Analysis of Pull-Factor Determinants of Filipino International Migration

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ANALYSIS OF PULL-FACTOR DETERMINANTS OF FILIPINO INTERNATIONAL MIGRATION

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Abstract

This paper was conducted to examine the pull-factor determinants of Filipino international migration. This study employed Ordinary Least Square (OLS) estimation of gravity model using panel data consisting of 27 countries of destinations from 2007 to 2011.

Results of the study revealed that migration flow over the years is increasing. Furthermore, 39% of Filipino migrants were located in USA, this is followed by Canada, UK, Australia and Italy which is the home of 34%, 15%, 5% and 3% of Filipinos respectively. Estimation results of the determinants of Filipino international migration showed that GDP, unemployment rate, cost of living, fiscal freedom, religion, distance and being a member of OECD are not significant pull factor indicators of Filipino migration. Furthermore, it revealed that Filipino migration is significantly and positively affected by population in the destination country. It shows the higher expectancy of migrants to acquire jobs in the destination country. Moreover, Filipino migrants preferred to migrate to a country which has less corruption and that English speaking countries are preferred destination by Filipino migrants.

Introduction

International migration is a very fluid phenomenon. In the case of the Philippines, the fluidity of these cross-border population movements covers 193 countries and territories, as well as ocean-plying vessels (Opiniano, 2007). These overseas migration movements by Filipinos are economic in nature, whether the movement is for overseas work (thus, temporary in nature), permanent settlement, or unauthorized or clandestine migration.

The second wave of organized migration came in the aftermath of the Second World War, when Filipino veterans who served in the U.S. armed forces were given a chance to migrate to the United States along with their dependents, including Filipino war brides of U.S. servicemen. The 1960's also saw the unprecedented reforms in the immigration laws of Canada (1962), the United States (1965) and Australia (1966), reducing restrictions to Asian immigration. Europe also introduced a guest worker program which many Filipino professionals took advantage of (Bautista, 1998).

The third wave came in the form of contract labor in the 1970s, a time when the country was gripped by severe unemployment, especially in the ranks of the professionals. The unemployment rate in the Philippines by 1970 had risen to an average of 11.8%. Towards the end of the Marcos era in 1985, unemployment reached 12.7%, the highest in the history of Philippine labor force surveys. From 1971 to 1975, average underemployment rate constituted 11.72% of the labor force. Coincidentally, the Middle East oil boom in the same period provided the impetus for skilled and semi-skilled labor to migrate to other countries.

The third wave persists with much of flows directed toward East and Southeast Asia such as Japan, South Korea, Taiwan and Singapore became economic powerhouses in the 80s and the 90s. As overseas employment grew, the type of occupations shifted from construction work and engineering services to domestic work, tourism and service jobs, healthcare, communications technology and a host of other expertise (Yearbook of Labor Statistics, 2003).

Along with a rise in cross border trade and investment, the number of migrant workers has been increasing globally. According to the World Migration Report in 2010, the number of immigrants globally was 214 million and the figure is predicted to rise to 405 million by 2050 (International Organization for Migration, 2010). In congruence with the global trend, emigration from the Philippines continues to rise as more and more people are searching for employment in the international labor market due to low income, intense unemployment, and other instances to find their own luck to other countries. In 2011, the outflow of permanent migrants is 83,410 (based on those who registered with the Commission on Filipinos Overseas before they left the Philippines) while the outflow of overseas Filipino workers (based on the OFWs that registered with the Philippine Overseas Employment Administration) is 1,687,83 (combination of both new hires and re-hires) (POEA and CFO.

Objectives of the Study

This paper will try to analyze migration patterns of Filipinos and factors affecting it. Specifically the study aims: to present trend of the flow of Filipino migrants to the rest of the world; and to empirically identify pull factor determinants of Filipino migration.

METHODOLOGY

Data Source

The flow of the permanent Filipino migration was taken from the Commission on Filipino Overseas (CFO) from year 2007 to 2011. The Index of Economic Freedom will be taken from the World Heritage Foundation. The official language data of the sample countries was taken from World Fact Book of Central Intelligence Agency (CIA). The Gross Domestic Product Per Capita, Consumer Price Index and population are taken from the World Bank Database.

Empirical Model

The study will provides the conventional way of estimating the gravity model equation 1 in the double log form.

$$\begin{aligned} lnMig_{jt} = {} & \beta_0 + \beta_1 lnGDP_{jt} + \beta_2 lnPop_{jt} - \beta_3 lnDist_{ij} + \beta_4 lnFFC_{jt} + \beta_5 lnFF_{jt} + \beta_6 CPI_{jt} \\ & + \beta_7 lnUnemp_{jt} + \beta_8 lnExc_{ijt} + dReg1_j + dReg2_j \\ & + dLang_j + dOECD_j + \varepsilon_{it} \qquad (1) \end{aligned}$$

where:

Mig_{ijt} - flow of migration from the Philippines *i* to destination country *j* at year *t*.
GDP_{jt} - Gross Domestic Product per Capita of country *j* at year *t*.
Pop_{jt} - population of country *j* at year *t*.
$Dist_{ij}$ - the distance between the Philippines *i* to destination country *j* at year *t*.
FFC_{jt} - the freedom of corruption in country *j* at year *t*.
FF_{jt} - the fiscal freedom of country *j* at year *t*.
CPI_{jt} - the consumer price index of country *j* at year *t*.
$Unemp_{jt}$ - the unemployment rate of country *j* at year *t*.
Exc_{ijt} - the value of foreign currency against peso at year *t*.
$Lang_j$ - a dummy variable characterizes one (1) if predominant English speaking country and zero (0) otherwise.
$Reg1_j$ - a dummy variable characterizes one (1) if religion is Roman Catholic and zero (0) otherwise.
$Reg2_j$ - a dummy variable characterizes one (1) if religion is Islam and zero (0) otherwise.
$OECD_j$ - a dummy variable characterizes one (1) if destination country is a member of the OECD and zero (0) otherwise.
ε_{ijt} - error term

Estimation Process

As an explanatory exercise, assuming parameter constancy across countries as well as across dates, a panel the data will be used. Panel data have three basic approaches: they are pooled and estimated by Ordinary Least Squares (OLS). The second approach assumed to be motivated by fixed effects model (FEM) and the third approach is the random effects model (REM). To formally check the specification (REM or FEM) the study carried out Hausman Test. The null hypothesis is the preferred model as random effects vs. fixed effects. It basically test whether the unique errors (*ui)* are correlated with the regressors, the null hypothesis are not (Green, 2008).

To further test for random effects, Breausch-Pagan Lagrange multiplier (LM) was employed. The LM test identified appropriate model between a random effects model (REM) and a simple OLS regression. The null hypothesis in the LM test is the variances across entities are zero. If the test failed to reject the null hypothesis, then OLS regression is the most appropriate.

In using OLS regression, we estimate the following model as:

$$Y_{ijt} = \beta_0 + \beta_1 X_{ijt} + \beta_2 X_{ijt} + \ldots \beta_k X_{ijt} + \varepsilon_{ijt}$$

where $i = 1,\ldots,N$, $j = 1,\ldots,N$, $t = 1,\ldots,T$ (2)

Pooled Regression is usually carried out on Time-Series Cross-Sectional data- that has observations over time for several different units or ‘cross-sections. It works similar to regular regression, except an extra intercept or “dummy” is added.

This approach can be used when the groups to be pooled are relatively similar or homogenous. Level differences can be removed by 'mean-centering' (similar to Within-Effects Model) the data across the groups (subtracting the mean or average of each group from observations for the group). The model can be directly run using Ordinary Least Squares on the concatenated groups. If the model yields large standard errors (small T-Stats), this could be a warning flag that the groups are not all that homogenous and a more advanced approach like Random Effects Model may be more appropriate.
The assumption of the pooled regression OLS are follows:

Classical Assumption

- Strict Exogeneity

$$E(e_{it} \mid \mathbf{W}) = 0; Cov(\mathbf{w}_{it}, e_{it}) = 0$$

- Homoscedasticity

$$Var(e_{it} \mid \mathbf{W}) = \sigma_e^2$$

- No cross section and time series correlation

$$Var(\mathbf{e} \mid \mathbf{W}) = \sigma_e^2 \mathbf{I}_{NT}$$

The assumption of pooled regression is when the intercept value is the same across units or entities. The slope coefficient is constant across units or entities. The limitation of pooled regression is when the assumptions of constant intercept and slope coefficients are highly restricted and far-fetched. It may distort the “true” relationship between the dependent and independent variables across entities.

RESULTS

Trend of Filipino Migration

Figure 2 shows the trend of Filipino migration from 2007 to 2011. Noticeable is the increase of migrants in the year 2007 to 2008 which accounted for about 214,827 migrants. In the year 2008 to 2009, there is a decrease in the number of migrants about 149,099. The 2008-2009 recession was the worst since the Great Depression.

The unemployment rate in the United States and other countries that had been magnets for migrants such as Spain and other developed countries more than doubled. However, relatively few migrants left the countries in which they were living even if they lost their jobs, since the recession also reduced opportunities at home. The year 2009 to 2010, saw a rapid increase of Filipino migrants for about 366,740.

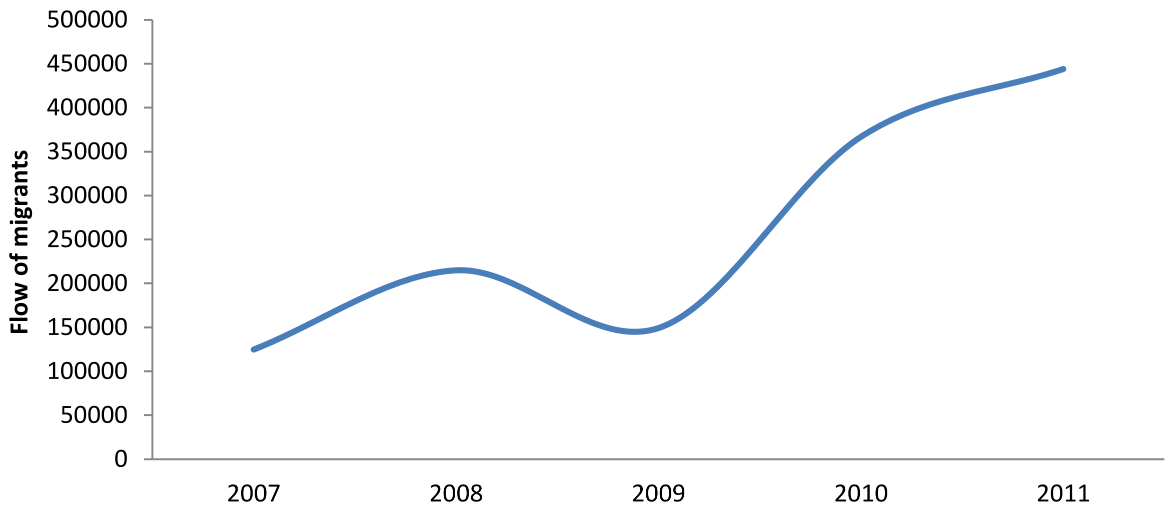

Figure 2.Total Filipino permanent migrants, 2007-2011.
Source: Commission on Filipino Overseas (CFO)

Table 1. Major destination country of Filipino migrants, 2011.

Table 1 presents the major destination country of Filipino migrants. It clearly USA is a favorite destination of the Filipino migrants accounting for 39% of the total Filipino migrants. This is followed by Canada, United Kingdom, Australia and Italy with 34%, 15%, 5% and 3% respectively. In Asia, the major destinations of Filipino migrants are Japan, South Korea and Lebanon with 0.08%, 0.03%, and 0.01% respectively.

To	2011 Migration Flow	Percentage Share (%)
USA	175,112	39%
Canada	154,353	34%
UK	67,331	15%
Australia	22,964	5%
Italy	16,946	3%
Japan	3,965	0.08%
Belgium	2,098	0.04%
New Zealand	1,671	0.03%
Korea	1,618	0.03%
Lebanon	689	0.01%

Source of data: Commission on Overseas Filipino

Filipino Migrants and Distance of Destination

Figure 3 shows the relationship between Filipino migration and distance. The size of the bubbles presents the volume of migrants, the larger the bubble the higher the number of migration. The distance is divided into 5 groups with 2,000 miles interval.

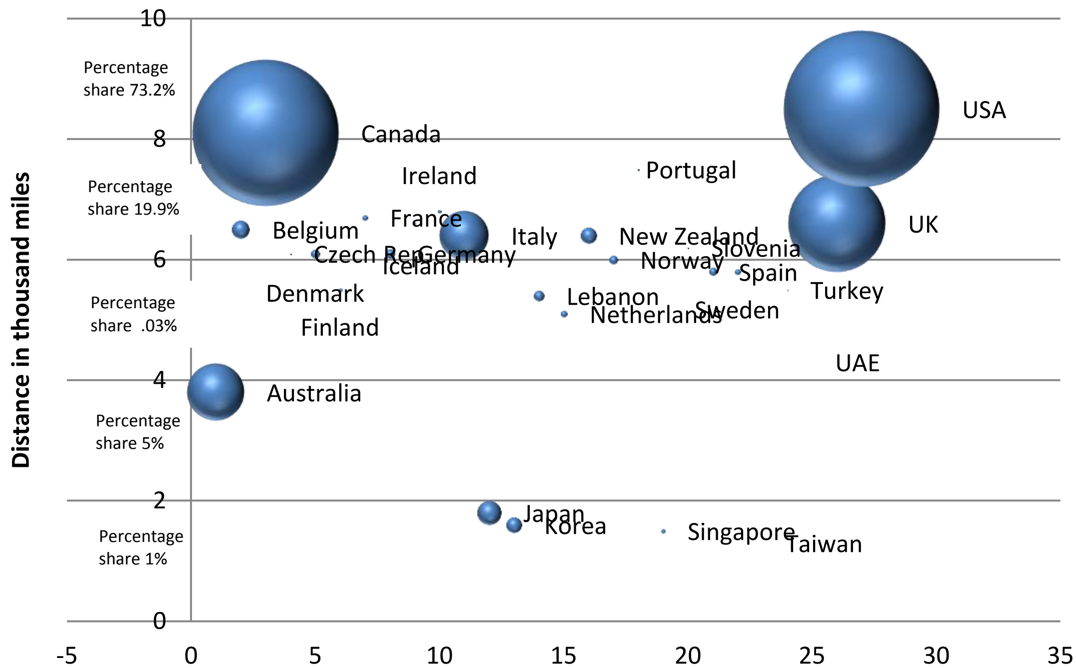

Figure 3.Market share of Filipino migration, 2011.
Source: Commission on Filipino Overseas (CFO)

It revealed that majority (73.2%) of the Filipino migrants are concentrated from countries ranging from 8 to 10 thousand mile-distance from the Philippines. The 73.2% Filipino migrants located in the United States of America and Canada. The second largest market share of migration is in range 6 to 8 thousand miles from the Philippines. The 19.9% percent share of countries of destination are Norway, Denmark, Germany, Czech Republic, Slovenia, Italy, New Zealand, Belgium, Iceland, United Kingdom, France, Ireland and Portugal. This is not consistent with the concept of gravity model which implies the farther distance will cause a lower volume of migration there is.

The distance is used as a cost of travel but because of the characteristics of these countries which is stable and with a prominent economy than the Philippines, the migrants prefer to live in a stable country and the cost of travel can be compensated after living in the foreign country. On the distance range 2 to 4 thousand miles, only Australia had a high volume of migration with a percent share of 5%. South Korea and Japan are the nearest country in which minimal flow of migration with a range of 2 below thousand miles distance from the Philippines with a market percent of 1% only in the year 2011.

Determinants of Pull Factors of Migration

To formally identify the determinants of Filipino international migration, an empirical analysis was conducted. To identify the proper specification of the panel gravity model, several were conducted.

The Hausman test was used to identify the appropriate specification of the model between fixed or random effects. Result of the test failed to reject the null hypothesis of fixed effects vs. random effects, therefore, random effects model is preferred than fixed effects model.

The Breusch-Pagan Lagrange multiplier (LM) is test was used to decide between random effects regression and a simple OLS regression. Result of the test failed to reject the null hypothesis then we can conclude that random effect is not appropriate. There is no significant evidence of panel effect across countries, therefore, simple OLS regression is appropriate than random effects model in estimation of the migration model.

Table 2 shows the result of OLS regression on determinants of pull factors of migration. Results revealed that the flow of Filipino migration is not significantly affected by GDP per capita of the possible destination country.

Population has a significant and positive effect in flow of migration in which a magnitude of 1.21 change in every increase of 1 unit of dependent variable. The implications of population are consistent in the theories of Lewer and Berg (2008) that the larger the population of the destination country, the larger the labor market for immigrants.

Unemployment rate, exchange rate and cost of living measured by relative CPI and fiscal freedom are not significant pull factors of migration. The freedom from corruption of the destination country is positive and significant with a magnitude of 4.15. Furthermore, results indicated that the determinant religion in the destination country has no effect on migration decision of Filipinos. A dominantly English speaking country is much preferable of Filipino emigrants with a magnitude of 1.67. The supporting variable OECD has positive effect but not significant.

The measure of goodness of fit shows that 55.83% of the variability of the flow of migration using panel data can be explained by the regressors included in the model. Result of the F test shows the coefficients in the regressors of the model are all jointly zero, which means that the model of this study is significant in analyzing the pull factors of Filipino migration.

Table 2. OLS estimation results on pull factors affecting migration.

Variable	**Estimated Coefficient**	**Standard Error**	**P-Value**

GDP per Capita	0.6194^{ns}	0.4701	0.190
Population	1.2133***	0.1445	0.000
Distance	-1.6589^{ns}	0.6589	0.294
Unemployment Rate	0.1706^{ns}	0.5115	0.739
Consumer Price Index	-0.0253^{ns}	0.0793	0.750
Freedom from Corruption	4.1530***	1.1316	0.000
Fiscal Freedom	0.3431^{ns}	1.0397	0.742
Cross Exchange Rate	0.1715^{ns}	0.1216	0.161
Religion 1	0.5494^{ns}	0.8094	0.499
Religion 2	0.5815^{ns}	1.0427	0.578
Language	1.6776***	0.5178	0.002
OECD	1.3409^{ns}	1.0786	0.216
constant	-35.9166***	10.1794	0.001
R^2	0.5583	Prob > F	0.0000

*, **, and ***, indicates significance at 10%, 5%, and 1% level respectively.
^{ns} not significant

Summary and Conclusion

Volume of migration have been observed as continuously increasing over the years. In this paper, a panel gravity model for Filipino migrations was used to identify factors that influence migration. These factors include income, market size of the destination country and the distance between Philippines and country of destination. Other factors like cost of living in the destination measured using CPI and exchange rate were included. The effects of economic freedom and other supporting variables like religion, language and membership of the country of destination to OECD were also examined as possible factors.

Results show that the numbers of Filipino migrants are increasing. The major destinations are USA which accounts for 39% of the total Filipino migrants in year 2011. This is followed by Canada, UK, Australia and Italy which homes for 34%, 15%, 5% and 3% Filipino migrants, respectively.

techniques in the estimation of the model. It revealed that POLS is the appropriate technique. Results of the estimation revealed that GDP, unemployment rate, cost of living, religion, distance and OECD are not significant pull factor indicators of Filipino migration. Furthermore, it revealed that Filipino migration is significantly and positively affected by population in the destination country. It shows the higher expectancy of migrants to acquire jobs in the destination country. Result revealed that Filipino migrants preferred to migrate to a country which is fewer from corruption. Moreover, it revealed Filipino migrants preferred English language speaking country.

Recommendations

Under the circumstances diversified strategies should be undertaken for sustainable development of emigration, the following are the recommendations after testing and analyzing the result of the study:

- In migration, country benefited from the remittances and unemployment rate is reduced. However, the economic disadvantage of this is the losses of the skilled workers were migrated to other countries due to high wages and salaries. Policies should be developed on enhancing sound labor market to prevent brain drain.

- Strengthening bilateral relations with the other countries to protect the safety and rights of the Filipino migrants;

- Profiling emigrants to capture a widen array of data on Filipino migrants.

REFERENCES

Aleshkovski, I. and Ionster, V,."System Analysis and Models of Integrated World System. - Vol. II – Mathematical Models of migration.

Anderson, J. (2011). "The Gravity Model."Boston College and NBER.

Ang, S. (2006). "Philippine International Migration: Causes and Consequences" (A Guest Lecture at the Dalhoustic University, Canada, 16 April 2008).

Asis, M. and Baggio, F. (2008). "Moving Out, Back and Up: International Migration and Development Prospects in the Philippines."

Bobkova, B. (2012). "Gravity Model Estimation using Panel Data – is Logarithmic Transformation Advisable?" Master Thesis Charles University in Prague.

De Haas, H. (2008). "Migration and Development, A Theoretical Perspective." International Migration Institute Working Papers paper 9.

Egger, P., Larch, M., and Staub, K. (2013)."The Log of Gravity with Correlated Sectors: An Application to structural Estimation of Bilateral Goods and Services."

Europian Science Foundation, (2011)."New Approaches, for Researching the Determinants of Migration Process: ESF Strategic Workshop on Migration Research."

Faustino, H. and Leitao, N. (2008)."Using the Gravity Equation to Explain the Portuguese Immigration-trade Link."Working Papers.

Fedrmuc, J. (2008). "Gravity Models in Integrated Panels."

Flowerdew, R. (1987). "Fitting the Lognormal Gravity Model to Heteroskedastic Data."Ihio State University Press Geographical Analysis, vol. 14, no. 3.

Hayes, A. and Cai, L. (2007). "Using Heteroskedasticity – Consistent Standard Error Estimator in OLS Regression."An Introduction and Software Implementation.Behaviour Research Methods, 2007, 39(4), 709 – 722.

King, R. (2012). "Theories and Typologies of Migration; An Overview and a Primer." Willy Brandt Series of Working Papers in International Migration and Ethnic Relations 3/12.

Kuhn, R. (2005). "The Determinants of Family and Individual Migration: A Case Study of Rural Bangladesh." Working Paper of Research Program on Population Processes, Institute of Behavioral Science.

Lewer, J. and Vande Berg, H. (2008)."A Gravity Model of Immigration."Management Faculty Publication. Paper 22.

Lekuze, E., Purser, M., Rodriguez, F., and Commins, M. (2009)."Revisiting the Migration Development Nexus: A Gravity Model Approach."UNDP Research Paper 2009/44.

Luckanachai, N. and Rieger, M. (2013). "Research Project; Making Migration a Development Factor: The Case of North and West Africa." Working Paper, A Review of International Migration Policies.

Luthria, M. (2009)."The Importance of Migration to Small Fragile Economics." Human Development Research paper 2009/55.

Melkumian, A. (2006). "A Gravity Model of Legal Migration into the United States.

Newton, I. (1687). "*Law of Universal Gravitation.*"

Opiniano, J. (2007). "Statistics of Filipino's International Migration: Issues and Steps Towards Harmonizing the Data." 10th National Convention on Statistics (NCS).

Orbeta, A. and Abrigo, M.R. (2011)."Managing International Migration: The Philippine Experience." Philippine Institute for Development Studies Discussion Paper Series no. 2011-33.

Parkins, N. (2010). "Push and Pull Factors of Migration." Arpejournal.com/ ARPEvolume8number 2/PArkins.pdf

Scharpio, K. (2009). "Migration and Eduucational Outcomes of Children.."UNDP Research Paper 2009/57.

Shaw, W. (2007). "Migration in Africa: A Review of the Economic Literature on International Migration in 10 countries." Development Prospects Group. The World Bank Washington DC 20433.

Simpson, N. and Sparber, C. (2010)."The Short and Long-Run Determinants of Unskilled Immigration into U.S. States."vity Modeling into Mainstream Economics?" Mater Thesis.

Sukanuntathum, A. (2012). "Robust Estimation of Gravity Models under Heteroskedasticity and Data Censoring." The 2012 International (Spring) Conference on Asia Pacific Business Innovation and Technology Management.

Todaro, M. (1980)."Internal Migration in Developing Countries."A survey, p.361-402.

Ullah, M.S. (2012). "Determinants of International Labor Migration from Bangladesh: A gravity Model of Panel Data.

Yiadom, L.B., and Mckay, A. (2006). "Migration Between Ghana's Rural and Urban Areas; The Impact on Migrants Welfare."

Online References

https://www.cfo.org
https://www.tradingeconomics.com
https://www.ilo.stat.org
https://www.indexmundi.com
https://www.wikipedia.com

APPENDICES

Appendix A. Result of the Fixed Effects Model

```
. xtset cs obs
       panel variable:  cs (strongly balanced)
        time variable:  obs, 1 to 27
                delta:  1 unit

. xtreg  lnmigflow lngdp lnpop lndist lnunemp cpi lnffc lnff lnexc drel1 drel2 dlang doecd , fe

Fixed-effects (within) regression               Number of obs      =       135
Group variable: cs                              Number of groups   =         5

R-sq:  within  = 0.5622                         Obs per group: min =        27
       between = 0.0207                                        avg =      27.0
       overall = 0.5579                                        max =        27

                                                F(12,118)          =     12.63
corr(u_i, Xb)  = -0.0170                        Prob > F           =    0.0000

------------------------------------------------------------------------------
   lnmigflow |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lngdp |   .5970068   .4765091     1.25   0.213     -.346611    1.540624
       lnpop |   1.213291   .1476433     8.22   0.000     .9209172    1.505665
      lndist |  -.7838636   .6702696    -1.17   0.245     -2.11118    .5434528
     lnunemp |   .3209295   .5612868     0.57   0.569    -.7905712     1.43243
         cpi |  -.0226415   .0943115    -0.24   0.811     -.209404     .164121
       lnffc |   4.308982   1.159922     3.71   0.000     2.012021    6.605942
        lnff |   .3567893   1.050001     0.34   0.735    -1.722498    2.436076
       lnexc |   .1834242   .1239025     1.48   0.141    -.0619365     .428785
       drel1 |    .609377   .8236786     0.74   0.461    -1.021731    2.240485
       drel2 |   .7173023   1.078182     0.67   0.507    -1.417791    2.852396
       dlang |   1.677356   .5244925     3.20   0.002     .6387184    2.715994
       doecd |   1.395986   1.093773     1.28   0.204    -.7699824    3.561955
       _cons |  -36.00173   10.27918    -3.50   0.001    -56.35731   -15.64615
-------------+----------------------------------------------------------------
     sigma_u |  .27334361
     sigma_e |  2.1200656
         rho |  .01635156   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(4, 118) =     0.43              Prob > F = 0.7898

. est store fixed
```

Appendix B. Result of the Random Effects Model

```
. xtreg  lnmigflow lngdp lnpop lndist lnunemp cpi lnffc lnff lnexc drel1 drel2 dlang doecd , re

Random-effects GLS regression                   Number of obs      =       135
Group variable: cs                              Number of groups   =         5

R-sq:  within  = 0.5619                         Obs per group: min =        27
       between = 0.0013                                        avg =      27.0
       overall = 0.5583                                        max =        27

Random effects u_i ~ Gaussian                   Wald chi2(12)      =    154.18
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
   lnmigflow |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lngdp |   .6194382   .4701284     1.32   0.188    -.3019964    1.540873
       lnpop |   1.213307   .1445475     8.39   0.000     .9299993    1.496615
      lndist |  -.6950545   .6589189    -1.05   0.291    -1.986512    .5964028
     lnunemp |    .170614   .5115967     0.33   0.739    -.8320972    1.173325
         cpi |   -.025312   .0793014    -0.32   0.750    -.1807399    .1301159
       lnffc |   4.153013   1.131633     3.67   0.000     1.935054    6.370972
        lnff |   .3431145   1.039725     0.33   0.741    -1.694709    2.380938
       lnexc |   .1715662   .1216103     1.41   0.158    -.0667856     .409918
       drel1 |   .5494293     .80943     0.68   0.497    -1.037024    2.135883
       drel2 |   .5815593   1.042781     0.56   0.577    -1.462255    2.625373
       dlang |   1.677643   .5178829     3.24   0.001     .6626117    2.692675
       doecd |   1.340954   1.078618     1.24   0.214     -.773099    3.455007
       _cons |  -35.91661   10.17944    -3.53   0.000    -55.86795   -15.96527
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  2.1200656
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store random
```

Appendix C. Hausman and Breusch-Pagan Lagrange Multiplier

```
. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lngdp	.5970068	.6194382	-.0224315	.0777191
lnpop	1.213291	1.213307	-.000016	.0300763
lndist	-.7838636	-.6950545	-.0888091	.1228303
lnunemp	.3209295	.170614	.1503155	.2308932
cpi	-.0226415	-.025312	.0026705	.0510485
lnffc	4.308982	4.153013	.1559687	.2546094
lnff	.3567893	.3431145	.0136749	.146539
lnexc	.1834242	.1715662	.011858	.0237229
drel1	.609377	.5494293	.0599477	.1525434
drel2	.7173023	.5815593	.1357431	.2740128
dlang	1.677356	1.677643	-.0002872	.083004
doecd	1.395986	1.340954	.0550324	.1814453

```
                 b = consistent under Ho and Ha; obtained from xtreg
  B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

              chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                       =     0.85
             Prob>chi2 =   1.0000

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

       lnmigflow[cs,t] = Xb + u[cs] + e[cs,t]

       Estimated results:
```

	Var	sd = sqrt(Var)
lnmigflow	9.089413	3.014865
e	4.494678	2.120066
u	0	0

```
       Test:   Var(u) = 0
                            chi2(1) = 1.04
                      Prob > chi2 =   0.3070
```

Appendix D. Estimation Result of OLS regression

```
. reg  lnmigflow lngdp lnpop lndist lnunemp cpi lnffc lnff lnexc drel1 drel2 dlang doecd
```

Source	SS	df	MS
Model	679.956281	12	56.6630234
Residual	538.025095	122	4.41004176
Total	1217.98138	134	9.08941325

Number of obs	= 135
F(12, 122)	= 12.85
Prob > F	= 0.0000
R-squared	= 0.5583
Adj R-squared	= 0.5148
Root MSE	= 2.1

lnmigflow	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lngdp	.6194382	.4701284	1.32	0.190	-.3112278	1.550104
lnpop	1.213307	.1445475	8.39	0.000	.927161	1.499453
lndist	-.6950545	.6589189	-1.05	0.294	-1.99945	.6093413
lnunemp	.170614	.5115967	0.33	0.739	-.8421428	1.183371
cpi	-.025312	.0793014	-0.32	0.750	-.182297	.1316731
lnffc	4.153013	1.131633	3.67	0.000	1.912833	6.393193
lnff	.3431145	1.039725	0.33	0.742	-1.715125	2.401353
lnexc	.1715662	.1216103	1.41	0.161	-.0691735	.4123059
drel1	.5494293	.80943	0.68	0.499	-1.052918	2.151777
drel2	.5815593	1.042781	0.56	0.578	-1.482731	2.645849
dlang	1.677643	.5178829	3.24	0.002	.6524426	2.702844
doecd	1.340954	1.078618	1.24	0.216	-.7942787	3.476187
_cons	-35.91661	10.17944	-3.53	0.001	-56.06783	-15.76539