male samples

Dependent variable: unemployed						
Variable	LFC		LUK		PES	
15-19	−0.0549	(0.016)***	−0.0668	(0.019)***	−0.0582	(0.021)**
20-24	0.0029	(0.012)	0.0091	(0.013)	0.0174	(0.014)
25-29	0.0216	(0.012)	0.0003	(0.012)	0.0272	(0.014)
30-34	0.0044	(0.011)	−0.0139	(0.011)	0.0007	(0.012)
35-39	0.0021	(0.010)	−0.0013	(0.011)	0.0146	(0.011)
45-49	−0.0113	(0.010)	−0.0091	(0.011)	−0.0057	(0.011)
50-54	−0.0174	(0.010)	−0.0008	(0.013)	0.0130	(0.013)
55-69	−0.0203	(0.012)	0.0557	(0.019)**	0.0469	(0.019)*
Not born in Austria	0.0268	(0.011)*	0.0264	(0.011)*	0.0118	(0.012)
Apprenticeship	−0.0213	(0.010)*	−0.0190	(0.011)	−0.0276	(0.012)*
BMS	−0.0280	(0.010)**	−0.0206	(0.011)	−0.0248	(0.013)
AHS	−0.0411	(0.012)**	−0.0336	(0.014)*	−0.0502	(0.015)***
BHS5	−0.0325	(0.012)**	−0.0265	(0.013)*	−0.0394	(0.015)**
BHS3	−0.0534	(0.019)**	−0.0252	(0.028)	−0.0326	(0.032)
HLA	−0.0161	(0.020)	−0.0361	(0.017)*	−0.0231	(0.023)
University	−0.0135	(0.016)	−0.0204	(0.016)	−0.0278	(0.018)
White collar worker	−0.0150	(0.010)	−0.0309	(0.011)**	−0.0288	(0.012)*
Food, beverages and tobacco	0.0239	(0.021)	0.0112	(0.022)	0.0321	(0.025)
Textiles and leather	0.0427	(0.026)	0.0380	(0.027)	0.0396	(0.030)

Table B.10: continued

Dependent variable: unemployed						
Variable	LPM		LUK		PES	
Wood, paper, furniture	0.0339	(0.020)	0.0437	(0.023)	0.0454	(0.024)
Coke, petroleum, chemicals, plastics	0.0475	(0.032)	0.0285	(0.032)	0.0159	(0.032)
Metal, machinery	0.0167	(0.013)	0.0058	(0.014)	0.0075	(0.015)
Construction	0.0153	(0.016)	0.0232	(0.019)	0.0127	(0.020)
Repair of cars/motorcycles	0.0023	(0.023)	−0.0224	(0.023)	−0.0134	(0.027)
Wholesale	0.0086	(0.013)	0.0077	(0.015)	0.0078	(0.016)
Retail trade	0.0228	(0.009)*	0.0219	(0.011)*	0.0269	(0.011)*
Hotels and restaurants	0.0430	(0.013)***	0.0551	(0.014)***	0.0778	(0.016)***
Transport, storage, communication	0.0071	(0.014)	0.0036	(0.015)	0.0218	(0.018)
Financial intermediation	0.0041	(0.011)	−0.0127	(0.011)	−0.0192	(0.011)
Real estate, renting, business activities	0.0062	(0.011)	0.0192	(0.013)	0.0153	(0.014)
Health and social work	−0.0061	(0.008)	−0.0121	(0.009)	−0.0180	(0.010)
Apprenticeship contract	0.0135	(0.024)	0.0020	(0.027)	−0.0092	(0.029)
Low skilled (manual)	−0.0344	(0.013)**	−0.0406	(0.014)**	−0.0503	(0.016)**
Medium skilled (manual)	−0.0266	(0.015)	−0.0312	(0.017)	−0.0362	(0.019)
Medium skilled (non-manual)	−0.0337	(0.013)**	−0.0471	(0.015)**	−0.0508	(0.017)**
High skilled	−0.0448	(0.014)**	−0.0681	(0.015)***	−0.0729	(0.018)***
Highly qualified (non-manual)	−0.0550	(0.017)**	−0.0614	(0.019)**	−0.0723	(0.020)***
High skilled (manual)	−0.0585	(0.040)	−0.0880	(0.037)*	−0.0820	(0.049)
Managers (non-manual)	−0.0176	(0.021)	−0.0361	(0.023)	−0.0581	(0.022)**
Burgenland	0.0110	(0.015)	−0.0084	(0.016)	−0.0163	(0.017)
Northern Austria	−0.0172	(0.011)	−0.0218	(0.013)	−0.0359	(0.014)**
Southern Austria	−0.0180	(0.011)	−0.0182	(0.013)	−0.0151	(0.014)
Western Austria	−0.0248	(0.011)*	−0.0360	(0.012)**	−0.0397	(0.013)**
Single parent	0.0268	(0.011)*	0.0106	(0.011)	0.0116	(0.012)

Table B.10: continued

Dependent variable: unemployed						
Variable	LPM		LUK		PES	
Married	−0.0088	(0.007)	−0.0182	(0.008)*	−0.0120	(0.009)
Owning an apartment	−0.0144	(0.009)	−0.0187	(0.010)	−0.0128	(0.011)
Owning a house	−0.0084	(0.007)	−0.0104	(0.007)	−0.0159	(0.008)
Second	0.0068	(0.008)	−0.0083	(0.009)	0.0014	(0.009)
Third	−0.0018	(0.007)	−0.0185	(0.008)*	−0.0110	(0.009)
Fourth	0.0045	(0.008)	−0.0062	(0.009)	0.0060	(0.010)
Constant	0.1172	(0.018)***	0.1747	(0.021)***	0.1758	(0.022)***
Number of observations	6,669		6,686		5,938	

Table B.9 presents the results of estimating a linear probability model for each of the concepts female sample.

* p<0.05, ** p<0.01, *** p<0.001, standard errors in parantheses

C Construction of the PES conform sample

Note that the following is a non commented Stata code. All commands are very intuitive and thus clear, for the meaning of the variables see the codebook which is available at http://www.statistik.at .

```
*Generate variable unemployed
gen unemp=.

*recode PES benefits
recode hamsl (100000=1) (200000=2) (300000=3) (600000=4)

**drop economically inactive

drop if jlwi==1
drop if jlwi==2
drop if hnagrund==1
drop if bpras==1
drop if hamsl==3
drop if hamsl==130000
drop if hamsl==230000
drop if hamsl==500000
drop if carw==2 & chearw==2 & hams==2 & hamsl==0
drop if carw==2 & chearw==2 & hams==2 & hamsl==4
drop if carw==2 & cgrund==12 & hams==2 & hamsl==0
drop if carw==2 & chearw==2 & lgru==4
drop if cgrund==2
drop if cgrund==5
drop if chearw==3
drop if dweni==10
drop if cgrund==6 & hams==2 & unemp==.
drop if carw==2 & chearw==1 & cdau==1 & cfort==2 & hams==2 & unemp==.
drop if cgrund==15 & unemp==.
drop if dweni==15 & unemp==.
```

```
drop if dweni==16 & unemp==.
drop if xdstd6==0 & unemp==.


**detecting employed
replace unemp=0 if hamsl==400000
replace unemp=0 if cgrund==11
replace unemp=0 if carw==2 & chearw==1 & cgrund==1 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & cgrund==3 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & cgrund==10 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & dweni==1 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & dweni==2 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & dweni==3 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & dweni==4 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & dweni==13 & unemp==.
replace unemp=0 if cgrund==1 & unemp==.
replace unemp=0 if carw==1 & cherw==2 & estund>=0 & cgrund==3 & unemp==.
replace unemp=0 if carw==1 & cherw==2 & estund>=0 & dweni==3 & unemp==.
replace unemp=0 if cgrund==3 & unemp==.
replace unemp=0 if carw==1 & cherw==1 & unemp==. & hams==2 & hamsl==0
replace unemp=0 if carw==1 & cherw==1 & unemp==. & hamsl==4 & hams==2
replace unemp=0 if carw==1 & xdstd==2 & unemp==.
replace unemp=0 if carw==1 & xdstd6>=2 & xdstd6<=5 & unemp==.
replace unemp=0 if carw==1 & cherw==1 & dstd>=20 & unemp==.
replace unemp=0 if cfort==1 & unemp==.
replace unemp=0 if cgrund==8 & unemp==.
replace unemp=0 if cgrund==7 & unemp==.
replace unemp=0 if carw==2 & chearw==1 & cdau==2 & cgrund==4 & hams==2 &
& hamsl==0 & unemp==.

**detecting unemployed
replace unemp=1 if hamsl==1
replace unemp=1 if hamsl==2
replace unemp=1 if carw==2 & csich==2 & chearw==2 & hams==1
replace unemp=1 if carw==2 & chearw==1 & dweni==12 & unemp==.
replace unemp=1 if cgrund==6 & hams==1 & unemp==.

*using information fromlgru
drop if lgru==3 & unemp==.
drop if lgru==8 & unemp==.

*else
```

```
drop if carw==2 & csich==2 & hams==2 & unemp==.
drop if carw==2 & chearw==1 & cdau==1 & cfort==2 & hams==2 & unemp==.
drop if unemp==1 & xdstd6==0 & estund==-3
gen estund2=estund
replace estund2=0 if estund==-3
gen tmp=dstd+estund2
drop if unemp==0 & tmp<12
drop tmp estund2
```

Abstract

This study questions whether men and women have different probabilities of being unemployed in Austria. Three definitions of unemployment are used in Austria: the labor force concept from the International Labor Organization, the subsistence concept and a national definition. Each concept is applied to estimate the effect of being female on the unemployment probability using four subsamples of the Austrian Labor Force Survey of 2004, 2005, 2006 and 2007. The female sample unemployment rate exceeds the male one in the labor force and the national concept by about 14-16 percent. But no significant effects of being female can be found, after taking personal, household and job characteristics into account. This holds independently of using a linear probability, a probit or a logit model. The main reason for this is the equalizing effect of industries and professional positions. The decomposition of the raw risk-differential into a part attributable to differences in endowments and a second, unexplained part shows that about 16.5 percent of the raw differential in the labor force concept and 55.9 percent in the national concept are unexplainable by endowments. When applying the subsistence concept, women are better off than men. Men have a higher sample unemployment rate. If men had the same characteristics as women, the male unemployment probability would even be higher. The analysis points out that the impact of being female depends on the applied concept. There seems to be a tendency that women face a higher risk of being unemployed due to discrimination or some unexplained differences between men and women, when applying the labor force concept and the national concept. In contrast, using the subsistence concept this tendency reversed.

Zusammenfassung

Diese Arbeit untersucht, ob Frauen in Österreich mit höherer Wahrscheinlichkeit arbeitslos sind als Männer. In Österreich gibt es drei Definitionen von Arbeitslosigkeit: das labor force Konzept, das Lebensunterhaltskonzept und eine nationale Definition. Alle drei Konzepte werden verwendet, um den Effekt des Frauseins auf die Arbeitslosigkeitswahrscheinlichkeit zu schätzen. Hierfür werden Daten der österreichischen Arbeitskräfteerhebung aus den Jahren 2004, 2005, 2006 und 2007 verwendet. Unter Anwendung des labor force Konzepts und der nationalen Definition liegt die Arbeitslosenrate der Frauen 14-16 Prozent über jener der Männer. Unabhängig von den Konzepten und der Schätzmethode - linear probability Modell, Probit und Logit Modell - können, nach dem Kontrollieren für Personen-, Haushalts- und Berufscharakteristika, keine signifikanten Effekte gefunden werden. Der Hauptgrund hierfür liegt im angleichenden Effekt von Industrie und beruflicher Stellung. Die Zerlegung der Risikodifferenz in einen Teil bedingt durch Charakteristika und einen zweiten, unerklärten Teil zeigt, dass 16.5 Prozent der Differenz im labor force Konzept und 55.9 Prozent gemäß nationaler Definition nicht durch die Charakteristika erklärt werden können. Unter Verwendung des Lebensunterhaltskonzeptes sind Frauen besser gestellt. Die Arbeitslosenrate im Sample ist höher für Männer. Hätten Männer und Frauen dieselben Charakteristika, wäre das Arbeitslosigkeitsrisiko von Männern noch höher. Die Untersuchung zeigt, dass die Unterschiede zwischen Männern und Frauen abhängig vom verwendeten Konzept sind.

Curriculum Vitae

Personal Information

Name	Martina Fink
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Education

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