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ABSTRACT

Market Orientation and Gender Wage Gaps: An International Study*

Two very different approaches are used to explore the relation between market orientation and gender wage differentials in international data. More market orientation might be related to gender wage gaps via its effects on competition in product and labor markets and the general absence of regulation in the economy. The first approach employs meta-analysis data and takes advantage of the fact that many studies already exist which use national data sources to the best possible extent. The second approach uses comparable micro data from the International Social Survey Programme (ISSP), which allows calculating internationally consistent gender wage residuals in the first place. By comparing these two very different methods of data collection we get a robust result relating higher levels of market orientation as proxied by the Economic Freedom Index with lower gender wage gaps.

JEL Classification: J16, J31, J71

Keywords: gender wage gap, competition, market orientation

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1 Introduction

Much of the debate about gender wage differentials and discrimination concerns the question whether competitive markets can bring an end to unequal labor market outcomes of men and women or whether some form of anti-discrimination law is necessary. There is extensive – although somewhat controversial – research on the impact of equal treatment laws and affirmative action in the U.S. (Neumark and Stock, 2001) and elsewhere (Gunderson, 1994). On the international level, Weichselbaumer and Winter-Ebmer (2007) looked at the impact that the ratification of international conventions, such as those from the International Labor Office (ILO), can have on gender wage differentials. Regarding the impact of competitive markets, there is less research, in particular on an international scale. This is remarkable, because Becker's seminal study (1957) on the economics of discrimination already started the discussion how markets might influence gender pay differentials. Becker argued that employers (like customers or coworkers) might have a "taste for discrimination" and maximize utility, not profit, by employing preferably men and paying them higher wages. As a consequence, competition should expunge discrimination in the long run, since non-discriminatory employers can produce at lower costs.

In recent years some studies have related narrow measures of competition in selected industries to measures of gender wage gaps in these industries (Ashenfelter and Hannan, 1986; Black and Strahan, 2001; Hellerstein et al., 2002) and found results consistent with Becker's theory. Another strand of empirical research focuses on the effect of increased international trade on women's relative wages. Using a difference-in-difference approach, Black and Brainerd (2004) show that the increase in the import share of the U.S. manufacturing industries resulted in a higher decrease of the gender wage gap in concentrated industries than in competitive industries. In contrast, Berik et. al. (2004) examine the effect of competition on the gender wage gap in Taiwan and South Korea and find that increased international trade is positively associated with gender wage discrimination in concentrated industries.[2] Oostendorp (2004) studies the effect of globalization, measured by FDI net inflows and trade (percentage of GDP) on the occupational gender wage gap and finds a narrowing impact of globalization except for high-skill occupations in poorer countries. Joliffe and Campos (2005) show for Hungary that the gender wage gap has decreased substantially between 1986 and 1998, a pe-

[2] Menon and Rodgers (2006) obtain similar results for the Indian manufacturing sector during the period 1983 to 2004. In contrast, Jacob (2007) – using the same individual-level data but different indicators for competition and different methodology – finds a negative association between increased competition resulting from the 1991 trade reforms and the gender wage gap in Indian manufacturing industries.

riod during which the country has experienced an increase in competition due to the transition from central planning to market economy.

However, a more general analysis of the effects of market-orientation and competitiveness of a country on its gender wage differentials is still missing. Becker concentrated on competition in the product market as the prime mechanism which should eliminate discrimination, but arguments can be made that the competitiveness in a country, i.e. the prevalent market orientation more generally, could do away with discrimination. The absence of regulation, the freedom to exchange goods and services, just like the protection of private property are paramount aspects of market orientation. They facilitate the entry of firms into markets, force less efficient enterprises out of the market and lead to the dissolution of monopolies. As a result open and covert discrimination against women by clubs, networks and social norms becomes less possible and females may find it easier to compete with males in the labor market. On the other hand, less regulation and state intervention which goes along with higher market orientation and competitive markets will diminish the role of legislature to influence wage setting which may increase gender wage differentials.[3] More market orientation or economic freedom may also lead to higher wage inequality in a country in general if there are, for example, no minimum wages that companies have to adhere to (Berggren, 1999). Since women are typically overly represented at the lower end of the wage distribution, increased general inequality may also increase the gender wage gap. Market orientation can, therefore, have both a limiting as well as furthering influence on gender wage differentials.[4]

We use the Index of Economic Freedom assembled by the Fraser Institute, Vancouver (Gwartney, et. al, various years) that, by its definition, measures the market orientation and competitive climate of a country. The index comprises several sub-components: size of government, structure of the economy and the use of markets, price stability, freedom to use alternative currencies, property rights, freedom in international exchange and freedom in financial markets. It also includes the mean tariff rates as a part of the international exchange section. The index has been designed to capture the degree of economic freedom and market orientation in a society and has been used in many studies to explain development and growth[5].

[3] Weichselbaumer and Winter-Ebmer (2007) showed that government regulation can also be detrimental to gender equality if it concerns 'protective legislation' that prohibits women from engaging in certain forms of employment (e.g. night-work, mining).

[4] Schultz (2006) shows that globalization, i.e. liberalization of trade policy, leads to greater gender inequality in terms of education and health.

[5] See Doucouliagos (2005) for a survey on the relation between economic freedom and growth, Berggren (1999) investigates the impact of economic freedom on inequality, Rose (2000) on trade and Graeff and Mehlkop (2003) that on corruption.

The index is available for 1970 up to 2000 for every five years; we use interpolated values to match our data.

This study takes two approaches to measure the effect of competition on the gender wage gap. In the first approach we take advantage of the fact that a large number of national studies that calculate gender wage gaps have already been done in the past and construct our data via the method of meta-analysis (Weichselbaumer and Winter-Ebmer, 2005, 2007). We collect all accessible published values for gender wage gaps for different countries and make them comparable by the use of meta-regression analysis. In total, the published estimates representing our meta data include 62 countries and cover a time span from 1963 to 1997. In the meta-regression analysis we use all the information on how an estimate of the gender wage gap was obtained: for example, we assess the impact of different empirical methodologies the researchers have used or the kind of data they had access to. This rich data set is subsequently supplemented with information on the level of competition, as measured by the Economic Freedom Index, to examine whether the often-proclaimed impact of this factor really exists internationally.

In a second approach we analyze micro data from the International Social Survey Programme (ISSP) to examine the effect of competition. The ISSP is an annual survey on social science topics that is conducted by national research teams. It has the big advantage that the data is easily comparable across countries and time. The ISSP data is available for a different number of years for thirty-one countries during the time period of 1985 to 2000. The results based on this data corroborate our findings from the meta analysis by showing a strong negative relation between economic freedom and gender wage gaps.

2 A meta-analysis of existing studies

2.1 Data

The data for our first way of examining the effect of economic freedom on the gender wage residual comes from the meta-analysis conducted by Weichselbaumer and Winter-Ebmer (2005). Meta-analysis is a helpful tool to cumulate, review and evaluate empirical research. Papers investigating one particular topic are collected and analyzed concerning their data and method. Meta-analysis then allows evaluating the effect of different data characteristics and methodologies on the result reported, e.g. a regression parameter (Stanley, 2001). Instead of the usual practice of analyzing observations of individual workers, in meta-analysis each previously conducted study represents one data point. Meta-regression analysis uses regression

techniques to explain these collected parameters by characteristics of the individual study. Meta-analysis is particularly suitable for the examination of gender wage differentials because the literature in this area is very standardized in the way the parameter of interest is usually estimated. As a result, the outcome variable is highly comparable across studies. Furthermore, there is a vast amount of literature available to be included in such a meta-analysis which gives a large number of data points.

For the meta-analysis on gender wage differentials all accessible published estimates for sex-discrimination were collected. In November 2000 we searched the Economic Literature Index for any reference to: "(wage* or salar* or earning*) and (discrimination or differen*) and (sex or gender)". From the resulting 1541 references all papers were excluded that did not provide an empirical estimate for gender wage "discrimination", i.e. wage differentials that occur for "equally productive" men and women. Such an estimate could simply be a sex dummy from a wage regression, which controlled for productive characteristics like education, job-experience etc., or a calculated "discrimination effect" from a Blinder-Oaxaca wage decomposition. In the latter, following Blinder (1973) and Oaxaca (1973), wages are estimated separately for individuals i of the different groups g (males m and females f):

$$W_{gi} = \beta_g X_{gi} + \varepsilon_{gi}, \qquad (1)$$

where W_{gi} is the log wage and X_{gi} are the control characteristics of an individual i of group g.

The total wage differential between men and women can then be decomposed into an explained part due to differences in characteristics and an unexplained residual.
The difference in mean wages can be written as:

$$\overline{W_m} - \overline{W_f} = (\overline{X_m} - \overline{X_f})\hat{\beta}_m + (\hat{\beta}_m - \hat{\beta}_f)\overline{X_f} \equiv E + U, \qquad (2)$$

where $\overline{W}_g$ and $\overline{X}_g$ denote the mean log wages and control characteristics of group g and $\hat{\beta}_g$ represents the estimated parameter from equation (1). While the first term stands for the effect of different productive characteristics (the endowment effect E), the second term represents the unexplained residual U which is due to differences in the estimated coefficients for both groups and is often referred to as "discrimination effect". Since it is never possible to include all potentially relevant productive characteristics when examining gender wage differentials, most authors abstain from the term "discrimination" when evaluating their empirical results. While an employer is assumed to have exact knowledge of *all* the relevant productive characteristics of an employee and can set the wage accordingly, the researcher usually possesses

only the data for a restricted number of indicators for productivity. If the omitted variables correlate with sex, then the estimate might capture not only discrimination, but unobserved group differences in productivity as well. In particular, it has been argued that less investment in on-the-job training, less experience, greater time in housework and lower occupational attainments of women may be voluntary choices made by women that are not adequately captured in the data and may be responsible for estimated differences in wages that remain after controlling for available productive characteristics. To do justice to this concern[6], in the following we will not speak of "estimates for sex-discrimination" but rather *"gender wage residuals"* that remain after controlling for all available productive characteristics. In other words we examine that part of (log) gender wage differentials that is unexplained.

Since the first use in the early seventies, hundreds of authors have adopted and also extended the Blinder-Oaxaca approach. In the meta-study all estimates for log wage differentials, dummies as well as the unexplained gender wage residual U and its derivatives[7] were included. These estimates are taken as the dependent variable in our meta-regression analysis which we try to explain by the respective papers' data and method characteristics. In total, 263 papers provided us with the respective estimates for differences in wages of men and women with identical characteristics in 62 countries. The meta data cover a time span from 1963 to 1997, measured according to the time of the original data set not the publication of the paper.

2.2 Research method

Our meta-regression model takes the form:

$$R_j = \sum a_k \, Z_{kj} + \sum b_t t_{jt} + \sum d_l c_{lj} + \varepsilon_j \,, \qquad (3)$$

$$(j = 1, 2, \ldots J), (k = 1, 2, \ldots M), (l = 1,2,\ldots L), (t=1,2,\ldots T)$$

where R_j represents the "gender wage residual", i.e. the unexplained log wage differential, of study j, which can either be the coefficient of a gender dummy from a wage regression or the Blinder-Oaxaca unexplained residual U_j from (2), Z_{kj} are the k meta-independent variables, t_{jt} are time dummies and c_{lj} are a set of country dummies; a_k, b_t and d_l are parameters to be estimated.

To extract all the relevant characteristics of a paper and record them in the meta data set, each article was analyzed and carefully coded. The included meta-independent variables

[6] See Weichselbaumer and Winter-Ebmer (2006) for a discussion how authors assess such gender wage differentials and how their rhetoric in the respective papers can be used to analyze underlying attitudes.

[7] For derivatives of the B-O decomposition see e.g. Brown et al. (1980), Reimers (1983), Cotton (1988), and Neumark (1988).

can be grouped into 3 categories: variables concerning the data selection, variables capturing the applied econometric method and variables that specify the type of control variables which were (not) included in the original wage regressions. Specifically, we used 14 variables for data set selection (e.g. data source (administrative statistics or survey data), data set restrictions to never-married individuals, minorities, etc.), 9 variables for econometric methods (like Blinder-Oaxaca, dummy variable approach, use of instrumental variables, Heckman sample selection or panel data methods), 21 variables for inclusion of specific human capital control variables (e.g. experience, training, tenure, occupation) in the underlying log wage regressions plus a variable for the sex of the researcher, since Stanley and Jarrell (1998) find systematically lower gender wage residuals for female authors.[8]

Many articles included in the meta data examine different countries and different time periods in one paper. All the estimates for these different units of observation have been included in our data set. Typically authors also present a number of estimates for each country and time unit based on different specifications of the regression model which also have been incorporated as we have no prior of which estimate to pick. Picking one particular estimate from a paper as "the" right one would be arbitrary; such a procedure would also hamper replication efforts, which are very important for meta-studies. For each estimate all the corresponding data characteristics, econometric specifications and methods were collected and coded. This procedure yields one observation in our meta data set per reported estimate. In total 1441 estimates for all countries and time units could be included in our study. To deal with the fact that we have several observations per country and period we weight the data appropriately and use a clustering approach in our analysis.

Obviously, the collected estimates are based on different data sets with their specific characteristics; also different methods and specifications have been used to gain the results. However, meta-regression analysis allows evaluating the effect of different data characteris-

[8] The strongest and most significant impact on the gender wage gap results from the type of data set used. In comparison to a random sample of the population, the gender wage gap is lower by 8.7 log points if only a sample of new-entries in the labor market is investigated. Likewise, the wage gap is lower in the public sector (- 6.7 log points) and if only a narrow occupation is studied (- 5.0), because in the latter case, holding productivity equal is much easier. The wage gap is higher in the sample with only low-prestige occupations (+ 4.9) and lower for only high-prestige jobs (- 12.1) as compared to a sample including all occupations. The wage gap is highest for married employees (+ 7.6) and significantly lower for singles (- 13.3). Among minority workers, the gender wage gap is somewhat smaller (- 7.3).
The impact of variables concerning method and inclusion of particular control variables is smaller and less systematic. If a study does not control for marital status this reduces the gender wage gap by 3.8 log points. If the variable tenure is missing the gender wage gap is higher by 4.7 log points and if the share of females in an occupation is not controlled for, this increases the wage gap by 7.4 log points. All the reported results are significant at the 1% level. Moreover, in our meta-analysis we do not find an effect of the sex of the researcher on the gender wage gap. See Weichselbaumer and Winter-Ebmer (2005) for a more detailed description and for specification and robustness checks of the same general model that we use here.

tics and econometric methods on the result reported by the use of a simple regression, where the gender wage residual is explained by the characteristics of the concerned study (Stanley, 2001). Using this method, we could estimate what each paper would have reported if a standard method and data set had been used and make the results comparable. This provides us with internationally comparable gender wage residuals for a variety of countries much broader than available in any micro data set.

2.3 Results

Figure 1 shows the raw correlation between the gender wage residuals, as reported in the original studies, but aggregated at the country level, and economic freedom, which is strongly negative: more economic freedom is associated with lower gender wage gaps. Table 2 reports standard OLS and country fixed effects estimations. In the first two specifications we regress the gender wage residuals of published studies only on the Economic Freedom Index as well as indicators for economic development and female labor market attachment: GDP per capita, the fertility rate as well as the female activity rate. Both a higher GDP and higher involvement of females are expected to lead to lower gender wage differentials[9]. In columns (3) and (4) we additionally include meta-regression variables describing data and methods of the underlying wage regressions – as enumerated in section 2.2. All specifications also include year dummies.

Results in Table 2 consistently show a negative effect of economic freedom on the gender wage residual. An increase of economic freedom by one point on the scale (0-10) is associated with a decrease of the wage residual by 2-7 percentage points.

In meta-regression analysis the methodological quality of the underlying gender wage gap studies is a major problem because all available studies are treated alike. One way to control for the quality of the studies is to take the econometric procedure explicitly into account. This has been done in the standard versions of our meta-regression models where we accounted for the major methodological issues typically regarded as relevant in the literature: we considered whether or not possibly endogenous human capital variables, like work experience, were instrumented in a particular research paper, whether panel data methods were used to control for unobservable individual effects or whether sample selection problems were duly taken into account.

[9] This is the case only when higher participation rates reflect higher education levels of women. However, since there is a selection bias that causes primarily skilled females to choose market work, an increase in female labor market participation that is merely the result of more low qualified women entering the labor market will increase the gender wage gap.

A further possibility is to treat (weight) studies at hand differently according to their assessed quality. So far our analysis has treated all studies found in the literature alike, i.e. all data points in our meta-regression analysis get equal weight in the regressions. In Table 3, we suggest three different weighting schemes to account for the quality of the underlying studies and to check for the robustness of our results.

At first, we look at journal quality and apply the citation-based journal rankings from Laband and Piette (1994) as weights (Cols. (1) and (2)). This scheme is agnostic about our own priors of study quality, but assumes that the peer-review process does a good gate-keeping job in letting the most reliable studies be published in the best journals. We assigned the lowest weight to non-journal publications like chapters in books or working papers. A drawback of this approach is that non-US and non-UK studies often find it much harder to get access to top-notch international journals. Therefore US and UK studies implicitly get a higher weight in this procedure. Since a higher number of control variables for individual productivity in a wage regression reduces the problem of unobserved heterogeneity, the quality of a gender wage gap estimate should increase with the number of controls used. In Cols. (3) and (4), therefore, the number of regressors in the underlying wage equations is used as a weighting scheme. Finally in Cols. (5) and (6), we use the square root of the degrees of freedom from the original wage regressions as a further weighting scheme. This weighting scheme should capture the reliability of the published wage regressions included in our meta data.

The estimations in Table 3 use all meta-regression variables and are fairly robust with respect to the weighting. Weighting with the number of regressors or the degrees of freedom in the wage regressions produces precisely estimated coefficients which are fairly close both in the OLS and fixed effects specifications. The weighting with journal rank produces smaller – and statistically non-significant estimates – which might be caused by an “overweighting” of the Anglo-Saxon countries where the variance of economic freedom is lower and the impact of still more economic freedom on gender issues might be small.

Considering the other control variables, we do find a consistently negative impact of the female activity rate and of economic development of the country (GDP per capita), but both effects are not always statistically significant.

3 Using internationally comparable micro data

3.1 Data

In the second approach, we estimate gender wage residuals with micro data from the International Social Survey Programme (ISSP) for the years 1985 to 2000. The ISSP is an annual survey on social science topics conducted by national research teams. The survey is based on a jointly developed questionnaire and includes a common set of background characteristics, such as earnings, working hours, age, education and gender, on a random sample of adults in each participating country. The big advantage of the ISSP is its comparability across countries and time; therefore, it has been used for many cross-country studies on gender wage gaps in the past (e.g. Blau and Kahn, 1992, 1996, 2003).

3.2 Research method

For each country and year, we estimate log earnings regressions separately for males and females and compute the gender wage residual using the decomposition procedure developed by Blinder (1973) and Oaxaca (1973). The dependent variable is calculated by taking the log of earnings divided by weekly working hours. With the exception of Ireland 1993-94 and 1998, where weekly earnings are available, earnings are measured either on an annual or on a monthly basis. Since we do not have information on the number of weeks worked, we simply adjust earnings for weekly working hours. Furthermore, some countries report gross earnings whereas in other countries earnings are measured after taxes and other deductions. In about 40% of country-years earnings are coded as continuous variable, in the remaining country-years earnings are coded in categories. In this case, we used the midpoints of each interval as the actual earnings measure, except for the open-ended top category, for which we coded 1.2 times its minimum value. To ensure that our results are not affected by these measurement differences, we include dummy variables indicating whether earnings are measured annually, before deductions or by categories.

We estimate two specifications of the earnings function differing in the number of explanatory variables. The first specification (I) is a traditional Mincer-type earnings function with years of education[10], potential experience (age - years of education - age at school entry) and the square of potential experience as explanatory variables. In the second specification

[10] In some country-year samples years of education are not available. In this case we have recoded years of education from country-specific education categories and include a dummy variable indicating whether education was recoded from categories.

(II) we additionally control for whether the individual is married (or living in a partnership). Due to potential endogeneity, following Blau and Kahn (2003) we do not control for occupational status, although we recognize that occupational status may reflect some differences in the skill levels of individuals[11]. Since other variables such as industry, union membership or public sector are not available for all country-year samples, we cannot include these variables in the earnings regressions without losing a considerable number of country-years.

Each country-year sample consists of all employed and self-employed individuals aged 18 to 65. We include the self-employed because otherwise we would lose many observations due to a large number of missing values in the employment status in some country-year samples. However, our results are similar to those we obtain if we use gender wage residuals that are estimated for employed individuals only.

In total, we are able to estimate gender wage residuals for 202 country-years. Since the number of participating countries varies from year to year, our country panel is not balanced and consists of 31 countries, each of which is available 6.5 times on average. Table 4 presents the available years for each country as well as the means and standard deviations of the estimated gender wage residuals and the Economic Freedom Index.

Our approach is very similar to Blau and Kahn (2003) who used ISSP data for the years 1985-94 to show that countries with a compressed wage structure, i.e. less wage inequality, and a higher female net supply have lower gender wage residuals.[12] Wage inequality denotes the dispersion of returns across skill levels and sectors, i.e. the more labor market prices differ across skill levels and sectors, the higher a country's wage inequality. Since women often have lower labor market exposure than men, e.g. less labor market experience, and are employed in lower-paying occupations and industries, they receive, on average, lower returns than men. It follows that countries with more dispersed skill prices and higher intersectoral wage differences also have higher gender wage residuals.

Following Blau and Kahn (2003) we use two approaches to control for the impact of a country's wage structure. First we construct a direct measure of wage inequality, i.e. the standard deviation of predicted values from the male earnings regressions corrected for country differences in male average characteristics. We use predicted male earnings because female

[11] Results with gender wage residuals calculated with regressions including occupational dummies show qualitatively similar results.

[12] The main difference to their study lies in the exact definition of the gender wage gap: Blau and Kahn (2003) first estimate separate earnings regressions by gender and then use the estimated coefficients for weekly working hours of full-time workers to compute an earnings measure that is based on a 40-hour week. Furthermore, for each country they replace the mean values of the productivity characteristics (years of education, potential experience and its square) by the characteristics of U.S. men and women for the respective year. Thus, their estimate of the gender wage gap removes international differences in the human capital characteristics of women relative to men, but includes human capital differences between U.S. men and women.

earnings may be influenced by discrimination; thus assume that the distribution of male earnings would be the same in the absence of discrimination against women. For robustness checks, we replace this measure by institutional indicators that are expected to influence a country's overall level of wage inequality.

The standard deviation of predicted male earnings measures between-group inequality and is determined by differences in male characteristics and differences in the male returns to those characteristics. Thus, country differences in male wage inequality are either due to differences in male average characteristics or differences in male average returns. To remove the effect of country differences in male average characteristics we use the characteristics of British males and the estimated returns from the male earnings regressions for each country and year when computing standardized predicted male earnings.[13]

As Blau and Kahn (2003) note, there are two problems with the wage inequality variable. Firstly, Fortin and Lemieux (1998) present evidence that the reduction in the U.S. gender wage gap in the 1980s has led to an increase in male wage inequality, i.e. the inequality indicator is potentially endogenous. Secondly, the inequality variable is a generated regressor and is thus measured with sampling error. Murphy and Topel (1985) show that ignoring the sampling error of a generated regressor yields incorrect estimates of the standard errors of all coefficients in the second-step regression.[14] Since we are primarily interested in the effect of economic freedom on the gender wage residual, the generated regressor problem is our major concern. We follow Blau and Kahn (2003) and replace the wage inequality variable by institutional indicators, such as trade union density, an index of the strictness of employment protection and an index for wage bargaining centralization. Using data for eleven OECD countries between 1973 and 1998, Koeninger et. al. (2007) have recently shown that a substantial part of the change in male wage inequality can be attributed to changes in labor market institutions.

3.3 Results

Figure 2 shows the correlation between the extent of economic freedom and the country means of the estimated gender wage residuals from specification I in the raw data; Tables 5 and 6 present results for specifications I and II. The first column in each table shows results for the base specification where we control for male wage inequality, some variables describ-

[13] The estimated returns are from regressions with education, potential experience, its square and a married dummy as explanatory variables.

[14] Blau and Kahn (2003) use a procedure suggested by Murphy and Topel (1985) to correct the standard errors and report that results did not change.

ing measurement differences in the earnings and education variables from the earnings regression, year dummies and a constant. In column (2) we additionally control for some socio-economic indicators, such as GDP per capita, the fertility rate and the female activity rate. In column (3) we further add country dummies to control for heterogeneity between countries. For specification I, we find a statistically and economically significant impact of economic freedom on the gender wage residual in the regressions without country fixed effects. The estimated effects of a one-point increase in the Economic Freedom Index are 5.6 and 3.6 percentage points in columns (1) and (2) which amount to 34% and 22% of the standard deviation of the estimated gender wage residuals. For specification II we find a statistically significant effect of 5.9 and 3.9 percentage points, respectively. When adding country dummies, the estimated coefficient on economic freedom is still almost the same in both specifications, but less precisely estimated. Considering that in the country-fixed effects estimations only within-country variation in the Economic Freedom Index is used to identify the effect, measurement error and relatively low variation of the index within countries can easily explain the decreased precision of the estimates.

We test the robustness of our results by applying two weighting schemes that account for differences in the quality of the estimated gender wage residuals. Such differences may arise from various sources, such as the quality of the national samples or the fit of the earnings function. In column (4), we therefore weight the regression by the inverse of the standard error of the estimated gender wage residual, with the result that countries for which the gender wage residual is estimated with a high standard error receive a lower weight in the regression. Alternatively, we use the average of the coefficients of determination, i.e. the R-squared from the male and female earnings regressions, as a weighting scheme (column (5)). In total, our results are robust to these weighting schemes.

As mentioned above, we further test the robustness of our findings by replacing the wage inequality variable by trade union density, an index of the strictness of employment protection and an index of the level of wage bargaining centralization. Since these indicators are available for OECD countries only, our sample reduces to 159 country-years. Table 7 presents results for specification I in columns (1)-(2) and for specification II in columns (5)-(6) which are consistent with the results shown before. In both specifications we find a negative effect for economic freedom, the exactly same point estimate in the pooled OLS and the fixed-effects model (specification II), but higher standard errors when adding country dummies. Relative to economic freedom, the structural variables for wage setting institutions are much less robust: among them only trade union density has a significant negative impact on the

gender wage residual. For comparison reasons, columns (3)-(4) and (7)-(8) replicate the regressions with the wage inequality indicator for the reduced sample of OECD countries.

As mentioned above, economic freedom might have a separate impact on general inequality by reducing labor market regulation, reducing the influence of unions and minimum wages and the like. In this case, the full impact of more market orientation or economic freedom on gender wage gaps will be the direct (negative) impact of the Economic Freedom Index together with the indirect (positive) impact via higher general inequality. An easy way to get the aggregate effect of economic freedom is to estimate a "reduced form" where general inequality in the economy is taken out from the list of regressors. The remaining Economic Freedom Index is then supposed to capture both the direct positive as well as the indirect negative effect. Doing this, we find generally lower effects for the Economic Freedom Index, but still negative in all specifications. Note, that using the meta data, we do not have enough information on general inequality due to the very diverse data set across time and countries: in this case our estimates already represent the results of a "reduced form" estimation; i.e. they cover both the direct and indirect effects of the Economic Freedom Index.

4 Subcomponents of the Economic Freedom Index

The Economic Freedom Index as compiled by the Fraser Institute is a conglomerate of items which are supposed to capture the main elements of economic freedom in a society, i.e. the lack of government intervention in markets in general. It is a weighted average of five sub-components, the sub-components themselves are constructed with several indicators each (38 indicators in total). The indicators are: i) size of government (expenditures, taxes, tax rates, etc.), ii) legal structure and security of property rights (rule of law, protection of intellectual property, etc.), iii) access to sound money (money supply, inflation, freedom to own foreign currency accounts, etc.), iv) freedom to trade internationally (tariffs, non-tariff trade barriers, capital market controls, etc.) and v) regulation of credit, labour and business.

Some of these sub-components are directly related to competition on product markets, like property rights and regulation or freedom of international trade, others are not. E.g. low inflation rates and low money supply growth rates will have only a second-order effect on the degree of competition in a society, if at all. Likewise, the size of the public sector can be seen as neutral with respect to competition as long as higher tax rates do not inhibit the formation of new businesses. However, it is a standard finding that gender wage gaps are generally lower in the public sector. As a result, including the public sector as one indicator of the Eco-

nomic Freedom Index (a higher public sector contributes negatively to the index), our results may underestimate the negative correlation between the general market-orientation of a country and gender wage differentials – as has been pointed out before.

In Table 8 we therefore disaggregate the Economic Freedom Index into its components and for both data sets perform the same analysis as before. The results show that the subindicator for government size has no impact on gender wage gaps and the impact of sound money is weak. We get more consistent results for the other indicators, in particular the subcomponent free trade, regulation and legal structure. These indicators are most closely related to competitive markets and in particular to competition in product markets. As before, fixed effects estimates are somewhat less precisely estimated.

5 Conclusions

Competitive markets may further gender equality in wages. In this paper we use international data to test this hypothesis. The Economic Freedom Index serves as an indicator for general market orientation and competitiveness in an economy; this indicator is consistently measured for a large number of countries over a considerable period of time. To investigate internationally comparable gender wage differentials we used two complimentary strategies: i) Published estimates of gender wage residuals from Blinder-Oaxaca wage decompositions allow us to make use of the best econometric techniques and the best nationally available data for a large set of countries. Meta regression analysis, in turn, can make this information comparable across countries and time. ii) The use of strictly comparable micro data from the International Social Survey Programme allows constructing gender wage gaps in a comparable way in the first place, even if for a smaller set of countries only.

Both data bases lead to the same conclusion: there is a strong negative correlation between competitive markets and gender wage gaps, in particular when competitive markets are measured by the components “free trade”, “absence of regulation” and “legal structure”. These indicators are strongly related to competitiveness in the product market and are, therefore, backing Becker’s taste for discrimination model. More competitiveness in the economy can reduce gender inequalities in wages – if it is enough to close the gender wage gap completely is still to be shown. It has to be said, though, that our analysis focuses on gender wage differentials of employed individuals only. We do not examine changes in employment as a consequence of economic freedom which would be a further dimension of women’s total wel-

fare. Also we cannot distinguish whether women's nominal pay has increased or male wages have suffered as a result of competition nor determine the effects on women's real income. More research is therefore required to examine these additional important effects.

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6 Data-Appendix

Published papers used in the Meta-analysis: http://www.econ.jku.at/weichsel/work/meta_papers.pdf

Fertility rates, economic activity rates, Women's Indicators and Statistics Database, Version 4, United Nations.
Journal Ranking from Laband and Piette (1994), rankings based on impact adjusted citations per character in 1990, citations to articles published 1985-1989.
Economic Freedom Index Fraser Institute, Gwartney et al. (various years).
Male earnings inequality, union density, employment protection indicator, index of wage bargaining centralization: OECD Labor market indicators.
ISSP data from Central Archive for Empirical Social Research, University Cologne.

7 Tables:

Table 1: Descriptive Statistics (Meta sample)

			Gender wage residual		Economic Freedom Index	
Country	Years	n	Mean	St.dev.	Mean	St.dev.
Argentina	1985	8	0.329	0.040	3.90	0.00
Australia	1973-1993	59	0.138	0.091	7.72	0.39
Austria	1983-1989	28	0.251	0.088	6.75	0.13
Barbados	1993-1994	4	0.211	0.014	6.00	0.00
Bolivia	1989	2	0.380	0.031	5.80	0.00
Brazil	1970-1989	19	0.416	0.265	4.06	0.63
Canada	1970-1993	60	0.224	0.112	8.14	0.18
Chile	1987	14	0.250	0.152	6.64	0.00
China	1985-1995	11	0.254	0.090	4.24	0.36
Colombia	1979-1988	6	0.115	0.044	4.84	0.25
Costa Rica	1989	8	0.185	0.059	6.84	0.00
Côte d'Ivoire	1986	9	-0.026	0.125	5.18	0.00
Cyprus	1979-1995	2	0.299	0.101	6.05	0.35
Denmark	1980-1990	20	0.106	0.078	6.81	0.46
East Germany	1990-1994	5	0.166	0.065	8.06	0.04
Ecuador	1987	2	0.180	0.022	4.96	0.00
El Salvador	1989-1991	6	0.270	0.098	5.25	0.38
Guatemala	1989	2	0.184	0.026	5.98	0.00
Honduras	1989	2	0.293	0.005	5.96	0.00
Hong Kong	1976-1991	10	0.135	0.073	9.39	0.14
Hungary	1987-1991	4	0.354	0.092	4.86	0.19
India	1975-1995	23	0.253	0.151	4.29	0.23
Indonesia	1980-1990	8	0.540	0.135	5.95	0.80
Ireland	1982-1990	22	0.170	0.113	6.85	0.18
Israel	1983-1993	11	0.255	0.073	4.39	0.40
Italy	1987-1993	13	0.108	0.053	7.14	0.22
Jamaica	1988-1989	3	0.497	0.251	5.39	0.09
Japan	1978-1988	10	0.366	0.082	7.52	0.33
Kenya	1980-1986	6	0.170	0.173	4.84	0.26
Malaysia	1973-1991	19	0.240	0.186	6.99	0.28
Mexico	1984-1993	22	0.133	0.113	6.06	0.71
Netherlands	1984-1989	15	0.136	0.111	7.91	0.08
New Zealand	1992	1	0.196	0.000	8.40	0.00
Nicaragua	1977	6	0.631	0.121	5.98	0.00
Norway	1982-1991	54	0.185	0.080	7.52	0.32
Pakistan	1975-1993	21	0.266	0.126	3.70	0.61
Panama	1989	2	0.189	0.001	6.92	0.00
Peru	1984-1990	22	0.223	0.173	2.78	0.64
Philippines	1978-1988	4	0.373	0.071	5.12	0.28
Poland	1992	1	0.345	0.000	5.28	0.00
Portugal	1985-1989	10	0.185	0.079	6.11	0.27
Singapore	1989	5	0.040	0.103	8.88	0.00
South Africa	1994	2	0.511	0.218	5.90	0.00
South Korea	1971-1992	38	0.160	0.103	6.02	0.29
Spain	1985-1988	13	0.207	0.075	6.44	0.14
Sweden	1980-1994	13	0.118	0.064	6.75	0.60
Switzerland	1987-1995	16	0.142	0.105	8.37	0.09

Taiwan	1978-1996	77	0.238	0.123	7.07	0.28
Tanzania	1971-1980	13	0.049	0.085	4.14	0.06
Thailand	1980-1989	4	0.219	0.034	6.14	0.39
Trinidad & Tobago	1994	2	0.341	0.036	6.54	0.00
UK	1971-1994	83	0.186	0.129	7.53	0.86
US	1970-1997	581	0.188	0.123	8.44	0.29
Uganda	1992-1995	9	0.297	0.100	3.87	0.49
Uruguay	1989	8	0.201	0.026	6.74	0.00
Venezuela	1987-1989	4	0.231	0.012	5.86	0.09
West Germany	1977-1989	19	0.224	0.110	7.78	0.17
Total		1441	0.201	0.136	7.33	1.48

Table 2: The impact of economic freedom on the gender wage residual (Meta sample)

	(1)	(2)	(3) + meta-variables	(4) + meta-variables
Economic Freedom Index (0-10)	-0.034	-0.073	-0.022	-0.058
	(0.023)	(0.017)**	(0.009)*	(0.013)**
Fertility rate	-0.009	0.005	-0.011	0.052
	(0.009)	(0.033)	(0.007)	(0.022)*
Female activity rate	-0.002	-0.013	-0.002	-0.009
	(0.002)	(0.005)**	(0.002)	(0.004)*
GDP per capita	-0.001	-0.002	-0.002	-0.005
	(0.005)	(0.005)	(0.003)	(0.003)+
Country fixed effects	No	yes	no	yes
Observations	1441	1441	1440	1440
Adjusted R-squared	0.150	0.460	0.410	0.620

Notes: Robust standard errors in parentheses, + significant at 10%, * significant at 5%; ** significant at 1%. Dummy variables for years and a constant are included. Additionally, all regressions are weighted with the inverse of the number of time-country observations in the meta data set.

Table 3: The impact of economic freedom on the gender wage residual (Meta sample, weighted effects)

	(1)	(2)	(3)	(4)	(5)	(6)
Weighting scheme	Journal rank	Journal rank	# of regressors	# of regressors	Sqr(degrees of freedom)	Sqr(degrees of freedom)
Economic Freedom Index (0-10)	-0.004	-0.013	-0.022*	-0.041*	-0.033**	-0.030+
	(0.011)	(0.014)	(0.010)	(0.016)	(0.009)	(0.015)
Fertility rate	-0.013	0.013	-0.010	0.036+	-0.020*	0.039*
	(0.012)	(0.029)	(0.007)	(0.020)	(0.007)	(0.015)
Female activity rate	-0.002	-0.014**	-0.002	-0.008*	-0.001	-0.017**
	(0.002)	(0.004)	(0.001)	(0.003)	(0.002)	(0.002)
GDP per capita	-0.005	-0.005	-0.002	-0.004	-0.003	-0.003
	(0.003)	(0.002)+	(0.003)	(0.002)+	(0.003)	(0.003)
Country fixed effects	No	Yes	no	yes	no	yes
Observations	1440	1440	1440	1440	1154	1154
Adjusted R-squared	0.650	0.770	0.470	0.640	0.620	0.780

Notes: Robust standard errors in parentheses, + significant at 10%, * significant at 5%; ** significant at 1%. Dummy variables for years and a constant are included. Additionally, all regressions are weighted with the inverse of the number of time-country observations in the meta data set.

Table 4: Descriptive statistics (ISSP sample)

			Gender wage residual		Economic Freedom Index	
Country	Years	n	Mean	St.dev.	Mean	St.dev.
Australia	1986-88, 1990, 1993-96, 1998, 1999	10	0.144	0.071	7.57	0.31
Austria	1986, 1988-89, 1993, 1995-96, 1999-2000	8	0.169	0.086	6.97	0.38
Bulgaria	1993-94, 1997, 1999-2000	5	0.277	0.052	4.78	0.25
Canada	1992-96, 1998-99, 2001	8	0.108	0.172	7.83	0.18
Chile	1998-2000	3	0.149	0.017	7.48	0.00
Cyprus	1996-99	4	0.277	0.044	6.19	0.02
Czech Republic	1995-99	5	0.256	0.050	6.16	0.31
Denmark	1997-98, 2001	3	0.164	0.002	7.57	0.02
France	1997-99	3	0.151	0.026	6.91	0.04
Germany	1985-93, 1995, 1997-98, 2000	13	0.231	0.083	7.28	0.22
Great Britain	1985-2000	16	0.354	0.093	7.70	0.47
Hungary	1990, 1992-94, 1996-98	7	0.097	0.080	6.01	0.56
Ireland	1988-89, 1991, 1993-94, 1996, 1998	7	0.431	0.247	7.43	0.69
Israel	1993-94, 1996-98, 2000	6	0.185	0.053	5.87	0.50
Italy	1988, 1990, 1993-95, 1997-98	7	0.079	0.078	6.52	0.21
Japan	1992-94, 1996-2000	8	0.684	0.075	7.19	0.08
Latvia	1995-96, 1998-2000	5	0.260	0.035	5.85	0.63
Mexico	2001	1	0.136	0.000	6.29	0.00
Netherlands	1988-89	2	-0.013	0.074	7.23	0.03
New Zealand	1991-94, 1996, 1999-2000	7	0.159	0.050	8.13	0.42
Norway	1989-2000	12	0.174	0.046	7.11	0.28
Philippines	1992, 1996-2000	6	0.284	0.128	6.95	0.41
Poland	1991-95, 1997, 1999	7	0.248	0.067	5.06	0.68
Portugal	1997-2000	4	0.229	0.118	7.31	0.03
Russia	1996-2000	5	0.435	0.073	4.57	0.29
Slovak Republic	1996, 1998, 2001	3	0.255	0.037	5.96	0.36
Slovenia	1995, 1997-98, 2000	4	0.017	0.025	5.43	0.40
Spain	1994-95, 1997-2000	6	0.172	0.093	7.13	0.20
Sweden	1994-99, 2001	7	0.124	0.021	7.22	0.11
Switzerland	1987, 1998-99, 2001	4	0.128	0.053	8.10	0.20
United States	1985-2000	16	0.321	0.154	8.09	0.32
Total		202	0.237	0.163	6.96	1.00

Notes: Data from ISSP 1985-2000. The estimated gender wage residuals are based on specification I of the earnings regression. For some countries we have data for the year 2001 because the year of the ISSP module does not always correspond to the year when the fieldwork was carried out, or more precisely, the year to which the questions refer. Until 1989 Germany represents West Germany only, from 1990 on East Germany is included. Since East and West Germany are separate data sets, we pooled them and used population weights (obtained from Statistisches Bundesamt Deutschland) in the wage regressions.

Table 5: The impact of economic freedom on the gender wage residual (ISSP sample, specification I)

	(1)	(2)	(3)	(4)	(5)
Weighting scheme				standard error	adj. R^2
Economic Freedom Index (0-10)	-0.056**	-0.036*	-0.034	-0.030*	-0.032+
	(0.012)	(0.015)	(0.039)	(0.014)	(0.018)
Male wage inequality (st.dev.)	1.078**	1.057**	0.347*	0.882**	0.914**
	(0.180)	(0.190)	(0.149)	(0.170)	(0.197)
GDP per capita		-0.004*	0.007	-0.005**	-0.005*
		(0.002)	(0.010)	(0.002)	(0.002)
Fertility rate		-0.047+	-0.122	-0.078*	-0.044
		(0.026)	(0.105)	(0.031)	(0.029)
Female activity rate		-0.000	0.005	-0.000	-0.001
		(0.002)	(0.009)	(0.002)	(0.002)
Country fixed effects	No	No	Yes	No	No
Observations	202	202	202	202	202
Adjusted R-squared	0.320	0.330	0.380	0.290	0.350

Notes: Robust standard errors in parentheses, + significant at 10%; * significant at 5%; ** significant at 1%. Dummy variables for annual earnings, gross earnings, continuous earnings and education derived from categories as well as year dummies and a constant are included. GDP per capita in constant 1995 international 1000$. In Columns (4) and (5) we weight the regressions by the standard error of the estimated gender wage residuals and the average of the adjusted R-squared of the male and female earnings regressions, respectively.

Table 6: The impact of economic freedom on the gender wage residual (ISSP sample, specification II)

Weighting scheme	(1)	(2)	(3)	(4) standard error	(5) adj. R^2
Economic Freedom Index (0-10)	-0.059**	-0.039*	-0.033	-0.033*	-0.037*
	(0.012)	(0.015)	(0.039)	(0.014)	(0.018)
Male wage inequality (st.dev.)	1.027**	1.007**	0.311*	0.824**	0.853**
	(0.184)	(0.191)	(0.149)	(0.170)	(0.203)
GDP per capita		-0.004*	0.009	-0.004*	-0.005*
		(0.002)	(0.010)	(0.002)	(0.002)
Fertility rate		-0.050+	-0.128	-0.084**	-0.051+
		(0.027)	(0.105)	(0.031)	(0.030)
Female activity rate		-0.001	0.004	-0.001	-0.002
		(0.002)	(0.009)	(0.002)	(0.002)
Country fixed effects	No	No	Yes	No	No
Observations	202	202	202	202	202
Adjusted R-squared	0.320	0.330	0.370	0.280	0.350

Notes: Robust standard errors in parentheses, + significant at 10%; * significant at 5%; ** significant at 1%. Dummy variables for annual earnings, gross earnings, continuous earnings and education derived from categories as well as year dummies and a constant are included. GDP per capita in constant 1995 international 1000$. In Columns (4) and (5) we weight the regressions by the standard error of the estimated gender wage residuals and the average of the adjusted R-squared of the male and female earnings regressions, respectively.

Table 7: The impact of economic freedom on the gender wage residual (ISSP sample, only OECD countries)

	Specification I (only OECD countries)				Specification II (only OECD countries)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Economic Freedom Index (0-10)	-0.096**	-0.089	-0.058**	-0.048	-0.096**	-0.096	-0.061**	-0.052
	(0.027)	(0.072)	(0.021)	(0.055)	(0.027)	(0.071)	(0.021)	(0.055)
Trade union density (%)	-0.003**	-0.009*			-0.003*	-0.009*		
	(0.001)	(0.004)			(0.001)	(0.004)		
Strictness of employment protection (0-6)	-0.016	-0.076			-0.018	-0.065		
	(0.026)	(0.072)			(0.025)	(0.071)		
Index of wage bargaining centralization (1-5)	-0.003	-0.014			-0.000	-0.011		
	(0.022)	(0.042)			(0.022)	(0.042)		
Male wage inequality (st.dev.)			1.353**	0.362+			1.303**	0.329+
			(0.205)	(0.185)			(0.204)	(0.184)
GDP per capita	-0.001	0.014	-0.003	0.011	-0.001	0.017	-0.003	0.013
	(0.003)	(0.013)	(0.002)	(0.012)	(0.003)	(0.012)	(0.002)	(0.012)
Fertility rate	-0.128	-0.131	-0.098	-0.189	-0.138	-0.154	-0.103	-0.203
	(0.092)	(0.160)	(0.073)	(0.153)	(0.092)	(0.159)	(0.073)	(0.153)
Female activity rate	-0.003	0.013	-0.001	0.010	-0.003	0.012	-0.002	0.010
	(0.004)	(0.014)	(0.003)	(0.011)	(0.004)	(0.014)	(0.003)	(0.011)
Country fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	159	159	159	159	159	159	159	159
Adjusted R-squared	0.200	0.420	0.380	0.400	0.200	0.420	0.380	0.400

Notes: Robust standard errors in parentheses, + significant at 10%; * significant at 5%; ** significant at 1%. Dummy variables for annual earnings, gross earnings, continuous earnings and education derived from categories as well as year dummies and a constant are included. GDP per capita in constant 1995 international 1000$.

Table 8: The impact of different components of the Economic Freedom Index on the gender wage residuals (Meta and ISSP samples)[15]

A: Meta Data	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Government size	0.006	-0.000								
	(0.005)	(0.010)								
Legal structures			-0.007	-0.014+						
			(0.008)	(0.007)						
Sound money					-0.013*	-0.012				
					(0.006)	(0.007)				
Free trade							-0.025*	-0.031		
							(0.011)	(0.026)		
Business, credit and labor market regulation									-0.009	-0.017
									(0.010)	(0.030)
Country fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1487	1487	1474	1474	1487	1487	1487	1487	1475	1475
Adjusted R-squared	0.400	0.610	0.400	0.600	0.410	0.610	0.410	0.610	0.410	0.600

B: ISSP Data	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Government size	0.004	-0.027								
	(0.007)	(0.024)								
Legal structures			-0.049**	-0.016						
			(0.014)	(0.025)						
Sound money					-0.009	-0.003				
					(0.008)	(0.013)				
Free trade							-0.038*	-0.013		
							(0.018)	(0.028)		
Business, credit and labor market regulation									-0.039*	-0.000
									(0.016)	(0.027)
Country fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	202	202	202	202	202	202	202	202	202	202
Adjusted R-squared	0.310	0.380	0.360	0.380	0.320	0.380	0.340	0.380	0.340	0.380

Robust standard errors in parentheses, + significant at 10%; * significant at 5%; ** significant at 1%

[15] Results in A correspond to the specification in Table 2, Columns (3) and (4), results in B to Table 5, Columns (2) and (3).

Figure 1: Economic Freedom and the Gender Wage Residual - Meta sample

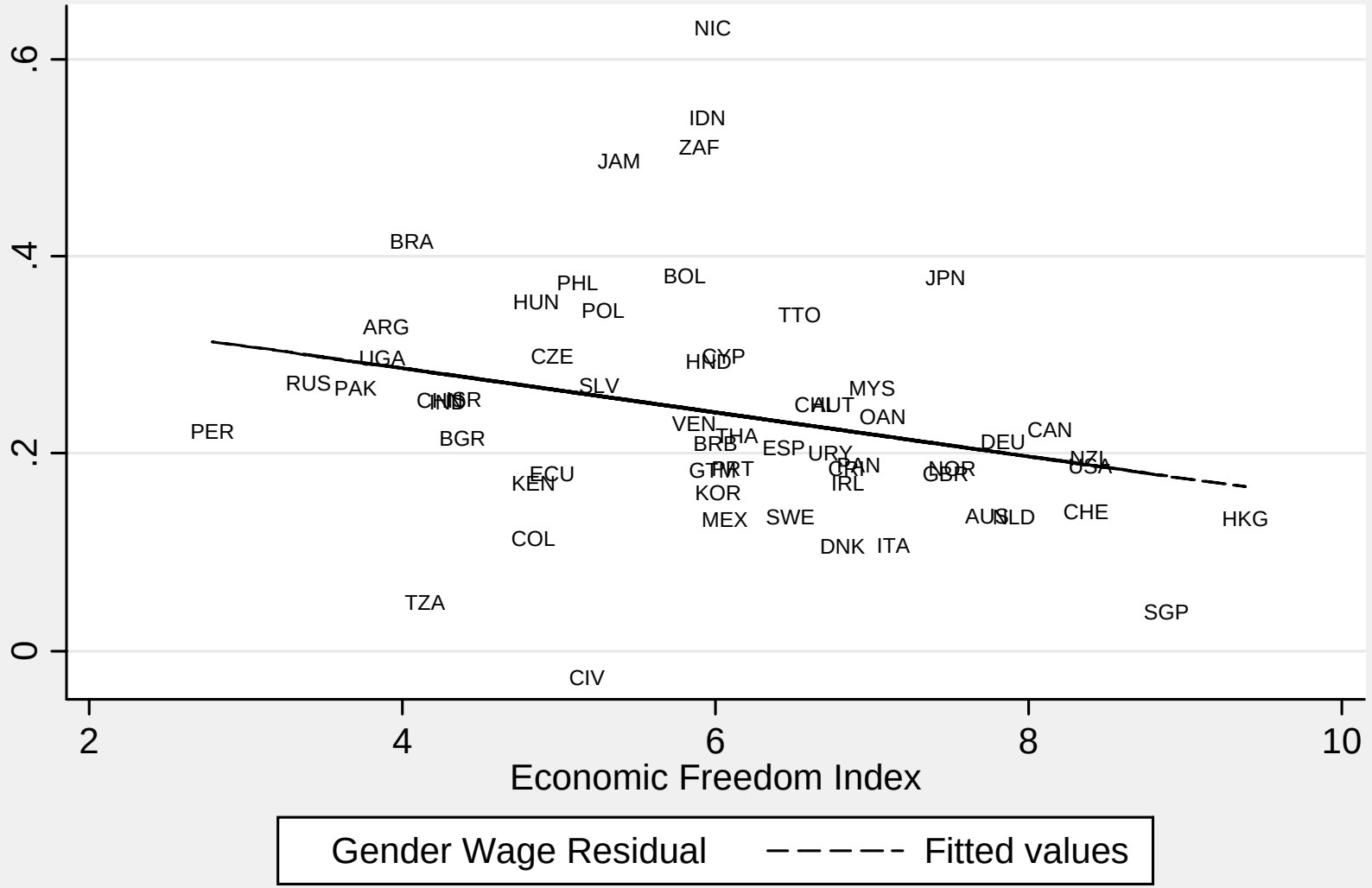

Figure 2: Economic Freedom and the Gender Wage Residual - ISSP sample