1 Introduction

Globalisation has increased dramatically over the last decades, with substantial economic impacts globally following increased economic integration. There has been a large economic debate on the effect of globalisation and trade on wage inequality (see Helpman (2016) for a literature review), with some evidence pointing to increasing wage inequality following globalisation. At the same time, there is a large literature analysing the often positive gender wage gap, meaning women receive less pay than their male counterparts (OECD, 2012). However, the gender dimension of the literature on the effect of trade on wage inequalities remains an understudied aspect. Gender inequality has become an increasingly pressing issue globally and has received a great deal of attention also in the economic literature. Gender inequalities is not only a matter of fairness and social justice, but also entails profound economic effects when women are prevented from fully realizing their potential as workers. There is therefore a need to include gender in the important debate on the effect of globalisation on wage inequality.

During the past years, some research has been done on the subject, presented below. This literature has mainly treated the effect of globalisation on the gender wage gap as internal and used a single-country approach. The results of the effect of globalisation on the gender wage gap and especially the driving mechanism remain inconclusive, calling for further research. At the same time, all existing studies choose to focus on either exports or imports, thereby failing to capture the whole effect of globalisation.

This analysis will contribute to the existing literature by using a European multi-country approach on the gender wage gap and including both imports and exports. It also contributes to the very limited research on the external spill-over effect of globalisation on the gender wage gap, exploring how the level of gender equality of a country's trading partner has a spill-over effect on the gender wage gap within the country itself, as in Videnord and Lark (2023). The motivation behind this is that globalisation increases the exposure to different levels of gender inequality through the trading partners, which may have spill-over effects on a country's own gender inequality. Noir-Luhalwe and Tharwaat (2021) and Khoban(2022) also look at the spill-over effect, but use gender equality and female labor force participation as the outcome variable. They all find a significant effect, but point to different explanatory mechanisms, pointing to the need of further research.

In the empirical analysis, annual country level panel data is used for 32 European countries between 1995 and 2021 to estimate a fixed effects model. A measure of exposure to gender inequality through trade is generated for each European country, by weighing the gender equality measured by the well-established Gender Inequality Index according to trade with a given trading partner in total trade. The regressions are then run both for exports and imports. The main findings suggest that there is a positive spill-over effect from the trading partner on the gender wage gap both for exports and imports, with a higher effect for imports. This indicates that trading partners with a higher degree of gender inequality have a stronger spill-over effect on the gender wage gap and that the effect works both through exports and imports.

In the literature on the spill-over effect of trade on gender equality, two main channels are raised as the explaining mechanism; technology and discrimination through gender norms. The analysis is therefore extended to also look into if certain groups of products based on technology intensity are driving the results, and if the gender norms interfere. The technology channel is raised by Noir-Luhalwe and Tharwaat (2021) based on the work of Juhn et al(2013). Although examining the effect on gender inequality as a whole instead of the gender wage gap specifically, they ascribe their findings to technology upgrading, meaning that the gender equality increases when technology is used that decreases the male physical comparative advantage, making women relatively more productive. The assumption is that more gender equal countries use technology that favors women to a higher degree, which are then adopted through trade by less gender equal countries. If technology makes women more productive by making tasks less physical, this should effect the gender wage gap. To analyse if certain technology groups seem to be driving the effect, the products are grouped according to technology intensity. More technology intense products have more room for adoption of technology, but at the same time the marginal effect may be small when the degree of technology is already high. The results show that the spill-over effect is mainly found among low technology products.

The analysis is then extended to also include the gender norms. Videnord and Lark (2023) ascribe the finding of a positive effect of globalisation on the gender wage gap in Sweden to the diffusion of gender norms and customer discrimination, especially for female managers. This is similar to the approach of Khoban (2022), who looks at whether imports in India can shift gender norms and finds a positive effect on the female labor force participation of exposure to higher gender standards through trade.

To In line with Khoban (2022), a measure of relationship intensity is included, as more human interaction should intensify the diffusion of gender norms and possibility of discrimination. This measure is included by product level, to first generate a measure of relationship-intensity for the trade with each specific trading partner, and then a weighted average for all trading partners. The interaction term also justifies that the contract intensity should capture the gender norms, and not the male comparative in bargaining as argued in Halvarsson et al. (2022). Very limited evidence is found that the gender norms are interfering.

In general, the results add to the aim of the thesis to show that there seems to exist a spill-over effect from trading partners on the gender wage gap across countries and for both exports and imports. It adds to the external validity of the existing literature. In addition, there is an indication that the result is driven by certain type of products, but not that gender norms are interfering. The results therefore call for further research into discerning the driving mechanism behind this spill-over effect.

1.1 Literature

The main part of the literature on how trade and globalisation affect gender equality uses the gender wage gap or female labor force participation rate as the dependent variable, treating the effect as internal, meaning excluding the effect of the trading partners. The direction of the effect and explaining mechanism differ, where the earliest contributions point to reduced discrimination following increased competition from trade (Black and Breinerd (2003), Bøler et al. (2015)). Further research looks into different effects of trade on the gender wage gap depending on the characteristics of the female worker (Ben Yahmed (2012), Ederington et al (2009)) and more specifically ascribe a positive effect on the gender wage gap to the biological clock (Keller and Utar (2018)), inflexbility (Goldin (2014)) working across time zones (Bøler et al. (2017), comparative disadvantage in bargaining skills (Halvarsson et al. (2022)), or a negative effect to a comparative advantage in social skills (Bonfiglioli and De Pace (2021)).

Related to the technology channel, Juhn et al. (2013) find evidence from Mexico after tariff reductions associated with NAFTA. They ascribe this effect to firms being encouraged to upgrade their technology when they enter the foreign market and thus making women more productive when the tasks become less physical demanding, meaning there is a skill-upgrading phenomenon at hand. This is the literature that Noir-Luhalwe and Tharwaat (2021) connect to.

All this literature treats the effect on the gender wage gap as internal. The literature that this analysis connects to is more recent research, which instead looks at the spill-over effect of the gender equality of the trading partner on the gender wage gap. Videnord and Lark (2023) find that the gender wage gap widens when Swedish firms export to more gender-unequal destinations, with no effect of increased trade to destinations with equal levels of gender equality to Sweden. They ascribe this to customer discrimination, also motivated by the fact that they find a stronger effect for female managers who arguably are most likely to interact with foreign customers. Noir-Luhalwe and Tharwaat (2021) use the technology channel to try to detect a spill-over effect of gender-equality from the trading partner, by using disaggregated product level data. The result show that imports of high-tech, medium-tech and mineral-fuel products have a spill-over effect on gender-inequality, but no effect for exports. Technology is available globally, but more gender equal countries are assumed to have specific technology that favors women. Khoban (2022) also uses imports when studying the effect on female labor force participation when Indian firms import from countries with a higher rate of female labor force participation, which she uses as a proxy for gender equality. The results show a positive effect that increases with contract-intensity, which are ascribed to dispersion of gender norms through imports.

It is clear that the evidence is inconclusive both on the direction of the effect of trade on gender inequality, and especially on what mechanism is driving the effect, highlighting the importance of further research.

2 Theoretical framework

To understand the gender wage gap, a theoretical framework in line with Videnord and Lark (2023) is presented. It is a stylized partial equilibrium model based on a Nash bargaining wage setting-framework,

$$w_{ijt} = \Omega_i + \theta(r_{ijt} - \Omega_i) \tag{1}$$

where wage for worker i at firm j at time t depends on the revenue productivity of the worker r, bargaining power θ and market value of the worker Ω.

The equation is then augmented by introducing differences in productivity depending on gender and gender equality of the trading partner. This means that women differ in their productivity compared to men, for example in their comparative disadvantage for tasks requiring physical strength.

$$r^d_{ijt} = a_{ij} + b^d_{jt} + \psi \times Female \times GI^d_t \tag{2}$$

where a_{ij} is worker match-specific productivity and b^d_{jt} is firm efficiency in destination d.

Eventually, the theoretical framework for how gender and gender inequality of the trading partner might affect the wage is presented,

$$w_{ijt} = \mu_{ij} + \eta_{jt} + \beta \times Female \times \sum_{d=1}^{N} (\omega_{jt}^{d} \times GI_{t}^{d}) \tag{3}$$

where β captures the spill-over effect of the trading partner on the female wage. ω is a weight representing the trade flows.

This theoretical framework shows how the individual wage of a worker can be influenced by the trading partner and is the underlying theoretical framework for the empirical model. In Videnord and Lark (2023), μ_{ij} and η_{jt} represent employer-employee match and firm-year specific terms respectively, which in this multi-country analysis instead will represent country and year fixed effects.

3 Econometric Model

The empirical model uses the theoretical framework on an aggregate level, where the gender dimension is captured in the dependent variable. In order to isolate the spill-over effect of the trading partner on the gender wage gap and using a multi-country approach, a panel regression with country fixed effects and time fixed effects is used. The following model is estimated,

$$GWG_{i,t} = \beta_1 \sum_{ij} \omega_{ij1995}^{Total} GII_j + \beta_2 X_i + \gamma_t + \alpha_i + \epsilon_{it}$$

where GWG is the gender wage gap for country i at year t, GII is the gender equality index for trading partner j, X_i are control variables, γ are country fixed effects and α are year fixed effects. The weight ω^{Total} is the trade intensity, meaning that a more important trading partner is given more weight, as the potential spill-over effect would have a larger impact. It is calculated as the share of trade between country i and j out of the total trade of i. $\sum_{ij} \omega_{ij1995}^{Total} GII_j$ therefore is a measure of the overall level of gender inequality among the trade partners, and thus the level of gender inequality that country i is exposed to. All weights are calculated from the 1995 pre-sample trade flows to avoid bias from the endogeneity issue of countries selecting into certain regions of trade. The regression will be run on two different levels; exports/imports and technology group by dividing the data into sub-samples according to the OECD classification specified below. The trade weights are calculated separately for each regression. For adding the gender norms to the analysis, the following regression is estimated which adds the relationship intensity measured by the contract intensity.

$$GWG_{i,t} = \beta_1 \sum_{ij} \omega_{ij1995}^{Total} GII_j + \beta_2 \sum_{ij} \omega_{ij1995}^{Total} (\sum_{ijk} \omega_{ij1995}^{Product} CI) +$$
$$\beta_3 \sum_{ij} (\omega_{ij1995}^{Total} GII_j \times \sum_{ijk} \omega_{ij1995}^{Product} CI) + \beta_4 GII_i + \gamma_t + \alpha_i + \epsilon_{it}$$

with CI being the relationship intensity measured by contract intensity for product k. $\omega^{Product}$ gives the product importance and $\sum_{ij} \omega_{ij1995}^{Product} CI$ therefore is a measure of of how contract intensive the trade with the specific trading partner is, calculated as the share of the value of trade for the specific product of total trade with the specific trading partner. The purpose of adding the contract intensity is to add an additional layer of the spill-over effect through gender norms, with the hypothesis that a higher exposure to gender inequality has a larger effect on the gender wage gap the more relationship intensive the trade is as this gives the opportunity for customer discrimination. If the trade has no human interaction, it is assumed that there are very limited possibilities of gender norms being able to cause discrimination. In other words, it is expected that a higher value of GII together with higher contract intensity has a positive effect on the gender wage gap, which would be captured by the interaction term. The contract intensity can also be interpreted on its own, captured by β_2. For example, the contract intensity is also used in the literature as a measure of the female comparative advantage in social skills, which would give an opposite effect compared to the hypothesis of the effect of the gender norms. It is however assumed that the comparative of social skills is unrelated to the level of gender equality in a country, and therefore the interaction term captures the effect from gender norms.

Based on the theoretical framework, the gender wage gap can be affected by gender differences in productivity and bargaining power as well as the spill-over effect of the trading partner. As in Videnord and Lark (2023), the bargaining power is assumed to be similar across genders, and thus productivity differences between the genders and the spill-over effect from the trading partner remain as the main factors affecting the gender wage gap. In the specified econometric model, the identification threats therefore consist of factors that are time-inconsistent and country-specific affecting both the gender wage and the gender equality of trading partners and causing productivity differences. There are several factors that could affect female productivity, such as maternal health, fertility, family-oriented policies and other structural and social indicators. These measures affecting productivity differences between the genders are therefore used as control variables. As these, as well as other dimensions potentially affecting female productivity such as birth rate and female education are all included in the Gender Inequality Index, the GII is used as the control for the main analysis, with additional robustness check for including the measures disaggregated. However, it should be noted that the analysis is still sensitive to other potential factors affecting the female productivity that are not controlled for in the fixed effects model.

3.1 Data

The trade data used are annual bilateral trade flows at the product level are from the CEPII BACI database, which builds on data reported by each country to the UN database on trade statistics UN Comtrade. The dataset spans across the years 1995-2021 for 200 countries. Each observation provides information about export country, import country, type of product and value of trade. The advantage of the BACI is that it corrects any discrepancies between the imports and exports reported, which makes the data more reliable. Products correspond to the Harmonized System (HS) 6 digit code nomenclature, a standardized numerical method of classifying traded products and administered by the World Customs Organisation (WCO) and used by all custom services. In total the BACI dataset includes 5000 types of products, grouped into 21 different sections. The HS is updated every five years, with the latest available update from BACI using the HS17 from 2017. For this analysis, the HS92 is used in order to be able to use the same classification across all years, as this is the only version that includes all years.

For the dependent variable which is the gender wage gap of European countries, the trade flow data is then matched with Eurostat data on the gender wage gap, calculated as the difference in hourly wages between women and men as a percentage of the male hourly wage. A positive value of the gender wage gap therefore means that women receive less pay than their male counterparts. Countries included are all EU countries as well as Albania, Iceland, Norway, Switzerland, Turkey, North Macedonia, Montenegro, Serbia and the United Kingdom. In the matching Belgium and Luxembourg are excluded as they do not exist as separate countries in the BACI dataset. Montenegro and Serbia are also excluded because of very limited data on the gender wage gap. The total sample includes 32 countries. There is some variation in the availability of the data across years, but not to a degree as to be believed to impact the analysis significantly. In total the data includes 701 observations when using the gender wage gap as dependent variable.

As a measure of gender inequality, the well-established Gender Inequality Index (GII) developed by the UNDP is used. It provides annual country-level data on gender inequality across three dimensions of human development; health, empowerment and labor market participation across genders. Different indicators are used to obtain the measures in the different dimensions. Health indicators include maternal mortality ratio and adolescent birth rate; empowerment indicators female education and female share of parliamentary seats; and the female labor force participation rate is used for the labor market participation dimension. The GII ranges from 0 to 1, where a lower value indicates lower inequality in the country. The availability of the data varies across countries, but not to a degree that is believed to affect the main analysis.

For the robustness check, the dataset is then matched with data on family policies, education and fertility from Eurostat. The data on family policies are calculated as the share of public expenditures on family policies. Education is the share of females of the total population with an upper secondary and post-secundary education. For fertility, the average number of children per woman is used.

3.1.1 Technological Classification

For analyzing if certain groups based on technology intensity are driving the spill-over effect on the gender wage gap, the products from the BACI dataset are classified according to technology intensity. For this, the OECD technological classification is used, which uses R&D intensity as a proxy for technology intensity. The classification uses a quantitative methodology that takes into account the technology level through direct and indirect R&D intensity, meaning the product groups can be ranked based on technology intensity. Direct R&D intensity accounts for the technology level of the industry and the indirect intensity for the technology level of the intermediate goods used in the production. The intensity is calculated as R&D expenditure divided by gross value added and is a weighted average of all OECD countries. The classification is on industry level, and Klotz et al (2016) is followed for matching the 21 HS sections to the 4 technology groups, where a HS section is matched to a group if a majority of products in this section belong to the specific group. High Technology means a R&D intensity higher than 20 percent and includes the HS section with optical and photographic products. Medium-high-tech has a R&D intensity between 5 and 20 percent, and includes the HS sections chemical products, machinery, mechanical and electrical products, vehicles, aircraft and vessels and arms and ammunition. Medium-tech has a R&D intensity between 1 and 5 percent and includes plastic and rubber products, stone, plastic and cement products and base metals. Low-tech has a R&D intensity below 1 and includes animal and food products, wood products and textiles. Non-classified HS sections include mineral products, leather, footwear and art.

To avoid the issue of results being sensitive to this particular classification, the UNCTAD Skill and Technology Classification will be used as a robustness check. This classifies products into 6 different categories; high-technology, medium-technology, low-technology, resource-intensive, mineral-fuel and non-fuel and takes into account skills, technology, capital and scale requirements at the final stage of production.

3.1.2 Relationship-specific intensity

For analysing the effect of gender norms and discrimination on the spill-over effect, the contract intensity is used. It is based on the approach in Nunn (2007) of contract intensity of goods (CI index), with the argument that more contract-intensive goods are more reliant on interpersonal contacts and thus increases the exposure to gender norms and discrimination. The CI index ranges from 0 to 1 and is matched to each product in the BACI data.

3.2 Descriptive statistics

Table 1: Descriptive statistics

	GWG	Weighted GII	Weighted CI	GII
Observations	701	701	701	701
Mean	15.8	.16	.86	.15
S.D.	5.7	.040	.084	.085
Min	-1.3	.082	.32	.013
Max	30.9	.29	0.99	.47

The descriptive statistics of table 1 show that the gender wage gap ranges from -1.3 to 30.9 with a standard deviation of 5.7. Turkey has the lowest overall gender wage gap and Estonia the highest. One concern with using European countries is that they would be quite similar. However, figure 1 shows that there remains a variance in the gender wage gap between the countries over the years. It can also be noted that the gender wage gap decreases slightly over time.

The GII ranges from 0.013 to 0.47 with a mean of 0.15, indicating a low gender inequality in Europe but still with large difference between the countries. This is also reflected in the weighted GII, which is a weighted sum of all the GII values of the trading partners of a country. Norway has the most gender equal trading partners and Cyprus the most gender unequal trading partners, highlighting the importance of using pre-sample trade weights in order to avoid the issue of countries selecting their trading partners.

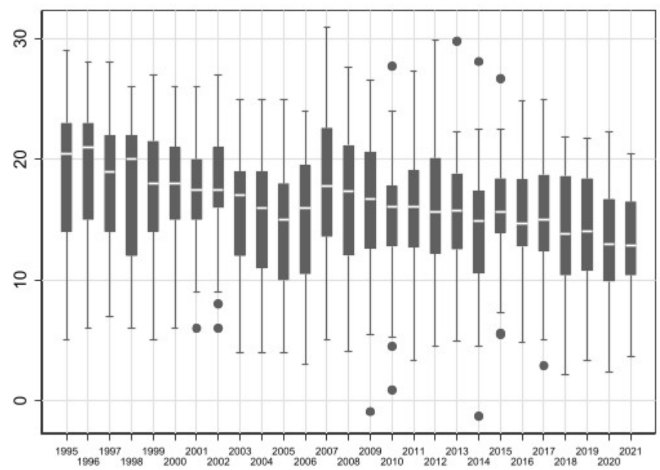

Figure 1: The gender wage gap over time

4 Results

The aim of the analysis is to analyse the spill-over effect of the trading partner on the gender wage gap. Specifically, it aims to shed light on if the effect exists across countries and for both imports and exports.

The results are presented in Table 2. Significant results are found for both exports and imports, although a stronger effect is seen among imports. A 0.1 change in the weighted GII index of the trading partners is associated with a 13 percentage points change in the gender wage gap for exports. For imports, a 0.1 change in the GII index of the trading partners is associated with a 24 percentage points change in the gender wage gap.

Furthermore, when including the controls, the positive effect is larger, indicating that the control variables are causing a negative bias in (1) and (3). It shows the importance of the inclusion of controls affecting the female productivity, or perceived productivity.

The results present evidence of a substantial spill-over effect on the gender wage gap from trading partners. It indicates that an increase in the gender equality of the trading partners gives a larger gender wage gap in the own country, and vice versa for a decrease in the gender equality of the trading partner, which gives a smaller gender wage gap. The direction of the results is in line with the literature. Videnord and Lark(2023) only study exports, where they find a positive effect. Noir and Luhalwe (2021) study both but find an effect only for imports. Even though the results show that the effect seems to exist for both imports and exports, it adds to their argument that imports seems to be the main channel of a spill-over effect.

Table 2: Exports and imports

	Exports (1)	Exports (2)	Imports (3)	Imports (4)
GII	124.5*	132.2*	210.3***	240.9***
	(70.74)	(67.55)	(73.60)	(71.59)
Controls	No	Yes	No	Yes
Observations	701	701	701	701
R-squared	0.771	0.771	0.797	0.801

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

The evidence of the existence of a positive spill-over effect for both exports and imports is important in itself, but does not show what is driving the effect. In the literature, two explaining mechanisms are presented; technology-upgrading and gender norms leading to discrimination. The analysis is therefore furthered to look into if the effect seems to be driven by a certain group of products based on technology intensity, and how the effect is impacted by the gender norms.

In Juhn et al (2013) and Noir and Luhalwe (2021), evidence of the existence of a technology-upgrading effect is presented. When the adoption of technology makes task less physical, it decreases the male comparative advantage in performing these tasks. It is assumed that more gender equal countries use technology favoring women to a larger degree, as higher gender equality indicates that the labour market would also be more adapted to women. As raised in the literature, trade gives access to new technology, meaning the possibility of adopting technology favoring women when trading with more gender equal countries. The following analysis therefore aims to show if the results in Table 2 of a positive effect on the gender wage gap by a higher GII index may be driven by the fact that trade with more gender equal countries makes countries adopt technology favoring women. The products are grouped into 5 groups according to the OECD Technology Classification specified above, with 4 technology groups ranked according to R&D intensity and one group including products that are not classified with this classification. The significant results are presented in Table 3, and the remaining results can be found in the appendix.

Table 3: Imports by technology intensity

	(1) Low-tech	(2) Other	(3) Low-tech	(4) Other
GII	465.6**	134.8**	465.6**	134.8**
	(198.9)	(59.39)	(198.9)	(59.39)
CI			2.822	-1.657
			(25.13)	(12.10)
GII × CI			-347.1*	-83.35
			(203.0)	(69.77)
Observations	701	701	701	701
R-squared	0.788	0.804	0.788	0.804

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

No significant results are obtained for exports, giving no evidence that a certain technology group is driving the effect found for exports. This is in line with the results of Noir and Luhalwe (2021) who uses the technology channel in making a similar analysis but for the GII index instead of the gender wage gap. They find no significant effect for exports. It seems reasonable that the adoption of technology favoring women mainly works through imports, as this is where the main access is received to the production process and product itself.

For imports, the significant results are obtained for low technology products and product groups not classified. Low technology products include live animals, animal and vegetable oil, prepared foodstuffs, beverages and tobacco, wood products, textile products and miscellaneous machinery products. The Other category includes vegetable products, mineral products, skin and leather products, footwear products and art products. The largest effect is obtained for low tech products, where a 0.1 change in the GII index is associated with a 46.5 percentage point change in the gender wage gap. This is a substantial effect, giving evidence that low-tech products are driving the spill-over effect of imports.

If technology-upgrading is the driving mechanism behind the result, the results give evidence that it is not the absolute technology intensity driving the effect, but rather the marginal effect of technology upgrading. For technology intensive products, the rooms for technology upgrading is small, whereas much room for technology upgrading and automatisation exists for the product categories included in the low technology group. For example, products included in food production and textile production probably have more room for automatisation than products already using high technology.

Another mechanism behind the spill-over effect raised in the literature is the gender norms, which gives rise to gender discrimination. Videnord and Lark (2023) argue that trade increases the exposure to other levels of gender inequality and therefore also gives room for customer discrimination when trading with less gender equal countries. To add this to the analysis, contract intensity is used as a measure of relationship intensity. Assuming that discrimination because of gender norms is not possible without interpersonal contact, an effect should only be found for contract intensive products. By interacting this with the GII, it should be expected that a higher GII and higher contract intensity should give an increased gender wage gap. Videnord and Lark (2023) ascribe their finding of a positive spill-over effect to this mechanism.

Once again, a significant effect for the interaction between the GII and contract intensity is only found for low-tech products. It indicates that contract intensive goods dampens the positive spill-over effect on the gender wage gap, contrary to the hypothesis of a widening gender wage gap. The results therefore give no supporting evidence that the gender norms of the trading partner are driving the spill-over effect on the gender wage gap. Instead, it gives an indication that the contract intensity is capturing something else and/or that the gender norms are not captured by the contract intensity. For example, it may give some evidence that a female comparative advantage in social skills is causing the effect, which has been raised by the literature (Bonfiglioli and De Pace (2021)).

4.1 Robustness Checks

One difficulty in the interpretation of the results is that it offers limited insight into the relative gender inequality, meaning that the sample includes countries whose trading partners on average are more unequal than themselves, and also the other way around with countries whose trading partners are more equal than themselves. In other words, some countries have trading partners with a higher value of GII than themselves, whereas others have a lower value of GII. In an analysis for countries with high GII such as Sweden, such as the analysis of Videnord and Lark, this is not an issue as almost all trading partners of Sweden have lower relative gender equality. For a multi-country analysis, this limitation means that the results don't show if relatively more gender equal trading partners are driving the results, or relatively less gender equal countries. As the literature referring to the technology-upgrading effect argue that the effect comes from less gender equal countries trading with more gender equal countries, and the literature referring to the gender norms argue for the opposite, the analysis is relevant.

By including the GII as a control variable, the analysis becomes relative. The results would show the effect of the GII of the trading partners on the gender wage gap of a country, conditional on the country's own GII. However, to further test if technology-upgrading is a possible explanation of the results, the observations are divided into two sub-groups where one includes countries whose trading partners on average have lower level of GII than themselves, and the other countries whose trading partners on average have a higher level of GII than themselves.

The results of this analysis can be found in the appendix. The results indicate that countries whose trading partners are more equal than themselves are driving the effect, lending even more support to the technology-upgrading mechanism. Interestingly, a larger number of technological groups now show a significant effect. It could give an indication of the fact that the technological upgrading effect is at hand both as an absolute effect, but also where the marginal effect is larger. However, a more detailed analysis into the types of products driving the effect and their technology intensity would be needed.

To see if the results are sensitive to the chosen classification, a robustness check is also performed using the UNCTAD classification described above. It classifies the products into 5 different groups depending on technology and skill. The results are presented in the appendix. These results also find a significant effect for the low-tech products, adding to the argument that the technology-upgrading effect is at hand mainly where the marginal effect is the largest. However, the largest effect is found for medium-tech products, meaning that further research is required to determine what is driving a potential technology-upgrading effect.

Furthermore, as the empirical model is sensitive to all factors affecting the female productivity that is time-invariant and differs between countries and that also correlates with the GII of the country's trading partners, the inclusion of controls is important. Therefore, measures included in the GII index are included as controls separately instead of added together in the GII, in order to test if the GII is a useful control. This does not produce any significant result. It should be noted, however, that the inclusion of the controls decrease the number of observations which could be the reason for losing the significance. It does however show that the empirical model could indeed be sensitive to the specified identification threats, making it important to include other controls and test other models in order to be able to draw any definite conclusions of the results. This is especially due to the limitation by using cross-country data instead of individual firm level data, causing these identification threats. In order to obtain definitive results, the analysis would need to be performed with individual level data.

5 Conclusion

The aim of the analysis is to contribute to the important literature on the effect of globalisation on the gender wage gap. More specifically, it aims to analyse the spill-over effect of the gender equality of the trading partner on the gender wage gap, as the main part of the literature only studies the internal within-country effects. To the limited literature on this spill-over effect, the main contribution is the multi-country approach and the inclusion of both imports and exports. The analysis is based on a theoretical foundation where the gender wage gap mainly depends on differences in productivity between men and females, and for the empirical analysis cross country panel data is used for a fixed effects model. As a measure of gender equality, the well established Gender Inequality Index is used, which is weighted according to importance of the trading partner to created a measure of exposure to gender equality.

The results provide evidence of a substantial positive spill-over effect from the trading partner on the gender wage gap. It also shows that the effect exists for both imports and exports, highlighting the importance for including both in further research. The effect is positive for both imports and exports, although a larger effect is found for exports. This means that an increasing GII among the trading partners is associated with a larger gender wage gap. More specifically, a 0.1 change in the GII for export trading partners is associated with a 13 percentage points change in the gender wage gap and a 24 percentage points change for import trading partners. The positive effect can also be interpreted as a decrease in the GII being associated with a smaller gender wage gap.

These results fulfil the aim of the analysis and underline the need for further research. But to further deepen the analysis, the regression is run on sub-samples depending on the technology intensity. The aim of this is to shed some light into the potential groups of products driving the positive effect, in line with the argument in the literature of a technology-upgrading effect being the explaining mechanism of the spill-over effect. The results from the sub-samples could suggest that the marginal effect of technology upgrading rather than the absolute effect is driving the effect, but this explanation is not completely robust to altering the classification. However, it provides an indication that some groups of products seem to be driving the effect, why further research should look into the technology-upgrading channel.

The other explaining mechanism raised by the literature, the gender norms, is analysed by including a measure of contract intensity to the regression by interacting the contract intensity with the GII. The hypothesis is that more human interaction gives more room for gender discrimination caused by gender norms, leaving a more positive effect on the gender wage gap the larger the GII. The results don't show any evidence for this hypothesis but find an opposite effect that the contract intensity is causing a shrinking gender wage gap. This highlights the need for further investigation into the spill-over effect from more contract intensive goods, with a possibility that the literature on the comparative female advantage in social skills being the explaining mechanism.

Also, even though time-invariant country characteristics are controlled for in the fixed effects model, the analysis does not provide any insight into whether a certain type of countries or trading partners are driving the results but only show the average effect for all European countries. Further research should therefore look into if certain regions or number of trading partners are driving the results, or if it may be driven by outliers with a high or low value of the GII. Through the inclusion of the GII as a control and the robustness check with the subsample some information is given on the relative GII, but further research should look deeper into other type of group characteristics are behind the effect.

It should also be noted that this analysis is limited to a European perspective with aggregated country-level panel data. This means that the identifying assumptions do not hold for any time-invariant country-specific effects. In the analysis, many factors that could have an impact on female productivity and discrimination are controlled for through the GII index, but of course there is a possibility of other factors causing a bias that should be included, or included disaggregated. The results should therefore be tested also using other models, as the use of aggregated data gives limited insight. Ideally this would be done by individual level data, but also by different models, for example using a trade shock or a spatial model. The former would be able to isolate the spill-over effect by looking at the change in trading partners, and the latter would be able to control for geographic dimensions and clustering, even though the fixed effects model allows for this to some degree.

All in all, the results give an indication of the existence of a spill-over effect both for imports and exports and highlights that further research is needed looking into the specific mechanisms at hand. As the effects are also likely to vary across firms, industries and occupation, further research should ideally use more disaggregated data than country level data.

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7 Appendix

Table 4: Exports by OECD classification

	(1) HT	(2) MHT	(3) MT	(4) LT	(5) Other	(6) HT	(7) MHT	(8) MT	(9) LT	(10) Other
GII	421.8	150.0	77.85	120.9	21.07	421.8	150.0	77.85	120.9	21.07
	(1,895)	(91.32)	(48.94)	(148.0)	(71.64)	(1,895)	(91.32)	(48.94)	(148.0)	(71.64)
CI						-29.91	23.94**	-5.936	16.20	-0.120
						(25.60)	(11.54)	(9.876)	(25.66)	(13.30)
GII × CI						-384.8	-99.16	54.00	-53.43	63.30
						(1,895)	(85.39)	(39.30)	(169.0)	(86.81)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	701	701	701	701	701	701	701	701	701	701
R-squared	0.765	0.777	0.776	0.765	0.770	0.765	0.777	0.776	0.765	0.770

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

Table 5: Imports by OECD classification

	(1) HT	(2) MHT	(3) MT	(4) LT	(5) Other	(6) HT	(7) MHT	(8) MT	(9) LT	(10) Other
GII	-914.4	199.4	-3.983	465.6**	134.8**	-914.4	199.4	-3.983	465.6**	134.8**
	(2,367)	(202.5)	(122.9)	(198.9)	(59.39)	(2,367)	(202.5)	(122.9)	(198.9)	(59.39)
CI						-62.12	-33.97	-12.81	2.822	-1.657
						(53.35)	(31.93)	(10.03)	(25.13)	(12.10)
GII × CI						1,171	-31.89	95.65	-347.1*	-83.35
						(2,415)	(199.2)	(104.2)	(203.0)	(69.77)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	701	701	701	701	701	701	701	701	701	701
R-squared	0.777	0.783	0.774	0.788	0.804	0.777	0.783	0.774	0.788	0.804

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

Table 6: Exports by OECD classification, countries with high GII

	(1) HT	(2) MHT	(3) MT	(4) LT	(5) Other
GII	5,500**	322.2*	63.70	-520.7*	-237.2
	(2,027)	(168.6)	(109.7)	(273.9)	(156.0)
CI	43.44	57.93*	-15.22	5.282	-46.13*
	(35.59)	(29.54)	(10.92)	(40.26)	(22.61)
GII × CI	-5,531**	-502.9**	91.34	721.5**	380.6*
	(2,036)	(213.5)	(83.11)	(312.6)	(200.4)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	258	241	313	308	274
R-squared	0.852	0.847	0.826	0.838	0.836

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

Table 7: Exports by OECD classification, countries with low GII

	(1) HT	(2) MHT	(3) MT	(4) LT	(5) Other
GII	-1,775*	189.9***	65.52	353.4***	138.9**
	(1,008)	(58.57)	(99.49)	(100.7)	(64.55)
CI	-23.37	20.53***	5.133	27.75	22.70***
	(31.45)	(7.072)	(9.682)	(16.48)	(6.617)
GII × CI	1,817*	-37.40	11.85	-349.7***	-103.2*
	(995.4)	(34.82)	(62.52)	(45.65)	(53.08)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	443	458	386	393	427
R-squared	0.823	0.845	0.815	0.831	0.822

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

Table 8: Imports by OECD classification, countries with high GII

	(1) HT	(2) MHT	(3) MT	(4) LT	(5) Other
GII	2,712	165.7	-199.3	-19.58	229.0
	(4,689)	(173.3)	(191.3)	(360.0)	(147.8)
CI	-60.76	-59.87*	-32.35**	-3.933	24.03
	(60.51)	(29.85)	(15.44)	(57.31)	(49.32)
GII × CI	-2,519	24.60	301.3	237.7	-167.9
	(4,807)	(221.9)	(189.7)	(362.8)	(176.0)
Observations	377	381	350	289	122
R-squared	0.787	0.802	0.801	0.826	0.822

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

Table 9: Imports by OECD classification, countries with high GII

	(1) HT	(2) MHT	(3) MT	(4) LT	(5) Other
GII	-2,090*	584.9***	66.84	456.5*	92.14
	(1,134)	(140.4)	(138.3)	(221.6)	(67.25)
CI	84.77	49.11**	-1.926	20.58	-7.692
	(53.20)	(22.30)	(10.64)	(20.27)	(22.14)
GII × CI	2,332*	-382.3***	9.382	-384.0*	-35.55
	(1,164)	(112.2)	(110.9)	(216.5)	(84.53)
Observations	324	320	347	412	579
R-squared	0.852	0.875	0.825	0.833	0.819

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

Table 10: Exports by UNCTAD classification

	(1) HT	(2) MT	(3) LT	(4) R	(5) M	(6) Other
GII	434.3***	934.2	80.13	-43.51	61.97	-17.45
	(140.2)	(628.1)	(61.40)	(45.92)	(111.5)	(21.84)
CI	32.08	9.933	9.855	5.194	-7.081	0.898
	(26.60)	(34.81)	(8.146)	(9.508)	(17.36)	(3.565)
GII $\times$ CI	-456.0***	-883.2	-19.61	151.2**	-51.23	18.80
	(156.0)	(667.8)	(39.44)	(55.40)	(128.1)	(21.97)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	701	701	701	701	701	701
R-squared	0.785	0.783	0.771	0.785	0.764	0.766

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

Table 11: Imports by UNCTAD classification

	(1) HT	(2) MT	(3) LT	(4) R	(5) M	(6) Other
GII	197.9	4,194**	131.8	105.7	267.6***	-8.438
	(294.5)	(1,616)	(142.9)	(117.6)	(72.46)	(10.33)
CI	-62.78**	-114.7***	-13.28	-10.06	-3.295	-11.71***
	(26.96)	(38.32)	(18.25)	(11.64)	(22.04)	(3.703)
GII $\times$ CI	-109.6	-4,232**	10.59	15.75	-212.8***	63.08***
	(291.6)	(1,685)	(126.8)	(81.87)	(76.39)	(21.59)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	701	701	701	701	701	701
R-squared	0.780	0.794	0.778	0.771	0.815	0.777

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