Patterns, Trends and Policy Implications of Private Spending on Skills Development in Mexico and the United States

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Abstract

This paper explores families' investment in skills development through education in a high-inequality, low-education quality country such as Mexico, comparing it to a lower-inequality, higher-quality education country such as the United States. The paper uses a series of Household Income and Expenditure Surveys for both countries spanning around 20 years and different methodological approaches. Of particular interest is the analysis of education expenditure patterns along the income distribution. Policy implications for both cases are discussed. While in Mexico stimulating private spending in education through public resources might be regressive, the contrary might be the case in the United States.

JEL classifications: D1, I2, J21

Keywords: *education; inequality; private spending; skills formation*

1. Introduction

When governments are successful in assuring their expected contribution to skills development by guaranteeing widespread access to high quality public schooling services to all individuals in society, generally speaking the educational role of private agents gathered in families and households could be complementary in reinforcing general areas such as moral values and principles, notions of citizenship, and idiosyncratic cultural or religious aspects that are not addressed by the public system due to their specificity to some population subgroups. In this kind of setting, private educational efforts should not directly generate inequalities of opportunity across individuals, but would rather introduce some differentiation associated with household preferences, priorities, and identities. The policy question would thus be how public programs or interventions can enhance the private sector's *complementary* involvement in order to support individual preferences and accelerate skills development.

Unfortunately, this is not normally the case, especially in developing countries. When public education services do not offer high quality equal access to education, the engagement of the private sector might be motivated more as a *compensatory* effort for addressing the perceived deficiencies.

In unequal societies, this situation can become a source of greater inequalities precisely due to the role of the private sector. In extreme situations under limited schooling access, only those with enough own resources will be able to progress in the education system. Similarly, when public education quality is perceived as inadequate, a direct link between family resources and the quality of education would also be expected. Poor public education, can thus become a source for perpetuating or accentuating inequalities, rather than being a mechanism for levelling the playing field. Moreover, in this context, policies that incentive or facilitate private investments in education—i.e., through fiscal incentives—may exacerbate inequalities even more.

This paper explores how much families invest in skills development through education in a high inequality and low education quality country such as Mexico, and compares it with the case of the United States (US), which is of interest due to the lower inequality, higher education access, and greater schooling quality in the education system,

as compared to the situation in the latter country. We would expect private spending in education to be of a *compensatory* nature and to be higher and more un equalizing in Mexico, and under the same logic, we would expect these investments to be more of a *complementary* nature in the United States. Based on our analysis we discuss policy implications for both cases.

The paper is organized in 5 sections, including this introduction. Section 2 presents the data and the main stylized facts. Section 3 offers an innovative approach to the analysis of household educational expenditures by performing cohort analysis. Section 4 estimates the income elasticity of private household expenditures in education for a period of around two decades, which allows establishing a clear link between household resources and human capital investment. Section 5 concludes.

2. General Stylized Facts and Data Used for the Analysis

2.1 Background

The data in Figure 1 provide the basis for hypothesizing that private investments in skills formation in the education system are of a more compensatory nature in Mexico, while they would have a rather complementary profile in the United States (US).
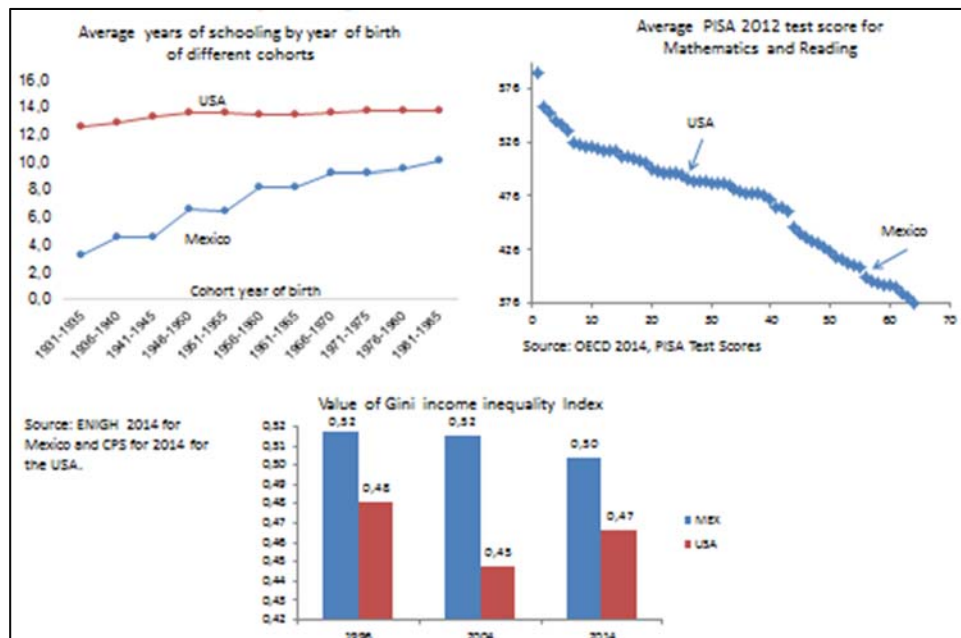

Figure 1. Years of Schooling, PISA Test Scores and Income Inequality in Mexico and the USA

The top left panel takes a long-term view of the extent and speed of education progress in both countries by plotting the average years of schooling of individuals belonging to different cohorts, reported in the latest household survey available for each country, namely the National Household Income and Expenditure Survey for Mexico (ENIGH), and the Current Population Survey (CPS) for the US, both for 2014.(Note 1) According to these estimations, individuals belonging to the cohort born in 1931-35 in Mexico, and who were ages 79-83 in 2014, attained on average 3.8 years of schooling, while their counterparts in the US already registered around 12 years. The cohort towards the right of the figure was born between 1981 and 1985, and thus belongs to the 29-33 age group in 2014. In Mexico this cohort achieved around 10 years of schooling, while in the US it registered almost 14. Evidently, education achievement has been much more widespread in the US, since while the average individual in this country already reached levels above High School five decades ago, in Mexico the average is still of only Lower Secondary.

The top right panel in the figure reports the results from the PISA(Note 2) international test for 2012 and points out the ranking of both countries. These data are normally interpreted as a measure of education quality and show that Mexico is one of the lowest performers, while the US is an above-average country, closer to the top performers. Finally, the bottom panel plots the value of the Gini inequality index for household per capita income for both

countries in 2014 from the ENIGH and the CPS, and it shows that the level of inequality in Mexico is significantly higher (although slightly declining) than in the US.

Thus, Mexico is characterized by lower education levels (suggesting more limited access to the service), lower schooling quality, and higher income inequality than the US. This combination of circumstances seems likely to make private investment in skills development an inequality-reinforcing factor.
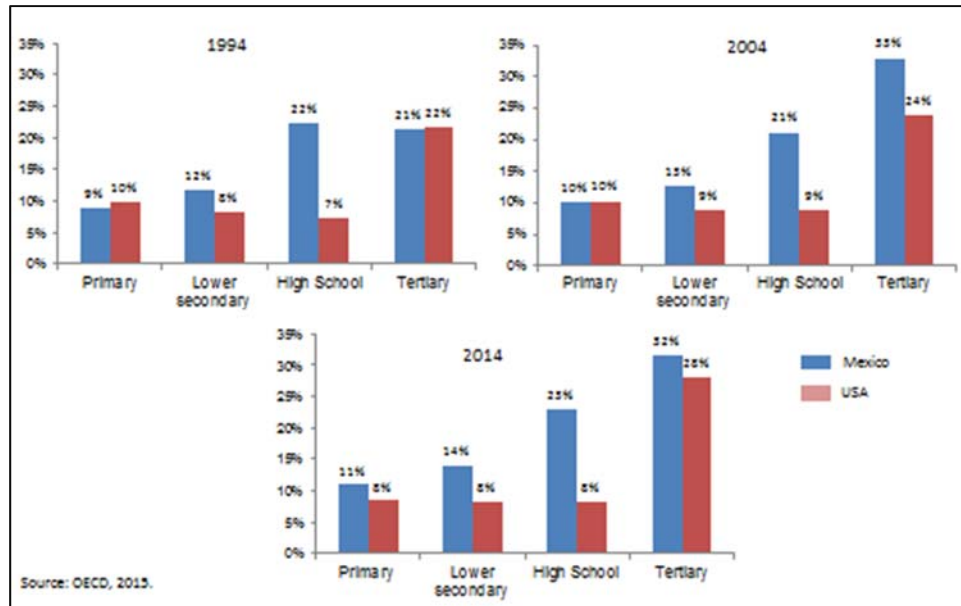
Figure 2. % of Students Attending Private Education Institutions in Mexico and the USA

This general hypothesis is reinforced by the view provided by aggregate data on school enrollment in private and public education systems in both countries, available from the OECD (Figure 2). (Note 3) At the primary level, where there is practically universal coverage in both countries, the proportion of students enrolled in private education services is very similar, at around 10 per cent—with a difference of about 3 points in 2014. However, at the Lower Secondary, Upper Secondary and Tertiary levels, where education coverage is significantly lower in Mexico, the share of students in the private sector is higher in Mexico, reaching differences of 6, 15 and 4 percentage points, respectively, by 2014. The greatest differences are observed at the Upper Secondary level, where around one fifth of total enrollment in Mexico has been private for the past 20 years, which contrasts with levels of between 7 and 9 percent in the US.
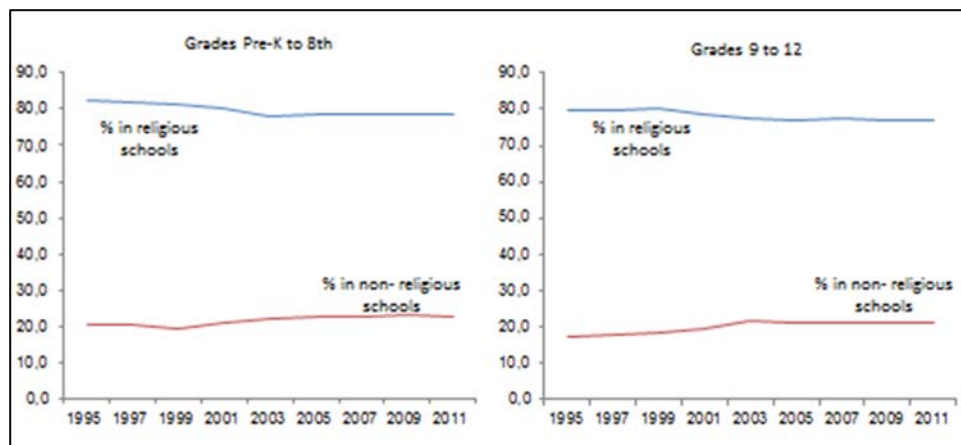

Figure 3. % of Total Private Enrollment in the USA That Registers in Religious Schools

Source: Digest of Education Statistics, 2013, National Center for Education Statistics, U.S. Department of Education

Interestingly, the smallest differences post-Primary, are observed in Tertiary education. This education level is beyond the compulsory education cycle in both countries and is characterized, especially in the US, by being financed directly by students rather than households as in the previous levels.

An additional piece of evidence, suggesting a less compensatory role of private investments in education in the US, is that in this country, the vast majority of individuals enrolled in private institutions, at least up to 12th grade, attend a religious school, which is typically related with objectives such as reinforcing religious or cultural identities. Figure 3 plots the data separately for enrollment in private institutions from Pre-K to 8th grade for the 1995-2011 period, showing that in all years the share of private school enrollment in religious institutions is of about 80 per cent of the total enrollment in private institutions. The same is the case for grades 9-12 for the same time period (right panel of the figure). (Note 4)
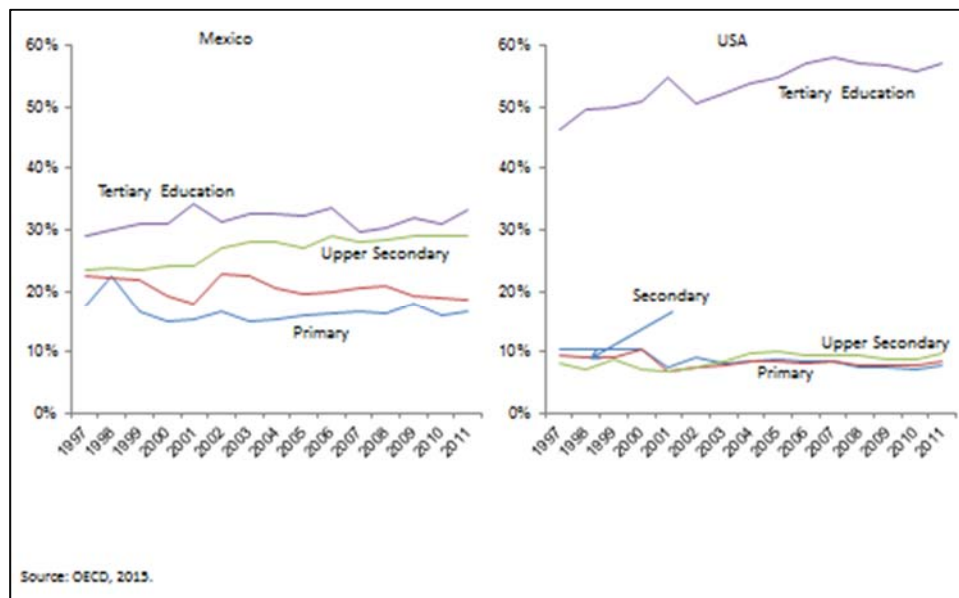
Figure 4. Private Expenditures as a % of Total Education Expenditures in Mexico and the USA

As for the composition of aggregate education expenditures, OECD (2015) data report that the importance of private investment in education is significantly greater as a source of total education investment in Mexico between Primary and Upper Secondary, than in the US. Figure 4 plots the share for all levels between 1997 and 2011 and shows, for instance, that at the High School level almost 30 per cent of all investments are originated from private resources, while these only account for about 10 per cent in the US. The private share oscillates around 20 per cent for Lower Secondary in Mexico, with shares below 10 per cent in the US. The difference is lower for Primary, but still apparent, with proportions around 17 per cent in Mexico and below 10 per cent in the US.

The notable exception is Tertiary education, for which more than half of total expenditures in the US are private, while they range about 30 per cent in Mexico. Important differences in access to finance in both countries, however, may account for a significant part of the discrepancy, since while the US has a well-established financial loan system for attending graduate and post-graduate studies, these mechanisms are incipient in Mexico, where private investments depend practically in their entirety on out-or-pocket resources.

2.2 A Closer Look at the Evidence from Household Survey Micro Data

The rest of this paper uses micro sources intensively for analyzing household expenditures in education. For Mexico we rely on the ENIGH, and for the US on the Consumer Expenditure Survey (CES), both of which include detailed consumption data, including education. The ENIGH is a nationally representative survey available for 1984, 1989, and biannually since 1992 through 2014—with 15 rounds—with a comparable design. The survey permits for a detailed account of all household income and expenditure items, with a breakdown of quarterly education expenses for every year. Actually, expenditures are registered at a considerable level of detail, and an important advantage is that the survey also includes the prices paid for different items as reported by the household informant.

The Consumer Expenditure Survey (henceforth CE) is the main source of data on household consumption in the US; it also includes data on income, as well as a range of household characteristics. The CE is nationally representative (with representativeness also for the Northeast, the Midwest, the South and the West regions). It has been held in 1996, and yearly since 2004, with 12 rounds altogether. The survey consists of two components, namely a quarterly Interview Survey and a Diary Survey. The Interview Survey tracks large expenditures, such as those for property, automobiles, and major durable goods, as well as those that are performed on a regular basis, such as rent or utilities. Each consumer unit is interviewed once per quarter for five consecutive quarters. The Diary Survey tracks day-to-day expenditures including more frequently acquired smaller items, such as food and beverages, which are registered over two consecutive one-week periods.

Figure 5 plots education expenditures as a share of all household consumption expenses for both countries using those data, as well as the average value of the education expenditures in 2005 purchasing power parity (PPP) adjusted US dollars. The left panel shows that education expenditures account for a much more significant percentage of total consumption value in Mexico, around 7 percent in 2014, as compared to their relative importance in the US, which has oscillated around 2 percent during the past 10 years. Interestingly, in the case of Mexico, these expenditures have increased from less than 4 percent in 1984, to a peak of 7.6 percent in 2008, with two drops, in 2004 and 2010, which are years of economic contraction. A drop is also observed in the US in 2010 and in 2013, both years of low economic growth.
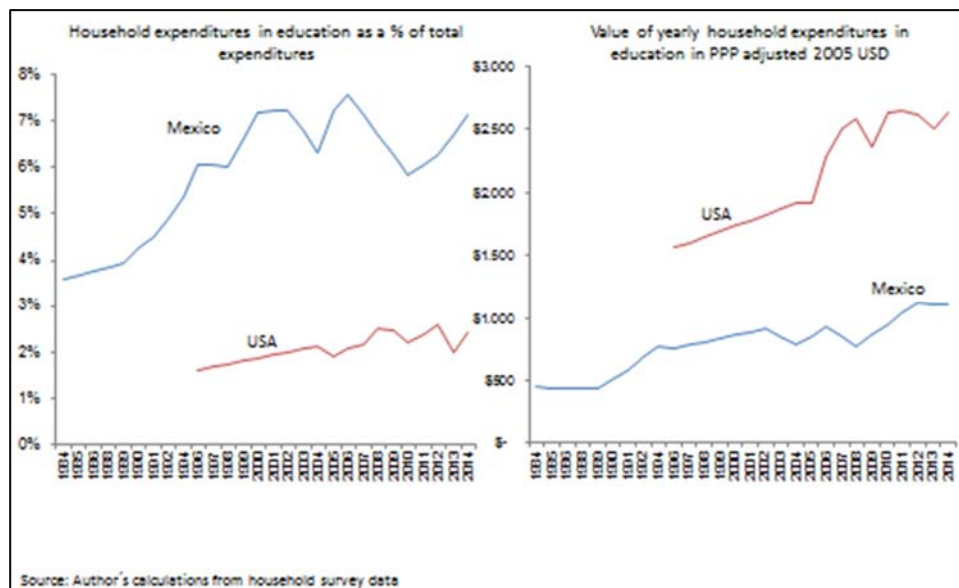
Figure 5. Private Expenditures in Education in Mexico and the USA as Measured by Household Survey Data

The average value of education expenditures, as expected, is considerably higher in the US. According to our calculations (right panel of the Figure) in 1996, while in Mexico the average household devoted $760 dollars a year to schooling expenses, the average for the US was $1,561, roughly double. While the difference is considerable, it is still important to note that the US registers a level of GDP per capita more than five times higher than that observed in Mexico. (Note 5) By 2014 the gap in education expenditures between the two countries expanded to about 2.4 times in favor of the US, where the average values grew somewhat faster, but the difference still remained at levels far below the gap in development levels.

Another relevant feature of the data is that household education investments are much more concentrated along the income distribution in Mexico. As shown in Figure 6, in 1996 more than 34 per cent of the total value of education expenditures in the country originated in the 10th decile, while only 21.3 per cent originated in the same sector in the US. The level of concentration reached a peak of almost 37 per cent in Mexico by 2004 and stabilized again at around 33 per cent in 2014. In the US there has been a slightly increasing concentration in the richest 10 per cent over the years, reaching 23 per cent in the course of the two decades considered. A relevant feature to note is that the main gap between the two countries is observed in the richest decile of the population. For instance, for the 9th decile

proportions are practically the same in both cases, and are higher in the US for all deciles below the 8th, with a gap of between 1 and 2 percentage points in all cases.
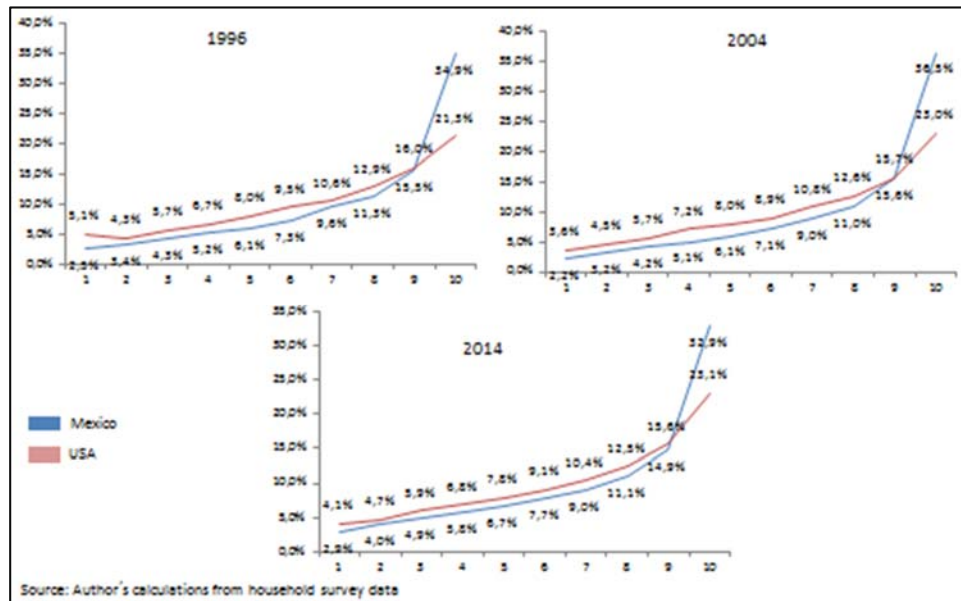

Figure 6. % of Total Household Education Expenditures Originated by Each Decile in Mexico and USA

The disparities along the distribution are also clearly illustrated by the levels of expenditure in different segments in the two countries. In Mexico for instance, the poorest 10 percent of the population devoted on average $494 PPP-adjusted 2005 dollars to education per year in 1996, compared with $8,241 per year invested on average by the richest 10 percent of the population in the same year, a gap of slightly less than 17 times (Figure 7). In the US, yearly education expenditures reach $2,146 and $10,097 US in the same year, respectively, at the two extremes of the distribution, which represents a gap of 4.7 times across deciles. While the gap across deciles expanded to 17 times in Mexico by 2014, it declined from 4.7 to 2.89 times in the US.
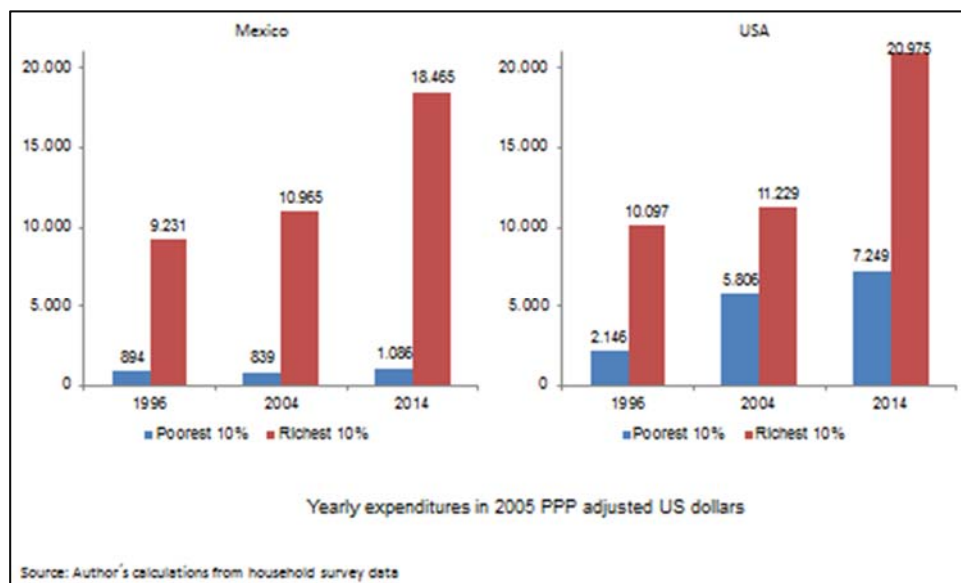

Figure 7. Value of Yearly Household Expenditures in Education by Decile in Mexico and the USA

The most notable feature of our results, however, is that Mexican households in the richest 10 percent of the population register education expenditures similar to the value of those of their counterparts in the United States for

all three years in the figure, with a difference of only 13 percent in 2014. This is a striking feature given the income and development differences—and therefore average purchasing potential- between the two countries. Combined with the distributional gaps just mentioned, the data suggest that in Mexico education expenditures are an (increasing) luxury of the rich, which again, is consistent with a pattern where private education expenditures are more of a compensatory nature. This argument is supported by the fact that, while for the richest Mexican households the value of annual education expenditures almost doubled between 1996 and 2014, these investments stagnated among the poorest households. This was not the case in the US, where average education expenditures among the poorest 10 per cent increased threefold during the same period, from $2,146 to $7,249 annually.

For the US the patterns may be influenced by changes in household structure along the life cycle, specifically due to the fact that a higher share of students leave their parental household to attend college. When young individuals leave for this purpose and devote most of their time to unpaid education activities, they are normally characterized by registering low incomes and might increase the ranks of the lower quintiles of the distribution. Table 1 plots the proportion of individuals in each income decile that attend Higher Education services and confirms the differences across countries, especially in the lower deciles. In Decile 1, for instance, the data show that 16.6 percent of all individuals attend Higher Education in the US, while the share is of only 0.4 per cent in Mexico. Interestingly, the share for the US declines up to Deciles 4 and 5, increases in the middle deciles, and drops again in the richest 10 per cent of the population. In contrast, in Mexico there is a direct positive correlation between the decile to which individuals belong and the probability of attending Higher Education.

Table 1. Proportion of Individuals in Each Decile That Are Enrolled in Higher Education Studies, in 2014

Decile	United States	Mexico
Decile 1	16.6%	0.4%
Decile 2	9.8%	1.1%
Decile 3	8.2%	1.8%
Decile 4	5.9%	2.3%
Decile 5	6.9%	2.6%
Decile 6	6.1%	3.4%
Decile 7	6.8%	4.4%
Decile 8	6.6%	5.1%
Decile 9	7.4%	6.0%
Decile 10	5.3%	9.0%

Source: Authors' calculations based on

household survey data

Another interesting feature from our exploration is that in Mexico, not only do the richest households account for the bulk of education expenditures, but they also tend to devote a larger share of their resources, as measured by their total consumption level, to education. This feature, however, is not present in the United States. This is shown in Figure 8, where it can be seen that, for instance, in 1996 the richest households in Mexico dedicated 7.6 percent of their consumption to education-related expenditures, while among the poorest 20 percent, on average the percentage was around 3.3 per cent. In contrast, in the same year, households in the poorest 20 per cent in the US distribution also dedicated around 3 percent of their consumption to private education expenditures while households in the richest 10 per cent registered only 2.2 per cent. While in Mexico the line plotting the shares by decile is clearly upward-trending as income increases, in the US a "U" shape is observed, with relatively larger shares registered among the poor, the lowest rates observed in the middle segments of the distribution which presumably belong to the middle class, and a slight increase between deciles 9 and 10.
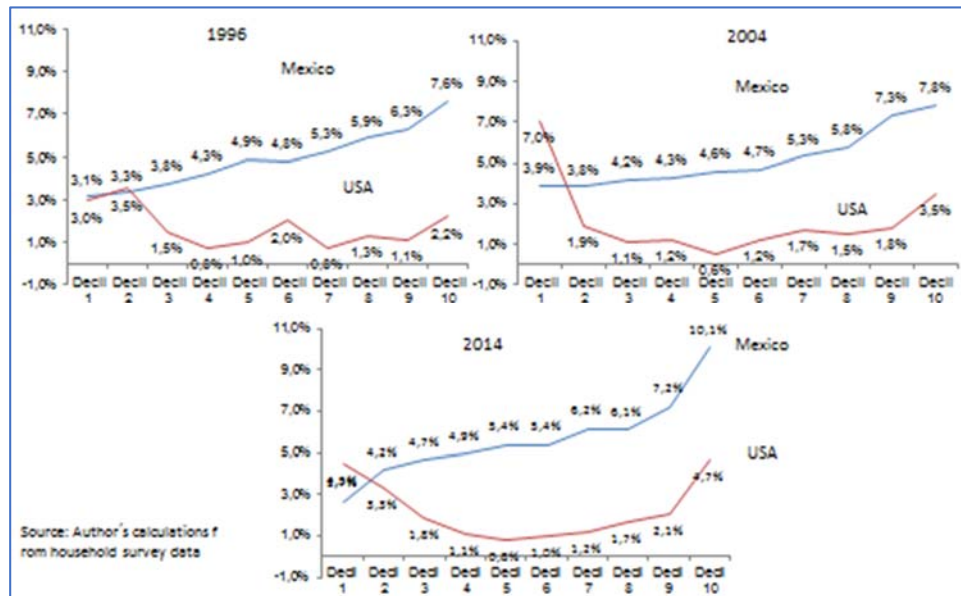
Figure 8. % of Total Household Expenditures That Are Devoted to Education in Each Decile in Mexico and USA

For the years 2004 and 2014 the patterns are similar in terms of the shape of the distribution curve, with two main differences. The first is that in Mexico deciles 1 to 9 show a slight increase in the relative share of their expenditure devoted to education, generally less than one percentage point, while the 10th decile increased its private educational investment from 7.8 percent of their income in 2004 to 10.1 percent in 2014, which is the most significant increase observed in all years in the two countries. In the US in contrast, there is a reduction in the relative educational expenditures at the bottom 10 per cent, there is relative stability up to decile 9, while the 10th decile increased its share by about 1 percentage point. The "U" shape pattern, however, remains in all years with proportions higher in the first than in the 10th decile.

In order to explore further the influence of the changes in household structure along the life cycle in the United States—and in particular the effect of higher shares of students leaving their parental household to attend college—we estimate household expenditures in education for this country by considering only households with a standard structure of 2 parents and 2 children. For instance, rather than generating 4.1 percent of all household expenditures, decile 1 only generates 1 percent when considering the more restricted household structure that is typical of pre-college school age in the USA. Rather than representing 4.5 percent of the overall value of household consumption, education expenditures account for only 0.4 per cent. As for the absolute value of expenditures, the difference is that when considering all households—including college students living on their own or with other students—the result is an expenditure of $2,145 USD in education, while for a more restricted structure of 2 parents and 2 children the value is $240 USD.

The differences in education expenditures observed along the income distribution are also likely to reflect disparities in the use of public and private services. This can actually be confirmed for Mexico, since the ENIGH data permit identifying the type of institution attended by each child. As shown in Appendix Table A.1, while about half of the students that inhabit households in the richest 10 percent of the population in 2014 attend private institutions, practically none of those in the first five deciles do so. The data also reveal that between 1996 and 2014 the disparities in this respect have grown.

By classifying education expenses by type, we find that the majority is dedicated to the payment of school fees, both in Mexico and the United States. In the US these type of expenses have represented around 80 percent of the total for the past decade, while in Mexico they accounted for around 60 percent in 1994 but have grown in importance steadily and now add up to around 80 percent also (see Figure 9). The main difference across countries is that in Mexico around 15 per cent of the total is dedicated to educational articles and materials, while only about 10 per cent is dedicated to related services. In the US the relative importance of these two items is reversed, with proportions similar to those observed in Mexico.
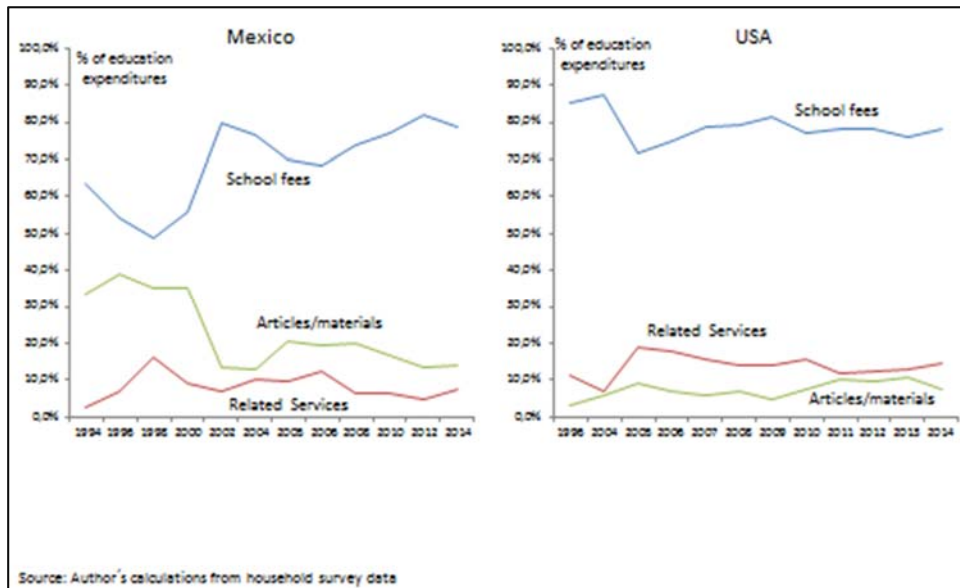
Figure 9. Distribution of Education Expenditures by Type in Mexico and the USA

According to our calculations, while in Mexico there are some differences in the relative importance of these groups of items along the income distribution, in the US the share of each is very similar across income deciles. This is shown in Figure 10, where it can be seen that, while in the richest 10 percent in Mexico and in the top and bottom deciles in the US, around 80 percent of all education expenses are devoted to school fees, this item accounts for 70 percent among the bottom decile in Mexico. The main difference is that poor Mexican households spend more on educational articles and materials—27 percent in 2014—while the richest households in the country spend only 6.6 percent in this item, and about 10 percent in related services. In the US, at both extremes of the distribution the second-most important item of expenditure is articles and materials, which absorb practically all resources remaining after paying school fees.
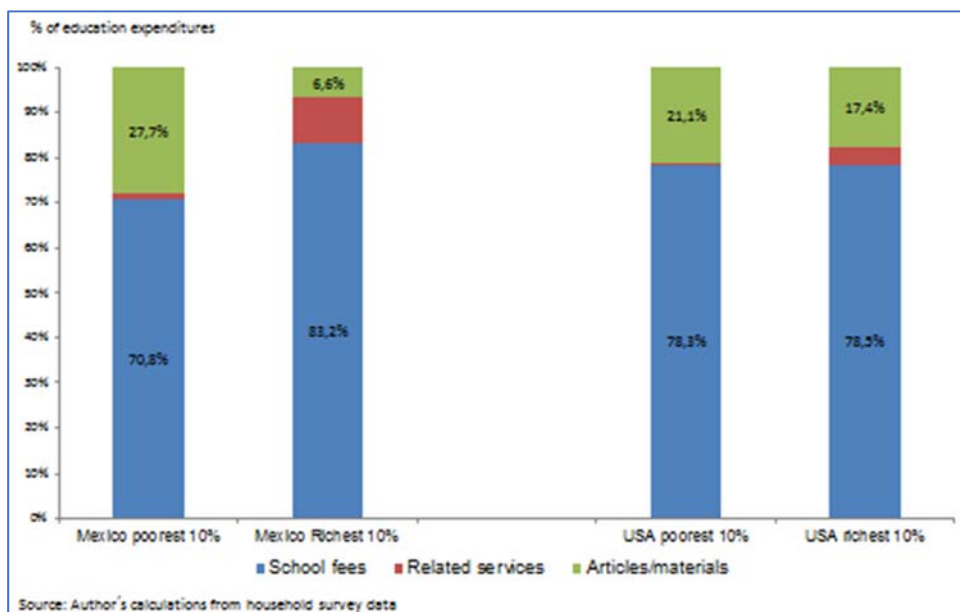
Figure 10. Distribution of Education Expenditures by Type in Mexico and the USA

Figure 11 identifies the household education expenditures that are invested in different education levels in both countries in different years. It is important, however, to note two differences in the data sources between Mexico and the US in this respect. The first is that, while in the Mexico data some expenditure items such as school fees can be clearly linked to a specific individual in the household, for some other items, such as materials, transport costs and uniforms, only the global amount of expenditures is reported. Therefore, for our estimations we link expenditure items to specific individuals when possible, while for the remaining items reported aggregately we divide the value of the investment flow on a per capita basis among household members who are attending school. The US data does allow linking all reported school expenditures to specific individuals, so this type of adjustment is not necessary. The second difference is that, while for Mexico it is possible to separate expenditures for each education level, the US data are aggregated only in two broad groups, consisting of expenses for Pre-K to High School (added together), and Tertiary education, respectively.
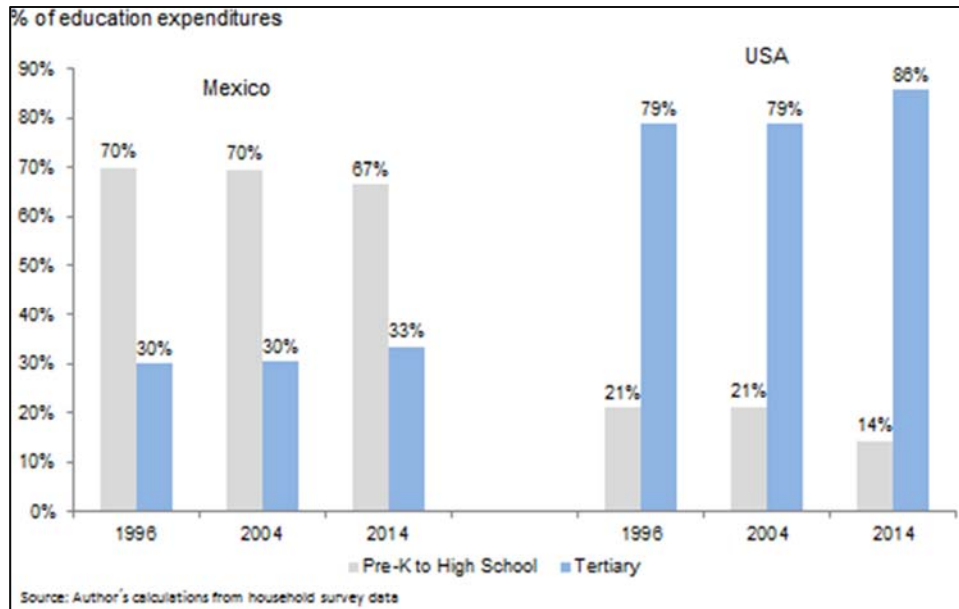
Figure 11. Distribution of Household Education Expenditures by Education Level in Mexico and USA

Our calculations, using the aggregation by levels in the US data for comparability, also show striking contrast in this respect (see Figure 11). While in Mexico between 67 and 70 percent of expenses are invested in Pre-K and up to High School and only around 30 per cent are invested in Tertiary schooling, in the US the pattern is exactly the opposite, with a minority of resources of 21, 21 and 14 percent being invested in Pre-K to High School for 1996, 2004 and 2014, respectively, and shares of between 79 and 86 percent accruing to Tertiary education in the same years. (Note 6)

The differences in the share of expenditures devoted to Tertiary education in both countries seem to be apparent along the income distribution. As Table 2 shows, while in the US practically all expenditures among the poorest households are devoted to Tertiary schooling, with declining shares for the rich, for Mexico the opposite is the case. In this country, the vast majority of private investments in education by the poorest households accrue to pre-Tertiary levels, with less than a third going to the Tertiary level for the first four quintiles. Only in the richest quintile do investments at the Tertiary level reach 35 per cent of the total, but this is still far below what is observed in the US.

For Mexico it is possible to break down expenditures to a finer extent by education level. (Note 7) The results of doing so are presented in Table 3, where it can be seen that since 1996 the relative weight of education expenditures at the Pre School and Tertiary levels increased by about 5 percentage points, respectively; in the same period the share of investment accruing to Primary and Secondary schooling declined by a similar extent, while the share invested in Upper Secondary remained stable. This is an important result since it is precisely at the Upper Secondary level where the highest dropout is registered, and the lowest access to education services is observed in the country. Since the year 2008 there has been a rather stable pattern, with around 14, 34, 19, 18 and 15 percent of all private education expenditures accruing to students attending Preschool, Primary, Lower Secondary, High School, and Tertiary Education, respectively.

Table 2. Distribution of Private Education Expenditures across Education Levels, by Quintile, in Mexico and the US

Quintile	Mexico		United States	
	Elementary	Tertiary	Elementary	Tertiary
1	89%	11%	2%	98%
2	84%	16%	4%	96%
3	76%	24%	20%	80%
4	70%	30%	23%	77%
5	65%	35%	16%	84%

Source: Authors' calculations from household survey data.

Additionally, large differences remain in the absolute value of spending per level. According to the 2014 data in the right columns of Table 3, while households spend 2005 PPP-adjusted $1,072 yearly per Preschool child, the value of per capita expenditures per Primary is 3.9 per cent above this value, while for Secondary, USE and Tertiary, expenditures reach values 11.7, 73.7 and 188 per cent more than what is observed in the lowest education level.

Table 3. Distribution of Private Education Expenditures across Education Levels in Mexico, 1984-2014

| Year	Distribution of all household private expenditures in education by Education Level					Value of per capita household expenditures in education By Education level, in US ppp2005				
	Preschool	Primary	Lower Sec.	High School	Tertiary	Preeschool	Primary	Lower Sec.	High School	Tertiary
1996	10%	39%	24%	18%	10%	$ 932	$ 795	$ 1.118	$ 2.199	$ 2.791
1998	10%	39%	23%	18%	10%	$ 1.081	$ 837	$ 1.050	$ 1.895	$ 2.904
2000	9%	38%	22%	19%	11%	$ 990	$ 873	$ 981	$ 1.891	$ 2.421
2002	7%	42%	22%	18%	11%	$ 775	$ 908	$ 977	$ 1.687	$ 2.468
2004	8%	40%	21%	18%	13%	$ 984	$ 1.046	$ 1.179	$ 1.801	$ 3.162
2005	8%	38%	21%	19%	14%	$ 1.065	$ 948	$ 1.026	$ 1.852	$ 2.899
2006	8%	38%	21%	18%	14%	$ 914	$ 994	$ 1.099	$ 1.817	$ 3.337
2008	14%	35%	20%	17%	14%	$ 857	$ 847	$ 990	$ 1.628	$ 2.692
2010	14%	34%	19%	18%	15%	$ 959	$ 920	$ 1.130	$ 1.742	$ 2.873
2012	15%	35%	19%	18%	13%	$ 909	$ 945	$ 1.054	$ 1.822	$ 3.567
2014	14%	34%	19%	18%	15%	$ 1.072	$ 1.114	$ 1.198	$ 1.862	$ 3.090

Source: Authors' calculations from household survey data.

Table 4. Distribution of Private Education Expenditures across Quintiles, by Education Levels in Mexico, 2014

Quintile	Preeschool	Primary	Lower Sec.	High School	Tertiary
1	6%	5%	5%	5%	2%
2	9%	11%	11%	10%	5%
3	13%	13%	14%	16%	10%
4	21%	19%	18%	22%	20%
5	51%	52%	51%	48%	63%
Total	100%	100%	100%	100%	100%

Source: Author´s calculations from household survey data

Interestingly, for all education levels the same feature that the bulk of private investments in education originate in the richest households is observed. As shown in Table 4, while half of all household private expenditures in education are concentrated in the richest quintile of the income distribution between Preschool and the Upper

Secondary level, for Tertiary education the concentration reaches 63 per cent of the total.
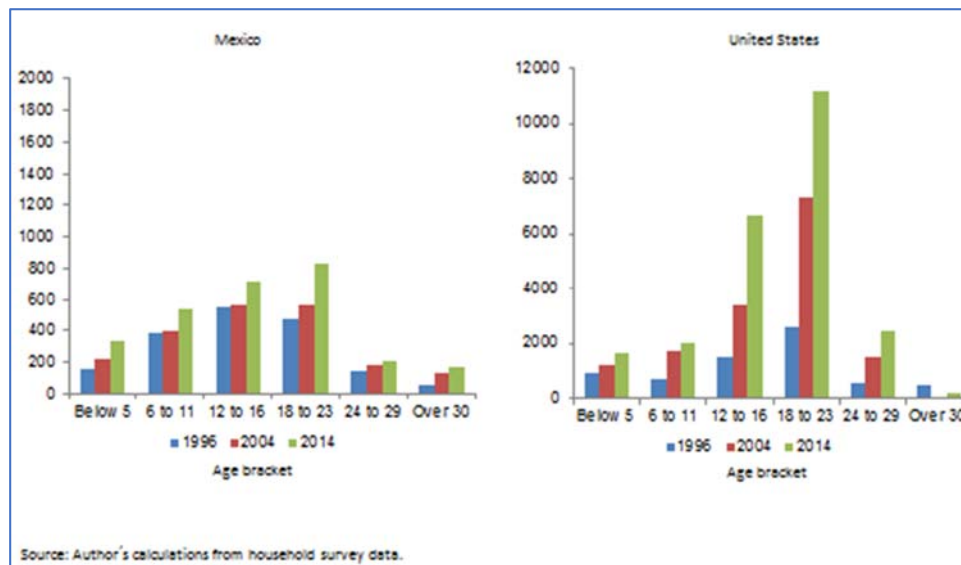
Figure 12. Age Pattern of Private Expenditures in Education in Mexico and the United States 1996-2014

Finally, education expenditures can also be classified by the age bracket of the school age population. Figure 12 shows that for both countries there is an inverted "U" pattern indicating that expenditures per child increase with age up to the 18 to 23 bracket, reflecting that education costs increase with the education level (note that the scale of the two panels differs due to the much larger values in absolute terms for the US). The drop after age 23 is presumably associated with exit from the education cycle. An interesting difference between Mexico and the United States is that, while in Mexico there is a steady marginal increase from the first group to the 18-23 age bracket, in the United States there is practically no change between the first two groups, and large increases are observed when transiting between the 6-11 to 12-16 brackets, and the 12-16 and 18-23 ranges.

3. Cohort Analysis of Private Expenditures in Education

So far we have provided a picture of private household expenditures in education by taking each household survey as a snap shot of data. In a 10 year period analysis such as the one provided these snapshots are consequence of: a) new households that enter the group that have children in school age; and b) households that exit the group of interest precisely because they have transcended the stage where their children are of school age.

When looking at comparisons between two periods of time, the averages actually hide at least three different effects that are of interest in our examination, especially due to the various disparities between Mexico and the US that might be influencing the results reported in the previous section. Perhaps the most evident is that both countries are at different stages of their demographic transition, which implies that there are more households in Mexico—which is a country with a younger population—that are in an education investments state due to their demographics, while in the US there are relatively fewer households with children at ages 3 to 24, which could be characterized as the typical age for attending school. Both the levels and the changes over time documented could in fact include a demographic composition effect that blurs the pure education expenditure choice.

Another source might be that generations can react differently to changes in the environment. For instance, as shown in Figure 1, average schooling in the US has already been much higher than that in Mexico for at least the last 50 years and has increased only modestly, precisely due to the already high levels achieved. In Mexico, although averages are still below those of the US, average years of schooling have grown steadily, which suggests that the "average parent" has been increasingly more educated. If greater education is associated with preferences for investing more in formal schooling, it would be expected that while generational increases in the US would be relatively low, in Mexico they would be potentially higher, and this could also be influencing the findings discussed above.

A third difference might be that households react differently regarding education investments when exposed to

economic shocks. Moreover, shocks may leave "scars" in the future when they affect school attendance, which might make it more difficult for certain individuals to re-engage in the education system—i.e., individuals closer to working age. As shown in the previous section, there seems to be a drop in private investments in skills formation through the schooling system in both countries, particularly after the 2008-2009 world recession, although the longer-term effects of this and other economic contractions could also be underlying factors behind the differences in trends and levels, at least to some extent.

In order to assess the magnitude of these differences it would be necessary to go beyond the snapshots of data and perform a dynamic analysis. To do so empirically, ideally it would be desirable to have access to panel data following specific households during the years of their life cycle when school attendance decisions are being taken, but unfortunately these types of data are not available for a sufficient number of years for both countries.

An alternative in the literature of life cycle choices, has been to use repeated cross-sections of data, which typically come from household surveys, that allow tracking the life cycle path of representative groups of individuals or households belonging to a birth cohort. This approach, proposed initially by Browning, Deaton, and Irish (1985) for analyzing other outcomes that are expected to vary throughout the life cycle, such as savings—and that has been used widely in other contexts due to their richness—implies the construction of pseudo panels. (Note 8)

As noted by Verbeek (2008), in general terms, perhaps the main limitation of these types of data is that they do not follow the same individual or household over time, but rather groups of representative agents. When the within-cohort variance of the variable under analysis is low, this may be of less concern since the average will be close to what is observed in actual individual observations. However, when high degrees of variability are observed, the cohort average will reflect individual cases to a much lower extent. On the other hand, two important advantages of using repeated cross-sections are that they minimize attrition biases and problems of non-response that are common in true panels, and that when household surveys are nationally representative, averaging across cohorts likely reduces idiosyncratic measurement error and heterogeneity (as discussed in Attanasio and Banks, 1998).

In the context of the present analysis the use of repeated cross-sections seems attractive given the availability of data for Mexico and the US for following the transition of households from the time when they would be expected to have children entering Primary school at ages 5-6, until they exit Tertiary age at around 24—households' typical investment history.

One important aspect to bear in mind, however, is that household structures in both countries are quite different, especially regarding youth turning 18 years of age. While in the US it is quite common for this age group to emigrate from the parental household, in Mexico the tendency is to stay in the nuclear group well beyond age 20. Furthermore, the emigration decision is intimately linked to schooling decisions. On the one hand, in the US enrolling in college is even a decision closely related to migrating geographically, which implies that under a traditional definition of a household—which normally refers to a group of individuals living in the same physical unit and sharing a common budget—those leaving the parental unit and attending Tertiary education might be considered as a household on their own. The data presented in Table 1 above indicate that this is an important element to consider in the case of this country.

On the other hand, Mexico displays different dynamics of household structure. Tertiary education attendance does not necessarily imply geographic migration and heavily relies on household resources, so that those engaged in those studies are more likely to be financed by the parental unit. This can influence particularly the (household head's) pattern of education investments in education.

For our analysis we construct similar trajectories for all the cohorts observed in Mexico that can be traced through school age from 1984 to 2014, while for the US we identify the same demographic cycle for generations observed between 1996 and 2014. In all cases, we focus on the household as unit of observation and take the age of the household head as reference for tracking the evolution of each household over time. Our variable of interest is the percentage of all household consumption that is devoted to education investments as categorized in Section 1 above. Household expenditures are presented on a per capita basis to control for household size—that is, all education expenses are divided over the number of individuals in school ages 4 to 24.
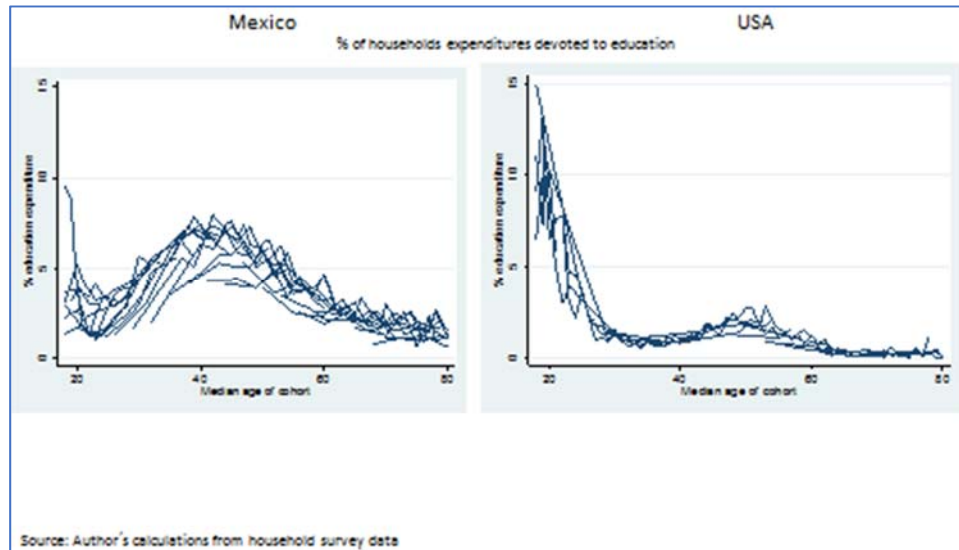
Figure 13. Cohort Trajectory of Education Investments As a Share of Total Household Consumption in Mexico and the USA(Households Classitied by the Age of the Household Head)

The trajectory of all cohorts for each country is presented in Figure 13, which shows a quite distinctive evolution in both cases. While in Mexico—with the exception of one cohort—there is a relatively low start in terms of educational investments that grows continuously thereafter until a turning point when the household head's age reaches the mid-40s, in the US there is an early start, with the highest investments when household heads are younger and presumably have younger children in their initial years of the school trajectory. Investments plunge rapidly, though, to the extent that when the head reaches about age 30 investments are low and only present a slight hump during ages 45-55.

The inclusion of the series of trajectories in the figure permits observing the different sources of variation discussed above. The first, which is more evident in Mexico, is that there are differences across generations, which are normally referred to as a "cohort effects," reflecting the variety of structural conditions for different generations. These are not apparent for the US, which is in line with the hypothesis that after education rates have reached high levels, there are only slight cohort differentials.

The second is that there are variations along the life cycle of each cohort, which are especially apparent for Mexico, and that apparently correspond to the dynamics of household size and structure. The inverted "&" pattern that increases until the household head's mid-40s and declines thereafter is similar to what is normally classified as an "age effect" in the literature.

A third source of variation is "time effects", which correspond to shocks that occur in a particular year, and that can affect school investment choices irrespective of the age or cohort effects. Economic crisis or natural disasters that alter the expected age pattern of investment and affect all cohorts in a country would be good examples of this. These effects, however, are not immediately apparent in the data.

In the context of the analysis of the dynamics of savings over the life cycle, several authors have attempted the identification of the aforementioned age, cohort, and time effects separately. (Note 9) We adapt this approach to identify the patterns of household expenditure in education. Similarly to the literature on household saving, the logic behind the model for estimating age, cohort, and time effects refers to the evolution of a continuous variable that may follow a complex underlying investment model similarly to savings and which may fluctuate quite a bit throughout the life cycle—whether whether to react to exogenous shocks or to change in investment strategies.

The estimated age, cohort and time effects for both countries are presented in Figures 14a, 14b and 14c, and confirm the previously noted trends. For Mexico there is a clear inverted "u" shape pattern corresponding to the demographic cycle of households, while in the US initial levels are high but drop considerably early on in the household evolution process. Interestingly, cohort effects are positive in Mexico –with the only exceptions of the firs cohort- indicating that over time, independently of the age effects identified, each generation in the country has tended to invest more in schooling as a share of household total consumption. This is not observed in the US where the cohort effects are

quite flat and even negative for the most recent generations. Finally, time effects are somewhat similar in both cases with a negative influence up to the year 2000, and slight positive effects thereafter, with a blip in 2010 presumably related to the economic contraction experienced during that year.
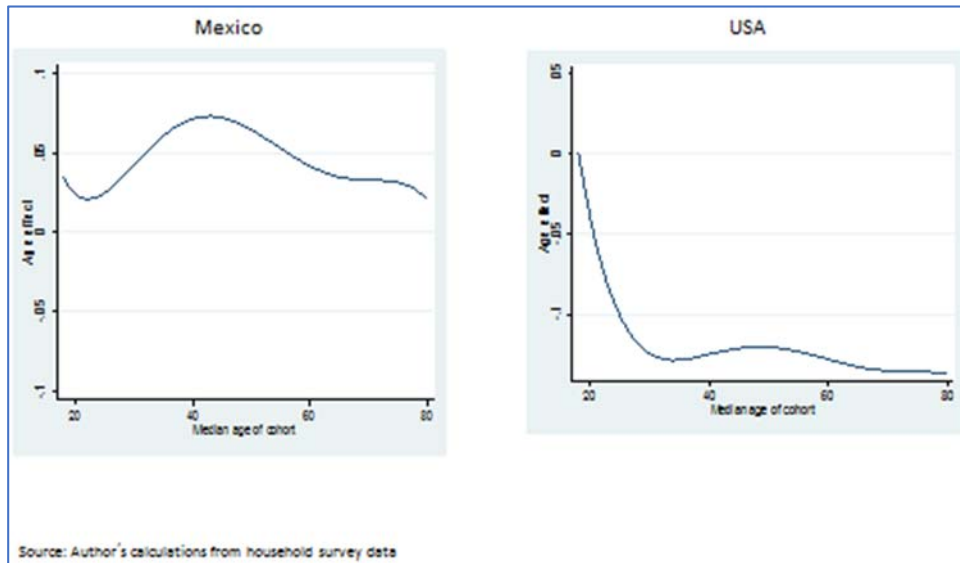
Figure 14a. Estimated Age of Effects for Education Investments as a Share of Total Household Consumption for Mexico and the USA
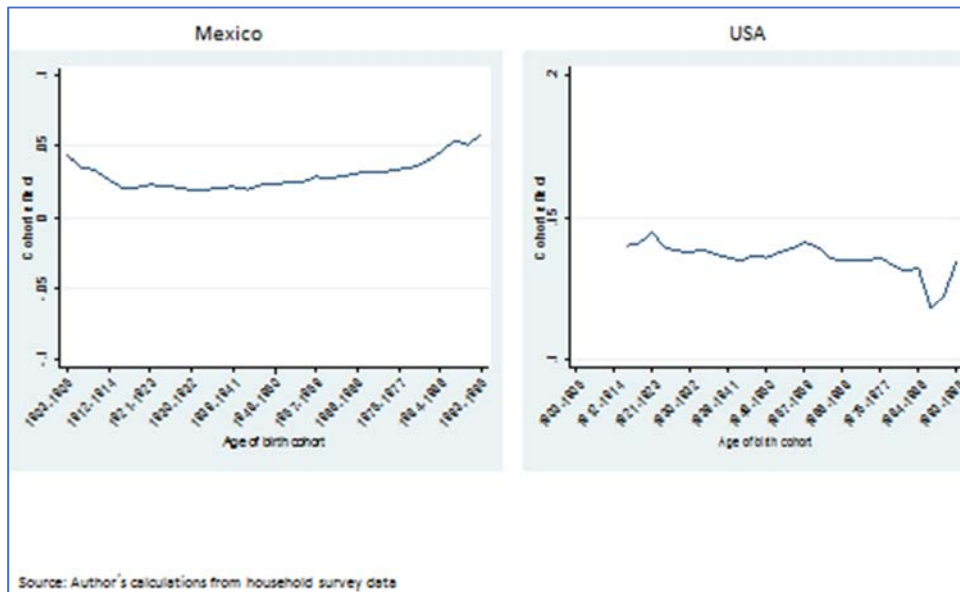
Figure 14b. Estimated Cohort Effects for Education Investments as a Share of Total Household Consumption for
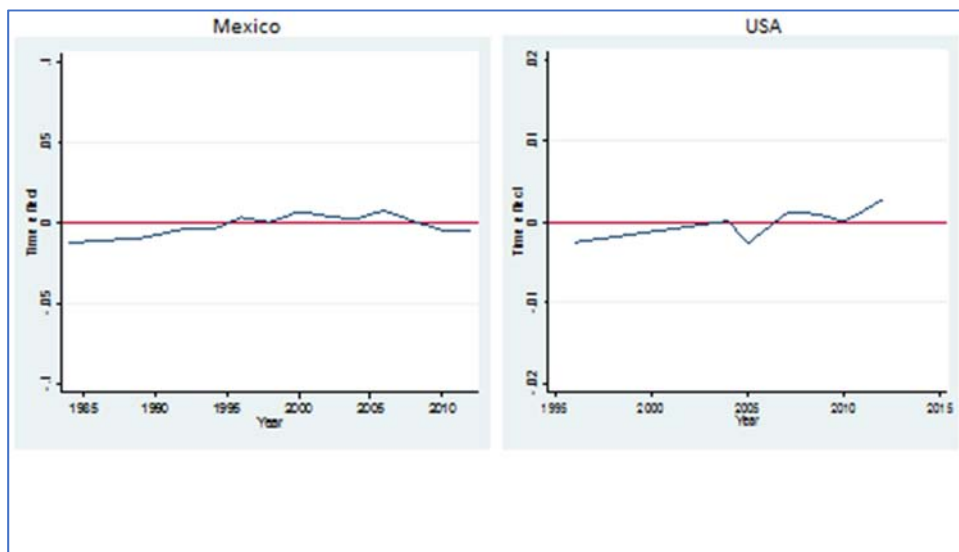
Mexico and the USA

Figure 14c. Estimated Time Effects for Education Investments as a Share of Total Household Consumption for Mexico and the USA

4. Income and Price Elasticities of Private Expenditures in Education

In order to provide further evidence of the nature of household education expenditures in Mexico and the United States, which is necessary for identifying the most adequate policy interventions for enhancing human capital formation, in this Section we estimate a series of elasticities. The first, which we are able to calculate for both countries is the income elasticity, which is an indicator of the strength of the income-education relation. The second is the price elasticity of education expenditures, which is possible in the case of Mexico due to the inclusion of detailed prices for all consumption items registered in the household survey. This also allows for the estimation of some cross elasticities with the objective of identifying goods that are complementary or substitutes to educational investments.

Table 5. Income Elasticity of Private Expenditures in Education in Mexico and the USA

Year	Mexico	USA
1992	1,10	
1994	1,15	
1996	1,12	0,50
1998	1,18	
2000	1,16	
2002	1,13	
2004	1,18	0,41
2005	1,14	0,48
2006	1,19	0,47
2007		0,35
2008	1,18	0,46
2009		0,41
2010	1,20	0,48
2011		0,40
2012	1,22	0,29
2013		0,41
2014	1,19	0,54

Source: Authors' calculations based on the ENIGH and the CPE.

In order to estimate the income elasticities, for each household in the ENIGH and the CES we identify all education expenditures and allocate to each school age child those items that are clearly age-specific (i.e., we allocate the value of primary school fees to children attending primary school, and so on), and distribute on a per capita basis the value of the expenditures items that cannot be directly linked to particular individuals in the household (i.e., school materials in Mexico). After considering all education expenditures we divide the value of the education expenditure per child over the value of the per capita total household expenditures and interpret this as a measure of household "effort" in financing schooling through its resources.

We estimate the elasticity of this variable with respect to household per capita income, and find that as expected, the sensitivity of household private investments in education per child is much higher in Mexico than in the US. In fact, as shown in Table 5, household education expenditures are highly income-elastic in Mexico, while they are inelastic in the US—which is consistent with the "u" shape observed in Figure 8. This suggests that investing in education in Mexico is mostly a privilege of the rich (or even a luxury), while it is a more much generalized phenomenon not as closely related to household positions in the income distribution in the US. In the context of low average quality and restricted access at the USE level, this in turn is consistent with a compensatory motive of investment in Mexico.

The data show that in Mexico there is a slightly increasing trend in the value of the elasticity since 1992, which can be interpreted as a sign of further concentration of human capital formation efforts along the income distribution. In the US the trend is more stable, with the exception of the year 2014, where an increase of about 20 per cent is observed.

5. Conclusions

This paper analyzes private household expenditures in education in Mexico and the United States. The comparison is of interest since Mexico is a country characterized by relatively low education quality and relatively low schooling coverage beyond High School education, and a highly unequal income distribution, while the United States has much higher quality and coverage rates. Additionally, although the United States is a country with a relatively unequal distribution of income by developed country standards, income concentration is much lower than in Mexico. The hypothesis is that in these two different contexts, private household expenditures in education respond to different motives, and have different effects on the human capital formation processes of school age individuals, which means that the public policy response for enhancing education investments should also be different.

The evidence presented here suggests that private expenditures in education in Mexico are actually more of a compensatory nature, while they are more in line with a complementary role in the United States.

Our main conclusion is that, while in Mexico promoting more private expenditures in education through increasing the income of poorer households, and through improving the access and quality of the public education system, may be the best way of accelerating human capital formation in an egalitarian way, in the United States other policy options, such as providing incentives to all households for facilitating their private education investments, might be a preferred alternative.

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Notes

Note 1. Encuesta Nacional de Ingresos y Gastos de los Hogares. Both the ENIGH and the CPS, are the main source of information for labor force characteristics in Mexico and the U.S. population. They include a wide range of data on income, education, employment, unemployment, earning, hours of work, and other indicators. In addition, they include a detailed demographic characterization of households including age, gender, race, marital status, and household composition, among other features, which are all important for our analysis.

Note 2. Program for International Student Assessment, by the Organization of Economic Cooperation and Development (OECD).

Note 3. OECD Education Statistics, 2015 http://www.oecd-ilibrary.org/education/data/education-database_edu-db-data-en. The figures plot the share of all students enrolled in each education level that attend private institutions.

Note 4. The data are from the Digest of Education Statistics, 2013, National Center for Education Statistics, U.S. Department of Education, based on the Private School Universe Survey (PSS).

Note 5. GDP per capita figures are from the World Bank World Development Indicators, 2015. As mentioned, the education expenses are calculated from household survey data for both countries. The averages are obtained only for households that report education expenditures greater than zero.

Note 6. To try to make the data as comparable as possible between the two countries, for Mexico the figure only includes the expenditure items, such as school fees, that are directly linked to specific individual. As can be seen in the following tables that report all expenditure items, this tends to overestimate the share of expenditures directed to Tertiary education. Once all expenditure items are considered (including those distributed on a per capita basis for our estimations), the share of Tertiary education expenditures oscillates around 15 percent.

Note 7. For this disaggregation we use the information on all education expenditures and not only those that can be directly allocated to specific individuals. As mentioned before, for the items for which this cannot be done, we divide the aggregate amount of what is spent in the household among all school-attending members.

Note 8. Shorrocks (1975), Moffit (1993), Deaton (1997), and Attanasio and Banks (1998) are some of the first to use this technique in the context of the analysis of savings. Recent applications to other areas include Dang et al. (2014) in the context of poverty analysis, Cruces, Fields and Viollaz (2013) who use the cohort approach for examining income mobility.
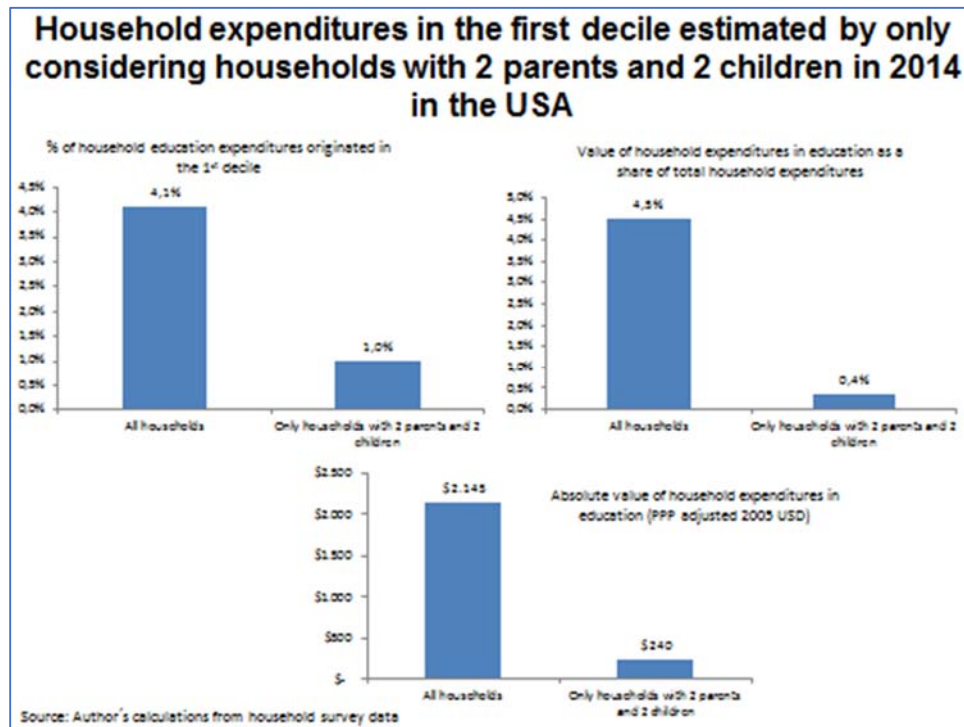
Note 9. Some examples are Attanasio (1993), Attanasio and Banks (1998), Attanasio (1998), and Attanasio and Székely (2001).

Appendix

Table A.1. % of Students Enrolled in Public and Private Institutions in Each Decile in Mexico

	1996			2004			2014	
Decile	Public	Private		Public	Private		Public	Private
1	99%	1%		100%	0%		99%	1%
2	99%	1%		99%	1%		99%	1%
3	99%	1%		98%	2%		98%	2%
4	99%	1%		97%	3%		97%	3%
5	98%	2%		96%	4%		96%	4%
6	97%	3%		95%	5%		94%	6%
7	94%	6%		92%	8%		92%	8%
8	93%	7%		87%	13%		87%	13%
9	84%	16%		75%	25%		76%	24%
10	57%	43%		45%	55%		48%	52%

Source: Authors' calculations based on household survey data.

Figure A.1