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Emparejamiento de datos provenientes de Registros Administrativos y Encuesta de Hogares en Chile

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Matching Administrative Records and Household Surveys in Chile*

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Resumen

Este documento desarrolla una metodología que permite combinar información proveniente de registros administrativos con encuestas de hogares. Este método nos permite preservar la información individual proveniente del registro de impuestos, junto a ingresos informales y tamaño real de los hogares acorde a cómo se informa en las encuestas, a la vez de mantener registros oficiales de matrimonio y relaciones filiales. Los resultados preliminares son diferentes a los que se obtienen usando las encuestas como fuente de información principal de ingresos. Además, este método servirá a futuro como base para el cálculo de las cuentas distributivas de los hogares en Chile.

Abstract

This paper develops a novel methodology to combine administrative records and household surveys using Optimal Transport. This allows us to preserve all information from individual tax records, bringing in informal income and capturing the real size of households (as reported in surveys) while preserving official marriage and filial relationships. The preliminary results are different from those obtained using only surveys as the main source of income information and this method will provide the basis to measure Household Distributional Accounts for Chile in the future.

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1 Introduction

Distributional series continues to be a matter of concern for policy makers and the public, and in recent years many Central Banks have incorporated this dimension of heterogeneity into their analysis. Many studies explore how monetary policy affects and is affected by income distribution (e.g. Kaplan, Moll and Violante (2018), Auclert (2019)). In addition, it is key to provide a coherent framework that enables the precise measurement of disparities and economic growth. This is especially challenging as the micro-data sources traditionally used for distributional income estimates have different concepts, coverage and biases. For example, survey data usually suffer from measurement errors, particularly the top of the distribution, whereas administrative data sources may not capture the full population (e.g., due to the use of thresholds) and may lack information on specific items.

In order to overcome some of these challenges, different initiatives have been developed to create distributional measures for some variables that are in line with national accounts' totals. The OECD-Eurostat Expert Group on Disparities in a National Accounts' framework (EG DNA) and World Inequality Lab (WIL DINA) are two of the main efforts to achieve internationally comparable measurement methodologies. Both methodologies highlight the importance of the micro-data source or sources used to achieve this. When multiple sources are used it is critical to combine them consistently and taking advantage of each data's specific attributes. This paper provides a novel methodology to combine multiple data sets, providing the basis for future estimates for the Household Distributional Accounts of Chile.

The main focus of this paper is to match tax records with household surveys at individual level using *'Optimal Transport'* to add key information missing from administrative records. The household survey used to complement the administrative records in this exercise corresponds to the main socioeconomic characterization survey in Chile (CASEN) and a novel aspect of this paper is that we are able to replicate the population's household size distribution (including non-relatives) while preserving information on marital and filial relationships from the Chilean Civil Registry. Preliminary income estimates

obtained with this method differs from those using surveys as the main data source and this work may be useful for other studies and institutions with similar information.

The data generated will provide information on the dynamics of household income, consumption and savings across different levels of income by age groups, region, gender, marital status and other characteristics. This dataset includes information on individual tax declarations, pension funds wealth, firm ownership network and banking records, and the CASEN survey adds data related to the informal sector of the economy.

1.1 Literature

The System of National Accounts is an accounting framework widely used by countries to compile information on Gross Domestic Product and its components, by economic sector among others. Their estimations are compiled by confronting and balancing information from various data sources according to a harmonized system of concepts and definitions. Distributional National Accounts in their two versions, EG DNA (Fesseau and Mattonetti (2013) and Zwijnenburg et al. (2024)) and WIL DINA (Alvaredo et al. (2020)), aim to bring disaggregated information from the main macroeconomic variables and international comparability into the measurement of income distribution. The two methodologies are very similar in the sense that they impute a distribution to the components of GDP from the income perspective. The main differences are that EG DNA focuses on the household sector (excluding government and corporations) and computes statistics at the household level instead of the individual level as in WIL DINA.

An important reason to measure Distributional National Accounts is that individual sources of income information are often incomplete or biased. There is significant discrepancy in the magnitude of distributional estimates for the same country depending on the data and methodology used. Household surveys are more precise in capturing income below the taxable threshold and from informal activities. The "missing-rich" from household surveys Lustig et al. (2020) suggest that tax records are more accurate in measuring higher incomes and capital. However, in some cases, even combining this two sources does not achieve full coverage of specific national accounts components, making necessary to perform further adjustments.

Depending on the development of the country and its regulation, tax records or household surveys can have better coverage at specific points of the income distribution. In some countries where evasion is relatively high or the informal sector is significant, it is advisable to use income surveys as the main source of information. On the other hand, in high income countries with strong statistical development it is natural to use administrative records as initial reference. If surveys are chosen as the starting point, it is necessary to correct for under-declaration and attrition at the top (e.g. Blanchet, Flores and Morgan (2022)). When tax records are the main source, income surveys should be used to represent low income earners and informality. In spite of being a developing country, Chile has administrative records of exceptional quality while its main household survey has coverage problems for some components.

Previous attempts of introducing distributional measures using national accounts started by focusing on top-incomes using mainly tax records (Fairfield and Jorratt (2016)). More recent studies broadened the scope to the full income distribution but did not have access to individual tax records or unpublished national accounts. De Rosa, Flores and Morgan (2020) measured distributional national accounts for a subset of Latin American countries using surveys as the main source of information, correcting the top with tabulated tax records. De Gregorio and Taboada (2022) showed that the Chilean survey underestimates high incomes but also has significant biases around the median income, reaching 30% for wages and 45% for independent income.

But in general the main issue arises at what dataset to use for this purpose, and how to combine different sources of information. In the most recent example, De Gregorio and Taboada (2022) are forced to use significant imputations for wages and capital income as their source of distributional information has very low coverage. This problem induces considerable uncertainty on the distribution and covariance of the variables that were imputed. On the other hand, our method preserves key information on the population's household size distribution while using substantially better information sources for the main income components.

2 Methodology

2.1 Income concepts for the matching exercise

The Handbook on Household Income Statistics (United Nations, 2011) defines household income as all benefits or gains that are obtained on a regular basis, that are available for present consumption and do not reduce net wealth or deteriorate equity positions. This includes all earnings, monetary and in kind, that households receive at annual or more frequent intervals, excluding irregular and one-time payments (such as inheritances and earnings from gambling). Income flows can derive from work, capital returns or transfers.

According to the System of National Accounts (SNA 2008) an institutional unit is an economic entity that is capable, in its own right, of owing assets, incurring liabilities and engaging in economic activities and in transactions with other entities. All resident units can be allocated to one of the following institutional sectors: non-financial corporations, financial corporations, general government, non-profit institutions serving households, and households.

Our focus is on households, which are defined as a group of persons who share the same living accommodation, pool some, or all, of their income and wealth, and consume certain types of goods and services collectively. This household income facilitates international comparisons, but some components are not directly consumable in the traditional sense. For example, investment income attributable to insurance policyholders, such as pension funds or unemployment insurance in the case of Chile.

For this paper the objective is to obtain a merge dataset for households. One first attempt relates to household primary income, which corresponds to the sum of labor and capital income received by households before income and wealth taxation and other forms of redistribution. Primary income can be defined as the sum of: (i) Income from production (compensation of employees, mixed income and operating surplus, the latter corresponds to imputed rentals of owner-occupied dwellings); and (ii) Net property income (income of corporations, income attributed to insurance policyholders, investment income attributable to collective investment fund shareholders, and net interest).

Although GDP is more frequently used to compare income across countries or across

time, it includes components that are not easily recognized as income for individuals or households. Capital depreciation is part of GDP but is does not allow to consume or accumulate wealth. Undistributed profits, or retained earnings[1] is considered as personal income according to the WIL DINA guidelines but is excluded from the DNA EG concept[2].

2.2 Optimal Transport Matching

To allocate national income on households a distribution for each component is required. However, there is no individual dataset that includes all variables necessary for complete distributional national accounts. Tax records from the Internal Revenue Service have a high coverage of wages and are the most reliable source for capital income (see Table 3) but by definition do not include the informal sector and also lack information on some key demographic variables. Administrative records from the Chilean Civil Registry have one key limitation, it only informs on the filial and marital relationship of individuals, making it impossible to identify the full household. On the other hand, the CASEN survey have some information related to the informal sector and households composition, however, it have a lower coverage on capital income and wages than tax records. So, in order to capture the real distribution of household size and incorporate all the variables that constitute household income, it is necessary to combine this different sources of information. As a common identifier between the CASEN survey and administrative records does not exist, we perform a "statistical matching" of individuals using Optimal Transport.

The main steps of our methodology can be summarized as follows. First, we combine individual administrative records from tax declarations, bank statements and the civil registry using a unique anonymized identifier[3]. Next, we construct initial households

[1] The income remaining in the corporate sector after the payment of wages, interest, dividends, and, for post -tax concepts, the corporate income tax

[2] We provide some insights of undistributed profits in the Appendix

[3] The information used is anonymized and shared only at aggregate levels. In order to secure the privacy of workers and firms, the Central Bank of Chile mandates that the development, extraction and publication of the results should not allow the identification, directly or indirectly, of natural or legal persons. Officials of the Central Bank of Chile processed the disaggregated data. All the analysis was implemented by the authors and did not involve nor compromise the related institutions

formed by spouses and their children under 27 years of age[4] as reported in the civil registry. We then statistically match these administrative microdata with the CASEN survey using Optimal Transport as in Blanchet, Saez and Zucman (2022). In addition to demographic characteristics and informal income from CASEN survey, we bring information about the household members who are not spouses or children of the household head. To the best of our knowledge, this is the first time this one to one statistical matching is used.

Formally, consider dataset A with variables X and Y, and dataset B with variables Y and Z. A can be called the base file (administrative records in our case) and B the supplemental file (the CASEN survey). Optimal Transport allows to bring Z variables (e.g., household members and informal income) into dataset A by minimizing the differences in Y variables (e.g. formal income and age) between matched observations. The optimal solution is a constrained statistical match (Rodgers (1984)) in which each individual from dataset B is matched "one-to-one" with an individual in A.

Specifically, suppose dataset A has weights $u = (u_1, u_2, ..., u_n)$ and dataset B has weights $v = (v_1, v_2, ..., v_m)$. Without loss of generality, weights can be normalized to sum to one. Denote by D_{ij} the distance between observation i from A and j from B over the Y variables. The solution of this problem is the optimal transport map $\Gamma \in \mathcal{R}^{nxm}$ that matches observations "one-to-one" and minimizes the sum of the distances between matched observations. This can be expressed as the following linear programming problem:

$$\min_{\Gamma \in \mathcal{R}^{nxm}} \sum_{i=i}^{n} \sum_{j=i}^{m} \Gamma_{ij} D_{ij} \qquad \text{such that} \qquad \Gamma 1 = u \qquad \Gamma' 1 = u \qquad \Gamma \geq 0$$

One advantage of this matching procedure is that the multivariate distribution of Z variables (the CASEN survey in our case) are preserved. The main obstacle to implement this type of methodology with respect to traditional matching methods[5] has been computing time. The matrix Γ_{ij} requires over one trillion entries to match the population

[4] In Chile, parents are required to economically support their children until 27 years old if they are enrolled in higher education

[5] For example, in 1:1 matching using propensity score, the are N! possible matching correspondences that depend on the order on which the individuals are matched.

of administrative records with the survey. For computational feasibility, we restrict each match inside a "bin" defined by the combination of region, gender, marital status, retirement status, employment and household head. We obtain 690 bins of 21,000 individuals on average. Computing time for each bin grows approximately with the square of the bin size. Bins should be approximately of the same size in the two datasets if both are adequately representative of the population. Nevertheless, too many categories can provoke disparities in bin sizes between the sources resulting in a less precise matching.

The variables on which the distance is minimized are income, age and household size. The match is performed only for individuals over 13 years old as at the time of this publication we do not have civil registry data on younger individuals. In the matched dataset we add individuals of uni-personal formal households to the household determined by the survey house identifier. This includes all children below 13 years old and individuals in the household that are not spouses, daughters or sons. The resulting dataset with all variables from records and the survey also replicates the household size of the survey while preserving real filial and marital bonds from the civil registry. See Table 1 for descriptive statistics of the original and matched datasets for the year 2017.

Table 1: Descriptive Statistics before and after Optimal Transport

	CASEN	CASEN age ≥13	Adm. records	Matched Data
Population	17,807,414	14,834,616	14,782,995	18,066,420
Married	26.8 %	32.2 %	34.5 %	28.8%
Wage earners	32.2 %	38.7 %	40.7 %	30.3%
Female	52.4 %	53.3 %	51.2 %	50,5%
age ≥ 65	12.8 %	15.3 %	12.7 %	12.7%

The matched dataset produces a high correlation between similar variables from the survey and tax records at the individual level. Figure 1 plots the average wage from surveys (Y-axis). Household sizes are also similar in the survey and matched dataset (Table 4)

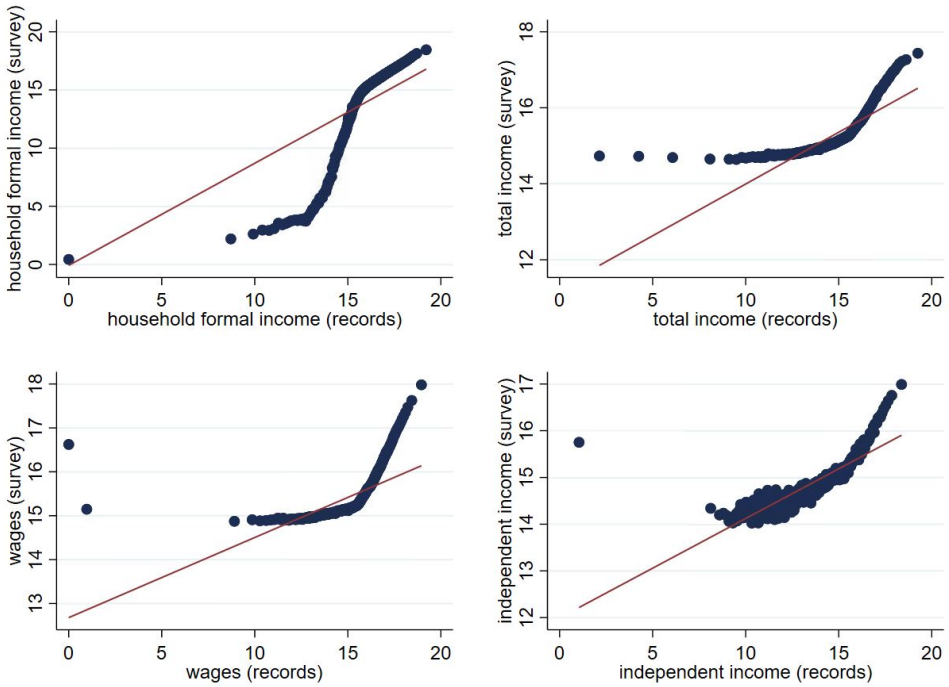

Figure 1: Correlation between survey and tax variables in matched data

Note: The figure plots tax records variables (X-axis) and survey variables (Y-axis) on the matched dataset. Each dot represents the average of approximately 2000 individuals, grouped by the X-axis variable.

3 Data

This section describes the components of primary income and how they are measured using the matched dataset. Table 2 shows the weight of the different components in the National Accounts.

Compensation of employees: The information on formal dependent workers' wages is obtained from administrative records declared by firms every month (administrative record: form F1887 from the Internal Revenue Service IRS[6]). This report provides details on net wages and the corresponding taxes paid by the worker. Utilizing these variables, social contributions are then estimated to derive the gross wage. We also use CASEN to measure remunerations not registered on administrative records and in kind remunerations declared by workers.

[6]The information contained in the databases of the Chilean IRS is of a tax nature originating in self-declarations of taxpayers presented to the Service; therefore, the veracity of the data is not the responsibility of the Service

Gross operating surplus and mixed income: For gross operating surplus we utilize the variable imputed rent[7] contained in CASEN for individuals residing in their own dwelling. Mixed income is estimated using administrative records of self-emloyed workers. This information is complemented with earnings declared in CASEN from independent workers

Net property income: Distributed income of corporations is estimated as the difference between total income declared in annual tax declarations and income coming from administrative records declaring salaries from dependent and independent workers and income associated with retirement pensions. Income attributed to insurance policyholders is measured using microdata from the Chilean Superintendency of Pensions, we use information regarding the balance in personal accounts from Pension Funds and Unemployment Insurance Funds and then we multiply it by the average annual return from each one. Interests paid are estimated using information from the household financial survey (EFH). We estimate the average percentage of income destined to pay debts by income decile, and use this ratio to impute paid interest according to the decile of production rents (Compensation of employees + Gross operating surplus and mixed income). Finally, interests received are distributed according to the income attributed to insurance policyholders.

Table 2: Primary income components 2017

Concept	Weight
Compensation of employees	58.3%
Gross operating surplus and mixed income	20.9%
Net property income	20.8%
Distributed income of corporations	19.2%
Interest paid	-4.3%
Interest received	1.3%
Income attributed to insurance policyholders	4.7%

Notes: This information is calculated from the integrated accounts table available at https://si3.bcentral.cl/estadisticas/principal1/enlaces/informes/anuariosccnn/anuario_ccnn_2022.html

[7]Imputed rent measures the rent homeowners would pay for a housing unit equivalent to the one they own.

Table 3: National Accounts coverage of surveys and tax records 2017

	CASEN	Tax Records	Combined
Compensation of employees	64.4%	88.6%	94.7%
Gross operating surplus and mixed income	84.2%	47.1%	98.7%
Net property income	7.0%	38.5%	41.8%

Note: Gross operating surplus is estimated only using CASEN.

Table 4: Household size distribution 2017

HH size	Adm. records	CASEN age ≥13	CASEN Full	Matched Data
1	67.5 %	68.0 %	15.4 %	23.2 %
2	19.0 %	20.2 %	25.5 %	32.0 %
3	8.2 %	7.9 %	23.5 %	19.5 %
4	4.0 %	3.2 %	19.5 %	13.1 %
≥ 5	1.2 %	0.6 %	16.1 %	12.2 %

Note: Household sizes for the first two rows correspond to filial and marital relationships. "CASEN Full" and "Matched Data" include all the population and all members of each household.

4 Results

This section gives preliminary results of the distribution of primary income obtained from the combined data set and its construction. Figure 2 highlights the importance of combining different sources of information. For half of the population tax records capture less income than the household survey. This is expected as around two thirds of the population are exempt of paying taxes. For higher quintiles, the ratio steadily climbs. Also, combining tax records and surveys results in higher income for Q1 and higher quintiles. This can be attributed to non-taxable and undeclared income, also capital has the lowest coverage of all income variables (see Table 3).

Figure 3 shows the components of primary income by quintile of the merge dataset and aligned to the National Accounts totals[8]. It shows that independent income and imputed rent is the main component of income for the first quintile of the income distri-

[8]The alignment to the National Accounts totals are made using equal allocation across the distribution for each variable that is covered by the merge dataset.

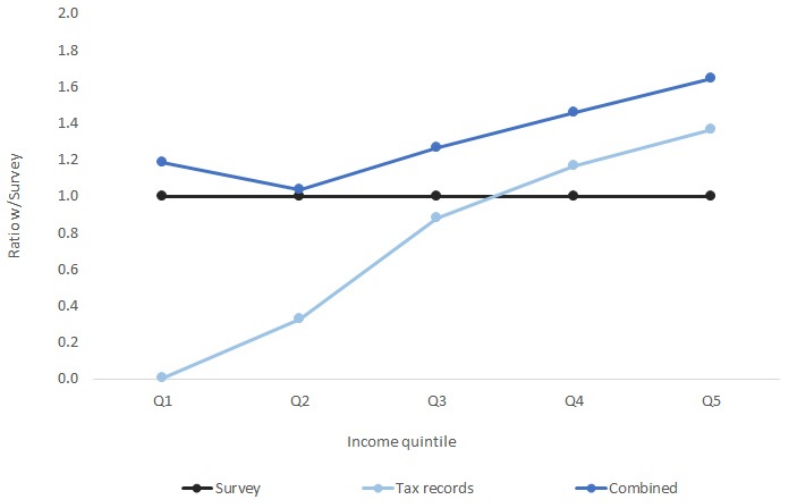

Figure 2: Income ratio by percentile

Notes: The figure displays the ratio of income according to three data sources with respect to income from the household survey. "Combined" refers to the data obtained after matching tax records and the survey. The lines are plotted for quintiles 1 to 5.

bution. Compensation of employees constitute the main source of income for the middle of the distribution while net property income is relevant for the higher quintile.

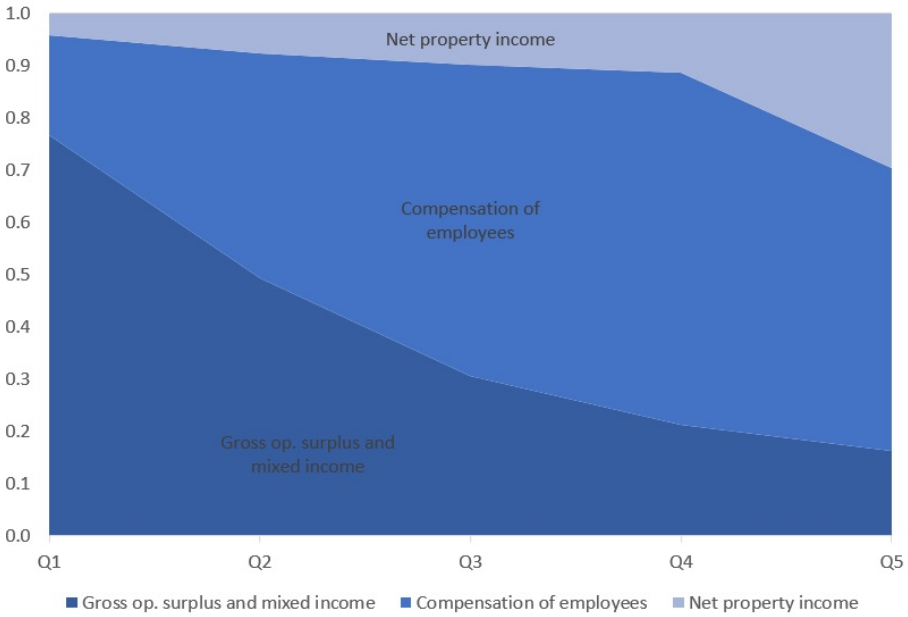

Figure 3: Primary Income Distribution

Notes: The figure displays the fraction of primary income corresponding to each component by income quintile of the household. The results are aligned to the National Accounts totals for Compensation of employees, Gross operating surplus and mixed income, and Net property income

5 Conclusions

In this paper we outline the methodology and preliminary results from merging different datasets for Chile. We combine tax records, the civil registry and household surveys with a novel methodology that uses Optimal Transport (Blanchet, Saez and Zucman, 2022). We are able to preserve more precise information on top earners while also capturing informality from the household surveys and the empirical household size distribution. A comprehensive assessment of the coverage and biases should be implemented before selecting surveys or tax records as the main source of information.

Finally, this methodology will serve in the future as the basis to estimate Household Distributional National Accounts for the main macreconomic variables in Chile according to the guidelines developed from OECD-EG DNA (Zwijnenburg et al. (2024)). These results will be useful to answer a broader range of questions, such as how much income distribution is affected by distributive items or how stable income distribution is over time, amongst others.

References

Alvaredo, Facundo, Anthony B Atkinson, Thomas Blanchet, Lucas Chancel, Luis Bauluz, Matthew Fisher-Post, Ignacio Flores, Bertrand Garbinti, Jonathan Goupille-Lebret, Clara Martínez-Toledano, et al. 2020. "Distributional National Accounts Guidelines, Methods and Concepts Used in the World Inequality Database."

Auclert, Adrien. 2019. "Monetary policy and the redistribution channel." *American Economic Review*, 109(6): 2333–2367.

Blanchet, Thomas, Emmanuel Saez, and Gabriel Zucman. 2022. "Real-time inequality." National Bureau of Economic Research.

Blanchet, Thomas, Ignacio Flores, and Marc Morgan. 2022. "The weight of the rich: improving surveys using tax data." *The Journal of Economic Inequality*, 20(1): 119–150.

De Gregorio, Jose, and Manuel Taboada. 2022. *Median Labor Income in Chile Revised: Insights from Distributional National Accounts.* Central Bank of Chile Working Papers.

De Rosa, M, Ignacio Flores, and Marc Morgan. 2020. "Inequality in Latin America revisited: insights from distributional national accounts." *Technical Note*, , (2020/02).

Fairfield, Tasha, and Michel Jorratt. 2016. "Top income shares, business profits, and effective tax rates in contemporary Chile." *Review of Income and Wealth*, 62: S120–S144.

Fesseau, Maryse, and Maria Liviana Mattonetti. 2013. "Distributional measures across household groups in a national accounts framework: Results from an experimental cross-country exercise on household income, consumption and saving."

Kaplan, Greg, Benjamin Moll, and Giovanni L Violante. 2018. "Monetary policy according to HANK." *American Economic Review*, 108(3): 697–743.

Lustig, Nora, et al. 2020. "The "missing Rich" in Household Surveys: Causes and Correction Approaches." ECINEQ, Society for the Study of Economic Inequality.

Rodgers, Willard L. 1984. "An evaluation of statistical matching." *Journal of Business & Economic Statistics*, 2(1): 91–102.

United Nations, Economic Commission for Europe. 2011. "Canberra group handbook on household income statistics."

Zwijnenburg, Jorrit, et al. 2024. "OECD centralised approach to calculate distributional results in line with national accounts totals - Methodology and results."

Appendix

A Property Matrix

The income concept from the SNA 2025 guidelines does not include income accrued by the corporate sector or undistributed profits. However, it is possible to include this income component as supplemental information. It is expected that that undistributed profits are more concentrated than other sources of income.

To assign profits it es necessary to know the structure of ownership between firms and individuals. From tax declarations we are able to build to matrices.

$$\mathcal{X}^{\star} : \text{Matrix of direct ownership by individual.This is } F \times I$$
$$\mathcal{M}^{\star} : \text{Matrix of ownership of between firms.This is } F \times F$$

To take into account the network structure of ownership, we need to find the final firm-to-firm ownership. This is done by using the inverse Leontief matrix, by doing the following calculation:

$$\mathcal{M} = (I - \mathcal{M}^{\star})^{-1}$$

which will give us the final ownership a firm j has on firm k, taking into account the intermediate ownership. The challenge to doing this calculation is that this matrix is very big (something like $200,000 \times 200,000$). Therefore, we cannot use conventional matrix operations so we will use sparse matrices.

Then, we need to assign these property to individuals. Since some individuals have firms that have property in other firms, we have to add that property to those households. We do that in the following way. Take an element from $\mathcal{X}^{\star}$, lets say $\mathcal{X}^{\star}_{fi}$ which is the share household i has in firm f. If firm f owns other firms, we need to assign those shares to

household i. The shares firm f has in all other firms is given by the vector $\mathcal{M}_{Ff}$. Hence, to assign those shares to household i we must multiply $\mathcal{X}^{\star}_{fi}\mathcal{M}_{Ff}$ which is a column vector of $F \times 1$. We must do this for all firms owned by the household, and then add that to the direct ownership vector of household i, to form the following $F \times 1$ vector:

$$\mathcal{X}_{Fi} = \sum_{f=1}^{F} \mathcal{X}^{\star}_{fi}\mathcal{M}_{Ff} + \mathcal{X}^{\star}_{Fi}$$

In this way, we form the final matrix of ownership that is of size $F \times I$, denoted by $\mathcal{X}$.

Finally, given an $F \times 1$ vector of firm profits Π^F, the vector of individual profits is given by

$$\Pi^I = \mathcal{X}'\Pi^F$$

which is the objective of this calculation. The element Π^I_i is the total profit an individual i got from all firms owned, both directly and indirectly.

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