

The distribution of assets, debt and income among Chilean households¹

Paulo Cox, Eric Parrado and Jaime Ruiz-Tagle V

I. Introduction

During the last decade, Chilean households' debt has been growing considerably faster than their income. Aggregate measures show that the amount of debt as a percentage of income has reached 58% recently from 30% at the end of 2001. This substantial debt growth has raised important questions about debt sustainability, households' financial strength, and the possible impact on the financial system.

So far, aggregate measures of household debt have been the only instrument to monitor the risks associated with the financial exposure of households in Chile. The problem with such measures is that they could be hiding the genuine financial situation of many households that could suffer greater financial stress. To work around this problem, it is necessary to analyze the financial position of the household population and their distribution.² Thus, the paper tackle the issue using the most recent Social Protection Survey (EPS, for *Encuesta de Protección Social*),³ which represents an important innovation that helps to characterize Chilean households both socially and financially.

Several interesting results emerge from the analysis. First, a relatively small fraction of households - the richest quintile - accounts for 57% of liabilities and 43% of assets, which contrasts with the low shares held of the two lowest income quintiles (14% and 24% of debt and assets respectively).

Second, the distribution of assets is less concentrated than is the distribution of debts, due mainly to the fact that home ownership is rather widespread among all households. Real estate assets account for 88% of total assets, and over 75% of households in all quintiles report owning their homes. In contrast, while 64% of debt is associated to mortgage, only 16% of households hold such debts. Since assets are at least eight times the amount of debts in all quintiles, households of different income brackets may have enough support for their debts.

Third, the distribution of indebtedness over the life-cycle indicates that relatively younger households are more likely to be running debts, although most of the debt is held by middle-age households. Mature households hold the major part of the assets, and ratios of debt to

¹ We thank valuable comments by Kevin Cowan, Pablo García, and seminar participants at the Central Bank of Chile and the BIS IFC conference on "Measuring the Financial Position of the Household Sector." We also thank the editorial assistance of Consuelo Edwards. The views expressed in this article are those of the authors and do not necessarily reflect the opinions of the Central Bank of Chile.

² This sort of microeconomic analysis has become common practice by central banks of developed countries that monitor financial stability. For example, Tudela and Young (2003), May, Tudela and Young (2004), and Barwell, May and Pezzini (2006) carry out a similar analysis for the United Kingdom, Bucks, Kennickell and Moore (2006) do the same for the United States and Johansson and Persson (2006) review the Swedish case.

³ The EPS is supported by the Superintendency of Social Security of the Ministry of Labor and is conducted by the Department of Economics of University of Chile. The EPS was first applied in 2002 and later at the end of 2004 and beginning of 2005.

income and debt to assets are low for all ages. This implies that debts are following income flows and that households accumulate assets as they turn older.

Fourth, households with higher education and/or employment contracts have larger proportion of debts. This suggests that loans are mainly allocated to those with higher present or future expected incomes, which are also less volatile.

Fifth, 80% of households have more assets than debts, while 9% have no debts or assets at all. The remaining 11% are households that have negative net worth, and hold 18% of total debt. The financial conditions of those households with negative worth indicate that only a quarter of them are under high financial stress.

Finally, most of the debt identified in the survey appears to have gone to those who are better suited to afford it. Financial fragility is only observed in 4% of households, but they hold only 9% of the total debt. Consequently, we find no strong evidence to support that households are particularly over-indebted and represent a threat to the financial system.

The paper is organized as follows. Section II provides a historical overview of household debt growth in Chile in the last fifteen years, outlining the main issues related to debt growth and income behavior. Section III describes the data and the methodological issues associated with the distribution of debt and assets across Chilean households. Section IV analyzes households' net worth, while section V presents estimations of debt service payments as a key element of financial vulnerability of households. The final section summarizes the main results of the paper and their implications for financial stability.

II. Household debt growth in Chile in the 1990s and 2000s

1. Stylized facts

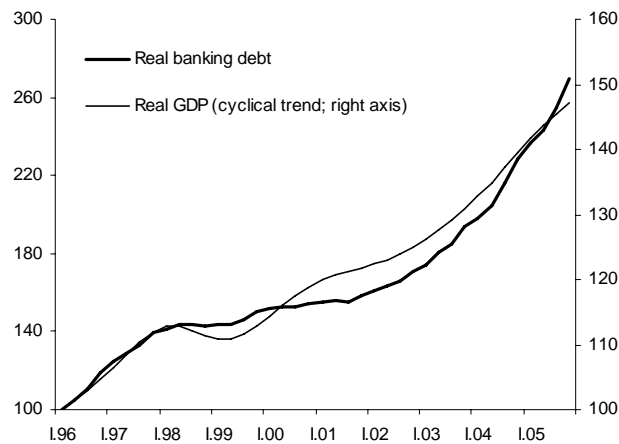
Debt's growth rate has been enormous and has constantly surpassed that of GDP during the last ten years. Although debt growth in Chile can be considered moderate compared to other emerging economies,⁴ the debt service burden has been maintained relatively high given the weight of consumer credit in the composition of the debt.

In real terms, households' banking debt has almost tripled, while real GDP increased nearly 50% during the same period (Figure 1). Banking debt's real annual growth rate averaged 19% between 1991 and 1998, fostered by the economy's strong growth through the first half of the 1990s. Although banking debt diminished its pace after the crises that hit several emerging economies, averaging only 5% between 1998 and 2003, it was spurred again by the economy's recovery, with a 15% jump between 2003 and 2006. This implied that total banking debt increased to 23% of GDP in 2005, from 15% of GDP in 1996.

Although banking debt is and has been the main component of total debt, its share has been declining over the last several years with the expansion of credit issued by nonbanking institutions (Figure 2.a). In fact, nonbanking debt went to 28% of total debt in 2005 from 22% at the end of 2001.

⁴ See IMF's Global Financial Stability Report 2006. See also Djankov, McLiesh, and Schleifer (2007) and Debelle (2004) for international comparisons and analysis of macroeconomic impact of rising household debt.

Figure 1
Household's banking debt and GDP growth
 Index; March 1996 = 100

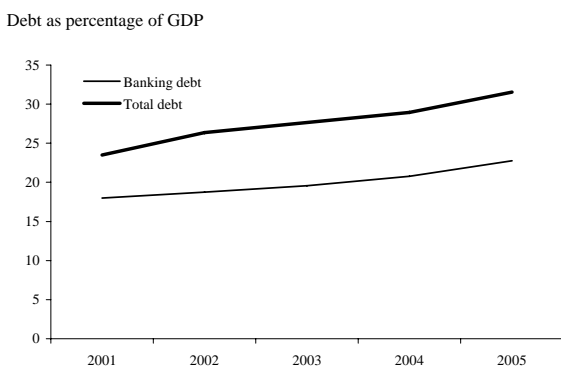


Source: Central Bank of Chile.

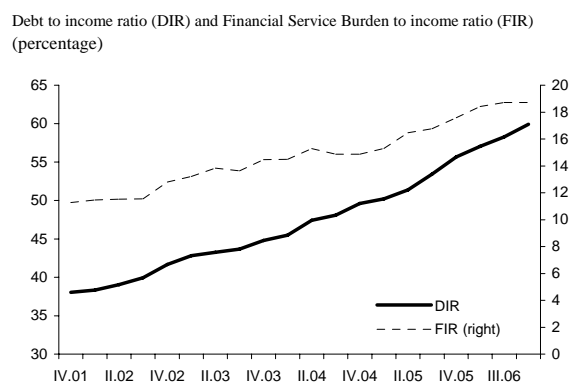
Total debt growth has also grown more than households' disposable income, which is reflected through the debt to income ratio (DIR). The DIR reached 55% in December 2005 from 37% at the end of 2001. The aggregate debt service burden⁵ has also expanded significantly, though less than total outstanding debt growth, because higher debt has been financed with lower rates and longer terms. The debt service to disposable income ratio (DSR) reached 18.7% in September 2006 from 11.3% in December 2001 (Figure 2.b).

Figure 2
Household debt indicators

a. Debt as percentage of GDP



b. Debt to income ratio (DIR) and debt service to income ratio (DSR), percentage



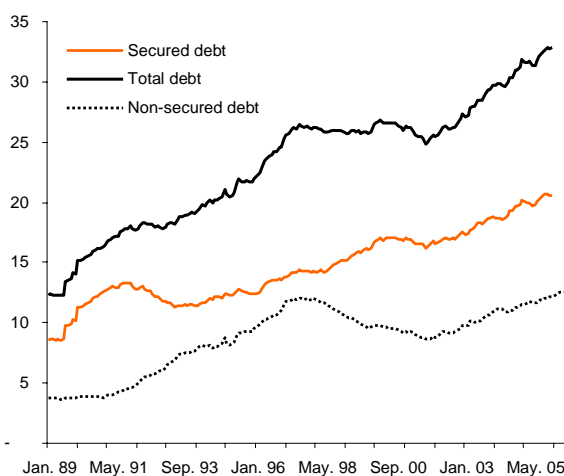
Source: Central Bank of Chile.

⁵ The debt service burden is defined by the amount of the debtor's resources allocated to paying financial obligations, both principal and interest.

Figure 3

Banks' exposure to household debt

As percentage of total banking loans



Source: Authors' own calculations with data provided by SBIF.

The strong expansion of household debt has implied higher exposure of the banking system to the household sector. Banking exposure, measured as the sum of total mortgage and consumer outstanding loans as a percentage of total outstanding loans, has increased to more than 33% in 2005 from 15% at the beginning of the 1990s (Figure 3). This expansion has been driven by unsecured debt mainly associated with consumer loans. Therefore, within the banking system, exposure is higher not only because of relatively higher household banking debt, but also because of a higher share of unsecured debt.

2. Explaining households higher level of indebtedness

Fundamentals and financial deepening

Despite the remarkable debt growth described above, there are important fundamentals supporting the debt expansion of households. Income growth has hit record highs during the last several years and both real and nominal interest rates have fallen to their lowest levels in decades. In addition, there is higher stability (less volatility) in the business cycle,⁶ which smoothes disposable income fluctuations.

These fundamentals represent both demand and supply effects. On the one hand, lower interest rates and higher current and expected incomes have supported credit demand. Recent growth in both mortgage and consumer loans is rooted in attractive credit conditions such as lower interest rates and longer terms, which have kept the financial burden from growing at debt's pace. Besides, there is evidence of housing price appreciation during the last four years,⁷ which allows higher mortgages and their associated equity withdrawal

⁶ See, for example, Franken, Le Fort, and Parrado (2006).

⁷ Cox and Parrado (2006) show that actual effective transaction prices for homes in Santiago have increased 14% since the end of 2001.

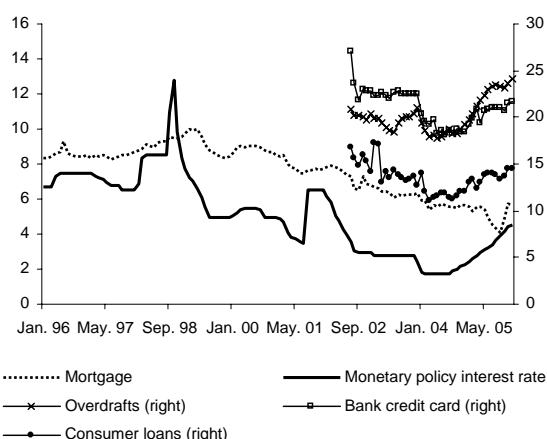
effect.⁸ On the other hand, higher income growth and improved macroeconomic stability increase expected incomes, which foster lending from financial institutions to households because of higher expected repayment capacity. Lower interest rates have been observed in all types of credit products in the aftermath of the 1998's monetary tightening (Figure 4.a). There is an additional factor underlying supply effects. Higher growth and less volatility of household income, together with lower interest rates, have reduced the level of default risk measured by most common risk indicators of the banking system (arrears and nonperforming loans) (Figure 5.b). This combination of demand and supply forces has contributed to both higher levels of credit and greater exposure of banks to households.

Financial deepening has also been mentioned as a key factor explaining credit growth in the household sector, through a less direct mechanism. Macroeconomic stability and financial development have improved internal financial conditions for borrowers, especially companies, traditionally the most important destination of banking funds in Chile. As nonbanking financing has risen (through bond issuance; IPOs) the banking industry has become more interested in lending to micro debtor niches or markets such as small firms and lower-income families.

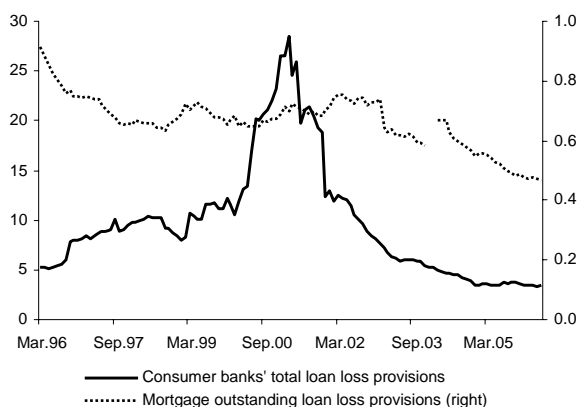
Figure 4

Interest rates and credit indicators

a. Monetary policy interest rate and credit product's interest rates, percentages



b. Credit risk indicators¹, as percentage of outstanding loans



Source: Central Bank of Chile and SBIF.

¹ Measured as risk indicators of mortgage loans and consumer loans of the banking system.

Source: Central Bank of Chile and SBIF. Author's own calculation.

Changes in labor markets

Some recent trends observed in the labor market may also help to explain long term debt growth in Chile. These include higher female participation, which increases, all things equal, households' current and expected income, reducing overall household income volatility; and higher number of formal workers, which is an indicator of sustainable income. In addition,

⁸ Mortgage equity withdrawal is borrowing that is secured on the housing stock but not invested in it, so it represents additional funds available for reinvestment or to finance consumption.

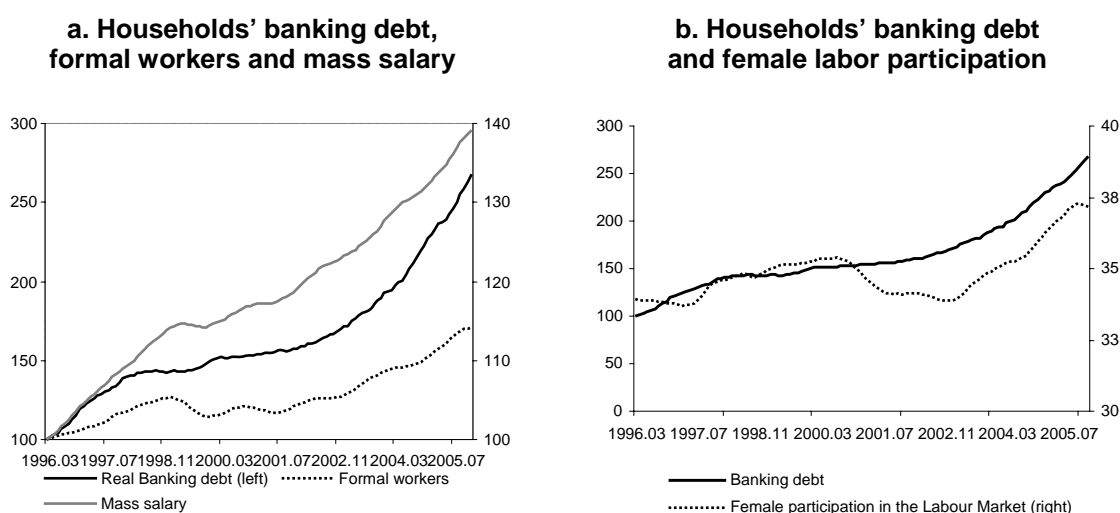
real mass salary, an aggregate measure of household income, has expanded significantly. Real mass salary summarizes information of labor productivity and population growth. As the population growth rate has been notoriously decreasing in the last decade, an expansion of mass salary indicates higher productivity. All trends improve households' access to and capacity of indebtedness in the credit market.

Total banking debt increased with the expansion of both formal workers and mass salary during the last decade (Figure 5.a). All variables remained stable during the economic downturn in 1999 and 2000, and then recovered when the economy found its growth path again. A similar trend is observed when comparing households' banking debt with the female participation in the labor market (Figure 5.b).

Figure 5

Households' banking debt and labor market

Index; March 96 = 100



Source: Central Bank of Chile.

III. Distribution of debt and assets among Chilean households

This section analyses the distribution of debt and assets according to income, age and employment vulnerability. All breakdowns have the purpose of shedding light on the relevance of the levels of debt, assessing how important they are for households' financial well-being and overall financial stability. The distribution of debts and assets according to income allows determining the ability to payback debts and hence, it helps to identify the households who are financially more vulnerable to change in macroeconomic and financial conditions. The distribution of debts and assets according to age of the household head indicates whether the household has a short or long horizon of planning and its profile of future income flows. Although a longer horizon implies higher levels income uncertainty, it also implies potentially increasing income profiles that would allow higher levels of indebtedness. The distribution of debts and assets according to employment vulnerability of the household head allows identifying over-indebtedness and default risks, being particularly useful for a financial stability assessment.

1. Data description and methodological issues

The most recent source of household financial data is the 2004 Social Protection Survey (EPS, for *Encuesta de Protección Social*), which includes for the first time a financial module in the 2004 wave. The survey was designed to assess the well being of workers and non-workers and their households. It accounts for 16,727 observations that represent the population of Chile aged 18 and more.

Although the EPS is not a financial survey, the financial module makes the dataset similar to those found in other countries.⁹ In the EPS the number of questions about debts and assets is limited, particularly relating to financial service burden. What is common to other surveys is the availability of demographic and labor information, household composition, incomes, and stock of debts and assets.

All information in the survey about debt and assets is self-reported. This implies that there is a potential bias to under-report debt and some assets (e.g., saving accounts, stock holdings), and to over-value some assets (e.g., value of real estate). Information on mortgages could be more accurate than information of the value of a property. For example, individuals know much better how much they must pay monthly and how many periods left they have than how much is the current market value of the property. Also, information on potential rent could be more accurate to indicate the value of a property. Thus, estimating the value of the rent could be much easier than estimating the market value of the property. We use both measures complementarily.

An aggregate measure of household income is required to carry out a quintile analysis. Obtaining such a measure is not straightforward as there are a number of difficulties. There could be non-reporting of some types of income and also under-reporting of some other types of income. The methodology used to aggregate household income is similar to that used by the *Encuesta de Caracterización Económica Nacional* (CASEN), which is the main survey designed for social policy making in Chile.¹⁰

Mortgage debt is calculated using an average interest rate, the monthly payment and the number of residual periods. Other debts include bank credit cards, bank credit lines, credit from department stores, bank consumer loans, finance institution consumer loans, vehicle loans, social institution loans, loans for education, and loans from other loaners (non-formal). For the sake of exposure, mortgage debt will be identified henceforth as “secured debt” and other types of debt will be classified as “unsecured debt.” Debts are reported as “amount of debt,” so there is no direct information on financial service burden.

Assets are separated into real estate and non-real estate. Real estate assets are those corresponding to the value of the housing properties (primary and secondary properties) reported by the interviewee and other members of the household. Non-real estate assets are financial assets, cars, and other assets. Financial assets comprise saving accounts in banks and pension institutions, fixed term deposits, stocks and bonds, investment funds, and others. “Cars” corresponds to the value of all motor vehicles owned by the household as reported by the interviewee. Other assets are capital assets such as machinery, land, livestock, and others.¹¹

⁹ See, for example, the Survey of Consumer Finances in the U.S., the Survey of Household Income and Wealth in Italy, and the Spanish Survey of Household Finances (EFF).

¹⁰ The methodology in this study differs in two aspects from CASEN: It does not make any correction for non reporting and it does not make any correction for under-reporting. The latter is common to the National Institute of Statistics.

¹¹ See Barceló (2006) and Bover (2004) for a review of the methodologies used for collecting financial data in households surveys applied to the 2002 Spanish Survey of Household Finances. See also Barceló and Bover (2006) for an insight of the use of this sort of data.

2. Debt and assets distribution across income quintiles

Distribution of debt

More than half of the Chilean households report some sort of debt. While only 16% of households report secured debt, 50% of households report unsecured debt (see Table 1). This indicates that there is wide access to credit, specially unsecured debt associated to consumer loans. Unsecured debt is particularly relevant at least for two reasons: First, it implies higher risks for the lender because there is less or no collateral for the loan. Second, it is mainly backed by future expected incomes, allowing for consumption smoothing over transitory income or needs shocks, being more volatile as requirements and use of debt are more linked to income/need shocks. Unsecured debt also mirrors financial deepening levels, indicating how able is the financial market to identify risks associated with individuals and to avoid problems of information asymmetries.

Table 1
Distribution of debt by income quintiles

Percentage

	Quintiles					Total
	I	II	III	IV	V	
<i>Total debt</i>						
% of households with debt	45	50	57	63	66	56
Share of debt	5	8	12	18	57	100
<i>Secured debt</i>						
% of households with debt	10	12	17	17	25	16
Share of secure debt	4	8	10	17	61	100
<i>Unsecured debt</i>						
% of households with debt	40	44	50	56	58	50
Share of unsecured debt	8	9	15	19	49	100

Source: Authors' own calculations based on EPS2004/05.

Although access to credit seems to be quite spread among population, richer households tend to use more debt. In fact, the richest quintile has 25% of households with secured debt, while quintiles I and II (the poorest) have only 10% and 12% of households, respectively. Quintiles IV and V have also above average proportion of households with unsecured debt. More than 55% of households in these quintiles hold unsecured debt, while the percentage of households in quintiles I and II is between 40% and 44%.

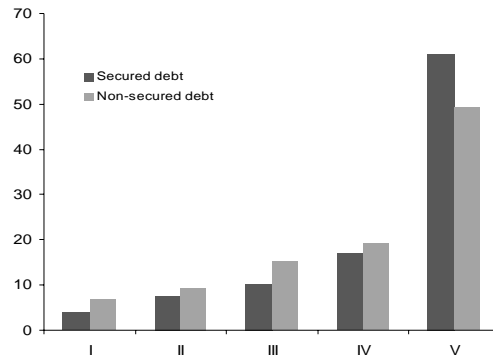
A large proportion of the debt corresponds to secured debt, indicating that the principal liability of households corresponds to housing. In fact, secured debt accounts for 64% of total debt, while unsecured debt accounts for 36%. This pattern is similar for all quintiles but quintile I, which has unsecured debt accounting for 52% of total debt.

Total debt is highly concentrated in the richest quintile, which holds 57% of the total amount of debt. In contrast, quintile I holds only 5% of total debt and quintiles III and IV have jointly 30% of total debt. Both secure and unsecured debt are mainly held by the richest quintile. Quintile V accounts for 61% of secured debt, while the poorest quintile holds a merely 3.9% of this debt. Also, the richest quintile has almost 50% of unsecured debt, and quintiles I and II jointly add up to no more than to 20% of unsecured debt (see Figure 6).

Figure 6

Distribution of debt

By total household income quintile as percentage



Source: Authors' own calculations using EPS 2004/05.

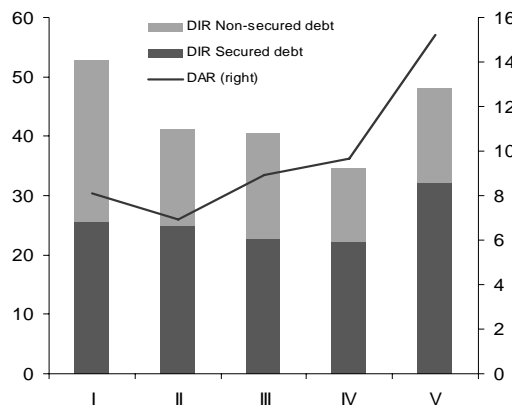
The concentration of secured debt in the richest households is highly correlated to the prices of properties they live in. Hence, low-income quintiles have a small amount of debt because they buy low-price properties. On the other hand, the concentration of unsecured debt is not particularly surprising because it follows the unequal distribution of income. Households request credit according to their income levels and are offered credit according to it.

The levels of household indebtedness are not particularly high when compared to income. Households who hold debt keep on average Debt to Income Ratio (DIR) of 43%. However, the median DIR is only 11%, indicating that half of all households have a particularly low DIR. The extreme quintiles have above average DIRs equal to 54% and 48%, respectively. Quintile IV looks like the least indebted one with a DIR of 38% (see Figure 7).

Figure 7

Debt to income ratio (DIR) and debt to asset ratio (DAR)

Percentage



Source: Authors' own calculations using EPS 2004/05.

Secure debt represents on average 26% of annual income. This is quite similar for all quintiles except for quintile V, which has a secured DIR of 32%. Unsecured debt is on average 18% of annual income. Only quintile I has above average levels, reaching 29%. Quintile IV is the least indebted one with DIR of 12%. Medians are quite low compared to

averages, indicating that there are some households with large ratios that bias upward the averages.

In sum, quintiles I and V appear to be the most indebted groups. While in aggregate terms quintile I is not particularly relevant since it holds a small share of debt, quintile V holds the majority of the debt. Nevertheless, only quintile I has a high debt to income ratio for unsecured debt.

Distribution of assets

More than 80% of households hold some sort of assets. The breakdown indicates that 77% of households in the poorest quintile report some asset holding, while more than 90% hold assets in the richest quintil (see Table 2). This is good news as assets can be used to back debts. Some of them could be liquefied in case of financial stress, implying less risk for the loan issuer. In fact, aggregate assets are 10 times aggregate debt.

Table 2
Distribution of assets by income quintiles
Percentage

	Quintiles					Total
	I	II	III	IV	V	
<i>Total assets</i>						
% of households with assets	77	82	83	87	92	84
Share of assets	10	13	14	20	43	100
<i>Real estate assets</i>						
% of households with assets	71	72	73	77	81	75
Share of real estate assets	11	13	15	21	40	100
<i>Non-real estate assets</i>						
% of households with assets	23	30	37	44	64	40
Share of non-real estate assets	7	7	9	15	61	100
<i>Financial assets</i>						
% of households with assets	14	18	20	22	31	21
Share of financial assets	4	5	5	12	73	100
<i>Cars and other assets</i>						
% of households with assets	11	15	22	29	52	26
Share of cars and other assets	7	8	10	16	58	100

Source: Authors' own calculations based on EPS2004/05.

The assets are also concentrated in the richest households, but less dramatically than debt. In fact, quintile V holds 43% of total assets, while quintiles III and IV add up jointly 35% of total assets. Quintiles I and II hold only 10% and 13%, respectively (see Figure 8).

Figure 8

Distribution of assets

By total household income quintile as percentage



Source: Authors' own calculations using EPS 2004/05.

When assets are broken down into real estate assets and non-real estate assets (financial assets plus cars and other assets) it is observed that above 70% of households report real estate asset holding in all quintiles. The relevance of real estate assets is reflected in the fact that the share of total assets is 88% (see Table 2). Non-real estate assets are a minor part of total assets even for the richest quintile (18% share). Breaking down further into financial assets and cars and other assets shows that financial assets are less than 3% of total assets. Even households in quintile V have a low share of financial assets (4.4%). These results may be due mainly to the fact that this is not a financial survey and hence does not make a particular effort in collecting appropriately financial data.¹²

The concentration of non-real estate assets is much more pronounced than that of real estate assets. While quintile V holds 61% of non-real estate assets, quintiles III and IV add up jointly to only 25%. The distribution of financial assets is even more concentrated since quintile V concentrates 74% of total financial assets (quintiles I, II and III only hold 14% of total financial assets). Cars and other assets are also rather concentrated in the richest quintile, where quintile V holds 58% of total cars and other assets. Non-real estate assets, particularly financial assets, are easier to liquidate than real estate assets, making them easily available to payback debts under financial stress.

In sum, the distribution of assets is not as concentrated as that of debt because it is driven by real estate assets, which are distributed more evenly than debt.¹³ This is reflected in the Lorenz curves, which show that debt distribution is more unequal than asset distribution and even more than income distribution (Figure 9). Two aspects must be underlined. First, the concentration of assets indicates an important backing to the concentration of debt, although a household-by-household analysis is required to determine household over indebtedness. Second, there is a low percentage of financial assets holding, that may be due to non-reporting problems in the survey.

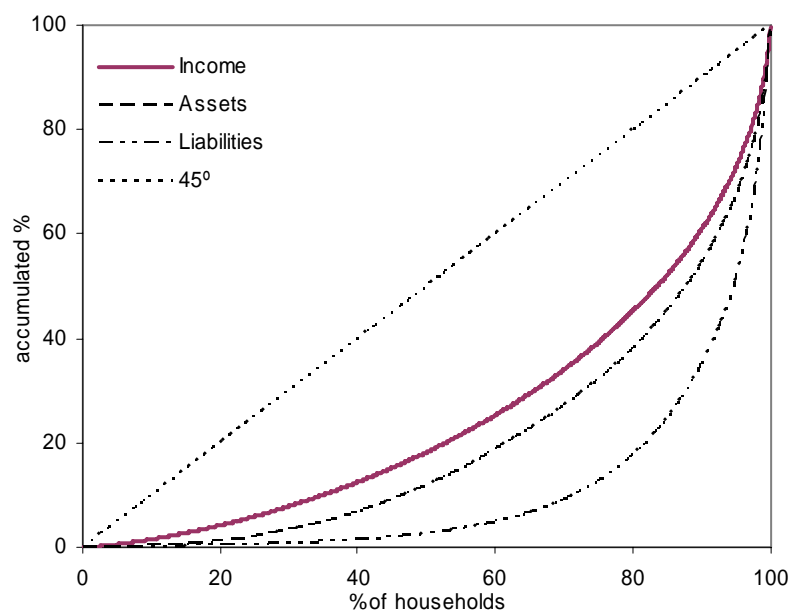
¹² "Proper financial surveys" even over sample richer households assuming they hold the majority of financial assets.

¹³ The high rates observed could be explained by the various housing policies implemented by the Chilean government. In the case of Chile, the results of the 2003 Casen survey indicate that 43.3% of the households that own the home in which they live have benefited from one of the State housing programs.

Figure 9

Distribution of households' incomes, assets and liabilities

Lorenz curve; percentage



Source: Authors' own calculations using EPS 2004/05.

3. Debt and assets along the life-cycle

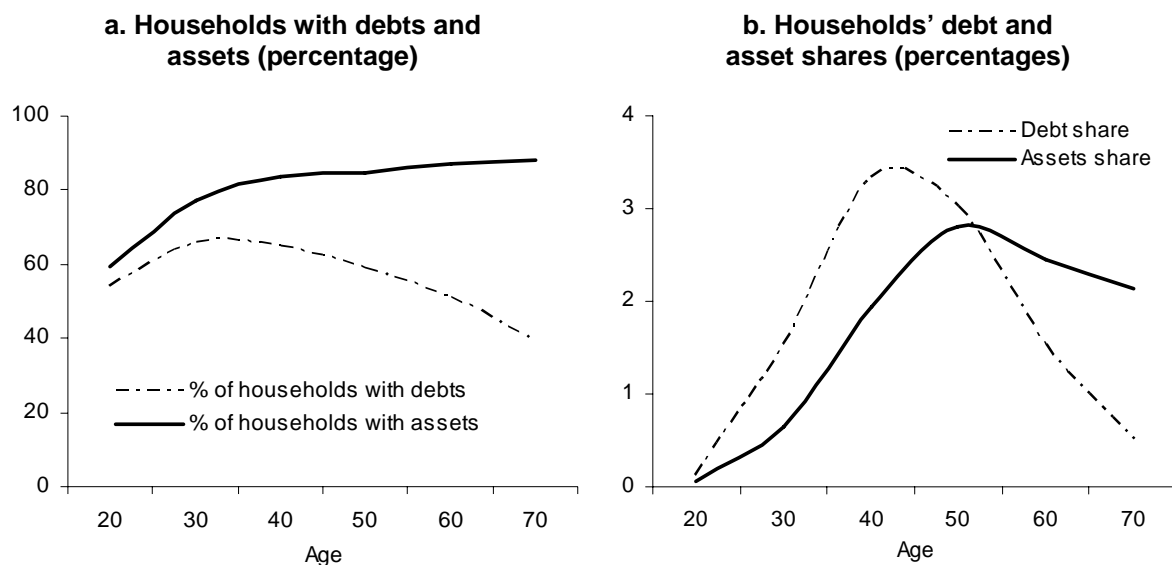
Along the life-cycle individuals have different income profiles and different spending requirements. In the context of the life-cycle, if individuals were able to borrow against their future income flows they would be borrowers at the beginning of the cycle, savers in the middle of the cycle, and dis-savers at end of the cycle. Hypothesis testing is beyond the scope of this article; nevertheless the life-cycle hypothesis is a useful framework. If future expected income is higher than current income, and if consumption desire is higher than current income, unconstrained individuals would be willing to borrow. This is the demand side. On the supply side, higher future expected income would increase repayment ability and hence more credit would be available for a younger individual. From a financial stability point of view, individuals with longer labor horizon would be able to sustain a larger burden and then would be more likely to honor their financial commitments.

Distribution of debt

The distribution of debt among different age cohorts indicates that younger households are more likely to be running a debt. While 56% on average report to have some sort of debt, above 60% of households with head in young to middle age brackets (aged 25-34, 35-44, and 45-54) have debt (Figure 10 and Table A2). Youngest and elderly households have below average debt reporting (18-24 have 54% and 65+ have 39%).

Households aged 35-44 and 45-44 hold the vast majority of the debt (33% and 30% respectively). Very young and elderly households only add up to 6% of total debt. Secured debt reporting is concentrated in young and mature households (25-54 hold a share that adds up to 83%, Table A2). Unsecured debt shows a different pattern. There is an evenly distributed profile debt reporting (at least 37% for all age groups). The share of debt is concentrated in households aged 35-64 (they add up to 79% of unsecured debt).

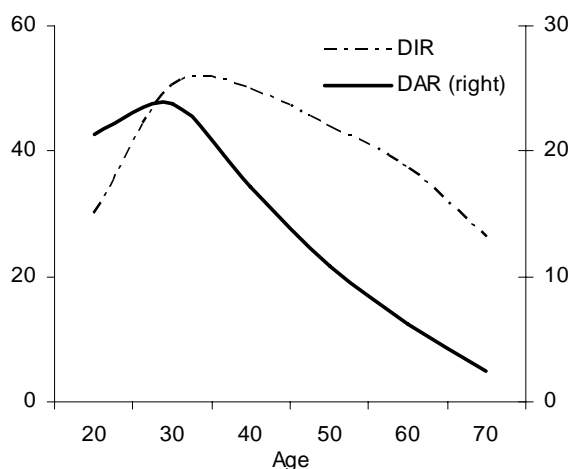
Figure 10
Debt and assets by age



Source: Authors' own calculations using EPS 2004/05.

Debt over income ratios vary significantly over age cohorts (Figure 11). Young to middle age cohorts present the higher DIR (above 44%). Secure debt DIRs are much larger for those aged 25-34 and 35-44 (36% and 34% respectively, Table A3). This is consistent with relatively young households running large mortgage debts. Unsecured debt DIR, however, shows a flat pattern over age cohorts, where older cohorts tend to have slightly larger ratios. It is worth noting that those older households may have less secured debt over income ratio at the same time (fifth row in Table A3).

Figure 11
Debt to income ratio (DIR) and
Debt to assets ratio (DAR) by age
Percentage



Source: Authors' own calculations using EPS 2004/05.

Total debt to income ratios are similar to those obtained with aggregate data (see section II). None of the cohorts have particularly high levels of DIR. While high levels of secured debt to income ratio are concentrated in young to middle individuals, high levels of unsecured debt to income ratios are concentrated in mature individuals. Whether these results obey demand or supply effects is a question that goes beyond the scope of this paper.

Distribution of assets

Only very young cohorts have below average assets reporting. Asset value holding is highly concentrated in mature and elderly households, where 93% of assets are held by households aged 35 and over (see Figure 10). Real estate assets are mainly present for cohorts older than 35, where at least 70% have real estate assets (Table A4). On the contrary, non-real estate assets are reported evenly among households of all ages. However, young households (aged 18-34) have a share of only 7% of the value of non-real estate assets.

The pattern of non-real estate assets is fairly similar for financial assets and cars and other assets. There is a similar proportion of households in all age cohorts that report having financial assets (21% on average), although younger households tend to be more likely to have assets. Only 5% of households aged 18-24 have cars and other assets, but for those aged 25 and above, at least 20% of households report holding those assets. Financial assets are mainly concentrated in groups aged 35-55, presumably because of accumulation towards buying real estate (Table A4).

Then, the overall picture is that assets are held by all age groups, according to what is expected in the life-cycle. More importantly from financial stability perspective, assets are available to back debts in all age groups.

4. Debt, assets and employment vulnerability

As stated above, employment vulnerability is crucial to determine default risks and hence over-indebtedness. Households' income is mainly composed by labor income, therefore the importance to assess vulnerability by a dimension that covers labor income uncertainty. Three dimensions were chosen to break down households: employment status, education, and formal status of the job.

Consequently, households were classified according to the characteristics of the household head: the first break down was between workers and non-workers. Worker household heads were classified according to their education into secondary education (complete and incomplete), and tertiary education (university education, technicians and other professionals). In addition, all sub-groups were divided according to employment contract (with and without employment contract). Categories of workers are ordered according to what should be higher to lower employment vulnerability.

Distribution of debt

There is a high correlation between employment vulnerability and household' total per capita income, which implies that this breakdown is useful in many dimensions: Human capital, employment quality, and job market performance.

It is worth noticing that only 13% of household heads have tertiary education. Also, non-worker household heads, including pensioners, are 23%. Household heads workers with incomplete secondary education are 42% (see Figure 13). Then, debt shares must be considered according to population shares of the groups.

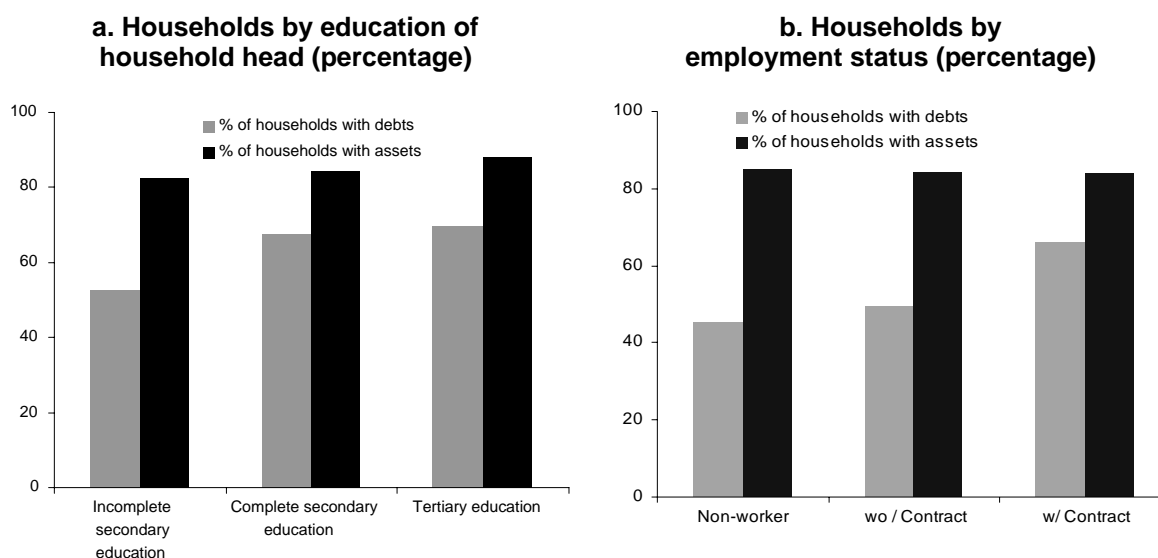
Noticeable, there is a large proportion of households with debts among those with higher education and/or employment contracts (above 60%), while the rest have below 45%. The

supply effect of access to credit market seems to be strong for employment contract as those workers with a formal job contract and complete secondary education or tertiary education exhibit the largest proportion of households with debt (71%, see Table A5).

The share of total debt held by households with tertiary education and employment contract is 33% (Figure 13), following the debt concentration reported in previous sections. Meanwhile, 20% of the debt is held by households with complete secondary education and job contract.

Figure 12

Debt and assets holding by employment vulnerability



Source: Authors' own calculations using EPS 2004/05.

The proportion of households with secure debt is lower for non-workers and incomplete secondary education without employment contract. Non-workers include pensioners who are more likely to own completely the property they live in, while incomplete secondary education workers are less likely to obtain a mortgage loan. Households with complete secondary education and with employment contract or with tertiary education hold jointly a share of 66% of secure debt (Table A5).

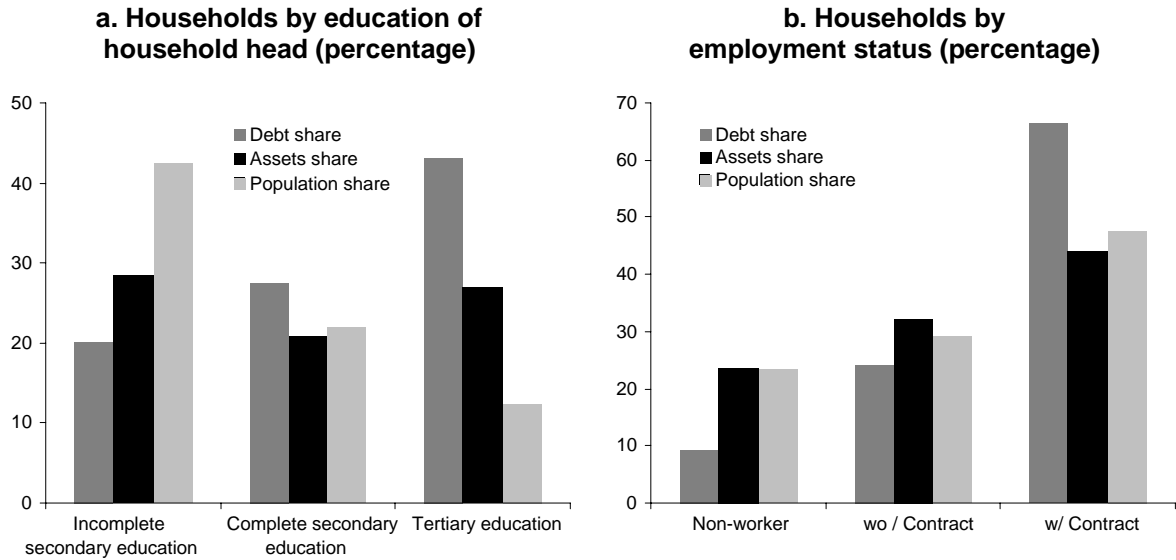
In parallel, the proportion of households with unsecured debt varies significantly among different groups. A share of 47% of unsecured debt is held by households with complete secondary education with contract or with tertiary education. However, non-workers hold 14% of unsecured debt and those with incomplete secondary education add up to 23% of unsecured debt.

Indebtedness also varies significantly among groups. While debt over income ratios is 31% for incomplete secondary education without employment contract, it is 66% for tertiary education with employment contract (see Figure 14 and Table A6). This indicates that households with less employment vulnerability are those with higher levels of indebtedness of any type. The picture of less employment vulnerable households holding larger levels of debt is repeated when breaking down into secured debt and unsecured debt.

Then, households with less employment vulnerability hold the major fraction of both secured and unsecured debt. This implies that there is no clear reason so far to consider that there is an important amount of debt "in the wrong hands".

Figure 13

Debt and assets shares by employment vulnerability



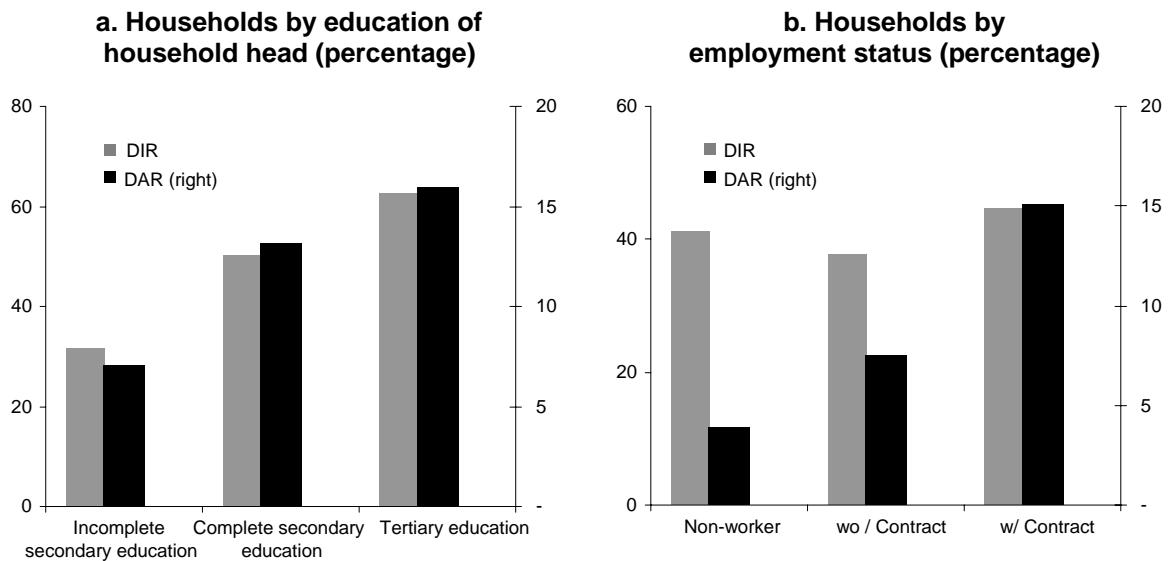
Source: Authors' own calculations using EPS 2004/05.

Distribution of assets

All groups have similar asset ownership proportion (between 82% and 91%, see Figure 12). In terms of the share of assets, it is much more equally distributed than debt, so that all groups share of total assets are according to their population shares.

Figure 14

Debt to income ratio and debt to assets ratio by employment vulnerability



Source: Authors' own calculations using EPS 2004/05.

Real estate assets are owned by more than 72% of households in all groups, exhibiting proportional real estate assets share (Table A7). A different situation is observed for non-real estate assets, where the proportion of households that have non-real estate assets varies from 30% for non-workers to 73% for tertiary educated with contract.

There is a large concentration of financial assets (43%) in households with tertiary education and employment contract. Also, those households with tertiary education without job contract, being only 3% of population, hold 17% of cars and other assets. This could be explained by self-employment linked to transport and micro and small enterprises.

IV. Households' net worth

Net worth determines whether assets held by the households cover their debts, and consequently, it allows assessing their financial strength. In normal times (without sudden price changes), mortgage debt is balanced by the value of the property. Debts associated with the purchase of cars, machinery and other vehicles may be guaranteed by the value of these assets. Therefore, negative net worth is generally originated by consumer debt that has limited or no guarantees. In this section, we measure the net worth of each household and characterize the households with negative worth in terms of income, age, and employment vulnerability of the household head.

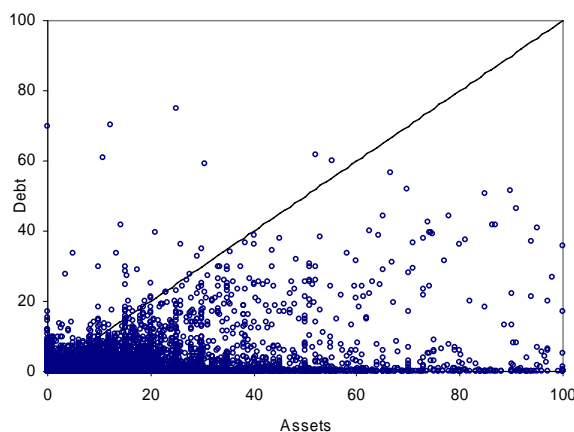
1. Net worth across quintiles

The vast majority of the households have positive net worth. This can be seen in Figure 12, where liabilities of each household are plotted against their assets. The figure shows that 80% of the households have more assets than liabilities (debt-asset combination lie below the 45° line). Observe also that 9% of households are gathered in the origin, indicating that they had no assets or liabilities. Only 11% of households have negative net. In other words, there is a low proportion of households that has not enough assets backing their debts, and therefore, are in a weak financial position. In most cases these households had comparatively little debt and little if any assets to draw upon, so these negative net worth households typically lie close to the origin of Figure 15.

Figure 15

Households' assets and debts

Millions of Chilean Pesos



Source: Authors' own calculations using EPS 2004/05.

Households with negative net worth hold 18% of total debt. However, as the majority of households in Chile own real estate, only 12% of the secured debt is in hands of households with negative wealth. Thus, these negative net worth households were almost exclusively renters whose unsecured debts (27% of total unsecured debt) exceeded the value of any financial assets they held.

The picture within quintiles is rather similar. At least 75% of households have positive net worth in all quintiles and no more than 12% of households have negative net worth in all quintiles (see Table 3). These results are due to three facts. First, total debt is only 10% of aggregate total assets (5% for quintile I and 13% for quintile V). Second, most of the debt is secured debt, which implies that the value of the property owned by the households acts as a guarantee. Third, a significant proportion of households hold non-real estate assets (cars for example).

Table 3
Distribution of net worth by quintiles

Percentage

	Quintiles					Total
	I	II	III	IV	V	
<i>% of households</i>						
Net worth > 0	75	77	79	84	88	80
Net worth = 0	13	11	9	7	5	9
Net worth < 0	12	12	12	9	8	11
<i>Debt of households with NW < 0</i>						
<i>Share of debt</i>						
Total debt	1	2	3	4	7	18
Secured debt	1	2	2	3	5	12
Unsecured debt	3	4	6	4	11	27
<i>Debt over income ratio (DIR)</i>						
Total debt	57	50	62	48	72	57
Secured debt	16	24	22	30	34	24
Unsecured debt	41	26	40	19	38	33

Source: Authors' own calculations based on EPS2004/05.

2. Net worth and the life-cycle

There are sizable differences in the proportion of households with negative net worth among different age groups. Young groups tend to be more likely to have negative net worth. More than 20% of those aged 18-34 and 13% of those aged 35-44 have negative net worth compared to an average of 9% (see Table 4). From a life-cycle perspective this was expected, since young households do not accumulate assets and try to smooth consumption over their lifespan. The good news comes from the fact that few mature or elderly households have negative net worth.

Households with negative net worth hold a small amount of total debt for all age groups. However, 27% of unsecured debt is held by households with negative net worth. Comparing the amount of the debts to their incomes, the most indebted households are the middle to

mature aged groups: those aged 35-44, 45-54 and 55-64, present DIR indexes of 54%, 82% and 52% respectively (see lower pane of Table 4).

Table 4
Distribution of net worth by age

Percentage

	Age groups						Total
	18-24	25-34	35-44	45-54	55-64	65+	
% of households in group	2	12	24	27	19	16	100
<i>% of households</i>							
Net worth > 0	53	68	79	81	85	87	80
Net worth = 0	22	12	8	9	8	8	9
Net worth < 0	25	20	13	10	7	5	11
<i>Debt of households with NW < 0</i>							
Share of debt							
Total debt	1	3	6	6	2	1	18
Secured debt	0	2	4	4	1	0	12
Unsecured debt	1	4	9	8	3	2	27
Debt over income ratio (DIR)							
Total debt	38	43	54	85	52	33	57
Secured debt	15	21	25	37	15	5	24
Unsecured debt	23	22	29	48	37	29	33

Source: Authors' own calculations based on EPS2004/05.

3. Net worth and employment vulnerability

The households who have above average negative net worth are relatively less vulnerable. We observe that 13% of households whose household head has incomplete secondary education with employment contract have negative net worth. Also, 15% of households with complete secondary education with employment contract and 13% of households with tertiary education with employment contract have negative net worth (see Table 5). Those groups with negative net worth that hold the largest share of debt are those with relatively less employment vulnerability, namely complete secondary education with and without employment contract, end tertiary education with and without employment contract.

The DIR of those households with negative net worth is only above average for three groups: Those with complete secondary education without employment contract, 61%, and with employment contract, 59%, and those with tertiary education with employment contract 117%. The latter group is the one that causes concern in terms of indebtedness. However, almost half of their debt corresponds to secured debt.

V. Debt service and vulnerability

Debt service payment is a key element of households' financial vulnerability analysis. Although the amount of debt determines the level of indebtedness of the households, it is the debt service payment what eventually may induce a household to default its financial

obligations. Certainly, it is the ratio of debt servicing cost over income what determines the ability of the household to fulfil its commitments.

Aggregate measures of debt service over income are used in financial stability analysis, although micro data indicators have replaced them progressively. In this section we first explain the estimation procedure of debt service burden and then we analyse household vulnerability from a financial stress point of view.

Table 5
Distribution of net worth by
employment vulnerability

Percentage

	Non-worker	Age groups				Tertiary Education		Total
		Secondary Education		Complete		wo/contract	w/contract	
		wo/contract	w/contract	wo/contract	w/contract			
%of Households in group	23	20	23	7	15	3	10	100
<i>% of Households</i>								
Net worth > 0	83	80	78	82	77	89	81	80
Net worth = 0	9	12	9	8	7	5	7	9
Net worth < 0	8	8	13	10	15	6	13	11
<i>Debt of Households with NW < 0</i>								
Share of Debt								
Total Debt	2	1	2	1	4	0	7	18
Secured Debt	1	1	1	1	3	0	5	12
Unsecured Debt	4	1	4	1	6	1	10	27
Debt over income ratio (DIR)								
Total Debt	52	38	39	59	61	57	117	57
Secured Debt	15	20	13	32	31	0	55	24
Unsecured Debt	37	18	27	27	31	57	62	33

Source: Authors' own calculations based on EPS2004/05.

1. Estimating debt service burden

The data required to compute accurately debt service is rarely available, even with financial surveys. Consequently, a series of assumptions must be made in order to obtain estimations of debt service. In our case, information on debt service burden is more accurate for mortgages, and less reliable for other types of debt. In fact, we have to make assumptions on the residual number of periods for each type of debt and on the interest rates effectively charged to each individual for each type of debt. Thus, we use average residual periods and average interest rates for each type of debt obtained from aggregate data. However, using average residual periods could overestimate actual residual periods for households that are ending the repayment of their loans, while it could underestimate actual residual periods for households that are just starting to repay their loans. We assessed this problem by computing residual periods for each household assuming a uniform distribution of type of debt within each of twenty equally large income groups.

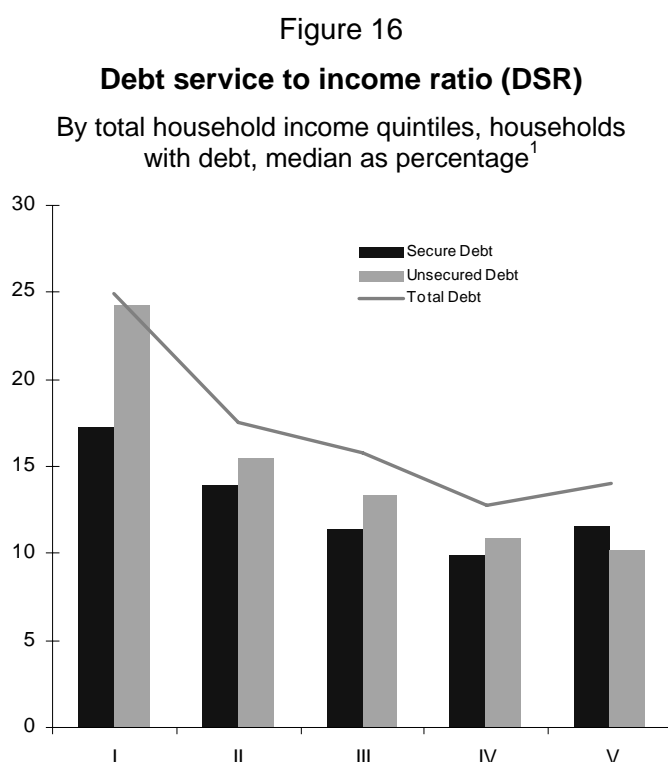
With nominal interest rates and residual periods for each type of debt in hand, the estimation of debt service for each type of debt d is simply:

$$ds_d = \frac{d_d}{\sum_{k=0}^{rp_d} \frac{1}{(1+r_d)^k}},$$

where ds_d is the monthly debt service payment, d_d is the total amount of debt d , r_d is the interest rate associated with debt d , and rp_d is the residual period corresponding debt type d for each household.

2. Households under financial stress

Our estimates show that the median debt service to income ratio (DSR) is 16% considering all indebted households.^{14,15} The richest households (IV and V) register DSRs lower than the overall median (13% and 14% respectively); while low income households (quintiles I and II) present DSRs between 25% and 18% (Figure 16). Given that there is a large concentration of debt in the richest quintiles, in particular in quintile V, a lower DSR for those households represents good news for the financial vulnerability assessment.



¹ Median secured debt DSR is computed only for those households who hold secured debt. Unsecured debt is computed similarly.

Source: Authors' own calculations using EPS 2004/05.

A deeper analysis of financial burden and households' vulnerability implies reviewing levels of DSR and corresponding debt shares. Table 6 presents different DSR percentiles and their associated debt shares. Three quarters of the households exhibit DSR lower than 31%. One in ten households presents DSR above 57%. This group might be considered as highly vulnerable. Notwithstanding this group holds only 13% of secured debt, they hold a large share of unsecured debt that reaches 40%.

¹⁴ This figure compares to 14% in the US, while three quarters of households in the UK have DSR below 25%, and Spain has a median DSR of 18% considering only mortgages.

¹⁵ Table A8 contains interest rates and terms used to estimate debt service.

In the case that these households are not able to fulfil their financial obligations, they may liquidate their assets, hence the relevance of their net worth situation. Table 13 indicates that households with DSR above 50% and negative net worth are only 4% of debtor households. Moreover, these households hold 9% of total debt, and consequently they do not represent a systemic menace to financial stability.

Table 6
Estimated debt service to income ratio (DSR)

Percentage

Percentiles	Upper DSR	Share of secured debt	Share of unsecured debt	Share of total debt
0-50	16	27	16	23
50-75	31	32	18	27
75-90	57	29	26	28
90-99	90	13	40	21

Source: Authors' own calculations based on EPS2004/05.

Table 7
Net wealth of households with debt service to income ratio (DSR) > 80

Percentage

Net wealth	Share of households	Share of secured debt	Share of unsecured debt	Share of total debt
NW > 0	8.2	10	28	16
NW < 0	3.8	6	17	9
Total	12.1	15	45	25

Source: Authors' own calculations based on EPS2004/05.

Vulnerability is also implied by the sensitivity to DSR to shocks. Households may be at risk of default if they suffer from negative income and interest rate shocks. The former is particularly important in the vulnerability assessment of Chilean households because of the lack of a strong social protection of workers. The latter is less relevant since the vast majority of loans is subscribed at fixed rates (or bounded variable rates). This analysis requires a deeper knowledge of unemployment and its duration, which goes beyond the scope of this paper, so it will be addressed in future research.

VI. Concluding remarks

The analysis based on individual household is essential to assess the degree of indebtedness and consequently vulnerability of the household sector before negative

changes in macroeconomic and financial conditions. This paper helps to discover the possible financial weaknesses of the household sector. The analysis, for the first time in Chile, studies the distribution of debts and assets, relating them to households' characteristics such as income, age, education, and employment vulnerability.

The analysis of the survey shows that households with higher income also concentrate a large proportion of debts and assets. These richest households are young adults with higher education and with employment contracts. This indicates that the debts are mainly concentrated in hands of households with high current income and high expected future income.

The most financially vulnerable households - with negative net worth and debt service burden relatively high - represent only 4% of total households and hold 9% of total debt. This evidence suggests that the majority of Chilean households enjoy enough financial strength to service their debts. Only a small proportion of the household sector has high levels of indebtedness and negative net worth, and hence, they are financially vulnerable. However, the exposed amount of debt is negligible. Thus, the household sector does not represent a source of systemic risk for the financial system.

Appendix

As stated in section III, an aggregate measure of household income is required to carry out an analysis based on income quintiles. Obtaining aggregate income within the household is not straightforward as there are a number of difficulties. In spite of adding up all types of income from all household members, two main problems are common to household surveys and may or may not be addressed: there could be non-reporting of some types of income and also under-reporting of some other types of income. The methodology used to aggregate household income is similar to that used by the *Encuesta de Caracterización Económica Nacional* (CASEN), which is the main survey designed for policy making in Chile, and carried out by the Ministry of Planning. The method consists in adding up all monetary incomes from household members, plus monetary subsidies, plus imputed rent. However, the methodology used in this paper differs in two-aspects from CASEN. First, it does not make any correction for non-reporting; and second, it does not make any correction for under-reporting. The former might be addressed in a future version of this work. The latter is the most controversial point in data correction in CASEN, to an extent that the *Instituto Nacional de Estadísticas* (INE, National Institute of Statistics) has abandoned that scheme.

After adding up all earnings from all household members a measure of aggregate income or total income is obtained. However, there is a proportion of households that reports total income equal to zero. This may be the result of households' members non-reporting their incomes. In order to avoid problems of miss-representation of the income distribution, only households with total income larger than zero were considered. Nevertheless, the overall distribution of income obtained matches the distribution obtained by CASEN 2003.

Table A1

Debt to income ratio (DIR)

By income quintiles, percentage

		Quintiles					Total
		I	II	III	IV	V	
Total Debt	Mean	54	41	40	35	48	43
	Median	13	8	9	8	19	11
Secured Debt	Mean	26	25	23	22	32	26
	Median	0	0	0	0	0	0
Unsecured Debt	Mean	29	16	18	12	16	18
	Median	7	4	4	3	4	4

Source: Authors' own calculations based on EPS2004/05.

Table A2

Distribution of debt by age

Percentage

	Age groups						Total
	18-24	25-34	35-44	45-54	55-64	65+	
%of Households	2	12	24	27	19	16	100
<i>Total Debt</i>							
% of Households with debt	54	66	65	59	51	39	56
Share of debt	1	15	33	30	15	5	100
<i>Secured Debt</i>							
% of Households with debt	9	20	24	19	11	3	16
Share of Secure Debt	1	18	36	30	13	3	100
<i>Unsecured Debt</i>							
% of Households with debt	50	60	55	51	46	37	50
Share of Unsecured debt	1	10	29	31	20	9	100

Source: Authors' own calculations based on EPS2004/05.

Table A3
Debt to income ratio (DIR)

By age, percentage

		Age groups						Total
		18-24	25-34	35-44	45-54	55-64	65+	
Total Debt	Mean	30	51	50	44	37	26	43
	Median	10	14	16	10	8	7	11
Secured Debt	Mean	15	36	34	25	18	9	26
	Median	0	0	0	0	0	0	0
Unsecured Debt	Mean	15	15	16	19	19	17	18
	Median	7	5	4	3	4	5	4

Source: Authors' own calculations based on EPS2004/05.

Table A4
Distribution of assets by age

Percentage

		Age groups						Total
		18-24	25-34	35-44	45-54	55-64	65+	
%of Households		2	12	24	27	19	16	100
<i>Total Assets</i>								
% of Households with Assets		60	77	84	85	87	88	84
Share of Assets		0	6	19	28	24	21	100
<i>Real Estate Assets</i>								
% of Households with Assets		40	54	72	78	82	84	75
Share of Real Estate Assets		0	6	19	28	24	22	100
<i>Non-Real Estate Assets</i>								
% of Households with Assets		31	49	42	38	39	32	40
Share of Non-Real Estate Assets		0	7	26	26	27	14	100
<i>Financial Assets</i>								
% of Households with Assets		29	32	22	19	19	16	21
Share of Financial Assets		0	9	29	27	21	15	100
<i>Cars and Other Assets</i>								
% of Households with Assets		5	26	28	27	27	20	26
Share of Cars and Other Assets		0	7	25	26	28	14	100

Source: Authors' own calculations based on EPS2004/05.

Table A5
Distribution of debt by employment vulnerability
 Percentage

	Non-worker	Age groups				Tertiary Education		Total
		Secondary Education		Complete		wo/contract	w/contract	
		Incomplete		wo/contract	w/contract			
		wo/contract	w/contract	wo/contract	w/contract			
% of Households	23	20	23	7	15	3	10	100
<i>Total Debt</i>								
% of Households with debt	45	44	61	60	71	65	71	56
Share of debt	9	7	13	8	20	9	34	100
<i>Secured Debt</i>								
% of Households with debt	7	11	16	22	25	21	28	16
Share of Secure Debt	7	7	12	8	20	9	37	100
<i>Unsecured Debt</i>								
% of Households with debt	42	37	54	49	62	55	64	50
Share of Unsecured debt	14	8	15	7	20	9	27	100

Source: Authors' own calculations based on EPS2004/05.

Table A6
Debt to income ratio (DIR)
 By employment vulnerability, percentage

	Non-worker	Age groups				Tertiary Education		Total
		Secondary Education		Complete		wo/contract	w/contract	
		Incomplete		wo/contract	w/contract			
		wo/contract	w/contract	wo/contract	w/contract			
<i>Total Debt</i>								
Mean	41	31	32	52	50	51	66	43
Median	7	9	9	15	16	17	24	11
<i>Secured Debt</i>								
Mean	18	18	18	36	32	30	44	26
Median	0	0	0	0	0	0	0	0
<i>Unsecured Debt</i>								
Mean	23	13	14	15	18	21	22	18
Median	5	4	4	3	5	6	5	4

Source: Authors' own calculations based on EPS2004/05.

Table A7

Distribution of assets by employment vulnerability

Percentage

	Age groups						Total	
	Non-worker	Secondary Education		Tertiary Education				
		Incomplete wo/contract	Complete w/contract	wo/contract	w/contract			
% of Households	23	20	23	7	15	3	10	100
<i>Total Assets</i>								
% of Households with Assets	85	83	82	86	84	91	87	84
Share of Assets	24	15	14	8	13	9	18	100
<i>Real Estate Assets</i>								
% of Households with Assets	80	74	74	74	72	77	72	75
Share of Real Estate Assets	25	14	14	8	13	8	17	100
<i>Non-Real Estate Assets</i>								
% of Households with Assets	30	37	32	50	43	73	64	40
Share of Non-Real Estate Assets	13	19	8	9	10	15	26	100
<i>Financial Assets</i>								
% of Households with Assets	17	17	21	20	24	29	33	21
Share of Financial Assets	16	7	9	7	9	9	43	100
<i>Cars and Other Assets</i>								
% of Households with Assets	17	26	16	38	27	63	51	26
Share of Cars and Other Assets	13	22	8	10	10	17	21	100

Source: Authors' own calculations based on EPS2004/05.

Table A8

Interest rates and residual periods

Nominal interest rates and average residual periods,
November 2004 to February 2005

Type of debt in EPS	Annual interest rate (December 2004)	Residual period (in months)
Bank credit cards	34%	6
Bank overdrafts	19%	3
Department stores loans (less than 90 days) *	37%	1.5
Department stores loans (90 days to 1 year) *	37%	7.6
Department stores loans (less than 90 days) *	37%	18
Bank consumption loans (less than 1 year) **	34%	6
Bank consumption loans (more than 1 year) **	16%	42
Finance company consumption loans	37%	6
Motorvehicle loans	33%	52.8
Social credit	16%	48
Educational loans	5%	96
Relative or friends loans	0%	6
Shark loans	75%	6
Other debts	75%	6

(*) Department stores are 62% less than 90 days, 27% between 90 days and 1 year, and 11% more than 1 year.

(**) Bank consumption loans are 19% less than 1 year and 81% more than 1 year.

Source: Central Bank of Chile and SBIF.

References

- Barceló, Cristina (2006): "Imputation of the 2002 Wave of the Spanish Survey of Household Finances (EFF)," Bank of Spain, Research Paper No. OP-0603.
- Barceló, Cristina and Olympia Bover (2006): "Lessons from the Spanish Survey of Household Finances," Bank of Spain, unpublished manuscript.
- Barwell, Richard, Orla May and Silvia Pezzini (2006): "The distribution of assets, income and liabilities across UK households: results from the 2005 NMG Research survey," *Bank of England Quarterly Bulletin*, Spring, pp. 35-44.
- Bover, Olympia (2004): "The Spanish Survey of Household Finances (EFF): Description and Methods of the 2002 Wave," Bank of Spain, Research Paper No. OP-0409.
- Bucks, Brian, Arthur Kennickell, and Kevin Moore (2006): "Recent Changes in U.S. Family Finances: Evidence from the 2001 and 2004 Survey of Consumer Finances," U.S. Federal Reserve Bulletin.
- Cox, Paulo, and Eric Parrado (2006): "Evolution of Housing Prices in Chile," Working Paper, Central Bank of Chile.
- Debelle, Guy (2004): "Macroeconomic implications of rising household debt," BIS Working Paper No. 153.
- Djankov, Simeon, Caralee McLiesh, and Andrei Shleifer (2007): "Private Credit in 129 Countries," forthcoming in *Journal of Financial Economics*.
- Johansson, Martin and Mattias Persson (2006): "Swedish Household's Indebtedness and Ability to Pay - A Household Level Study," Sveriges Riksbank, unpublished manuscript.
- May, Orla, Merxe Tudela, and Garry Young (2004): "British household indebtedness and financial stress: a household-level picture," *Bank of England Quarterly Bulletin*, Winter, pp. 414-28.
- Tudela, Merxe and Garry Young (2003): "The distribution of unsecured debt in the United Kingdom: survey evidence," *Bank of England Quarterly Bulletin*, Winter, pp. 417-27.