

Azarnert, Leonid V.

Working Paper

Foreign aid, fertility and populations growth: Evidence from Africa

Working Paper, No. 2009-12

Provided in Cooperation with:

Department of Economics, Bar-Ilan University

Suggested Citation: Azarnert, Leonid V. (2009) : Foreign aid, fertility and populations growth: Evidence from Africa, Working Paper, No. 2009-12, Bar-Ilan University, Department of Economics, Ramat-Gan

This Version is available at:

<https://hdl.handle.net/10419/95993>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Foreign Aid, Fertility and Population Growth: Evidence from Africa

Leonid V. Azarnert*

Abstract

This article investigates the relationship between foreign aid and population growth in sub-Saharan Africa. The work considers population growth rate and a directly related to fertility demographic indicator – total fertility rate. Using a panel of 43 African countries over the last four decades of the 20th century, it demonstrates the positive association between foreign aid and population growth and suggests that foreign aid affects population growth primarily through its effect on fertility. These findings suggest that the appreciation of the demographic effect of foreign aid can have important implications for the design of policies regarding to foreign aid for presently developing countries, particularly in sub-Saharan Africa.

JEL classification: F35, J11, O11.

Keywords: Foreign aid, Fertility, Population growth

* Department of Economics, Bar Ilan University, Ramat Gan, 52900, Israel (azarnel@mail.biu.ac.il). I would like to express my thanks to Daniel Tsiddon for helpful discussions. I also thank Elhanan Helpman, Zvi Hercowitz, Yona Rubinstein and participants in seminars at the Hebrew University of Jerusalem, Tel-Aviv University, University of Haifa, as well as at the conference on 'African Development and Poverty Reduction: The Macro-Micro Linkage' held in Cape Town for valuable suggestions.

1. Introduction

Sub-Saharan Africa has long been the most aided region of the developing world. Thus, for more than one-third of Sub-Saharan countries, foreign aid has constituted more than 10% of their Gross National Income (GNI) since independence. During the 1990s, foreign assistance averaged over 10% of GNI in nearly two-thirds of the countries of the region (World Bank, *WDI*, 2001). At the same time, the sub-Saharan African population has been growing faster than that of any other major world region. In the mid-1990s, African population was growing by about 2.7% per year. Moreover, in several countries in the region population growth rate even increased from the 1960s to the 1990s. As a result, over last four decades of the 20th century, the region's total population increased almost three-fold – from 229 million people in 1961 to 659 million in 2000.¹ Although an enormous literature has been devoted to different aspects of foreign aid, existing works do not consider a possible connection between the two aforementioned facts. This paper attempts to shed some light on the previously unobserved effect of foreign aid on fertility and population growth that might have important policy implications.

Large-scale foreign aid to impoverished nations has long been viewed as necessary to stimulate capital formation and promote economic growth in the recipient countries. The findings of the large literature with regard to aid are generally not very encouraging and as a result aid policy has come under increasing scrutiny. Several observers have argued that a large portion of foreign aid is wasted and only increases unproductive consumption (e.g., Boone, 1996). Researchers argue that if recipient economies do not have the appropriate economic and political environment, foreign assistance will have no positive impact on their macroeconomic policies and growth. Insufficient institutional development, economic distortions and bureaucratic inefficiency are often cited as reasons for this result (for an extensive discussion of these issues, see World Bank, 1998). The influential article on the link between the effectiveness of aid and recipients' economic policy by Burnside and Dollar (2000) triggered an extensive debate in the literature (see Roodman (2004) for a review of the literature). It has also been argued in the literature that aid can generate more problems than it solves with

¹ For detailed descriptions of the long-term trends in African population growth, see, for instance, Foote et al. (1993), Tarver (1996), Goliber (1997); cf. also United Nations (2004).

regard to development.² In their meta-analysis of 68 aid-growth studies, Doucouliagos and Paldam (2008) found that aid effectiveness literature that amassed during 40 years of research has failed to prove that the effect of development aid on growth is statistically significantly larger than zero and concluded that aid has not achieved its aimed goal of generating development. In the specific case of Africa, it has been suggested that the region has been overaided and that a substantial decrease in aid might be to the benefit of many African countries (Lancaster, 1999).

The present study enriches the existing literature with a novel way of evaluating the macroeconomic impact of foreign aid. It examines aid's effect on fertility and population growth. The reason to expect such relationship is simple. As we know from Malthus, a rise in aggregate income could bring about a proportional rise in population without improvement in living standards. If aid even partly reaches the general population, it will increase the aggregate income of households. If a selection of African countries is in Malthusian regime, where increases in income translate into increasing fertility, and if aid even partly reaches the general population in these countries, then we might expect aid to increase fertility.

The argument I lay out in the paper is chiefly related to the literature on endogenous fertility and growth. Many recent growth models with endogenous fertility, such as, for example, Dahan and Tsiddon (1998), Galor and Weil (2000), Galor and Moav (2002), among others, have implied that non-labor income transfers to the poor increase population growth because the income effect entices the poor to increase their family size.³ More recently, researchers explicitly studied the implications of income redistribution in favor of the poor for fertility differentials between the rich and the poor, population growth and economic growth in more (Azarnert, 2004) or less (Morand, 1999; Moav, 2005) detail. Azarnert (2008) expands the theory to show that aid flows from advanced economies to the impoverished nations foster population growth in the

² This point of view can be traced back to Milton Friedman (1958) and Bauer (1976) who argued that foreign aid detracts from development. For a voluminous literature that points to a diverse set of potential causes of sub-Saharan African ills, see, for example, Easterly and Levine (1997).

³ The direct income effect may also be accompanied by the influence on the quantity-quality tradeoff of endogenous fertility models to induce a reallocation of parental resources away from quality of children toward quantity.

recipient countries and adversely affects the recipients' incentive to invest in human capital. This provides a theoretical basis for the present empirical hypothesis.

Equipped with the Malthusian theory, the present work concentrates on the poorest region of the world – sub-Saharan Africa. The study considers the following two demographic indicators. One is population growth rate (PGR) – the only demographic indicator, for which systematic yearly data are available. Another is the directly related fertility total fertility rate (TFR).⁴ The data used in this paper are from the World Bank's *World Development Indicators, 2001*. The data set includes main 43 Sub-Saharan African countries during the period 1962 – 2000 (see Appendix A). The analysis of population growth rate is performed separately in a balanced panel of 22 countries, for which the annual data are available throughout all of the period, and in an unbalanced panel that includes all the countries. Since for the most of the countries that are not in the balanced panel only a few observations are available, the analysis of fertility is limited to the balanced panel.

A graphical presentation of a strong positive correlation between the average yearly population growth rate in Africa and the average foreign aid lagged one year in Section 2 starts the discussion. In the formal analysis in Section 3, two sets of regressions are presented. In the first specification of the regression model population growth rates are the dependent variable. This specification demonstrates a positive association between population growth and foreign aid received in the previous year. Given the period of gestation, the positive and statistically significant coefficients observed on foreign aid lagged one year probably suggest that aid affects population growth via its effect on fertility. A re-estimation of the regression model with both linear and quadratic functional forms of foreign aid shows that the effect of aid on population growth rate is characterized by diminishing returns. The second set of regressions directly concentrates on fertility, as measured by the total fertility rate. The estimated effect of aid is also shown to be positive and statistically significant. As in the regressions of population growth, it is also characterized by diminishing returns.

⁴ Total fertility rate (TFR) represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with prevailing age-specific fertility rates.

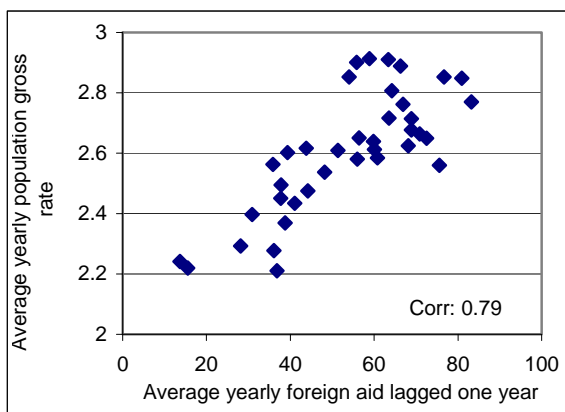
Moreover, if foreign aid increases population growth in the recipient countries, it may thus not only directly lead to the expansion of the poor populations, but, as follows from the standard theory on the link between population growth and economic growth,⁵ it may also indirectly lead to their further impoverishment. Taking into consideration this indirect effect of foreign aid may thus probably help to partly explain the discouraging results of development efforts in Africa to date. These findings suggest that the appreciation of the demographic effect of foreign aid can have important implications for the design of policies regarding of foreign aid (especially, humanitarian foreign aid) for presently developing countries, particularly in sub-Saharan Africa.⁶

2. Evidence: A First Look

This section illustrates the potential of the hypothesis postulated in the paper. A formal examination follows in Section 3.

The graphs present in this section refer to the balanced sample of 22 African countries, for which the data are available throughout all of the period (see Appendix A).

Graph 1: Population gross rate vs. foreign aid in constant 1995 US\$ lagged one year



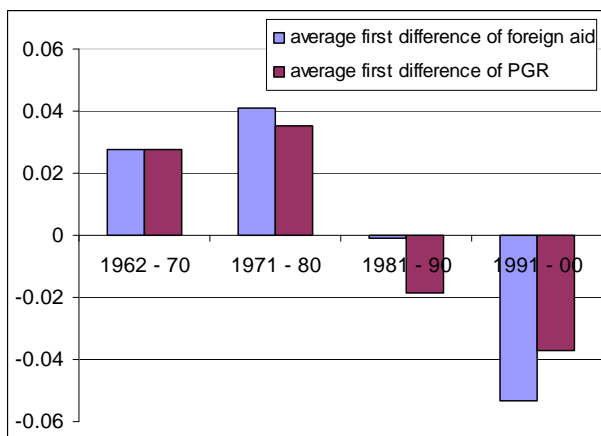
Notes: Yearly averages are calculated over the whole sample. Each dot refers to a year.

⁵ See Galor (2005) for a survey of the literature.

⁶ In an interesting theoretical study Blackorby et al. (1999) postulate that foreign assistance can be given in a form of population-control aid.

Graph (1) shows the strong positive relationship between the average population growth rate and the average foreign aid in constant 1995 US\$ lagged one year. The graph demonstrates that during the period of 40 years in a recipient African country on average the years with higher population growth rate have been associated with relatively generous aid received in the previous year. Coefficient of correlation between these two variables is 0.79.

Graph 2: Average first difference of foreign aid in constant 1995 US\$ per capita (in \$100) vs. average first difference of population growth rate (four decades)



Graph (2) presents average data on each of the four decades within the period separately. It shows that in each decade the average first difference of population growth rate in sub-Saharan Africa moved in the same direction as the average first difference of yearly foreign aid. During the first decade of the period positive average first difference of foreign aid coincided with the positive average first difference of PGR. An increase in aid granted to African countries in the second decade, 1971 – 1980, is associated with an increase in population growth rate in the recipient countries. The subsequent two decades show that the change in the generosity of foreign aid was associated with the corresponding change in the behavior of population growth. The 1981 – 1990 decade demonstrates that the slightly negative average first difference of foreign aid coincided with a start of a slow down of the increase of African population, as captured by the negative average first difference of population growth rate. The last decade of the period

under consideration shows that a continuing at a faster rate slow down of PGR followed a large decline in aid allocated to sub-Saharan Africa.

Next section analyzes the effect of foreign aid on population growth rate and fertility in Africa in a formal panel regression framework.

3. Panel Regression Framework

This section presents the formal analysis of the effect of foreign aid on fertility and population growth in Africa in a panel regression framework. The method of estimation is pooled least squares. The results of estimation are shown in Table (1) in Appendix. To take into account historical, religious, cultural or other country specific factors that may affect population growth rate, the regression model is estimated with country specific fixed effects. In every specification, the estimated coefficient on once-lagged foreign aid is shown to be positive and statistically significant.

3.1. Foreign Aid and Population Growth

This section shows the effect of foreign aid on population growth rate – the only demographic indicator, for which systematic yearly data are available. The analysis is performed separately in a balanced sample that includes 22 countries, for which the data are available throughout all of the period, and in an unbalanced panel that includes all 43 African countries (see Appendix A). Along with foreign aid and the recipient's income per capita in constant 1995 US\$, the set of explanatory variables include the percent of urban population and the percent of female in total population in previous year, the time trend, and two lags of the dependent variable.

Consider first the basic specification with foreign aid along with the other explanatory variables lagged one year. Column (1) presents the results of estimation in the balanced panel of 22 countries, whereas Column (4) shows the results of estimation in the unbalanced panel of 43 countries. In both regressions the estimated coefficient on aid received in the previous year is positive and statistically significant at a 1% level in the balanced panel and at a 4% level in the unbalanced panel of all the countries. Given the period of gestation, the positive and significant coefficient observed on aid lagged one year probably suggests that aid affects population growth via its effect on fertility.

Interestingly, the estimated coefficient on aid is higher and more statistically significant than that of the recipient's GNI. In fact, in the balanced panel the coefficient on the recipient's GNI is not significant even at a 35% level. This result probably suggests that, whereas foreign aid captures only income effect of non-labor income transfers, the recipient's GNI may capture both income and substitution effects of labor income that affect fertility in the opposite directions. As to the effect of the other explanatory variables, as expected, the percent of female in population affects population growth positively, whereas the percent of urban population affects it negatively.

To test the robustness of the theoretical prediction that aid affects population growth primarily via its effect on fertility postulated in Columns (1) and (4), the regression model is re-estimated with foreign aid in current period in addition to the first lag of aid. As shown in Columns (2) and (5), in these regressions the estimated coefficient on once-lagged aid is still positive, although in the unbalanced panel the level of significance of the once-lagged aid declined. In contrast, the estimated coefficients on current foreign aid are statistically insignificant in both estimations and are of opposite sign: positive in the balanced panel and negative in the unbalanced panel of all 43 countries. Given that in such a setting an effect of foreign aid through the reduction of mortality should be captured by the estimated coefficient on aid in the current period, this result also suggests that foreign aid affects population growth primarily through its effect on fertility rather than through decreases in mortality or increases in life expectancy.⁷

In Columns (3) and (6) the regression model is re-estimated with both linear and quadratic functional forms of foreign aid. In such specification the positive linear effect of aid is much stronger than the negative effect of aid in square thus testifying the positive overall effect that is characterized by the diminishing returns to scale. In both regressions adding aid in square also slightly decreases the magnitude and significance of the recipient's own income.

3.2. Foreign Aid and Fertility

⁷ This result does not question the effect of various public health programs, such as, for instance, immunization of children against infectious and parasitic diseases that have substantially contributed to child mortality decline in Africa. For the effect of an exogenous decline in child mortality on human capital accumulation and economic growth in the developing world, see Azarnert (2006).

This section demonstrates the effect of foreign aid on fertility in Africa. It considers the directly related to fertility demographic indicator – total fertility rate (TFR). The regressions are run over 16 yearly observations for which data on TFR are available (see Appendix A). Since for the most of the countries that are not in the balanced panel only a few observations are available, the analysis is performed in the balanced panel of 22 African countries only.

Fertility is assumed to depend on foreign aid and the recipient's income per capita in constant 1995 US\$, infant mortality rate, life expectancy, and the percent of urban population. Given that total fertility rate is calculated per woman, the percent of female in population is not included. The set of explanatory variables also includes the time trend.⁸ All the regressors are lagged one period. Data on life expectancy and infant mortality are available for the same years as the data on fertility. For foreign aid, the recipient's income, the percent of urban population, and the percent of female in population, for which data are available for every year, averages of the corresponding variables are used (see notes to Appendix A for details).⁹

Table (1) in Appendix presents the results of estimation. Column (7) shows the main results of a pooled LS estimation with country specific fixed effects. The regression demonstrates that the coefficient estimated on foreign aid is positive and statistically significant. In contrast, the estimated coefficient on the recipient's own income, although positive, is not significant even at a 35% level. The coefficient on the recipient's income is also much lower than that on foreign aid. Thus the direct fertility estimation supports the hypothesis postulated in the previous sub-section on PGR that foreign aid captures the positive income effect of non-labor income transfers on fertility, whereas the recipient's GNI may capture both income and substitution effects of labor income.

Following the approach employed in the analysis of population growth, if the model is re-estimated with both linear and quadratic functional forms, as shown in Column (8), the positive and statistically significant linear effect of aid is much stronger than the negative effect of the quadratic form. This observation confirms the result from

⁸ Systematic data on schooling (particularly, that of female) and contraceptive prevalence that are generally used in the literature to estimate fertility decisions (e.g., Schultz, 1997) are not available for the early part of the period.

the PGR estimation that the positive overall effect of aid on fertility is characterized by the diminishing returns to scale.

4. Conclusion

This work investigates the effect of foreign aid on fertility and population growth in sub-Saharan Africa. The work considers population growth rate (PGR) and the directly related to fertility total fertility rate (TFR). Using a panel of main 43 sub-Saharan African countries during the last four decades of the 20th century, it demonstrates the positive association between population growth rate and foreign aid received in the previous year and suggests that foreign aid affects population growth primarily via its effect on fertility. The work also shows that in the direct estimation of the total fertility rate the coefficient estimated on once-lagged foreign aid is positive and significant as well.

These findings suggest that the appreciation of the demographic effect of foreign aid can have important implications for the design of policies regarding to foreign aid for presently developing countries, particularly in sub-Saharan Africa.

References

- Azarnert, L.V. (2004) Redistribution, fertility, and growth: the effect of the opportunities abroad. *European Economic Review* 48: 785 – 795.
- Azarnert, L.V. (2006) Child mortality, fertility and human capital accumulation. *Journal of Population Economics* 19: 285 – 297.
- Azarnert, L.V. (2008) Foreign aid, fertility and human capital accumulation. *Economica* 75, 766 – 781.
- Bauer, P.T. (1976) *Dissent on Development*, London: Weidenfield and Nicholson.
- Blackorby, C., Bosswort, W. and Donaldson, D. (1999) Foreign aid and population policy: some ethical considerations. *Journal of Development Economics* 59: 203 – 237.
- Boone, P. (1996) Politics and the effectiveness of foreign aid. *European Economic Review* 40: 289 – 329.

⁹ Using data lagged one year instead of the averages does not affect the results concerning the effect of aid

- Burnside, C., and Dollar, D. (2000) Aid, policies, and growth. *American Economic Review* 90, 847 – 867.
- Dahan, M., and Tsiddon, D (1998) Demographic transition, income distribution and economic growth. *Journal of Economic Growth* 3: 29 – 52.
- Doucouliafos, H. and Paldam, M (2008) Aid Effectiveness on Growth: A Meta Study. *European Journal of Political Economy* 24: 1 – 24.
- Easterly, W., and Levine, R. (1997) Africa's growth tragedy: politics and ethnic divisions. *Quarterly Journal of Economics* 112: 1203 – 1250.
- Foote, K.A., Holl, K.H., and Martin, L.G. (eds.) (1993) *Demographic Change in Sub-Saharan Africa*, Washington, DC: National Academy Press.
- Friedman, Milton (1958) Foreign economic aid. *Yale Review* 47: 500 – 516.
- Galor, O. (2005) From Stagnation to Growth: Unified Growth Theory. In Aghion, P. Durlauf, S. (eds.) *Handbook of Economic Growth*, North Holland, Amsterdam: Elsevier, Vol. 1A, pp. 171 – 295
- Galor, O. and Moav, O. (2002) Natural selection and the origin of economic growth. *Quarterly Journal of Economics* 117: 1133 – 1191
- Galor, O. and Weil, D.N. (2000) Population, technology and growth: from the Malthusian stagnation to the demographic transition and beyond. *American Economic Review* 86: 374 – 387.
- Goliber, T.J. (1997) Population and reproductive health in sub-Saharan Africa. *Population Bulletin* 52(4): 1 – 43.
- Lancaster, C. (1999) Aid effectiveness in Africa: the unfinished agenda. *Journal of African Economies* 8: 487 – 503.
- Moav, O. (2005) Cheap children and the persistence of poverty. *Economic Journal* 115, 88 – 110.
- Morand, O.F. (1999) Endogenous fertility, income distribution, and growth. *Journal of Economic Growth* 4: 331 – 349.
- Roodman, D. (2004) The anarchy of numbers: aid, development and cross-country empirics. Center for Global Development, Working Paper no. 32.

- Shultz, P.T. (1997) Demand for children in low income countries. In M.R. Rosenzweig and O. Stark (eds.), *Handbook of Population and Family Economics* (pp. 349 – 432). Amsterdam: Elsevier Science.
- Tarver, J.D. (1996) *Demography of Africa*, Westport, CT: Praeger.
- United Nations (2004) *World Population Prospects: The 2004 Revision*, New York: United Nations.
- World Bank (1998) *Assessing Aid: What Works, What Doesn't and Why*, New York: Oxford University Press.
- World Bank (2001) *World Development Indicators 2000*.

Appendix A: List of main sub-Saharan African countries and data availability
(the period 1962 – 2000)

Country	Aid and GNI	Country	Aid and GNI
Benin*	1962 – 2000	Angola	1987 – 2000
Botswana*	1962 – 2000	Capo Verde	1988 – 2000
Burkina Faso*	1962 – 2000	Congo, Dem. Rep.	1962 – 69; 1973 – 98
Burundi*	1962 – 2000	Equatorial Guinea	1987 – 2000
Cameroon*	1962 – 2000	Eritrea	1994 – 2000
Central African Rep.*	1962 – 2000	Ethiopia	1983 – 2000
Chad*	1962 – 2000	Gambia	1968 – 2000
Congo, Rep.*	1962 – 2000	Guinea	1988 – 2000
Cote d'Ivoire*	1962 – 2000	Guinea-Bissau	1975 – 2000
Gabon*	1962 – 2000	Liberia	1962 – 1987
Ghana*	1962 – 2000	Mali	1969 – 2000
Kenya*	1962 – 2000	Mozambique	1982 – 2000
Lesotho*	1962 – 2000	Namibia ¹	1990 – 2000
Madagascar*	1962 – 2000	Rwanda ²	1962 – 2000
Malawi*	1962 – 2000	Senegal	1970 – 2000
Mauritania*	1962 – 2000	Sierra Leone	1966 – 2000
Mauritius*	1962 – 2000	Somalia	1962 – 1990
Niger*	1962 – 2000	Swaziland	1972 – 2000
Nigeria*	1962 – 2000	Tanzania	1990 – 2000
Sudan*	1962 – 2000	Uganda	1984 – 2000
Togo*	1962 – 2000	Zimbabwe ¹	1980 – 2000
Zambia*	1962 – 2000		

Notes to Appendix A: Countries with asterisk are in the balanced sample.

AID and GNI: Foreign aid and the recipient's GNI per capita in constant 1995 US\$ (deflated by the US CPI), correspondingly. Yearly data on population growth rate (PGR), the percent of female in total population, and urban population as percent of total population are available since 1960 throughout all of the period. Data on total fertility rate (TFR), infant mortality rate and life expectancy at birth during the period 1962 – 2000 are available for the following years: 1962, 1965, 1967, 1970, 1972, 1975, 1977, 1980, 1982, 1985, 1987, 1990, 1992, 1995, 1997, 2000. In TFR regressions, for AID, GNI, the percent of urban population, and the percent of female, for which data are available for each year, for each decade four averages are calculated on 2 or 3 years basis in such a manner: for the year that ends with 2, the average is calculated for two years within the same decade that end with 1 and 2; for the year that ends with 5, the average is for three years that end with 3, 4 and 5; for the year that ends with 7, the average is for the years that end with 6 and 7; for the year that ends with 0, the average is for the years that end with 9 and 0.

(1) For Namibia, data refer to the years since independence only. For Zimbabwe, only the period of the black majority rule is considered.

(2) For Rwanda, the 1994 – 1997 period that saw substantial movements of Rwandans across the county's boundaries as a consequence of the civil war is excluded.

Republic of South Africa that did not receive aid, but suffered from international sanctions throughout almost all of the period is not included in the sample.

Table 1: Population Growth Rate (PGR) and Total Fertility Rate (TFR) Estimation

Dep. Variable	Population Growth Rate			Population Growth Rate			Total Fertility Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Observ.	836	836	836	1279	1279	1279	330	330
AID(-1)	4.97E-04 (2.66)	5.52E-04 (2.59)	1.02E-03 (2.63)	5.10E-04 (2.09)	4.00E-04 (1.18)	1.46E-03 (2.63)	1.62E-03 (1.92)	7.39E-03 (3.64)
AID(-1) ²			-2.06E-06 (-2.15)			-3.80E-06 (-2.50)		-2.71E-05 (-3.47)
AID		-7.99E-05 (-0.48)			1.61E-04 (0.47)			
GNI(-1)	1.03E-05 (0.94)	1.02E-05 (0.93)	9.70E-06 (0.89)	3.30E-05 (1.99)	3.30E-05 (2.00)	3.18E-05 (1.94)	3.12E-05 (0.87)	4.19E-05 (1.25)
TIME	1.13E-03 (1.24)	1.15E-03 (1.27)	7.08E-04 (0.76)	1.91E-03 (1.11)	1.82E-03 (1.06)	1.31E-03 (0.79)	-0.181 (-10.03)	-0.187 (-10.70)
PGR(-1)	1.313 (14.83)	1.313 (14.81)	1.312 (14.85)	1.097 (4.85)	1.096 (4.84)	1.096 (4.84)		
PGR(-2)	-0.423 (-5.35)	-0.423 (-5.35)	-0.423 (-5.36)	-0.297 (-1.49)	-0.296 (-1.49)	-0.297 (-1.49)		
Urban Popul.(-1)	-1.85E-03 (-1.43)	-1.89E-03 (-1.47)	-1.57E-03 (-1.23)	-2.33E-03 (-1.35)	-2.17E-03 (-1.25)	-2.01E-03 (-1.18)	-5.38E-04 (-0.10)	-2.37E-04 (-0.04)
% of Fem.(-1)	5.74E-02 (1.99)	5.75E-02 (2.00)	5.49E-02 (1.90)	5.57E-02 (1.55)	5.61E-02 (1.56)	5.33E-02 (1.50)		
Life Exp.(-1)							3.49E-02 (2.56)	3.03E-02 (2.22)
Infant Mort. Rate(-1)							-1.23E-02 (-4.78)	-1.25E-02 (-4.92)
Adj. R ²	0.933	0.933	0.933	0.797	0.797	0.797	0.855	0.858

Notes: Columns (1) to (3) and (7), (8): Balanced Sample, Columns (4) to (6): Unbalanced Panel.

Method of estimation: LS with country specific fixed effects.

White heteroskedasticity-consistent *t*-values in parentheses.

Bar-Ilan University
Department of Economics
WORKING PAPERS

- 1-01 **The Optimal Size for a Minority**
Hillel Rapoport and Avi Weiss, January 2001.
- 2-01 **An Application of a Switching Regimes Regression to the Study of Urban Structure**
Gershon Alperovich and Joseph Deutsch, January 2001.
- 3-01 **The Kuznets Curve and the Impact of Various Income Sources on the Link Between Inequality and Development**
Joseph Deutsch and Jacques Silber, February 2001.
- 4-01 **International Asset Allocation: A New Perspective**
Abraham Lioui and Patrice Poncet, February 2001.
- 5-01 **מודל המועדון והקהילה החרדית**
יעקב רוזנברג, פברואר 2001.
- 6-01 **Multi-Generation Model of Immigrant Earnings: Theory and Application**
Gil S. Epstein and Tikva Lecker, February 2001.
- 7-01 **Shattered Rails, Ruined Credit: Financial Fragility and Railroad Operations in the Great Depression**
Daniel A. Schiffman, February 2001.
- 8-01 **Cooperation and Competition in a Duopoly R&D Market**
Damiano Bruno Silipo and Avi Weiss, March 2001.
- 9-01 **A Theory of Immigration Amnesties**
Gil S. Epstein and Avi Weiss, April 2001.
- 10-01 **Dynamic Asset Pricing With Non-Redundant Forwards**
Abraham Lioui and Patrice Poncet, May 2001.
- 11-01 **Macroeconomic and Labor Market Impact of Russian Immigration in Israel**
Sarit Cohen and Chang-Tai Hsieh, May 2001.

Electronic versions of the papers are available at
http://www.biu.ac.il/soc/ec/wp/working_papers.html

- 12-01 **Network Topology and the Efficiency of Equilibrium**
Igal Milchtaich, June 2001.
- 13-01 **General Equilibrium Pricing of Trading Strategy Risk**
Abraham Lioui and Patrice Poncet, July 2001.
- 14-01 **Social Conformity and Child Labor**
Shirit Katav-Herz, July 2001.
- 15-01 **Determinants of Railroad Capital Structure, 1830–1885**
Daniel A. Schiffman, July 2001.
- 16-01 **Political-Legal Institutions and the Railroad Financing Mix, 1885–1929**
Daniel A. Schiffman, September 2001.
- 17-01 **Macroeconomic Instability, Migration, and the Option Value of Education**
Eliakim Katz and Hillel Rapoport, October 2001.
- 18-01 **Property Rights, Theft, and Efficiency: The Biblical Waiver of Fines in the Case of Confessed Theft**
Eliakim Katz and Jacob Rosenberg, November 2001.
- 19-01 **Ethnic Discrimination and the Migration of Skilled Labor**
Frédéric Docquier and Hillel Rapoport, December 2001.
- 1-02 **Can Vocational Education Improve the Wages of Minorities and Disadvantaged Groups? The Case of Israel**
Shoshana Neuman and Adrian Ziderman, February 2002.
- 2-02 **What Can the Price Gap between Branded and Private Label Products Tell Us about Markups?**
Robert Barsky, Mark Bergen, Shantanu Dutta, and Daniel Levy, March 2002.
- 3-02 **Holiday Price Rigidity and Cost of Price Adjustment**
Daniel Levy, Georg Müller, Shantanu Dutta, and Mark Bergen, March 2002.
- 4-02 **Computation of Completely Mixed Equilibrium Payoffs**
Igal Milchtaich, March 2002.
- 5-02 **Coordination and Critical Mass in a Network Market – An Experimental Evaluation**
Amir Etziony and Avi Weiss, March 2002.

- 6-02 **Inviting Competition to Achieve Critical Mass**
Amir Etziony and Avi Weiss, April 2002.
- 7-02 **Credibility, Pre-Production and Inviting Competition in a Network Market**
Amir Etziony and Avi Weiss, April 2002.
- 8-02 **Brain Drain and LDCs' Growth: Winners and Losers**
Michel Beine, Frédéric Docquier, and Hillel Rapoport, April 2002.
- 9-02 **Heterogeneity in Price Rigidity: Evidence from a Case Study Using Micro-Level Data**
Daniel Levy, Shantanu Dutta, and Mark Bergen, April 2002.
- 10-02 **Price Flexibility in Channels of Distribution: Evidence from Scanner Data**
Shantanu Dutta, Mark Bergen, and Daniel Levy, April 2002.
- 11-02 **Acquired Cooperation in Finite-Horizon Dynamic Games**
Igal Milchtaich and Avi Weiss, April 2002.
- 12-02 **Cointegration in Frequency Domain**
Daniel Levy, May 2002.
- 13-02 **Which Voting Rules Elicit Informative Voting?**
Ruth Ben-Yashar and Igal Milchtaich, May 2002.
- 14-02 **Fertility, Non-Altruism and Economic Growth: Industrialization in the Nineteenth Century**
Elise S. Brezis, October 2002.
- 15-02 **Changes in the Recruitment and Education of the Power Elites in Twentieth Century Western Democracies**
Elise S. Brezis and François Crouzet, November 2002.
- 16-02 **On the Typical Spectral Shape of an Economic Variable**
Daniel Levy and Hashem Dezhbakhsh, December 2002.
- 17-02 **International Evidence on Output Fluctuation and Shock Persistence**
Daniel Levy and Hashem Dezhbakhsh, December 2002.
- 1-03 **Topological Conditions for Uniqueness of Equilibrium in Networks**
Igal Milchtaich, March 2003.
- 2-03 **Is the Feldstein-Horioka Puzzle Really a Puzzle?**
Daniel Levy, June 2003.

- 3-03 **Growth and Convergence across the US: Evidence from County-Level Data**
Matthew Higgins, Daniel Levy, and Andrew Young, June 2003.
- 4-03 **Economic Growth and Endogenous Intergenerational Altruism**
Hillel Rapoport and Jean-Pierre Vidal, June 2003.
- 5-03 **Remittances and Inequality: A Dynamic Migration Model**
Frédéric Docquier and Hillel Rapoport, June 2003.
- 6-03 **Sigma Convergence Versus Beta Convergence: Evidence from U.S. County-Level Data**
Andrew T. Young, Matthew J. Higgins, and Daniel Levy, September 2003.
- 7-03 **Managerial and Customer Costs of Price Adjustment: Direct Evidence from Industrial Markets**
Mark J. Zbaracki, Mark Ritson, Daniel Levy, Shantanu Dutta, and Mark Bergen, September 2003.
- 8-03 **First and Second Best Voting Rules in Committees**
Ruth Ben-Yashar and Igal Milchtaich, October 2003.
- 9-03 **Shattering the Myth of Costless Price Changes: Emerging Perspectives on Dynamic Pricing**
Mark Bergen, Shantanu Dutta, Daniel Levy, Mark Ritson, and Mark J. Zbaracki, November 2003.
- 1-04 **Heterogeneity in Convergence Rates and Income Determination across U.S. States: Evidence from County-Level Data**
Andrew T. Young, Matthew J. Higgins, and Daniel Levy, January 2004.
- 2-04 **"The Real Thing:" Nominal Price Rigidity of the Nickel Coke, 1886-1959**
Daniel Levy and Andrew T. Young, February 2004.
- 3-04 **Network Effects and the Dynamics of Migration and Inequality: Theory and Evidence from Mexico**
David McKenzie and Hillel Rapoport, March 2004.
- 4-04 **Migration Selectivity and the Evolution of Spatial Inequality**
Ravi Kanbur and Hillel Rapoport, March 2004.
- 5-04 **Many Types of Human Capital and Many Roles in U.S. Growth: Evidence from County-Level Educational Attainment Data**
Andrew T. Young, Daniel Levy and Matthew J. Higgins, March 2004.

- 6-04 **When Little Things Mean a Lot: On the Inefficiency of Item Pricing Laws**
Mark Bergen, Daniel Levy, Sourav Ray, Paul H. Rubin and Benjamin Zeliger,
May 2004.
- 7-04 **Comparative Statics of Altruism and Spite**
Igal Milchtaich, June 2004.
- 8-04 **Asymmetric Price Adjustment in the Small: An Implication of Rational Inattention**
Daniel Levy, Haipeng (Allan) Chen, Sourav Ray and Mark Bergen, July 2004.
- 1-05 **Private Label Price Rigidity during Holiday Periods**
Georg Müller, Mark Bergen, Shantanu Dutta and Daniel Levy, March 2005.
- 2-05 **Asymmetric Wholesale Pricing: Theory and Evidence**
Sourav Ray, Haipeng (Allan) Chen, Mark Bergen and Daniel Levy,
March 2005.
- 3-05 **Beyond the Cost of Price Adjustment: Investments in Pricing Capital**
Mark Zbaracki, Mark Bergen, Shantanu Dutta, Daniel Levy and Mark Ritson,
May 2005.
- 4-05 **Explicit Evidence on an Implicit Contract**
Andrew T. Young and Daniel Levy, June 2005.
- 5-05 **Popular Perceptions and Political Economy in the Contrived World of Harry Potter**
Avichai Snir and Daniel Levy, September 2005.
- 6-05 **Growth and Convergence across the US: Evidence from County-Level Data (revised version)**
Matthew J. Higgins, Daniel Levy, and Andrew T. Young , September 2005.
- 1-06 **Sigma Convergence Versus Beta Convergence: Evidence from U.S. County-Level Data (revised version)**
Andrew T. Young, Matthew J. Higgins, and Daniel Levy, June 2006.
- 2-06 **Price Rigidity and Flexibility: Recent Theoretical Developments**
Daniel Levy, September 2006.
- 3-06 **The Anatomy of a Price Cut: Discovering Organizational Sources of the Costs of Price Adjustment**
Mark J. Zbaracki, Mark Bergen, and Daniel Levy, September 2006.

- 4-06 **Holiday Non-Price Rigidity and Cost of Adjustment**
Georg Müller, Mark Bergen, Shantanu Dutta, and Daniel Levy.
September 2006.
- 2008-01 **Weighted Congestion Games With Separable Preferences**
Igal Milchtaich, October 2008.
- 2008-02 **Federal, State, and Local Governments: Evaluating their Separate Roles in US Growth**
Andrew T. Young, Daniel Levy, and Matthew J. Higgins, December 2008.
- 2008-03 **Political Profit and the Invention of Modern Currency**
Dror Goldberg, December 2008.
- 2008-04 **Static Stability in Games**
Igal Milchtaich, December 2008.
- 2008-05 **Comparative Statics of Altruism and Spite**
Igal Milchtaich, December 2008.
- 2008-06 **Abortion and Human Capital Accumulation: A Contribution to the Understanding of the Gender Gap in Education**
Leonid V. Azarnert, December 2008.
- 2008-07 **Involuntary Integration in Public Education, Fertility and Human Capital**
Leonid V. Azarnert, December 2008.
- 2009-01 **Inter-Ethnic Redistribution and Human Capital Investments**
Leonid V. Azarnert, January 2009.
- 2009-02 **Group Specific Public Goods, Orchestration of Interest Groups and Free Riding**
Gil S. Epstein and Yosef Mealem, January 2009.
- 2009-03 **Holiday Price Rigidity and Cost of Price Adjustment**
Daniel Levy, Haipeng Chen, Georg Müller, Shantanu Dutta, and Mark Bergen,
February 2009.
- 2009-04 **Legal Tender**
Dror Goldberg, April 2009.
- 2009-05 **The Tax-Foundation Theory of Fiat Money**
Dror Goldberg, April 2009.

- 2009-06 **The Inventions and Diffusion of Hyperinflatable Currency**
Dror Goldberg, April 2009.
- 2009-07 **The Rise and Fall of America's First Bank**
Dror Goldberg, April 2009.
- 2009-08 **Judicial Independence and the Validity of Controverted Elections**
Raphaël Franck, April 2009.
- 2009-09 **A General Index of Inherent Risk**
Adi Schnytzer and Sara Westreich, April 2009.
- 2009-10 **Measuring the Extent of Inside Trading in Horse Betting Markets**
Adi Schnytzer, Martien Lamers and Vasiliki Makropoulou, April 2009.
- 2009-11 **The Impact of Insider Trading on Forecasting in a Bookmakers' Horse Betting Market**
Adi Schnytzer, Martien Lamers and Vasiliki Makropoulou, April 2009.
- 2009-12 **Foreign Aid, Fertility and Population Growth: Evidence from Africa**
Leonid V. Azarnert, April 2009.