THE IMPACT OF THE DEMOGRAPHIC DIVIDEND ON THREE KEY SUPPORT SYSTEMS: EDUCATION, HEALTH CARE, AND PENSIONS

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Introduction

This paper examines the impact of changing age structures on transfer systems. The analysis is based on a simple age model that assumes a fixed age shape of average transfer benefits and payments – whose levels shift in response to changes in the population age structure. The paper begins with a broad overview of transfers and then focuses more narrowly on public sector transfers and public secondary education. Section 1 provides estimates on the impact of changes in population age structure on familial and public sector transfers for 20 countries in Latin America over the period 1950-2050. Section 2 takes a closer look at the possible impact of age structure changes in the public sector by forecasting public education, health care, and pensions using the age model. Section 3 examines the funding costs of universal secondary education in Latin America.

The data used in this report are based on the National Transfer Accounts (www.ntaccounts.org). This is an international effort led by Professors Ronald Lee (UC Berkeley) and Andrew Mason (U Hawaii) aimed at developing a common surveillance system of economic activity by age, consistent with national accounts (Mason, Lee, and others, 2008). NTAs have two distinguishing features in this respect. First, they add the dimension of age to national accounts. For example, while national accounts report aggregate labor income and consumption in a national economy, NTAs report the distribution of labor income and consumption by age. Information on economic activity by age is derived from national censuses and socio-economic surveys that are then adjusted so that the aggregate totals match those of National Accounts. The second distinguishing feature of NTAs is the inclusion of information on economic transfers by families, both within and between households. Family transfers are the primary means of support for children and in many countries also represent a major source of support for older persons. One of the major goals of the project is to allow comparison between familial and public sector transfers by measuring them within a common framework and this paper utilizes the NTAs for this purpose. At present, five Latin American countries are participating in the global project (Brazil, Chile, Costa Rica, Mexico and Uruguay) under a technical assistance project (www.cepal.org/celade/transferencias_intergeneracionales) executed the UN ECLAC/CELADE – Population Division with funding from Canada's International Development Research Center.

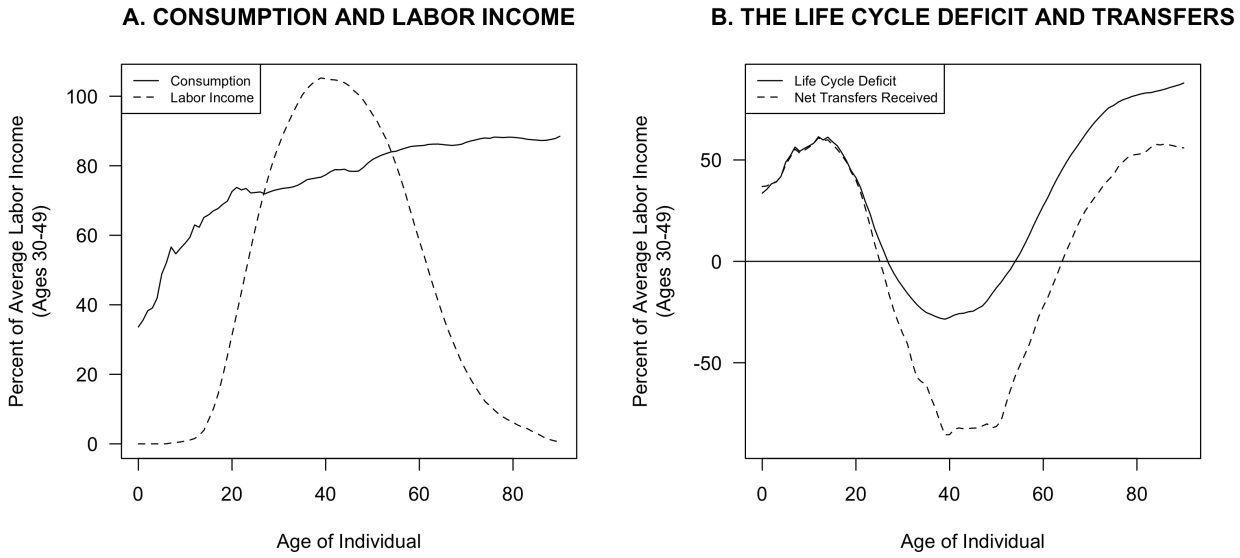
1. The Transfer Dividends

The possible economic benefits of the demographic dividend and the possible detrimental aspects of population ageing both originate in the economic life cycle , a pattern of economic activity that has been found to be broadly similar across countries, with some important variations. Figure 1a shows the economic life cycle for individuals based on NTA data from 4 Latin American economies (Brazil, Chile, Mexico, and Uruguay). Economic activity is measured relative to average labor earnings between the ages of 30 and 49 in each of the economies in order to standardize the measure across all the countries. The dashed line represents average labor earnings by age. These refer to average earnings per person, not per worker; that is, the average is calculated across all persons of a given age. Therefore, the profiles reflect the effects of labor force participation rates and unemployment rates. Labor earnings are zero for children and show a steep increase around age 20, representing entry into the labor market and exit from formal schooling. Labor earnings are somewhat flat over the age range 35 to 50. This pattern is rather different from that of the United States and European countries (Lee, Lee and Mason, 2007), whose profiles tend to show increases in labor earnings with age, reflecting in part the returns on experience and education. Labor earnings then begin to decline at older ages, reflecting retirement and exit from the labor market. In countries with higher levels of pension coverage, we tend to see much steeper declines in labor activity,

centered on mandated ages for retirement. In these Latin American economies, we see older persons continuing to rely on income from labor earnings, as many older people work for as long as they are physically able.

The solid line in Figure 1a indicates average consumption levels by age. This measure of consumption also includes consumption of publicly provided goods and services, most importantly public education and health care. Consumption levels are low for children and rise almost linearly throughout childhood. The effects of educational expenditures on children can be seen in the more rapid rise of consumption near ages 5 and 6 as children enter the school system. Consumption slowly rises over the adult years – reaching a peak in the 90+ age group. This consumption pattern of older persons stands in stark contrast to that observed in the United States and Japan, where consumption among older persons rises extremely sharply at advanced ages, reflecting greater consumption of public and private health care in these countries (Lee, Lee, and Mason, 2007).

Figure 1
THE ECONOMIC LIFE CYCLE IN LATIN AMERICA
(FOUR-COUNTRY AVERAGE, CIRCA 2000)



Source: National Transfer Accounts (www.ntaccounts.org): Brazil (), Chile (1997), Mexico (2004), and Uruguay (1994).

The difference between consumption and labor income is called the life cycle deficit and is shown as a solid line in Figure 1b. Economic life passes through three distinct periods. Early in life, children and young adults rely on transfers from their families and the public sector to provide for their consumption needs. This period of economic dependency last for about 25 years. Economic dependency during early life reaches a peak during the teenage years, at age 15.[1] Support for these teenagers is equivalent to about half of the annual labor earnings of adults ages 30-49. Economic dependency steadily decreases as individuals leave school and enter the workforce. By the late 20s, most individuals are economically independent. At the other end of life, older individuals – who in general have withdrawn from the labor force – rely on transfers from their adult children or the public sector for support. This period of

1 At present, the NTAs, like national accounts, lack information on time use. Presumably, incorporation of information on time use would increase the level of dependency of infants and young children relative to teenagers.

economic dependency begins in the late 50s and steadily increases, reaching a peak in the last age interval (90+).

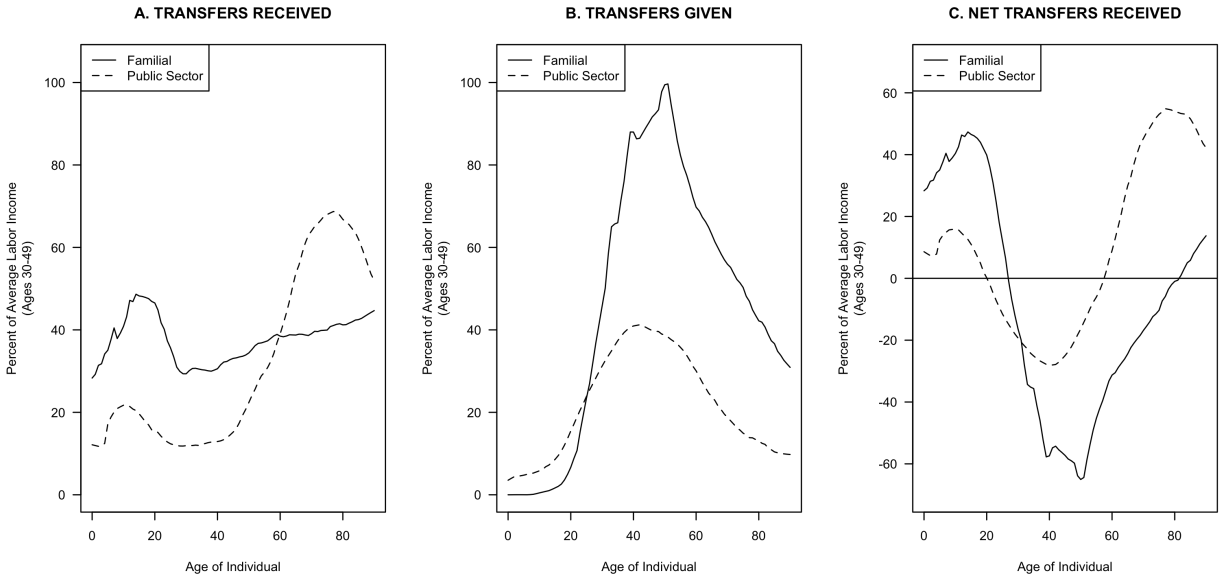
These periods of economic dependency in early and later life are supported by drawing on the 30-year period of surplus production during the prime working years. There are three primary mechanisms through which this reallocation of resources takes place: familial transfers, public sector transfers, and intertemporal transfers via financial markets in the form of savings and borrowing. Familial transfer can take place within a single household, as when parents provide food, clothing, and shelter to their children. They can also take place between households, as when a migrant worker sends remittances home, or as occurs at death in the form of a bequest. Public sector transfers involve the taxation of one population group (most typically workers) to pay for the public sector benefits provided to others. These benefits can take the form of cash payments, such as pensions, welfare, or unemployment benefits, or in-kind benefits such as public education. While taxes are drawn primarily from the working-age population, benefits are mainly provided to children and older persons. The final mechanism of support is the use of financial markets for savings and borrowing. Saving for future retirement by the working-age population (either through private pensions or government-mandated programs) leads to the creation of a large amount of financial wealth, which is then drawn on during the retirement years. In Figure 1b, the dashed line represents the net transfers received by age. The early life period of dependency is nearly completely funded by transfers. In contrast, an important part of dependency in later life is funded by assets. The average older person in Latin America is less dependent on transfers than the average child.

We can examine transfers received by age according to their source: families or the public sector. In Figure 2a it is evident that familial transfers (solid line) dominate among the young – and are 2-3 times higher than public sector transfers (dashed line). Among the elderly, public sector transfers dominate and are about 1/3 higher than familial transfer received. Figure 2b shows the average amount of transfers given by age. The working-age population is the main source for both familial and public sector transfers. Under the NTA system, sales taxes (VAT taxes) are assumed to be paid by consumers and hence children appear as taxpayers funding public sector transfers. It is interesting to note that despite the heavy reliance of Latin American governments on consumption taxes as a revenue source, the age profile of taxation continues to be heavily concentrated among the working-ages.

Figure 2c shows net transfers by age for familial and public sector transfers. Individuals are net recipients of familial transfers up until age 27. Among the elderly, familial transfers are quite important – with high levels of both giving and receiving, so that the net transfer is close to zero. It is not until after age 82 that the elderly receive more in familial support than they give. The dominant pattern evident in familial transfers is the high dependency of the young and the absence of dependence of older persons – except at the very oldest ages.

Individuals are net recipients of public sector transfers up until age 20. On net, they pay more in taxes than they receive in benefits from age 21 through age 58. The dominant pattern here is much higher levels of dependency among the elderly than the young. Net public sector transfers to the elderly amount to about 42% of average labor income of prime-age adults; while net public transfer to the young among to about 10%.

Figure 2
FAMILIAL AND PUBLIC SECTOR TRANSFERS IN LATIN AMERICA
(FOUR-COUNTRY AVERAGE, CIRCA 2000)



Source: National Transfer Accounts (www.ntaccounts.org): Brazil (1996), Chile (1997), Mexico (2004), and Uruguay (1994).

We can measure the economic magnitude of the transfer dividend in terms of the effect of changing age structure by calculating the transfer dependency ratio: in which the numerator is the weighted number of transfer recipients (with the weights equal to average transfers received in the reference year) and the denominator is the weighted number of transfer donors (with the weights equal to average transfers given in the reference year). Since aggregate transfers given must equal aggregate transfer received (a transfer dependency ratio of 1.0), deviations in the transfer dependency ratio from 1.0 measure the extent to which average benefit levels (or tax levels) must be changed in order to maintain equilibrium in the transfer system. A decline in the transfer dependency ratio indicates a favorable change in the population age structure that allows for an increase in average benefits received while maintaining the same average transfer burden.

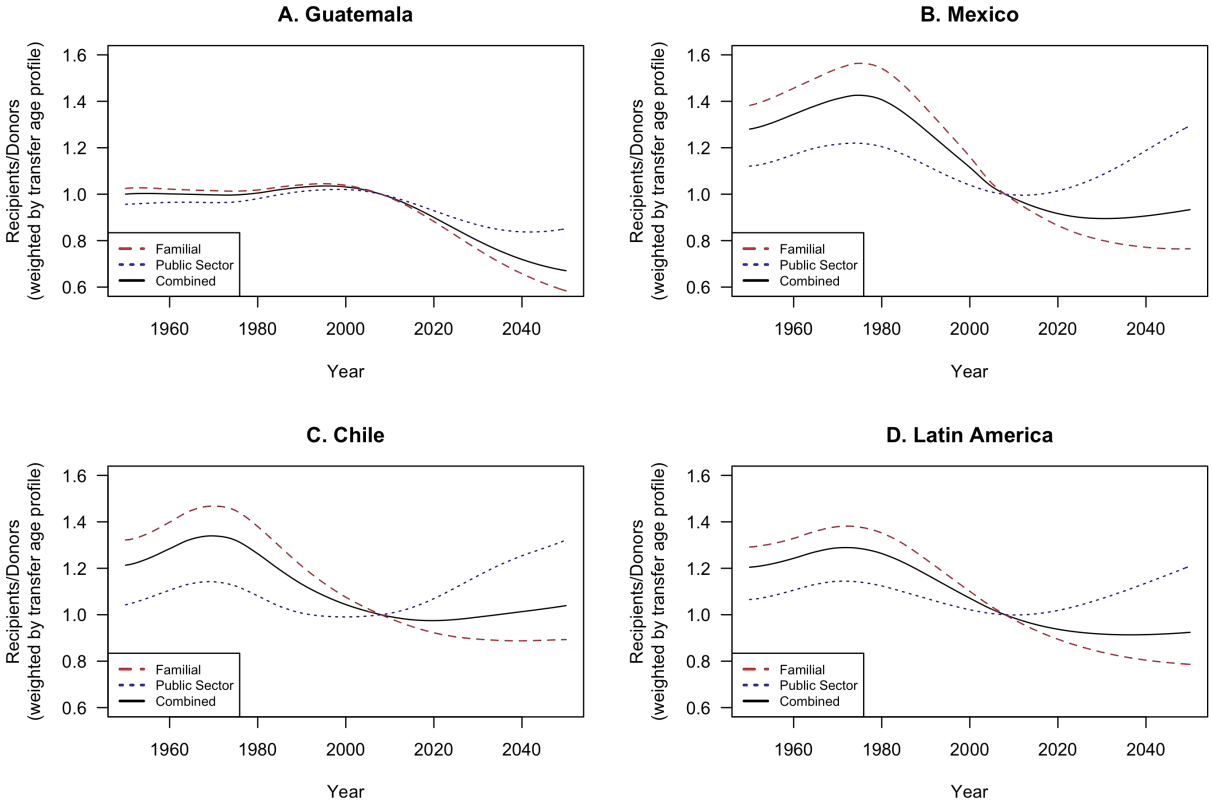
Equation 1
TRANSFER DEPENDENCY RATIO

Transfer dependency ratio: $B(t,i) / D(t,i) = \sum\{b(x)*n(x,t,i)\} / \sum\{d(x)*n(x,t,i)\}$
Where $B(t,i)$ = Effective number of transfer recipients in year t, country i;
$D(t,i)$ = Effective number of transfer donors in year t, country i;
$b(x)$ = Average transfers received at age x from the standard profile (Figure 2a);
$d(x)$ = Average transfers given at age x from standard profile (Figure 2b);
$n(x,t,i)$ = Total population at age x, year t, in country i.

In this analysis, aggregate transfer benefits over time in each country are calculated by multiplying each country's population age distribution by a standard age profile of transfer receipts (based on a simple average of the NTA transfer data from Brazil, Chile, Mexico, and Uruguay). In a similar manner, aggregate transfer payments are calculated using a standard age profile of transfer payments. By using country-specific demography with these standard age patterns of economic activity, the analysis in this section focuses solely on the economic impacts arising from demographic differences among countries.

As suggested by Rosero-Bixby and Robles (2008), the demographic dividend can be decomposed into two parts: a fiscal dividend arising from public sector transfers and a familial dividend arising from family transfers. Three transfer dependency ratios have been calculated: one based on familial transfers, one based on public sector transfers, and a third which combines the two. Figure 3 presents the results for 3 countries at different stages of the demographic transition. In Guatemala, we observe virtually no change in the transfer dependency ratio over the period 1950-2008 – reflecting the early-transition, stable age structure of Guatemala. As the fertility transition continues and child dependency rates continue to fall over the projection period (2008-2050) we observe significant declines in the familial dependency ratio – dropping by 40% by 2050. The public sector dependency ratio also declines but less dramatically. In the case of Mexico, we observe slight increases in the transfer dependency ratio from 1950 to the mid-1970s, reflecting increases in child dependency rates due to increased survival rates. The familial dependency ratio among families dropped by 50% from its apex to 2008 and is projected to continue to decline over the forecast period. In contrast, the public sector dependency ratio is projected to increase sharply over the projection period. This divergent pattern in the dependency ratios for families and the public sector is also evident in Chile and for the region as a whole (panels 3C and 3D).

Figure 3
TRANSFER DEPENDENCY RATIOS, 1950-2050
(relative to 2008)



Source: Calculations based on data from the Latin American and Caribbean Demographic Centre (CELADE) – Population Division of ECLAC, estimates and projections for the Latin American and Caribbean population, 2007.

The trends in the transfer dividends for all the countries in the region are presented in Figure 4. The graph is separated into 4 quadrants based on the change in the overall transfer dependency ratio (x-axis)

and the change in the public sector dependency ratio (y-axis) between 2008 and 2038. Most countries fall into quadrant II, showing the divergent paths of increasing public sector dependency ratios and decreasing overall dependency ratios. For these countries, the increased demands placed on governments are more than offset by the declining burden of familial transfers. Only two countries in the region show an increase in the overall transfer burden in 2038: Chile and Cuba in quadrant I. Six countries (Guatemala, Honduras, Nicaragua, Haiti, Bolivia, and Paraguay) – at an earlier stage of the demographic transition – are projected to have declines in the public sector dependency ratio – as the number of taxpayers is projected to grow more rapidly than the number of beneficiaries.

Figure 4
TRANSFER AND PUBLIC SECTOR DEPENDENCY RATIOS, PERCENT CHANGE 2008-2038

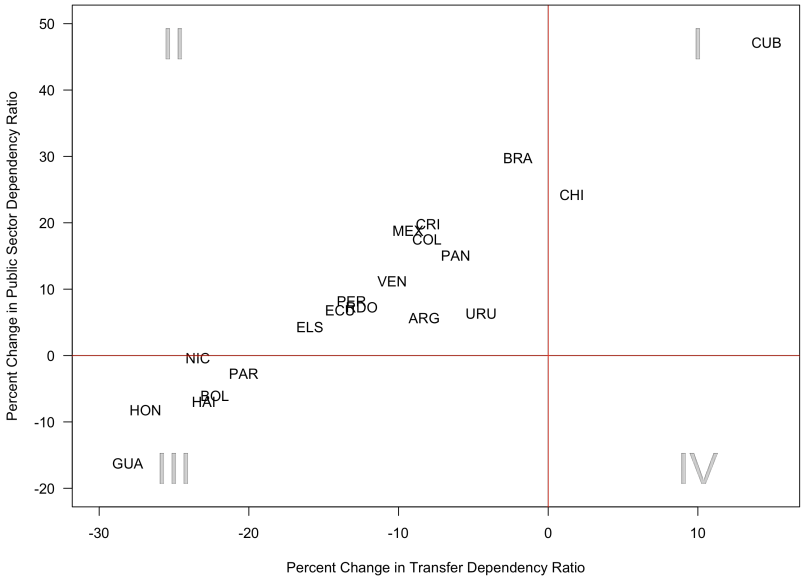


Table 1 provide additional estimates for other points in time: 2020, 2035, and 2050. The countries are ranked from oldest to youngest populations according to the aging index (the ratio of the population over 65 to the population under 20). For the group of older populations, we see that the public sector dependency ratio has already reached its nadir or will within a few years. For the younger populations, this point is still 1 or 2 decades in the future. Population aging is likely to lead to sharply higher levels of government spending to maintain current levels of coverage. Yet, as is evident in the last columns of Table 1, the increased burden in the public sector is largely offset by the decreased burden of familial transfers – so that the overall burden in transfer systems is declining in the region.

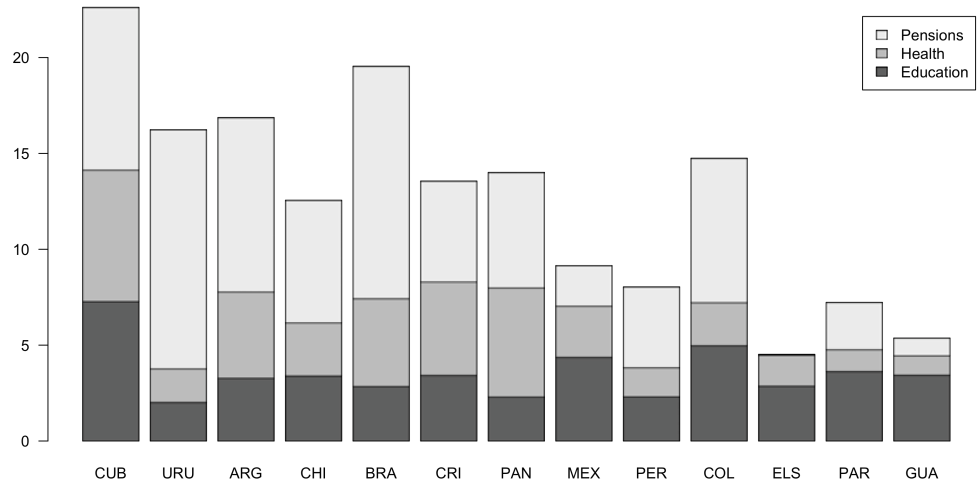
Table 1
FISCAL IMPACTS OF CHANGING AGE STRUCTURE IN LATIN AMERICA

Country	Aging Index	Public Sector Transfers				Familial and Public Sector Transfers			
		Year of Least Demographic Pressure	Increase needed to maintain average benefit *(relative to 2008)*			Year of Least Demographic Pressure	Increase needed to maintain average benefit *(relative to 2008)*		
			2020	2035	2050		2020	2035	2050
Cuba	0.47	1998	1.12	1.39	1.54	2014	1.00	1.11	1.19
Uruguay	0.44	1959	1.00	1.04	1.11	2036	0.97	0.95	0.97
Argentina	0.30	1950	0.99	1.03	1.13	2037	0.95	0.92	0.93
Chile	0.27	2006	1.06	1.21	1.31	2019	0.97	1.00	1.04
Brazil	0.18	2001	1.08	1.24	1.40	2024	0.96	0.97	1.00
Latin America	0.17	2010	1.02	1.10	1.21	2036	0.94	0.91	0.92
Costa Rica	0.16	2011	1.02	1.15	1.31	2030	0.92	0.91	0.95
Mexico	0.16	2012	1.01	1.13	1.29	2031	0.92	0.90	0.93
Panama	0.16	2006	1.03	1.12	1.20	2050	0.96	0.94	0.93
Ecuador	0.15	2016	0.99	1.04	1.14	2043	0.92	0.87	0.86
Colombia	0.14	2009	1.03	1.14	1.25	2033	0.93	0.92	0.94
Peru	0.14	2016	0.98	1.05	1.16	2040	0.91	0.87	0.88
Dominican Republic	0.14	2013	1.00	1.05	1.12	2050	0.93	0.89	0.87
El Salvador	0.13	2020	0.96	1.01	1.12	2043	0.90	0.84	0.84
Venezuela	0.13	2009	1.02	1.09	1.18	2045	0.94	0.90	0.90
Paraguay	0.11	2029	0.96	0.96	1.03	2047	0.90	0.81	0.79
Bolivia	0.09	2032	0.95	0.93	0.99	2050	0.90	0.80	0.76
Haiti	0.09	2030	0.93	0.92	0.99	2050	0.88	0.79	0.76
Nicaragua	0.09	2022	0.95	0.97	1.07	2046	0.86	0.78	0.76
Guatemala	0.08	2042	0.93	0.85	0.85	2050	0.90	0.76	0.67
Honduras	0.08	2032	0.93	0.91	0.97	2050	0.86	0.75	0.71

2. Public Sector Transfers

This section takes a closer look at three public sector transfer programs which determine the overall fiscal impact of changes in population age structure: education, health care, and pension programs. The level of societal effort directed toward each of these programs can be conveniently measured by expenditures as a share of GDP. Figure 5 presents data for 14 Latin American countries in 2006. The countries are arranged by the aging index (ratio of population 65 and older to the population under 20), with Cuba as the oldest society and Guatemala as the youngest. Generally, the oldest societies have higher levels of spending as a percentage of GDP – mainly due to higher pension costs. But important exceptions to this rule are seen in younger societies such as Brazil and Colombia who show relatively high levels of spending on public pensions.

Figure 5
Public Expenditures on Education, Health, and Pensions, 2006
(relative to GDP)



In this section, we project the costs of each of these three programs as a share of GDP. Expenditure as a share of GDP can be expressed as the multiplicative sum of 3 factors: sector dependency ratio, coverage, and benefit level.

Equation 2
EXPENDITURE FORECAST EQUATION

E/Y = Sector Dependency Ratio * Coverage Rate * Benefit Level
= P(r)/P(w) * B/P(r) * (E/B)/(Y/P(w))

Where
E = Total expenditures in the sector (education, health care, or pensions)
Y = GDP
P(r) = Population at Risk
P(w) = Working-age Population (ages 20-64)
B = Number of beneficiaries

The first factor, the sector dependency ratio for each sector (education, health care, and pensions), measures the impact of population age structure on spending. This is defined as the ratio of the population at risk divided by the population in the working-ages (defined as ages 20 to 64). The cost projections are based solely on the forecast of this variable. Changes in the sector dependency ratio lead to proportional changes in spending as a share of GDP.

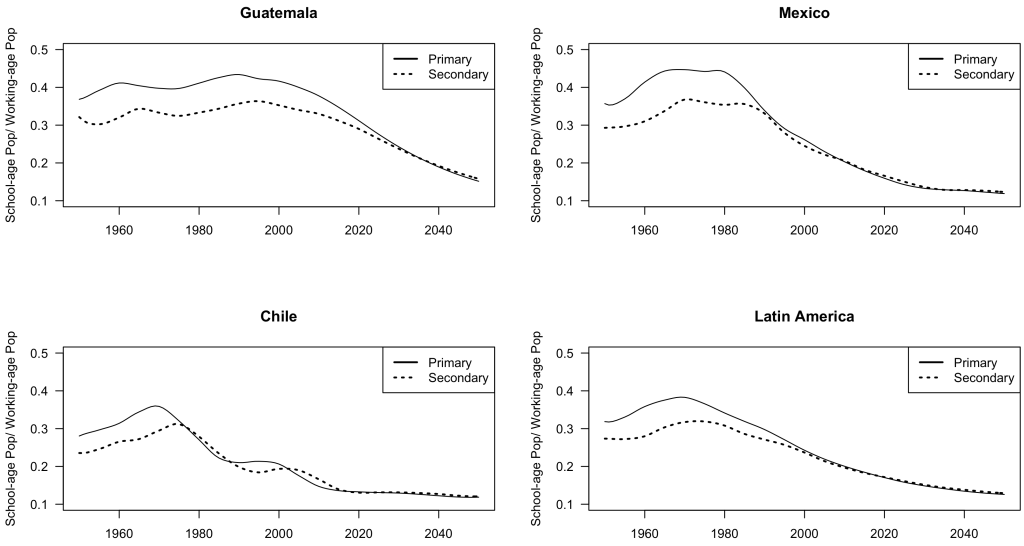
The second factor measures coverage. It is the participation rate in the public program: the number of beneficiaries divided by the population at risk. For the cost projections in this section, coverage is assumed to remain constant at current levels. For the cost projections of universal secondary education in the next section, this coverage rate is raised from current levels to 100%.

The third factor is a measure of average spending per beneficiary relative to GDP per working-age adult (domestic productivity per adult). GDP per working-age adult is roughly equivalent to the average

annual salary of a worker in the economy. Hence, our measure of the average benefit is standardized across economies roughly as a proportion of the average worker's annual salary. For the costs projections in this section, the average benefit is assumed to remain constant at current levels. For the cost projections of universal secondary education presented in the following section, these benefit levels are assumed to rise from current levels to those of OECD nations, about 1.7 times greater.

For public education, the population-at-risk for primary education is considered to be ages 6 to 11and for secondary education ages 12 to 17. Figure 6 presents estimates and forecasts of this dependency ratio for primary and secondary education. These large declines in dependency rates translate into significant freeing of resources that could be used for increasing the coverage and quality of education systems. Over the course of the demographic transition, the dependency ratio in education falls dramatically: from peak values of 0.45 toward 0.1. That is, providing universal basic and secondary education in societies at the start of the demographic transition would require 4.5 times the level of societal resources used in a low-fertility society.

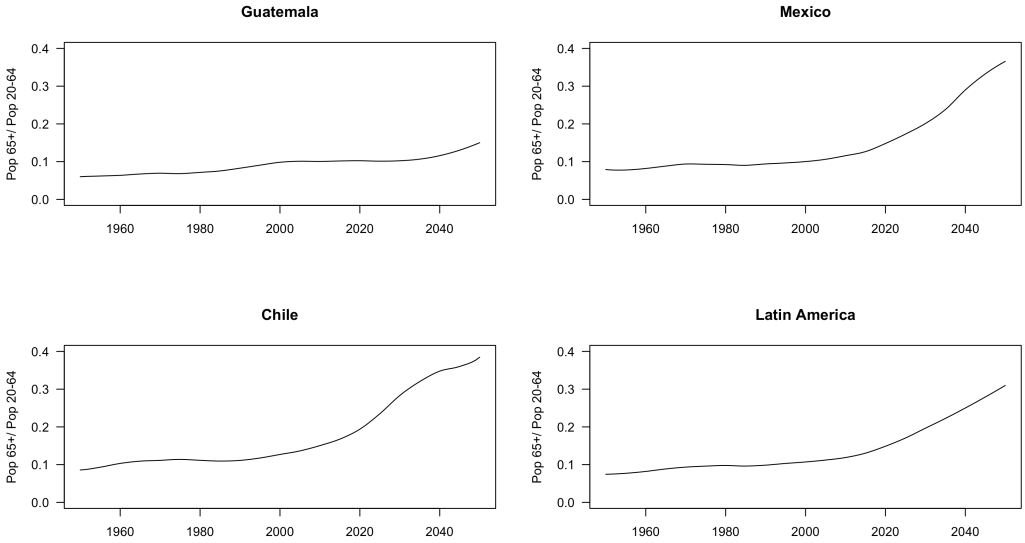
Figure 6
Dependency Ratio for Primary and Secondary Education, 1950-2050



Changes in age structure will lead to a substantial reduction in the fiscal burden associated with financing education and make possible significant expansions in educational coverage. By contrast, these changes are also steadily increasing the difficulty of funding pay-as-you-go pension systems. Figure 7 shows the trend in the pension dependency ratio (i.e., the old-age dependency ratio) for Guatemala, Mexico, Chile, and the region as a whole. In 1950, the ratio stood at less than 0.1 in every country in the region. Demographic pressures on pay-as-you-go pension systems were negligible for most of the last century. Recently, the effects of population ageing in the region have begun to be felt and the pension dependency ratio is projected to rise steeply, reaching a regional level of 0.3 by 2050. That is, without considering the additional impacts of expanding pension coverage, population ageing would have the effect of more than tripling the expenditures devoted to pensions by the middle of this century. These results assume that the pension system is functioning as a pay-go system. Starting with Chile in the 1980s, some countries have adopted pension reforms that privatize their public systems to varying degrees. These reforms have the effect of increasing short-term costs of pensions (in paying the transition costs of the reform) but in the long run reduce or eliminate the public sector burden and lead to large increases in asset holdings. To

some extent, those countries undertaking pension reform may be unwittingly chosen a development path that emphasizes the accumulation of physical capital to the detriment of human capital.

Figure 7
Dependency Ratio for Public Pensions, 1950-2050



The health-care dependency ratio measures the ratio of the number of consumers of health care to the working-age population. The population-at-risk was measured by taking a weighted average of the population where the weights are based on average health care spending by age (with 1.0 representing the average health care expenditure of a person aged 30-49). Health-care spending tends to be concentrated among children and older persons and generally appears as a J-shape curve in most of the NTA countries.[2] Figure 8 shows the trajectory of the health-care dependency ratio. In Mexico, Chile, and the region as whole the health-care dependency ratio rose slightly throughout the 1950s and 1960s as the proportion of children increased in the region (children tend to use significantly more health-care resources than the general population). The regional health-care dependency ratio peaked in 1967 before beginning a long period of decline, corresponding to higher proportion of the population of working age (which tend to use lower amounts of health-care resources than children or older persons). The dependency ratio – eventually reaching levels like those observed in the 1950s. The direct impact of demographic change on health care is rather modest in comparison to that of education or of pensions. For example, we can observe in Mexico a peak dependency rate of 2.2 and a nadir of 1.6. This corresponds to a reduction in spending as a share of GDP of about 28%.

The more important impact of demographic change will be in the composition of health care spending. As the population ages, the health-care needs of the older population come to represent a greater share of all health-care spending in society, especially because older persons, on average, use many more health resources than working-age individuals. In Latin America, NTA estimates indicate that the average older person consumes twice as much health care as the average working-age adult. Health systems will increasingly need to focus on chronic ailments such as cancer and heart disease as the population ages. Figure 9 presents estimates of

2 As noted earlier, one important exception to this general age pattern is evident in Japan and the United States where health spending among oldest adults is extremely high.

the percentage of health-care resources used by the older population in 1970 (grey bars) and in 2030 (black bars), based on a standardized age profile of health-care usage using NTA data for Latin America. Large increases are seen in every country over this 60-year period. For the region as a whole, health spending on older persons would have amounted to about one tenth of all health spending in 1970 and would be projected to rise to about one quarter by 2030. Cuba (at 37%), Uruguay (32%) and Chile (30%) are projected to lead Latin America in health-care spending on older persons in 2030.

Figure 8

Dependency Ratio for Health Care, 1950-2050

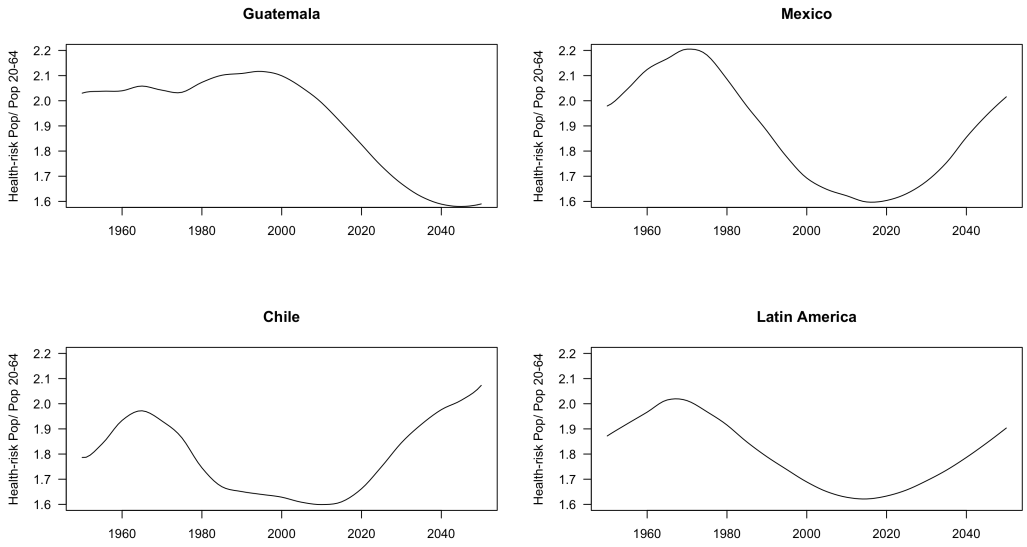
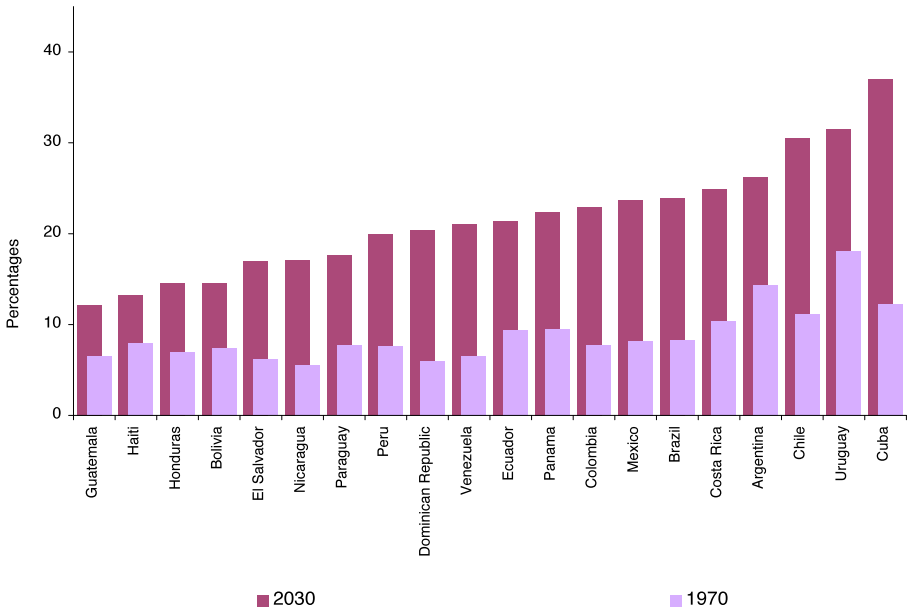


Figure 9

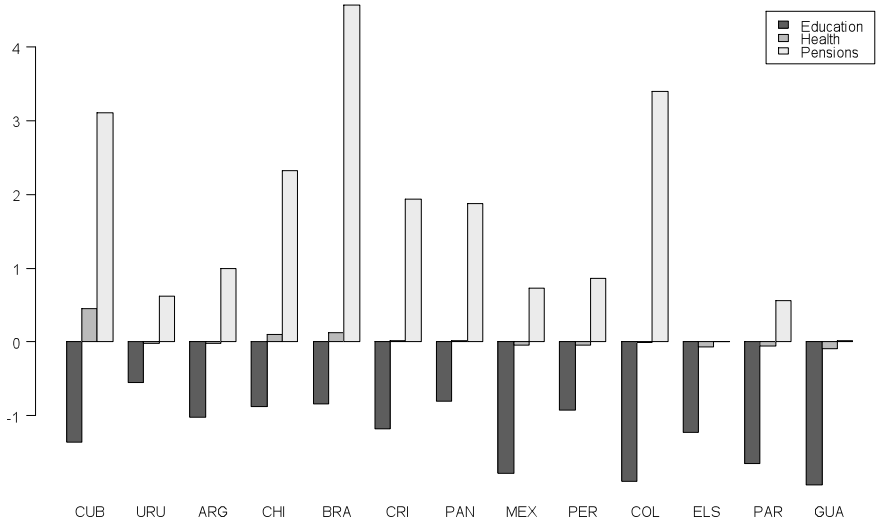
HEALTH-CARE RESOURCES DEVOTED TO OLDER PERSONS, 1970 AND 2030

(Percentages)



Using the forecasts of sector dependency ratios with the initial spending levels in each country we can forecast the costs of the 3 programs. Figure 10[3] presents the results of the cost projections looking at the net increase in program expenditures in 2020 relative to 2008. Changes in age structure lead to reductions in program expenditures on education by more than 1 percentage point of GDP by 2020 in many of the countries. These additional revenues could be invested in the educational system to improve coverage or spending per student. However, the increased demands in the public pension system will be competing with those of education. Brazil, Colombia, and Cuba show particularly large projected increases. With the exception of Cuba, the economic impact of changing age structure has minimal effect on overall health costs.

Figure 10
NET INCREASE IN PROGRAM EXPENDITURES DUE TO POPULATION CHANGE, 2008 to 2020
(percent of GDP)



3. Investing the Demographic Dividend in Education

Having looked at costs projections for public education, health, and pensions, this section focuses on cost estimates for achieving "universal" secondary education in Latin American countries. Universal primary education in Latin America is nearly complete and average levels of enrollment in secondary education in the region are about 68%. Table 2 presents a decomposition of spending on secondary education between Nicaragua and Japan using the cost equation from the previous section. Both countries devote about 1.6% of GDP to secondary education, but with vastly different educational outcomes as a result of the differences in age structure. The dependency ratio for secondary school in Nicaragua is 2.6 times as large as that of Japan. But with similar shares of GDP devoted to secondary education, Nicaragua's coverage rates are much lower than Japan's and so, too, is its level of spending per student.

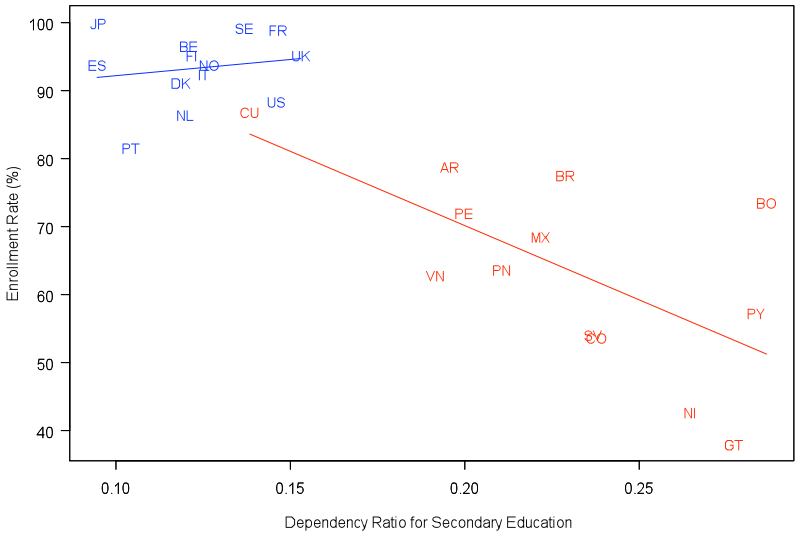
3 Using NTA data for these countries, we could also calculate the net decreases in the size of familial transfers.

Table 2
DECOMPOSITION OF SPENDING ON SECONDARY EDUCATION, NICARAGUA AND JAPAN

	Nicaragua	Japan	Japan/Nicaragua
Spending (as % GDP)	1.7%	1.6%	0.95
Dependency Ratio (School-age population/working-age population)	0.26	0.10	0.38
Gross enrollment rate	66%	102%	1.5
Spending per student (relative to GDP/Working-age pop)	10%	17%	1.7

This negative relationship between demographic dependency and average investment in children is evident in Figure 11 that compares the demographic dependency ratio and enrollment rates in secondary education. While no relationship is evident among the OECD nations, a strong negative relationship is evident among the Latin American countries with a simple correlation of -0.67. Cuba, which leads the region in net secondary enrolment at 87%, also has the lowest secondary school-age dependency ratio at 0.13. Guatemala, which lags the region in net enrolment in secondary education, has the highest school-age dependency ratio in the region at 0.33. This negative relationship is suggestive of a fiscal constraint on educational spending arising from demographic factors. However, it is important to note that this is not a binding constraint as is evident from countries like Bolivia, which with a relatively unfavorable demographic situation is achieving quite high levels of education.

Figure 11
LATIN AMERICA AND OECD NATIONS:
NET ENROLLMENT RATES AND DEPENDENCY RATIOS IN SECONDARY EDUCATION



Note: AR-Argentina; AT-Austria; BE- Belgium; BO-Bolivia; BR-Brazil; CL-Chile; CO-Colombia; CR-Costa Rica; CU-Cuba; CZ-Czech Republic; DE-Germany; DK-Denmark; ES-Spain; FI-Finland; FR-France; GT-Guatemala; IT-Italy; JP-Japan; MX-Mexico; NI-Nicaragua; NL-Netherlands; NO-Norway; PE-Peru; PN-Panama; PT-Portugal; PY-Paraguay; SE-Sweden; SK-Slovakia; SV-El Salvador; UK-Great Britain; US-United States; UY-Uruguay; VN-Venezuela.

Source: Latin American and Caribbean Demographic Centre (CELADE) – Population Division of ECLAC, estimates and projections for the Latin American and Caribbean population, 2007 and on the basis of figures from the Database on Social Statistics and Indicators (BADEINSO) [online database] http://www.eclac.cl/badeinso/Badeinso.asp.

Based on the decomposition of secondary school expenditures (see Equation 2 and Table 2), we can estimate the costs of achieving universal education in Latin America. For example, the financial costs of achieving universal secondary education in Nicaragua at its current level of spending per student would amount to increasing enrolment by a factor of 1.5 (100%/66%) and costs would rise from 1.7% of GDP to 2.55% of GDP. If in addition, expenditures per student (measures relative to productivity per working-age adult) were raised to OECD levels (17% from its current level of 10%), spending on secondary education would need to rise to 4.33% of GDP. Doing similar calculations for all Latin American countries, we arrive at an estimate of the costs of funding universal secondary education in Latin America as requiring 2.1% to 2.4% of regional GDP[4] – an additional expense of $7.3 to $14.4 billion, an increase of 20 to 37% above the current level of expenditures ($36.6 billion). If in addition spending per student (relative to productivity levels) were to reach OECD levels, funding of universal secondary education would require expenditures of 4.0 to 4.4% of regional GDP or an additional expenditure of $46.9 to 55.5 billion annually.

The declines in the education dependency ratio (in both primary and secondary education) will generate substantial reductions in the costs of achieving universal secondary education over time. If governments maintained educational spending at their current levels relative to GDP, investments in education per child would gradually increase over time (i.e., the demographic dividend in education). But this default strategy of waiting for the demographic dividend to fund increases in education would be unwise. In the case of Nicaragua, sufficient levels of funding for universal secondary education would not be reached for another 20 years. It is likely that a superior development strategy would be to fund those increases in education now – through development aid, tax increases, or even increases in public debt – in anticipation of both the future declines in the costs of education (i.e., the transfer dividend) as well as likely increases in economic growth as these investments in child education pay-off in improvements in human capital of the workforce (Lutz, Cueresma, and Sanderson, 2008; Lee and Mason, 2008).

4. Conclusions

This paper presented a simple age model to look at the effects of demographic change on familial and public sector transfer systems. The four main conclusions were:

1. For most countries in the region, demographic pressures on government budgets are at historic lows.

2. This situation will change dramatically in the near future as population aging increases pressures on public pension programs and to a less extent, health care systems. Government spending as a share of GDP will increase in the region on the order of 10-20% over the next two decades – simply to maintain social programs at their current levels of coverage and benefits. These future cost increases are moderated in those countries (such as Chile) that have introduced pension privatization.

4 The range of estimates reflects different assumptions about the proportion of students who are outside of the official school-age population -- due either to high grade repetition rates or delayed entry into school (as is common when educational systems expand). Empirically, we observe that the ratio of gross to net enrollment rates are higher at lower levels of net enrollment and decline towards 1 as the net enrolment rate approaches 100%.

3. This increased need for government transfer programs is to a large degree offset by decline in familial transfers to support children, so that the net impact of changing age structure on overall transfers would be moderate. However, this result depends on a large shift in resources toward the public sector.

4. Achievement of universal secondary education with increased investment per student in Latin America would require a substantial increase in public spending – some of which could be financed from the transfer dividends in the public and private sector. At the same time, in many countries there will be increased competition for scarce public revenues from public pensions systems (or the legacy costs of such systems in the form of higher public debt) that might limit the progress toward increased educational investment.

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