

# **Female vs Male Migrants in Batam City Manufacture: Better Equality or Still Gender Bias?**

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## **Abstract**

The proportion of female migrants working in manufacture is higher than male migrants in the city of Batam. This study investigates whether this phenomenon implies better equality in labor market or whether it still has gender-biased conditions. Using the 2010 Census, three indicators used to assess gender bias: marital status and living arrangement, the percentage of under-five and the percentage of adults. Female migrants with higher probability to work in manufacture are the ones who are not married while male migrants with higher probability to work in manufacture are the ones who are married. The percentage of under-five is negatively related with female migrants' probability to work in manufacture while positively related with male migrants' probability to work in manufacture. The percentage of adults positively affect the probability to work for both male and female migrants, but for female migrants the effect is much steeper. These findings indicate that the opportunity of womens' time may be still highly connected with household production much more than of men's. Thus, female migrants may be more likely to work in manufacture than male migrants, but under certain gender bias conditions, their probabilities to work in manufacture may be declining.

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## **Introduction**

High economic growth in developing countries has rapidly transformed the structure of labor markets that create more jobs for women and has also triggered women's migrations. Although employment opportunities has been expanded for both men and women, women's jobs in developing countries are still dominated by jobs in informal economy, characterized by low pay, irregular working hours, and less security. In case of migration, changes in structure of labor market has triggered the tendency that more and more women are solo migrants who move to seek for economic opportunities, although women's migration has long been recognized as migration accompanied by spouses or families (Todaro & Smith, 2006).

This rapid transformation has also been experienced by the City of Batam in Riau Islands province in Indonesia. This city has experienced high economic growth in the last decade, triggered by very large investment scheme in the beginning of 2000, which has created employment for both men and women. There are two unique features of employment structure in this area that are interesting to be investigated further. The first one is the fact that the rapid growth of the province of Riau Islands and especially in Batam has created formal industrialized jobs, less for its 'native' citizens, but more for migrants (Nasution, 2012). The second one is that contrary to the picture of the higher tendency of females to work in informal jobs than males, also in the case of Indonesia (Nazara, 2010), female migrants have higher tendency to work in the formal manufacturing industry or manufacture jobs in Riau Islands and even more in Batam City (Mursini, 2009; Nasution, 2012).

There are two implications of the higher tendency of female migrants than male migrants in manufacture jobs in Batam regarding gender equality. The first one, is that it might be a proof of improvement in gender equality in terms of less sex segregation of occupation. The second one, on the contrary, female migrants are chosen due to women constructed stereotyped characteristics—greater manual dexterity, greater willingness to take orders, to do monotonous/repetitive work and to accept lower wages (Anker, 1998), which means that they are relatively 'cheaper' for the employers than male migrants, especially when they are single or with no dependants. These implications raise several issues: Given the same individual characteristics, do female migrants really dominate the manufacture jobs in the city of Batam compared to male migrants? If we disaggregate them further by marital status and other household condition and structure, to what extend can we find evidence to support the idea that female migrants might have been chosen because they are relatively

‘cheaper’ compared to male migrants in the city? Answers to these questions would give some insights on the phenomenon of women vs men migrants in manufacture jobs in Batam city and whether there is an indication of improvement in gender equality.

### **Theory and Previous Empirical Studies**

To understand the determinants of labor market outcome, one of which is employment sector, we need to understand the mechanism in labor market. The labor market condition is determined by the interaction of supply of labor and demand for labor (Ehrenberg & Smith, 2006). The growth of industrial activities within a location creates demand for skilled labors, which when are lacking, may trigger migration from elsewhere. The classical Todaro model conceptualizes that a natural mechanism of migration of excess labor supply from rural areas would fill the gap created by the demand from the growth of urban employment and later on equalizes the wage level of rural and urban areas (Todaro, 1969; Todaro & Smith, 2006). In case of Riau Islands, however, it is found that this gap instead is filled by skilled labors from outside the province instead of from rural areas within the province (Nasution, 2012) and by female migrants with higher likelihood than male migrants.

The supply of labor of female and male migrants can be explained by the difference in allocation of time between males and females. The traditional role of males as main bread winner and females as the caretaker may create different preference between males and females for household production. Females consider household production such as childbearing, childcare and doing household chores more than males that influence different allocation of time for labor market for each sex (Becker, 1976). Single or unmarried women, especially with no dependence, are thus more ‘free’ to enter labor market than the married ones and possibly also more flexible in conducting migration. However, if we assume that single women are more or less as flexible in entering the labor market as single men and even married men due to their preference towards labor market activities instead of household production, this is only sufficient in explaining the labor supply side of a particular labor market dominated by female migrants.

To asses the demand for labor side in answering why an employer hire men or women, Anker (1998) provides several explanations. The first one is the neoclassical human capital model, which stresses that from employer side, occupations with high level of education is usually offered to men and that women are considered more costly (in terms of absenteeism rates, labor turnover, and toilet facilities). If in fact from the supply side females

have better skills and education, consequently employer may hire females than males, *ceteris paribus*. It is found in Batam that female migrants who work in manufacturing industry usually have high school level education (Mursini, 2009), which is relatively high for Indonesia. Still, it is necessary to find whether at the same level of education, female migrants are more likely to work in industry than male migrants. The second explanation is institutional and labor market segmentation theories that recognizes segregation in occupations. One of them is dual labor market theory that there are ‘male’ primary sector jobs that are more secure with better pay and ‘female’ secondary sector jobs that are consequently give lower pay. The last explanation is from feminist theories with the basic premise that ‘women’s disadvantaged position in the labor market is caused by, and is a reflection of, patriarchy and women’s subordinate position in society and the family’ (p. 22, Anker, 1998). According to Anker, feminist theories provide valuable contribution to explain that female occupations are closely related to typical stereotypes of women and their supposed abilities. In view of these explanation, it is therefore intriguing to assess why in Batam the pattern of occupations do not fit these theories as female migrants are more likely to occupy formal jobs in industry compared to their male counterparts.

## **Data and Method**

This study is in principle driven by the previous findings of Nasution (2012) with 2010 Population Census (SP 2010) on working age population in Riau Islands province. The specific features of Batam City that are characterized with high proportion of migrants in the city especially the higher proportion of female migrants than male migrants in manufacture jobs also showed up in the data. However, the comparison between female migrants and male migrants was not really highlighted in this study. The difference in their characteristics were not assessed further to get better understanding the gender aspect of this phenomenon. Therefore, in this study we explore this issue in order to have better explanations on the relationships of women and men migrants and their choice of employment sector.

For this study, we use the SP 2010 data on 132,167 recent migrants in Batam who are working at the time of census. Based on previous study, Nasution (2012) has already found that females are more likely to work in manufacturing industry compared to males for the whole Riau Islands province. Due to large number of observations, we are able to disaggregate further the variables used in this study only for the City of Batam and by comparing only female and male migrants. The variables used are employment sector as dependent variable, and sex, age, level of education, marital status, living arrangement, job

status, and the variables to measure dependants such as percentage of under-five children and the percentage of adults 15 years and older. Employment sector is grouped from nineteen categories into four categories, which are manufacture, trade, hotels and restaurants, education, health, and social services sector, and the rest of the categories.

For regression analysis, we employ multinomial logit regression for three statistical models. To first model is to assess whether female migrants are more likely to be employed in manufacture than male migrants. Included in this model is one of the indicators of gender bias used, which is the combination of marital status and living arrangement. We expect that female migrants who are more likely to be employed in manufacture than male migrants are the ones who are not married, either single or divorced/widowed and living without dependants. We also want to assess whether marital status and living alone, living with family or living with non-relatives affect the likelihood to be employed in manufacture differently for male and female migrants.

For the second and the third model, we include two continuous variables percentage of under-five children and percentage of adults 15 years and older in the migrants' households. The percentage of under-five is included to analyze the opportunity cost of women's time. As women are expected to be caretaker, the presence of under-five children is expected to influence the likelihood of women to be working in manufacture jobs. The percentage of adults is also included to measure opportunity cost of women's time with two contradicting explanations. As proportion of adults increases, women may be more likely to work in a more formal industrial jobs than other type of jobs because household production can be shared with other adults. By interaction with dummy variable indicating females, we can see whether the effect of proportion of under-five in the second model and adults in the third model affect working in manufacture sector compared to other sectors differently for male and female migrants. In the next section, the descriptive statistics of the data used for these three models are presented in Table 1, 2, and 3.

### **Descriptive Analysis**

From Table 1, we can see the distribution of employment sector of migrants by explanatory variables. The percentage of female migrants (68.5%) in manufacture is higher than male migrants (47.7%). It seems like women migrants have higher tendency than men migrants to work in manufacture in Batam. If we look at employment sector by age group and education, the patterns occur as expected. The older the age groups and the lower

education level, the lower the percentage of migrants working in manufacture. The pattern in other sectors according to age and education are the other way around.

**Table 1. Employment Sector of Migrants in Batam by Individual Characteristics, Census 2010**

Characteristics	Sector*				%	Total N
	M	THR	EHS	Others		
<i>Sex</i>						
Male	47.65	17.03	9.58	25.74	100	74,081
Female	68.50	11.94	13.87	5.69	100	58,086
<i>Age Group</i>						
15-24	69.35	12.44	7.74	10.47	100	75,377
25-34	45.82	16.43	15.02	22.73	100	41,425
35-44	28.65	20.54	19.68	31.13	100	10,707
45+	16.44	25.03	21.21	37.31	100	4,658
<i>Highest Level of Education</i>						
Up to Primary School	23.04	23.70	23.94	29.32	100	11,786
Junior High School	35.46	26.00	15.85	22.69	100	19,131
High School	69.50	11.86	6.10	12.54	100	88,815
Diploma/University	31.09	10.07	31.19	27.65	100	12,435
<i>Living Arrangement &amp; Marital Status</i>						
Unmarried, living alone	52.65	17.89	12.38	17.08	100	9,045
Unmarried, living with family	62.40	15.11	7.49	15.00	100	48,854
Unmarried, living with others	70.98	8.64	11.93	8.45	100	35,886
Married, living alone	30.82	18.60	14.83	35.74	100	1,301
Married, living with family	38.55	20.21	13.95	27.29	100	34,123
Married, living with others	27.52	10.62	38.57	23.29	100	2,958
<i>Job Status</i>						
Formal	63.01	11.18	11.10	14.71	100	117,753
Informal	6.15	44.29	14.47	35.08	100	14,414
<i>Total</i>						
Percentage	56.81	14.79	11.47	16.93	100	
Observations	75,088	19,550	15,153	22,376		132,167

\*M=Manufacture, THR=Trade, Hotels & Restaurants; EHS=Education, Health, and Social Services; Others=Agriculture, Mining, Electricity, Gas & Water, Construction, Transportation, Communication and Information, Financial Sector, Others

From Table 1, we can see that the highest percentage of migrants working in manufacture based on living arrangement and marital status is among the migrants who are not married and living with others who are not family (71%) followed by unmarried migrants living with family. The lowest percentage of working in manufacture is among those who are married and living with others. It is an interesting finding to see that the tendency to work in

manufacture is the highest among the non married migrants. The characteristics of being relatively independent may be one of the determinants of working in this sector for migrants.

It is also interesting to see the descriptive statistics in Table 2 for the percentage of under-five and adults. The highest mean value of percentage of adults is in the households of workers working in manufacture (73.15%) but it also has the lowest mean value of percentage of under-five. Perhaps under-five functions as dependants and thus may prohibit the migrants to work in a regular formal sector as manufacture and adults may help each other in household responsibilities that allow migrants to work in a more regular setting such as manufacture.

**Table 2. Distribution of Percentage of Under-five and Adult within the Households of Migrants in Batam by Employment Sector, Census 2010**

<b>Sector</b>	<b>Percentage of</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<i>Manufacture</i>	Under-five	4.24	10.04	0.00	66.67
	Adult (15+)	73.15	28.98	5.56	100.00
<i>Trade, Hotels and Restaurants</i>	Under-five	6.60	11.95	0.00	75.00
	Adult (15+)	62.69	29.88	5.88	100.00
<i>Education, Health, and Social Services</i>	Under-five	9.17	13.39	0.00	66.67
	Adult (15+)	55.10	31.05	2.00	100.00
<i>Others</i>	Under-five	7.47	12.87	0.00	66.67
	Adult (15+)	62.41	30.94	2.00	100.00

If we want to specifically compare male and female migrants working in manufacture, Table 3 provides the descriptive statistics. If we look at the percentages, the dominant proportions for each characteristic of each male and female migrants are almost similar. They both are predominantly youngest age group, with high school education, and with formal status, such as expected from manufacturing industry. For higher level of education, if we compare male and female migrants working in manufacture, however, females have higher percentage of ones with high school education than males having lower percentage of diploma/university education than males. It may indicate that male migrants perhaps have higher tendency to be employed in higher positions in manufacture than female migrants. If we look at the living arrangement and marital status, both male and male migrants are predominantly not married living with family. However, if we compare specifically male and female migrants who are married and living with family, male migrants have three times the proportion of female migrants in this category. To really assess how living arrangement and marital status determine the likelihood of working in manufacture compared to other sectors, however, we need to perform regression analysis that will be presented in the next section.

**Table 3. Characteristics of Male and Female Migrants Working in Manufacture,  
Census 2010**

Characteristics	Male (%)	Female (%)	Total
<i>Age Group</i>			
15-24	52.69	84.63	69.62
25-34	37.85	14.12	25.28
35-44	7.49	1.07	4.09
45+	1.96	0.18	1.02
<i>Highest Level of Education</i>			
Up to Primary School	6.29	1.25	3.62
Junior High School	15.06	3.68	9.03
High School	70.55	92.54	82.20
Diploma/University	8.11	2.53	5.15
<i>Living Arrangement &amp; Marital Status</i>			
Unmarried, living alone	6.01	6.63	6.34
Unmarried, living with family	43.42	38.10	40.60
Unmarried, living with others	20.57	45.76	33.92
Married, living alone	0.92	0.20	0.53
Married, living with family	27.10	9.02	17.52
Married, living with others	1.99	0.28	1.08
<i>Job Status</i>			
Formal	1.83	0.60	1.18
Informal	98.17	99.40	98.82
Total	100.00	100.00	100.00

### **Findings**

The regression results of Model 1, 2, and 3 are presented in Table 4, 5, and 6. From Table 4 we can see that female migrants are 3 times more likely than male migrants to be working in manufacture compared to other sectors. The predicted probability values of working for each sector by sex can be found in Figure 1. It show that female migrants have higher probability to work in manufacture and education, health and service sectors than male migrants while male migrants have higher probability to work in trade, hotels, and restaurants and the rest of the sectors.

The results for marital status and living arrangement variables, one of the indicators of gender bias we use, show that only being married and living with family is statistically significant affecting working in manufacture. Migrants who are married and living with family are 1.22 times more likely to work in manufacture than in other sectors compared to migrants who are not married living alone. The predicted probabilities for this sector is presented in Figure 2.

**Table 4. Multinomial Regression of Employment Sector of Migrants in Batam, Model 1**

Variables	Manufacture			Trade, Hotels, and Restaurants			Education, Health, and Social Services		
	Coef.	SE	RRR	Coef.	SE	RRR	Coef.	SE	RRR
Female	1.124**	0.069	3.08	0.965**	0.079	2.62	0.660**	0.087	1.94
Unmarried, living with family	0.297**	0.042	1.35	-0.077	0.049	0.93	-0.446**	0.055	0.64
Unmarried, living with others	0.272**	0.045	1.31	0.087	0.054	1.09	-0.232**	0.061	0.79
Married, living alone	-0.103	0.089	0.90	-0.602**	0.106	0.55	-0.931**	0.113	0.39
Married, living with family	0.195**	0.043	1.22	-0.381**	0.050	0.68	-0.613**	0.055	0.54
Married, living with others	0.044	0.071	1.04	-0.826**	0.093	0.44	-0.831**	0.098	0.44
Female*Unmarried, living with family	0.063	0.076	1.06	-0.044	0.088	0.96	0.562**	0.098	1.75
Female*Unmarried, living with others	1.112**	0.085	3.04	-0.317**	0.101	0.73	2.136**	0.105	8.47
Female*Married, living alone	-0.047	0.253	0.95	1.110**	0.252	3.03	1.432**	0.266	4.19
Female*Married, living with family	-0.160*	0.080	0.85	0.663**	0.090	1.94	1.018**	0.098	2.77
Female*Married, living with others	-0.064	0.217	0.94	1.384**	0.227	3.99	3.932**	0.212	51.00
15-24	1.385**	0.052	4.00	0.303**	0.048	1.35	-0.140**	0.054	0.87
25-34	0.925**	0.050	2.52	0.029	0.045	1.03	-0.006	0.049	0.99
35-44	0.518**	0.054	1.68	-0.016	0.049	0.98	0.033	0.053	1.03
Junior High School	0.448**	0.035	1.57	0.366**	0.035	1.44	0.012	0.038	1.01
High School	1.303**	0.030	3.68	0.096**	0.031	1.10	-0.596**	0.035	0.55
Diploma/University	0.107**	0.038	1.11	-0.681**	0.044	0.51	0.492**	0.039	1.63
Formal	2.649**	0.039	14.14	-0.610**	0.024	0.54	0.326**	0.032	1.39
Constant	-3.979**	0.075	-	0.015	0.065	-	-0.610**	0.073	-
Number of obs		132167							
LR chi2(60)		55964.42							
Prob > chi2		0.0000							
Pseudo R2		0.1836							

\*\*Significant at 1% level; \*Significant at 5% level

**Table 5. Multinomial Regression of Employment Sector of Migrants in Batam, Model 2**

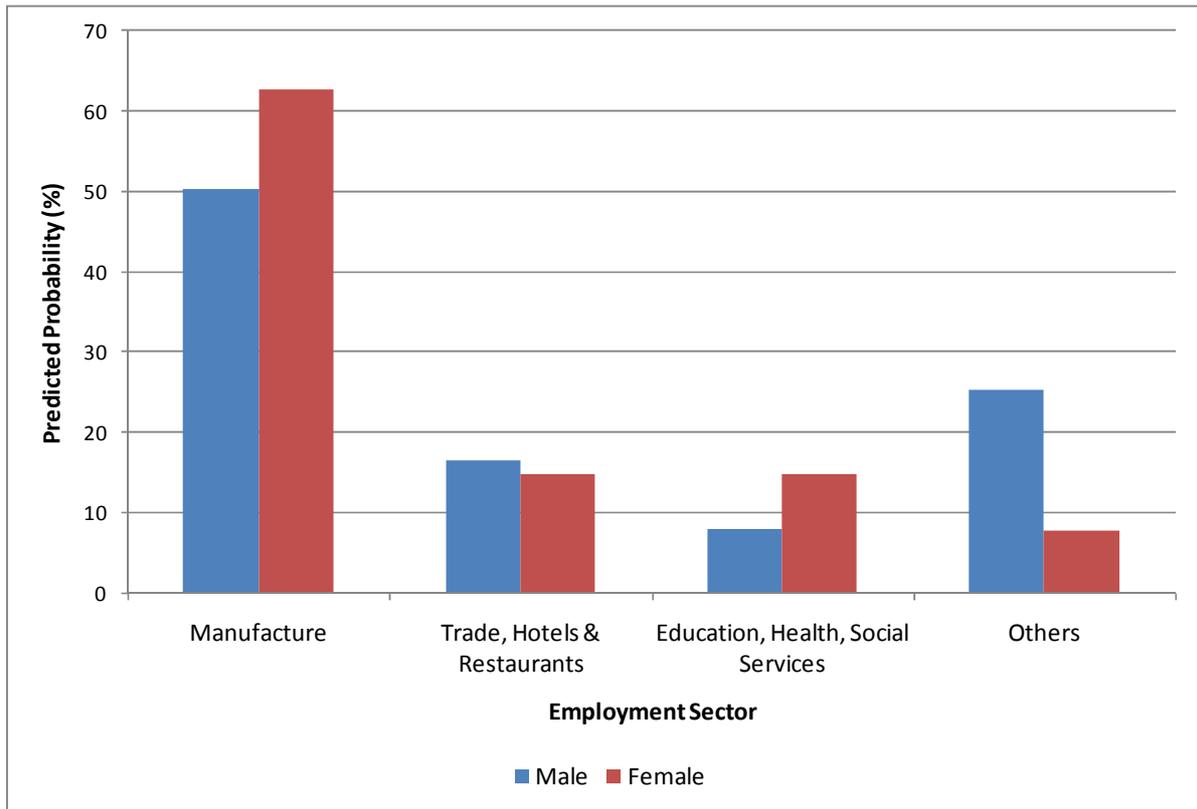
Variables	Manufacture			Trade, Hotels, and Restaurants			Education, Health, and Social Services		
	Coef.	SE	RRR	Coef.	SE	RRR	Coef.	SE	RRR
Female	1.523**	0.024	4.58	1.097**	0.028	3.00	1.744**	0.030	5.72
% Under-five	0.545**	0.090	1.72	-0.760**	0.106	0.47	-1.045**	0.120	0.35
Female*% Under-five	-2.017**	0.189	0.13	0.720**	0.208	2.05	2.358**	0.205	10.57
15-24	1.499**	0.049	4.48	0.492**	0.044	1.64	0.100*	0.048	1.10
25-34	0.939**	0.049	2.56	0.203**	0.044	1.22	0.121*	0.047	1.13
35-44	0.509**	0.054	1.66	0.033	0.049	1.03	0.078	0.052	1.08
Junior High School	0.417**	0.035	1.52	0.383**	0.034	1.47	-0.088*	0.037	0.92
High School	1.257**	0.030	3.52	0.117**	0.031	1.12	-0.611**	0.033	0.54
Diploma/University	-0.001	0.038	1.00	-0.587**	0.043	0.56	0.320**	0.038	1.38
Formal	2.685**	0.039	14.66	-0.625**	0.024	0.54	0.520**	0.031	1.68
% Adult (15+)	0.519**	0.033	1.68	-0.167**	0.039	0.85	-0.978**	0.042	0.38
Constant	-4.179**	0.065-		-0.175**	-	0.84	-0.653**	0.056-	
Number of obs		132167							
LR chi2(60)		53923.74							
Prob > chi2		0.0000							
Pseudo R2		0.1769							

\*\*Significant at 1% level; \*Significant at 5% level

**Table 6. Multinomial Regression of Employment Sector of Migrants in Batam, Model 3**

Variables	Manufacture			Trade, Hotels, and Restaurants			Education, Health, and Social Services		
	Coef.	SE	RRR	Coef.	SE	RRR	Coef.	SE	RRR
Female	0.821**	0.052	2.27	1.265**	0.058	3.54	2.734**	0.058	15.40
Male (Ref)									
% Adult (15+)	0.161**	0.037	1.17	-0.073	0.044	0.93	-0.188**	0.052	0.83
Female*% Adult (15+)	0.865**	0.070	2.38	-0.195*	0.080	0.82	-1.404**	0.084	0.25
15-24	1.521**	0.049	4.58	0.481**	0.044	1.62	0.046	0.048	1.05
25-34	0.965**	0.049	2.63	0.190**	0.044	1.21	0.071	0.047	1.07
35-44	0.534**	0.054	1.71	0.024	0.049	1.02	0.041	0.052	1.04
45+ (Ref)									
Up to Primary School (Ref)									
Junior High School	0.410**	0.035	1.51	0.383**	0.034	1.47	-0.080*	0.038	0.92
High School	1.242**	0.030	3.46	0.117**	0.031	1.12	-0.584**	0.034	0.56
Diploma/University	-0.018	0.038	0.98	-0.590**	0.043	0.55	0.344**	0.038	1.41
Formal	2.695**	0.039	14.80	-0.626**	0.024	0.53	0.492**	0.031	1.64
% Under-five	-0.201*	0.084	0.82	-0.495**	0.095	0.61	0.311**	0.099	1.36
Constant	-3.916**	0.066	-	-0.240**	0.052	-	-1.171**	0.059	-
Number of obs		132167							
LR chi2(60)		54384.71							
Prob > chi2		0.0000							
Pseudo R2		0.1785							

\*\*Significant at 1% level; \*Significant at 5% level



**Figure 1. Predicted Probability to Work in Particular Employment Sector for Migrants**

From Figure 2 we can see that for manufacture, females who are not married and living with others have the highest probability of working in manufacture. This probability is significantly higher than probability of non-married females living alone. Overall if we look at the distribution of predicted probabilities, we can see that for females, the non married ones have the higher probabilities to work in manufacture than the married ones, while for males, the married ones have the higher probabilities to work in manufacture than the non-married ones. As one of the indication of gender bias, this might be one of the proofs that although female migrants are more likely to work in manufacture than male migrants, their marital status and living arrangements do matter in influencing either the decision to work or the decision to employ. This result may support that gender bias still characterizes the labor market although in the surface there seems to be improvement in the equality of employment.

To assess the variables used to indicate the opportunity cost of women’s time, we can see the results in Table 5 and 6. In Table 5 we can see that while the percentage of under-five positively affects the probability of working in manufacture for all migrants, for female migrants, the relationship is negative. On the other hand, in Table 6 we can see that both coefficients of percentage of adults within the households of migrants are positive either

solely or in interaction with female. The result of predicted probability to work in manufacture for any increase in percentage of under-five and adults are shown in Figure 3 and Figure 4. It is interesting to see the steeper curve of predicted probabilities for females than males to work in manufacture in both figures. It seems like the influence of the presence of under-five and adults is bigger for female migrants than male migrants. More interestingly, the slope of the predicted probability curves for female migrants are different: negative for the percentage of under-five, and positive for the percentage of adults. Based on this result, we may have additional proofs of several gender bias conditions faced by female migrants. Although female migrants are more likely to work in manufacture, female migrants' probability to work in manufacture is declining by the increase of percentage of under-five while male migrants' probability to work in manufacture is increasing by the increase of percentage of under-five. The curve of predicted probability to work in manufacture for male migrants is increasing by the increase of percentage of adults within households but rather flat compared to the much steeper curve of predicted probability to work in manufacture for females. Although the slopes are both positive, this may be an indication of other types of gender bias condition. The presence of other adults seem to be more important in the decision to work by female migrants than male migrants. It portrays the opportunity cost of women's time. These findings shed some light in understanding the phenomenon of higher tendency of women migrants to work in manufacture compared with men migrants.

## **Conclusions**

The purpose of this study is to assess whether in Batam City female migrants are more likely to work in manufacture than male migrants and whether this phenomenon is an indication of improvement of gender equality or rather the results of gender bias in the labor market. Three indicators used to assess gender bias, which are marital status and living arrangement, the percentage of under-five and the percentage of adults all show the presence of possible gender bias. Females migrants with the higher probability to work in manufacture are the ones who are not married who are relatively 'free' than the married ones while on the contrary, male migrants with the higher probability to work in manufacture are the ones who are married. The percentage of under-five is negatively related with female migrants' probability to work in manufacture while positively related with male migrants' probability to work in manufacture. The percentage of adults positively affect the probability to work for both male and female migrants, but for female migrants the effect is much steeper. These two

findings may be an indication of the opportunity of womens' time that may be still highly connected with household production much more than for males. The main conclusion of this study is, thus, female migrants may be more likely to work in manufacture than male migrants, but under certain gender bias conditions, their probabilities to work in manufacture may be declining.

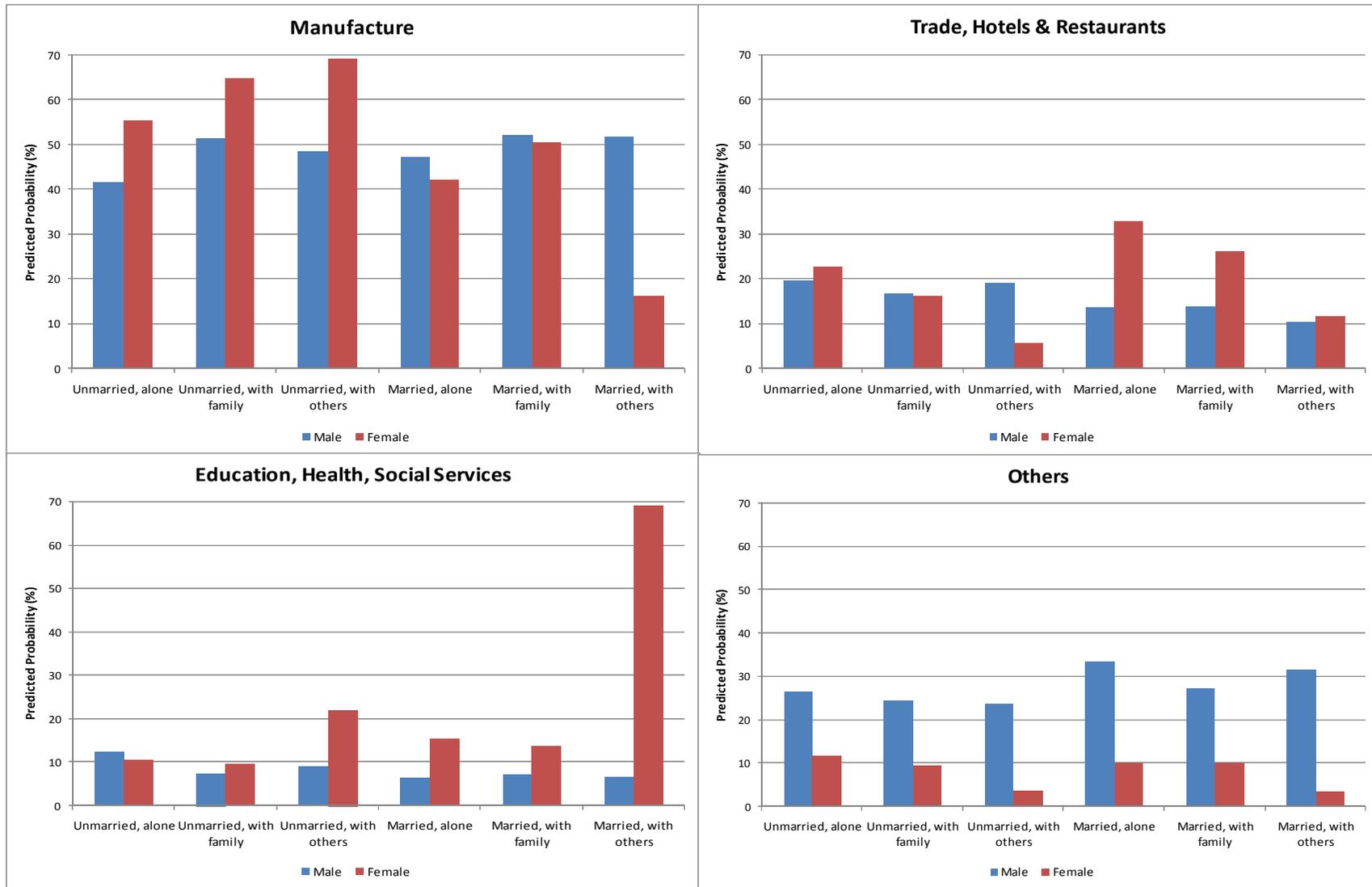
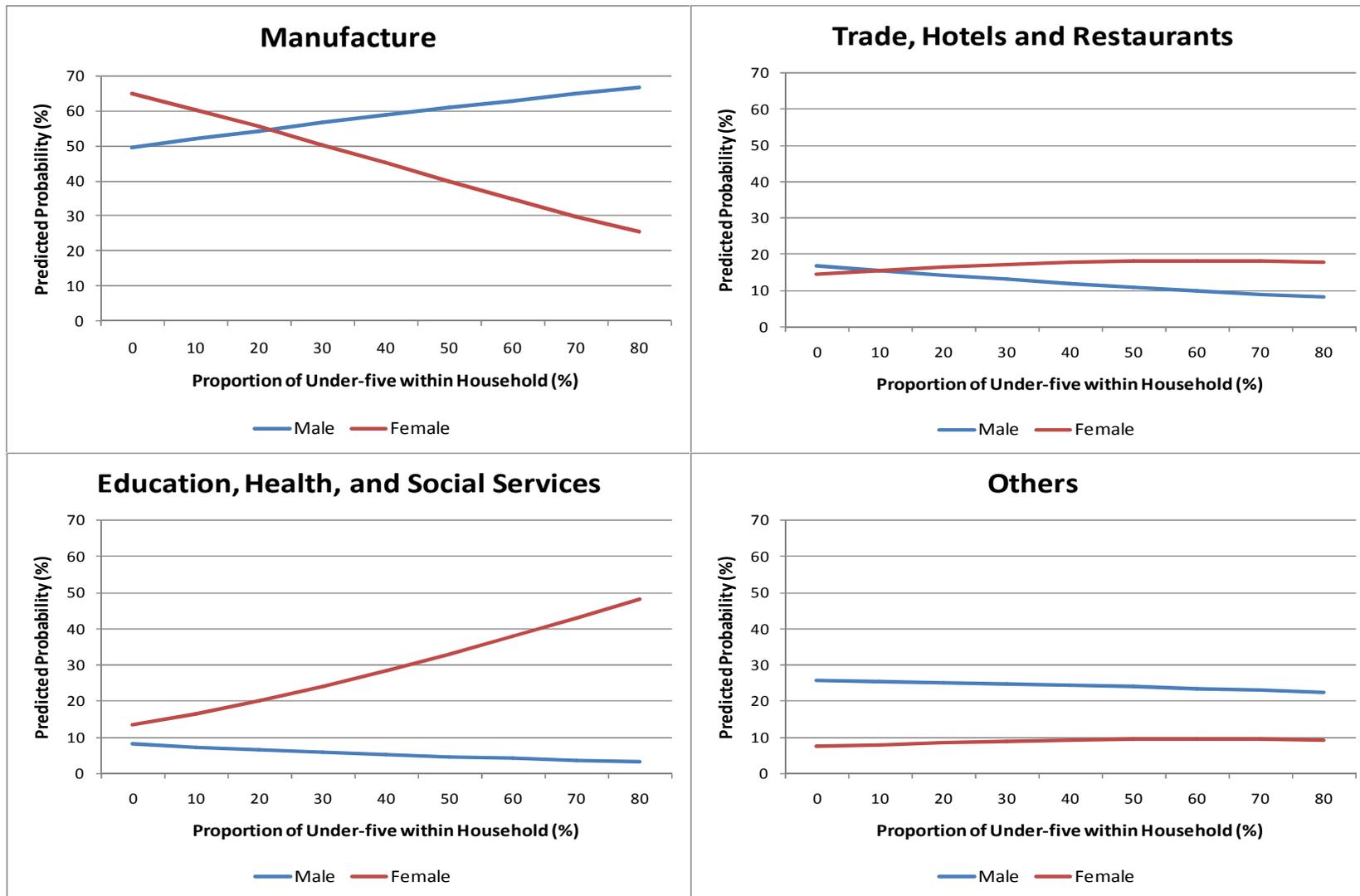


Figure 2. Predicted Probability to Work in Particular Employment Sector by Marital Status and Living Arrangement, Model 1



**Figure 3. Predicted Probability to Work in Particular Employment Sector by Proportion of Under-Five, Model 2**

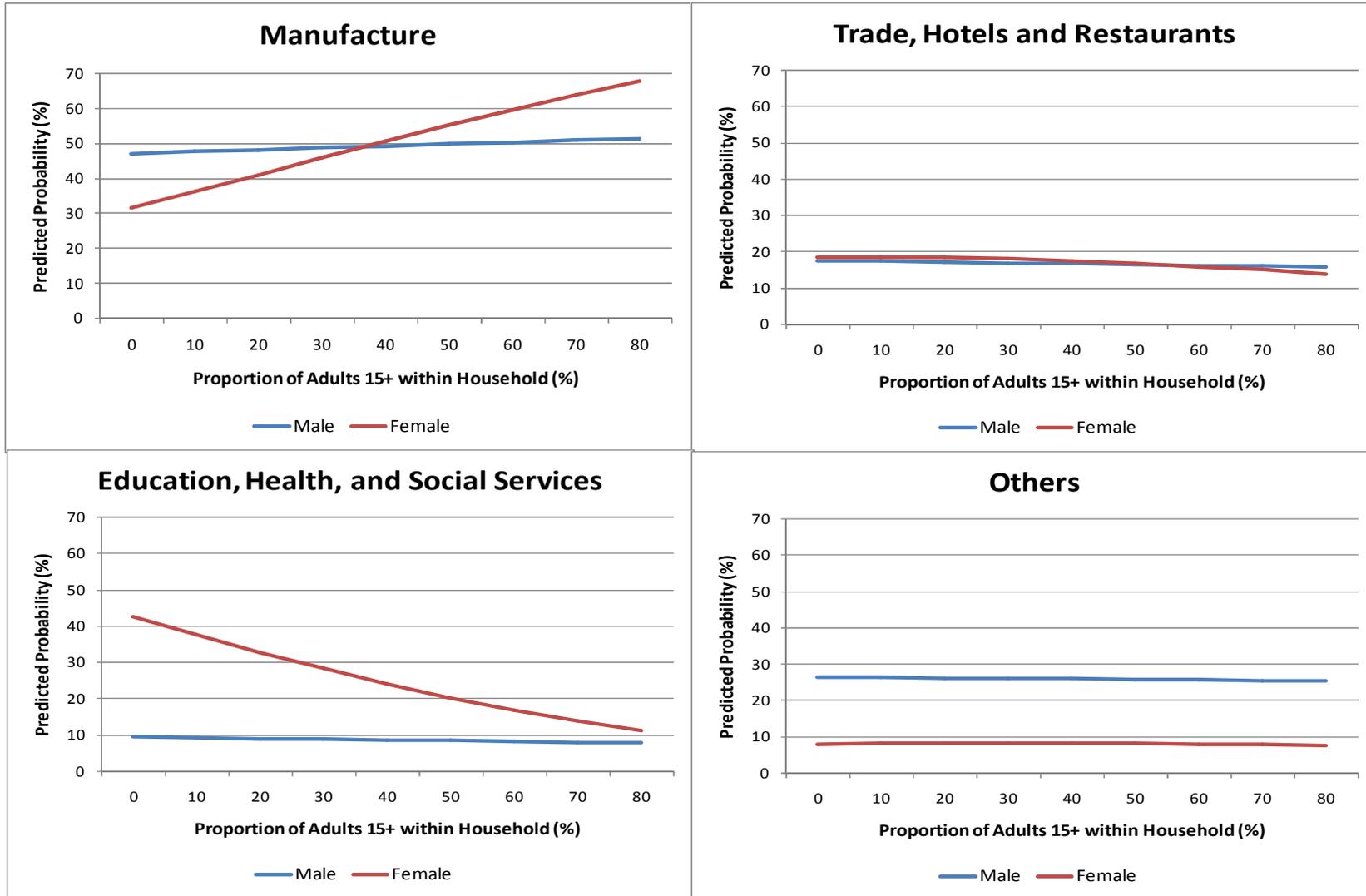


Figure 4. Predicted Probability to Work in Particular Employment Sector by Proportion of Adult 15 Years and Older, Model 3

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