Immigration, Trade and Wages in Germany

Mehmet-Erdem Yaya

June 2005

Immigration, Trade and Wages in Germany

Mehmet E. Yaya[1]

Department of Economics, Finance, and Legal Studies, University of Alabama,

200 Alston Hall, Tuscaloosa, AL 35401, USA

May 2006

Abstract:

This paper examines the effects of several macroeconomic variables such as GDP, imports, unemployment, immigration and emigration on the real wages and salaries of German laborers. Annual data for 49 years has been used to estimate twelve different regressions, trying to capture the effect of these variables on the real wages and salaries in Germany while considering the unification of West-East Germany with a dummy variable. The results are intriguing, and contradicting with most of the earlier literature. The paper concludes that wages are unresponsive to the macroeconomics changes most of the time while salaries are more sensitive to macroeconomic changes. The paper also contributes to the literature by investigating the effects of macroeconomic variables on the salary and wage changes of different gender groups.

Keywords: Immigration, wages, international trade, Germany

[1] Tel.: 1-334-559-1472; e-mail: myaya@cba.ua.edu

1. INTRODUCTION

Germany implemented a systematic immigration policy post World War II at the beginning of 1960s, and had signed several recruitment agreements with developing countries with abundant labor force to fill the low-skill labor need during the economic expansion period. The countries which provided low skill labor are Italy, Spain, Greece, Turkey, Morocco, Portugal, Tunisia, and Yugoslavia. However, the immigration policy had been fine-tuned after the baby-boomers entered the labor force around 1970s. The number of immigrants coming to Germany less the departures from Germany is equal to net surplus of immigrants, given in Chart 1 and Chart 2, demonstrating strong evidence of several immigration policy changes over 30 years in the country.

[Chart 1]

[Chart 2]

Chart 1 clearly depicts that Germany had consecutive positive immigration surpluses during the 1960s when the guest workers were employed in low skill jobs, particularly in the jobs that Germans were increasingly unwilling to work, in accordance with the bilateral agreements signed with the countries listed above. Following 1970s, however, the German immigration policy got stricter in filtering the immigrants, therefore, decreasing the immigration surplus until 1980s. Starting from 1985, the need for unskilled labor rose again, forcing Germany to loosen the strict immigration policy, leading to the all times highest immigration surplus in 1991. Since the 1991 immigration surplus, mostly due to the collapse of Berlin Wall and reunion of West and East Germany, the immigration surplus has been gradually decreasing.

This paper is testing the hypothesis that immigration affects the labor market conditions in Germany. The underlying assumption is that immigrants increase the supply of labor force in an economy, thus, lower the market price of labor (See Figure 1). For a given economy, labor supply is fixed in short run, and immigration moves the inelastic supply curve of labor to the right, resulting in lower equilibrium wages for labor. Yet, the literature for the effect of immigration on wages has little support to the assertion made above.

[Figure 1]

The effect of immigration on wages has been long studied and has remained controversial among scholars for decades. Theoretical models have been established since early 1940s by economists like Samuelson, Mundell, Fleming, Heckscher and Ohlin, but empirical studies have not fully supported these theoretical models yet. The purpose of this paper is examining literature and shedding a light on this controversial subject.

Two main strands of research on this issue have been pursued by scholars from two distinct fields in economics: labor economists and trade economists. Labor economists tried to find a relation between immigration and real wages among labors with different skill, and/or education level. The theory behind the labor economists' stand is that immigration changes the labor supply of the economy, and thus, alters the overall labor market conditions. On the other hand, trade economists consider trade as the main influence on wages and employment. They believe trade causes factor price equalization (or at least convergence), reducing the incentives for immigration.

The outline of this paper is as follows: Section two introduces the effect of immigration on labor market, where the labor economists' argument is covered. Section three introduces the trade economists' point of view on the issue. Moreover, an extensive Rybczynski Model and Heckscher-Ohlin Model are presented. Section four introduces empirical studies and results in trade and labor literature on immigration and trade. Section five presents the data and the economic model tested. Section six introduces the empirical results of the model. Finally, section seven concludes.

2. LABOR ECONOMISTS' VIEW ON THE EFFECTS OF IMMIGRATION AND TRADE ON WAGES AND EMPLOYMENT

The effect of immigration on wages and employment has been debated in various platforms, especially considering the political implications of immigration and concerns of labor unions, which gave incentives to labor economists to investigate the issue. Gaston, Nelson (2000) outlined the theory on which labor economists rely with a General Equilibrium Model (see Figure 2). Generally, labor economists try to explain the effect of immigration with a single final good and m inputs model.

[Figure 2]

In the general equilibrium model (Figure 2), we have one good and two inputs: Skilled Labor (S); and Unskilled Labor (L). Production is given by unit isoquant (1/P). Initial endowments are given by z' = (S', L'), and the slope of the ray through z' from origin is s = S/L (the equilibrium input ratio). At a perfectly competitive market, equilibrium for relative wages is $w = w_s/w_l$ and is determined by the slope of the isocost line that is tangent to the isoquant, namely AA'. Now suppose that due to immigration, the endowment of unskilled labor increases, assuming that the immigrants are trying to maximize their lifetime expected utility and believing that moving to another country will generate more benefits. It is apparent that the supply shock alters the endowments, increasing L while holding S constant. Therefore the optimal ratio of inputs decreases as L increases ($s' < s$). Now, on the new equilibrium, wages are determined with a new

isocost line which has a lower slope, which represents the decrease of unskilled labor's wage (w_l) and the increase in skilled labor's wage (w_s).

Borjas, Freeman, Katz (1996) made extensive research on the effects of immigration on labor market in U.S., arguing that immigration is somewhat important in reducing the relative pay of U.S. high school dropouts. In their paper, Borjas et al. (1996) divided the labor into sub groups with respect to their educational level and tried to capture the effect of immigration on labor with different levels of education. The data set used by the authors indicate that a disproportionate high school dropout immigrants came in to the U.S. during 1980's (mostly from Mexico) which in return contributed to the decline in pay for less educated labor.

In order to capture the labor market consequences of immigration, Borjas et al. followed two main approaches: "Area Approach" and "Factor Proportions Approach". The first approach is in line with the labor economists' view, whereas the latter one is in line with trade economists'. Area Approach investigates the effect of immigration on gateway cities or states with high concentration of immigrants (Borjas et al., 1996). In this study, the authors concluded that there is a higher depressant effect of immigration when a wider area is studied than when a smaller metropolitan area is considered. They argued two main reasons for this conclusion: first, the authors believe that "the immigration of native workers responds to immigration induced changes in outcome, so that immigrant/native ratio overstates the immigration-induced increase in supply in any locale.", second they think that capital may respond to immigration induced changes in labor supply (Borjas et al., 1996). For Factor Proportions approach; Borjas et al. (1996) suggest to examine the effect of immigration through its effect on the national supply of labor with different skills. The authors

conclude that the effects of immigration and trade on relative wages are heavier for dropouts/other workers than high school/college equivalents. To summarize; Borjas et al. (1996) state that the effect of immigration on domestic labor market highly depends on the method used to assess immigration. Furthermore, regional negative effects of immigration on domestic labor wages are augmented in magnitude as wider areas are examined. Finally, the Factor Proportions Approach showed that immigration is an important factor in reducing the wages of high school dropouts while immigration and trade together only have a modest contribution on the fall of wages of high school equivalent employees. (Borjas et al., 1996)

In a previous paper, Borjas, Freeman, Katz (1991), put more emphasis on trade compared to the 1996 paper. In this earlier paper, Borjas et al. (1991) find the same results of immigration on wages. Namely, immigration augments the nation's supply of less skilled workers, particularly those with less than high school education. Therefore, immigration is likely to contribute substantially to the drop in earnings and employment opportunities of workers with low skill level. However Borjas et al. (1991) made important contribution to trade literature on this paper as well. Borjas et al. (1991) argues that the pattern seen in the U.S. in early 1980's is parallel to the Heckscher-Ohlin Model, where trade and immigration are substitutes. The H-O model will be presented extensively in the next section. Nevertheless, there are some important conclusions that the authors have derived which should be included here. In the 1996 paper, the authors argued that only immigration has substantial effect on wages of high school dropouts but in 1991 paper, they state that trade and immigration both contribute to the decline in wages of high school dropouts. In addition to this argument; Borjas et al. (1991) discuss the effect of exports and imports in the labor market. Exports are believed to induce the employment for both production and non-

production types of labor, whereas imports only induce non-production (selling, packing, and delivery) workers while it displaces production workers. The authors also present that import industries employ relatively less skilled labor than export industries. Consequently, the conclusion is that, like immigration, trade adversely affects the relative wages of employees with the skills intensively used in import intensive sectors. This is consistent with the Heckscher-Ohlin model.

Before closing this section, an alternative view on the effects of immigration on wages should also be presented. Butcher, Card (1991) argued in their paper that labor market consequences of immigration are limited based on the previous studies in the literature reviewed (Greenwood, McDowell, 1986). Butcher, Card (1991) have also used the Area Approach to the problem and tried to measure the labor market effects of immigration on different cities. However they suspect that two shortcomings of the Area Approach may exist, which were also mentioned by Borjas et al. (1996). These shortcomings are: first, area selections of immigrants are insensitive to local market conditions; second domestic migration of natives may offset the effects of immigration. Consequently, the authors suspect an underestimation of the overall effect of immigration on the local market conditions. Because the Census 1980 data indicate that immigration is highly concentrated on few cities, the research targets the effect of immigration on those cities: New York, Las Angeles, and Miami etc. Another important aspect of the Census immigration data, as the authors mentioned, is that there is a great variation on the size and quality of immigrants. The quality (wage gap between native and immigrant) is lower in cities with high inflow of immigrants. An important assumption the authors made is that the immigration induces a proportional increase in labor force and population. In contrast, Butcher, Card (1991) found weak

indication of adverse effects of immigration on wages. However they found a positive link between immigration and net domestic migration.

3. TRADE ECONOMISTS' VIEW ON THE EFFECTS OF IMMIGRATION AND TRADE ON WAGES AND EMPLOYMENT

As mentioned before, trade economists and labor economists have a different approach to assess the effects of immigration on wages and employment. Probably, the most significant difference between these approaches is dimensionality. Labor economists generally use one final good with several inputs, whereas trade economists use multiple final goods with multiple inputs. Therefore, the General Equilibrium model explained in section two becomes insufficient to capture the effects of immigration for trade economists (Gaston, Nelson, 2000). To reflect the multiple final goods alteration in the model; a second good with a similar isoquant ($1/P_2$) is added to the figure. (See Figure 3) This is also called Factor Proportions Model with Lerner-Price Diagram.

[Figure 3]

Since both goods have unit isoquant the isocost line, tangent to both isoquants, should be the same, AA'. Having the same isocost line yields same slope for both goods; meaning same relative wages ($w= w_s / w_l$) for both goods. Free factor mobility and small open economy (SOE) characteristics are assumed here. With these assumptions; we are able to fix the prices of goods (economy is price-taker), and therefore to fix the isoquants and isocost line whose slope gives us the relative wage rate. If two countries produce the very same goods, Good 1 and Good 2, have the same technology and same price but different endowments, these they choose the same S_1 and S_2 and have the same relative wages ($w = w_s / w_l$). This is called Factor Price Equalization.

If a single country case is considered; then the effect of immigration is explained by the Rybczynski Model. The increase in immigration of less skilled labor (L) should have an effect on the economy but we have shown that isoquant and isocost lines can not change under the perfect factor mobility and SOE assumptions. Therefore, the only way the economy can respond to this endowment change (increase in less-skilled labor) is specializing on the good that has been intensively used in the sector that faces increased endowment. Rybczynski Model explains that the increase in endowment will cause specialization in the sector that faces endowment increase. That is specialization changes the output mixture of the economy. An economy that has increased the amount of unskilled labor immigration (L) will increase the output in the sector that uses unskilled labor intensively while decreasing the output that uses skilled labor (S) (See Figure 3).

Unlike the Rybczynski Model, the Heckscher-Ohlin Theory (H-O) looks at two country scenario. The theory has been developed by two Swedish economist, one of which (Bertil Ohlin), won the Nobel Prize in economics, in 1977. Basically, the H-O Theory suggests that each country exports the good that uses intensively the factor with which they relatively well endowed under set of assumptions. These assumptions are: first, perfect competition in the good markets; second, countries with identical technologies and homothetic preferences; and finally, perfect mobility of the factors.

[Figure 4]

In Figure 4, the model has been presented using the same assumptions the Heckscher-Ohlin Theory made earlier. We have skilled (S) and unskilled (L) labor where the SOE produces two

outputs (Good 1 and Good 2). There is unskilled labor immigration in the economy that increases the unskilled labor endowment of the economy. The increased unskilled labor puts pressure on the wages of unskilled labor that is currently employed in the economy so that the relative wages ($w = w_s / w_l$) changes in favor of skilled labor. Thus, the slope of the isocost line gets flatter, and the economy moves to a different isoquant for the good that uses unskilled labor intensively (from $1/P_2$ to $1/P'_2$). The main difference between the Rybczynski Model and the H-O Model is the fact that Rybczynski assumes isocost and isoquants in the economy are fixed and the economy response is limited to specialization. The economy moves within the cone, cone of diversification, defined by s_1 and s_2 in Figure 3. On the contrary, in the H-O Model, the economy adjusts the isocost and isoquants to reflect the effects of endowment change.

4. EMPIRICAL RESULTS AND OTHER ISSUES ON IMMIGRATION, TRADE AND WAGES IN THE LITERATURE

Bilal, Grether, de Melo (1998) also investigated the immigration era with a trade model where a three factor two sector model has been employed to analyze the effects of immigration. However, the purpose of the paper is to find the determinants of natives' attitudes toward immigration. Bilal et al. (1998) correctly indicted that factor movement has a sole incentive: to maximize income. Yet, the authors pinpointed that contrary to all globalization movements; the countries have not been only encouraging the free capital movement but also opposing the free labor movements. Not surprisingly they are also opposing the low-skill low-capital labor more than the high-skill ones. The important assumption here is that the immigration and imports are substitutes. That is, the countries that are subject to low-skill labor immigration assumed to import goods that are produced by low-skilled labor intensively. The attitudes of domestic are summarized by the authors as follows: one shot immigration wave does not affect the income of the natives. Domestic high and low skill labors always have opposite attitudes towards the immigration (Bilal et al., 1998).

Zimmerman (1996) has also investigated the effect of immigration and trade on wages and employment in Germany and Austria during the post Iron Curtain fall time. The Austrian results indicate that immigration negatively affected the wages and employment of natives but had no effect on total employment. Imports negatively affected the employment whereas exports positively affected wages. However, results are mixed for Germany. Neither immigration nor trade negatively affected wages and employment. Trade did not affect wages at all, and hardly affected

employment. Nonetheless, he concluded that blue collar immigrants are substitutes for native blue collars and complements for native white collars. From this behavior, Zimmerman (1996) concluded that most of the immigrants (from East Europe) are complement to white collar native workers in Germany thus the overall effect of migrants on the German labor market is unproblematic.

There are numerous other studies about the effect of immigration and trade on wages, employment. Heiskem-DeNew and Zimmermann (1994) stated that the immigration hardly affects native's wages. Haisken-DeNew and Zimmermann (1997) studied the wage and mobility effects of trade and migration. They found that trade matters more than migration for their effects on wages. Moreover, wages are affected negatively by a relative increase in imports (relative to exports). Brandel, Hofer and Pichelman (1994) analyzed turnover processes in firms and concluded that the recent surge of new immigrants into Austria led to a significant displacement of guest workers of earlier generations, but also of natives. Winter-Ebmer and Zweimüller (1997) conclude that increased immigration did not result in higher unemployment entry of Austrian manufacturing workers, although it increased the duration of unemployment. Aiginger, Winter-Ebmer and Zweimüller (1997) analyzed a panel of Austrian workers in manufacturing, and conclude that individual unemployment rates over a period of three years react significantly negative to increased export volumes and (only insignificantly) positive to import volumes. Brezis (1993) argues that although the initial effect of immigration is negative on wages, the long term effect should be expected to be positive, due to endogenous response of investment together with increasing returns to scale. Drinkwater, Levine, Lotti (2002) supports the idea of no significant detrimental effect of immigration on labor market and wages with his empirical study both on

Germany and US. He also found a limited relation between trade and immigration. Bruder (2004) encountered no significant impact of immigration on trade, but found a negative effect of trade on immigration and a weak link between trade and factor movement. She also indicates that immigration promotes imports of intermediary and finished goods, but has an insignificant effect on exports. Kohli (2002) has almost gotten the same results for the effect of immigration on international trade. He argues that immigration tends to stimulate imports and worsen the trade balance where export has not been significantly affected by immigration. These findings are based on his Swiss non-resident worker research.

5. THE ECONOMIC MODEL AND DATA

Consistent with the earlier literature, the following variables are chosen as dependent and independent variables: real wages, real salary, gross domestic product (GDP), unemployment, imports, labor arrivals in form of immigrants, migrant departures from Germany. The functional form of the economic model can be depicted as:

Wages = F (GDP, Unemployment, Imports, Arrivals, Departures)

Salary = F (GDP, Unemployment, Imports, Arrivals, Departures)

GDP, unemployment and imports are all the control variables that account for the macroeconomic changes in the German economy since 1950. Wage and salary are the dependent variables in which we are interested. The data consist of annually reported forty nine observations, and have been kindly provided by the Federal Statistic Office of Germany. GDP and imports are given in nominal values; therefore, they are inflation adjusted before being used in the log linear regression model. Unemployment is given in percentages, the arrival and departure data is given in actual numbers. Time series models have many restrictions that limit the researcher who has to take these restrictions into consideration before estimating the model. The initial model that includes level data for the dependent and independent variables can not be estimated, due to the fact that none of the variables are stationary except unemployment rate.

$$wages = \delta_0 + \delta_1 GNP + \delta_2 imports + \delta_3 unemployment + \delta_4 arrivals + \delta_5 departures + \varepsilon$$

$$salary = \gamma_0 + \gamma_1 GNP + \gamma_2 imports + \gamma_3 unemployment + \gamma_4 arrivals + \gamma_5 departures + \varepsilon$$

[Graph 1.a-1.e]

Graph 1.a-1.e clearly demonstrates that real wages and real salaries are sharing a common trend, while imports are probably following a stochastic common trend with GDP. Unemployment rate started high then decreased for years, and after a minimum point around 1970, it started rising. West-East Germany Union gave increasing rate of unemployment after 1990s. Finally arrivals and departures have a less clear upward trend which is expected by the literature that Germany is running 1% immigration surplus every year on average.

Since the original model can not be estimated in levels, all the variables are converted into logarithmic form, however, they were again found to be non stationary, having a trend component, therefore is not suitable for regression estimation. Finally, first differences of the logarithmic form of variables have been used in the estimation and they are depicted in Graph 2.a-2.e. The variables in first difference in logarithmic form are found to be stationary, autoregressive of degree one, AR(1).

[Graph 2.a-2.e]

All the variables in first difference in logarithmic form are found to be stationary, autoregressive of degree one, AR(1) with white noise residuals. Summary statistics for the AR(1) process can be found on the appendix to the stationarity table. Consequently, the first degree difference model below has been used to test the coefficients of the variables.

[STATIONARITY TABLE]

$$\Delta \ln wages = \delta_0 + \delta_1 \Delta \ln GNP + \delta_2 \Delta \ln imports + \delta_3 \Delta \ln unemployment + \delta_4 \Delta \ln arrivals + \delta_5 \Delta \ln departures + \varepsilon$$

$$\Delta \ln salary = \gamma_0 + \gamma_1 \Delta \ln GNP + \gamma_2 \Delta \ln imports + \gamma_3 \Delta \ln unemployment + \gamma_4 \Delta \ln arrivals + \gamma_5 \Delta \ln departures + \varepsilon$$

The expected signs of the coefficients are: $\gamma_1, \delta_1 > 0$; $\gamma_2, \delta_2 < 0$; $\gamma_3, \delta_3 < 0$; $\gamma_4, \delta_4 < 0$; $\gamma_5, \delta_5 > 0$. As GDP and migrations outside from Germany increase, wages and salary in the German labor market expected to increase, while imports, unemployment and immigrants increases, wages and salary are expected to decrease. GDP is the macroeconomic control variable, and directly affect the labor market with income effect. As GDP increases, the general wealth of the society also increases. Therefore, the wages are expected to rise with GDP. Imports have adverse affect on wages; an increase in imports decreases the production in the economy, and therefore, a decrease the demand for labor in the market. Assuming a perfectly inelastic market supply of labor; decrease in demand for labor pushes the equilibrium level of wages and salaries. Unemployment has also negative effect on wages and salaries of labor in the economy. As unemployment rate increases, labor available in the market rises; giving more power to the employers, and thus, decreasing the equilibrium wages. Finally, arrivals have negative effect on wages, increasing the labor available in the market while departures have positive effect, decreasing the number of labor available to be employed.

6. EMPIRICAL RESULTS

Table 2 demonstrates four different regression results, one of which, Model 1, has been given below:

Model 1

$$\Delta \ln wages = \delta_0 + \delta_1 \Delta \ln GNP + \delta_2 \Delta \ln imports + \delta_3 \Delta \ln unemployment + \delta_4 \Delta \ln arrivals + \delta_5 \Delta \ln departures + \varepsilon$$

Model 1 does not yield the expected sign of the coefficients, mostly due to the heteroscedasticity and serial correlation problems. Serial correlation problem can be inferred from Durbin-Watson Statistic, which is yielding rejection of null hypothesis of no first order serial correlation. White's procedure also indicate that there is heteroscedasticity problem, clearly indicating that the data has a structural break where the variances on subsets, before and after the break, are not the same. These problems gave mostly insignificant coefficient values, and also the signs of the coefficients were not as expected. The explanatory power of the model is low, $R^2 = 0.21$, and F-Test states that all the coefficients are zero with five percent confidence level.

Model 2 is testing the previous model plus a time variable and a lagged dependent variable. The purpose of these two additional variables is to solve the serial correlation problem in the Model 1. The new model looks like:

Model 2

$$\Delta \ln wages = \delta_0 + \delta_1 \Delta \ln wages_{t-1} + \delta_2 \Delta \ln GNP + \delta_3 \Delta \ln imports + \delta_4 \Delta \ln unemployment + \delta_5 \Delta \ln arrivals + \delta_6 \Delta \ln departures + \delta_6 Time + \varepsilon$$

Model 2 has more significant variables with better coefficient estimates, for example, the lagged dependent variable has a positive significant coefficient, which is expected. In addition unemployment has negative sign with a significant t-value. Despite imports has a significant coefficient, the coefficient has the plus sign. The explanatory power of the model rose dramatically to $R^2 = 0.66$; the F-test indicate that at least one of the coefficients is non-zero. Finally, Durbin-Watson statistic shows that serial correlation problem has been solved.

Model 3 introduces a dummy variable and robustness to the model. Dum91 has been constructed such as Dum91 = 0 for t = 1951-1990 and Dum91 = 1 for t = 1991-1998, which accounts for the unification effects of the West-East Germany. Model 3 looks like:

Model 3 - 4

$$\Delta \ln wages = \delta_0 + \delta_1 \Delta \ln wages_{t-1} + \delta_2 \Delta \ln GNP + \delta_3 \Delta \ln imports + \delta_4 \Delta \ln unemployment + \delta_5 \Delta \ln arrivals + \delta_6 \Delta \ln departures + \delta_6 Time + \delta_7 Dum91 + \varepsilon$$

The results from Model 3 are disappointing. Only the lagged dependent variable and unemployment are significant and the rest of the variables are not sufficient enough explaining the change in wages, $R^2 = 0.66$. Using robustness and adding a dummy variable did not increase the quality of the estimation. It is still the case that at least one of the coefficients is different than zero,

and there is no serial correlation problem in the model. It should be also noted that despite the insignificant coefficients, arrivals and departures has coefficients with the correct signs.

Model 4 is the same model as Model 3, with a single difference of the Cochran-Orcutt transformation procedure. The Cochran-Orcutt procedure is used to filter the serially correlated variables to get better estimates on coefficients. However, our estimation is far from yielding desired results. Only lagged dependent, GDP and unemployment are significant, despite the incorrect sign of GDP. Arrivals, as well as departures did not affect the wages in any models. Imports are significant with incorrect sign in three of four different models. On the other hand unemployment is significant in three of four models with correct sign. GDP, time, and the dummy variable have no impact on the model based on the four model results.

In the first four models, real wages are the dependent variable; now, salary becomes the new dependent variable in Model 5-8. (See Table 3) Model 5 is estimating the salary on GDP, imports, unemployment, arrivals to and departures from Germany.

Model 5

$$\Delta \ln salary = \gamma_0 + \gamma_1 \Delta \ln GNP + \gamma_2 \Delta \ln imports + \gamma_3 \Delta \ln unemployment + \gamma_4 \Delta \ln arrivals + \gamma_5 \Delta \ln departures + \varepsilon$$

Model 5 is more appealing than the first four models, because despite the fact that only two variables are significant, one of that variable is arrival (immigration) with a correct coefficient sign. The model still suffers from serial correlation and possible heteroscedasticity, but the initial

results are encouraging. GDP, arrival and departure has all correct signs and the F-test confirms that at least one of the coefficients is non-zero. Serial correlation exists in the model, proven by the Durbin-Watson statistic.

Model 6 introduces the lagged dependent to the R.H.S. of the equation. Serial correlation problem is supposed to be solved by the new independent variable. In addition, a time variable is added to Model 6 in order to get more accurate coefficients. Model 6 can be depicted as:

Model 6

$$\Delta \ln salary = \gamma_0 + \gamma_1 \Delta \ln salary_{t-1} + \gamma_2 \Delta \ln GNP + \gamma_3 \Delta \ln imports + \gamma_4 \Delta \ln unemployment + \gamma_5 \Delta \ln arrivals + \gamma_6 \Delta \ln departures + \gamma_7 time + \varepsilon$$

Model 6 has better estimates than Model 5, in terms of explanatory power of the regression and the number of significant coefficients. In this model, lagged dependent, unemployment and arrivals (immigration) are all significant at 1%, 10%, and 5% significance level, respectively. Moreover signs of all the significant variables are correct. Explanatory power of the model rose, $R^2 = 0.87$, and the no serial correlation remained in the model, shown by the Durbin Watson statistic.

Similar to the methodology used in Model 3, where wage is the dependent variable, in Model 7 a dummy variable is added to account for the unification of Germany. The Dummy variable is not found to be significant but asserting a negative impact of unification on the labor market with a negative coefficient sign. Unemployment and immigration negatively affected the salary earners, supported with significant coefficients. As usual, the dependent lag variable is significant. In addition, the explanatory power of the regression increased slightly and the Durbin Watson

statistic come closer to the significant value of two (2). The robust model tested is demonstrated below. Robustness decreases the standard error variability in the model.

Model 7 - 8

$$\Delta \ln salary = \gamma_0 + \gamma_1 \Delta \ln salary_{t-1} + \gamma_2 \Delta \ln GNP + \gamma_3 \Delta \ln imports + \gamma_4 \Delta \ln unemployment + \gamma_5 \Delta \ln arrivals + \gamma_6 \Delta \ln departures + \gamma_7 time + \gamma_8 Dum91 + \varepsilon$$

Finally, the last model we estimated, Model 8, includes the Cochran-Orcutt Transformation, expecting to get better estimates from the regression. The results are not different from Model 7's. Lag dependent, unemployment and immigration have correct signs for their correspondent coefficients and are significant at 1%, 5% and 5% confidence level, respectively. R^2 increased slightly to 0.881 (to be consistent with the other numbers) and the Durbin Watson Statistic increased to 1.97. However, standard errors increased for almost all variables.

The conclusions that can be inferred from the first four models, Models 1 - 4 are as follows (see Table 2): GDP is not found to be a significant factor determining the wages in German labor market. The coefficient sign of GDP is found to be negative in all the Models 1-4, which indicates the weak exogenous effect of GDP. On the other hand, Imports are found to be affecting the wages significantly at 10% confidence level in three of four models tested, with an incorrect sign of coefficient. The reason may be the fact that contrary to the previous literature, imports in Germany may be growth inducing, consisting mostly of intermediary goods that are used for production. However, all the earlier work on the effects of imports has assumed that imports deteriorate the production, thus, hurt the labor market conditions. Immigration is insignificant in all the models 1

– 4, with incorrect sign except the first model. Migration from Germany has the correct sign of the coefficient but is never significant. Time has no significant effect on wages with negative coefficient sign in all the models. Finally, the dummy variable, which intends to capture the effect of unification of West and East Germany on wages, has no significant effect in Models 3 – 4. The weak results for wages mostly stems on the fact that the labor unions has tremendous power on setting the wages in German labor market. Wages are unresponsive to the macroeconomics changes most of the time, and the democratic socialist government supports the power balance of employer and labor unions.

Model 5-8 where the salaries become the dependent variable, on the other hand, have much more anticipated results compared to first four models. (See Table 3) GDP has the correct coefficient sign, despite it is never significant. Likewise, imports are never significant with a positive coefficient sign. This result is consistent with the argument that imports in Germany are mostly intermediary goods based, therefore, inducing economic growth, contrary to the belief in the literature studying the import effect on wages. Unemployment is significant with anticipated sign of the coefficient in three of four models at 5% and 10% significance level. Based on Model 8, 1% increase in unemployment decreases the salaries by 0.018 %. Fortunately, immigration is also significant in all the models tested; Model 5-8 with the expected sign of coefficient. Model 8 asserts that 1% increase in immigration decreases the salary by 0.021%. Departures are never significant neither the time variable, in any model but the coefficients has the anticipated sign. In contrast, the dummy variable has the expected sign, although it is not significant. The Explanatory power of the second set of models, Models 5-8, is much higher than the first set, Models 1-4, ranging from 0.30-0.88.

Then, the vital question is why the salary is more responsive than wages. Why can one see an effect of immigration on salaries of employees but not on wages? The explanation needs more research on the issue, but it can be argued that the power of labor unions limit the responsibility of the wages where they are set by the negotiations between the labor unions and employees. Contrary to wages, salaries in the German labor market are more flexible and open to external shocks, allowing the adjustment process in the free market economy.

This paper also wishes to contribute to the field by extending the models, including the gender as a dependent variable, such that wages and salaries for male and female labor differ significantly, therefore, establishing an economic model based on gender. Inferring results from these results will definitely shed a light on the effect of immigration over male and female labor. Wages and salaries for different gender groups are also kindly provided by the German Statistics Office, including annual wage and salary data of 1951-1998. For the regression, a robust model that includes the dependent lag variable, time, and dummy variable, is used that as similar as Model 3 and Model 7, tested earlier. Model 9 includes the wage for a male in Germany as a dependent and lagged wage, GDP, imports, unemployment, arrivals, departures, time and dummy as independent variables. Model 9 looks like:

MODEL 9

$$\Delta \ln wages(male) = \delta_0 + \delta_1 \Delta \ln wages(male)_{t-1} + \delta_2 \Delta \ln GNP + \delta_3 \Delta \ln imports$$
$$+ \delta_4 \Delta \ln unemployment + \delta_5 \Delta \ln arrivals + \delta_6 \Delta \ln departures + \delta_6 Time + \delta_7 Dum91 + \varepsilon$$

MODEL 10

$$\Delta \ln wages(female) = \delta_0 + \delta_1 \Delta \ln wages(female)_{t-1} + \delta_2 \Delta \ln GNP + \delta_3 \Delta \ln imports + \delta_4 \Delta \ln unemployment + \delta_5 \Delta \ln arrivals + \delta_6 \Delta \ln departures + \delta_6 Time + \delta_7 Dum91 + \varepsilon$$

The model estimations for different genders yield some insightful results (See Table 4). First, wages for females are more dependent on last year's wages than wages for males. The coefficient for females is higher than for male workers. Second, none of the following variables, GDP, immigration, departure, time, are significant for neither male nor female workers. However, despite the fact that immigration is insignificant, the magnitude for male workers is higher meaning that immigration has greater effect on male workers than female workers. On the other hand, unemployment is significant at 10% confidence level for both male and female workers, and the effect of unemployment on female workers is higher than male workers. Finally, imports are significant for male at 10% confidence level with a positive coefficient, whereas it is insignificant for females with a negative coefficient. So, increase in imports is inducing male dominated jobs significantly but imports have insignificant negative impact on jobs dominated by female workers.

MODEL 11

$$\Delta \ln salary(male) = \delta_0 + \delta_1 \Delta \ln salary(male)_{t-1} + \delta_2 \Delta \ln GNP + \delta_3 \Delta \ln imports + \delta_4 \Delta \ln unemployment + \delta_5 \Delta \ln arrivals + \delta_6 \Delta \ln departures + \delta_6 Time + \delta_7 Dum91 + \varepsilon$$

MODEL 12

$$\Delta \ln salary(female) = \delta_0 + \delta_1 \Delta \ln salary(female)_{t-1} + \delta_2 \Delta \ln GNP + \delta_3 \Delta \ln imports + \delta_4 \Delta \ln unemployment + \delta_5 \Delta \ln arrivals + \delta_6 \Delta \ln departures + \delta_6 Time + \delta_7 Dum91 + \varepsilon$$

Model 11 – 12 are the regressions where the salary is a dependent variable and independent variables are the same that were used in all the other models for male and female workers respectively (See Table 4). Robustness is applied to the regressions and serial correlation and heteroscedasticity problems are intended to be solved. The comparative results of males and females are as follows: both male and female salaries are highly dependent on the previous year's salary; however, female salaries are more dependent on previous year's salary than male salaries. Lag salary are both significant at 1% confidence level. GDP is not significant for both groups and has incorrect sign. Imports are insignificant, like GDP, for male and female salaries but the interesting outcome is that imports insignificantly affect both groups in different direction. More clearly, despite the fact that imports are not significant, they have a positive effect on male dominated industries while has negative effect on female dominated industries. On the other hand, unemployment negatively affects both groups and the coefficient for the variable is significant at 5% significance level. However, unemployment is negatively affecting males slightly higher than females. Thus, it can be inferred that the industries that employ males more than females are more responsive to market changes than other industries. Arrivals have no significant effect, and also the coefficient sign is not correct. Contrary to arrivals, departures have alternating signs for male and female salary groups. However, they are both insignificant. Departures negatively affect the salaries of the males while positively affect the females with insignificant coefficients. Finally, for the first time, the dummy variable that accounts for unification became significant with 10% significance level, though the coefficient is reported to be positive. The dummy variable confirms that the unification of Germany has a significant impact in salary earners market.

7. CONCLUSION

This paper examines the effect of several macroeconomic variables such as GDP, imports, unemployment, immigration and emigration on the real wages and salaries of German laborers. Annual data for 49 years has been used to estimate twelve different regressions, trying to capture the effect of these variables on the real wages and salaries in Germany while considering the unification of West-East Germany with a dummy variable. The results are intriguing, and contradicting with most of the earlier literature. The paper also contributes to the literature by investigating the effects of macroeconomic variables on the salary and wage changes of different gender groups.

Starting with GDP variable, it is found to be the insignificant factor determining the wages and salaries in German labor market for both male and female laborers. On the contrary, imports are found to be affecting the wages significantly at the 10% confidence level, and affecting salaries insignificantly with a positive coefficient, claiming that imports in Germany, contrary to the literature, may be growth inducing, which consist mostly intermediary goods that are used for production industries. For different wage and salary groups, increase in imports is inducing male dominated jobs and their wages significantly but imports have insignificant negative impact on job wages dominated by female workers. Moreover, despite it is not significant, imports have a positive effect on the salary of the male dominated industries, and have negative effect on female dominated industries.

Immigration is an insignificant factor determining the wages in German labor market; however, it is significant for the salary determination. Model 8 asserts that 1% increase in immigration decreases the salaries by 0.021%. Immigration has a greater negative effect, although insignificant, on male workers' wages and salaries than female workers'**.** Departures are never significant, neither is the time variable, in any model for wage and salary determination. Nonetheless, the time variable negatively affects the salaries of the males while positively affect the females with insignificant coefficients.

Unemployment negatively affects the wages as well as the salaries with 5% significance level. Based on Model 3 and 8, 1% increase in unemployment decreases the wages by 0.031% and the salaries by 0.018 %. In addition, unemployment is significant at 10% confidence level for the wages' of both male and female workers and the effect of unemployment on female workers' wage is higher than male workers' while it negatively affects males' salaries slightly higher than females'. That is, the industries that employ more males than females are more responsive to salary changes than other industries.

Finally, wages and salaries for females are more dependent on last year's salaries and wages. The dummy variable confirms that the unification of Germany has a significant impact in salary earners market. The weak results for wages mostly stems on the fact that the labor unions have tremendous power on setting the wages in the German labor market. Wages are unresponsive to the macroeconomics changes most of the time, while salaries are more sensitive to macroeconomic changes.

REFERENCES

Bilal, Sanoussi; Grether, Jean-Marie; de Melo, Jaime. Determinants of Attitudes Towards Immigration: A Trade-Theoretic Approach.. [Working Paper] *Centre for Economic Policy Research, Discussion Paper: 1877. p 26. May 1998.*

Borjas, George J; Freeman, Richard B; Katz, Lawrence F. On the Labor Market Effects of Immigration and Trade.. [Working Paper] *National Bureau of Economic Research, Inc, NBER Working Papers: 3761. 1991*

Borjas, George J; Freeman, Richard B; Katz, Lawrence F. Searching for the Effect of Immigration on the Labor Market. [Working Paper] *National Bureau of Economic Research, Inc, NBER Working Papers: 5454. 1996.*

Brandel, Franz, Hofer, Helmut and Karl Pichelmann: *Verdrängungsprozesse am Arbeitsmarkt,* Research Memorandum No. 345, Institute for Advanced Studies, Vienna, 1994.

Brezis, Elise S; Krugman, Paul. Immigration, Investment and Real Wages. [Working Paper] *National Bureau of Economic Research, Inc, NBER Working Papers: 4563. 1993.*

Bruder, Jana. "Are Trade and Migration Substitutes or Complements? - The Case of Germany, 1970-1998" [Working Paper] 2004.

Butcher, Kristin F.; Card, David. "Immigration and Wages: Evidence From the 1980's," [Working Paper] Industrial Relations Sections, Department of Economics, Princeton, 1991.

Drinkwater, Stephen; Levine, Paul; Lotti, Emanuela. "The Economic Impact of Migration: A Survey", *International Journal for Economic Development*, Vol. 5, No. 2, 2003.

Haisken-DeNew, John P.; Zimmermann, Klaus F. "Wage and Mobility Effects of Trade and Migration," [Working Paper] CEPR Discussion Papers 1318, C.E.P.R. Discussion Papers, 1994.

Haisken-DeNew, John P.; Zimmermann, Klaus F. "Native Wage Impacts of Foreign Labor," [Working Paper] 1997.

Gaston, Noel; Nelson, Douglas. Immigration and Labour-Market Outcomes in the United States: A Political-Economy Puzzle. [Journal Article] *Oxford Review of Economic Policy. Vol. 16 (3). p 104-14. Autumn 2000.*

Gaston, Noel; Nelson, Doug. The Employment and Wage Effects of Immigration: Trade and Labour Economics Perspectives. [Collective Volume Article] *Trade, investment, migration and labour market adjustment. Greenaway, David Upward, Richard Wakelin, Katharine, eds., IEA Conference Volume, no. 135. Houndmills, U.K. and New York: Palgrave Macmillan in association with the International Economic Association. p 201-35. 2002*

Kohli, Ulrich. Migration and Foreign Trade: Further Results. [Journal Article] *Journal of Population Economics. Vol. 15 (2). p 381-87. May 2002.*

Rassekh, Farhad; Thompson, Henry. Micro Convergence and Macro Convergence: Factor Price Equalization and Per Capita Income. [Journal Article] *Pacific Economic Review. Vol. 3 (1). p 3-11. February 1998.*

Thompson, Henry. International Differences in Production Functions and Factor Price Equalization. [Journal Article] *Keio Economic Studies. Vol. 34 (1). p 43-54. 1997.*

Thompson, Henry. Free Trade and Income Redistribution across Labor Groups: Comparative Statics for the U.S. Economy.. [Journal Article] *International Review of Economics & Finance. Vol. 6 (2). p 181-92. 1997.*

Thompson, Henry. Production and Trade with International Capital Movements and Payments. [Journal Article] *Southern Economic Journal. Vol. 58 (3). p 743-49. January 1992*

Winter-Ebmer, Rudolf; Zweimuller, Josef. Immigration, Trade and Austrian Unemployment.. [Collective Volume Article] *Unemployment in Europe: Proceedings of a conference held by Confederation of European Economic Associations, Vienna, Austria. Landesmann, Michael A. Pichelmann, Karl, eds., Confederation of European Economic Associations Conference Volumes. New York: St. Martin's Press; London: Macmillan Press; in association with Confederation of European Economic Associations. p 250-67. 1997.*

Zimmermann, Klaus F. Wage and Mobility Effects of Trade and Migration.. [Working Paper] *C.E.P.R. Discussion Papers, CEPR Discussion Papers: 1318. 1996.*

CHART 1

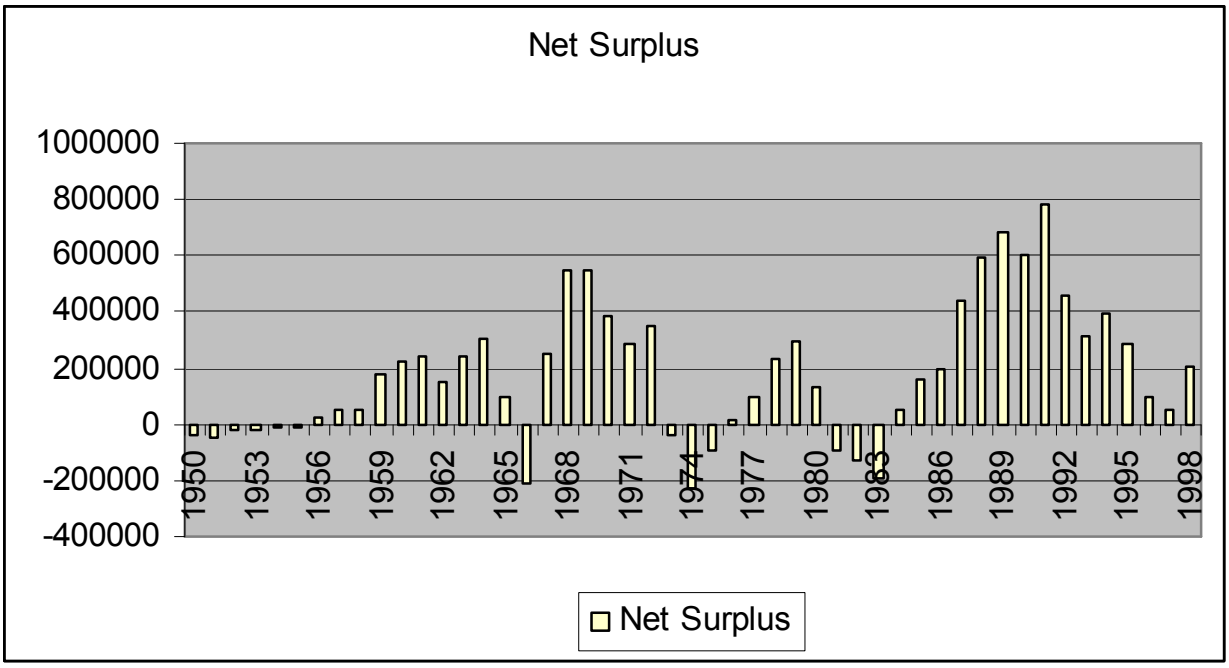


CHART 2

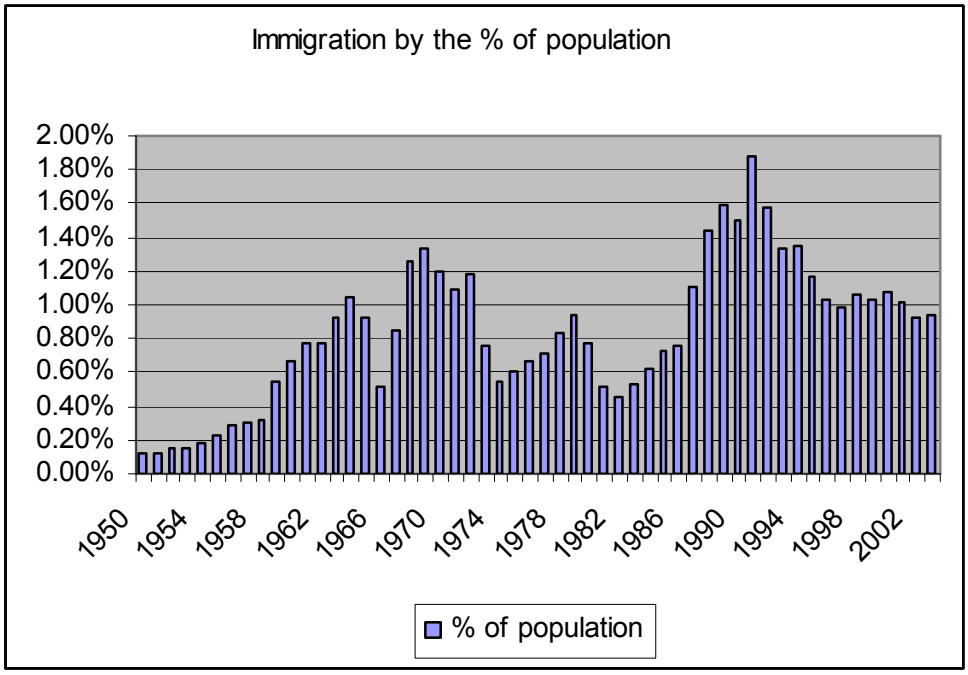


Figure 1

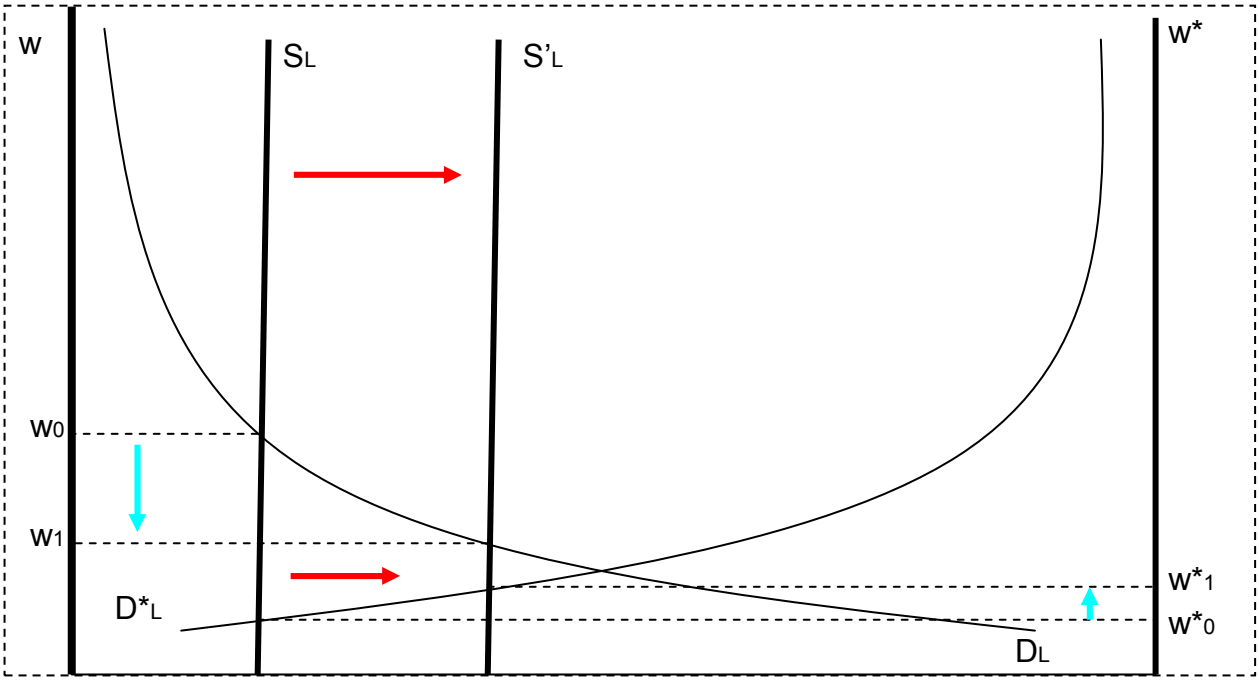


Figure 2

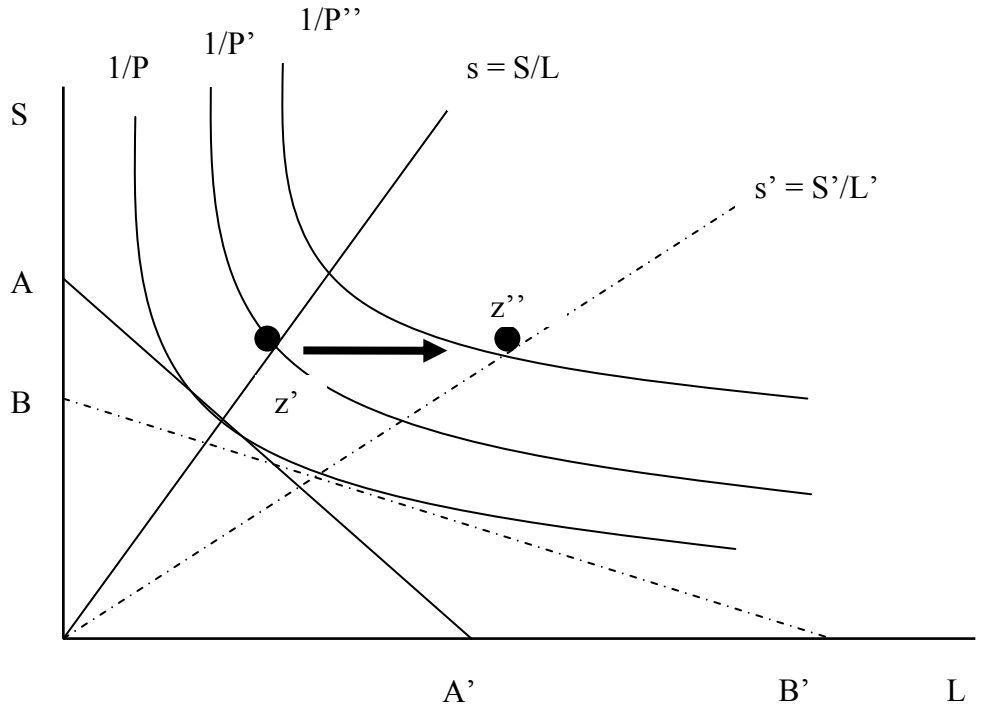


Figure 3

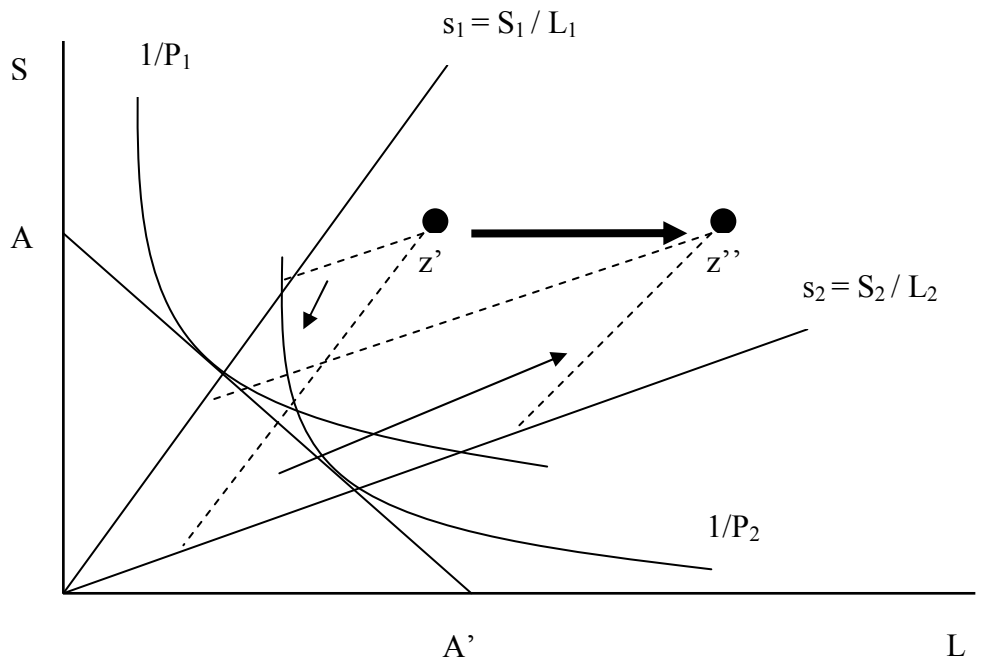
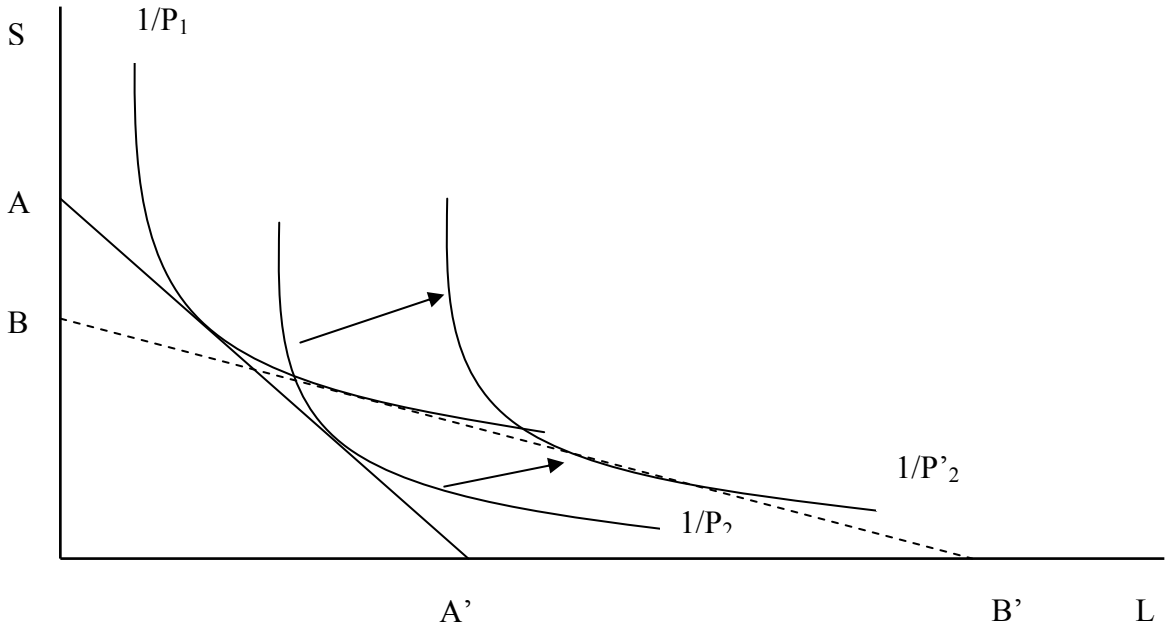
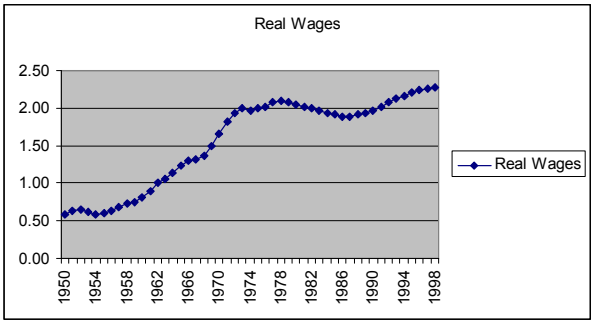


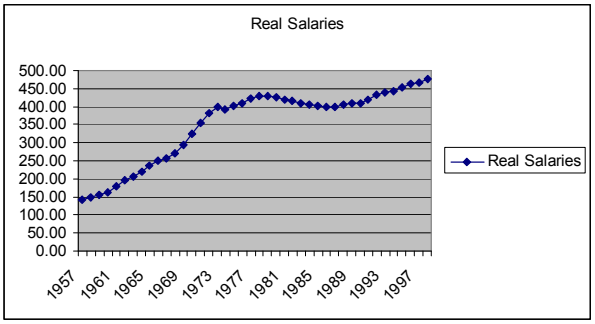
Figure 4



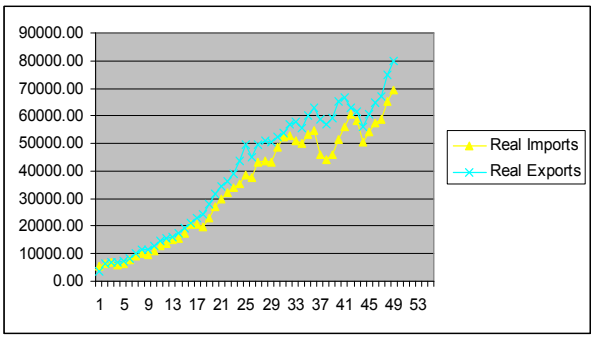
GRAPH 1



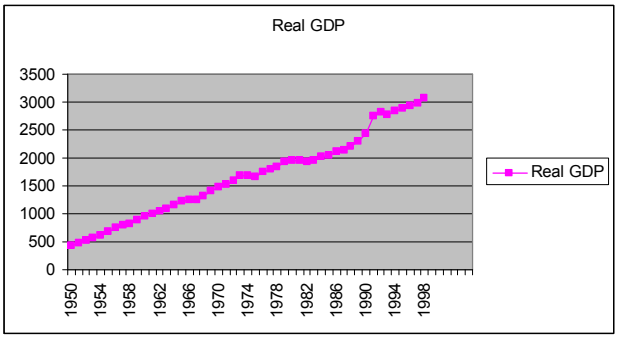
Graph 1.a



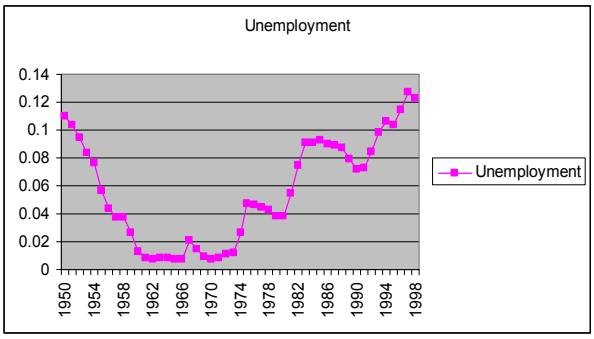
Graph 1.b



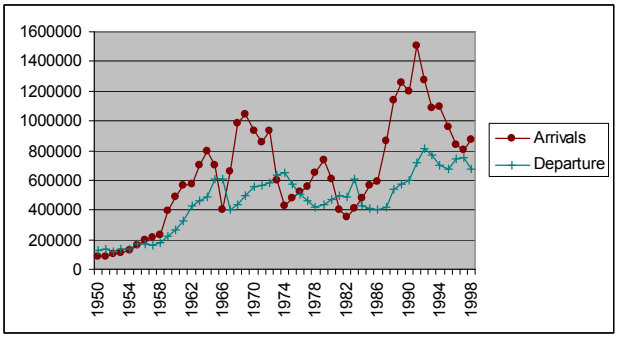
Graph 1.c



Graph 1.d

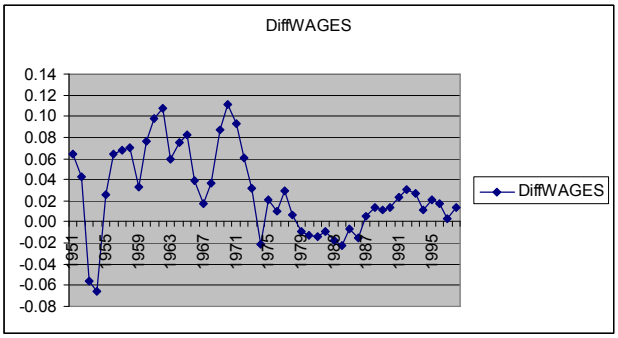


Graph 1.d

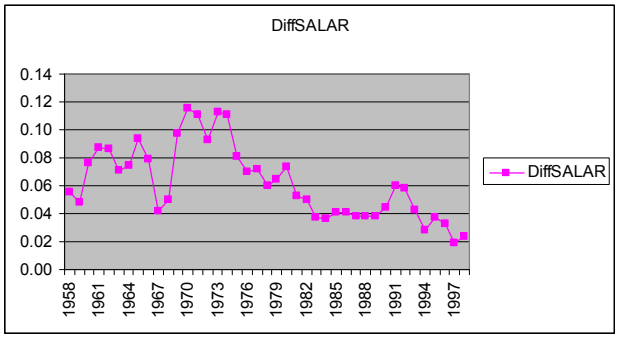


Graph 1.e

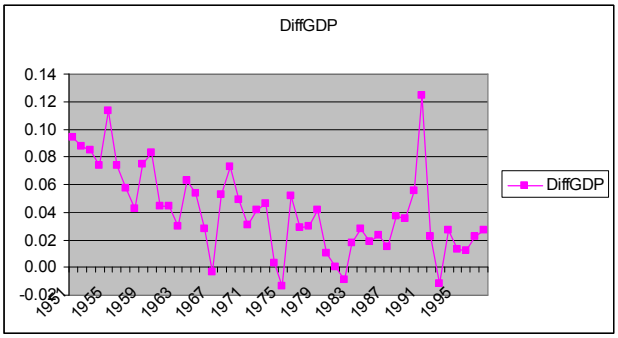
GRAPH 2



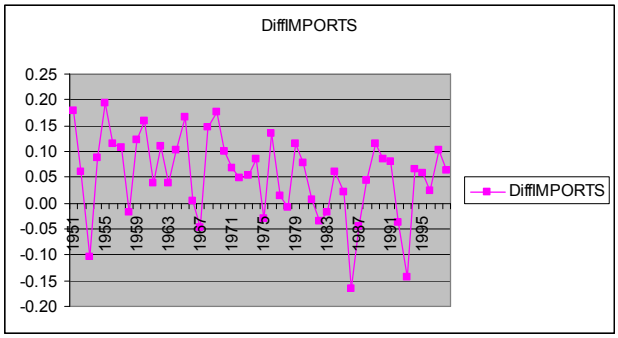
Graph 2.a



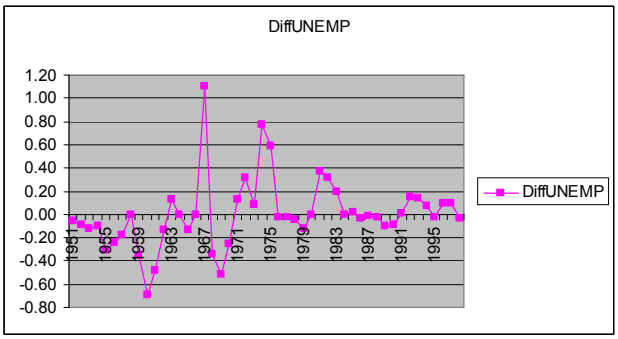
Graph 2.b



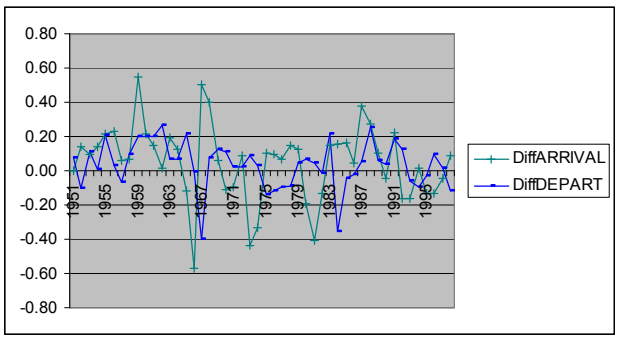
Graph 2.c



Graph 2.d



Graph 2.e



Graph 2.f

STATIONARY TABLE 1

Variable	AR(1)	t-stat
DiffWAGES*	$a_1 + 2\sigma$ $0.721 + 0.102 < 1$	7.06
DiffSALARY*	$a_1 + 2\sigma$ $0.834 + 0.099 < 1$	8.42
DiffGDP*	$a_1 + 2\sigma$ $0.513 + 0.123 < 1$	4.18
DiffIMPORTS	$a_1 + 2\sigma$ $0.181 + 0.142 < 1$	1.28
DiffARRIVAL	$a_1 + 2\sigma$ $0.271 + 0.143 < 1$	1.89
DiffDEPARTURE	$a_1 + 2\sigma$ $0.168 + 0.149 < 1$	1.13

APPENDIX TO STATIONARITY TABLE

```
regress diffwages l.diffwages
      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  1,    45) =   49.90
       Model |  .041740023     1  .041740023           Prob > F      =  0.0000
    Residual |  .037642955    45   .00083651           R-squared     =  0.5258
-------------+------------------------------           Adj R-squared =  0.5153
       Total |  .079382978    46  .001725717           Root MSE      =  .02892

------------------------------------------------------------------------------
diffwages    |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diffwages    |
          L1 |   .7217472   .1021749     7.06   0.000     .5159563    .9275381
_cons        |   .0067509   .0051022     1.32   0.192    -.0035255    .0170273
------------------------------------------------------------------------------
 regress  diffsalar l.diffsalar
      Source |       SS       df       MS              Number of obs =      40
-------------+------------------------------           F(  1,    38) =   70.83
       Model |  .017988917     1  .017988917           Prob > F      =  0.0000
    Residual |  .009651083    38  .000253976           R-squared     =  0.6508
-------------+------------------------------           Adj R-squared =  0.6416
       Total |  .027640001    39  .000708718           Root MSE      =  .01594

------------------------------------------------------------------------------
diffsalar    |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diffsalar    |
          L1 |   .8343653   .0991402     8.42   0.000     .6336664    1.035064
_cons        |    .009435    .006735     1.40   0.169    -.0041993    .0230692
------------------------------------------------------------------------------
. regress diffgdp l.diffgdp
      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  1,    45) =   17.50
       Model |  .011458295     1  .011458295           Prob > F      =  0.0001
    Residual |  .029465109    45   .00065478           R-squared     =  0.2800
-------------+------------------------------           Adj R-squared =  0.2640
       Total |  .040923404    46  .000889639           Root MSE      =  .02559

------------------------------------------------------------------------------
diffgdp      |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diffgdp      |
          L1 |   .5138249   .1228296     4.18   0.000     .2664335    .7612163
_cons        |   .0181704   .0061702     2.94   0.005     .0057431    .0305977
------------------------------------------------------------------------------
. regress  diffimports l.diffimports
      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  1,    45) =    1.63
       Model |  .010084192     1  .010084192           Prob > F      =  0.2085
    Residual |  .278681768    45  .006192928           R-squared     =  0.0349
-------------+------------------------------           Adj R-squared =  0.0135
       Total |   .28876596    46  .006277521           Root MSE      =   .0787

------------------------------------------------------------------------------
```

```
diffimports  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diffimports  |
          L1 |   .1818156   .1424816     1.28   0.208     -.105157    .4687883
_cons        |   .0411413   .0137718     2.99   0.005     .0134035    .0688792
------------------------------------------------------------------------------
. regress diffunemp l.diffunemp
      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  1,    45) =    6.63
       Model |  .539289249     1  .539289249           Prob > F      =  0.0134
    Residual |  3.65779584    45  .081284352           R-squared     =  0.1285
-------------+------------------------------           Adj R-squared =  0.1091
       Total |  4.19708509    46   .09124098           Root MSE      =   .2851

------------------------------------------------------------------------------
diffunemp    |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diffunemp    |
          L1 |   .3583333   .1391168     2.58   0.013     .0781376     .638529
_cons        |   .0025496   .0415888     0.06   0.951    -.0812144    .0863137
------------------------------------------------------------------------------
. regress  diffarrival L.diffarrival
      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  1,    45) =    3.57
       Model |   .16877862     1   .16877862           Prob > F      =  0.0652
    Residual |  2.1262682    45  .047250405           R-squared     =  0.0735
-------------+------------------------------           Adj R-squared =  0.0530
       Total |  2.29504682    46  .049892322           Root MSE      =  .21737

------------------------------------------------------------------------------
diffarrival  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diffarrival  |
          L1 |   .2711516   .1434684     1.89   0.065    -.0178086    .5601118
_cons        |   .0361863   .0324166     1.12   0.270    -.0291041    .1014767
------------------------------------------------------------------------------
. regress   diffdepart L.diffdepart
      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  1,    45) =    1.28
       Model |  .024183309     1  .024183309           Prob > F      =  0.2630
    Residual |  .846986911    45  .018821931           R-squared     =  0.0278
-------------+------------------------------           Adj R-squared =  0.0062
       Total |  .871170221    46  .018938483           Root MSE      =  .13719

------------------------------------------------------------------------------
diffdepart   |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
diffdepart   |
          L1 |   .1689004   .1490064     1.13   0.263    -.1312139    .4690148
_cons        |   .0281405   .0208269     1.35   0.183    -.0138071     .070088
------------------------------------------------------------------------------
```

TABLE 2

	Model 1	Model 2	Model 3	Model 4
Dependent :	DiffWages			
DiffWages L1 :	-	0.6805535[a] (0.104)	0.6750847[a] (0.157)	0.6822558[a] (0.107)
DiffGDP :	-0.1337953 (0.271)	-0.2684851 (0.206)	-0.2677132 (0.244)	-0.2666656 (0.218)
DiffIMP :	0.1630675[b] (0.087)	0.1352261[b] (0.059)	0.1356771 (0.096)	0.1375818[b] (0.061)
DiffUNEMP :	-0.0256751 (0.026)	-0.0326038[c] (0.018)	-0.0317256[c] (0.018)	-0.0318252[c] (0.018)
DiffARRIVAL:	-0.0055299 (0.028)	0.0154824 (0.019)	0.0161664 (0.019)	0.0164593 (0.019)
DiffDEPART :	0.0470221 (0.049)	0.0157336 (0.033)	0.0170989 (0.026)	0.0168138 (0.036)
TIME :	-	-0.0001168 (0.000)	-0.0001905 (0.000)	-0.000182 (0.000)
CONSTAT :	0.0229598[a] (0.011)	0.2410061 (0.718)	0.385925 (1.109)	0.368852 (0.881)
Dum91 :	-	-	0.004252 (0.013)	0.0042123 (0.014)
R^2 :	0.2108	0.6611	0.6619	0.6725
F-test :	2.24	10.19	14.32	9.50
DW-Stat :	0.8650	2.0346	2.0315	1.820943

a,b,c denote 1%, 5% and 10% significance respectively.
Numbers in parenthesis are the standard errors

TABLE 3

	Model 5	Model 6	Model 7	Model 8
Dependent :	DiffSALARY			
DiffSALA L1 :	-	0.7932203[a] (0.125)	0.7937728[a] (0.111)	0.7653458[a] (0.123)
DiffGDP :	0.2660551 (0.217)	0.1593212 (0.099)	0.1269751 (0.088)	0.1354352 (0.099)
DiffIMP :	0.0832584 (0.061)	0.032887 (0.029)	0.0387337 (0.029)	0.0364547 (0.028)
DiffUNEMP :	0.0180297 (0.016)	-0.0171866[c] (0.008)	-0.0189972[b] (0.008)	-0.0178294[b] (0.008)
DiffARRIVAL:	-0.0425867[b] (0.017)	-0.0244494[b] (0.009)	-0.0254337[c] (0.013)	-0.0211897[b] (0.009)
DiffDEPART :	0.0352719 (0.032)	0.0098449 (0.014)	0.0094511 (0.011)	0.0131499 (0.014)
TIME :	- -	-0.0002369 (0.000)	-0.0000648 (0.000)	-0.0002186 (0.000)
CONSTAT :	0.0490364[a] (0.007)	0.4749458 (0.530)	0.1367457 (0.597)	0.4423984 (0.599)
Dum91 :	-	-	-0.0080646 (0.005)	-0.005624 (0.006)
R^2 :	0.3057	0.8697	0.8766	0.8809
F-test :	3.08	30.50	38.47	27.73
DW-Stat :	0.4903	1.820	1.924	1.975

a,b,c denote 1%, 5% and 10% significance respectively.
Numbers in parenthesis are the standard errors

TABLE 4

	Model 9	Model 10	Model 11	Model 12
Dependent :	DiffWAGE		SALARY	
	MALE	FEMALE	MALE	FEMALE
DiffSALA L1 :	0.6752009[a] (0.171)	0.6838525[a] (0.122)	0.6152057[a] (0.158)	0.6728752[a] (0.123)
DiffGDP :	-0.3320598 (0.226)	-0.3827519 (0.264)	-0.0270969 (0.102)	-0.01528 (0.099)
DiffIMP :	0.1436769[c] (0.087)	0.130856 (0.081)	0.0127455 (0.037)	-0.0124047 (0.028)
DiffUNEMP :	-0.033069[c] (0.017)	-0.0351862[c] (0.019)	-0.031751[b] (0.012)	-0.0312081[b] (0.008)
DiffARRIVAL:	0.0261044 (0.017)	0.0212299 (0.019)	0.0083316 (0.015)	0.0028523 (0.009)
DiffDEPART :	0.0201816 (0.024)	0.0297677 (0.025)	-0.0042737 (0.017)	0.0016447 (0.014)
TIME :	-0.0003112 (0.000)	-0.000461 (0.000)	-0.0008515 (0.000)	-0.0008159 (0.000)
CONSTAT :	0.6243759 (1.189)	0.923417 (1.143)	1.691709 (1.121)	1.622694 (0.599)
Dum91 :	0.0107034 (0.011)	-0.0138541 (0.010)	0.0156421[c] (0.009)	0.0160114[c] (0.006)
R^2 :	0.6660	0.6978	0.7933	0.7873
F-test :	13.41	14.55	14.70	14.03
DW-Stat :	1.955	1.826	1.816	1.888

a,b,c denote 1%, 5% and 10% significance respectively.
Numbers in parenthesis are the standard errors