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Abstract

We explore potential relationships between international economic activities and gender wage gaps (GWGs) using linked employer-employee data for Japan. We find evidence that exporting and multinational activities are associated with reduced GWGs. Domestic-owned firms that neither export nor invest abroad (i.e., domestic-only firms) report the largest GWG, followed by Japanese-owned multinational enterprises (JMNE), then by locally-owned exporters that do not invest abroad and finally by foreign-owned multinational enterprises (FMNE). We separate FMNE by mode of entry and confirm that FMNE established by greenfield investment deviate more than FMNE established by merger and acquisition from domestic-only firms in terms of wages. Greenfield-born FMNE are associated with the smallest GWG and largest gender-neutral wage premium among the firm types. The estimated GWG among Greenfield-born FMNE is almost 12 percentage-points lower than the 26.8 percent prevailing at domestic-only firms.

Keywords: gender wage gap; wage premium; exporters; multinational enterprises
JEL Classification: F14, F16, J31

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1 Introduction

"Womenomics", a concept first articulated by Kathy Matsui, vice chair of Goldman Sachs Japan, and adopted by Japan's Prime Minister Shinzo Abe, proposes increasing female employment and reducing gender pay disparities in order to achieve economic growth.[1] While Japan has improved its female labor force participation rates and now reports a rate that exceeds the OECD average by over 5 percentage points,[2] it has not been as successful in reducing gender-based earnings inequality. Japan's raw gender earnings gap of 24.5 percent was much higher than the OECD average of 13.2 percent in 2017.[3] Only South Korea (34.6 percent) and Estonia (28.3 percent) reported higher gender earnings gaps than Japan.[4]

International activities, both trade and foreign direct investment (FDI), have the potential for impacting a country's gender earnings gap. We seek to explore how Japan's gender pay gap may be affected by exporting and multinational activities. Exposure to foreign markets and foreign gender norms through exporting and FDI outflows and inflows has the potential to impact male and female workers differently. Using linked employer-employee data for the manufacturing sector, we find suggestive evidence that international activities contribute to reducing Japan's gender wage gap (GWG). We find that foreign-owned multinational enterprises (FMNE) report the smallest GWG, followed by locally-owned firms that export but do not invest abroad, then by Japanese-owned MNE (JMNE) and finally by domestic-only firms (i.e., domestic-owned firms that neither export nor invest abroad).

[1] Matsui et. al. (2014) estimate that closing the gender employment gap in Japan will produce a nearly 13 percent increase in GDP.
[2] Based on 2017 data with Japan's female labor force participation rate at 69.4 percent compared with the OECD average of 64 percent (OECD, 2019).
[3] Gender pay gap of median monthly earnings defined as the difference between male and female median monthly earnings divided by male median monthly earnings for full-time employees (OECD, 2017).
[4] Estonia's data reflects 2014, the most recent statistic available in the OECD's online data available at: https://data.oecd.org/earnwage/gender-wage-gap.htm.

After finding that FMNE deviate the most from domestic-only firms in terms of GWGs, we ask whether FMNE mode of entry matters for gender wage outcomes. We propose that FMNE originating from greenfield investment will deviate further from domestic-only firms than FMNE originating from mergers and acquisitions (M&A). A Greenfield-born FMNE involves foreigners in setting up the human resource management (HRM) and pay systems from the firm's establishment, while an M&A-born FMNE involves foreigners influencing and possibly changing existing HRM and pay systems.[5] We find support for our hypothesis that Greenfield-born FMNE deviate the most from the gender wage inequality existing at domestic-only firms. Among majority-owned FMNE, only Greenfield-born ones are associated with significant, large reductions in the GWG while M&A-born FMNE do not differ significantly from domestic-only firms. Greenfield-born FMNE are associated with an 11.9 percentage-point smaller GWG than domestic-only firms that report a 26.8 percent GWG on average. Quintile regressions indicate that Greenfield-born FMNE deviate the most from domestic-only firms in terms of GWGs in the middle quintiles of the wage distribution.

Our research relates to three strands of literature. The first is extensive research on wage premiums paid by exporters or by foreign-owned firms. Early research on this topic used firm-level or plant-level data to estimate these wage premia while more recent empirical work has utilized matched employer-employee data in order to control for both firm characteristics and worker characteristics in estimating wage premia.[6] While the research using matched datasets,

[5] For example, IBM Japan is a greenfield-born MNE (see: https://www.ibm.com/ibm/jp/ja/history.html) while Nissan Motor Co. is a (minority-foreign-owned) M&A-born FMNE based on Renault's equity links to Nissan (see: https://www.nissan-global.com/EN/COMPANY/PROFILE/HERITAGE/HISTORY/).

[6] Early research includes Bernard and Jensen (1995, 1997, 1999) on exporter wage premia, and Aitken et al. (1996) and Lipsey and Sjoholm (2004) on MNE wage premia. More recent work using linked employer-employee data to examine exporter wage premia includes Frıas et al. (2018), Munch and Skaksen (2008), Schank et al. (2007), Schank et al. (2010), and Verhoogen (2008), while MNE wage premia are addressed using linked data in Girma and Gorg (2007), Heyman et al. (2007), Hijzen et al. (2013) and Martins (2011).

especially panel matched datasets, has improved our understanding of these globalization wage premia by accounting for firm and worker heterogeneity, differing conclusions have been found. Using quasi-experimental variation in exports due to a currency devaluation, Frías et al. (2018) find a large causal link between exporting and wage premia using Mexican data (i.e., a 1 percent increase in a plant's export share leads to a 3 percent increase in the plant-specific wage premium). Heyman et al. (2007) reject the notion of wage premia paid by foreign-owned firms relative to domestic-owned firms using linked employer-employee data for Sweden, while Hijzen et al. (2013) find foreign-ownership wage premia of 1 to 6 percent using matched data for three developed economies (i.e., Germany, Portugal, the UK) and one developing economy (i.e., Brazil).

A second strand of related literature has focused on the impacts of international activities on gender pay disparities. While several papers have examined the potential links between import competition and GWGs,[7] we focus on how exports and multinational activities may impact the GWG. On this topic, the literature is quite recent and relatively sparse but a few hypotheses have been proposed and empirically tested. Bøler et al. (2018) propose that exporting requires more flexible workers who can communicate with trade partners at odd hours and/or travel internationally on short notice, which tends to disfavor female workers who are perceived as being more family-oriented and therefore less flexible. Using matched employer-employee data, they find that entry into exporting by Norwegian firms leads to a three-percentage-point increase in the GWG among college-educated workers. Juhn et al. (2014) use firm-level data for Mexico to show that trade-liberalization-induced exporting increased the relative wage and employment of blue-

[7] Black and Brainerd (2004) employ the Becker (1957) model of discrimination to explain their finding that increased product market competition through imports reduces the ability of U.S. manufacturing firms in concentrated industries to gender discriminate in wages. Other studies in a similar vein have used industry-level evidence to examine trade liberalization effects for one or two countries mainly through import competition and impacts on gender wage gaps (e.g., both Seguino (2000) and Berik et al. (2004) study South Korea and Taiwan).

collar women because exporting firms adopted new technologies that reduced the need for physically demanding skills. Blue-collar men were replaced by blue-collar women and new production technologies. These two papers suggest that the relationship between exporting and GWGs may differ substantially based on the skill or education level of workers.

Researchers also have explored the link between MNE and gender wage gaps. Oostendorp (2009) finds that the within-occupation GWG tends to decrease with trade and FDI in richer countries but no significant effects are found in poorer countries. Vahter and Masso (2019) use Estonian matched employer-employee data to conclude that foreign-owned firms have larger GWGs than locally-owned firms. They argue that the larger GWG is due to men capturing a larger share of MNE wage premiums. One previous study has used matched employer-employee data for Japan to study this issue. Ono and Odaki (2011) use matched data for 1998 to document MNE wage premiums and smaller GWGs within foreign-owned MNE. They suggest that FMNE may have an advantage in hiring career-minded Japanese women, who are under-valued by Japanese firms due to the seniority-wage and lifetime employment systems.[8] They find a GWG of 28 percent in locally-owned firms, but only 19 percent in FMNE defined using a 10 percent foreign equity minimum to define FMNE.[9] Our study updates and extends the work of Ono and Odaki (2011) by using more recent data (i.e., for 2012), by controlling for average worker productivity at the plant-level, by examining wage premiums over the wage distribution by using quintile regression methods, and by separating firms in our dataset into five different types, instead of only two types (i.e., foreign and domestic), which allows us to address the impacts of exporting,

[8] See Ono (2010) and Kambayashi and Kato (2010) for more details on Japan's seniority wage and lifetime employment systems.

[9] Ono and Odaki (2011) report a GWG of 32 percent for domestic firms and 21 percent for FMNE based directly on their log-level regression coefficients, which we convert using exp(coefficient)-1 due to the large values involved and to make their wage premiums more directly comparable to those in our study.

multinationality and foreign ownership. We also examine FMNE heterogeneity by home country, which has not been done previously with linked employer-employee data for Japan.

A third strand of related literature examines the transmission of culture across international borders through economic activity. Of particular interest is the transmission of more gender-neutral corporate culture into a country with less gender-neutral norms. Tang and Zhang (2017) find that foreign affiliates in China from more gender-equal countries tend to have higher female shares of employment compared with foreign affiliates from less gender-equal countries. Siegal et al. (2019) find that FMNE are more likely to hire and/or promote female managers in Korea, while Choi and Greaney (2020) find that FMNE acquisitions of Korean firms result in workforce reorganization that favors proportionately more women in the most elite postings within a firm. They also show that this workforce reorganization produces productivity gains for the acquired firms. [10] Kodama et al. (2018) find that FMNE tend to employ proportionately more women and more female managers than locally-owned firms in Japan. They also find that the FMNE tend to have more family-friendly workplace policies, such as flextime, telecommuting, used vacation days and childcare subsidies. Our results complement the Kodama et al. (2018) results in that we find wage-based evidence that foreign-owned MNE have more gender-equal pay structures than locally-owned firms in Japan. In addition, we find that Greenfield-born FMNE from more gender-equal home countries tend to have lower firm-level GWGs in Japan.

We contribute to the literature in five distinctive ways. Our study is the first, to our knowledge, to use linked employer-employee data for Japan to examine gender-based differences in employee returns to both exporting and MNE activities and to examine these wage differences

[10] This result relates to another strand of research that examines how culture impacts firms' international economic performance through differences in management practices. See, for example, Guiso et al. (2006), Bloom and Van Reenan (2007) and Bloom et al. (2012a, 2012b).

while controlling for average worker productivity at the plant-level.[11] These two international activities typically have been examined by separate strands of literature that seek to identify wage premiums, whereas we are able to directly compare and disentangle the two effects on wages and GWGs.[12] By controlling for average worker productivity, we identify exporter and MNE wage premiums above the usual premiums arising from the tendency of these firms to be more productive than firms that do not export or invest abroad.

Second, our study presents a detailed analysis of international influences on gender wage gaps in Japan at a potentially important inflection point in time. By using wage data for 2012, we examine the labor market after major revisions were made in Japan's Equal Employment Opportunity Act (EEOA) in 1999 and 2007.[13] Ono and Odaki (2011) used data for 1998, just before the EEOA changes occurred. Additionally, our 2012 data captures the labor market conditions in Japan just prior to the start of Abenomics policies related to women in the workforce and inward FDI. The Abenomics growth promotion policies include encouraging better utilization of Japan's female labor force and enticing more FDI inflows from 2013.[14] Therefore, our study using 2012 data makes an important "post-EEOA revisions but pre-Abenomics" contribution to the literature.[15]

[11] Ono and Odaki (2011) use Japanese linked employer-employee data for 1998 to examine the GWG between foreign-owned and locally-owned firms, but they do not address export activities nor distinguish between locally-owned and foreign-owned MNE or between foreign-owned MNE based on entry mode.
[12] Greaney and Li (2017) also disentangle exporter and MNE wage premiums using firm-level data for China.
[13] First enacted in 1986, Japan's EEOA only advised employers to make efforts to avoid discrimination against women in hiring, task assignment and promotion. The 1999 revision strengthened the EEOA by prohibiting discrimination against women and mandating maternity protection for pregnant employees. The 2007 revision broadened the EEOA by prohibiting discrimination against both sexes. See Abe (2013) for further details.
[14] See Japan Revitalization Strategy: Japan is Back, 2013, for details on Prime Minister Abe's economic growth strategies involving "Promoting active participation by women" (p. 44-48) and "Activating inward direct investment (p. 137-138). See Hoshi and Kiyota (2019) for details and analysis of Japan's promotion of inward FDI since 2013.
[15] Note that the differences in data and methodology between Ono and Odaki (2011) and our study cited above prevents us from drawing conclusions regarding the EEOA's impact on GWGs in Japan. Instead, our study can be a benchmark for future study of the impacts of Abenomics policies on women in the workforce.

Third, we distinguish between domestic-owned MNE and foreign-owned MNE and find substantial differences in worker wages, especially for women in Japan. We find that FMNE pay much larger gender-neutral wage premiums than JMNE operating in Japan, and female workers receive larger added wage premiums by working at FMNE so these firms feature the smallest GWGs. This implies that the "multinationality" of a firm matters in a quantitatively small way among Japanese-owned firms, but foreign ownership matters in a quantitatively large way in Japan's labor market.

Our fourth and perhaps most unique contribution is to separate FMNE based on their mode of entry which has not to our knowledge been previously done in the literature on FMNE wage premiums. This distinction allows us to test the hypothesis that mode of entry matters for the transmission of corporate gender norms. We propose that Greenfield-born FMNE are the most likely to deviate from the existing corporate gender norms in Japan,[16] while other international firm types (i.e., M&A-born FMNE, JMNE and exporters) may be influenced by foreign gender norms to a lesser degree, using domestic-only firms as the reference group. Since our dataset does not distinguish between Greenfield-born FMNE and M&A-born FMNE, we make a unique contribution to the data by examining the history of each FMNE to determine whether its origin involved a foreign partner from the start. The advantage of separating FMNE based on mode of entry is it allows us to address the endogeneity problem for a specific group of foreign-owned firms using cross-sectional data. Smaller GWGs associated with FMNE may be due to foreign owners instituting a more gender-neutral pay system or due to foreign owners preferring to acquire local firms with more gender-neutral pay systems already in place. In order to conclude that foreign ownership drives gender wage outcomes, rather than vice versa, we separately identify FMNE

[16] This argument assumes that most FMNE come from countries more gender equal than Japan. Statistics to support this assumption are presented in the next paragraph.

established through greenfield investment. For these firms, foreign influence occurs from firm establishment so we can reasonably interpret the direction of causality as flowing from foreign ownership to gender wage outcomes.

Finally, our fifth contribution is to additionally allow for FMNE heterogeneity by home country and to link FMNE gender wage gaps in Japan to home country workplace gender equality. Using majority-owned FMNE, we find that Greenfield-born FMNE from more gender-equal home countries tend to have smaller gender wage gaps in their Japanese affiliates, but this tendency is not observed in M&A-born FMNE. This is a new result for the literature on the transmission of workplace gender norms across international borders.

Japan is an ideal country to use for this study for several reasons. First, Japan has some unique labor market characteristics such as the lifetime employment system and seniority wage system that have been identified as posing barriers to women in the labor market.[17] Second, Japan has a large GWG but a relatively low level of male wage inequality, making it an interesting outlier among the 22 developed countries studied in Blau and Kahn (2003).[18] Third, most of the FMNE in Japan are from countries that are more gender-equal than Japan in terms of employment practices. In the World Economic Forum's Global Gender Gap Report 2012, Japan was ranked 102 out of 135 countries for Economic Participation and Opportunity.[19] In 2012, the largest foreign investors in Japan based on FDI stock ranked well above Japan in terms of gender equality using the same gender gap index, with the US (ranked 8) followed by the Netherlands (24), France (62) and the UK (33).[20]

[17] See Kawaguchi (2015) and Hara (2018) on this topic.
[18] They find that compressed returns to skills (i.e., low measured male wage inequality) tend to correspond with low gender wage gaps among developed economies, with Japan being the exception.
[19] Japan's ranking in the most recent WEF Gender Gap Report 2020 was 115 out of 153 countries for the same sub-index, but we present 2012 data above to match the 2012 wage data used in our study.
[20] Japan's inward FDI stock data obtained from the OECD (2019) database.

We present our methodology in the next section, followed by a description of our data sources and summary statistics. Section 4 presents our empirical results, followed by a section on robustness checks. We conduct robustness checks by changing our definition of foreign ownership from majority-foreign-ownership to a more expansive definition that includes all firms with 10 percent or more foreign capital ownership. In section 6, we discuss causal mechanisms linking gender wage gaps to our different firm types and include our results based on FMNE home country gender equality. Our conclusions are presented in Section 7.

2 Methodology

This study employs both ordinary least squares (OLS) and quantile regression (QR) to estimate the Mincer (1974) wage equations.[21] After investigating the wage premium using OLS, we conduct QR to examine wage premiums on a particular percentile of the wage distribution to investigate whether these premiums vary across the range of wages. For example, we examine whether high-wage workers obtain higher multinational wage premiums than low-wage workers and whether GWGs vary between high-wage and low-wage workers. QR has several attractive features, as explained in Koenker and Hallock (2001) and Cameron and Trivedi (2010). First, QR enables us to investigate the effects of a covariate on the full distribution or any particular percentile of the distribution, whereas OLS reveals the average relationship between the wage and explanatory variables. Second, QR is robust to the presence of outliers, whereas OLS regression is sensitive to such presence.

[21] Ideally we would use the difference-in-differences technique to examine our research questions with panel data, but our linked employer-employee data is not available as a panel, as we explain in the Data section.

First, we employ OLS and the following Mincer wage equation to examine whether exporters or multinationals pay higher wages than our reference group that we call "domestic-only" establishments (i.e., locally-owned plants that neither export nor own subsidiaries abroad):

$$\boldsymbol{lnWage_{ip} = \alpha + \beta Female_i + \gamma' \sum_p EstType_p + \delta' \sum_p Female * EstType_p + \theta' EstChar_p + \mu' WorkerChar_i + \varepsilon_{ip}}. \quad \textbf{(1)}$$

lnWage_{ip} is the log of hourly wage for worker i in plant p, Female_i is an indicator variable for female workers, and EstType_p is a vector of dummy variables for our various international establishment types of interest (i.e., initially, Exporter, JMNE and FMNE). In some specifications we replace the FMNE dummy with separate dummy variables for Greenfield-born FMNE and M&A-born FMNE. We control for the following establishment characteristics (EstChar_p): size (measured by the log of establishment employment), a headquarters dummy variable, average worker productivity (measured by the log of plant sales per worker), and industry and region fixed effects.[22] We also control for individual worker characteristics (WorkerChar_i) that are typically included in a Mincer wage regression (i.e., education,[23] experience, experience squared, tenure, and tenure squared), along with dummy variables for white-collar workers and workers hired for an indefinite period. The latter is used to proxy for long-term employees of Japanese firms. The descriptive statistics of all variables for male and female workers are presented in Appendix Table A1.[24]

In an alternate OLS specification, we measure the international activities variables of interest using continuous variables. For exporting, we use the export share of total sales which

[22] We have 24 manufacturing industries at the 2-digit level and 47 prefectures.
[23] We include three dummy variables to indicate the highest educational attainment achieved: high school graduate, junior college graduate, or college graduate.
[24] Appendix tables appear online here: https://sites.google.com/site/greaneyecon/research.

allows us to control for exporting by local exporters and by JMNE and FMNE.[25] To measure JMNE activities with a continuous variable, we use the log of the number of foreign subsidiaries reported by each firm. More foreign subsidiaries indicates greater engagement in foreign markets and stronger potential for the transmission of more gender-equal workplace norms to filter back to Japan. For FMNE, the foreign ownership ratio is used as the continuous variable. The larger the foreign ownership ratio, the stronger the foreign influence on the workplace norms.

Second, this study employs QR to estimate the wage premium on any particular percentile of the wage distribution. Using the linear programming method, we obtain the qth estimator $\widehat{\gamma_q}$, which minimizes over γ_q the objective function:

$$\boldsymbol{Q(\gamma_q)} = \sum_{\boldsymbol{i}:\, \boldsymbol{y_i \geq x_i'\, \gamma}}^{\boldsymbol{N}} \boldsymbol{q}\left|\boldsymbol{y_i - x_i'\, \gamma_q}\right| + \sum_{\boldsymbol{i}:\, \boldsymbol{y_i < x_i \gamma}}^{\boldsymbol{N}} \boldsymbol{(1-q)}\left|\boldsymbol{y_i - x_i'\, \gamma_q}\right| \qquad \boldsymbol{(2)}$$

where $0 < q < 1$, y_i is the log of hourly wage and x_i is a vector of explanatory variables. We divide the wage distribution into quintiles and use the same explanatory variables as were used in the OLS regression. The QR estimates have the advantage of being more robust to non-normal errors and outliers. For consistency across our OLS and QR specifications, we use industry and region fixed effects in both.[26]

[25] Note that this differs from our treatment with dummy variables in which the establishment types are mutually exclusive (i.e., an exporting firm is classified as a locally-owned exporter, a JMNE or a FMNE).
[26] Note that we do not use industry-region fixed effects because 73 percent of industry-regions that have at least one firm have only one firm-type. In these cases, the fixed effects would absorb the firm-type effects that are our variables of interest.

3 Data and summary statistics

3.1 Data

To construct the matched employer–employee data, this study uses confidential data from three official surveys: (i) *The Basic Survey on Wage Structure* (2012), (ii) *The Economic Census for Business Frame* (2009), and (iii) *The Economic Census for Business Activity* (2012).[27] We merge the data from these three surveys at the plant level using the common plant-level census ID.

First, we obtain the data on most variables used in the analysis, such as worker-level wage and other worker-, plant-, and firm-level variables from *the Basic Survey on Wage Structure*, and construct the worker-level cross-sectional data. *The Basic Survey on Wage Structure* is conducted every year from July 1st to 31st by the Ministry of Health, Labour and Welfare (MHLW).[28] The survey covers plants with five or more regular employees in major industries in Japan. Plants are selected using a uniform sampling method. Employees are also selected using a uniform sampling method from among the plants selected for the survey.

Second, we merge the worker-level data with the firm-level data on foreign ownership from *The Economic Census for Business Frame*. This is a newly-created census to identify the basic structure of establishments and enterprises in Japan and is conducted by the Ministry of Internal Affairs and Communications (MIC).[29] The 2009 census was the first one and it was conducted as of July 1, 2009.

Third, we also merge the worker-level data with data on firms' export status from *The Economic Census for Business Activity*. This is another newly-created census to investigate the economic activity of establishments and enterprises in all industries. The purpose of the census is

[27] All three surveys are conducted as Fundamental Statistics according to Japan's Statistics Act.
[28] See the MHLW website (http://www.mhlw.go.jp/english/database/db-l/wage-structure.html) for more details.
[29] See the MIC website (http://www.stat.go.jp/english/data/e-census/index.htm) for more details.

to obtain basic information for conducting various statistical surveys.[30] Using the results of the *2009 Economic Census for Business Frame*, the *2012 Economic Census for Business Activity* was conducted by MIC and the Ministry of Economy, Trade and Industry (METI) in February 2012 to investigate the activities of establishments and enterprises during 2011.

Full details on the matching procedures appear in Appendix Figure A1.[31] As indicated, we use worker-level data and plant-level data from 2012 except for export data, which is reported in the *2012 Economic Census for Business Activity* for 2011, and JMNE number of foreign subsidiaries and FMNE foreign equity shares, which are from *The Economic Census for Business Frame* for 2009. The matching procedure to link employees and employers is successful only for the 2012 data so we are restricted to using single-year cross-sectional data.[32]

After constructing the linked employer–employee data through these steps, we develop a dataset to estimate the Mincer wage equation. This study's procedure follows that of Kawaguchi (2011). In particular, we restrict our analysis to the sample of full-time workers under the age of 60 years who work at private manufacturing firms. The reasons for these restrictions are as follows.[33] First, we restrict our analysis to full-time workers because information on the education level of part-time workers is unavailable in the survey.[34] Second, we drop the data on workers over 60 years of age to address the fact that workers in Japan at the age of 60 years tend to face large declines in wages due mainly to mandatory retirement policies at almost all Japanese firms.[35]

[30] See the MIC website (http://www.stat.go.jp/english/data/e-census/2012/index.htm) for more details.
[31] Appendix Figure A1 is available online here: https://sites.google.com/site/greaneyecon/research.
[32] Kawaguchi (2011) noted the same single-year matching outcome. Note that *The Basic Survey on Wage Structure* is not a longitudinal survey so even studies that use only this data for multiple years cannot use worker-fixed-effects models or establishment-fixed-effects models.
[33] See Kawaguchi (2011) for more details.
[34] Full-time workers include regular (*sei shain*) and non-regular (*hisei shain*) workers, with both groups further divided into staff hired for an indefinite period (i.e., long-term employees) or staff hired for a definite period. Regular workers make up approximately 90 percent of our sample.
[35] Mandatory retirement policies were used at 93.3 percent of Japanese firms overall, and 99.8 percent of firms with 1000 or more employees, according to the 2013 General Survey on Working Conditions conducted by the MHLW.

Lastly, we restrict our sample to manufacturing firms because we do not have export data for non-manufacturing firms that can be matched with the employee data.

Following Kawaguchi (2011), the monthly total wage is calculated as the sum of monthly wages plus one-twelfth of yearly bonuses. Then, the hourly wage used in our analysis is calculated as the monthly total wage divided by hours worked expressed in hundreds of Japanese yen (JPY). To control for the potential influence of outliers, we exclude hourly wages that fall below the minimum wage at the prefectural level and hourly wages that exceed the mean wage plus 10 standard deviations.

Utilizing the data from the two Economic Censuses, we initially classify firms into four types: domestic-only firms, exporters, Japan-owned MNE (*JMNE*), and foreign-owned MNE (*FMNE*). Domestic-only firms are locally-owned non-exporters without foreign subsidiaries, whereas exporters are locally-owned exporters without foreign subsidiaries. JMNE are locally-owned firms with foreign subsidiaries which are defined as foreign affiliates that are 50 percent or more equity-owned by the JMNE and its other subsidiaries. Finally, FMNE are defined as firms for which more than 50 percent of the equity is foreign owned. We conduct robustness tests using a 10 percent foreign equity cutoff to check our results. We also separate FMNE based on their mode of entry into Greenfield-born FMNE and M&A-born FMNE for further tests. This separation is based on the authors' research into the corporate history of each FMNE to determine whether foreign ownership was involved at the time of the firm's establishment. It should be noted that we use the existence of foreign subsidiaries to identify JMNE and the presence of foreign equity ownership to identify FMNE, but our wage data is based solely on each establishment's employees

Workers at such firms are expected to formally retire at age 60 but often continue to work at the same firm at a lower wage.

in Japan. Therefore, foreigners working in Japan will be included but all employees of JMNE and FMNE working outside Japan are excluded.

3.2 Summary statistics

Table 1 presents the number of firms, plants, workers and wages in the sample by firm type using the 50 percent criteria for FMNE.[36] Among 7,932 firms, 6,485 firms (82 percent) are domestic-only firms. The number of JMNE is 971 (12.2 percent), which is the second largest group. The third largest group is exporters, at 437 firms (5.5 percent). The number of majority-owned FMNE is only 39 (0.5 percent), with 20 Greenfield-born and 19 M&A-born FMNE.[37] The shares of plants by firm type follow the same ranking.

The tendency for exporters and MNE to be larger than domestic-only firms is confirmed in the employment statistics. Domestic-only firms account for 82 percent of firms but only 61 percent of employees in our data, while JMNE employ 31 percent, exporters employ 7 percent and FMNE employ 1 percent of the 188,787 workers in our dataset. Of the 43,260 female workers in our dataset, 70 percent work in domestic-only firms, 23 percent in JMNE, 6 percent in exporters and 0.7 percent in FMNE.

<Table 1>

[36] Table 1 also shows summary statistics for observations using a 10 percent foreign-ownership criteria for defining FMNE. This alternate definition will be used later for robustness checks.

[37] It should be noted that the small number of majority-owned FMNE in our employer-employee linked dataset is indicative of their scarcity in Japan. Majority-owned FMNE account for only 0.2 percent (or 498) of the 277,066 total number of manufacturing enterprises included in the *The Economic Census for Business Frame* in 2009.

Table 1 also provides worker-level descriptive statistics for mean hourly wage by firm type and indicates that FMNE tend to pay the highest wages (3170 JPY), followed by JMNE (2760 JPY), exporters (2150 JPY), and domestic-only firms (1770 JPY) in descending order of wage.

4 Estimation results

Table 2 shows regression results for the Mincer wage regression in equation (1) using dummy variables for firm types and majority foreign-ownership as the criteria for defining FMNE. Industry and region fixed effects are included in all regressions and standard errors are clustered at the firm-level. The results in column (1) indicate a large "raw" GWG of 34.0 percent when we only control for industry and region fixed effects. [38] In column (2) we reduce the GWG to 27.4 percent by adding worker characteristics to the estimation. We next add other plant characteristics in column (3) to reduce the GWG to 26.2 percent. The estimated coefficients on the other control variables used in Table 2 are significant and have the expected signs with positive values for plant size, plant sales per worker, all education dummy variables, experience, tenure, lifetime employee and white collar.[39] Note in particular that by controlling for plant size and plant sales per worker, we attempt to control for the tendency of exporters and MNEs to be larger and more productive than domestic-only firms and to pay wage premia based on these tendencies. [40]

Column (4) shows the effect of our establishment-type variables on wages and on the GWG. The coefficient on Female now represents the average GWG among domestic-only firms, which

[38] Wage premiums for all dummy variables are calculated as exponent(coefficient)-1.
[39] We find negative but quantitatively very small coefficients for the squares of experience and tenure, and a negative small coefficient on the headquarters (HQ) dummy variable. The latter result may reflect that HQ workers receive larger non-wage compensation through transportation and housing allowances that are not captured in our wage data. Full regression results are suppressed in our tables due to space constraints but are available online here: https://sites.google.com/site/greaneyecon/research?authuser=0 .
[40] We acknowledge, however, that the WP associated with these firm characteristics may not be fully captured by single coefficients for firm size and average worker productivity, so these characteristics may contribute to gender-neutral WP for exporters and MNEs. Table 1 shows the large size differences across firm types and Appendix Table A2 shows the large productivity differences.

is estimated to be 26.8 percent. This result implies that women earn 26.8 percent less than men working in domestic-only firms after controlling for observable plant and worker characteristics. Exporters, JMNE and FMNE all pay wage premia (WP) relative to domestic-only firms and women receive significantly higher WP than men from these international firm types. Compared with domestic-only firms, exporters and JMNE pay modest gender-neutral WP of 2.8 percent and 7.4 percent, respectively, while majority-owned FMNE pay a large gender-neutral WP of 24.7 percent. Female workers at these types of firms receive these gender-neutral WP plus added ones of 4.2 percent, 2.6 percent and 10.2 percent, respectively. These added WP for female workers imply smaller GWGs among these international firms compared with domestic-only firms. The GWG is 19.3 percent at FMNE, a 7.5 percentage-point improvement compared with the 26.8 percent gender wage gap at domestic-only firms.[41] Due to the large gender-neutral WP plus female-specific WP associated with working at FMNE, women working at these firms earn 0.6 percent more than men working at domestic-only firms, after controlling for other plant and worker characteristics. This implies approximate wage parity between a female worker and a male worker with similar observable worker, plant, industry and region characteristics except that the woman works for an FMNE while the man works at a domestic-only firm.

<Table 2>

In column (5) of Table 2 we separate FMNE based on their mode of market entry and we confirm strong differences both in WP and GWG based on entry mode. Greenfield-born FMNE pay a much larger gender-neutral WP of 35.5 percent relative to domestic-only firms while M&A-

[41] GWG for each international firm type is calculated as exp(Female + Female*EstType) – 1.

born FMNE pay a corresponding WP of only 14.7 percent. These results suggest that both types of FMNE on average have superior productivity and/or superior workers compared with domestic-only firms, but these advantages are stronger among Greenfield-born FMNE. Of even greater interest, only Greenfield-born FMNE are associated with a significant reduction in the GWG, with an estimated GWG of 14.9 percent. This implies that the GWG among Greenfield-born FMNE is 11.9 percentage-points lower than it is among domestic-only firms or among M&A-born FMNE. These results support our hypothesis that foreign owners have a greater influence on corporate HRM and pay structure when they are involved from the firm's birth rather than taking control at a later stage through M&A.[42]

Based on these results, we cannot determine whether Greenfield-born FMNE hire very similar workers to other firm types but gender discriminate less in paying them or hire more able female workers who only appear similar to those at other firms based on observable characteristics that cannot capture ability or ambition. Either interpretation (i.e., pay similar female workers more or employ better female workers) supports our hypothesis of the transmission of more gender-equal pay structures through Greenfield-born FMNE. In the latter interpretation, the employee-employer matching that pairs more able female workers with Greenfield-born FMNE is not random but arguably reflects the more gender-equal corporate culture of the foreign-owned firms that deviate the most from the local corporate norms of gender inequality.[43] Greenfield-born FMNE also may be the most likely to deviate from the lifetime employment plus seniority wage

[42] An alternative hypothesis regarding the wage differences found between Greenfield-born and M&A-born FMNE may be that the former tend to be 100 percent foreign-owned while the latter are not. However, the six percentage point difference in average foreign equity shares across the two firm types (i.e., 87.8 percent for Greenfield-born FMNE versus 81.5 percent for M&A-born FMNE) seems much too small to explain such large differences in WP and GWG.

[43] Kodama et al. (2018) cite anecdotal evidence that Japanese women are likely to have better career opportunities working in FMNE than in Japanese-owned firms, using evidence from IBM Japan and Nissan Motor Co. following its acquisition by Renault. Both firms made substantial increases in their numbers of female managers.

system that fails to adequately reward merit,[44] which implies that more ambitious workers who want a more market-based, competitive pay structure seek out employment with these foreign-owned firms. The large gender-neutral WP at FMNE, and particularly at Greenfield-born ones, supports this hypothesis.[45] In addition, Ono (2007) concludes that workers at foreign firms in Japan have higher levels of general human capital and are more likely to have changed jobs in the past, indicating a higher mobility of these workers compared with workers in Japanese-owned firms who are less mobile in part due to their firm-specific human capital.[46]

In Table 3, we use continuous variables rather than dummy variables for each of our international firm activities. In column (1) we control for exporting using the export share of sales for each establishment. This allows us to control for any WP associated with export-related activities by "Exporters" and by MNE, but it changes the reference group to now include both domestic-only firms and locally-owned exporters without foreign subsidiaries. We find that a 10 percentage-point increase in export share of sales is associated with a 0.45 percent gender-neutral WP and an added 0.68 percent female WP. Greater export intensity corresponds with higher wages and lower GWGs.

<Table 3>

[44] Survey results from 2005 indicate that 67.2 percent of foreign-owned firms reported adopting meritocracy in their labor management (i.e., compensation, job assignments and promotions) while only 55.9 percent of Japanese-owned firms responded similarly. (The Japan Institute for Labour Policy and Training, "Report on the Survey on Foreign Firms Industrial Relations", *Gaishi Kei Kigyo no Roshi Kankei Tou Jittai Chousa Kekka Houkokusyo*.)

[45] A reasonable question is whether Japanese job applicants can identify Greenfield-born FMNE relative to other types of firms, including M&A-born FMNE, but the corporate name is often a clear indication since foreign names are written in "*katakana*", a separate Japanese syllabary used specifically for foreign-language words.

[46] Firm-specific human capital is developed through intra-firm training that is typical of the Japanese HRM system involving lifetime employment and seniority wages. See Ono (2007) for more details.

The regression results in columns (2) through (4) of Table 3 change our measurement of MNE activities to continuous variables and establish that being "more international" as an MNE is associated with higher gender-neutral WP for workers but not necessarily smaller gender wage gaps (i.e., M&A-born FMNE is the only MNE type that does not produce a significant reduction in the gender wage gap, as shown in column (4)) . Column (2) results include the log of the number of foreign subsidiaries held by each JMNE as a continuous indicator of their international activities. We estimate that a 10 percent increase in the number of foreign affiliates for a JMNE corresponds with 0.3 percent gender-neutral WP and an additional 0.11 percent WP for women at these firms. In column (3), FMNE are measured using the foreign capital ownership ratio, which can vary from 50 percent to 100 percent in this specification. A 10 percentage-point increase in the foreign capital ownership ratio of majority-owned FMNE is associated with a 3 percent gender-neutral WP and an additional 1 percent WP for women.[47] Column (4) shows our results using the foreign capital ownership ratio again but dividing FMNE into those that are Greenfield-born versus M&A-born. The estimated coefficients confirm our previous results that Greenfield-born FMNE deviate more than M&A-born FMNE from local norms in worker compensation, and we find the deviation increases in the level of foreign ownership. Greenfield-born FMNE pay larger gender-neutral WP than M&A-born FMNE (i.e., 3 percent versus 2 percent WP, respectively, from a 10 percentage-point increase in the foreign capital ownership ratio) and Greenfield-born FMNE are the only ones that pay a significant added WP to women (i.e., 2 percent WP from a 10 percentage-point increase in the foreign capital ownership ratio).

In column (5) of Table 3, we include continuous variables for all of our international firm-type activities. More foreign subsidiaries for JMNE and higher foreign ownership ratios for

[47] Ono and Odaki (2011) also find a 3 percent wage premium associated with a similar increase in foreign equity share using 1998 wage data, despite using fewer worker and firm characteristics to control for worker productivity.

Greenfield-born and M&A-born FMNE generate significant gender-neutral WP while higher export shares do not. Higher export shares, more foreign subsidiaries for JMNE and higher foreign ownership ratios for Greenfield-born FMNE all correspond with lower GWG. Our results using continuous variables show that more international activities tend to generate larger gender-neutral and female-specific WP. Our results using both indicator and continuous variables support our hypotheses that mode of entry matters for gender wage outcomes and that larger deviations from the host-country gender wage outcomes are associated with Greenfield-born rather than M&A-born FMNE.

Quantile regression results using the majority-foreign-ownership criteria and controlling for both plant and worker characteristics are shown in Table 4. Having established significant differences between Greenfield-born and M&A-born FMNE in previous results, we now include these two types of FMNE separately in each estimation. The strongest changes across the income distribution for our establishment-type variables of interest are for FMNE WP, which increase strongly in wage quintiles, particular for Greenfield-born FMNE. The gender-neutral WP associated with Greenfield-born FMNE relative to domestic-only firms is 27.0 percent for workers in the lowest wage quintile while it is a whopping 41.6 percent for workers in the highest quintile.

<Table 4>

The Table 4 results indicate that the additional WP for female workers at Greenfield-born FMNE are largest in the middle three quintiles of the wage distribution, while M&A-born FMNE pay no significant added WP to women in these wage quintiles. These WP can be used to calculate GWGs by firm type, which are presented in Figure 1 across the five wage quintiles. The figure

clearly shows that Greenfield-born FMNE deviate the most from domestic-only firms in terms of having much lower GWGs. Greenfield-born FMNE are associated with 13.2, 16.1 and 12.2 percentage-point reductions in the GWGs of 26.1 to 26.4 percent prevailing at domestic-only firms at the 25th, 50th and 75th wage quintiles, respectively.[48] The next highest reductions in GWG at these quintiles are only 3.4 to 3.5 percentage-points for exporters.

<Figure 1>

Greenfield-born FMNE are associated with the smallest reduction in GWG at the highest income quintile, with a 4.8 percentage-point reduction, but this is still larger than the next highest GWG reduction of 3.2 percentage-points for M&A-born FMNE. This may indicate that women still face barriers to achieving the highest-paying corporate jobs in Japan, even at FMNE. In this context, it is interesting to note that the 30 percent Club Japan was launched on May 1, 2019, with the goal of increasing female representation on corporate boards of TOPIX100 companies to 10 percent by 2020 and to 30 percent by 2030. Of the group's 36 members thus far, it is noteworthy that 14 (i.e., almost 39 percent) are from foreign-owned firms or organizations.[49] This suggests that gender-based differences between FMNE and Japanese-owned firms in the highest wage quintile may continue and even grow in the future as the latter are under-represented in this public commitment to corporate change. Overall, the QR results show strong differences between

[48] See Appendix Table A3 to see the gender wage gap differentials for all firm types that correspond with the coefficients in Tables 2, 4, 5 and 7.
[49] Based on 30 percent Club Japan website accessed on July 24, 2019: https://30percentclub.org/about/chapters/japan . The 30 percent Club originated in the United Kingdom in 2010, and the Japan Chapter was the club's 14th chapter.

Greenfield-born FMNE and M&A-born FMNE with the former contributing much more in terms of gender-neutral WP and reductions in the GWG across income quintiles.

5 Robustness Checks

Our results thus far are based on majority-owned FMNE, but the typical cut-off for classifying FDI is 10 percent or more foreign ownership of a firm. Therefore, we check the robustness of our results by considering a less stringent criteria for defining foreign ownership. That is, we lower our criteria from 50 percent to 10 percent minimum foreign equity ownership to classify FMNE. This reclassification moves minority-foreign-owned firms (i.e., those with foreign-equity ownership of at least 10 percent but less than 50 percent) into the FMNE group and out of one of the three domestic-owned firm groups. Summary statistics in Table 1 show that FMNE gain a total of 153 firms, or 19,140 workers, with the change from a 50 percent to a 10 percent cutoff, most of which come from JMNE (135 firms with 18,206 workers), while only a handful come from domestic-only firms (10 firms with 646 workers) and exporters (8 firms with 288 workers). Note that this change in our definition of FMNE to include minority-owned FMNE means 11 percent of our sample is now classified as working for FMNE whereas we previously had just under 1 percent classified as working for majority-owned FMNE. This expanded definition of FMNE allows us to check our results for the influence of outliers and/or measurement errors due to the relatively small number of workers at majority-owned FMNE.

Table 5 shows the Mincer wage regression results using dummy variables to indicate firm type and the 10 percent criteria for defining FMNE and other firm types. The qualitative results of interest hold, while quantitatively the WP for FMNE are smaller as anticipated due to the reclassification of so many previously-classified JMNE workers who work in minority-owned FMNE. Column (4) results show the same firm-type ranking of significant positive WP for women

that was previously established, going from FMNE (4.5 percent), to exporters (4.0 percent), and then JMNE (2.5 percent) all paying women more than they earn in domestic-only firms. Column (5) of Table 5 shows results after grouping FMNE by mode of entry. Similar to our previous findings, Greenfield-born FMNE are associated with a larger gender-neutral WP of 25.1 percent versus only 10.2 percent for M&A-born FMNE. With the 10 percent foreign ownership criteria we find that both modes of entry are associated with significant reductions in GWGs. Greenfield-born FMNE are associated with a larger reduction in the GWG than M&A-born FMNE which is consistent with our prior findings (i.e., 6.5 percentage-points for Greenfield-born FMNE versus 2.6 percentage points for M&A-born FMNE).

<Table 5>

Next we report the estimation results using continuous variables to measure international activities and the 10 percent criteria for defining FMNE in Table 6. The elasticity estimates using the various continuous variables are very similar to previous estimates presented in Table 3 using the 50 percent criteria for FMNE. As we found previously, the GWG is reduced by increases in export share of sales, JMNE number of foreign subsidiaries and the foreign ownership ratio of Greenfield-born, but not M&A-born, FMNE.

<Table 6>

Table 7 reports QR results using the 10 percent foreign-ownership criteria for identifying FMNE and the other firm types. As noted previously, QR analysis is more robust than OLS analysis

to non-normal errors and outliers. The inclusion of minority-owned FMNE makes the previously-observed strong upward trend in the Greenfield-born FMNE gender-neutral WP disappear, but we again see an upward trend until the 50th or 75th percentiles of the wage distribution and then a decline in this firm type's additional WP for women. Greenfield-born FMNE are associated with declines in the GWG of 6.2, 12.6 and 8.7 percentage-point at the 50th, 75th, and 90th percentiles of the wage distribution, but this firm type is no longer a significant determinant of the GWG at the lowest two wage quintiles. M&A-born FMNE are now associated with reductions in the GWG at all wage quintiles, with an increasing trend from 1.5 percentage-points at the lowest wage quintile to 3.4 percentage-points at the highest wage quintile. Overall, we find that our main results are robust in qualitative terms to relaxing the definition of FMNE to include minority-foreign-owned firms. This implies that our results are not driven by measurement errors or outliers among the relatively small sample of majority-owned FMNE.

<Table 7>

6 Discussion: Mechanisms for reducing gender wage gaps in Japan

While we cannot formally test for firm-type causal effects and wage mechanisms with only one year of linked employer-employee observations, we can use this data to explore suggestive evidence of mechanisms that may help to explain our results thus far. First, we explore a mechanism that links FMNE to gender wage gaps. Second, we discuss a mechanism that links exporters and JMNE to GWGs.

6.1 Gender wage gaps and heterogenous foreign owners

Our wage results in previous sections have found some significant GWG differences by separating FMNE by their mode of entry into Japan. Another dimension of FMNE heterogeneity that may impact GWGs is the level of workplace gender equality in the foreign owner's home country. Do foreign owners from more gender-equal countries bring more gender-equal human resource management practices with them to Japan? To explore this question, we need to identify FMNE home countries and then assign each home country a workplace gender equality score using the World Economic Forum's (WEF's) Employment Participation and Opportunity gender gap index for 2012.[50] The Economic Participation and Opportunity gender gap index contains three gender gap concepts (i.e., the participation gap, the remuneration gap and the advancement gap) that reflect gender equality in the workplace.

As stated previously, our dataset does not identify the home country of FMNE, but we are able to use corporate histories posted online to identify the home countries of 33 out of our 39 majority-owned FMNE.[51] The US is the most common home country with 19 FMNE and 894 employee observations, followed by Germany with five FMNE and 273 employee observations, as shown in Table 8. Other countries with smaller numbers of FMNE are aggregated into regional totals to avoid disclosing country-firm-specific information. Table 8 also shows the WEF (2012) Gender gap Index (GI) for Employment Participation and Opportunity for both countries with sufficiently high numbers of firms. The GI can range from complete gender disparity (0) to complete gender parity (1). Among the nine home countries linked to majority-foreign-owned

[50] The World Economic Forum's Global Gender Gap Report annually assesses countries using four gender gap indices (i.e., Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment) along with tallying an overall gender gap index. Choi and Greaney (2020) also use the WEF gender gap index as a measure of workplace gender equality of MNE home countries.

[51] The six FMNE that we classify as having an "unknown" home country tend to report foreign investors from multiple countries in their online corporate histories.

firms in Japan in our dataset, the US has the highest GI at 0.8143 with a corresponding gender gap rank of 8 out of 135 countries. Our lowest-ranked foreign owner is gender gap ranked in the 70's while Japan is ranked at 102 with a GI of 0.5756. Across all employees working at majority-owned FMNE with identified home countries in our dataset, the mean GI is 0.7852, which corresponds with a gender gap rank of 14, far above Japan's rank of 102.

<Table 8>

Since the US is our highest gender-equality-ranked foreign investor and US investors employ the majority of both our total FMNE employee observations (i.e., 51.5 percent) and our Greenfield-born FMNE employee observations (i.e., 58.6 percent), it is reasonable to ask whether US-owned FMNE alone drive our results.[52] To address this question, we repeat the specifications shown in columns (4) and (5) of Table 2 but add a US indictor variable interacted with the FMNE and Female*FMNE indicator variables. The results are shown Table 9 columns (1) and (2). The first column of results shows that US owners do not pay a significantly higher gender-neutral WP compared with other foreign owners and we lose the significance of the FMNE female WP by allowing US owners to have a separate effect. However, by splitting FMNE into Greenfield-born versus M&A-born firms, we recover our main results that the former pay the largest gender-neutral WP and they have the smallest GWG among firms in Japan, as shown in Table 9 column (2). This column of results also indicates that US owners of FMNE using either entry mode do not have

[52] The question is particularly pertinent if US MNEs differ from other countries' MNEs in their management practices and if these differences matter for worker productivity. Bloom et al. (2012a) find that US firms, on average, are better managed than British, French or German firms, leading to productivity gains. Bloom et al. (2012b) find that tougher HRM practices used in US MNEs in Europe are a primary cause of their higher productivity gains from information technology relative to non-US-owned MNEs.

significantly different wage effects from other foreign owners using the same entry mode. These results imply that our paper's main results regarding WP differences across FMNE by mode of entry are not driven solely by US-owned FMNE nor by a US-specific management style.

Having identified the foreign owners of most of our majority-owned FMNE, we proceed to test whether home country workplace gender norms are correlated with firm-level gender wage gaps in Japan. We interact our variables of interest with the WEF (2012) gender gap index for the 32 FMNE from home countries for which we can identify a GI.[53] These regressions do not produce significant coefficients of interest,[54] but if we allow the gender-neutral WP to be captured by an indicator variable and the female-only WP to be captured by a continuous variable using the GI, we regain our previous results ranking gender-neutral FMNE WP by mode of entry and we add new results using the GI, as shown in column (3). Greenfield-born FMNE pay higher gender-neutral WP than M&A-born FMNE, with magnitudes similar to those found in Table 2. In addition, Greenfield-born FMNE from home countries with higher GI pay significant female WP while the same result is not found for M&A-born FMNE. In other words, higher workplace gender equality at home corresponds with lower firm-level GWGs in Greenfield-born FMNE in Japan. The coefficient of 0.192 for Female*Greenfield-born FMNE*GI implies that a 0.1 increase in a foreign owner's gender gap index corresponds with a 1.92 percentage-point higher female WP (i.e., a 1.92 percentage-point lower GWG). Using the FMNE employee mean GI shown at the bottom of Table 8 and the 0.192 coefficient from Table 9 column (3), we can calculate an 11.9 percentage-point lower GWG for an employee at a Greenfield-born FMNE from an average GI home country

[53] In addition to the six FMNE with unknown countries of origin, one additional country of origin has no reported gender gap index in the WEF (2012).
[54] These results are suppressed due to space constraints but are available upon request from the authors.

relative to an employee at a domestic-only Japanese firm.[55] This GWG differential is identical to what we found in our previous result for majority-owned Greenfield-born FMNE.

<Table 9>

As a robustness check on these home country gender gap index results, we consider different ways of handling the observations of employees working for the seven FMNE for which we cannot identify a home country and/or a home country GI. Thus far, we have dropped these observations, which all involve M&A-born FMNE, but that means we lose 25.1 percent of our M&A-born FMNE employee sample and 12.6 percent of our total FMNE employee sample. To include these employee observations, we consider two alternatives for classifying the FMNE with unknown home country GI: 1) set the GI to the minimum observed M&A-born FMNE GI (i.e., a conservative approach),[56] or 2) set the GI to the mean observed M&A-born FMNE GI. Table 9 column (4) shows our regression results using the conservative approach and column (5) shows the results using the mean approach. The coefficients of interest across columns (3), (4) and (5) are very similar in magnitude and significance, which suggests that our results are robust to different treatments of employee observations with unknown FMNE home countries.

Summing up this discussion section, we find that the majority of our employee observations among all FMNE and among Greenfield-born FMNE work in US-owned firms, but these firms do not differ significantly from all of the other foreign owners in terms of gender-neutral WP and GWGs. Therefore, our main results are not driven solely by US-owned FMNE nor

[55] This GWG differential is calculated as follows: [exp(Female + Female*Greenfield-born FMNE*GI) – 1] – [exp(Female) – 1].

[56] Note that excluding the observations with unknown home country GI can be considered to be the "most conservative" approach, since that precludes results driven by misidentified home country GI.

by any possible US-specific management style. Instead, we find evidence suggesting that home country gender norms in the workplace may influence firm-specific GWGs in Japan. Greenfield-born FMNE coming from more gender-equal home countries tend to have smaller firm-level GWGs in Japan. Again, this correlation may be caused by more gender-equal compensation systems in these firms and/or by the more gender-equal workplace at these firms attracting more ambitious and able Japanese female workers who earn higher wages. We cannot distinguish between a "similar workers, less gender wage discrimination" story and a "Japanese female worker sorting" story, but the correlation between home country workplace gender equality and smaller gender wage gaps in Japan is an important new result based on majority-owned Greenfield-born FMNE. This result is consistent with the hypothesis that workplace gender norms can be transmitted across international borders, but further research is needed to examine the relationship across a larger group of FMNE inclusive of minority-foreign-owned firms.[57]

6.2 Gender wage gaps, exporters and JMNE

Our empirical results found small reductions in firm-level GWGs corresponding with exporters and JMNE compared with domestic-only firms. What mechanisms might help to explain these findings? Our results are consistent with a "competition story" along the lines of Black and Brainerd (2004) but applied in an exporting and external market context. Black and Brainerd (2004) employ the Becker (1957) model of discrimination to explain their finding that import competition leads to lower GWGs in more concentrated manufacturing industries in the US. That is, firms are less able to indulge in a "taste for discrimination" when faced with stronger product market competition. In the context of our paper, this competition story implies that exporters and

[57] Detailed online public information on the corporate histories of the 153 minority-owned FMNE, which is needed in order to identify the country of origin of foreign investors, is less widely available so we were unable to replicate this analysis using the 10% foreign ownership criteria.

JMNE are more constrained than domestic-only firms within the same industry in their tendencies to practice gender-based wage discrimination because exporters and JMNE face stronger product market competition by virtue of their exposure to overseas markets. Within an industry, all of our domestic firm types are exposed to a similar level of import competition, but only exporters and JMNE are additionally competing to sell their products outside Japan. Our results using continuous variables to measure exporting and JMNE activities in Tables 3 and 6 are consistent with this competition story using either a 50% or 10% foreign ownership criteria. Firms with higher export shares of sales have smaller GWGs and JMNE with more foreign subsidiaries have smaller GWGs.

While these results are consistent with the competition hypothesis, they also are consistent with a hypothesis involving corporate culture transmission across international borders. Greater exposure to more gender-equal corporate culture abroad, through exporting and overseas investment, leads Japanese exporters and MNE to adopt more gender-equal workplace practices at home. Our dataset does not allow us to more fully explore this hypothesis because we do not observe the countries receiving firm exports or the countries receiving JMNE investment in order to test for correlations between these countries' gender gap indices and the Japanese firms' GWGs. We leave that topic for future research.

7 Conclusions

Using linked employer-employee data for 2012, we find that FMNE pay the largest gender-neutral wage premia and they feature the smallest gender wage gaps in Japan compared with domestic-only firms, exporters and JMNE. We separate FMNE by their mode of market entry—Greenfield-born versus M&A-born—and find that Greenfield-born FMNE deviate the most from domestic-only firms in term of wages and gender wage gaps. Separating FMNE by mode of entry allows us to address the endogeneity problem, at least for Greenfield-born FMNE, in using cross-

sectional, rather than panel, data for this study. We confirm that the influence of foreign workplace gender norms is most apparent at Greenfield-born FMNE, which report a much lower GWG than any of our other firm types. Greenfield-born FMNE are associated with a GWG that is almost 12 percentage-points lower than the 26.8 percent prevailing among domestic-only firms.

The smaller gender-based pay discrepancy is likely due to both lower levels of gender discrimination in pay and unobservable worker quality differences that match more ambitious and able female workers with these foreign-owned firms. Greenfield-born FMNE also report the highest gender-neutral wage premia (i.e., 35.5 percent) which suggests more ambitious and able male workers also may seek employment with these FMNE that are less likely to practice the seniority wage plus lifetime employment system of Japanese-owned firms. We interpret the lower GWG and higher gender-neutral wage premia associated with Greenfield-born FMNE as being caused by foreign influences on a firm's corporate culture and human resource management. [58]

To provide support for our interpretation of causal foreign influences on GWGs in Japan, we explore FMNE heterogeneity by home country and link firm-level GWGs in Japan to home country workplace gender equality. Using majority-owned FMNE for which we can identify the home country, we find that Greenfield-born FMNE from more gender-equal home countries tend to have smaller firm-level GWGs in Japan. Among the majority-owned FMNE, we find that the US is the highest-ranked foreign owner for workplace gender equality and US-owned FMNE account for the majority of our FMNE. Despite the large US presence as a home country of FMNE in our dataset and its high gender equality ranking, we confirm that our main results are not driven solely by US-owned FMNE nor by any possible US-specific management style.

[58] See Kato and Kodama (2018) for an extensive review of the literature on management practices and gender-based outcomes in the workforce, including suggested directions for further research.

While FMNE are linked to large reductions in firm-level GWGs in Japan, we also find that Japanese exporters and JMNE correspond with small reductions in GWGs relative to domestic-only firms. Exporters tend to have GWGs about 3 percentage-points smaller and JMNE have GWGs almost 2 percentage-points smaller than domestic-only firms. We also find that the GWGs in these firms shrink as their level of international activities increases (i.e., as export share of sales increases or as JMNE number of foreign subsidiaries increases). These findings are consistent with a hypothesis regarding (overseas) product market competition as a constraint on a firm's ability to indulge in a "taste for discrimination" (i.e., gender-based wage discrimination, in this case). The findings also are consistent with a hypothesis in which corporate culture regarding workplace gender norms is transmitted across international borders through greater overseas market exposure. We are unable to disentangle these two potential mechanisms with our dataset, but the main message is that more exposure to overseas markets through exporting and investing corresponds with lower GWGs within Japanese firms.

Admittedly our study would benefit from the availability of panel data that links employer and employee observations. That would allow us to control for unobservable worker and plant characteristics so that we could more precisely examine the causal links between foreign ownership, multinationality, exporting and worker compensation. Since such data is currently unavailable for Japan, our unique approach with cross-sectional data addresses the endogeneity issue for a subset of FMNE by separating them by mode of entry. The strong differences found between Greenfield-born FMNE and M&A-born FMNE provide support for this approach.

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Table 1: Summary statistics by firm type

50% criteria

	N. of Firms		N. of Plants		N. of Employees		N. Female Empl		Hourly Wage (100 JPY)				
Firm type	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent	Mean	Median	St Dev	Min	Max
Domestic-only	6,485	81.8	6,706	76.8	115,931	61.4	30,413	70.3	17.7	15.7	8.6	6.5	171.6
Exporter	437	5.5	478	5.5	12,322	6.5	2,656	6.1	21.5	19.4	10.1	6.6	140.0
JMNE	971	12.2	1,504	17.2	58,797	31.1	9,885	22.9	27.6	25.0	13.4	6.6	162.3
FMNE	39	0.5	45	0.5	1,737	0.9	306	0.7	31.7	27.7	16.5	7.7	144.1
Greenfield-born	20	0.3	21	0.2	868	0.5	156	0.4	32.6	28.5	16.7	8.3	128.2
M&A-born	19	0.2	24	0.3	869	0.5	150	0.4	30.8	26.8	16.2	7.7	144.1
Total	7,932	100	8,733	100	188,787	100	43,260	100	21.1	18.3	11.5	6.5	171.6

10% criteria

	N. of Firms		N. of Plants		N. of Employees		N. Female Empl		Hourly Wage (100 JPY)				
Firm type	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent	Mean	Median	St Dev	Min	Max
Domestic-only	6,475	81.6	6,692	76.6	115,285	61.1	30,327	70.1	17.6	15.7	8.6	6.5	171.6
Exporter	429	5.4	469	5.4	12,034	6.4	2,595	6.0	21.5	19.3	10.1	6.6	140.0
JMNE	836	10.5	1,142	13.1	40,591	21.5	7,470	17.3	25.8	23.2	12.5	6.6	162.3
FMNE	192	2.4	430	4.9	20,877	11.1	2,868	6.6	31.3	28.8	14.5	7.4	161.7
Greenfield-born	30	0.4	43	0.5	2,070	1.1	338	0.8	29.8	26.7	14.5	7.4	128.2
M&A-born	162	2.0	387	4.4	18,807	10.0	2,530	5.9	31.5	29.0	14.5	7.4	161.7
Total	7,932	100	8,733	100	188,787	100	43,260	100	21.1	18.3	11.5	6.5	171.6

Notes: 50% criteria and 10% criteria refer to the minimum foreign equity shares used for defining FMNEs relative to other firm types.

Table 2: Wage regressions using 50% foreign ownership criteria and firm-type indicator variables

	(1)	(2)	(3)	(4)	(5)
	ln Hourly Wage				
Female	-0.416***	-0.320***	-0.304***	-0.312***	-0.312***
	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]
Japanese-Owned Exporters (50%)				0.028**	0.028**
without Foreign Subsidiaries				[0.011]	[0.011]
Female * Japanese-Owned Exporters (50%)				0.041***	0.041***
				[0.011]	[0.011]
JMNE (50%)				0.071***	0.071***
				[0.009]	[0.009]
Female * JMNE (50%)				0.026***	0.026***
				[0.008]	[0.008]
FMNE (50%)				0.221***	
				[0.038]	
Female * FMNE (50%)				0.097**	
				[0.040]	
Greenfield-born FMNE (50%)					0.304***
					[0.046]
Female * Greenfield-born FMNE (50%)					0.151***
					[0.035]
M&A-born FMNE (50%)					0.137**
					[0.053]
Female * M&A-born FMNE (50%)					0.037
					[0.046]
Worker characteristics included	No	Yes	Yes	Yes	Yes
Other plant-level characteristics included	No	No	Yes	Yes	Yes
Observations	200,230	192,917	192,891	182,094	182,094
R-squared	0.299	0.646	0.707	0.712	0.712

Notes: The "50%" indicators are a reminder that all firm-types are defined using that criteria for identifying FMNE. Standard errors, clustered at the firm level, appear in brackets. Industry and region fixed effects are suppressed. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3: Wage regressions using 50% foreign ownership criteria and firm-type continuous variables

	(1)	(2)	(3)	(4)	(5)
	ln Hourly Wage				
Female	-0.310***	-0.311***	-0.312***	-0.312***	-0.309***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Japanese-Owned Exporters (50%)		0.028**	0.029**	0.028**	
without Foreign Subsidiaries		[0.011]	[0.011]	[0.011]	
Female * Japanese-Owned Exporters (50%)		0.039***	0.040***	0.041***	
		[0.011]	[0.011]	[0.011]	
JMNE (50%)	0.062***		0.060***	0.070***	
	[0.009]		[0.009]	[0.009]	
Female * JMNE (50%)	0.016*		0.025***	0.026***	
	[0.009]		[0.009]	[0.008]	
FMNE (50%)	0.210***	0.213***			
	[0.038]	[0.037]			
Female * FMNE (50%)	0.090**	0.086**			
	[0.040]	[0.043]			
Export Share	0.045*				0.013
	[0.027]				[0.026]
Female * Export Share	0.068**				0.060**
	[0.029]				[0.028]
ln N. of Foreign Subsidiaries		0.030***			0.028***
		[0.003]			[0.003]
Female * lnN_Foreign_Subsidiaries		0.011***			0.008***
		[0.003]			[0.003]
Foreign Ownership Ratio (FOR)			0.003***		
			[0.000]		
Female * Foreign Ownership Ratio			0.001*		
			[0.000]		
Greenfield-born FMNE FOR				0.003***	0.003***
				[0.001]	[0.001]
Female * Greenfield-born FMNE FOR				0.002***	0.001***
				[0.000]	[0.000]
M&A-born FMNE FOR				0.002**	0.001**
				[0.001]	[0.001]
Female * M&A-born FMNE FOR				0.000	0.000
				[0.001]	[0.001]
Worker characteristics included	Yes	Yes	Yes	Yes	Yes
Other plant-level characteristics included	Yes	Yes	Yes	Yes	Yes
Observations	182,094	182,094	182,094	182,094	182,094
R-squared	0.712	0.713	0.713	0.712	0.713

Notes: The "50%" indicators are a reminder that all firm-types are defined using that criteria for identifying FMNE. Standard errors, clustered at the firm level, appear in brackets. Industry and region fixed effects are suppressed. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 4: Wage regressions using 50% foreign ownership criteria and firm-type indicator variables, QR results

Dependent variable = Ln Hourly Wage					
	q10	q25	q50	q75	q90
Female	-0.289***	-0.303***	-0.306***	-0.307***	-0.304***
	[0.005]	[0.005]	[0.004]	[0.003]	[0.003]
Japanese-Owned Exporters (50%)	0.043***	0.028***	0.026***	0.029***	0.036***
without Foreign Subsidiaries	[0.004]	[0.001]	[0.002]	[0.001]	[0.005]
Female * J-Owned Exporters (50%)	0.041***	0.046***	0.045***	0.046***	0.025**
	[0.003]	[0.009]	[0.005]	[0.007]	[0.010]
JMNE (50%)	0.065***	0.063***	0.067***	0.075***	0.079***
	[0.002]	[0.004]	[0.005]	[0.003]	[0.002]
Female * JMNE (50%)	0.011***	0.024***	0.023***	0.027***	0.033***
	[0.004]	[0.005]	[0.006]	[0.003]	[0.011]
Greenfield-born FMNE (50%)	0.239***	0.281***	0.277***	0.289***	0.348***
	[0.006]	[0.004]	[0.005]	[0.009]	[0.035]
Female * Greenfield-born FMNE (50%)	0.128**	0.165***	0.198***	0.153***	0.063**
	[0.057]	[0.057]	[0.033]	[0.019]	[0.025]
M&A-born FMNE (50%)	0.114***	0.115***	0.113***	0.148***	0.186***
	[0.011]	[0.031]	[0.022]	[0.027]	[0.032]
Female * M&A-born FMNE (50%)	0.036***	0.028	0.038	0.019	0.043***
	[0.013]	[0.041]	[0.043]	[0.047]	[0.006]
Worker characteristics included	Yes	Yes	Yes	Yes	Yes
Other plant-level characteristics included	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.4434	0.4737	0.4844	0.4849	0.473
Observations					182,094

Notes: The "50%" indicators are a reminder that all firm-types are defined using that criteria for identifying FMNE. Standard errors, clustered at the firm level, appear in brackets. Industry and region fixed effects are suppressed. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 5: Wage regressions using 10% foreign ownership criteria and firm-type indicator variables

	(1)	(2)	(3)	(4)	(5)
	ln Hourly Wage				
Female	-0.416***	-0.320***	-0.304***	-0.312***	-0.311***
	[0.005]	[0.004]	[0.004]	[0.005]	[0.004]
Japanese-Owned Exporters (10%)				0.029**	0.028**
without Foreign Subsidiaries				[0.012]	[0.012]
Female * Japanese-Owned Exporters (10%)				0.039***	0.039***
				[0.011]	[0.011]
JMNE (10%)				0.068***	0.066***
				[0.009]	[0.009]
Female * JMNE (10%)				0.025**	0.025***
				[0.010]	[0.010]
FMNE (10%)				0.111***	
				[0.016]	
Female * FMNE (10%)				0.044***	
				[0.012]	
Greenfield-born FMNE (10%)					0.224***
					[0.035]
Female * Greenfield-born FMNE (10%)					0.086***
					[0.031]
M&A-born FMNE (10%)					0.097***
					[0.017]
Female * M&A-born FMNE (10%)					0.035***
					[0.013]
Worker characteristics included	No	Yes	Yes	Yes	Yes
Other plant-level characteristics included	No	No	Yes	Yes	Yes
Observations	200,230	192,917	192,891	182,094	182,094
R-squared	0.299	0.646	0.707	0.711	0.712

Notes: The "10%" indicators are a reminder that all firm-types are defined using that criteria for identifying FMNE. Standard errors, clustered at the firm level, appear in brackets. Industry and region fixed effects are suppressed. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6: Wage regressions using 10% foreign ownership criteria and firm-type continuous variables

	(1)	(2)	(3)	(4)	(5)
	ln Hourly Wage				
Female	-0.310***	-0.310***	-0.311***	-0.311***	-0.308***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Japanese-Owned Exporters (10%) without Foreign Subsidiaries		0.023**	0.024**	0.023**	
		[0.012]	[0.012]	[0.012]	
Female * Japanese-Owned Exporters (10%)		0.037***	0.039***	0.040***	
		[0.011]	[0.011]	[0.011]	
JMNE (10%)	0.060***		0.057***	0.057***	
	[0.009]		[0.009]	[0.009]	
Female * JMNE (10%)	0.017		0.026***	0.026***	
	[0.011]		[0.010]	[0.010]	
FMNE (10%)	0.101***	0.029*			
	[0.017]	[0.017]			
Female * FMNE (10%)	0.033***	0.022			
	[0.012]	[0.016]			
Export Share	0.038				0.014
	[0.027]				[0.026]
Female*Export Share	0.060**				0.062**
	[0.028]				[0.027]
ln N. of Foreign Subsidiaries		0.024***			0.025***
		[0.004]			[0.004]
Female*lnN_Foreign_Subsidiaries		0.009***			0.007**
		[0.004]			[0.003]
Foreign Ownership Ratio (FOR)			0.003***		
			[0.000]		
Female*Foreign Ownership Ratio			0.001**		
			[0.000]		
Greenfield-born FMNE FOR				0.003***	0.003***
				[0.001]	[0.001]
Female*Greenfield-born FMNE FOR				0.001***	0.001***
				[0.000]	[0.000]
M&A-born FMNE FOR				0.003***	0.001**
				[0.000]	[0.000]
Female*M&A-born FMNE FOR				0.001	-0.000
				[0.000]	[0.000]
Worker characteristics included	Yes	Yes	Yes	Yes	Yes
Other plant-level characteristics included	Yes	Yes	Yes	Yes	Yes
Observations	182,094	182,094	182,094	182,094	182,094
R-squared	0.711	0.711	0.713	0.712	0.713

Notes: The "10%" indicators are a reminder that all firm-types are defined using that criteria for identifying FMNE. Standard errors, clustered at the firm level, appear in brackets. Industry and region fixed effects are suppressed. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7: Wage regressions using 10% foreign ownership ratio criteria and firm-type indicator variables, QR results

Dependent variable = Ln Hourly Wage					
	q10	q25	q50	q75	q90
Female	-0.289***	-0.302***	-0.305***	-0.306***	-0.305***
	[0.002]	[0.004]	[0.003]	[0.002]	[0.004]
Japanese-Owned Exporters (10%)	0.041***	0.027***	0.027***	0.030***	0.038***
without Foreign Subsidiaries	[0.007]	[0.004]	[0.001]	[0.003]	[0.004]
Female * J-Owned Exporters (10%)	0.041***	0.046***	0.043***	0.041***	0.022
	[0.001]	[0.012]	[0.006]	[0.016]	[0.017]
JMNE (10%)	0.063***	0.061***	0.062***	0.067***	0.074***
	[0.002]	[0.001]	[0.000]	[0.000]	[0.003]
Female * JMNE (10%)	0.010***	0.019***	0.024***	0.032***	0.032***
	[0.003]	[0.003]	[0.005]	[0.005]	[0.009]
Greenfield-born FMNE (10%)	0.206***	0.204***	0.199***	0.191***	0.198***
	[0.011]	[0.010]	[0.007]	[0.004]	[0.008]
Female * Greenfield-born FMNE (10%)	0.017	0.007	0.081*	0.158***	0.111***
	[0.011]	[0.036]	[0.044]	[0.031]	[0.012]
M&A-born FMNE (10%)	0.096***	0.089***	0.095***	0.100***	0.104***
	[0.004]	[0.003]	[0.005]	[0.007]	[0.004]
Female * M&A-born FMNE (10%)	0.020***	0.032***	0.029***	0.035**	0.045**
	[0.007]	[0.009]	[0.009]	[0.016]	[0.022]
Worker characteristics included	Yes	Yes	Yes	Yes	Yes
Other plant-level characteristics included	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.4439	0.474	0.4845	0.4848	0.4725
Observations					182,094

Notes: The "10%" indicators are a reminder that all firm-types are defined using that criteria for identifying FMNE. Standard errors, clustered at the firm level, appear in brackets. Industry and region fixed effects are suppressed. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8: Gender gap index and FMNE home countries using 50% foreign ownership criteria

FMNE (50%) home countries/regions	FMNE		Greenfield-born FMNE		Gender gap index	Gender gap rank
	Num. firms	Employee obs.	Num. firms	Employee obs.		
Germany	5	273	3	116	0.7399	31
Other Europe	6	252	5	176	*	*
USA	19	894	11	509	0.8143	8
Other N.&S. America	*	100	*	*	*	*
Asia	*	23	*	*	*	*
Unknown	6	195	0	0	NA	NA
Total	36	1,737	19	801		
FMNE employee mean					0.7852	14
Japan					0.5756	102

Notes: * indicates suppressed due to small numbers of firms from individual countries; NA indicates not available.

Sources: FMNE home countries identified by authors using corporate histories available online; gender gap index and rank (out of 135 countries) from WEF (2012).

Table 9: Wage regressions using 50% foreign ownership criteria, firm-type indicator variables and FMNE home country gender gap index

	(1)	(2)	(3)	(4)	(5)
	ln Hourly Wage				
Female	-0.312***	-0.312***	-0.312***	-0.312***	-0.312***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
FMNE (50%)	0.182***				
	[0.053]				
Female * FMNE (50%)	0.075				
	[0.062]				
Greenfield-born FMNE (50%)		0.264***	0.304***	0.304***	0.304***
		[0.061]	[0.046]	[0.046]	[0.046]
Female * Greenfield-born FMNE		0.186***			
		[0.042]			
M&A-born FMNE (50%)		0.119	0.128*	0.136**	0.137**
		[0.073]	[0.067]	[0.053]	[0.053]
Female * M&A-born FMNE		0.009			
		[0.068]			
FMNE * US	0.072				
	[0.074]				
Female * FMNE * US	0.070				
	[0.074]				
Greenfield-born FMNE * US		0.068			
		[0.089]			
Female * Greenfield-born FMNE * US		-0.057			
		[0.068]			
M&A-born FMNE * US		0.038			
		[0.104]			
Female * M&A-born FMNE * US		0.115			
		[0.094]			
Female * Greenfield-born FMNE * GI			0.192***	0.192***	0.192***
			[0.045]	[0.045]	[0.045]
Female * M&A-born FMNE * GI			0.125	0.061	0.049
			[0.077]	[0.063]	[0.060]
Worker characteristics included	Yes	Yes	Yes	Yes	Yes
Other plant-level characteristics included	Yes	Yes	Yes	Yes	Yes
Observations	182,094	182,094	181,876	182,094	182,094
R-squared	0.712	0.712	0.712	0.712	0.712

Notes: Indicator variables for exporter and JMNE, along with their interactions with the Female indicator variable, are included in all regressions but suppressed due to space constraints (values are identical to those shown in Table 2). GI = gender gap index. Standard errors, clustered at the firm level, appear in brackets. Industry and region fixed effects are suppressed. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Appendix Table A1: Summary statistics by worker gender

	Male Workers				Female Workers			
	Mean	St Dev	Min	Max	Mean	St Dev	Min	Max
Ln Wage	3.030	0.458	1.878	5.145	2.564	0.402	1.875	5.019
Domestic-only	0.555	0.497	0	1	0.659	0.474	0	1
Exporter	0.063	0.242	0	1	0.058	0.233	0	1
JMNE	0.335	0.472	0	1	0.228	0.420	0	1
FMNE (50% criteria)	0.010	0.099	0	1	0.007	0.084	0	1
Jr High School	0.039	0.194	0	1	0.050	0.217	0	1
High School	0.635	0.481	0	1	0.709	0.454	0	1
Jr College	0.083	0.275	0	1	0.145	0.352	0	1
College	0.244	0.429	0	1	0.096	0.295	0	1
Experience	20.477	10.983	0	44	21.673	11.668	0	44
Tenure	13.474	10.819	0	44	10.699	9.331	0	44
Employee for an Indefinite Period	0.943	0.232	0	1	0.814	0.389	0	1
White Collar	0.363	0.481	0	1	0.395	0.489	0	1
Blue Collar	0.613	0.487	0	1	0.582	0.493	0	1
ln Plant Size (ln N. of Employees)	4.917	1.558	1.609	9.468	4.586	1.379	1.609	9.468
Headquarters	0.252	0.434	0	1	0.266	0.442	0	1
ln Plant Sales per Worker	7.213	2.398	0	12.407	6.798	2.324	0	12.407
Observations	154,067				46,163			

Notes: Employee for an Indefinite Period indicates a long-term or "lifetime" employee of the firm.

Appendix Table A2: Firm-type differences in average worker productivity

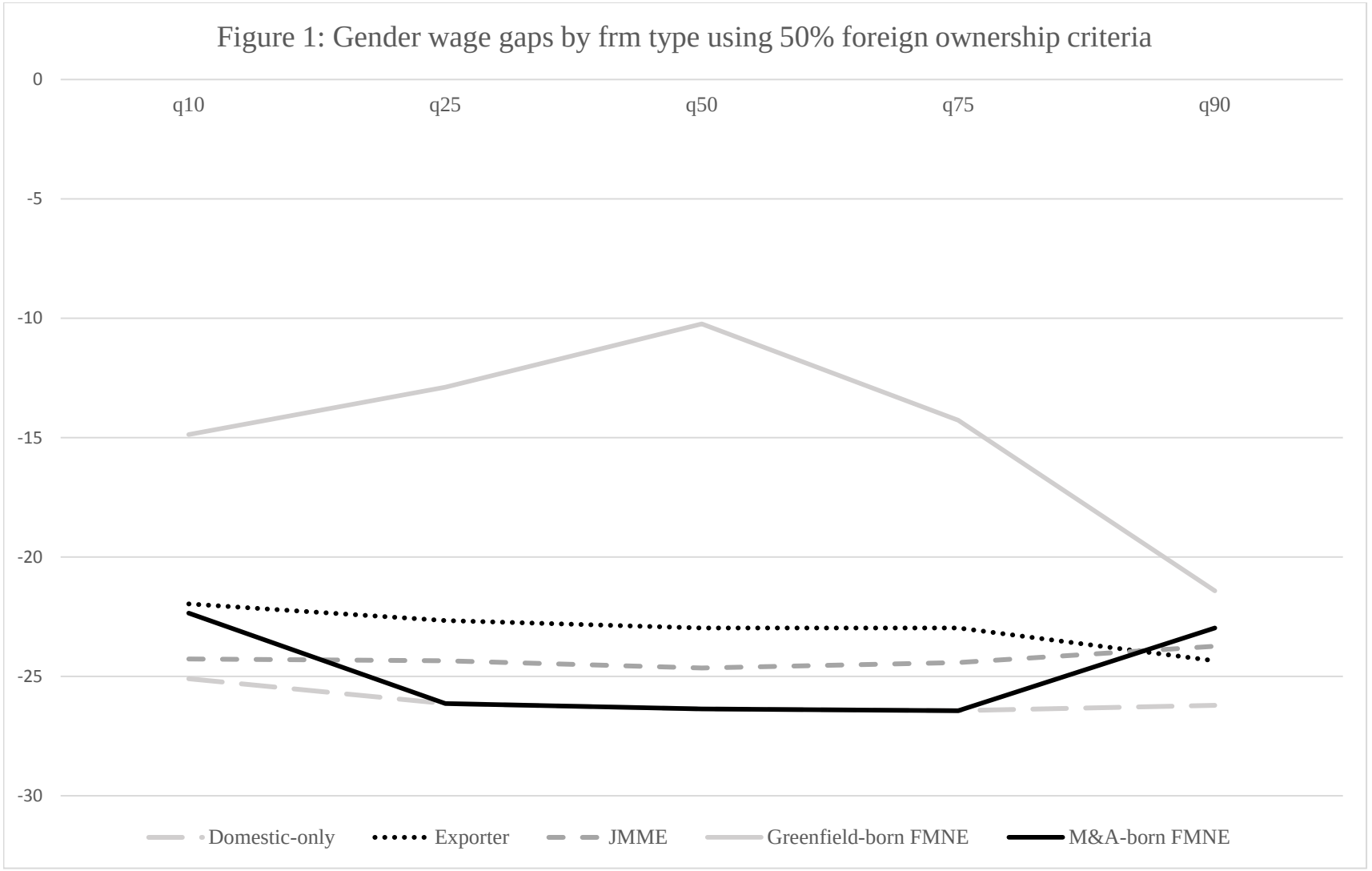
Firm type	FMNE criteria	N. of plants	Mean	Median	Min	Max	St dev
Domestic-only	50%	6,706	2,216.6	1,337.2	0	108,122.8	3,580.6
Exporter	50%	478	3,365.7	2,267.3	0	34,683.2	3,717.9
JMNE	50%	1,504	6,096.5	3,549.6	0	244,449.3	14,041.8
Greenfield-born FMNE	50%	21	11,981.0	3,251.7	0	142,904.2	30,859.7
M&A-born FMNE	50%	24	10,787.4	3,668.8	0	123,816.8	24,646.4
Domestic-only	10%	6,692	2,125.1	1,335.1	0	108,122.8	3,582.8
Exporter	10%	469	3,350.8	2,235.7	0	34,683.2	3,727.9
JMNE	10%	1,142	4,783.7	3,052.6	0	86,155.1	6,492.3
Greenfield-born FMNE	10%	43	7,499.8	3,015.9	0	142,904.2	21,992.5
M&A-born FMNE	10%	387	10,261.1	5,188.9	0	244,449.3	25,641.2
Total		8,733	2,925.6	1,562.5	0	244,449.3	7,135.8

Notes: Average worker productivity measured by log of plant sales per worker in JPY.

Appendix Table A3: Gender wage gaps and differentials by firm type and wage quintile

		Baseline GWG	Significant differentials from baseline (percentage points)			
FMNE criteria	Quintile	Domestic-only	Exporter	JMME	Greenfield-born FMNE	M&A-born FMNE
50% criteria	All	-26.8	3.1	1.9	11.9	0.0
50% criteria	q10	-25.1	3.1	0.8	10.2	2.7
50% criteria	q25	-26.1	3.5	1.8	13.2	0.0
50% criteria	q50	-26.4	3.4	1.7	16.1	0.0
50% criteria	q75	-26.4	3.5	2.0	12.2	0.0
50% criteria	q90	-26.2	1.9	2.5	4.8	3.2
10% criteria	All	-26.8	2.9	1.9	6.5	2.6
10% criteria	q10	-25.1	3.1	0.8	0.0	1.5
10% criteria	q25	-26.1	3.5	1.4	0.0	2.4
10% criteria	q50	-26.3	3.2	1.8	6.2	2.2
10% criteria	q75	-26.4	3.1	2.4	12.6	2.6
10% criteria	q90	-26.3	0.0	2.4	8.7	3.4

Notes: Based on estimated coefficients in Tables 2, 5 and 7; zero indicates no significant difference.



Notes: Based on authors' QR results in Table 4.