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Abstract

Using micro data from the Austrian Labor Force Survey from 1996 to 2010, this paper explores the effects on gender segregation of two opposing trends in gender differentials: decreasing gender differentials in participation rates and increasing gender differentials in the incidence of part-time jobs. To do so, we propose an index for the gender division of labor and look at the contributions of gender differences in participation, the incidence of part-time jobs, and in occupational choices to its evolution. Our main results show that the gender division of labor is very stable over the 15-year period. This is because the positive effects from the rising female labor force participation rates are counterbalanced by the negative effects from increasing gender differences in the incidence of part-time jobs. We also find that occupational segregation is the most important source of the gender division of labor and that its contribution remains stable throughout the entire period. These results are robust to alternative definitions of economic activity and labor market involvement and are also found after controlling for educational levels and fields.

JEL-Classification: J16, J24,J62

Keywords: gender division of labor, sources of gender segregation, segregation indexes, Mutual Information

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INTRODUCTION

In recent decades, female labor force participation has increased in all Western societies and, contrary to the ideal of the male breadwinner–female caretaker model, women did not leave these jobs after starting a family. By the end of the 20th century, this profound social transformation (a "revolution" in the words of Paula England 2010) meant that educational achievements—in terms of years of education—and economic and political rights had been equalized across genders (e.g., Claudia Goldin, Lawrence F. Katz, and Ilyana Kuziemko 2006). It is tempting to presume that with the gradual elimination of legal barriers, the increasing social acceptance of gender egalitarianism, and the greater need for specialized labor, Western societies would be rapidly approaching an egalitarian system in which equal rights are translated into equal work and pay across genders.

However, the division of labor that has emerged presents a picture that is more complex than the one portrayed in this egalitarian system. Gender differences persist in educational fields (Richard Anker 1998, Maria Charles and Karen Bradley 2009, Andrea Leitner and Anna Dibiasi 2015) and in working conditions (Eurofound 2011). Substantial increases in female participation rates and women's increasing access to higher positions in firms do not translate to decreasing levels of occupational segregation (Charles 2011, Juan Jose Dolado, Florentino Felgueroso, and Juan Francisco Jimeno 2003, Hadas Mandel and Moshe Semyonov 2006, Francesca Bettio and Alina Verashchagina 2009, Stephanie Steinmetz 2012). Although large increases in female market work are associated with decreases in time devoted to home production by women and with increases in men's hours of non-market work, gender differences in time spent on non-market work remain substantial (Dominique Anxo, Letizia Mencarini, Ariane Pailhé, Anne Solaz, Maria Letizia Tanturri, and Lennart Flood 2011, Mark Aguiar and Erik Hurst 2007).[1]

Empirical studies on gender differences in the labor market have been traditionally classified into two streams. On the one hand, traditional studies on occupational segregation by gender focus on gender differences in occupational choices within paid work. These studies ignore women's *unpaid work*, which not only is the sole type of work for a still sizable proportion of women but is also important for many active women and during career breaks. On the other hand, studies that focus on gender differentials in labor participation do not evaluate the extent to which participation decisions create and contribute to gender segregation. This dual approach takes place even though social scientists have long recognized the importance of the notion of the gender division of labor, i.e., the importance of the differences between women and men not only in the realm of paid work but also in unpaid work (Lena Gonäs and Jan Karlsson 2006, Colin Crouch 1999, Colette Fagan and Jill Rubery 1996). However, the empirical attempts to evaluate the relative role of paid and unpaid work on the gender division of labor are remarkably few. Philip N. Cohen's (2004) study of occupational segregation by gender in the US using the Index of Dissimilarity includes those who are "keeping house" as an independent occupational category. Ricardo Mora and Javier Ruiz-Castillo (2005) exploit a well-known property of the Mutual Information index M to quantify the contribution of the increasing female labor force participation in Spain on gender segregation.[2] More recently, Daniel Guinea-Martín, Ricardo Mora, and Javier Ruiz-Castillo (2013) apply this methodology to UK LFS data to consider the gender segregation of the entire working-age population and study the relative importance of gender differences in part-time work throughout the life cycle.

In this paper, we follow a similar approach to Guinea-Martín, Mora, and Ruiz-Castillo (2013) to propose a segregation index for the working-age population which we refer to as the Gender Division of Labor (GDL) index and is based on the M index of

segregation. We illustrate the usefulness of our approach using micro data from the Austrian Labor Force Survey, ALFS. The ALFS is part of the European Labor Force Survey, a survey that provides information not only on economic activity, labor force participation, occupational category and usual hours of work but also on two additional dimensions relevant for our analysis: first, the ALFS provides information on the type of non-paid work that those classified as (partly) inactive perform (for instance, working part-time and also doing work at home). Second, the ALFS dataset includes detailed information not only on the number of years of education but also on the educational field.

The originality of our paper is based on three points. First, our proposed GDL index can be decomposed to identify the relative role of gender differences in economic activity, labor market involvement, and occupational choice on the gender division of labor. Second, our analysis differs from that of Guinea-Martín, Mora, and Ruiz-Castillo (2013) because GDL uses a more detailed classification of activities for those who are inactive and focuses on recent trends in the evolution of gender segregation. Finally, we extend the notion of the gender division of labor to the notion of the gender division of education and labor and evaluate the importance of each different source of labor market segregation after controlling for the level of education and the choice of educational field in high school and college.

We focus on the Austrian labor market because of its recent trends. During the 1996-2010 period, the Austrian labor market experienced a large decrease in the gender differential in labor force participation rates that does not coincide with a fall in occupational segregation by gender (Leitner and Dibiasi 2015). Interestingly, Austria has also experienced a moderate decrease in the gender differential in the rate of managerial jobs within white-collar occupations and a large increase in gender differentials in part-time job

rates (Megan Gerecke 2013). These somewhat opposing findings highlight that the increased participation of women in paid work in Austria and the stability of occupational segregation are incomplete signals from a complex process of segregated integration.

The implementation of our methodological approach to the ALFS data allows us to study the relative importance of both occupational segregation and time devoted to labor market activities on the gender division of labor. Moreover, we can assess the extent to which the rising female labor force participation has reduced the gender division of labor and how the increased incidence of part-time jobs may have mitigated this positive trend.

THE AUSTRIAN SEGREGATED LABOR MARKET

Austria stands out as an interesting illustration with its relatively early integration of women into the workplace and its current high participation rates, high levels of female part-time work, and persistent levels of occupational segregation. In this section, we first review the trends reported elsewhere on gender segregation in the Austrian labor market. Then, we present stylized facts using the ALFS. Finally, we devote the last part of this section to substantiate our research goal in view of these stylized facts.

Trends of segregation in the Austrian labor market

Persistence in the levels of occupational segregation does not imply that the segregated structure of economic activity is the same as it was a few decades ago. The emergence of a group of women who fully devote their time to market activities traditionally associated with men and who cover household production using the market services provided

by other women is a driving factor towards gender equality. These women successfully pursue professional careers and contribute to decreases in gender differentials in managerial jobs and to the incidence of part-time jobs by creating a demand for household and caring services. However, as emphasized by some scholars, the increasing participation in the labor market is also resulting in a larger presence of so-called "female jobs" (Maria Charles and David B. Grusky 2005). More generally, several new sources of segregation counteract the desegregation effects of the emergence of women fully devoted to market activities (Stephanie Steinmetz and Johann Handl 2003, Theo Sparreboom 2014).

First, a large proportion of men are reluctant to compromise their own careers by devoting sufficient time to household work (Statistik Austria 2009, Claudia Geist 2005). Hence, many women with a family have to choose between sacrificing their full-time careers and outsourcing part of the domestic work with services provided by the market. This choice is conditioned by social conventions because the strategy of devoting most non-leisure time to market activities is perceived as acceptable for men, whereas when a woman, especially if she is a young mother, follows such a strategy, it is met with criticism (Georg Wernhart and Norbert Neuwirth 2007, Mylène Lachance-Grzela and Geneviève Bouchard 2010). The increase in female labor market participation can be associated with increases in part-time work rather than full-time work (Eurofound 2011). Many women who enter the labor market after a long career interruption end up in flexible part-time jobs in occupations with tasks similar to those traditionally carried out within the family. In practice, flexibility fosters female occupational concentration into special jobs—the so-called "pink ghettos"—and leads to increases in gender differentials in the incidence of part-time and managerial jobs (Steinmetz and Handl 2003, Elena Bardasi and Janet C Gornick 2008, Eleonora Matteazzi, Ariane Pailhé, and Anne Solaz 2014). These new channels of segregation have high costs. For example, part-time

jobs usually offer lower wages, more limited career opportunities, and fewer possibilities to switch to other jobs because of narrow specialization. Additionally, part-time labor participation directly leads to vertical segregation between women and men (Stephanie Steinmetz and Johann Handl 2003).[3]

Second, some activities traditionally regarded as belonging to the sphere of the family increasingly take place through market operations (Richard B Freeman and Ronald Schettkat 2005). As these activities are still conducted by women, occupational segregation increases via a larger concentration of working women in paid jobs related to domestic and care services. Hence, new markets for atypical activities traditionally done within the family or a close social network—such as the informal daily care of someone else's children in one's private home—mechanically result in higher female participation and greater horizontal segregation. Vertical segregation can be reinforced by this new form of atypical employment and their associated higher unemployment risks (Andreas Baierl and Olaf Kapella 2014, Susanne Pernicka and Bettina Stadler 2006,Margareta Kreimer 2004).

Finally, women may seek to find jobs where many women work as a result of their own preferences. Experimental studies find evidence compatible with women being more risk averse and more averse to competition than men (see Rachel Croson and Uri Gneezy 2009, and the references therein). Additionally, many empirical studies report discrimination practices in hiring and promotion that can work as informal barriers to gender equality and influence preference formation at the early stages of the life cycle (see Joseph G. Altonji and Rebecca M. Blank 1999 and Glenn W. Harrison and John A. List 2004 for reviews and Doris Weichselbaumer 2004 for a study in the Austrian context).

The decision to participate in the labor market and the distribution of women across occupations is conditional on previously made human capital investment decisions. Re-

sults from empirical studies on the female labor supply suggest that convergence in levels of education between women and men may help to partly explain the decreasing gender gap in labor market participation (Bradley T. Heim 2007, Mark R Killingsworth and James J Heckman 1986, Richard Blundell and Thomas MaCurdy 1999). However, gender equality in the levels of education does not imply convergence in human capital investments: women and men in secondary and higher education may choose different educational fields leading to diverging professional careers. Hence, convergence in levels of education does not preclude divergence in educational fields and post-education increases in gender segregation (Lex Borghans and Loek Groot 1999, Irene Prix 2012).

Stylized facts using data from the Austrian labor force survey

We look a the evolution of the Austrian labor market and gender differentials from 1996 to 2010. Our data source is the ALFS. We narrow our study to the 1996:2010 period for several practical reasons. First, data are available for most variables since 1995. Second, there is only one significant methodological change after 1996 that takes place in 2003. Finally, since 2011, the ALFS moved from using ISCO-88 codes for the occupational categories to ISCO-08 codes.

We focus on individuals living in private households between the ages of 15 and 74. This is the largest age interval that starts at the beginning of the working cycle and defines a population split close to 50/50 by gender. This population target is interesting for two reasons. First, it allows us to recover gender differentials in education, given that men are more likely to do an apprenticeship in the Austrian dual vocational training system, meaning that they join the labor market while still enrolled in training courses. Second, it also helps us capture gender differences between old people who consider themselves only retired and old people who consider themselves doing work at home.[4]

Table A.1 in the Appendix shows basic statistics for gender differences in Austria during the 1996-2010 period. In Table 1, we report the first and the last year of the period as well as 2003 and 2004 because there are significant changes in the methodology between 2003 and 2004 that affect, among other variables, the classification of occupations (see Josef Kytir and Bettina Stadler 2004). In the following, we discuss trends within the two sub-periods.

The evolution of occupational segregation as measured by the index of Dissimilarity and the Gini index is shown in the first two lines of Table 1. Both indexes provide a picture that is consistent with a stable or slightly increasing level of occupational segregation by gender. The index of dissimilarity does not show any clear trend and remains stable at approximately 56.5 (from 56.62 to 56.10) during the period from 1995 to 2003 and approximately 52.2 (from 52.10 to 52.25) during the period from 2004 to 2010. The Gini index also remains very stable from 1996 to 2003 (starting with 72.33 in 1996 and ending with 71.84 in 2003), and it experiences a very slight increase in the $2004-2010$ period, with a 0.36 percent annual average increase. These figures are of the same order of magnitude as figures published by Bettio and Verashchagina (2009).

For all other variables in Table 1, we present percentage point differences between female and male rates. A feature frequently found in gender segregation studies is that female employment is more concentrated than male employment. This is also the case in Austria during the study period: on average, 58.93% of women work in the top ten largest female occupations (of the 109 3-digit ISCO-88 occupational categories), but only 41.66% of men work in the top ten male occupations. Gender differentials in gender concentration of employment are 18.64 percentage points in 1996 and 18.19 in 2003, but they increase from 15.42 in 2004 to 16.87 in 2010.

Table 1: Recent Trends in Gender Differences

Austria. Selected Indicators & Years.

	1996	2003	2004	2010
Indexes of occupational segregation				
Dissimilarity index(×100)	56.62	56.10	52.10	52.25
Gini index(×100)	72.33	71.84	68.06	69.74
Gender differentials (in percentage points)				
Job share in 10 largest occupations	18.64	18.19	15.42	16.87
Participation	-19.47	-15.43	-13.64	-11.63
Unemployment	-0.13	-0.79	-0.00	-0.35
Part-time jobs	22.83	28.72	31.98	32.67
White-collar occupation	23.77	24.68	22.79	23.71
Managers in white-collar occupations	-15.00	-13.82	-11.42	-10.79
Low education	16.93	12.50	10.03	9.60
Indexes of segregation across educational fields				
Dissimilarity index(×100)			49.88	51.12
Gini index (×100)			56.76	58.67

Note: Own calculations from Austrian data of the EU Labor Force Survey, selected years. Gender differentials are the difference between the female and the male percentage rate. Shares in 10 largest occupations are obtained selecting the 10 occupations with the largest share of jobs by gender. Part-time workers are those who usually work less than 30 hours per week. An occupation is white-collar if it belongs to 1-digit ISCO-88 major occupational categories 1 to 6, and it is blue-collar otherwise. Managers in white-collar occupations reflect the proportion of managerial jobs among the white-collar category.

The Austrian female participation rate, which is 53.72 in 1996, increases by 7 percentage points to 60.95 in 2010. In contrast, the male participation rate hardly declines, from 73.19 to 72.58. As a result, the gender differential in the participation rate drops from 19.47 percentage points (in favor of men) to 11.63 (a 40.27 percent overall decrease).

Austrian unemployment levels are low relative to those in other OECD countries. During the study period, female unemployment levels fluctuate from 4.13 percent to 5.60 percent, and gender differentials are very low and stable. Because male unemployment is more volatile than female unemployment, the gender differential becomes negative when the

economy enters a recession and turns positive when the economy recovers. Absolute differences between the gender unemployment rates, however, are always less than 1.1 percentage points.

The vast majority of part-time workers, defined (in line with the OECD criterion) as workers who usually work less than 30 hours per week, are women: the share of women among those in part-time work starts at 88.63% in 1995, peaks at 89.65 percent in 2001 and decreases to 82.82 percent in 2010. The proportion of women in part-time work steadily increases throughout the entire period, from 26.19 percent in 1996 to 41.22 percent in 2010. This increasing importance of part-time work among women results in an increase in the gender differentials in part-time rates: from 22.83 percentage points in 1996 to 32.67 percentage points in 2010.

White-collar occupations are becoming more prevalent both for women and men: from 71.54 percent and 47.77 percent in 1996 to 78.54 percent and 54.83 percent in 2010, respectively.[5] The gender differential has nevertheless remained remarkably similar over the entire period. On average, whereas approximately 75 percent of women work in white-collar occupations, only approximately 51 percent of men do so. The blue- vs. white-collar division of occupations is only a rough proxy for vertical occupational segregation. Using the ISCO-88 classification of occupations, an alternative notion that incorporates a vertical dimension is the proportion of managerial jobs in the white-collar category. On average, approximately 75 percent of managers in white-collar occupations are men. Fluctuations around this average are small, although the gender differential appears to decrease very slightly in both subperiods (see Appendix for details).[6]

The proportion of women with low education in 1996 is 43.03 and gradually decreases to 29.38 in 2010. The male participation rate declines from 26.10 to 19.78, so the gender differential in the proportion of individuals with low education narrows from

16.93 percentage points to 9.60. This substantial reduction in the educational gap, however, is not reflected in reductions in gender differentials in choices of educational field. Using the 14–field classification reported in the ALFS since 2004 (the first year for which this information is available), we also compute dissimilarity indexes of gender segregation by educational fields.[7] The results show that, if anything, gender segregation by educational choice has increased from 2004 to 2010 (see the last two rows in Table 1).

To summarize, during the 1996-2010 period, the Austrian labor market experiences a large decrease in the gender differential of labor force participation. In consonance with findings in other countries, this large decrease does not come with a noticeable fall in segregation. We find a moderate decrease in the gender differential in the rate of managerial jobs within white-collar occupations and no clear trends in the gender differentials in the rate of white-collar occupations and in the unemployment rates. In contrast, we find increases in gender differentials in part-time job rates, which are roughly of the same order of magnitude as the decrease in gender differentials in participation rates.

Discussion and research goals

We depart from the literature of gender segregation in the labor market by exploring the notion of the gender division of labor rather than focusing on occupational segregation. We do this because we want to analyze all economic activity decisions. Therefore, we want to study not only occupational gender differentials but also gender differentials in the time involved in paid work and in the decision to participate in the labor market or engage in other economic activities (such as doing domestic work full time). Our starting point is the observation of both increasing participation of women in the paid

labor market and the very stable level of occupational segregation in the last two decades in Austria. We also find increasing gender differences in the incidence of part-time work and partly decreasing gender differences in managerial jobs. Finally, although there are converging trends in the educational levels, there does not seem to be any convergence between women and men in their choices of educational field.

Our first goal is to evaluate the evolution of the overall gender division of labor in this period, given that its components have evolved in opposing directions. What do we expect from the reported trends in Table 1? We have two types of influences or developments, which we will refer to as positive and negative developments, respectively.

By "positive" developments, we mean trends that entail decreases in gender differentials. Among them, we include the increases in female labor market participation, the increases in the share of women with medium or high qualifications, and, more generally, the decreases in gender differences in educational levels. By "negative" developments, we mean those that increase gender differentials and, thus, result in increases in the gender division of labor. Among them, we expect to find the increase in female part-time jobs—and the increases in the corresponding gender differential—the stable or slightly increasing gender concentration and segregation across occupations, and the stable or increasing levels of gender segregation across educational fields.[8]

Our second goal is to provide a quantitative assessment of the independent contributions of all developments to the gender division of labor. Assessing separately the evolution of each manifestation of gender division—education, participation, unemployment, part-time incidence, occupational segregation—is informative, but cannot provide a definite answer to their roles in the evolution of the gender division of labor. To do this, we need an encompassing measurement framework for the gender division of labor that accommodates all sources of labor division systematically. In other words, we need a

measure of the gender division of labor that can be decomposed in terms that capture the effects of the independent developments. The need for an appropriate measurement framework for the gender division of labor is thus clear and we devote the next section to presenting it.

METHODS AND DATA

Measures of independent sources of the gender division of labor

Most indexes of occupational segregation by gender capture the tendency of women and men to be distributed unequally across occupations (see, e.g., Ives Flückiger and Jacques Silber 1999, and Robert M Blackburn 2012). The notion of the gender division of labor expands the notion of occupational segregation to also capture gender differences in economic activity and labor market involvement.

One could, in principle, use any traditional index of occupational segregation as a measure for the gender division of labor. The novelty would be to replace the original set of occupations with a new set of categories that extends the original ones. For example, Cohen (2004) extends the set of occupational categories to include *keeping house* as an additional occupational category and employs the index of dissimilarity to study the evolution of segregation in the US.

However, our aim is also to obtain an evaluation of the independent contributions to the gender division of labor from all its sources. In particular, we want to measure the contribution of occupational segregation, of gender differences in labor market participation, of gender differentials in part-time incidence, and of gender differentials in educational choices. Consider, again as an illustration, the case addressed by Cohen

(2004) where women and men either work for pay or do *housekeeping,* and if they work for pay, they choose one occupation among J alternatives. Given that the segregation levels obtained with the $J+1$ categories capture gender differences in occupations and also in participation in the labor market, an empirically relevant question is how much of gender segregation can be attributed exclusively to occupational segregation independent of the participation decision. Ricardo Mora and Javier Ruiz-Castillo (2011) show that this empirical question is best answered when the segregation index is strongly decomposable.

Let I be an index of gender segregation, i.e., an index that measures how differently women and men distribute along a finite number U of organizational units (such as occupations and *housekeeping*). Consider any partition of these units into S superunits or subsets of organizational units. For example, the superunit *work for pay* includes all occupations and the superunit *housekeeping* includes itself. Let I^* be the index of segregation when each superunit s is treated as a unit. In Cohen's case, for example, I^* is the segregation index using only *work for pay* and *housekeeping.* Now, let I_s be the index of segregation by gender in the subset of organizational units that belong to superunit s. The I index of segregation is said to satisfy *Strong Decomposability* if $I = I^* + \sum_s p_s I_s$, where p_s is the share of individuals in superunit s. Put simply, for any partition of the organizational units into superunits, *Strong Decomposability* requires that the index can be decomposed into a between term that captures segregation along the superunits and a within term that is a weighted average of the segregation indexes computed within each superunit.

Consider how *Strong Decomposability* can be applied to study segregation in Cohen's framework. We compute the index I using the $J+1$ categories, i.e., adding *housekeeping* to the set of J occupations. We also compute the index of occupational segregation,

which is the index of segregation in the subset *work for pay*. Let us denote this index by I_w. Because the other superunit, *housekeeping*, only contains one organizational unit, its index of segregation I_h is equal to zero and *Strong Decomposability* implies that $I = I^* + p_w I_w$ where p_w is the proportion of people at work and I^* is the segregation index using only *work for pay* and *housekeeping*.

In the general case, the term $\sum_s p_s I_s$ captures by how much segregation would decrease if there were no differences in the proportions of women and men across the units within each superunit s (Mora and Ruiz-Castillo 2011). In the illustration using Cohen's setup, $p_w I_w$ reveals how much segregation would decrease if there were no occupational segregation and therefore identifies the importance of occupational segregation in the notion of gender segregation. Note also that I^* captures gender differences in housekeeping and working for pay, and thus provides a measure of the importance of the participation decision.

The Mutual Information index

In their characterization of the Mutual Information index, M, Frankel and Volij (2011) prove that it is the only multigroup segregation index that, together with other properties, satisfies *Strong Decomposability*, which they refer to as *Strong School Decomposability*. As we are not aware of any other segregation index that is strongly decomposable, M is the natural candidate to conduct our analysis.

The M index is based on the notion of the entropy of a distribution. Consider a variable X with distribution probability P. The entropy of P, denoted by $E(P)$, is the expected value of the information obtained with the variable X (Solomon Kullback 1959). Let $P^{\mathcal{U}}$ represent the distribution of workers across organizational units, and let $P^{\mathcal{U}|woman}$ and

$P^{\mathcal{U}|man}$ represent the distribution of women and men, respectively, across organizational units. The M index is the average increase in the information we have about the individual's organizational unit that comes from learning her or his gender:

$$M = p_{woman}\left(E\left(P^{\mathcal{U}}\right) - E\left(P^{\mathcal{U}|woman}\right)\right) + p_{man}\left(E\left(P^{\mathcal{U}}\right) - E\left(P^{\mathcal{U}|man}\right)\right).$$

Although the M index satisfies a number of desirable properties (Sean F. Reardon and Glenn Firebaugh 2002, Frankel and Volij 2011), it is neither composition invariant (i.e., it changes with the proportion of women in the population) nor normalized (i.e., its maximum value when women and men are completely segregated is not fixed to 1). Composition invariance is a property advocated by many researchers of segregation because changes in an index that is not composition invariant capture changes in how women and men are distributed across occupations together with changes in the overall female share. However, this concern should not affect us because our target population is all individuals living in private households between the ages of 15 and 74. This is the largest age interval that starts at the beginning of the working life and that defines a population split close to 50/50 by gender. Hence, in this case using a composition variant index such as the M index cannot create any problem of interpretation because there are no changes in the overall gender mix.

Indexes are usually normalized between 0 and 1, with 0 associated with perfect integration (i.e., when the distributions of women and men across occupations are equal) and 1 associated with complete segregation (i.e., a situation in which women and men work in completely separated occupations). The M index is generally not normalized because it only equals its upper bound when woman and men work in completely separated occupations *and* each group represents 50 percent of the total population (Mora and

Ruiz-Castillo 2011). Thus, given that by construction women and men represent each 50 percent of our population target, the M index in our application is normalized in the sense that its limits can be interpreted as those of normalized indexes.[9]

For these reasons, we use the M index to conduct our analysis.

The M index for the Gender Division of Labor

Increasing female participation suggests that women are advancing their integration into the labor market. The simultaneous stability in occupational segregation signals that this integration in the labor market contradicts a scenario in which women and men have the same economic roles. Moreover, increasing gender differences in part-time vs. full-time jobs suggests that the changes in the labor market are complex. In this subsection, we propose to exploit the decomposability properties of the M index to evaluate the overall effect of these opposing trends on the gender division of labor.

The gender division of labor: As before, individuals who work do so in one of J occupations, and individuals who do not work do housekeeping. Assume now that jobs are classified into part-time and full-time jobs. The division of jobs along the part-time vs. full-time divide adds a new dimension to the set of occupations over which segregation takes place. To accommodate this new dimension, the set of organizational units includes all interactions between the occupational categories and the part-time vs. full-time status of the job.[10] Therefore, we now have $2J + 1$ categories.

In this setup, we define the M index for the gender division of labor, GDL, as the M index over the expanded set of $2J+1$ activities. The expected information of learning the worker's organizational unit is measured by her or his entropy E_{2J+1}. After learning that

the individual is a woman, her entropy becomes E_{2J+1}^{woman} and, similarly, E_{2J+1}^{man} denotes the entropy when the individual is known to be a man. The M index for the gender division of labor is:

$$GDL_{2J+1} = p_{woman}\left(E_{2J+1} - E_{2J+1}^{woman}\right) + p_{man}\left(E_{2J+1} - E_{2J+1}^{man}\right). \tag{1}$$

The role of occupational segregation: Let $FPLF_{2J+1}$ be the M index of gender segregation where the only organizational units are *working part-time*, *working full-time*, and *housekeeping*. Note that these three organizational units define a partition of the original $2J+1$ classification of activities. Hence, by *Strong Decomposability*:[11]

$$GDL_{2J+1} = FPLF_{2J+1} + \text{Within}\left(FPLF_{2J+1}\right). \tag{2}$$

The within term $\text{Within}\left(FPLF_{2J+1}\right)$ can be interpreted as how much GDL_{2J+1} would fall if the only source of segregation were gender differences in the incidence of part-time jobs and housekeeping. Hence, the ratio $\frac{\text{Within}(FPLF_{2J+1})}{GDL_{2J+1}}$ is a measure of the importance of the contribution of occupational segregation to the gender division of labor after controlling for gender differences in housekeeping and the incidence of part-time jobs vs. full-time jobs.[12]

Traditional notions of Occupational Segregation: In traditional studies on occupational segregation, there is no distinction between part-time and full-time jobs and only the working population is considered in the analysis. Let M_0 denote the traditional index of occupational segregation using as organizational units the original J occupations over the working population. Using the decomposability properties of the M index,

it can be shown that:

$$GDL_{2J+1} = LF + p_{work}M_0 + \text{Within}\,(M_{J+1}) \tag{3}$$

where LF is the Mutual Information index that captures the extent to which women and men differ in their participation rates, p_{work} is the proportion of individuals who choose to work in the labor market, M_{J+1} is the Mutual Information index that captures gender differences in housekeeping and occupational choices, and Within (M_{J+1}) is a within term that can be interpreted as the extent to which GDL_{2J+1} would decrease if there were no gender differences in the incidence of part-time jobs. Equation 3 is useful because it highlights that the traditional notion of occupational segregation, M_0, is embedded in our framework so that it is possible to establish the relation between M_0 and GDL_{2J+1}. In particular, equation 3 shows that M_0 is an incomplete measure of GDL_{2J+1}: it does not take into account that some individuals do not work for pay but are still segregated in specific economics activities (such as housekeeping and unemployment) and that workers are gender-segregated into part-time and full-time jobs.

The role of education: Consider the situation wherein people choose at the beginning of their life cycle among K educational categories that are investment decisions affecting their future earnings and occupations. The gender division of labor is likely associated, at least in part, with gender differences in these investments. Hence, a relevant empirical question is how much gender differences in education investments executed at the beginning of the life cycle affect the gender division of labor. To answer this question within the measurement framework of the M index, we first interact the $2J+1$ organizational units used in GDL_{2J+1} with the K educational categories and compute a new M index of segregation that we refer to as $GDLEd_{K(2J+1)}$. Then, using the

decomposability properties of the M index, it can be shown that

$$GDLEd_{K(2J+1)} = Ed_K + GDL\,(Ed)\,. \tag{4}$$

The term Ed_K captures gender segregation induced by gender differences in education, whereas $GDL\,(Ed)$ is a within term that can be interpreted as gender differences in the division of labor after controlling for gender differences in education. Note that the term $GDL\,(Ed)$ can be decomposed along the lines of equations (2) and (3).

Data

We exploit the rich information available in the ALFS data to construct GDL with more organizational units than the ones defined in the previous section. We first consider six categories of economic activity. Active individuals are classified into *Full-time work* (i.e., more than 30 hours a week), *Part-time work*, and *Unemployment*. Inactive individuals are classified as either *Student*, *Other inactive young* (younger than 50 years of age), and *Other inactive old*. Due to changes in the design of the survey, from 1998 onwards, we can consider nine economic activity categories. Two additional categories are added for active individuals: *Working part-time and also doing home work*, and *Working and in maternal/paternal leave*. For inactive individuals, we additionally identify individuals who declare to do *Only home work*. From 2005 on, we can distinguish those in part-time work who declare as their main economic status being students (*Student and part-time work*) and those who are inactive and young who live in a household where there are kids under five (*Young inactive with kids*). Thus, from 2005 onwards, we consider 11 economic activity categories.

In addition, we consider not only part-time and full-time jobs but also six levels of labor

market involvement: *No involvement*, *Unemployed*, *Less than* 12 *hours a week*, *Between* 12 *and* 21 *hours*, B*etween* 22 *and* 30 *hours*, and *More than* 30 *hours a week*. We employ the 3-digit ISCO-88 codes for occupational categories.

Finally, the ALFS data include information that enables us to construct two measures of past educational investments. Combining educational levels and age, we can create educational categories that differ according to highest level of education completed and the cohort of the individual.[13] Hence, we interact 4 age intervals with 3 levels of education to develop 12 categories, ranging from those with low education between 16 and 19 years of age to those with high education between 60 and 74 years of age. From 2004 onwards, we can interact the highest level of education completed with the educational field available in the data. Because the interaction results in small cell problems, we aggregate those educational fields with very few observations ending up with 14 categories (for the list of the educational fields available in the ALFS data, see footnote 7). In addition to low education, this alternative measure of educational investments considers 13 categories—five fields for intermediate education and eight fields for high education. For those individuals with intermediate educational levels, the five fields are *General*, *Social sciences*, *Sciences*, *Engineering*, and *Health and services*. The eight higher education fields are *Humanities*, *Social sciences*, *Sciences*, *Engineering*, *Agriculture*, *Health*, *Services*, and *Other*.

RESULTS

The gender division of labor

We identify the recent evolution of the gender division of labor by computing the M index using as organizational units the 3-digit classification of occupations interacted with the 6 levels of labor market involvement as well as the economic activity categories. We first compute the index using the six-category economic activity variable. We refer to this index as $GDL1$ and present the results for a selected number of years in row 1 of Table 2.[14] From 1998, we also compute the index using the nine-category economic activity variable and refer to it as $GDL2$ (shown in row 2). Finally, from 2005, we compute the index using the 11-category economic activity variable (row 3). This index, which we refer to as $GDL3$, employs a total of 1304 categories to compute gender differences in the division of labor. Each of these indexes captures not only how much women and men differ in their occupational choices but also how much they differ in their economic activity statuses and their labor market involvement.

Although $GDL2$ and $GDL3$ are very similar for the years in which both indexes can be computed, $GDL1$ is, on average, 18.80 percent lower than $GDL3$. Thus, we obtain an alternative measure of the gender division of labor for the entire period by backwards extrapolation of $GDL3$ using the growth rates of $GDL2$ and $GDL1$ for the periods 1998-2005 and 1996-1998, respectively. In the following, we will use this measure, which we refer to as GDL, as our measure for the gender division of labor. We show the results for a selected number of years in row 4 of Table 2. We see that GDL hardly changes, decreasing from 23.95 in 1996 to 23.90 in 2003. In the 2004-2010 period, it first increases

Table 2: Recent Trends in the Gender Division of Labor (GDL)

Mutual Information Indexes. Selected Years.

	1996	1997	1998	2003	2004	2005	2010
1. $GDL1$	18.82	18.91	18.80	18.80	16.35	17.04	16.89
2. $GDL2$			23.31	22.71	19.78	20.15	19.66
3. $GDL3$						20.66	20.22
4. GDL(Gender Division of Labor)	23.95	24.05	23.90	23.29	20.29	20.66	20.22
of which							
5. $FPLF$ (Full- vs. Part-time & LFP Status)	5.57	5.51	5.54	6.08	6.22	5.91	5.66
6. LF (Labor Force Participation Status)	2.06	1.90	1.79	1.31	1.00	1.05	0.76
7. Within $FPLF$ ($= FPLF - LF$)	3.51	3.61	3.76	4.77	5.22	4.87	4.89
8. LMI (Labor Market Involvement)	5.63	5.56	5.59	6.11	6.26	5.96	5.75

Note: Own calculations from the Austrian datafile of the EU Labor Force Survey, selected years. Mutual Information indexes are computed using natural logarithms and multiplied by 100. $GDL1$ is computed using as organizational units the 3-digit ISCO 88 classification of occupations interacted with six levels of labor market involvement (i.e. no involvement, unemployed, less than 12 hours a week, between 12 and 21 hours, between 22 and 30 hours, and more than 30 hours a week) as well as the 6-category economic activity classification (see main text). $GDL2$ and $GDL3$ are computed similarly but with the 9- and 12-category economic activity classifications, respectively. GDL is computed by backwards extrapolation of $GDL3$ using the growth rates of $GDL2$ and $GDL1$ for the 1998-2005 and the 1996-1998 periods, respectively. $FPLF$ is computed using as organizational units *inactive*, *unemployed*, *full-time*, and *part-time*. LF is computed using as organizational units whether the individual is participating in the labor market or not. The within term $FPLF - LF$ in row 7 captures $FPLF$ segregation that cannot be attributed to the decision to participate. Labor Market Involvement, LMI, is computed using as organizational units the six levels of labor market involvement.

from 20.29 in 2004 to 21.19 in 2007 (not shown in Table 2) and then it decreases back to 20.22 in 2010. Annual changes for the entire period 1996-2010 (excluding the change between 2003 and 2004) are, on average, less than one percentage point. Thus, our first conclusion is that the changes in the labor market during the period do not result in significant changes in the gender division of labor.

Participation and full-time vs. part-time jobs

How much of the evolution of GDL is driven by the convergence in labor force involvement across genders? To answer this question, we apply equation (2) with a richer set of economic alternatives. We first compute an M index of segregation for each year using four organizational units: *inactive*, *unemployed*, *full-time*, and *part-time*. The M index based on these four categories, which we refer to as $FPLF$, uses information that has not suffered significant changes in methodology over the entire period. In row 5 of Table 2, we report the values of $FPLF$ for a selected number of years. Because the organizational units used to compute $FPLF$ are a partition of the organizational units in GDL, the index GDL can be decomposed into $FPLF$ and a within term that can be interpreted as the part of GDL that cannot be attributed to the decision to participate, the unemployment status, and the full- or part-time nature of the job. Consider, for example, the $FPLF$ index in 1996. Its value, 5.57, implies that most of GDL, $\frac{20.84-5.57}{20.84}x100 = 73.27$ percent, cannot be attributed to the decision to work, unemployment status, or the decision to work full- or part-time. By 2003, this share is only marginally larger, 73.89 percent, and from 2004 to 2010, this source of segregation decreased in importance in GDL by 2.6 percentage points.

Changes in $FPLF$ capture changes in gender differentials in the decision to participate, in unemployment status, and also in the incidence of part-time jobs. Thus, to isolate the effect of gender differentials in the incidence of part-time jobs, we compute an M index that uses as organizational units whether the individual has a job or not. This index, which we refer to as LF, is reported in row 6 of Table 2. The strong decomposability property of the Mutual Information index ensures that, for each year, the difference between $FPLF$ and LF—reported in row 7 in Table 2—can be interpreted as the level of segregation in $FPLF$ that is independent of the labor force participation decision and

the unemployment status. The increasing female participation rates have a negative effect on segregation levels, as LF decreases from 2.06 in 1996 to 0.76 in 2010 (a 63.64 percent decrease). However, these changes hardly matter in regard to the evolution of GDL, as LF represents only 8.60 and 3.76 percent of GDL in 1996 and 2010, respectively. In contrast, segregation arising from the full-time vs. part-time division of jobs (row 7 in Table 2) increases from 3.51 in 1996 to 4.89 in 2010, or from 14.66 to 24.18 percent of GDL, respectively. Hence, our second conclusion: the reduction of segregation arising from the convergence in labor force participation rates (together with very small gender differentials in unemployment rates) has been offset by the effects of increasing differentials in the incidence of part-time work, especially during the 1996-2003 period.

These conclusions do not change when, instead of $FPLF$, we construct an M index of labor market involvement by directly using the six categories of labor market involvement that are used to compute GDL. The results for the selected years are reported in the last row of Table 2: $FPLF$ is almost exactly equivalent to LMI, the M index that captures gender differences in the six categories of labor market involvement.

Occupational segregation

How important is occupational segregation as a driver of the gender division of labor? Exploiting the decomposability properties of the M index, we can also give a quantitative answer to this question. To do so, we first compute an M index of segregation using as organizational units the interaction of labor market involvement and the three alternative economic activity variables, $EALMI1$, $EALMI2$, and $EALMI3$. In row 1 of Table 3, we re-print the values for GDL presented in Table 2. As we did with $GDL3$, we extrapolate $EALMI3$ backwards using the growth rates of $EALMI2$ and $EALMI1$ for the 1998-2005 and 1996-1998 periods, respectively. We refer to the index for the full

period as $EALMI$ and report its values for selected years in row 2 of Table 3 (see the Appendix for all values of $EALMI1$, $EALMI2$, $EALMI3$, as well as $EALMI$).

Table 3: GDL AND OCCUPATIONAL SEGREGATION

Mutual Information Indexes. Selected Years.

	1996	1997	1998	2003	2004	2005	2010
1. GDL (Gender Division of Labor)	23.95	24.05	23.90	23.29	20.29	20.66	20.22
of which							
2. $EALMI$	11.95	12.05	12.03	11.60	10.75	10.23	9.48
3. $EALMI$ & Blue vs. White Collar	13.47	13.58	13.64	13.43	12.23	12.01	11.27
Contribution of occupational segregation to GDL							
4. Within $EALMI$ ($= GDL - EALMI$)	12.00	12.00	11.87	11.69	9.54	10.43	10.74
5. Within $EALMI$ & Blue vs. White Collar	10.48	10.47	10.26	9.86	8.06	8.65	8.95
The traditional notion of occupational segregation							
6. M_0 (occupational segregation)	21.91	22.27	21.84	22.00	19.27	20.53	20.64
7. $p_{work}M_0$ (contribution to GDL)	13.85	14.03	13.88	14.19	12.15	13.30	13.76

Note: Own calculations from Austrian data of the EU Labor Force Survey, selected years. Indexes are computed using natural logarithms and multiplied by 100. GDL is reproduced from Table 2. $EALMI1$ is computed using as organizational units the interaction of labor market involvement as well as the 6 economic activity classification. $EALMI2$ and $EALMI3$ are computed similarly but with the 9 and 12 economic activity classifications, respectively. $EALMI$ is computed by backwards extrapolation of $EALMI3$ using the growth rates of $EALMI2$ and $EALMI1$ for the 1998 : 2005 and the 1995 : 1998 periods, respectively. $EALMI$ & Blue vs. White Collar adds the Blue- vs. White collar division in the taxonomy of the organizational units and is computed backwards in a similar way as $EALMI$. The contribution of Occupational Segregation to GDL within $EALMI$ (& Blue vs. White Collar) equals GDL minus $EALMI$ (& Blue vs. White Collar). The contribution of Occupational Segregation to GDL as traditionally measured is the the product of the proportion of individuals who work, p_{work}, times occupational segregation, i.e. the index using as organizational units the 3-digit ISCO 88 classification of occupations, M_0.

Because the organizational units used to compute $EALMI$ are a partition of the organizational units used to compute GDL, the latter can be decomposed, following equation (2), into the former plus a within term that can be interpreted as the contribution to GDL of gender differences in occupational segregation that are independent of economic activity status and labor market involvement. We report this contribution in row 4 in Table 3. The results show that occupational segregation is a major component of the

gender division of labor. Across all years and periods, this contribution ranges between $\frac{9.54}{20.29} \times 100 = 47.02$ percent in 2004 and $\frac{11.07}{20.63} \times 100 = 53.63$ percent in 2009 percent of GDL (not shown in Table 3). Although we find no significant changes in the first period, in the second period, we observe a steady gradual increase in the contribution, from 47.02 percent in 2004 to $\frac{10.74}{20.22} \times 100 = 53.12$ percent in 2010.

It is sometimes argued that the gender division along labor market involvement likely translates into fewer career opportunities for part-timers and can be at least partially associated with occupational choices along major white–collar and blue–collar occupations. To further isolate the contribution of occupational segregation from this effect, we report in row 5 of Table 3 the contribution of occupational segregation to GDL that cannot be associated with gender differentials in economic activity decisions, labor market involvement, and the blue–collar vs. white–collar partition of occupations.[15] As expected, the within term decreases. Nevertheless, the contribution of occupational segregation is still large. For example, it accounts for approximately 44 percent of GDL in 2010. In addition, we still find an increase in its contribution since 2004.[16]

We can now state our third result: occupational segregation is a major component of the gender division of labor, and we find increases in its contribution to GDL since 2004.

So far, we have obtained the contribution of occupational segregation on GDL controlling for economic activity status and the labor market involvement decision. Traditional studies of occupational segregation, however, do not distinguish between full-time and part-time jobs and compute occupational segregation for the entire working population using as organizational units the occupational categories only. How does the traditional notion of occupational segregation relate to our GDL index? Equation (3) shows that, within the measurement framework of the Mutual Information index, the contribution of occupational segregation as traditionally measured is the product of the proportion

of individuals who work and the index of occupational segregation. We report the traditional notion of occupational segregation, M_0, in row 6 of Table 3 and its contribution, $p_{work}M_0$ in row 7 of Table 3.

From the results, we can see how focusing on occupational segregation provides an inaccurate description of the gender division of labor. In particular, the contribution computed by multiplying the proportion of the employed population to the index of occupational segregation does not take into account that occupational choices are conditioned by activity and labor market involvement decisions. Consider, as an illustration, the situation in 1996. The contribution measured by using the traditional index is 13.85—or 57.83 percent of GDL—whereas the contribution, after controlling for labor force participation decisions *and* the incidence of part-time jobs, is only 12.00—or 50.10 percent of GDL. The difference of almost 8 percentage points can be attributed to gender differences in labor market involvement and economic activity decisions.

The role of education

The gender division of labor can be associated, at least in part, with gender differences in educational investments. To evaluate the extent to which gender differences in educational investments affect the gender division of labor, we perform a decomposition along the lines of equation (4). To do so, we first interact the organizational units used in computing GDL with educational categories and compute a new M index of segregation, which we refer to as $GDLEd$. Then, we decompose this index into Ed, which captures gender segregation induced by gender differences in education, and $GDL\,(Ed)$, which is a within term that can be interpreted as gender differences in the division of labor after controlling for gender differences in education[17].

In row 1 of Table 4 we re-print the values for GDL presented in Table 2. In row 2 of Table 4, we report $GDLEd$. As expected, $GDLEd$ is always higher than GDL, as it captures not only gender differentials in the Gender Division of Labor, but also gender differentials in education. $GDLEd$ can be decomposed into gender differences in educational categories, Ed (row 3), and gender differences in the division of labor within educational categories term, $GDL\,(Ed)$ (row 4). Consider the results using educational levels and cohorts (first four columns in Table 4). The conclusion is inescapable: most of the gender differences are concentrated in the division of labor. Moreover, gender differences in the division of labor are larger within educational levels and cohorts (compare $GDL\,(Ed)$ with GDL). These results show how gender convergence in educational levels (see row 3) can take place together with stable or increasing gender differences in the division of labor (see row 4).

Do these results imply that human capital has no role in the gender division of labor? Not quite. From 2004 onwards, we report the M indexes of gender segregation by educational fields (last three columns in Table 4). We first see that these indexes are much larger than those computed using differences in educational levels and cohorts, highlighting the importance of educational fields as a dimension of gender differentials (for instance, compare for 2010 the value for Ed using educational fields, 12.96, with the value using only levels and cohort differences, 0.67). We also note that Ed is increasing, showing no gender convergence in educational fields since 2004. Consequently, $GDL\,(Ed)$, i.e., the index for the gender division of labor after controlling for educational fields, is smaller than GDL and is decreasing.

How does controlling for educational fields affect the importance of each of the sources of

Table 4: *GDL* AND THE ROLE OF EDUCATION

Mutual Information Indexes. Selected Years.

	Educational levels & cohorts				*Educational fields*		
	1996	2003	2004	2010	2004	2005	2010
1. *GDL*	23.95	23.29	20.29	20.22	20.29	20.66	20.22
2. *GDLEd*	25.42	24.56	22.00	21.66	28.61	28.70	28.63
of which							
3. *Ed* (gender differences in education)	1.60	0.97	0.86	0.67	11.72	12.47	12.96
4. Within *Ed* (*GDL* (*Ed*) = *GDLEd* − *Ed*)	23.82	23.59	21.14	20.99	16.89	16.23	15.67
of which							
5. *LF* (*Ed*) (labor force participation status)	1.34	0.89	0.65	0.51	0.92	0.99	0.75
6. Within *FPLF* (*Ed*) (= *FPLF* (*Ed*) − *LF* (*Ed*))	3.45	4.75	5.24	4.95	3.86	3.59	3.41
7. *EALMI* (*Ed*)	11.28	11.29	10.67	9.55	8.76	8.30	7.49
Contribution of occupational segregation to *GDL* (*Ed*)							
8. Within *EALMI* (*Ed*) (= *GDL* (*Ed*) − *EALMI* (*Ed*))	12.54	12.30	10.47	11.44	8.12	7.93	8.18

Note: Own calculations from Austrian data of the EU Labor Force Survey, selected years. Indexes are computed using natural logarithms and multiplied by 100. The variable *Educational levels and cohorts* is obtained from the interaction of 4 age intervals with 3 levels of education into 12 categories ranging from those with low education with age between 16 and 19 to those with high education and age between 60 and 74. The variable *Educational fields* considers, in addition to low education, 13 categories (five fields for intermediate education and eight fields for high education). For those individuals with intermediate educational levels, the five fields are *General*, *Social sciences*, *Sciences*, *Engineering*, and *Health and services*. The eight higher education fields are: *Humanities*, *Social sciences*, *Sciences*, *Engineering*, *Agriculture*, *Health*, *Services*, and *Other*. *GDLEd* is computed using as organizational units both educational categories and those used to construct *GDL*. *Ed* is computed using as organizational units the educational categories only. *GDL* (*Ed*) is computed as *GDLEd* minus *Ed* and captures gender differences in the division of labor after controlling for gender differences in education. All remaining indexes in the Table are computed in a similar manner.

the gender division of labor? Consider the role of educational fields in gender differences in the incidence of part-time jobs in 2010. Accounting for educational fields reduces the index from $FPLF - LF = 4.89$ (row 7 in Table 2) to $FPLF\,(Ed) - LF\,(Ed) = 3.41$ (row 6 in Table 4), or a $\left(1 - \frac{3.41}{4.89}\right) x100 = 30.27$ percent decrease. In other words, the importance of the incidence of part-time jobs in gender segregation turns out to be approximately 30 percent lower if we control for educational fields. Educational fields also help explain significant parts of the gender differences in economic activity and labor market involvement and in gender differences in occupational choices. For example, in 2010, it accounts for decreases in *EALMI* of $\left(1 - \frac{7.49}{9.48}\right) \times 100 = 20.99$ percent (compare *EALMI* in row 7 of Table 4 with row 2 of Table of 3). Similarly, it accounts for

decreases in gender differences in occupational choices of $\left(1-\frac{8.18}{10.74}\right)\times = 23.84$ percent (compare the within $EALMI$ term in row 8 of Table 4 with row 4 of Table of 3). In contrast, the role of educational levels seems less important, with increases in $EALM$ and in $Within\ EALM$ of $\left(1-\frac{9.48}{9.55}\right)\times 100 = 0.73$ and $\left(1-\frac{10.74}{11.44}\right)\times = 6.12$ percent, respectively.[18]

We observed in Table 2 that GDL was stable over the entire period. After controlling for educational fields, this main finding remains. We then found that the reduction of segregation arising from the convergence in labor force participation rates has been offset by the effects of increasing differentials in the incidence of part-time work, especially during the 1996-2003 period. We find in Table 4 that decreases in $LF\left(Ed\right)$ from 1996 to 2003 are also offset by increases in $FPLF\left(Ed\right) - LF\left(Ed\right)$. Moreover, in the 2004-2010 period, the level of segregation in $FPLF\left(Ed\right)$ that is independent of the labor force participation decision (row 6 in Table 4) is becoming more important relative to gender segregation arising from the participation decision, $LF\left(Ed\right)$ (row 5 in Table 4). This result holds regardless of whether we control for educational levels or educational fields and replicates the finding without controlling for education. Finally, we saw that occupational segregation accounts for approximately half of the gender division of labor, whereas labor market involvement accounts for more than a fourth. After controlling for educational fields, the relative importance of each term remains. Occupational segregation is still approximately 50 percent of $GDL\left(Ed\right)$ ($\frac{8.18}{15.67}\times 100 = 48.08$ percent in 2004 and 52.20 percent in 2010), and segregation due to gender differences in the part-time incidence and labor force participation status ($FPLF\left(Ed\right)$)) is still over 25 percent ($\frac{3.86+0.92}{16.89}\times 100 = 28.30$ percent in 2004 and 26.55 percent in 2010).

CONCLUSIONS

Using data from the Austrian Labor Force Survey, in this paper we review recent trends in the Austrian labor market. In particular, we are concerned in particular with how increasing female participation interacts with occupational choice and the incidence of part-time jobs. We note that during the 1996-2010 period, the Austrian labor market experiences a substantial decrease in the gender differential in participation rates, increasing differentials in the incidence of part-time jobs, and stable levels of occupational segregation by gender. We characterize these trends as "positive" or "negative" developments based on how we expect them to affect the gender division of labor. We argue that these somewhat opposing findings highlight that the gradual incorporation of women into paid work is a complex process of segregated integration.

To study the overall effect of these opposing trends on the gender division of labor, we propose an index for the gender division of labor based on the Mutual Information index first proposed by Theil and Finizza (1971). Exploiting the strong decomposability property of the index, we then study the incidence on the gender division of labor of changes in the gender differentials in participation rates, in the incidence of part-time jobs, and in occupational and educational choices.

Our main results show that our index for the gender division of labor is very stable over the 15-year period. Hence, our main result is that opposing trends have counterbalanced each other. Positive developments in the increases in female labor market participation and the share of women with medium or high qualifications, have led to marginal decreases in gender segregation. In particular, the reduction of segregation arising from the convergence in labor force participation rates has been offset by the effects of increasing differentials in the incidence of part-time work, especially from 1996 to 2003. We also

find that occupational segregation is a major component of the gender division of labor and that it is stable, albeit with some increases in its contribution to the gender division of labor since 2004. These results are robust to alternative definitions of economic activity and labor market involvement.

Gender differences in educational fields have increased gender segregation in labor and educational investments from 2004 to 2010. We also find that after controlling for educational fields, the relative importance of each source of the gender division of labor remains. Occupational segregation is still approximately half of the gender division of labor, and gender differences in part-time incidence and labor force participation status account for over a quarter of the gender division of labor.

Our results suggest that if Austria is to witness substantial improvements in the gender division of labor, then they will be likely related to three sources of gender segregation. The first source with high potential for improvement is the choice of educational field. The second source is occupational segregation. Finally, Austria could also witness gains in the Gender Division of Labor by reducing gender differentials in the incidence of part-time jobs. We do not have hard evidence on the relative roles of vertical versus horizontal segregation, and we suspect that our results—due to the lack of detailed information on the vertical dimension of the jobs—do not appropriately reflect the importance of vertical segregation.

A Appendix

See notes in Tables in the main text for the definition of the variables.

Table A.1: *Recent Trends in Gender Differences*

year	DI	Gini	Concentrat'n		Participat'n		Unempl.		Part Time		White Collar		Managerial		Low Educ.	
			female	male	female	male	female	male	female	male	female	male	female	male	female	male
1996	0.566	0.723	59.46	40.82	53.72	73.19	5.22	5.35	26.19	3.36	71.54	47.77	6.47	21.47	43.03	26.10
1997	0.565	0.728	59.58	40.39	53.84	72.58	5.28	5.06	26.57	3.31	72.18	48.24	6.72	19.70	40.23	24.86
1998	0.559	0.722	59.13	40.73	54.67	72.78	5.59	5.42	27.84	3.62	73.03	48.87	6.95	20.09	39.52	24.90
1999	0.562	0.721	59.76	41.58	55.08	73.02	4.77	4.66	30.02	3.65	72.88	48.35	6.97	21.40	38.59	24.53
2000	0.554	0.715	59.27	41.28	55.21	72.66	4.60	4.77	30.52	3.53	74.62	48.94	7.27	20.38	37.34	24.12
2001	0.553	0.716	57.68	42.17	55.28	71.83	4.13	3.92	31.45	3.63	74.97	50.09	7.58	20.95	35.86	23.60
2002	0.562	0.724	58.83	42.32	56.75	72.04	4.54	5.12	33.33	4.19	76.04	50.22	6.56	19.79	34.53	22.67
2003	0.561	0.718	59.53	41.34	56.91	72.34	4.35	5.13	32.80	4.08	76.00	51.32	6.27	20.09	34.75	22.26
2004	0.521	0.681	59.93	44.51	56.31	69.95	5.31	5.31	36.70	4.72	77.88	55.09	5.31	16.73	32.18	22.14
2005	0.531	0.700	60.30	44.12	58.01	71.78	5.49	4.91	37.86	6.35	77.46	52.76	5.80	18.83	31.33	21.82
2006	0.527	0.698	59.98	42.99	59.15	72.57	5.26	4.34	38.42	6.48	76.65	52.78	5.82	17.63	33.04	21.13
2007	0.534	0.702	60.13	43.27	59.89	73.59	5.02	3.93	39.18	7.03	76.76	52.84	5.45	18.05	33.30	21.33
2008	0.527	0.700	60.60	43.70	60.51	73.30	4.14	3.57	39.23	7.72	77.63	53.31	5.46	17.05	31.73	20.81
2009	0.527	0.704	60.46	43.64	61.27	72.78	4.56	4.99	40.45	8.16	78.44	54.79	4.96	16.50	30.59	19.95
2010	0.523	0.697	60.27	43.40	60.95	72.58	4.22	4.57	41.22	8.55	78.54	54.83	5.22	16.01	29.38	19.78

Table A.2: *The Gender Division of Labor*

year	GDL1	GDL2	GDL3	GDL	LF	FPLF-LF	LMI
1996	0.188295			0.239460	0.020593	0.035132	0.056335
1997	0.189091			0.240472	0.019005	0.036139	0.055589
1998	0.187953	0.233055		0.239025	0.017854	0.037562	0.055871
1999	0.189894	0.231293		0.237218	0.017596	0.042922	0.061014
2000	0.185912	0.228062		0.233905	0.016617	0.044648	0.061628
2001	0.185326	0.228345		0.234195	0.014863	0.046364	0.061581
2002	0.188471	0.228474		0.234327	0.012819	0.048076	0.061452
2003	0.187916	0.227058		0.232874	0.013092	0.047699	0.061064
2004	0.163469	0.197787		0.202854	0.010026	0.052172	0.062629
2005	0.170419	0.201495	0.206600	0.206600	0.010459	0.048666	0.059606
2006	0.171559	0.201733	0.207238	0.207238	0.010058	0.050466	0.061184
2007	0.176871	0.206831	0.211872	0.211872	0.010615	0.050705	0.062088
2008	0.173616	0.203112	0.208315	0.208315	0.009282	0.048077	0.058221
2009	0.172421	0.201218	0.206302	0.206302	0.007511	0.048716	0.057017
2010	0.168889	0.196555	0.202189	0.202189	0.007639	0.048949	0.057524

Table A.3: *GDL and Occupational Segregation*

year	EALMI1	EALMI2	EALMI3	EALMI	$p_{work} * M_0$	M_0
1996	0.065587			0.119451	0.138533	0.219057
1997	0.066146			0.120468	0.140319	0.222681
1998	0.066055	0.115556		0.120302	0.138792	0.218423
1999	0.070397	0.114896		0.119615	0.139574	0.218508
2000	0.070152	0.116529		0.121314	0.136713	0.214347
2001	0.069596	0.115471		0.120213	0.138267	0.218013
2002	0.068654	0.110735		0.115283	0.143314	0.223084
2003	0.068942	0.111408		0.115983	0.141933	0.220002
2004	0.065310	0.103295		0.107537	0.121480	0.192726
2005	0.064120	0.098555	0.102316	0.102316	0.133018	0.205259
2006	0.065088	0.098870	0.103009	0.103009	0.134779	0.204915
2007	0.066290	0.099328	0.103523	0.103523	0.139100	0.208695
2008	0.061943	0.094185	0.098052	0.098053	0.139199	0.208304
2009	0.059906	0.091760	0.095576	0.095576	0.140514	0.209886
2010	0.059536	0.090391	0.094793	0.094793	0.137613	0.206357

Table A.4: *GDL within Educational Levels*

year	*Ed*	*GDL1*	*GDL2*	*GDL3*	*GDL*	*LF*	*FPLF-LF*	*EALMI1*	*EALMI2*	*EALMI3*	*EALMI*
1996	.01598237	0.188303			0.238176	0.013405	0.034543	0.060830			0.112751
1997	.0136267	0.190195			0.240569	0.012426	0.036384	0.063164			0.117077
1998	.01233595	0.189999	0.233627		0.240322	0.011564	0.037902	0.062606	0.111042		0.116042
1999	.01313889	0.193287	0.232926		0.239601	0.011660	0.042356	0.066594	0.109553		0.114487
2000	.0114398	0.191454	0.231552		0.238188	0.011162	0.044683	0.068478	0.112980		0.118068
2001	.00993315	0.190143	0.231276		0.237904	0.009760	0.046319	0.067730	0.111971		0.117014
2002	.0086654	0.193443	0.231872		0.238517	0.008883	0.047756	0.066975	0.107606		0.112452
2003	.00969835	0.191699	0.229321		0.235893	0.008947	0.047508	0.067114	0.108050		0.112916
2004	.00857734	0.172740	0.205538		0.211428	0.006521	0.052442	0.065521	0.102101		0.106699
2005	.00705839	0.177184	0.207167	0.212873	0.212873	0.007826	0.048687	0.064407	0.097766	0.101770	0.101770
2006	.01010803	0.177678	0.206485	0.212436	0.212436	0.006513	0.050213	0.065031	0.097615	0.102040	0.102040
2007	.01025023	0.183033	0.211439	0.217406	0.217406	0.006814	0.050409	0.066309	0.097932	0.102662	0.102662
2008	.0086931	0.180012	0.208808	0.214792	0.214792	0.006015	0.048068	0.062098	0.093676	0.097894	0.097894
2009	.00816942	0.179968	0.207459	0.213376	0.213376	0.004917	0.048945	0.061183	0.091843	0.095954	0.095954
2010	.00669321	0.176900	0.203546	0.209895	0.209895	0.005079	0.049451	0.061091	0.091000	0.095484	0.095484

Table A.5: *GDL within Educational Fields*

year	*Ed*	*GDL1*	*GDL2*	*GDL3*	*GDL*	*LF*	*FPLF-LF*	*EALMI1*	*EALMI2*	*EALMI3*	*EALMI*
2004	.11723413	0.135998	0.163337		0.168874	0.009234	0.038598	0.054091	0.083953		0.087624
2005	.12466008	0.131486	0.157307	0.162342	0.162342	0.009864	0.035899	0.051810	0.079450	0.082993	0.082993
2006	.1248534	0.131767	0.156378	0.161563	0.161563	0.008626	0.036568	0.051207	0.077864	0.081515	0.081515
2007	.12252689	0.134844	0.159365	0.164884	0.164884	0.009438	0.035249	0.051535	0.077666	0.081422	0.081422
2008	.12557329	0.132940	0.157828	0.163178	0.163178	0.008691	0.032980	0.047925	0.074087	0.077327	0.077327
2009	.13314972	0.129331	0.152711	0.158182	0.158182	0.007168	0.034206	0.046908	0.071716	0.074980	0.074980
2010	.12963638	0.127622	0.151154	0.156693	0.156693	0.007491	0.034118	0.046543	0.071251	0.074903	0.074903

Notes

[1]Using time use datasets Aguiar and Hurst (2007) report that in 2003, US female hours in non-market work still exceed those of men by 68.03 percent, or 90 minutes per day. In fact, some sociologists stress how little the "gender revolution" since the 1960s has affected gendering in the personal realm (see England 2010 and the references therein). For Austria, time-use data show similar results (Statistik Austria 2009).

[2]The M index of segregation was first proposed by Henri Theil and Anthony J. Finizza (1971) in the context of racial segregation in schools. For a characterization of the M index, see David M. Frankel and Oscar Volij (2011).

[3]For international studies on flexibility, "pink ghettos", the costs of part-time jobs, and vertical segregation, see, among others, Sylvia Walby 1997, Richard Anker 1998, Jill Rubery and Colette Fagan 1995, Damian Grimshaw and Jill Rubery 1997, Charles and Grusky 2005, and Jane Elliott 2005.

[4]As will be shown below, this population choice also ensures that the M index of segregation is normalized and that results cannot be driven by changes in the share of women in the population.

[5]We define a white-collar occupation as any occupation within the 1-digit ISCO-88 major occupational categories 1 to 6 and a blue-collar occupation as anything else. Occupations in the major groups *Skilled agricultural and fishery workers*, *Craft and related trades workers*, *Plant and machine operators and assemblers*, and *Elementary occupations* are then classified as blue-collar, and all the other major groups are classified as white-collar.

[6]The gender wage gap corrected for human capital differences is also an indicator of vertical segregation. Empirical studies for Austria show even fewer changes towards a reduction of segregation. In particular, the male income advantage is a constant factor that persists, despite the continuous trend of the majority of women reaching higher qualification levels (Klaus Grünberger and Christine Zulehner 2009, René Böheim, Helmut Hofer, and Christine Zulehner 2007).

[7]The original educational fields recorded in the ALFS are *General programmes*, *Teacher training and education science*, *Humanities, languages and arts*, *Foreign languages*, *Social sciences, business and law*, *Science, mathematics and computing*, *Life science*, *Physical science*, *Mathematics and statistics*,

Computer science, *Engineering, manufacturing and construction*, *Agriculture and veterinary*, *Health and welfare*, and *Services*.

[8] We could also consider those changes in the labor market from which we do not expect a substantial effect on the gender division of labor. Among them, we can include changes in unemployment rates and in the proportion of white-collar occupations. The reasons why these changes are not likely to have major effects are varied. First, it is reasonable to expect business cycle behavior in the influence of unemployment gender differences on the gender division of labor that would be easier to observe using a higher frequency data, such as quarterly data. With annual data and because gender differences in unemployment rates in Austria have been and remain relatively low, we expect the role of unemployment gender differentials on the gender division of labor to be minor in this particular case. Second, vertical segregation is a complex and multifaceted notion. If measured by the partition of occupational categories into blue- and white-collar categories, we do not expect it to have a major role in the gender division of labor. Better measures of vertical integration might nonetheless lead to different results. Unfortunately, our conclusions here may be limited by the quality of the information available to us. In this paper, we include unemployment as one labor force participation status and thus recover its effect in the labor force component. We also attempt to control for some vertical integration when computing the component of occupational segregation by controlling for two, admittedly rough, measures of vertical jobs.

[9] The upper limit of the index is the minimum value between the logarithm of the number of organizational units and the logarithm of the number of groups. In gender studies, the number of groups is two and hence is generally smaller than the number of organizational units. Thus, in applications of occupational segregation by gender, the M index is bounded between 0 and $\ln(2) \simeq 0.69315$.

[10] Note that in practice it is possible that some individuals devote part-time to paid work and part-time to housekeeping, whereas other individuals may devote only part-time to work. Although we take this possibility into account in the empirical section, we abstain from considering these cases here for simplicity.

[11] See Ricardo Mora and Javier Ruiz-Castillo (2003) for the proof of this result for the case with two groups and Frankel and Volij (2011) for the multigroup case.

[12] The importance of each component of GDL_{2J+1} in equation (2) is invariant to any scale transfor-

mation of the M index. Hence, the same results regarding the relative role of each source of gender differences are obtained if we use the Entropy index, which is a normalization of the M index by the gender entropy of the population.

[13]We interact educational levels and cohorts to ensure that we do not neglect changes in the educational system implying that the same level of education is not comparable across cohorts. If anything, this approach overestimates the importance of educational levels because it accounts as educational any differences across cohorts.

[14]See the Appendix for the results for all years.

[15]Note that, in contrast of the full-time vs. part-time partition of jobs, the blue–collar vs. white–collar partition of ISCO-88 occupational categories does not add a new dimension of segregation to the notion of occupational segregation. Hence, we can still refer to the index "$EALMI$ & Blue vs. White Collar" reported in row 3 as the part of GDL that can be associated to economic activity decisions, labor market involvement, and the blue-collar vs. white-collar partition of occupations.

[16]Alternatively, for the 2006-2010 period, we can create a variable of vertical job stratification using nine categories: family work and employees, employees, self-employed with fewer than 11 employees, self-employed with between 11 and 20 employees, self-employed with between 20 and 50 employees, self-employed with at least 50 employees, self-employed with an unreported number of employees, and a worker with an occupation belonging to major occupational category *Legislators, officials, and managers* in ISCO-88. Adding this vertical variable induces increases in both GDL (almost a 43 percent increase in 2010) and Occupational segregation within $EALMI$ (a 66.10 percent, or from 10.74 to 17.84). Hence, vertical segregation as measured by this nine-category variable increases the importance of occupational segregation from approximately 50 percent to approximately 60 percent.

[17]In what follows, we will denote that an index is a within term in the decomposition of $GDLEd$ after controlling for Ed by adding (Ed) to the usual notation for the index.

[18]The role of educational levels, however, is not negligible in all the dimensions of the gender division of labor. Gender differences in labor force participation status can be partly attributed to educational levels. For example, in 2004 $LF = 1.00$ (row 6 in Table 2), whereas $LF^W = 0.65$ (row 5 in Table 4) or 35 percent lower.

References

Aguiar, Mark and Hurst, Erik. 2007. "Measuring Trends in Leisure: The Allocation of Time Over Five Decades." *The Quarterly Journal of Economics* 122(3):969–1006.

Altonji, Joseph G. and Blank, Rebecca M. 1999. "Race and gender in the labor market." *Handbook of labor economics* 3C:3143–3259.

Anker, Richard. 1998. *Gender and jobs: Sex segregation of occupations in the world*. Cambridge Univ Press.

Anxo, Dominique, Mencarini, Letizia, Pailhé, Ariane, Solaz, Anne, Tanturri, Maria Letizia, and Flood, Lennart. 2011. "Gender differences in time use over the life course in France, Italy, Sweden, and the US." *Feminist Economics* 17(3):159–195.

Baierl, Andreas and Kapella, Olaf. 2014. "Trend zur Teilzeit: Bestandsaufnahme und Auswirkungen für Beruf und Familie." *Working Paper 81, Österreichisches Institut für Familienforschung, Wien* .

Bardasi, Elena and Gornick, Janet C. 2008. "Working for less? Women's part-time wage penalties across countries." *Feminist economics* 14(1):37–72.

Bettio, Francesca and Verashchagina, Alina. 2009. *Gender segregation in the labour market: root causes, implications and policy responses in the EU*. Office for Official Publications of the European Communities.

Blackburn, Robert M. 2012. "The measurement of occupational segregation and its component dimensions." *International Journal of Social Research Methodology* 15(3):175–198.

Blundell, Richard and MaCurdy, Thomas. 1999. "Labor supply: A review of alternative approaches." *Handbook of labor economics* 3A:1559–1695.

Böheim, René, Hofer, Helmut, and Zulehner, Christine. 2007. "Wage differences between Austrian men and women: semper idem?" *Empirica* 34(3):213–229.

Borghans, Lex and Groot, Loek. 1999. "Educational presorting and occupational segregation." *Labour Economics* 6(3):375–395.

Charles, Maria. 2011. "A world of difference: international trends in women's economic status." *Annual Review of Sociology* 37:355–371.

Charles, Maria and Bradley, Karen. 2009. "Indulging Our Gendered Selves? Sex Segregation by Field of Study in 44 Countries1." *American journal of sociology* 114(4):924–976.

Charles, Maria and Grusky, David B. 2005. *Occupational ghettos: The worldwide segregation of women and men.* Stanford University Press.

Cohen, Philip N. 2004. "The gender division of labor "Keeping house" and occupational segregation in the United States." *Gender & Society* 18(2):239–252.

Croson, Rachel and Gneezy, Uri. 2009. "Gender Differences in Preferences." *Journal of Economic Literature* 47(2):448–474.

Crouch, Colin. 1999. *Social Change in Western Europe.* Oxford University Press.

Dolado, Juan Jose, Felgueroso, Florentino, and Jimeno, Juan Francisco. 2003. "Where do women work?: Analysing patterns in occupational segregation by gender." *Annales d'Economie et de Statistique* 71–72:293–315.

Elliott, Jane. 2005. "Comparing occupational segregation in Great Britain and the United States." *Work, Employment & Society* 19(1):153.

England, Paula. 2010. "The Gender Revolution Uneven and Stalled." *Gender & Society* 24(2):149–166.

Eurofound. 2011. "European Company Survey 2009: Part-time work in Europe." `http://www.eurofound.europa.eu/sites/default/files/ef_files/pubdocs/2010/86/en/3/EF1086EN.pdf`. Accessed: 2015-08-10.

Fagan, Colette and Rubery, Jill. 1996. "The Salience of the Part-Time Divide in the European Union." *European Sociological Review* 12(3):227–250.

Flückiger, Ives and Silber, Jacques. 1999. *The measurement of segregation in the labor force*. Physica-Verlag.

Frankel, David M. and Volij, Oscar. 2011. "Measuring school segregation." *Journal of Economic Theory* 146(1):1–38.

Freeman, Richard B and Schettkat, Ronald. 2005. "Marketization of household production and the EU–US gap in work." *Economic Policy* 20(41):6–50.

Geist, Claudia. 2005. "The welfare state and the home: Regime differences in the domestic division of labour." *European Sociological Review* 21(1):23–41.

Gerecke, Megan. 2013. *A policy mix for gender equality?: lessons from high-income countries*. Internat. Inst. for Labour Studies.

Goldin, Claudia, Katz, Lawrence F., and Kuziemko, Ilyana. 2006. "The Homecoming of American College Women: The Reversal of the College Gender Gap." *Journal of Economic Perspectives* 20(4):133–156.

Gonäs, Lena and Karlsson, Jan, editors. 2006. *Gender segregation. Divisons of work in post-industrial welfare states*. Ashgate.

Grimshaw, Damian and Rubery, Jill. 1997. "The concentration of women's employment and relative occupational pay: A statistical framework for comparative analysis." *OECD Labour Market and Social Policy Occasional Papers 26* .

Grünberger, Klaus and Zulehner, Christine. 2009. "Geschlechtsspezifische Lohnunterschiede in Österreich." *WIFO-MB* 82(2):139–150.

Guinea-Martín, Daniel, Mora, Ricardo, and Ruiz-Castillo, Javier. 2013. "More than jobs: The evolution of gender segregation across the life course." *mimeo* .

Harrison, Glenn W. and List, John A. 2004. "Field Experiments." *Journal of Economic Literature* 42(4):1009–1055.

Heim, Bradley T. 2007. "The Incredible Shrinking Elasticities: Married Female Labor Supply, 1978–2002." *Journal of Human Resources* 42(4):881–918.

Killingsworth, Mark R and Heckman, James J. 1986. "Female labor supply: A survey." *Handbook of labor economics* 1:103–204.

Kreimer, Margareta. 2004. "Labour market segregation and the gender-based division of labour." *European Journal of Women's Studies* 11(2):223–246.

Kullback, Solomon. 1959. *Information theory and statistics*. Wiley Publication in Mathematical Statistics.

Kytir, Josef and Stadler, Bettina. 2004. "Die kontinuierliche Arbeitskräfteerhebung im Rahmen des neuen Mikrozensus." *Statistische Nachrichten* 6(2004):511–518.

Lachance-Grzela, Mylène and Bouchard, Geneviève. 2010. "Why do women do the lion's share of housework? A decade of research." *Sex roles* 63(11-12):767–780.

Leitner, Andrea and Dibiasi, Anna. 2015. "Frauenberufe – Männerberufe. Ursachen und Wirkungen der beruflichen Segregation in Österreich und Wien." *Frauen. Wissen. Wien* No. 2:41–104.

Mandel, Hadas and Semyonov, Moshe. 2006. "A Welfare State Paradox: State Interventions and Women's Employment Opportunities in 22 Countries." *American Journal of Sociology* 111(6):1910–1949.

Matteazzi, Eleonora, Pailhé, Ariane, and Solaz, Anne. 2014. "Part-Time Wage Penalties for Women in Prime Age A Matter of Selection or Segregation? Evidence from Four European Countries." *Industrial & Labor Relations Review* 67(3):955–985.

Mora, Ricardo and Ruiz-Castillo, Javier. 2003. "Additively decomposable segregation indexes. The case of gender segregation by occupations and human capital levels in Spain." *Journal of Economic Inequality* 1(2):147–179.

Mora, Ricardo and Ruiz-Castillo, Javier. 2005. "Gender Segregation from Birth to Occupation: An Application to Spain." *UC3M WP Economic Series* 03–36.

Mora, Ricardo and Ruiz-Castillo, Javier. 2011. "Entropy-Based Segregation Indices." *Sociological Methodology* 41(1):159–194.

Pernicka, Susanne and Stadler, Bettina. 2006. "Atypische Beschäftigung–Frauensache? Formen, Verbreitung, Bestimmungsfaktoren flexibler Arbeit." *Österreichische Zeitschrift für Soziologie* 31(3):3–21.

Prix, Irene. 2012. "Gender Segregation Within Different Educational Levels: Austrian and Finnish Trends in the Light of Educational Reform, 1981–2005." *Scandinavian Journal of Educational Research* 56(6):637–657.

Reardon, Sean F. and Firebaugh, Glenn. 2002. "Measures of Multigroup Segregation." *Sociological Methodology* 32:33–67.

Rubery, Jill and Fagan, Colette. 1995. "Gender segregation in societal context." *Work, Employment & Society* 9(2):213–240.

Sparreboom, Theo. 2014. "Gender equality, part-time work and segregation in Europe." *International Labour Review* 153(2):245–268.

Statistik Austria. 2009. "Zeitverwendung 2008/09, ein Überblick über geschlechtsspezifische Unterschiede." `https://www.bmbf.gv.at/frauen/publikationen/zeitverwendung_2008_09_barri_25887.pdf`. Accessed: 2015-11-20.

Steinmetz, Stephanie. 2012. *The Contextual Challenges of Occupational Sex Segregation. Deciphering Cross-National Differences in Europe.* VS Verlag für Sozialwissenschaften. Wiesbaden: Springer Fachmedien.

Steinmetz, Stephanie and Handl, Johann. 2003. "Segregation and part-time work: Obstacles to adequate employment." *Working Paper, FENICs working group of the University of Erlangen-Nuremberg* .

Theil, Henri and Finizza, Anthony J. 1971. "A note on the measurement of racial integration of schools by means of informational concepts." *The Journal of Mathematical Sociology* 1(2):187–193.

Walby, Sylvia. 1997. *Gender transformations.* Routledge: London.

Weichselbaumer, Doris. 2004. "Is It Sex or Personality? The Impact of Sex Stereotypes on Discrimination in Applicant Selection." *Eastern Economic Journal* pages 159–186.

Wernhart, Georg and Neuwirth, Norbert. 2007. "Geschlechterrollenwandel und Familienwerte 1988-2002. Österreich im europäischen Vergleich. Ergebnisse auf Basis des ISSP

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