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Fertility decline; no mystery

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ABSTRACT: The *economic opportunity hypothesis* states that perceived shrinkage of opportunity discourages women or couples from embarking on marriage or reproduction. On the contrary, the sense that opportunity is expanding encourages couples to raise their family-size target. The hypothesis assumes that humans are genetically programmed to maximize successful reproduction by having more offspring when environmental/economic conditions appear favorable, but exercise restraint—waiting or limiting the total number of offspring—if the latter strategy promises greater longrun success.

KEY WORDS: Fertility rates · Population · Incentives · Perception · Reproduction

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INTRODUCTION

The March 8, 2002 UN Report (Crossette 2002, Francis 2002) on declining fertility rates makes pleasant reading, especially because a New York Times' summary states that 'The decline in birthrates in nations where poverty and illiteracy are still widespread defies almost all conventional wisdom. Planners once argued—and some still do—that a falling birthrate can only follow improved living standards and more educational opportunities, not outrun them. It now seems that women are not waiting for that day' (Crossette 2002).

For women's rights advocates the response is triumphant—given any power at all to control their own reproduction, women have opted for smaller family size. For environmentalists the lower fertility rates are a relief—fewer people means less pressure on the population carrying capacity and less degradation of natural resources. Only some professional demographers are bemused; they have long maintained that a decline in poverty and illiteracy are preconditions for smaller family size, a hypothesis that is manifestly inadequate.

For an anthropologist like myself, the UN Report is a great vindication. Over several decades I have explored the effects of economic opportunity (EO) (Abernethy 1979, 1993), concluding that a sense of expanding opportunity encourages people to raise their family-size targets. Conversely, falling expectations and the perception of heightened competition for limited goods bring about reproductive and marital caution. I call this the EO hypothesis.

Fertility rates are now falling almost worldwide because maintaining a culturally defined, good standard of living is becoming more difficult in most environments. Despite over 1 trillion US dollars in foreign aid given by the United States alone since World War II (Poverty Lobby II 2002), and globalized trade, increasing numbers live in poverty or must compete more to stay in the middle class. 'Most people in Latin America, the Middle East and Central Asia are poorer than at the cold war's close, despite the fast economic integration of the 1990s (Kahn & Weiner 2002). In addition, a review finds that, 'Infant mortality rates deteriorated in large swaths of Africa... and in much of the developing world, the number of people who lived on less than \$1 a day shot up over the last decade' (Sengupta 2002)

In today's poorer countries, clean fresh water is scarce for a growing number of people. Worldwide, grain

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production per capita has not risen since the mid-1980s, and an enormous gap between the infant mortality rates in developed and developing countries—the difference between 8 and 67 deaths per 1000 respectively—persists (Population Reference Bureau 2001).

Explosive population growth is a principal contributor to many of these negative developments. Optimistically, some would say the EO hypothesis implies that runaway population growth is self-correcting in the long run, because reproductive caution is triggered by the tougher economic, social, and environmental conditions associated with rapid population growth.

That 'long run' appears to have arrived. Can the title of my paper published several years ago, 'Population dynamics: why we can sit back and watch fertility fall,' (Abernethy 2000) be more explicit?

The EO hypothesis is a simple and comprehensive explanation of declining fertility rates. It is equally applicable in developed and less-developed countries, and in urban or rural settings. But to say that it does not disturb certain experts of the international development cabal would be to ignore such comments as, 'She's a nut,' and 'Her ideas are ignored by the demographic community. I'd say that's justified.' Both statements, by well-known demographers, appeared in a Wall Street Journal feature story on the EO hypothesis (Zachary 1998).

This paper summarizes numerous published data including findings from a prospective test. In addition, the reader will find citations to demographic and anthropological case studies that illustrate the hypothesis. References, with one exception, are exact.

TESTING THE HYPOTHESIS IN THE WAKE OF ECONOMIC COLLAPSE

The economic collapse of former 'Asian tigers' (Hong Kong, Indonesia, Japan, Malaysia, The Philippines, Singapore, South Korea, Taiwan, and Thailand) in late summer, 1997, presented the opportunity for a prospective test of the EO hypothesis. Abernethy predicted (1998) that the tigers' collapsing economies would cause their fertility rates to decline at a faster rate during the 1997 to 1999 interval than observed in preceding 2 yr intervals. Fertility had been declining in each of these countries for varying numbers of years but with the collapse of the economies that decline was expected to accelerate.

The 9 economies of the former Asian tigers are modern in at least 1 primary sector of the society and, until 1997, this sector was relatively affluent. The economies vary greatly, however, in the pervasiveness of modernizing influences. The Philippines might have been excluded because it never achieved independent economic take-

off and remained heavily reliant on the presence of US naval bases for nearly a century, until the early 1990s. Other observers would exclude Japan from the sample because of the length of time that its economy has been modernizing. Japan began to invest in technology and education before the turn of the 20th century, and modernized other facets of society immediately after World War II. Taiwan and Hong Kong embarked on extensive modernization within a decade of the ending of World War II (Abernethy & Penalzoza 2002).

Whatever their differences and pace of change, some generalizations apply. By 1997, each country had experienced improvements in standard of living, the value of education was increasingly appreciated as the high road to economic success, and the prospect of entering the middle class was influencing an increasing proportion of the population (Abernethy & Penalzoza 2002).

However, within a matter of months after late summer 1997, the 9 economic tigers faced collapsing asset values including currency devaluation of up to 40%. The downward spiral was initiated by a sharp devaluation of the Thai baht and quickly spread. In Japan, the unemployment rates in 1998 and 1999 rose to a level higher than at any time since 1953. Personal bankruptcies in 1999 were 50% higher than in 1997, and a further sign of falling incomes was the decline in Japanese retail sales from 1997 to 1999. In 1998, the Japanese suicide rate was the highest ever recorded. Contemplating an uncertain future, a majority of university students expressed a preference for government as opposed to private-sector employment (Abernethy & Penalzoza 2002).

The EO hypothesis suggests that adjustment to uncertainty, unemployment, and the negative wealth effect is likely to entail the derailment of marital and reproductive plans. Further decline from already low fertility rates in most Asian tiger economies seemed possible. Under similarly difficult circumstances, fertility rates in East Germany temporarily declined to a level that, if maintained over women's entire lifetimes, would have led to an average completed family size of as little as 0.6 children per woman (Conrad et al. 1996).

Results

The predicted, significantly greater-than-trend fertility decline in former tigers materialized. The fertility rate by economy, in 2 yr intervals, is shown in Table 1. Table 2 shows the percentage change in fertility rates, also in 2 yr intervals. The relevant finding is that the decline in the 1997 to 1999 interval is statistically significant, being >6 times as great as the average of declines in previous intervals (Abernethy & Penalzoza 2002).

A comparison group of countries that experienced no particular economic shock shows a random pattern of fertility rates (See Tables 3 & 4).

ILLUSTRATIONS OF THE EO HYPOTHESIS

Malawi

Malawi's first census in 1966 counted a population of 4 million. By 1995 it was 10 million. In recent years, the annual rate of population growth has been 3.5% (Kalipeni 1996).

Confronted with a rising population and limited arable land, the 85% of Malawians who derive their livelihood from subsistence farming have 3 options for maintaining a viable ecological niche: (1) they can work harder on existing holdings, activities known as 'agricultural intensification'; (2) they can migrate to

available but less good, in fact, marginal lands; or (3) they can limit family size to avoid adding to existing pressure on the land.

Anthropologist Ezekiel Kalipeni suggests that the hard work of agricultural intensification holds greatest promise in the short term but cannot keep ahead of population momentum. Migration to infertile marginal lands occurs but is unattractive, which leaves only the option of limiting family size. In comparison with other sub-Saharan Africans, rural Malawians began treating fertility control as a real choice relatively early. Between 1977 and 1987, crude birth rates declined from 48 to 41 births per 1000 persons in the population.

Kalipeni tested a number of traditional explanations of the fertility decline but found no significant relationships between the fertility rate and education, infant mortality, or urbanization in either 1977 or 1987 data. However, his 1987 regression model revealed a statistically significant inverse relationship between the fertility rate and population density ($r = -0.40$). That is, the denser the population, the lower the fertility rate. Drawing together all data, Kalipeni infers that land hunger was the central stimulus in the onset of Malawi's fertility decline. He writes:

'Correlation does not prove causality. Nevertheless, variation in the rate at which fertility is declining within regions suggests that land hunger does, indeed, drive the more cautious approach to childbearing: specifically, the fastest fertility decline is occurring in the region of highest population density... Land is a crucial commodity for survival since most of the people are subsistence farmers... the strong negative relationship between fertility and population density could be due to the lack of resources to grow enough food to feed a large family. It may also be an indication of prolonged out-migration of males to the few cities and to other parts of the country to seek wage employment... based on the tentative analysis shown above, it can be concluded that areas that are experiencing intense environmental pressure are also beginning to go through a fertility transition' (Kalipeni 1996, p. 299–300).

Table 1. The total fertility rate, by economy, by year. Source: Population Reference Bureau (1991 to 1999)

Country	Year				
	1991	1993	1995	1997	1999
Hong Kong	1.2	1.2	1.2	1.2 ^a	1.1
Indonesia	3.03	3.03	2.8	2.9	2.8
Japan	1.5	1.5	1.5	1.5	1.4
Malaysia	4.1	3.6	3.3	3.3	3.2
Philippines	4.1	4.1	4.1	4.1	3.7
Singapore	1.8	1.7	1.8	1.7	1.6
South Korea	1.6	1.6	1.6	1.7	1.6
Taiwan	1.7	1.6	1.8	1.8	1.4
Thailand	2.2	2.4	2.2	1.9	2.0

^aEstimated. Hong Kong's changed administrative status—reversion to Mainland China—is responsible for gap in Population Reference Bureau data

Table 2. Percentage change in total fertility rate, by economy, in 2 yr intervals

Country	2 yr interval			
	1991–1993 (%)	1993–1995 (%)	1995–1997 (%)	1997–1999 (%)
Hong Kong	0.0	0.0	0.0	-8.3
Indonesia	0.0	-7.6	3.6	-3.4
Japan	0.0	0.0	0.0	-6.7
Malaysia	-12.2	-8.3	0.0	-3.0
Philippines	0.0	0.0	0.0	-9.8
Singapore	-5.6	5.9	-5.6	-5.9
South Korea	0.0	0.0	6.3	-5.9
Taiwan	-5.9	12.5	0.0	-22.2
Thailand	9.1	-8.3	-13.6	5.3
Average decline	-1.6	-0.6	-1.0	-6.6

Rwanda

The beginning and course of population cycles are sometimes shrouded in history. One may conclude, nevertheless, that Malawian and Rwandan stories illustrate the effects of contrasting expectations. Relatively early, the Malawians accepted a theory of limits on arable land. Rwandan farmers, on the contrary, were encouraged to believe that the settlement of fertile new lands would be a continuing option.

Table 3. Total fertility rate by country by year: Latin America. Fourteen countries with populations of less than 1 million persons were excluded from the sample (Antigua, Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guadeloupe, Guyana, Martinique, Netherland Antilles, St Kitts-Nevis, Saint Lucia, St. Vincent and the Grenadines, and Suriname). Source: Population Reference Bureau (1991 to 1999)

Region Country	Year				
	1991	1993	1995	1997	1999
Central America					
Costa Rica	3.3	3.3	3.1	2.8	2.7
El Salvador	4.6	4.6	3.8	3.9	3.6
Guatemala	5.3	5.2	5.4	5.1	5.1
Honduras	5.3	5.6	5.2	5.2	4.4
Mexico	3.8	3.4	3.1	3.1	3.0
Nicaragua	5.5	4.8	4.6	4.6	3.9
Panama	3.0	2.9	3.0	2.8	2.7
Caribbean					
Cuba	1.9	1.8	1.8	1.5	1.6
Dominican Republic	3.6	3.3	3.3	3.2	3.2
Haiti	6.4	6.0	4.8	4.8	4.8
Jamaica	2.6	2.4	2.4	2.6	2.8
Puerto Rico	2.2	2.2	2.2	2.1	2.1
Trinidad & Tobago	2.4	2.4	2.7	2.0	1.7
South America					
Argentina	2.7	2.9	2.8	2.8	2.6
Bolivia	4.9	4.9	4.8	4.8	4.2
Brazil	3.3	2.6	2.9	2.5	2.3
Chile	2.7	2.6	2.5	2.4	2.4
Colombia	2.9	2.8	2.7	3.0	3.0
Ecuador	3.8	3.8	3.5	3.6	3.3
Paraguay	4.5	4.4	4.3	4.5	4.4
Peru	4.0	3.5	3.5	3.5	3.5
Uruguay	2.4	2.5	2.3	2.3	2.4
Venezuela	3.3	3.7	3.6	3.1	2.9

The Belgian and its successor indigenous government (beginning in 1962) recognized growing population pressure but, avers John May, projected an image of expansionary opportunity until the 1980s. The governments' principal responses to population pressure after World War II were agricultural intensification and 'extensification.' Extensification entailed dispersing the Rwandan population to empty paysannats within Rwanda and to less congested territories in neighboring countries (Zaire, now the Democratic Republic of Congo, Uganda, and Tanzania). These strategies, especially relocation, became 'by far the most important policy response ever adopted in Rwanda to cope with rapid population growth' (May 1995, p. 329).

May speculates that agricultural extensification created a frontier mentality—an image of opportunity—and that these expansive expectations may have raised the fertility rate: 'In fact, the relative availability of land during the agricultural colonization and intensification processes might have been conducive to higher fertility levels' (May 1995, p. 329).

The mid-1980s fertility rate was 8.5 births per woman. By the 1990s, Rwanda was 'the most densely populated country of continental sub-Saharan Africa' (May 1995, p. 333). 'Largely because of extremely high fertility,' states demographer Leon Bouvier, 'the population quadrupled between 1950 and 1993' (Bouvier 1995, p. 1).

Belatedly in 1981, donors of international aid forced the initiation of a national family planning effort. Fertility began to decline in 1985 and within 5 yr arrived at 6.2, a fall of more than 2 children per woman.

One could easily infer that offering women modern contraception caused the fertility decline. That, nevertheless, would overlook a contrary fact: by 1992, only 12.9% of married, reproductive-age women used modern contraceptive methods. Later marriage, May observes, was the most visible contributor to the Rwandan fertility decline (May 1995).

Delayed marriage is just one of many behavioral adjustments that can be adopted independently of contraception in any society—rural or not, deeply illiterate or not, patriarchal or not. Delayed marriage in response to adversity may be a pan-African or even pan-human response. Yoruba villagers in Nigeria explicitly ascribe decisions to delay marriage in 'hard economic times' (Caldwell et al. 1992, p. 237). Nineteenth century Irish, well before the 1845 famine, responded to land hunger with very late marriage or celibacy in a very large fraction of the population (Connell 1968).

John May reasons that Rwandans began to delay marriage by the late 1980s because the incentive structure had changed. Gains from intensifying agriculture had run their course. Land productivity decreased as marginal soils brought into cultivation 20 yr earlier steadily deteriorated. Droughts appeared to worsen, and the competition among alternate uses for land (e.g. cultivation, pastureland, forests, and domestic woodlots for fuel) intensified. Political realities ruled out further population dispersal, so family plots were subdivided to accommodate each maturing generation. Many farms reached a size that barely supports a family. By 1984, 57% of family holdings were less than 1 hectare in size (May 1995).

The shrinking opportunity structure apparently forced itself into Rwandan calculations by the mid-1980s and accounted for delayed marriages and first births. The new availability of contraception no doubt helped by making it easier to space and limit births within marriage. However, motivation is key. In the absence of couples' wanting to limit family size, both a World Bank-

Table 4. Percentage change in total fertility rate, by country, in 2 yr intervals: Latin America

Region Country	2 yr interval			
	1991–1993 (%)	1993–1995 (%)	1995–1997 (%)	1997–1999 (%)
Central America				
Costa Rica	0.0	-6.1	-9.7	-3.6
El Salvador	0.0	-17.4	2.6	-7.7
Guatemala	-1.9	3.8	-5.6	0.0
Honduras	5.7	-7.1	0.0	-15.4
Mexico	-10.5	-8.8	0.0	-3.2
Nicaragua	-12.7	-4.2	0.0	-15.2
Panama	-3.3	3.4	-6.7	-3.6
Average Decline	-3.2	-5.2	-2.8	-7.0
Caribbean				
Cuba	-5.3	0.0	-16.7	6.7
Dominican Republic	-8.3	0.0	-3.0	0.0
Haiti	-6.3	-20.0	0.0	0.0
Jamaica	-7.7	0.0	8.3	7.7
Puerto Rico	0.0	0.0	-4.5	0.0
Trinidad & Tobago	0.0	12.5	-25.9	-15.0
Average Decline	-4.6	-1.3	-7.0	-0.1
South America				
Argentina	7.4	-3.4	0.0	-7.1
Bolivia	0.0	-2.0	0.0	-12.5
Brazil	-21.2	11.5	-13.8	-8.0
Chile	-3.7	-3.8	-4.0	0.0
Colombia	-3.4	-3.6	11.1	0.0
Ecuador	0.0	-7.9	2.9	-8.3
Paraguay	-2.2	-2.3	4.7	-2.2
Peru	-12.5	0.0	0.0	0.0
Uruguay	4.2	-8.0	0.0	4.3
Venezuela	12.1	-2.7	-13.9	-6.5
Average decline	-1.9	-2.2	-1.3	-4.0
Average decline in Latin America	-3	-4	-3.2	-3.9

sponsored study (Pritchett 1994) and the literature underlying the EO hypothesis show that contraceptive programs are just marginally effective (Abernethy 1979).

May concludes that different government policies might have led to fertility decline sooner. The dispersal of the population through out-migration was a principal policy that shielded the people from the ecological realities of carrying capacity and prevented a timely response (May 1995).

South Asia

Timothy Dyson's analysis of a century of major famines in the Indian sub-continent connects the fertility rate to fluctuations in the natural and socioeconomic environment. He shows that small price increases for staple foods—typically the first response to a drought and a warning of possible famine—resulted in significantly lower fertility rates.

The mechanism was a series of behavioral adjustments. Dowries, for example, are more difficult to accumulate when crops are failing, so marriages and therefore births were delayed. Reproduction within marriage was also often delayed because married men left home to seek work in less affected areas.

Such marital and reproductive responses to price-mediated signs of shortage, coming well before the full force of famine materialized, effectively reduced the total fertility rate because a birth delayed is often a birth avoided. As positive factors, these adaptations seem also to have largely forestalled significant, famine-induced increases in mortality. Mortality appeared actually to fall among reproductive-age women, perhaps because of lower exposure to the perils of childbirth (Dyson 1991a,b).

Morocco

The Moroccan fertility rate rose in the wake of independence, in 1957, strong world prices for a principal export (phosphates), and the government's use of export profits to subsidize social programs. The total fertility rate (TFR) was approximately 7 children per woman in 1960, and by 1973 had risen to 7.4 (Courbages 1995).

In the late months of 1974 and 1975, watershed years, phosphate prices collapsed. Declining revenues forced the government to both raise personal income taxes and scale back subsidies for health care, education, food subsidies, and housing. The new role of government was not as giver but as taker of incomes, and it drove a renewed imperative: family self-reliance. Families cast back onto their own resources sought to satisfy basic needs as well as recently acquired tastes (for example, education and healthcare). Many women entered the workforce for the first time in order to supplement family income.

Youssef Courbages suggests that these unanticipated pressures on family lifestyles were the major cause of a fertility decline beginning in 1975. 'The sudden reversal of the economic and fiscal condition of Moroccan households is related to the sharp drop in fertility, which diminished by 20%, from 7.3 to 5.9 children per woman in just four years' (Courbages 1995, p. 89). Socioeconomic pressures have been unrelenting and, by 1997, the Moroccan TFR was 3.3 children per woman.

Egypt

Among all other Muslim countries, Egypt has the longest history of concern over its expanding population. Coinciding with consolidation of President Gamal Abdel Nasser's socialist regime in the 1960s, family planning advocates expanded their political base, programs became active and, by 1970, fertility had declined from 6.7 children per woman to a new low of 5.0.

Philippe Fargues nevertheless rejects the conclusion that programmatic family planning efforts caused the fertility decline. He cites, instead, the economic recession through which Egypt floundered until the death of President Nasser in 1970 (Fargues 1997).

Nasser left a political void that soon was filled by the economically progressive Anwar el-Sadat (1973 to 1985). President El Sadat encouraged domestic entrepreneurial activity as well as emigration, welcomed foreign investment, and signed a formal peace treaty with Israel (the 1981 Camp David accords) guaranteed by the United States.

The Camp David accords promise Egypt 2.5 billion US dollars in aid, annually, from the United States. This aid supplemented by oil revenues and fees for foreign shipping through the Suez Canal allowed serious expansion of the government's education, healthcare, food, and housing subsidies and other social programs that benefited broad segments of society. Such freshening breezes from windfall government revenues entailed, 'At the household level... a substantial increase in the standard of living.' Government largesse was augmented by remittances from overseas Egyptians that flowed directly to relatives, which by the early 1980s amounted to 5 billion US dollars a year, the equivalent of 90% of Egypt's annual export revenues (Fargues 1995, p. 183, 1997). The broadly distributed new wealth was enjoyed nationwide.

Fargues observes that 'Now better off, families could more easily satisfy an unchanged desire to have numerous offspring.' The fertility rate did indeed peak, rising 30% from 1970 to a high of 6.5 births per woman in the early 1980s (Fargues 1997, p. 124).

An economic reversal was evident by the mid-1980s. Indeed, the standard of living noticeably eroded because falling oil prices, population growth, and tougher World Bank and other international lending criteria forced rollbacks in government spending. President Hosni Mubarak, successor to the murdered El Sadat, had no choice but to scale back social programs and subsidies at the same time that the historically large population was experiencing massive underemployment.

In addition, Egypt was no longer self-sufficient in food production. Much of Egypt's 'breadbasket' out-

side of Cairo and along the Nile had been converted from agricultural to commercial and residential use. Shortage of water as well as arable land, and increasing dependence on imported food, contributed to the sense of foreboding that comes with growing unemployment and underemployment (Courbages 1995, Fargues 1995, 1997). Riots erupted when the government announced a higher price (lower subsidy) on bread. The price increase on bread was rescinded, but the government's next moves were the introduction of a larger, higher-priced loaf followed by erosion of the size of both loaves, until the original loaf, price unchanged, was materially smaller.

Seen in 1987, Cairo's schools had become so crowded that children were divided into 3 shifts and attended classes for only a few hours daily. Port Said was able to hold the line at just 2 shifts. Everywhere, the relative scarcity of more coveted professional jobs forced job-sharing: school-teachers taught 1 shift and made up their incomes as waiters or bazaar peddlers, and university professors drove cabs. Low wages forced many into homecrafts to be peddled on street corners, some earned tips from doling out single sheets of toilet paper in public-access bathrooms, and tens of thousands made their living from rag-picking in the smoldering garbage dumps that ring Cairo. By 1988 the government was unable to honor its pledge of a job for every university graduate, and offered a grant title to a 5-acre desert tract as a substitute for the job.

Such indicators (Abernethy 1993) presaged a renewed, rapid decline in the fertility rate. The Egyptian TFR declined from 5.0 children per woman in 1988 to 3.6 by 1997 (Population Reference Bureau 1997). The decline appeared to accelerate at the same time that ground was being lost in measures of social welfare, including literacy. Whereas 60% percent of women were literate in the late 1970s, the total adult literacy rate in 1997 was just 50%.

Trends in socioeconomic indicators and the fertility-rate support Fargues' contention that, 'Egypt's demographic transition has been driven not so much by economic development as by its hiccups' (Fargues 1997, p. 131).

Morocco compared to Egypt and other Muslim, Arab Countries

Youssef Courbages (1995) and Philippe Fargues (1995, 1997) concur that fertility rates in middle-eastern Muslim countries do not correlate with the modernization variables that many demographers see as fundamental. Reductions in infant mortality, better healthcare and education—especially for women—

and rising standards of living are not even correlated, and clearly are not causally related to declining fertility rates (Fargues 1995, 1997).

For example, modernization indicators in Morocco compared to other Muslim, Arab countries would not have predicted that Morocco would attain one of the first sustained fertility rate declines in the region. Moroccan women lagged others in both literacy and achieved educational level. Fewer than 40% of Moroccan women of childbearing age were literate when its fertility decline began, compared to ~60% in Egypt. Moreover, within each social stratum, Egyptian women were attaining a higher educational level (Courbage 1995). By the late 1970s, nevertheless, Moroccan fertility was lower than Egyptian:

'No one could have foreseen the slower fertility decline in Egypt and its relative acceleration in Morocco, because the evidence suggested exactly the opposite.... Egyptian economic growth has been particularly rapid without bringing down fertility, while in Morocco slow economic growth and a decrease in fertility have gone hand in hand' (Courbage 1995, p. 85).

The comparison is still more striking with rich countries such as Kuwait and Saudi Arabia, where all sectors of the population have had access to education, excellent healthcare and other social subsidies for many decades. Arab oil kingdoms have much lower infant mortality and proportionately more literate and better-educated women than Morocco but their fertility rates remained at very high levels until approximately 1990 (Courbage 1995).

Only in the past decade has extremely rapid population growth begun to overtake mid-east oil wealth. Per capita income and subsidies have declined, young men are seeking but not always finding employment and, at last, Iranian, Saudi, and Kuwaiti fertility rates have begun to fall.

FERTILITY RATES REFLECT PERCEIVED CHANGES IN ECONOMIC PROSPECTS

The Malaysian example

Before withdrawing from their Malaysian colony in 1957, the British instituted democratic reforms that left the more numerous Malays politically dominant. In addition, Great Britain affirmed the special position of the Malays, 'reserving for them four-fifths of all jobs in the civil service, three-fourths of university scholarships and training programs offered by the federal government, and a majority of license permits from the operation of trade and business' (Govindasamy & DaVanzo 1992, p. 247).

The Malays gained at the expense of the Indians and Chinese—Malaysia's 2 other principal ethnic groups. As the Malays consolidated their economic and cultural advantage, both Indians and Chinese were progressively discriminated against in access to education, jobs, and public office. Many Chinese fled to Singapore after race riots and a switch in the official language from English to Malay in the early 1960s. In 1965, Singapore became a separate political entity.

Demographers Govindasamy & DaVanzo trace the culmination of Malay bureaucratic and legislative power through the passage of a 20 yr blueprint for development (1971 to 1990) known as the New Economic Policy. By 1983, 'the Malay language was used as a medium of instruction at all levels of education...' (Govindasamy & DaVanzo 1992, p. 248) and competency in Malay became a criterion for graduation and civil service jobs.

The reversals in Malaysia's power structure after 1957 foretold demographic trends. In 1957, when Malays still were the least educated and poorest as well as the most rural population, they had the lowest total fertility rate. When they acquired political power at the expense of other ethnic groups, the pattern reversed.

Indian and Chinese fertility rates declined, respectively, from nearly 8 children per woman in 1957 to about 3 in 1987, and from more than 7 to 2.5 children per woman over the same period. The Malay fertility rate, in contrast, increased by 12%. Thus, by 1987, after the Malays had consolidated power, their fertility rate stood 'twice as high as the Chinese and 63% higher than that of the Indians' (Govindasamy & DaVanzo 1992, p. 243). Differential ethnic fertility has been persistent except for a brief period when trend lines crossed. By 1988, the Malays were a solid majority of the population.

Persistently high Malay fertility—despite increasing urbanization, economic expansion, and better education and healthcare—has been variously attributed to the pronatalism of Muslim religious forces as well as, according to Govindasamy & DaVanzo (1992), to the reversal in the opportunity structures, particularly after 1971. They offer the interpretation that the differential access to political and economic advantage 'is consistent with the arrested decline in total fertility rates for Malays in the mid-1970s, in the face of continuing decline for Chinese and Indians' (Govindasamy & DaVanzo 1992, p. 250).

Differential fertility among groups which gain (or lose) access to political levers and the spoils of victory may be a common phenomenon. Shifting political arrangements offer a promising setting in which to test the fertility opportunity model.

CYCLES OF RISING AND FALLING FERTILITY

Peru

A boom and bust psychology has long been associated with Peru's exports of natural resources. Peru became a prosperous exporter of guano for fertilizer in the 1850s, but the boom psychology was dampened by timely recognition of the limited nature of the resource. By the 1940s, guano mining was being managed frugally, with exports limited to the equivalent of the 255 000 tons of guano annually, the average amount deposited.

To supplement guano, President Manuel Odria, newly elected in 1948, began encouraging the development of anchoveta exports. Anchovetas appeared inexhaustible and Peru again prospered from fishing and associated industries. The growth phase of anchoveta fishing lasted for over a decade, and harvests remained strong until the El Niño Southern Oscillation (ENSO) event of 1972–73 decimated the haul (Pauly & Tsukayama 1987, Golnaraghi & Kaul 1995).

Beginning around 1972, the anchoveta industry and the Peruvian economy went into steep decline, as described in the August 1995 issue of *The Economist*. Successive socialist governments nationalized key food-producing sectors including fishing, with disastrous results for productivity. Natural disasters such as drought and recurrent ENSO events further undermined yields. Worsening hyperinflation and unemployment contributed to popular support for insurgent revolutionary groups that ultimately threatened Peru's political as well as economic viability. The terrorist force, *El Sendero Luminoso*, appeared on the verge of destabilizing Lima until reigned in by President Alberto Fujimori after his election in August 1990.

With these facts in hand as of February 1995, I expected that the fast-growing anchoveta industry would have spurred fertility right up to the 1972–73 episode of El Niño but that subsequent to this natural event and to political developments, fertility rates would decline. I asked several demographers for help in locating Peruvian fertility statistics. Most helpfully, John F. May of the Futures Group (Washington, DC) unearthed a paper from the Peruvian Instituto de Estudios en Población y Desarrollo.

As expected, the fertility rate did rise following the growth period of anchoveta fishing and its supporting industry. Whereas from 1876 through the early 1940s, Peru's total fertility rate remained in the range of 5.6 to 5.8 children per woman ('the fecundity appears to be more or less constant'), it then rose by more than one child per woman, to 6.85 ('by 1950...it arrived at 6.85 children per woman'; Montenegro & de Muelle 1990, p. 70–71).

Historically high levels of fertility were maintained for some 15 yr after 1950. Then, coinciding with the plateau of the anchoveta industry, a slow decline began. The fertility decline accelerated after the ENSO-related fishery collapse in 1972. Tracking the economy, the TFR still hovered at 6.85 children per woman in 1965, and declined to 6.56 by 1970, 6.00 by 1975, 5.38 by 1980, and 4.59 by 1985 (Montenegro 1990). The 1995 Population Data Sheet of the Population Reference Bureau shows Peru with a fertility rate of 3.5 children per woman (Population Reference Bureau).

The EO hypothesis accounts for oscillations in Peru's fertility rate: profits and employment in the anchoveta industry carried fertility up then down. This, however, is not the interpretation put upon the data by Peruvian demographers Montenegro & de Muelle. They suggest that women's better health and survival rates account for the fertility increase in 1950, and that classic modernization variables caused the post-1965 decline (Montenegro & de Muelle 1990, p. 70–71).

But congruent with the EO hypothesis, Ferrando & Aramburu (1996) explain the fertility decline by way of varying economic prospects. They write, '...even though the process of economic and cultural modernization created favourable (sic) conditions for the beginning of the decline, it was the economic crisis that accelerated the process, causing it to extend to the lower classes in both urban and rural areas in the 1970s.' They cite structural conditions in Peruvian society, first the great and growing inequalities and, second, the 'central' factor which is 'the profound and prolonged economic crisis suffered by Peru, which continues with variable intensity and has become more acute in the past 2 yr.

The United States

Demographic studies of the United States span the earliest English settlements to the present. Several points are significant:

First, colonists in the New World—whether Roman Catholic French in Quebec or English Protestants in New England—averaged much higher fertility rates than were usual in the societies from which they came. The colonists' high rates have been attributed to seemingly boundless natural resources which could absorb almost any amount of labor and, indeed, could not be transformed into wealth without human labor.

Second, the transition from the frontier to established agricultural community meant that free land vanished and good land became expensive. Land prices became an obstacle to setting up families on farms of the expected size and quality, delaying

marriage. Economist Richard Easterlin shows that denser settlement, with or without industrialization, was linked to declining fertility (Easterlin 1971, 1976).

Third, economic cycles are superimposed on other factors almost from the beginning of colonial settlement. For example, prosperity in Concord, an offshoot of the Massachusetts Bay colony settled by Puritans in 1630, varied with earnings from lumber and agricultural exports. The export trade relied upon backloading, the return trip of ships that had brought new colonists, as well as on strong demand for raw products in England.

The first hiatus in Concord's export trade occurred around 1642 when Puritans temporarily ceased immigrating to the colony, so no ships were available to carry back lumber and other colonial products. Subsequent interruptions in revenue from exports followed economic recessions and collapsing demand in England.

Each dislocation in the colony's export market, specifically 1642, the 1680s, the 1740s and the 1790s, affected family size. Political scientist Berry (1996) observes that, in every case, the contracting export market was followed by decline in the fertility rate.

Easterlin (1962) traces the later history of the colonies and the United States, showing how the domestic economy drove fertility rates. For example, the 1920 break in farm prices followed by the 1929 to 1939 Great Depression was reflected in declining fertility first in rural and then in urban areas.

The economy revived during World War II and, particularly after the war, was characterized by low inflation, scientific and technological innovation, growth in labor productivity, and a labor force that was sufficiently small and stable to drive up entry-level wages and accelerate promotions. Easterlin (1962) concludes that the expansive opportunities available to (young) entry-level workers account for the rapid increase in family formation and family size that became known as the 1947 to 1962 baby boom.

Not to belabor the contrast, but US fertility rates declined in the 1930s, when educational opportunity, wealth, and infant mortality indexes were at depression-era levels. However, the fertility rate was high in the 1950s and early 1960s, when young families benefited from favorable educational and employment opportunities and national health statistics looked better than ever. The baby boom came along when prospects—relative to families' wants, life experiences, and expectations—were very bright.

Fertility drifted lower during the 1960s as after-tax, inflation-adjusted income failed to rise at the pace to which families had become accustomed. The 1973–74 oil shock began the 'quiet depression,' with productivity and wage increases much below those of the pre-

vious 3 decades. Fertility followed economic trends, declining to 1.7 children per woman in 1976 (Macunovich & Easterlin 1990).

The fertility rate of native-born Americans as the US enters the 21st century is 1.9 children per woman, which is below replacement level. At least 2 forces seem responsible. First, consumerism puts the goal of acquiring things into competition with the value of extra children, both because of the time value of child-rearing and the actual expense associated with raising children in the United States (Macunovich & Easterlin 1990). Second, earnings have deteriorated for men, especially for men who have entered the labor market since the early 1980s and who, if prospects were better, might feel more inclined to assume the responsibility of marriage and a family.

Rapid growth in the supply of labor goes far to explain declining wages. Historically, rapid growth in the labor supply leads to decline in the value of labor, that is, to workers being obliged to accept lower wages and less desirable conditions (Lee 1980, Social security and the future of US fertility 1997). Since ~1980, several factors including mass immigration have been a driving force behind rapid and continuing expansion in the labor supply and significantly negative effects for workers (Borjas et al. 1996).

A study by the liberal-leaning Russell Sage Foundation (Bernhardt 2002) finds that 90% of young white male workers can expect to have lower lifetime wage growth than the previous generation. A reviewer cites the 4 sociologist and statistician authors' conclusion that the 'change is significant and permanent, comprising 'a massive downshift in earnings standards' (Roberts 2002, available at www.vdare.com/roberts/low_wage.htm). The fertility rate of this sector of native-born Americans will almost certainly remain below replacement level so long as their disadvantage in the labor market—relative to their expectations and, perhaps, relative to other groups—persists.

Thus, both consumerism and competition in the labor market heighten the sense that acquisition of desirable, limited goods is an unremitting struggle. The EO hypothesis suggests that this perception, or worldview, makes people cautious in embarking on marriage and childbearing.

Persuaded by history, US government's the Advisory Council on Social Security has generalized to the future. Their 1994–95 Report, excerpted in the journal *Population and Development Review*, argues that low fertility results in a small birth cohort whose members are likely to encounter ample job opportunities relative to their number, will command high wages, see rapid career advancement and, therefore, have relatively large families (Social Security and the Future of US Fertility 1997).

The Advisory Council reckon without the effect of mass immigration and immigrants' large average family size. Although the fertility rate of native-born Americans remains at about 1.9 children per woman, the total fertility rate of the United States had risen to replacement level, 2.1 births per woman, by 2000, because it blends native-born rates with the higher rates of the foreign-born.

Economic immigrants in the United States usually encounter conditions better than those left behind, so their perceptions of opportunity may be expected to differ materially from those of native-born Americans. Although less than 10% of the population, the foreign-born already in 1994 accounted for 18% of all US births (Ventura et al. 1996), proportions that have since risen.

DISCUSSION

These brief histories link economic and fertility variables. Single society vignettes, comparisons between countries, and cyclic patterns over time as well as one prospective, statistical test support the EO hypothesis. Much data is available, has been collected in previous publications, or becomes available on an almost daily basis.

Conditions for experiments in nature arise occasionally and fortuitously (but not fortunately). For example, the catastrophic economic collapse in Argentina—which assumed critical proportions beginning in December 2001—suggests that a sharp decline in the fertility rate will occur soon. Pregnancies last 9 mo, so the fertility decline should be fully manifest by 2003. The Population Reference Bureau will probably publish the 2003 figures by approximately midyear, 2004. Prospective tests require patience.

How many illustrations and statistical tests constitute proof of a scientific proposition? Outside of mathematics, perhaps nothing is ever proved because science operates, famously, through putting its hypotheses in jeopardy. Social science hypotheses are perhaps hardest to prove because only trivialities can be tested under controlled laboratory conditions. Theories about important relationships usually await testing through opportune circumstances that arise in nature, or by an accumulation of examples that almost always allow for alternate explanation. The EO hypothesis is easily mired in such objections.

Nevertheless, readers who delay marriage or plan their own families with one eye on a budget may easily absorb the EO hypothesis because it seems like common sense. Others, whose family history include suffering through the Great Depression and, perhaps, whispered tales of an aunt who aborted a third or fourth pregnancy, acknowledge that small families are

imposed by a sense of limited resources, whereas larger families would be wanted if their means of support were no object. Finally, biologists who recognize a common, large-animal-species pattern of adjusting fertility to available resources tend to accept the hypothesis as a true account of reality.

The hypothesis has its roots in biology, anthropology, economics, and psychology. The incentive structure and the innate motive to maximize one's chances for successful reproduction are assumed to underlie the relationship between perception of economic prospects and fertility.

The EO hypothesis holds that a sense of contracting opportunity encourages a cautious approach to marriage and reproduction whereas the perception of expanding opportunity allows people to raise family size targets. Mechanisms associated with small family size include delaying marriage or interrupting marital relations, abstinence before or within marriage, or protected sex. Social, cultural, and behavioral adaptations as well as intentional contraception can limit child-bearing.

The EO hypothesis, the women's empowerment lobby, and the 'just provide contraception' school do not have mutually exclusive explanations. The questions of why women want fewer children than most currently have, and how avoiding pregnancy can be made easier, link these perspectives to the EO hypothesis.

In fact, women today want fewer children because raising children in a culturally acceptable manner is hard and possibly getting harder. Depending upon gender roles and family structure, women may feel the constraints earlier and more acutely than men. Easily used contraception is clearly helpful in avoiding pregnancy where privacy, stability, and hygienic conditions are in short supply.

The implication of the EO hypothesis is that most humanitarian aid and refugee policies are self-defeating because they neutralize the subtle, or direr, signals of economic downsizing and resource scarcity that ordinarily lead to reproductive caution. That is, large-scale international interventions are unlikely to help and may harm. Exceptions are assistance with family planning and micro-loans that link small amounts of start-up capital to large measures of self-help. The latter types of assistance tend to be offered by non-governmental organizations in small scale, face-to-face settings.

Thus, the EO hypothesis does not militate against helping. But it is a warning that assistance may change the incentive structure. If generosity creates the impression that wealth and assistance are limitless, or even sufficient, the risk of succumbing to the lure of a(nother) child is increased.

The EO hypothesis can also guide policy if encouraging reproduction is the objective. The key is improving the opportunity structure for those about to enter young adulthood. Ample entry-level jobs, a climate offering rapid advancement, salaries sufficient to allow one earner to support a family, and low enough interest rates to encourage first-time home ownership promote marriage and childbearing. Governments may need to end immigration in order to protect jobs for native-born citizens, protect industry so that jobs do not go off-shore to low-wage producers, and use tax incentives for businesses that raises productivity through technological innovation. It is not so hard to make babies.

Humans are genetically programmed to seek reproductive success. Restraint is the hard part, needing to be strengthened by fear of consequences.

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