

Female Labor in Egyptian Manufacturing Sector: The Demand Side Story

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Introduction: *Motivation (1)*

- Compared to the world average of 52%, labor force participation rate for Egyptian women is very low ranging between 20% and 25% through out the 2000s.
- Moreover while women represent only 23% of the labor force their unemployment rate increased from 23.7% in 2006.
- The high unemployment and inactivity rates among females are considered to be one of the most important challenges facing Egypt today.

Introduction: *Motivation (2)*

- On one side this could be attributed to **supply side factors** related to why Egyptian females choose to withdraw from the labour market.
 - individual characteristics,
 - household socioeconomic characteristics
 - as well as norms and traditions shaping gender roles in the society
- On the other side it could be explained by **demand side factors** related to employers choices and preferences of males versus females or visa versa.
 - firm specific characteristics
 - industry level characteristics,
 - as well as institutions and macroeconomic environment.

Introduction: *Gaps*

- However, the review of the empirical literature for Egypt reveals that
 - ✓ Most of the empirical literature addressing Labor markets outcome related to females in Egypt focused on the supply side factors.
 - ✓ While demand side factors have been a rather neglected topic in the literature, mainly due to lack of micro data describing establishments.

Objective

- This paper aims to fill this gap in the Egyptian literature on the demand-side factors affecting women's participation in the labor market, taking advantage of the newly available Economic Census 2013 data.
- Accordingly the analysis aims to examine main determinants of female labour demand in Manufacture sector in Egypt.

Methodology (1)

- The model used in this study is based on a labor demand equation that is obtained from the firm's cost minimization problem.
- It follows standard practice by adopting the dual approach and minimizing costs given a constant output (Hamermesh 1993; Litcher et al. 2012).
- Accordingly, the econometric model underlying the estimation of the female labor demand is based on the assumption of cost-minimizing firms and a Hicks-neutral Cobb-Douglas demand function for the representative firm i in sector j .

Methodology (2)

- The firm's i in industry j demand for labor can be written as follows

$$l_{ij} = \lambda_0 + \lambda_1 y_{ij} + \lambda_2 w_{ij} + \lambda_3 k_{ij} \quad (1)$$

- Where y denotes ln real output,; k is ln real capital stock; l is ln units of labor employed; and w is wage rate.

Methodology (3)

- The study focus on examining labor demand for females versus males.
- Thus adding subscript f indicating females a disturbance term ε to equation (1) the labor demand equation for female estimated is specified as:

$$l_{fij} = \lambda_{f0} + \lambda_{f1}y_{ij} + \lambda_{f2}w_{fij} + \lambda_{f3}w_{mij} + \lambda_{f4}k_j + \beta_{zf}Z + \beta_{fIND}IND + \varepsilon_{fij} \quad (2)$$

- Disaggregating labor inputs by gender and distinguishing males' and females' wages allow as to examine the relationship between demand for males and females as distinct types of labor.

Methodology (4)

$$l_{fij} = \lambda_{f0} + \lambda_{f1}y_{ij} + \lambda_{f2}w_{fij} + \lambda_{f3}w_{mij} + \lambda_{f4}k_j + \beta_{Zf}Z + \beta_{fIND}IND + \varepsilon_{fij} \quad (2)$$

Of special interest are the coefficients λ_{f2} , λ_{f3} . Where

- λ_{f2} is **Own-wage elasticity of demand for females**; defined as the percentage change in females employment (L_f) induced by a 1 percent increase in females wage rate (W_f) keeping output and prices of all other factors constant.
- λ_{f3} is **cross-wage elasticities of demand for females**, defined as is the percentage change in the demand for female employment (L_f) induced by a 1 percent change in the wage rate of males (W_m) keeping output and prices of all other factors constant.
 - ✓ λ_{f3} +ve \rightarrow an increase in the wage rate for males would increase the demand for females \rightarrow **gross substitutes**.
 - ✓ λ_{f3} -ve \rightarrow an increase in the wage rate for males would decrease the demand for females \rightarrow **gross complements**.

Methodology (5)

Regressors include

I- A set of the firm characteristics “Z”: firm specific effects to examine effect of firm-specific characteristics on Labor demand

- ✓ Formality,
- ✓ Firm size and age,
- ✓ Legal form,
- ✓ Dummy for whether the firm export or not,
- ✓ A measure of productivity: TFP
- ✓ Region where the firm is located.
- ✓ Share of workers in each occupation.

Methodology: *Regressors* (6)

II- Industry-specific effects “IND”:

- industry characteristics are expected to affect Labor absorption in each firm. Firms in different industries usually operate under different technologies this may result in varied labor demands.
- *Two alternatives.*
- **First:** including industry dummies IND for four digits industries as an explanatory variable.
- **Second:** through including variables reflecting industry specific characteristics:
 - ✓ four digits Industry capital labor ratio.
 - ✓ Share of firms that export at four digits industry level.
 - ✓ average productivity at four digits industry level.
 - ✓ average firm size at four digits industry level.
 - ✓ A measure of technological intensity.

Methodology (7)

- Our main data source is the Egyptian Economic census 2013 “C13”. While this set of data provide wage disaggregated by occupational groups it does not include wages classified by gender.
- Yet our estimation model for female labor demand needs wages for females and males by firm.
- Thus females and males wage rate per firm is estimated in this study using a two-stage estimation technique.
- This technique combines the ELMPS 2012 with the C13 to estimate wages by gender for the C13 sample.

Methodology (8)

This typically involve the following three steps:

1- Identifying firm characteristics available in the ELMPS2012 and the C13

- In this stage the ELMPS2012 and the C13 questionnaires were compared to identify common firm variables found in the two datasets.
- Variables included were: Firm size, share of female workers, industry and governorate dummies.

Methodology (9)

2. Estimating female/male wages using the ELMPS2012 data

- ELMPS2012 is used to estimate wage rate for individual female or males i as a function of the chosen common set of firm j characteristics where she or he works.
- A log-linear function of wages per female/male, w_{fij} , is estimated as follows

$$\ln w_{fij} = X_j' \beta + \eta_{fij} \quad (4)$$

- Bootstrap was performed to correct the standard errors.

Methodology (10)

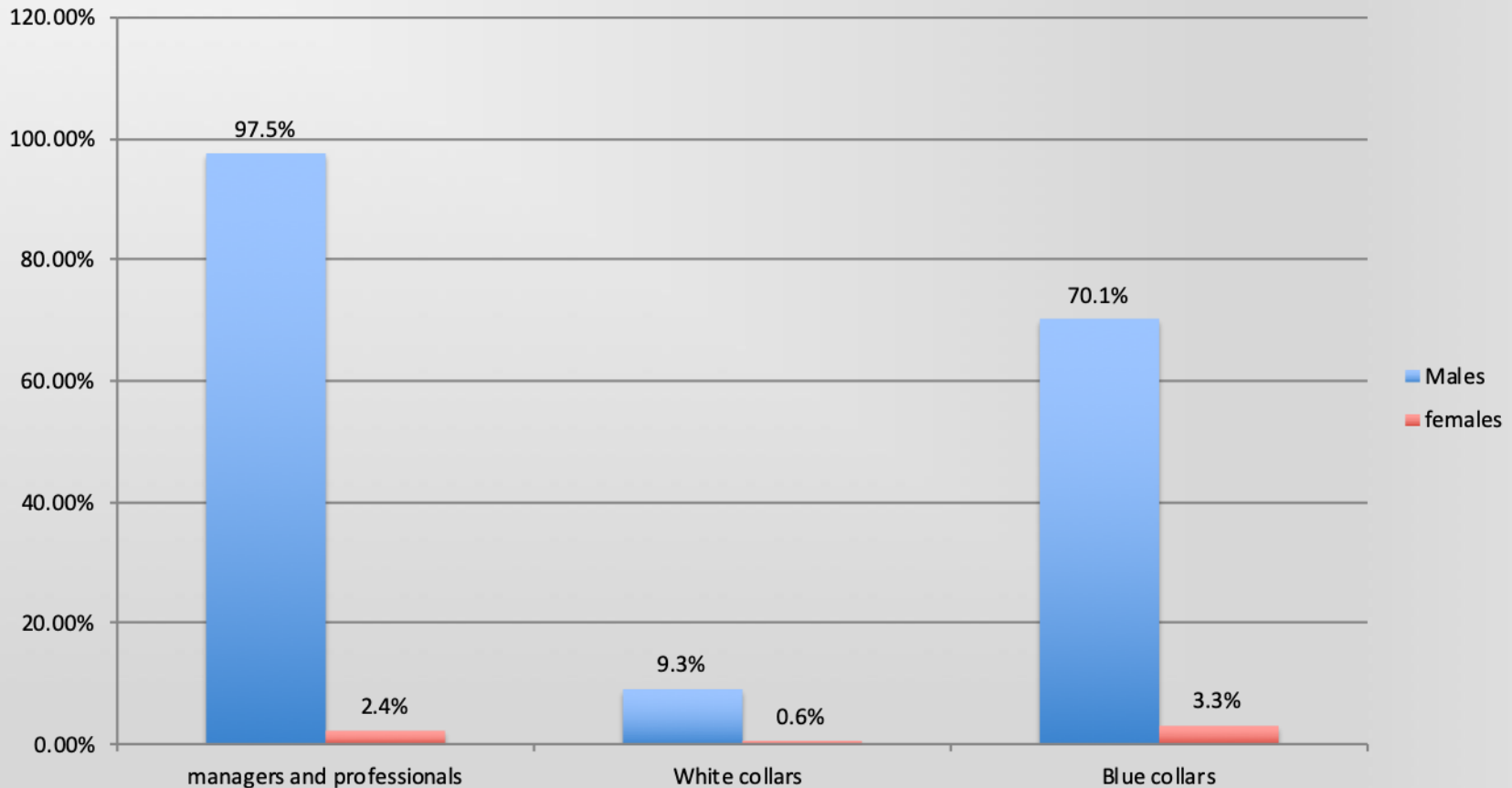
3. Predicting female wages per firm for the C13 sample

- In this stage, the regression models developed in the previous step and the C13 data are used to predict wage rate per female or male by firm in the C13 data w_{fij} .

Data

- The research focuses on 12476 firms in the manufacturing sector with an average age of 11.5 years.
- The average number of workers per firm is 6 workers.
- The average number of females employed is approximately one per firm . While for males it is 6 male workers .
- Average real hourly wages for females is less than that of males; moreover the variation for females is higher than for males. In addition while the maximum wage rate is higher for females the minimum wage rate is lower indicating that for the minimum females earn relatively less.

Data: *Average share of males and females from total workers in each occupation*

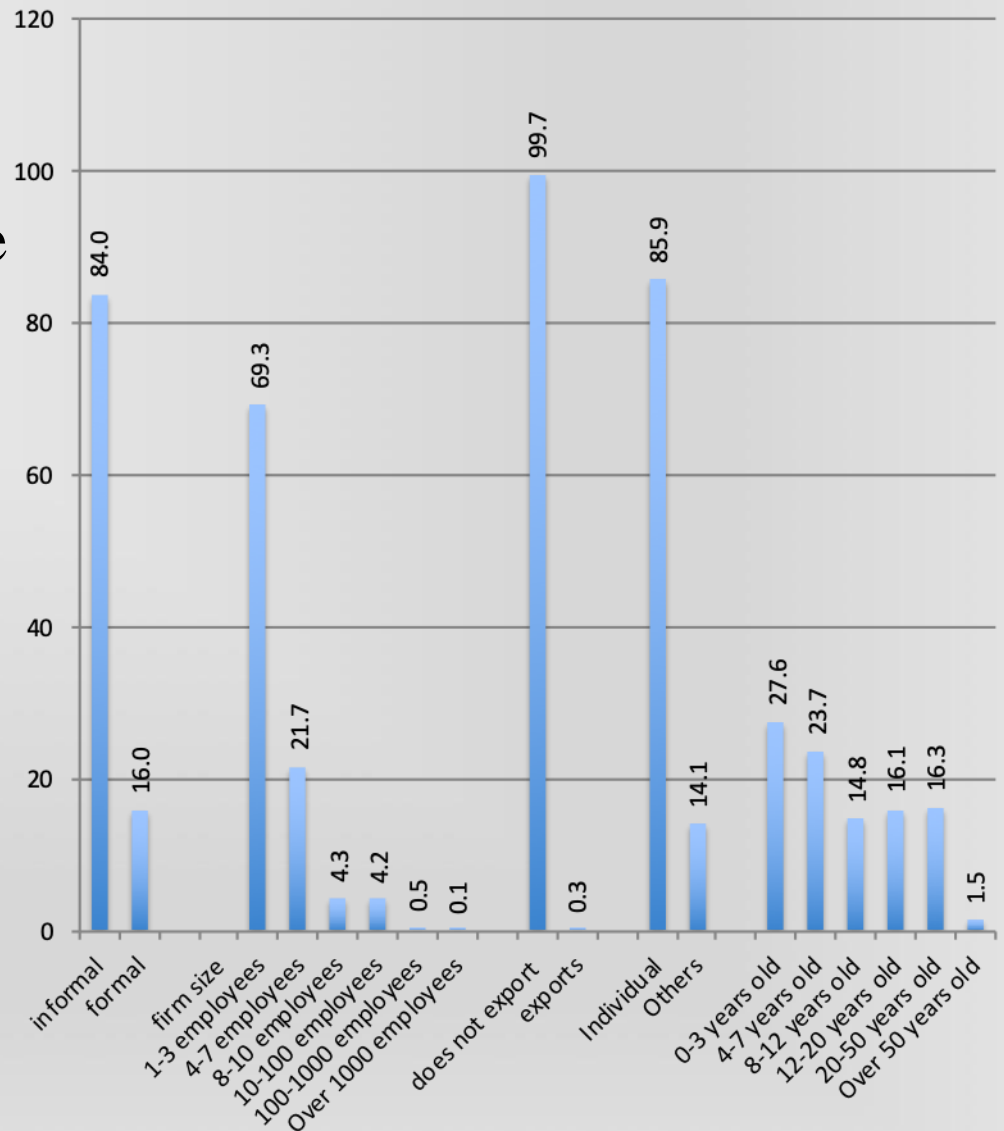


- males exceeds females in all occupations.

Data: *Sample Distribution according to different firm characteristics (%)*

As commonly known the majority of firms

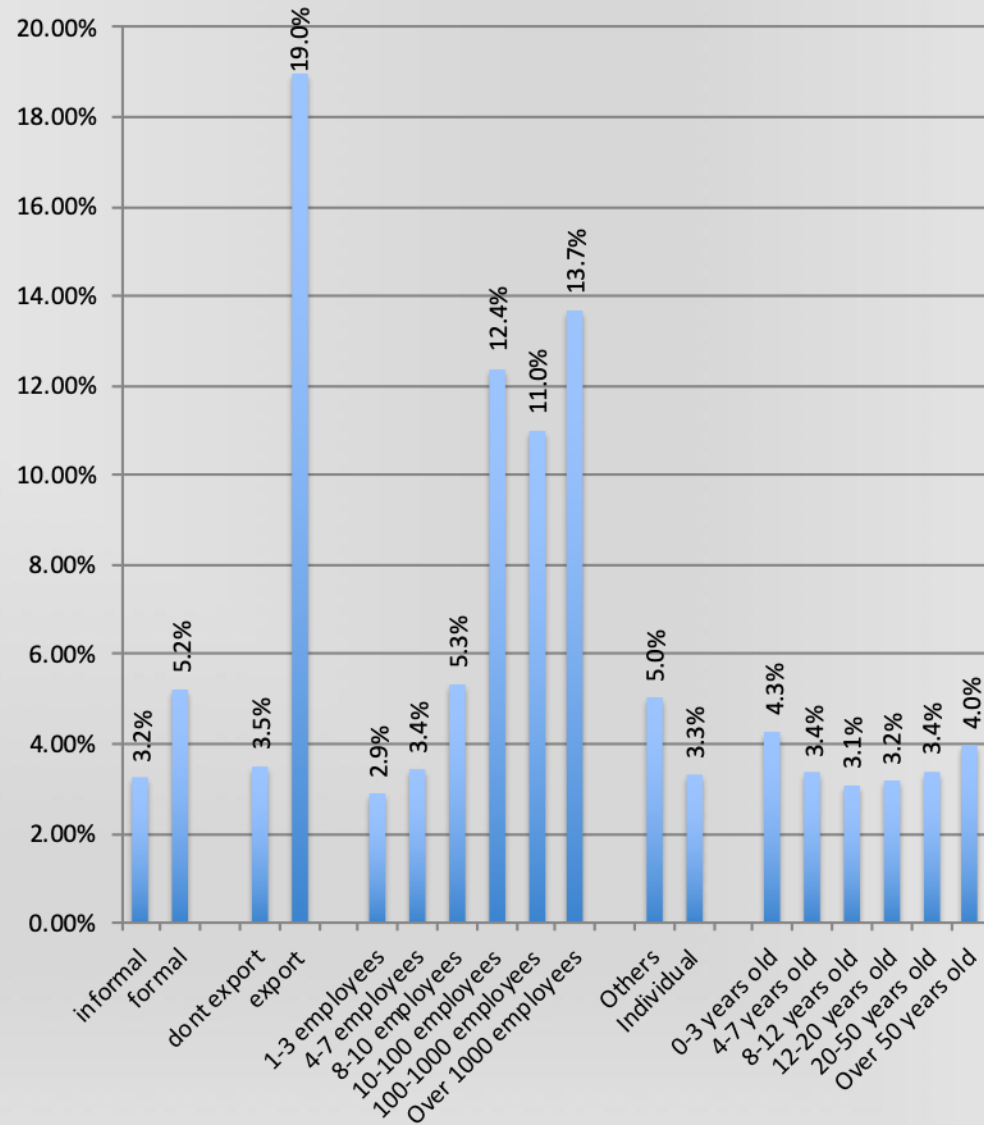
- ✓ are informal (about 83.9%)
- ✓ small sized (69.3%)
- ✓ did not export during the survey period (99.7%)
- ✓ Individually owned (85.9%)
- ✓ age less than 12 years (66.1%).



Data: *Average Share of Female Workers per firm by firm characteristics*

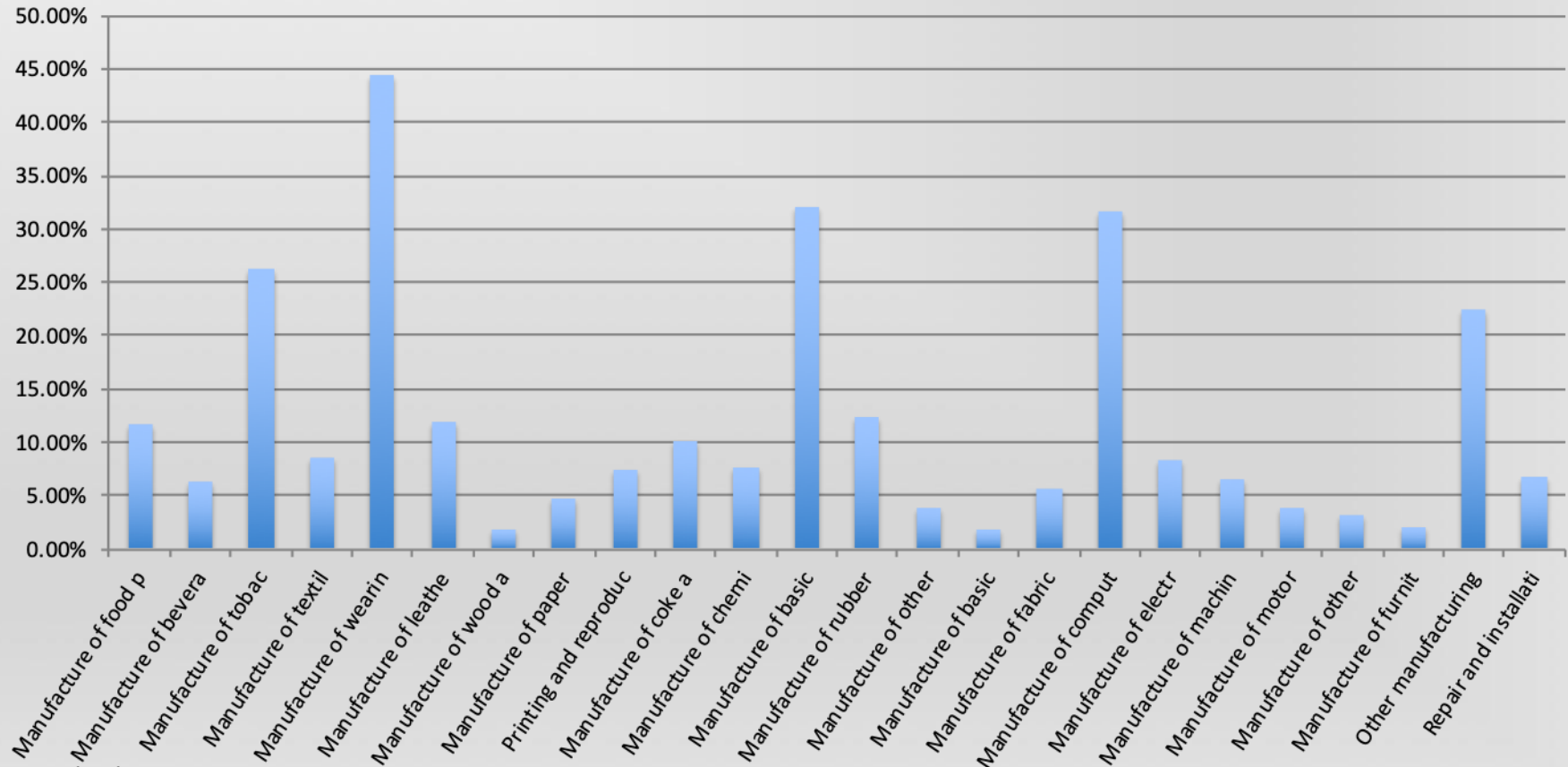
The average the share of employed females from total firm employment is higher

- ✓ for formal firms,
- ✓ if the firm exports,
- ✓ the larger the firm size,
- ✓ for non individual owned firms
- ✓ for young (0-3) years old firms and old firms (over 50 years old).



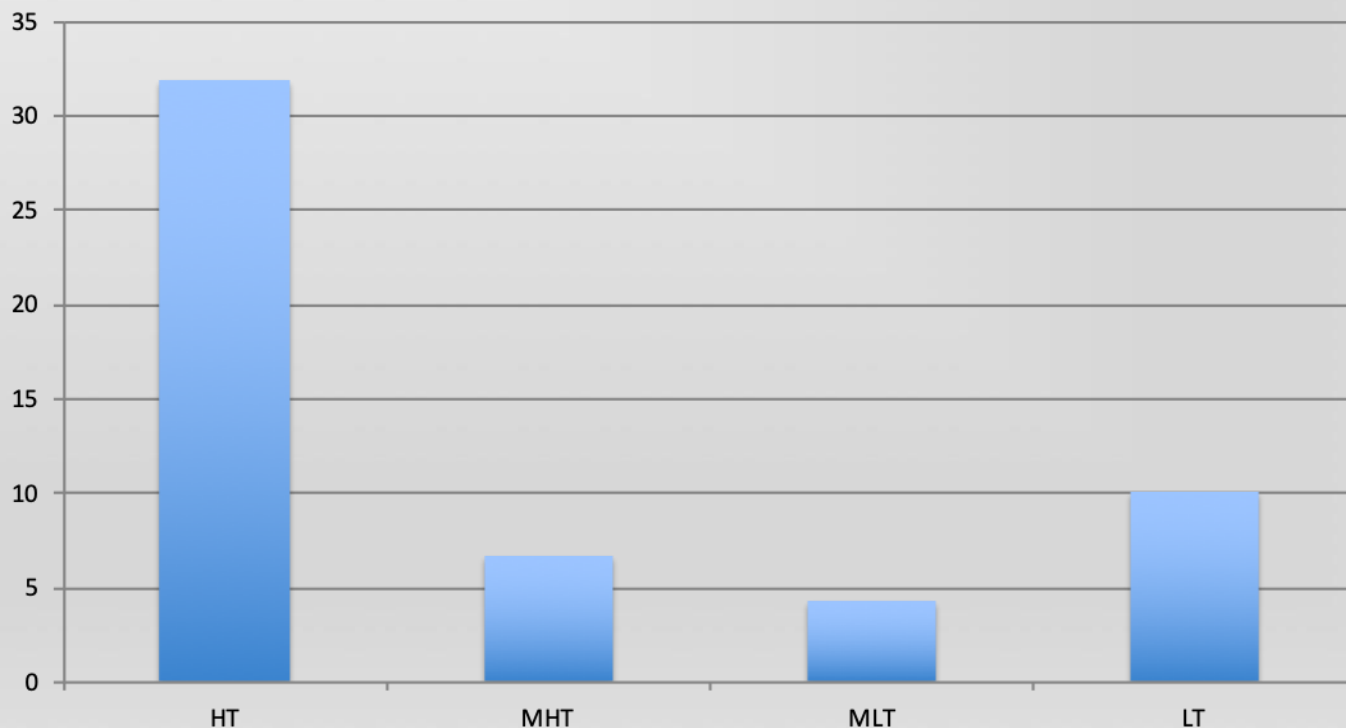
Data: % of female workers by industry from total industry workers

- Manufacture of wearing apparel has the maximum value, followed by Manufacture of basic pharmaceutical products and pharmaceutical preparations, Manufacture of computer, electronic and optical products. While Manufacture of basic metals has the lowest value.
- This may suggest that female's share is higher in high tech industries.



Data: % of female workers by industry from total industry workers according to technological intensity of the industry

- % of female workers by industry from total industry workers is highest in the high-technology HT industries group followed by the low-technology LT group.
- Moreover the difference is noticeable as it is almost 3 times higher in the HT group compared to the LT group.

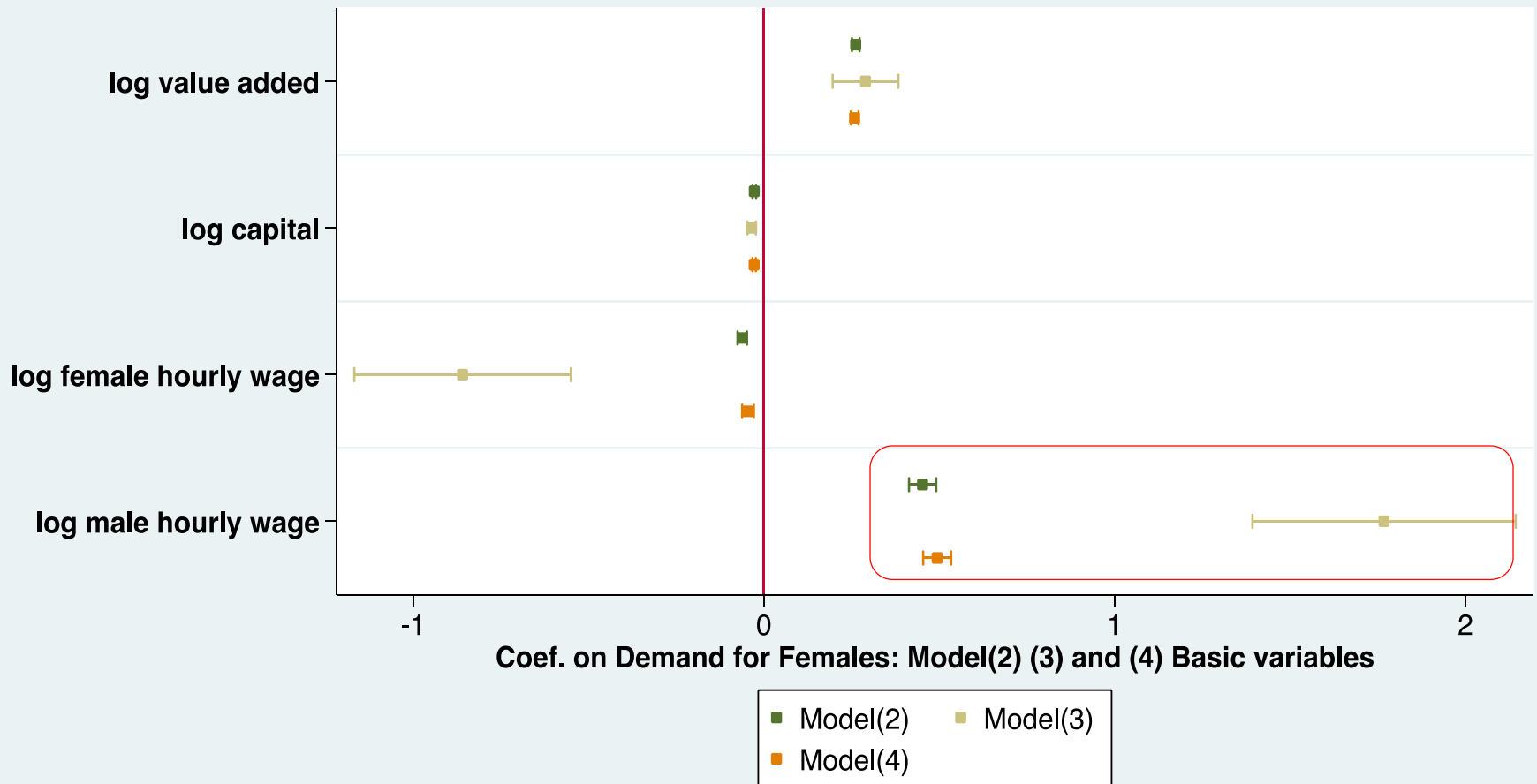


Main Findings: (1)

- Four versions of the model has been estimated,
 - (1) included only basic labor demand equation regressors,
 - (2) added firms characteristics
 - (3) added four digits industries dummies: intra industry variation in demand for females' labor
 - (4) included industry level characteristics instead of industries dummies: to assess the inter industry variation in demand for females labor.
- The explanatory power of the model significantly increases moving from the first to the second to the third.
- Generally the significance and direction of association of the regressors with female employed were very close in the 2nd and 4th models.
- While results for some regressors in the 3rd model were relatively different. The magnitude of the effect of some variables in explaining the within industry variation is remarkably different than in explaining the between industry variation.

Main Findings: (2)

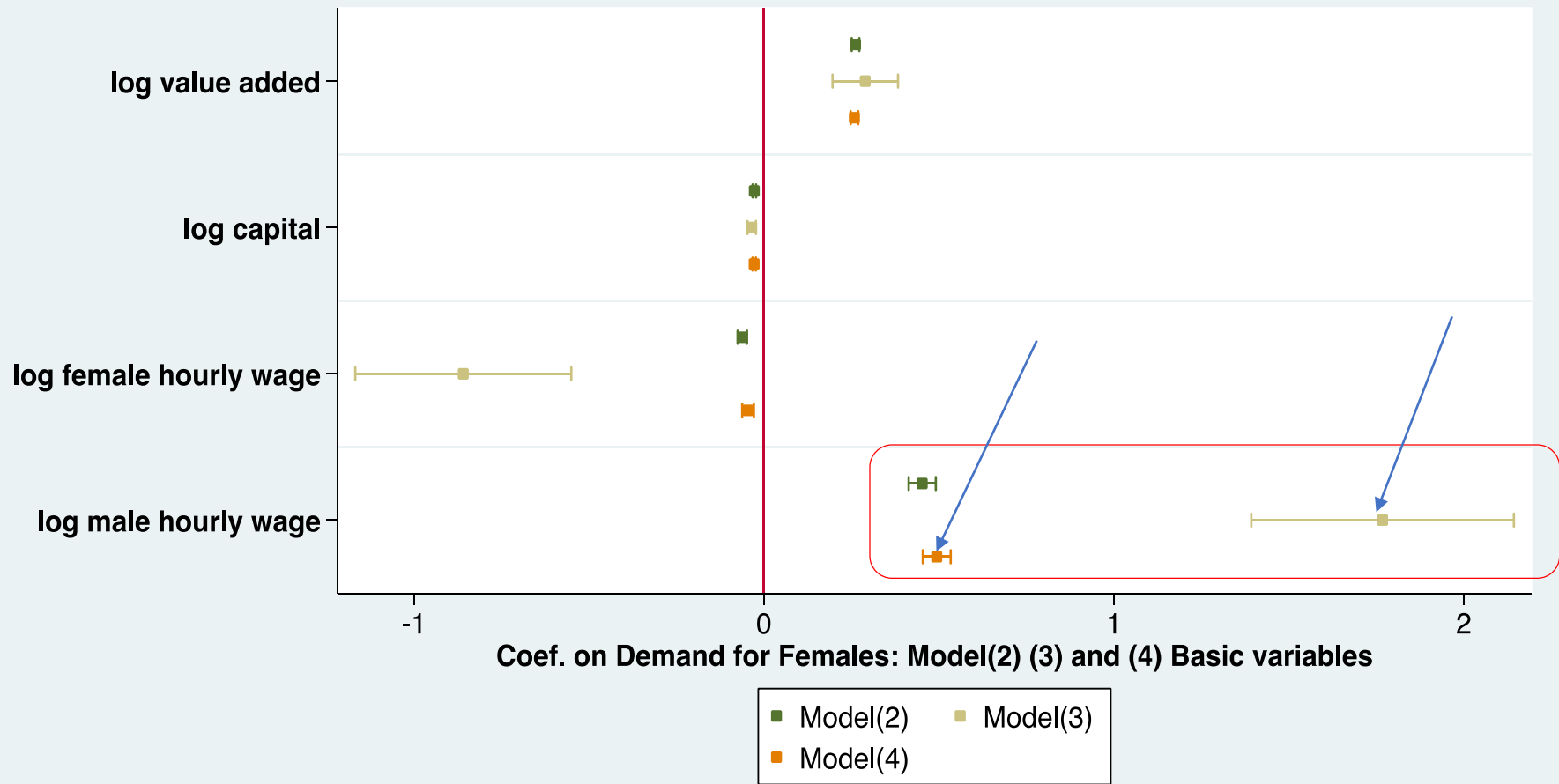
Basic regressors



- cross wage elasticity of demand suggests that Male wages have a positive significant relationship, indicating that as male wages increase, female employment increases, which points to a possible gross substitution effect.

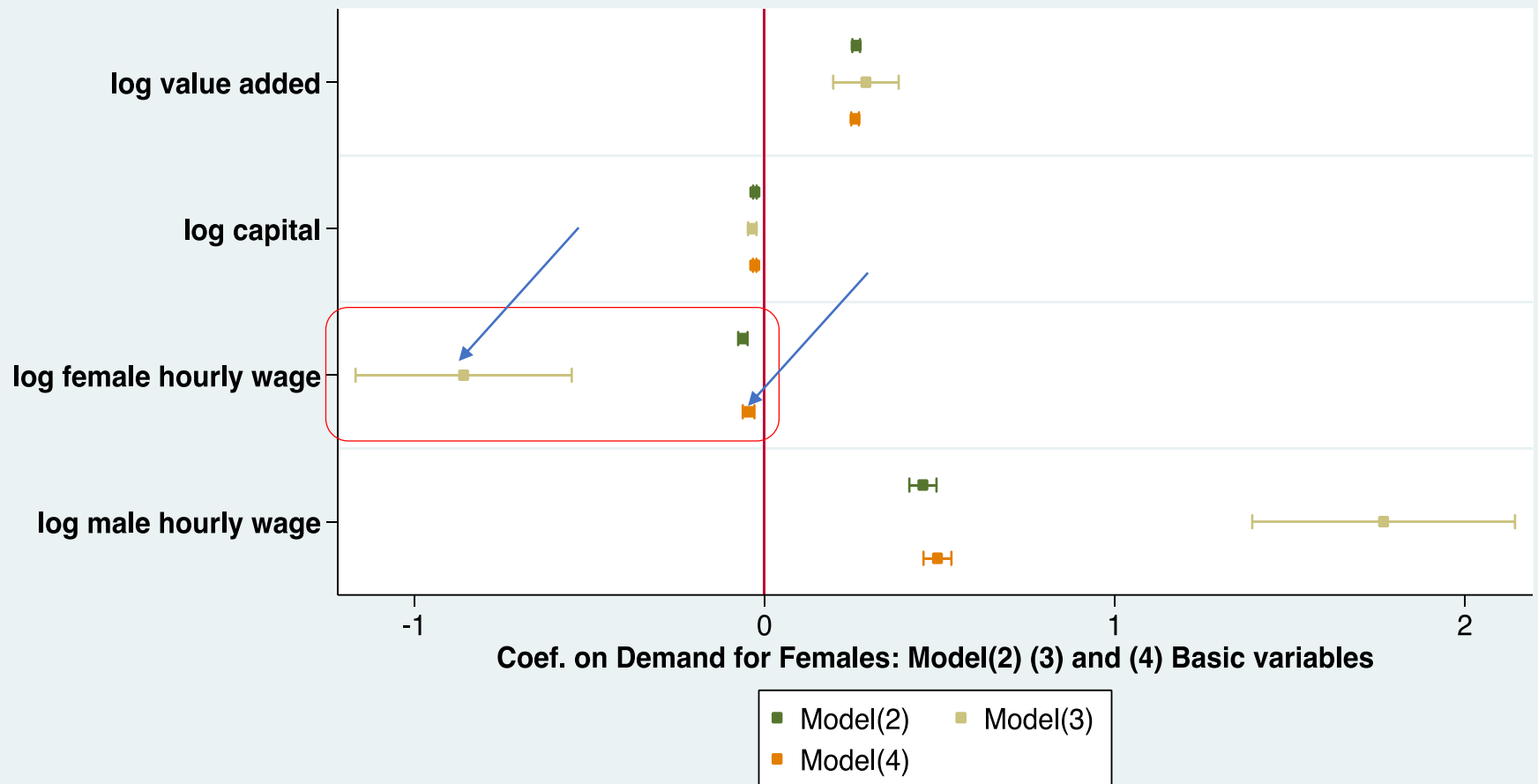
Main Findings: (3)

Basic regressors



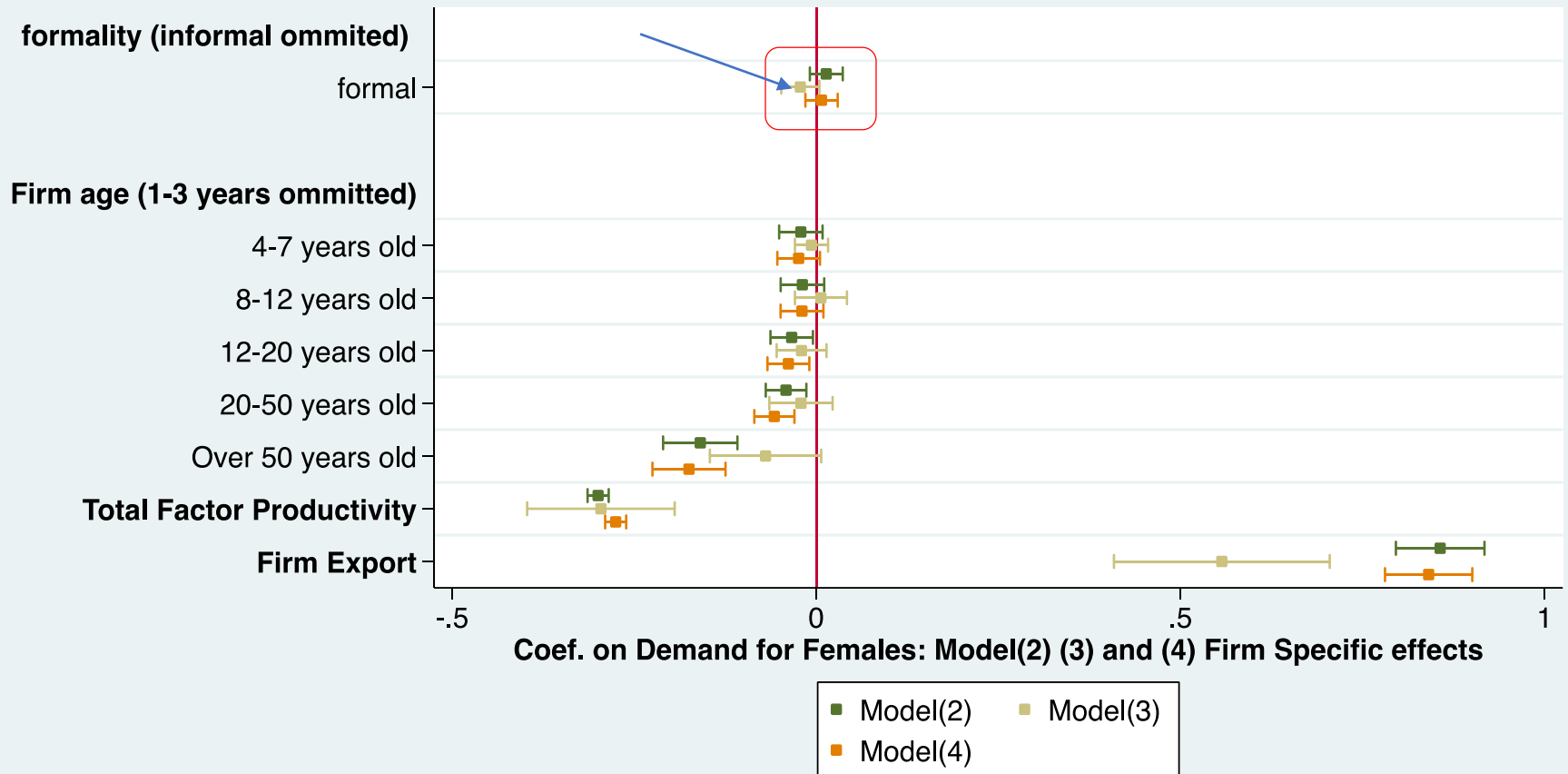
- What is noticeable is that the the magnitude was much higher in the 3rd model that explains variation within the same industry compared to the 4th model that explains variation between industries.
- meaning that effect is stronger within the same industry.

Main Findings: (4) *Basic regressors*



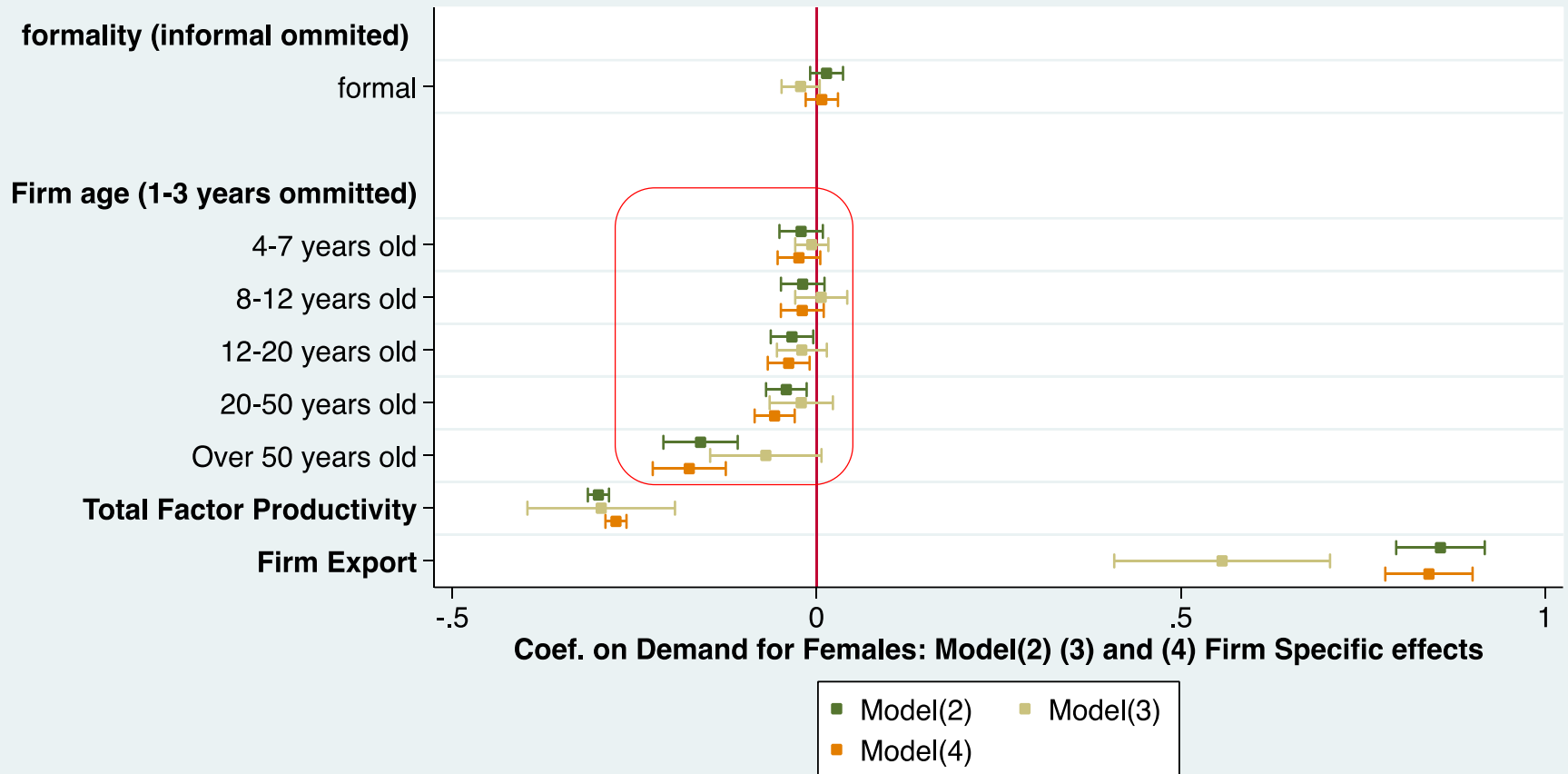
- Same comment apply for Results for the own wage elasticity of demand

Main Findings: (5) Firm level regressors: Formality



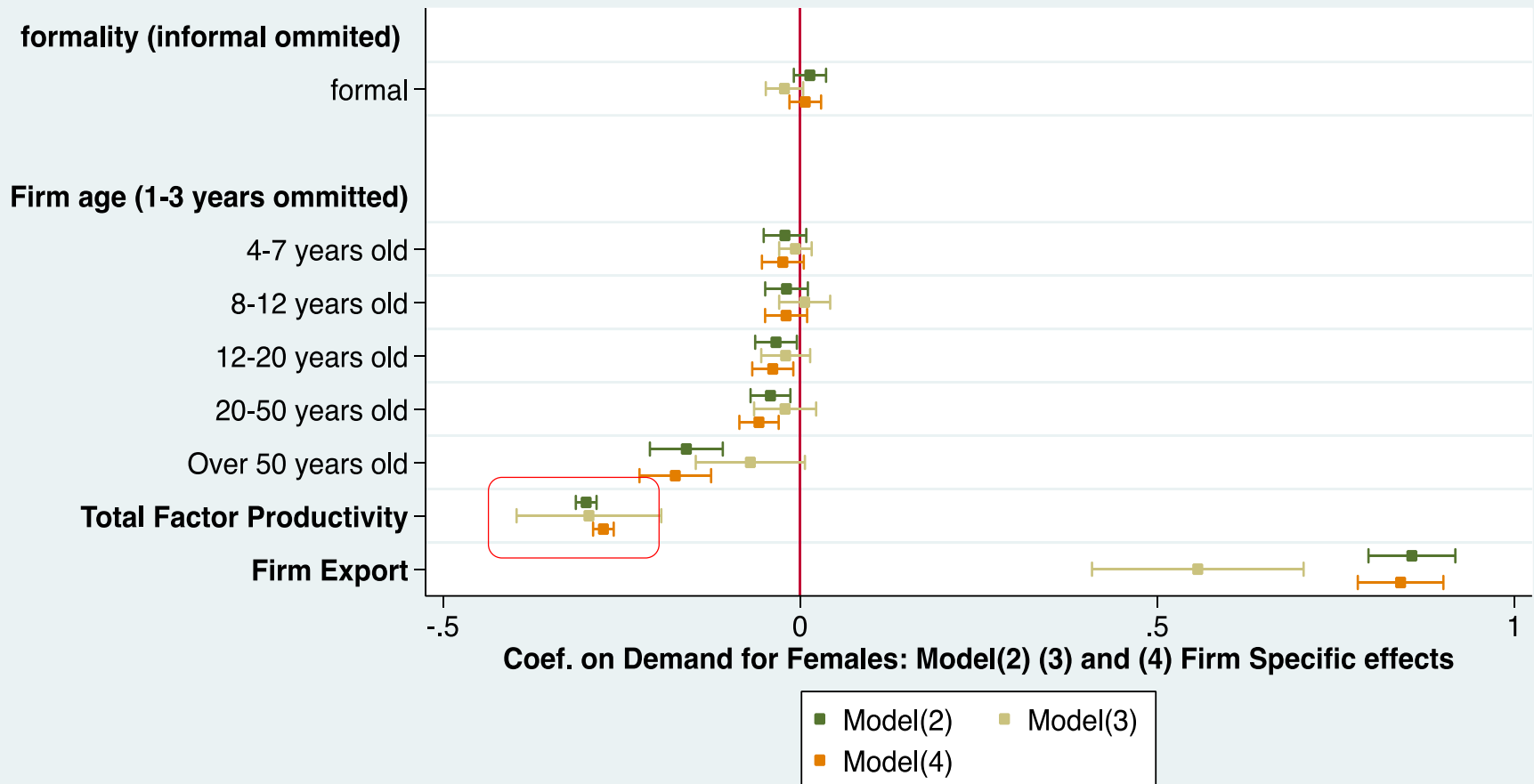
- only in Model (3) when we control for industry dummies is demand for female employment significantly higher for informal firms compared to formal ones.
- This indicates that formality is important in explaining within industry variation in demand for female labor but not to explain between industry variation.

Main Findings: (6) *Firm level regressors: Age*



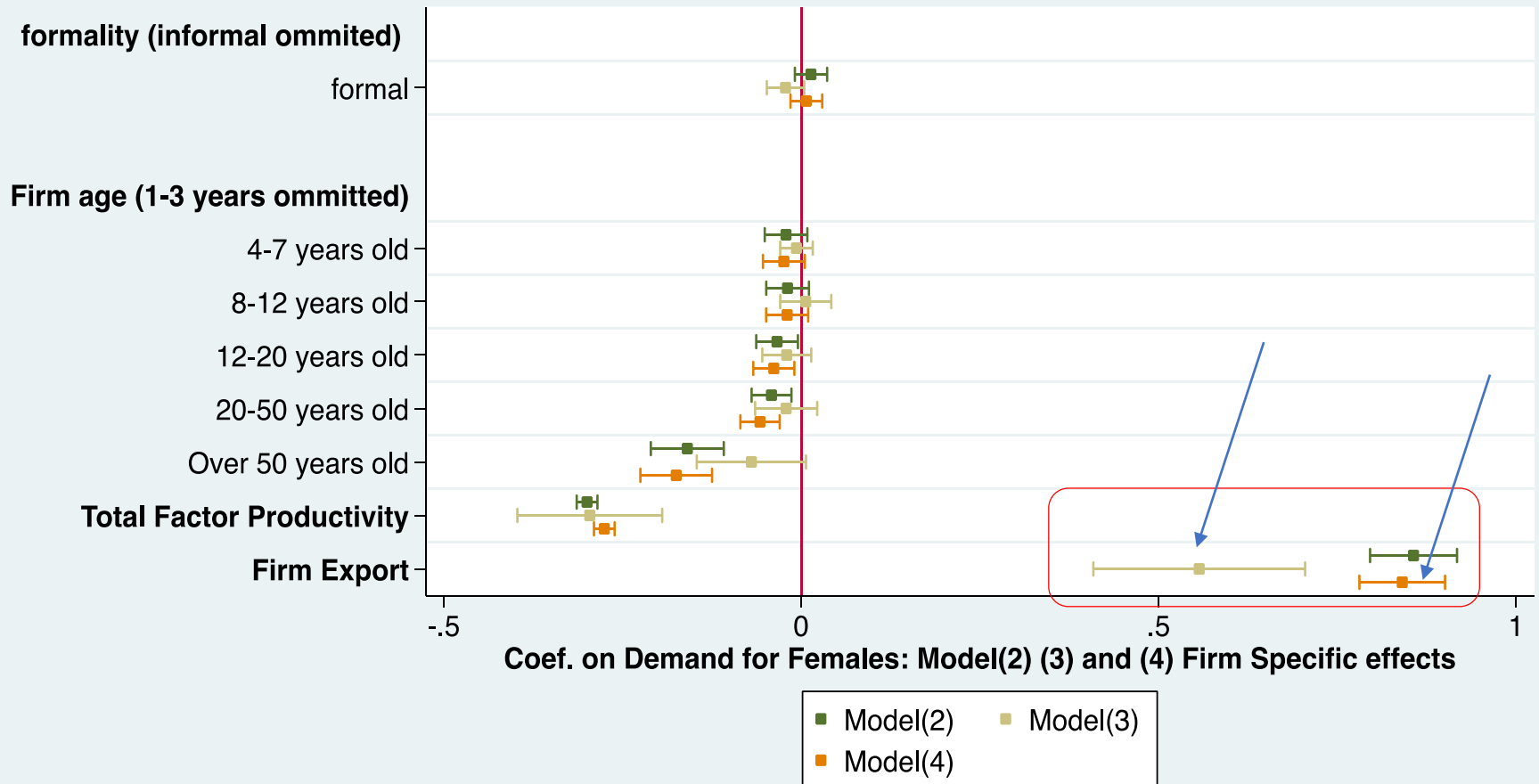
- Compared to young firms of 1-3 years, firms with 12 or more years have a negative significant association with demand for female labor.

Main Findings: (7) Firm level regressors: Productivity



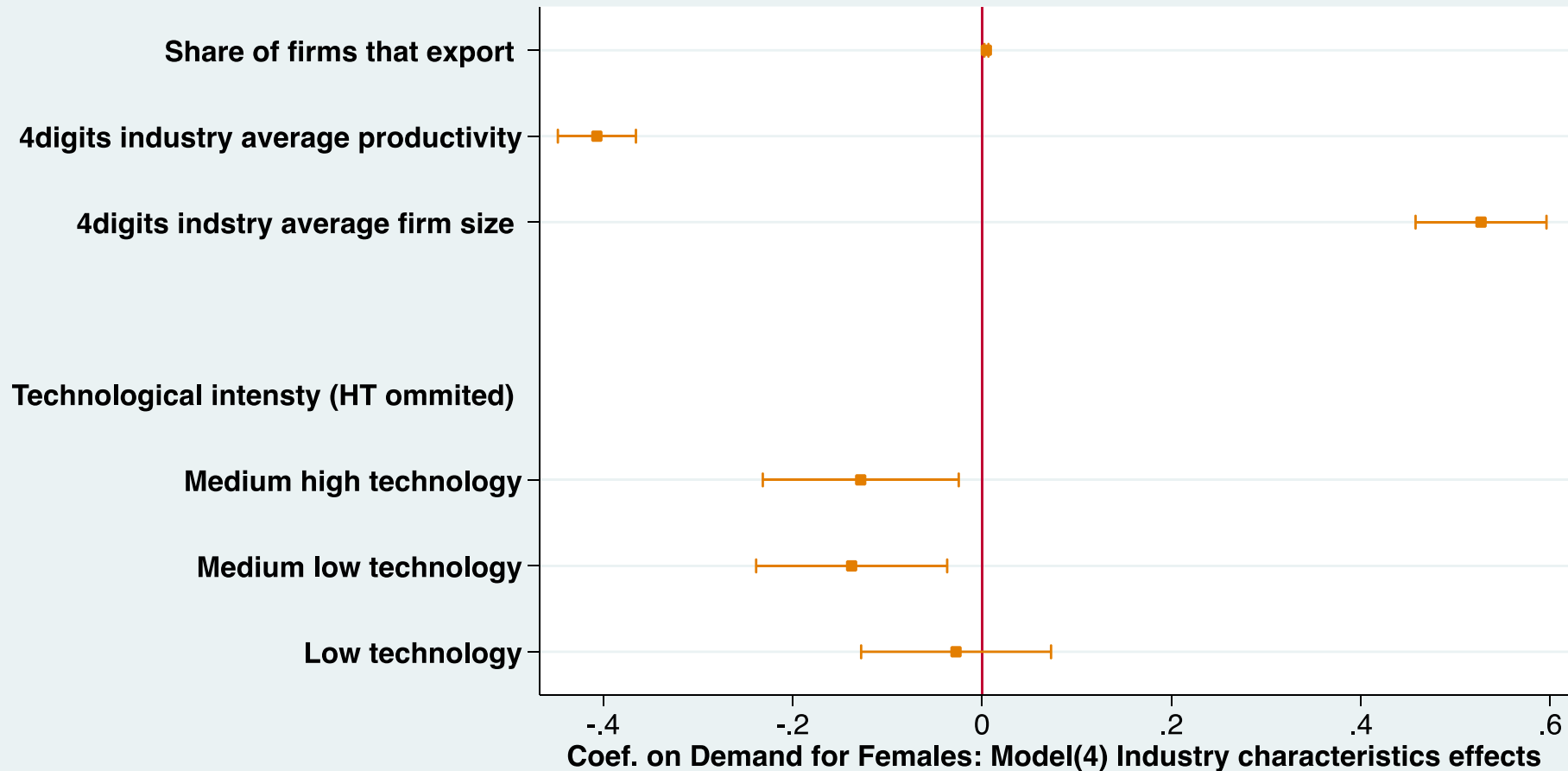
- Total factor productivity has a negative significant relationship in all models.
- This could be due to the fact that high productivity firms have higher levels of worker human capital and may thus be reluctant to hire female labor because of higher turnover.

Main Findings: (8) Firm level regressors: Exports



- Female employment is higher for firms that export compared to those having zero exports in all three models.
- However, the magnitude is lower in the third model.
- Indicating that exporting is more important in explaining between industry variation in demand for female labor than in explaining within industry variation.

Main Findings: (10) *4digits Industry level regressors*

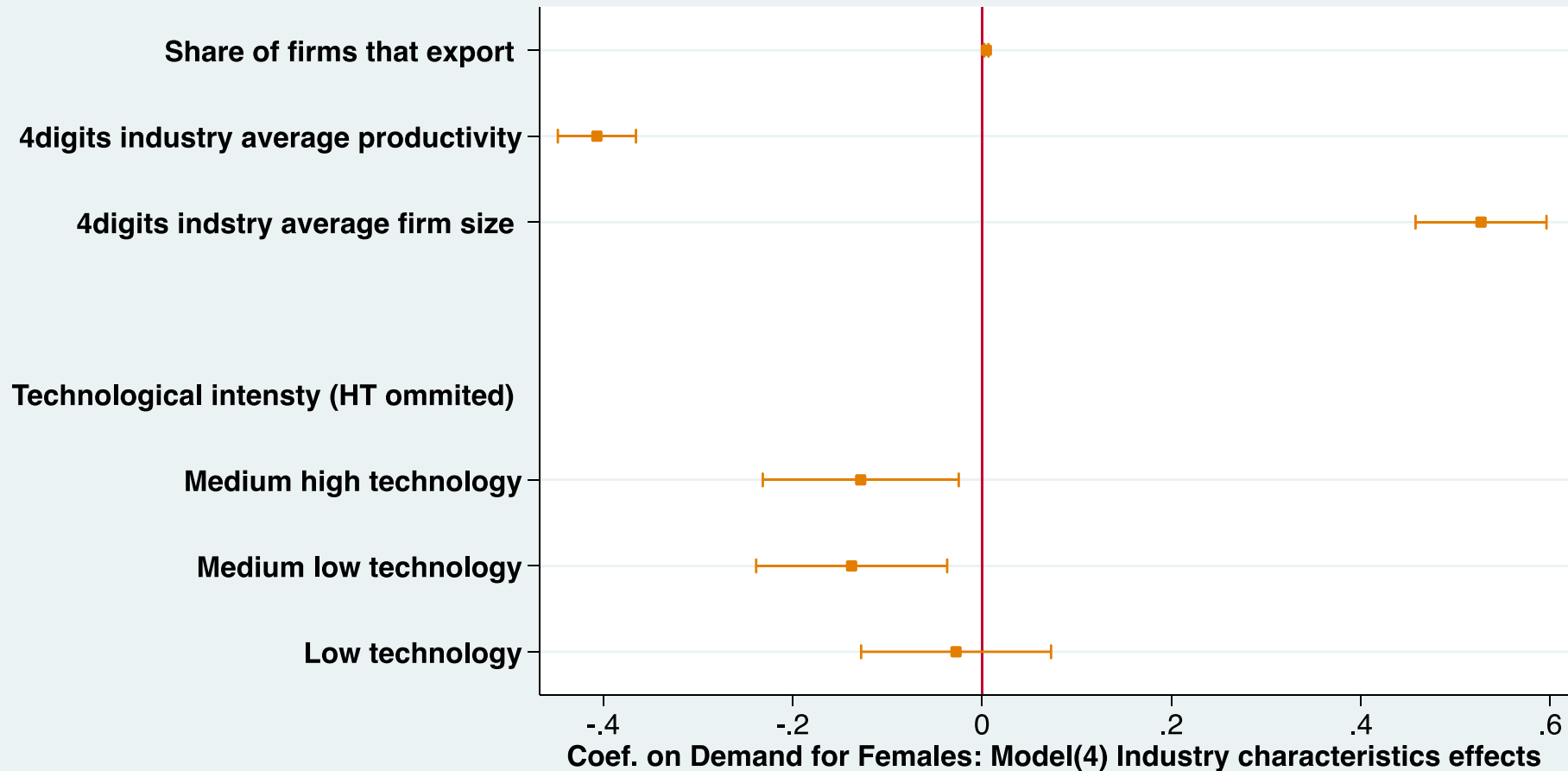


Number of females employed by firms is higher in:

- ✓ industries with a higher share of firms that export,
- ✓ industries with higher average firm size
- ✓ high technology industries.

Main Findings: (11)

4digits Industry level regressors



Number of females employed by firms is less in industries with higher average TFP. This goes in line with the results of individual firms TFP.

Conclusion

Based on the findings of the current study, some recommendation concerning demand side factors may be suggested in an attempt to promote demand for female labor.

Export

**Startups
Middle sized**

**High technology
industries**

Conclusion

First, Exports.....

more openness and integration into global markets and hence more exports.

Specially in labor-intensive sectors such as apparel and garments could have a huge effect on female labor especially since those sectors are female labor intensive.

Conclusion

Second,, startups

more attention should be given to policies that encourage and promote startups.

It is worth noting that the Egyptian government is giving special attention and interest to encouraging small and medium enterprises.

However exciting efforts need to be evaluated at regular basis and new efforts should be introduced to insure significant success in this regard.

Conclusion

Third, high technology industries

More attention should be given to encouraging high technology industries where the highest association with female employment was evidence, like Manufacture of basic pharmaceutical products and Manufacture of computer, electronic and optical products.

Thank you for your attention

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