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Harriet Taylor Mill-Institut für Ökonomie und Geschlechterforschung
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Abstract

Studies routinely document that the nature of immigrant employment is largely specific: it often concentrates in non-traded goods sectors and many immigrants, particularly females, often have low inter-sectoral mobility. We consider these employment and gender related characteristics of immigrants for the question of how immigration affects a nation's pattern of production and trade. Based on a model in which immigrant gender influences the nature and likely sector of employment, we postulate that the higher is the proportion of immigrants who are female the more likely that immigration and trade will be complements. Empirical investigation of the relationship between migrant gender and the production of traded and non-traded goods in a panel dataset of OECD countries supports the conjecture that female immigration and trade are complements whereas male immigration and trade are substitutes. This difference arises because employment of female immigrants is more likely to be concentrated in non-traded goods sectors and females are likely to have lower inter-sectoral mobility relative to male immigrants. We discuss the implications of these empirical findings for immigration policy.

JEL codes: F1, F2; F16; F22; J61; C33

Keywords: trade, immigration, gender, non-traded goods, specific factors, panel, immigration policy.

Inhaltsverzeichnis

1. Introduction

Growing immigration over the past 30 years has increased the share of foreign-born persons in the total population of most OECD countries. The labor market activities of (particularly newer) immigrants exhibit a number of interesting characteristics. First, many immigrants work in low-skilled service sector occupations (e.g., hotels, restaurants, etc.) whose output is not internationally traded (e.g., OECD 2002; Dimararanan and McDougall 2002). Second, some immigrant workers have low inter-sectoral mobility due to factors such as language barriers, low skill levels, and possible illegal status, and are therefore likely to remain employed in sectors producing non-traded goods and services (OECD 2002). Bowen and Wu (2013) investigated both theoretically and empirically the implications of these labor market characteristics for the question of how immigration impacts an economy's pattern of production and international trade. They found that a specificity of immigrant employment in non-traded goods (i.e., non-traded services) implies that immigration and international trade are likely to evidence a complementary relationship; this complementary relationship is more likely the greater the number of new migrants who become specific to sectors producing non-traded goods and services.

Given the findings of Bowen and Wu (2013), an interesting aspect of the increasing immigration trend is that females are a growing proportion of total immigrants.[1] Analysis by Fry (2006)[2] indicates that the percentage of female migrants has risen worldwide from 47.2 percent in 1980 to 49.6 percent in 2005. Together with the rising proportion of female migrants, female immigrants are more likely than male immigrants to become employed in sectors producing non-traded services. Evidence that immigrants, and particularly females, are more likely to become employed in sectors producing non-traded goods comes from varied sources. For the United States, the March 2002 Current Population Survey reported that "19 million of the 135 million employed US workers were foreign-born.

Foreign-born workers were significantly less likely to be in managerial and technical occupations, and more likely to be in farming and service occupations. These occupation gaps were most pronounced for foreign-born workers who arrived since 1990."[3] Available statistics for most OECD countries indicate that recent immigrants most often work in service sector occupations such as restaurants, domestic helpers, etc. For London, an estimated 60% of the workers in the hotel and restaurant industry come from outside of the UK (Dyer, McDowell and Batnitzky 2010) As to gender, Gosh (2009, p.8) notes that "Male migrants tend to be concentrated in the production and construction sectors, and to a much lesser extent in service activities. Female migrants, by contrast, are dominantly found to be working in specific service activities – in the domestic work and care sectors, as well as in entertainment work." Data for Germany indicates that women are more likely to be employed in "other services" whereas men are three times more likely to be employed in the manufacturing sector.[4] In London, an estimated 60% of the workers in the hotel and restaurant industry come from outside of the United Kingdom (Dyer et al. 2010). Finally, King and Zontini (2000) argue that generally, and then for Southern Europe, "the strong expansion of the service sector, especially in the area of personal and domestic services, has favored the immigration of female over male workers."

[1] OECD, SOPEMI 2010
[2] Fry, Richard (2006). Pew Hispanic Center analysis of data from the U.S, Census Bureau and the United Nations. http://pewhispanic.org/reports/report.php?ReportID=64#OtherTitle
[3] Migration News, September 2003 (10:4), http://migration.ucdavis.edu/mn/more.php?id=2698_0_10_0
[4] Authors' calculations using German immigration data (Bundestatistikamt, 2005-2010).

Interpreting these observations and findings within the model framework of Bowen and Wu (2013), the differential pattern of employment of female versus male immigrants implies that immigrant gender may have a differential impact on an economy's pattern of production and trade. The implications of a rising share of female immigrants and the concentration of their employment in mainly non-traded service sectors is an area largely overlooked in the literature on the economic impacts of immigrant gender. Beginning with Gould (1994), much of the existing literature explores general effects of immigration on trade, specifically bilateral trade patterns. A notable example is Head and Ries (1998), who empirically investigate the impact that different classes of migrants to Canada have on Canada's bilateral trade. Their findings suggested that a 10% increase in immigration would be associated with a 3% increase in imports from, and a 1% increase in exports to, the immigrant's country of origin. Family immigration and independent immigration were reported to have a larger effect on trade flows than immigration by entrepreneurs.

In this paper, we investigate for a differential impact of immigrant gender on an economy's pattern of production and international trade. Building on Bowen and Wu (2013), we conjecture that female immigration will expand non-traded sector output and exports, and hence that female immigration and trade will evidence a complement relationship. In contrast, we conjecture that male immigration will reduce non-traded sector output and exports, and hence that trade and male immigration will evidence a substitute relationship. Evidence supporting the conjectured differential impact of immigrant gender on non-traded goods production and trade would lend support to the model of Bowen and Wu (2013) as a framework for thinking about the impact of immigration, and it would identify an important channel by which immigration impacts the structure of an economy. Support for the conjectured differential impact of immigrant gender would also have important implications for immigration policy, and in particular for targeted immigration policies. Farré, González and Ortega (2010) empirically examined for the effect of female immigration on the labor supply of skilled native women in Spain. Their results suggested the special visa program that directs the employment of female migrants into household services might be effective in helping the indigenous skilled female population cope with child and elderly care, therefore suggesting a complementary effect of female household service workers on the supply of skilled female labor. They also report that "in 2008, 49% of recent immigrant women were employed as housekeepers or home-providers of child or elderly care."[5]

This paper's focus on the production and trade effects of immigration contrasts with the majority of prior work in the economics literature that has instead focused on the implications of immigration for domestic wages. In this regard, the majority of research based on partial equilibrium methods has found little evidence of significant wage effects from immigration,[6] even when labor market effects are disaggregated to capture differences in gender. Studies using a general equilibrium framework suggest that an absence of significant wage effects may reflect the operation of a Rybczynski effect: an immigration-induced increase in labor supply is absorbed not by a change in domestic factor prices but instead by a reallocation of labor (and other productive factors) across sectors and hence by a change in the sectoral pattern of production. If so, then understanding the impact of immigration on an

[5] Farre et al. (2011).
[6] Borjas (1994, 1995, and 2003) reviews the economic benefits of immigration. Dustman, Hatton, and Preston (2005) examine labor market effects of immigration. Friedberg and Hunt (1995) and Docquier, Özden, and Peri (2011) review studies on the wage effects of immigration.

economy's pattern of production and trade may prove more insightful regarding the economy-wide impact of immigration. Yet, to date, only a few general equilibrium based studies have examined for the economic impact of immigrant heterogeneity (e.g., Bowen and Wu 2013; Felbermayr and Kohler 2007), and none has considered immigrant heterogeneity arising from differences in gender.

In this paper, we modify the model of Bowen and Wu (2013) to allow the gender of immigrants to impact the proportion of immigrants likely to become specific to a non-traded goods sector. Specifically, we conjecture that female migrants are more likely than male migrants to become specific to an economy's non-traded goods sector. If there does exist a positive relationship between the proportion of migrants who are female and the proportion of migrants who are likely to be employed in sectors producing non-traded goods and services then the model of Bowen and Wu (2013) predicts that the relationship between female migrants and trade is likely to be positive (complementary) whereas the relationship between male migrants and trade is likely to be negative (substitutes).

To explore these predictions, we estimate relationships between female and male immigrants and exports and the output of non-traded goods in a panel dataset covering the period 1995-2010. Our empirical results confirm the prediction of a differential impact of female and male immigrants. We find that exports and the output of non-traded goods rises with female immigration but declines with male immigration, confirming the prediction that female immigration and trade evidence a complementary relationship whereas male immigration and trade instead evidence a substitute relationship.

2. Theory

To study the implications of immigrant gender for the impact of immigration on the sectoral pattern of output and trade we adopt the model of Bowen and Wu (2013). Their model assumes an economy that produces two traded goods (one exported and one imported) and one non-traded good using three factors of production: capital, "domestic" labor that is domestically mobile and works in all three sectors and "immigrant" labor that is specific to the non-traded goods sector. Using their model, Bowen and Wu (2013) demonstrate that whether a complementary or a substitute relationship between immigration and trade emerged depends on the proportion of new migrants that become specific to the non-traded goods sector. Specifically, a complement relationship is more likely the higher the proportion of new migrants that become specific to the non-traded goods sector whereas a substitute relationship emerges between trade and immigration if all new migrants are "domestic status" workers, that is, workers who are freely mobile across sectors and can work in any of the three sectors.

In this paper, we focus on the propositions derived in Bowen and Wu (2013) that the higher is the fraction of new immigrants who will become employed in, and hence specific to, the non-traded sector the more probable that immigration and trade are complements. In their model, λ denotes the fraction of new immigrants who are "domestic-status" workers, and hence (1 – λ) denotes the fraction of new immigrants that will be specific to the non-traded sector.

Whereas λ was an exogenously given parameter in Bowen and Wu (2013), here we instead assume that λ is a decreasing function of the number of female immigrants. Since the smaller is λ the more likely that immigration and trade are complements, we conjecture that the relationship between female immigration and trade will be positive (complementary) and that the relationship between male immigration and trade will be negative (substitutes). Since production of the non-traded good depends negatively on λ we also conjecture that production of non-traded goods will be positively related to female immigration and negatively related to male immigration.[7]

A key finding of Bowen and Wu (2013) is that immigration and trade can be complements (substitutes) even if the export sector is capital-intensive (labor-intensive). This result contrasts with the prediction of a standard (Heckscher-Ohlin) trade model in which immigrants are homogenous since immigration in that model is predicted to expand the labor-intensive sector (i.e., the import-competing sector) and contract the capital-intensive sector (i.e., the export sector) – the standard Rybczynski effect.

Testing these implications empirically using a panel of OECD data for the years 1970-2009, Bowen and Wu (2013) find that, consistent with their model, the output of services (non-traded) rises with immigration and that trade (exports) and immigration are complements. They also found that the complementary relationship between immigration and trade is reduced, and could be reversed, by immigration policies that favor immigrants who are more likely to assimilate into a nation's labor supply and that often direct the employment of migrants into traded goods sectors (e.g. guest-worker programs). In all cases, their results were consistent with the predictions of their theoretical model in which some immigrants become specific to an economy's non-traded goods sector.

We now turn to empirically examine these predictions regarding the relationships between female versus male migrants, production and trade.

3. Empirical Analysis

In this section, we investigate empirically the predicted relationships between female and male immigration and the output of non-traded goods (services) and trade (exports). The model of Bowen and Wu (2013) predicts that the higher is the proportion of immigrants who will become specific to the non-traded sector the more likely that immigration will be associated with an increase in the output of non-traded (service sector) goods. If, as assumed, female immigrants are more likely than male immigrants to become specific to the non-traded goods sector then we expect a positive relationship between the output of the non-traded (services) sector and the level of female immigration but a negative relationship for male immigration. For the export sector, the effect of immigration depends on the gender mix of new foreign workers and the share of sector specific immigrants already working in the

[7] The effect of gender can be formally introduced into the model of Bowen and Wu (2013) by assuming that the proportion of non-sector specific workers in any new wave of immigrations (λ) is an increasing function $\lambda(\mu)$ of the number of male immigrants (μ, for men) with limit values $\lambda(0) > 0$ and $\lambda(1) \leq 1$. The strictly positive lower limit insures that some male immigrants will become sector specific whereas the upper allows, but does not require, that some male immigrants become sector specific.

non-traded goods sector. Workers arriving from a country where they are more likely to integrate into the domestic labor pool, or to have attained the skills to work in the traded goods sector, will reduce the positive effects on non-traded goods output and may result in trade and immigration being substitutes. We would therefore expect a positive relationship between male immigration and exports production when immigration, both female and male, is sector specific. However, if as conjectured, male immigrants are less likely to become sector specific then a substitute relationship between male immigration and trade is then implied, and we accordingly expect a negative relationship between male immigration and export sector production.

3.1 Model Specification

We estimate two relationships, one between immigration and services output and one between immigration and exports. In each case, we use GDP per capita as a control for differences in country wealth and size and, in the case of services output, also for the known relationship between services output and GDP per capita.[8] We further include the square of GDP per capita to allow for a possible nonlinear relationship between each dependent variable and GDP per capita.

Our data sample includes two countries (Austria and Germany) that have or had "guest worker" programs. Guest worker immigrants have been, to our knowledge, traditionally male, and by definition such programs skew the mix of incoming foreign workers toward those who will be, in the terminology of the model of Bowen and Wu (2013), "domestic-status" workers, and hence they may also channel employment of such immigrants into traded goods sectors. Hence, if not taken into account, such programs could bias downward our estimates of immigration's effect on services output and bias upward estimates of immigration's effect on exports.[9] To control for these potential effects at the country level we augment our model to include a guest-worker dummy (GW) that equals 1 if a country had, at any time, a guest-worker program. In addition, we also control for the effect that a guest worker program may have on the incremental effect of immigration by interacting our dummy variable with both the female and male immigration variables.

Letting Y_{it} denote either exports or services output in country i at time t, the relationships we estimate can be written:

$$Y_{it} = \beta_0 + \beta_1 (\text{Female Immigration}_{i,t-1}) + \beta_2 (\text{Male Immigration}_{i,t-1})$$

$$+ \beta_3 (\text{GW}_{\text{it}} \times \text{Female immigration}_{i,t-1}) + \beta_4 (\text{GW}_{\text{it}} \times \text{Male immigration}_{i,t-1})$$

$$+ \beta_5 \text{GW}_{\text{it}} + \beta_6 (\text{GDP per capita}_{it}) + \beta_7 (\text{GDP per capita}_{it})^2 + \varepsilon_{it} \quad (1)$$

[8] Across countries, GDP per capita is also highly correlated with the stock of capital per worker. Hence, GDP per capita can also be seen as a proxy of national capital-labor ratios.

[9] The conjectured effect on exports could be downward biased if guest workers are instead channeled into import-competing production. For example, in Germany, most guest-workers were employed in manufacturing, notably in mining, metal and ferrous industries (e.g., Martin and Miller 1980; Danzar and Yaman 2010); part of the production in such sectors may be import-competing rather than exporting.

As indicated, we use lagged (one year) values of our immigration variables since we expect a lagged effect between the time a migrant arrives and the subsequent impact on exports and services output.

Our empirical analysis can be thought to be uncovering the sign of a Rybczynski effect associated with a change in a country's stock of male or female workers. This suggests that the appropriate specification to estimate would involve the level of output in relation to the stock of immigrant workers. However, lacking reliable data on immigrant stocks, and for statistical reasons, we instead estimate (1) using the change (first difference) in each dependent variable and the GDP per capita controls.[10]

In summary, our regression model specifies the annual change in either exports or services output in relation to lagged female and lagged male immigration, a dummy and interaction variables to account for guest-worker program countries, and the annual change and square of the annual change in GDP per capita.

Since we are only interested in that part of services likely to be non-traded, we limit our focus to data on non-financial services, which is further broken down into two categories: "wholesale/retail non-financial services" and "other non-financial services." With respect to exports, we examine total exports of goods and services as well as each component separately: exports of goods and exports of services.

3.2 Data

Data on the gross inflows of migrants by sex is that given in OECD (2002) and OECD (2010) and available online at OECD stat. These data refer to permanent inflows and therefore exclude tourists, etc.[11] and were generally available for the years 1995-2010 for 14 OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, Germany, Ireland, Italy, Norway, Spain, Sweden, the UK, and the US.

Data on gross domestic product, population, exports of goods and services, and the output (value added) of "wholesale/retail non-financial services" and "other non-financial services" were taken from the OECD National Accounts database (OECD 2010).[12] The "wholesale/retail non-financial services" sector encompasses wholesale and retail trade as well as hotel, restaurant, and transportation activities. The sector "other non-financial services" includes non-business services such as public administration and health care.[13] Total services output is calculated as the sum of the outputs of these two service categories. The GDP, export, and services output data are all measured in constant (year 2000) U.S. dollars.

[10] As described in the data section to follow, tests detected the presence of first order autocorrelation for both services and exports. Therefore, we correctly need to first difference before estimation.
[11] Other sources of migration data are Eurostat and the International Labor Office (ILO). The Eurostat is limiting since it is available only for European countries and coverage is fragmentary. The ILO data is available for most OECD countries (with time gaps) but these data only report numbers of actively employed immigrants.
[12] Wholesale/retail non-financial services comprise: wholesale and retail trade, repair of motor vehicles, personal and household goods, hotels and restaurants, storage and communications. Other non-financial services comprise: public administration (includes landscape of public buildings) and defense, education, health and social work, and other community and personal service activities.
[13] Given the high social spending in these areas by some countries in the panel, a measure of non-public services would be ideal. Unfortunately, we were limited by data availability.

Since we have panel data, we performed standard tests for cross-sectional correlation, serial correlation in the panel, and group-wise heteroscedasticity. These tests indicated first order autocorrelation in the levels of both services output and exports. We correct for these AR1 processes using first differences in the respective data. Tests for group-wise heteroscedasticity using the modified Wald statistic indicated its presence. In addition, the Breusch-Pagan Lagrange Multiplier (LM) test for independence of the errors across panels indicated that the errors are not independent but are correlated across countries. Because we have an unbalanced panel, we were limited in our choice of corrective estimation techniques. We therefore used the Prais-Winsten transformation to obtain panel-corrected standard errors to account for group-wise heteroscedasticity. We further specified that the covariance matrix be calculated using all available information.[14]

3.3 Results

Table 1 reports summary statistics and correlations for our model variables. The simple correlation between the annual change in services output and lagged female immigration is 0.71; the correlation between the annual change in goods and services exports and lagged female immigration is 0.40. The corresponding correlations for male immigration are 0.55 for total services output and 0.37 for exports of goods and services. The simple correlation between male and female immigration is 0.95.

Table 1: Summary statistics and correlations

Variable	Mean	Std. Dev.	Services	Wholesale services	Other services	Exports goods & services	Exports goods	Exports services	Female immigration	Male immigration	GDP per capita
Services value added	11169.4	25424.0	1								
Wholesale services	6660.0	17534.0	0.981	1							
Other services	4509.4	8911.1	0.923	0.831	1						
Exports goods & services	11093.3	35224.1	0.599	0.657	0.418	1					
Goods exports	7637.0	29840.9	0.512	0.570	0.338	0.984	1				
Services exports	3432.3	7930.1	0.737	0.770	0.586	0.747	0.614	1			
Female immigration	128179.9	138336.6	0.706	0.638	0.759	0.392	0.321	0.532	1		
Male immigration	137376.2	142728.1	0.546	0.478	0.618	0.367	0.310	0.458	0.955	1	
GDP per capita	337.5	709.0	0.260	0.310	0.133	0.490	0.479	0.378	-0.076	-0.104	1
GDP per capita squared	19841.1	42970.2	0.290	0.337	0.164	0.471	0.456	0.382	-0.043	-0.083	0.989

Obs = 109; Services value added, exports and GDP per capita variables measured as annual change.

3.3.1 Results for Services Output

Table 2 reports the results of estimating equation (1) for the each of the three categories of services output. In all cases, the coefficient on lagged female immigration is positive and significant ($p < .01$) and the coefficient on lagged male immigration is negative and significant ($p < .01$). These results are also coherent with our prediction, based on Bowen and Wu (2013), that non-traded sector output will rise with female immigration since female migrant workers are more likely to become sector specific. The coefficient on per capita GDP is positive, as expected, and significant in all cases except for "Other Services". In addition, only for Total

[14] All estimations were performed using STATA's "xtpcse" routine with the "pairwise" option enabled.

Services, the coefficient on squared GDP per capita is negative and significant. These results indicate a non-linear relationship with respect to changes in services output: changes in GDP per capita have an increasing but diminishing marginal effect on the growth of services output. This result indicates a non-linear relationship between changes in services output and changes in GDP per capita.

Table 2: Estimated relationship between services output and immigration by gender

Variable	Total Services	Other Services	Wholesale Services
Female immigration (lagged)	0.509*** [0.084]	0.161*** [0.035]	0.348*** [0.069]
Male immigration (lagged)	-0.395*** [0.072]	-0.117*** [0.029]	-0.278*** [0.058]
Guest worker × female immigration (lagged)	-0.561** [0.280]	-0.526*** [0.095]	-0.035 [0.264]
Guest worker × male immigration (lagged)	0.460** [0.191]	0.378*** [0.066]	0.082 [0.180]
Guest worker country	2,119.675 [3,304.920]	4,020.834*** [1,064.854]	-1,901.167 [2,981.692]
GDP per capita	21.958*** [8.234]	5.715** [2.476]	16.244** [6.355]
GDP per capita squared	-0.248 [0.146]	-0.071 [0.043]	-0.177 [0.112]
Constant	-4,912.406*** [1,521.063]	-1,291.568** [526.815]	-3,620.838*** [1,154.767]
R^2	0.78	0.77	0.72
Wald statistic	283.946***	121.900***	480.339***
Observations	121	121	121
Countries	14	14	14

** p < .05; *** p < .01. Standard errors in brackets; Immigration variables lagged one period (year); Services calculated as total of wholesale and retail trade, and other non-financial services; Dependent and GDP per capita variables first differenced and measured in 2000 US dollars; Coefficient of squared GDP per capita multiplied by 1000.

As shown in Table 2, the coefficient on the interaction between the dummy for guest-worker countries and female immigration is negative and significant for the output of Total Services and Other Services but not for Wholesale Services. The coefficient on the interaction between the dummy for guest-worker countries and male immigration is positive and significant for the output of Total Services and Other Services but not for Wholesale Services. Hence, where significant, the impact of a guest-worker program is to offset the direct effect of female and male immigration on services output. These results are consistent with the conjecture that a guest worker program skews the mix of immigrants toward domestic-status workers.

Since the guest-worker program effect for female and male immigration are opposite their direct effect, the question arises whether the guest-worker effect is large enough to offset the direct effect of immigrant gender on services output. To address this question, Table 3a shows the coefficient values for female and male immigration for guest-worker and non-guest-worker program countries (the non-guest worker results are just the direct effects shown in Table 2).

Table 3a: Total effects on services output when guest-worker country effect is significant

Variable	Total Services	Other Services	Wholesale Services
Female immigration, non-guest-worker country	0.509*** [0.084]	0.161*** [0.035]	0.348*** [0.069]
Female immigration, guest-worker country	-0.052 [0.266]	-0.365*** [0.086]	same as non-guest-worker country
Male immigration, non- guest-worker country	-0.395*** [0.072]	-0.117*** [0.029]	-0.278*** [0.058]
Male immigration, guest-worker country	0.065 [0.179]	0.261*** [0.058]	same as non-guest-worker country
Intercept (non-guest-worker country)	-4,912.406*** [1,521.063]	-1,291.568** [526.815]	-3,620.838*** [1,154.767]
Intercept (guest-worker country)	same as non-guest-worker country	4,020.834*** [1,064.854]	same as non-guest-worker country

*** p < .01.

For female immigration, the negative guest-worker program effect exactly offsets the positive direct effect for Total Services to render the combined effect not significant; for Other Services the guest-worker program effect reverses the positive direct effect to render the combined effect negative and significant. For male immigration, the positive guest-worker program effect exactly offsets the negative direct effect for Total Services, and it reverses the negative direct effect for Other Services and Wholesale Services such that the combined effect becomes positive and significant. Overall, these results indicate that guest-worker programs have a significant impact on the direction of the differential effect of female versus male immigration for the output of non-traded non-financial services. While the results for female immigration are consistent with guest-worker programs skewing the mix of immigrants toward those with domestic-worker status, the results of male immigration are somewhat puzzling since we would have expected the effect for male immigration to be more negative in guest-worker program countries. What may be happening over the time period studied is a change in guest worker program countries to allow for family reunification. If so, this may serve to augment the pool of female immigrants who would tend to work in the non-traded services sector. To know more one would need a more detailed understanding of the changes to immigration policy in guest-worker program countries during the period studied.

Table 3b: Services output elasticities (at data means), guest-worker versus non-guest-worker countries

Immigration variables	Total Services	Other Services	Wholesale Services
Female, non- guest-worker country	**4.71****	**3.68****	**5.41****
Female, guest-worker country	*-0.13*	**-2.19****	*1.28*
Male, non- guest-worker country	**-3.62****	**-2.65****	**-4.28****
Male, guest-worker country	*0.22*	**2.17****	*-1.11*

** p < .05

Finally, Table 3b lists the output elasticity estimates (at data means) for female and male immigration in guest-worker and non-guest-worker countries. As discussed above, the services output elasticities with respect to female immigration are lower in guest-worker countries while the elasticities with respect to male immigration are higher in guest-worker countries.

3.3.2 Results for Exports

Table 4 reports the results of estimating (1) for each of the three categories of exports. The coefficient on female immigration is positive and highly significant in all cases. The coefficient on male immigration is negative and highly significant for goods and services exports and for goods exports. These results are consistent our conjectures regarding these effect based on the model of Bowen and Wu (2013). Specifically, female immigration and trade (exports) evidence a complementary relationship whereas male immigration and trade (exports) evidence a substitute relationship.

Table 4: Estimated relationship between exports and immigration by gender

Variable	Exports of		
	Goods & Services	Goods	Services
Female immigration (lagged)	0.409*** [0.072]	0.305*** [0.052]	0.110*** [0.027]
Male immigration (lagged)	-0.332*** [0.064]	-0.252*** [0.046]	-0.086*** [0.024]
Guest worker × female immigration (lagged)	3.774 [2.123]	3.732 [1.985]	-0.037 [0.159]
Guest worker × male immigration (lagged)	-2.359 [1.428]	-2.359 [1.336]	0.058 [0.108]
Guest worker country	-42,024.959 [22,496.540]	-41,668.348** [21,186.837]	-692.145 [1,865.094]
GDP per capita	101.198*** [20.115]	97.712*** [17.059]	18.820*** [4.599]
GDP per capita squared	-1.309*** [0.311]	-1.256*** [0.271]	-0.226*** [0.078]
Time trend	1,541.717 [790.914]	1,186.039** [552.702]	404.011*** [143.926]
Constant	-64,559.248** [28,792.962]	-51,394.700*** [19,644.324]	-16,094.330*** [5,067.063]
R^2	0.58	0.58	0.56
Wald statistic	149.447***	946.373***	271.462***
Observations	122	110	110
Countries	14	12	12

** p < .05; *** p < .01. Standard errors in brackets; Immigration variables lagged one period (year); Services calculated as total of wholesale and retail trade, and other non-financial services; Dependent and GDP per capita variables first differenced and measured in 2000 US dollars; Coefficient of squared GDP per capita multiplied by 10.

The results for the guest-worker interaction variables indicate that such programs have no significant impact on the direct effect of female and male immigration on exports. The guest-worker dummy is negative and significant only for exports of

goods, suggesting that guest-worker countries have lower goods exports relative to countries without a guest-worker program. This suggests that the main effect of guest-worker programs may be to channel immigrants into sectors producing goods that are import-competing. Finally, as for services output, in all cases the coefficient on per capita GDP is positive and significant, and the coefficient on squared GDP per capita is negative and significant, indicating an expected non-linear relationship between changes in GDP per capita and changes in exports.

Since there is no difference in the effects of female and male immigration on exports in guest-worker and non-guest-worker countries, we can simply report elasticity values (at data means) for exports with respect to a change in lagged female and male immigration. For lagged female immigration the export elasticity values are: Goods and Services Exports 3.67; Goods Exports 3.96; Services Exports 3.26. For male immigration, the export elasticity values are: Goods and Services Exports -2.92; Goods Exports -3.21; Services Exports -2.49. All elasticity values are significant at the 0.05 level. In each case, the elasticity with respect to female immigration exceeds that with respect to male immigration, consistent with the finding of Bowen and Wu (2013), a positive and significant relationship between exports and total immigration.

4. Conclusion

The literature on the economic effects of immigration has generally overlooked the question of the role of immigrant gender. This paper addressed this gap in the literature by investigating empirically a set of predictions regarding a differential impact of female versus male immigration on an economy's pattern of production and trade. The basis of these predictions was the heterogeneous immigrant model of Bowen and Wu (2013). From this model, we conjectured that female migrants and trade are likely to be complements whereas male immigrants and trade are likely to be substitutes. These predictions derived from the conjecture that female migrants are more likely than male migrants to become specific to an economy's non-traded goods sector.

Empirical investigation of these predictions with respect to the relationship between male and female immigration and trade was conducted in a panel of OECD countries for the years 1995 to 2010. The findings were consistent with the theoretical predictions. Specifically, the output of services was found to rise with the level of female immigration but to decrease with the level male immigration. The findings also supported the prediction that a complementary relationship between female immigration and trade could be enhanced by certain immigration policies, such as guest-worker programs, that target greater immigration of (mostly male) workers, who are either more likely to readily assimilate into the domestic labor pool or who are assigned by policy to work mainly in sectors producing traded (exported) goods.

Overall, the findings of this paper offer strong support for the model of Bowen and Wu (2013) and its emphasis on the importance of immigrant heterogeneity, the sector distribution of immigrant employment, and the nature of such employment. In particular, this paper demonstrates that immigrant gender has important implications for the effect of immigration on a nation's pattern of production and trade. Further investigation along these lines of inquiry is warranted.

References

Borjas, G.J. 1994. The Economics of Immigration. Journal of Economic Literature, 34:1667-1717

Borjas, G.J. 1995. The Economic Benefits of Immigration. Journal of Economic Perspectives, 9(2).

Borjas, G.J. 2003 The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor, Quarterly Journal of Economics, 118(4): 1335-1374.

Bowen, H.P. and Wu, J. Pédussel. 2004. "Does It Matter Where Immigrants Work? Traded Goods, Non-traded Goods, and Sector Specific Employment. Working Paper B16-2004, Center for European Integration Studies.

Bowen, H.P. and Wu, J. Pédussel. 2013. Immigrant Specificity and the Relationship between Trade and Immigration: Theory and Evidence. Southern Economic Journal, 80 (2).

Dimaranan, B. V. and McDougall, R. A. McDougall. 2002. Global trade, assistance and production: The GTAP 5 data base. Center for Global Trade Analysis, Purdue University

Docquier, F., Özden, C. and Peri, G. 2011. The wage effects of immigration and emigration. World Bank Policy Research Working Paper No. 556.

Dustman, C., Hatton, T. and Preston, I. 2005. The labour market effects of immigration. The Economic Journal 115:297–99.

Dyer, S., McDowell, L. and Batnitzky, A. 2010. The Impact of Migration on the Gendering of Service Work: The Case of a West London Hotel. Gender, Work & Organization, 17 (6): 635–657.

Farré, L., González, .L. and Ortega, F. 2011. Immigration, Family Responsibilities and the Labor Supply of Skilled Native Women. The B.E. Journal of Economic Analysis & Policy, 11(1) (Contributions, Article 34).

Felbermayr, G.J. and Kohler, W. 2007. Immigration and native welfare. International Economic Review 48:731-60.

Friedberg, R. M. and Hunt, J. 1995. The impact of immigration on host country wages, employment and growth. The Journal of Economic Perspectives, 9:23-44.

Fry, R. 2006. Pew Hispanic Center analysis of data from the U.S, Census Bureau and the United Nations:
http://pewhispanic.org/reports/report.php?ReportID=64#OtherTitle

Ghosh, J. 2009. Migration and Gender Empowerment: Recent Trends and Emerging Issues. Human Development Research Paper 2009/04, United Nations Development Programme Human Development Reports.

Gould, D. 1994. Immigrant links to the home country: Empirical implications for US bilateral trade flows. Review of Economics and Statistics, 76:302-16.

Head, K. and Ries, J. 1998. Immigration and trade creation: Econometric evidence from Canada. Canadian Journal of Economics, 31:47–62.

International Labor Statistics (ILO). 2010. LABORSTAT Labour Statistics Database. INTERNATIONAL LABOUR ORGANIZATION Geneva.

King, R. and Zontini, E. 2000. The role of gender in the South European immigration model. Revista de Sociologia Special Issue: Female Immigration in Southern Europe, Paper 60, 35-52: http://ddd.uab.es/pub/papers/02102862n60/02102862n60p35.txt.

Martin, P. L. and Miller, M. J. 1980. Guestworkers: Lessons from Western Europe. Industrial and Labor Relations Review, 33:3.

Migration News, September 2003 (10:4): http://migration.ucdavis.edu/mn/more.php?id=2698_0_10_0

Organization for Economic Co-operation and Development (OECD). 2002. Trends in International Migration, SOPEMI 2001.

Organization for Economic Co-operation and Development (OECD). 2010. Trends in International Migration, SOPEMI 2009.

Organization for Economic Cooperation and Development (OECD). 2010. National Accounts database: http://www.oecd.org/topicstatsportal/0,3398,en_2825_495684_1_1_1_1_1,00.html

Zimmerman, K. 1995. Tackling the European Migration Problem. Journal of Economic Perspectives, 9(2)

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