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DATA DESCRIPTOR

Wealth Composition, Distribution, and Transmission: The Graduate Center Wealth Project Data Warehouse

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Private wealth, as well as its distribution and intergenerational transmission have become much-debated issues. However, existing evidence remains fragmented, context-dependent, and sometimes contested. This data descriptor introduces the Graduate Center (GC) Wealth Project data warehouse, a collection of databases covering multiple countries and time periods, designed to address these challenges. The data warehouse consolidates most existing evidence on private wealth and undertakes a significant data harmonization effort. We supplement each data point with extensive metadata on methodology. The data warehouse features an extensive collection of information on the household wealth levels and balance sheets, along with distributional statistics from a wide range of sources. Moreover, it draws together data on wealth transfer tax revenues, and tax features such as rates, exemption thresholds, and tax schedules. The broad range of data sources in the warehouse allows users to assess the degree of heterogeneity of estimates, and how methodological choices affect measurement outcomes. The new data series and policy indicators also allow extending quantitative analysis of wealth and public policy.

Background & Summary

Individuals and households accumulate wealth through saving out of income and through net wealth transfers that they receive. The economic concept of wealth refers to the stocks of resources that economic agents accumulate (actively through savings and passively through changes in the prices of assets). Wealth is an important indicator of economic wellbeing. Its extreme concentration compounds other socio-economic inequalities, affects intergenerational mobility, and may damage the democratic process. Finally, economic and geopolitical crises highlight the importance of private wealth. This includes the global financial crisis, that demonstrated the importance of resilient household portfolios, but also the recent role of asset freezes targeting high net worth individuals as a key part of economic sanction packages.

Against this backdrop, private wealth and its distribution have received significant attention in the social sciences recently. This has resulted in the development of new measurement tools that help shed light on the long-run dynamics of private wealth and its distribution. Additionally, significant theoretical innovations, that relate the distribution of wealth to income growth, its distribution, asset prices, and (intergenerational) wealth transfers have contributed to a lively debate centered around wealth.

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However, despite the great importance of wealth (inequality) both in academia and policymaking, key stylized facts around wealth and its distribution are either disputed or remain unknown. Wealth is notoriously hard to measure, and improving data infrastructure continues to be a major research priority. While information on income and its distribution is more systematically collected, much less is known about wealth. To some extent, this is because many countries do not tax wealth ownership or its transmission in a way that would allow using tax data to measure wealth. Yet, even with perfect data, private wealth comes in many forms and approaches differ in what they count as wealth. While it is widely acknowledged that private wealth consists of assets such as real estate, business wealth, bank accounts, bonds and shares and debt including mortgage liabilities, only a few papers count future public pension entitlements or human capital as household wealth. Therefore, a comprehensive data collection on wealth is warranted. This data descriptor introduces a new data source that helps monitoring different aspects of wealth, over time and across different geographical areas: The Graduate Center (GC) wealth project data warehouse[1].

This data descriptor's contribution is an overview of the data warehouse[1], a new collection of data that takes stock of what we know about wealth. The warehouse brings together information that we structure into three main databases: Wealth Topography (TOPO), Wealth Inequality Trends (INEQ), and Estate, Inheritance and Gift Taxes (EIGT). The Wealth Topography database illustrates the composition of private or personal wealth from a balance sheet perspective, distinguishing concepts such as financial wealth, housing wealth and debt. The Wealth Inequality Trends database contains common statistics on the distribution of net wealth among households or individuals (the sum of assets net of liabilities). These statistics include Gini indices, the share of wealth held by groups of people at different parts of the distribution (such as the wealthiest 1%), as well as the average level of net wealth along the wealth distribution. Finally, the data warehouse also looks at wealth from a public policy perspective. It compiles systematic information on the evolution of the main features of wealth transfer taxation (Estate, Inheritance and Gift Taxes database), including tax revenue, tax rates, introduction and repeal dates, and exemption thresholds.

The data warehouse[1] provides several new vantage points on wealth. As a first important contribution, it adds new datapoints on the volume and distribution of wealth, its composition in terms of household portfolios, as well as taxation. For example, we calculate wealth aggregates and distributional statistics from internationally available micro-data sources. Another case in point is a set of novel statistics on estate, inheritance and gift taxation, where we extract information from legal documents and corporate research, among other sources. For the first time, this allows for a systematic comparison of wealth transfer taxation across more than 160 countries – some with data going back to the 18th century.

A second new aspect of the data warehouse[1] is that it provides a variety of estimates that often exist for certain statistics. In addition, the dataset brings together information about different sources, provides classifications of sources and adds detailed methodological notes. On the one hand, this approach acknowledges that different measurement methods have strengths and weaknesses. Users can make an informed decision on which data to use and leverage differences across measurement approaches to improve their analysis. On the other hand, the collection of data from a wide range of sources also allows users to assess any consensus in the literature. For example, looking at the US only, the data warehouse features 17 different time series for the share of wealth held by the top decile of the distribution. In Italy and Germany, nine different series for this indicator are available. This breadth enables comparison across sources and helps identify areas of agreement and divergence.

The third key innovation of the data warehouse[1] is the harmonization of concepts it offers. For example, we provide detailed mappings of various definitions of assets and liabilities used in different data sources to arrive at comparable aggregates across countries. As a result, it is possible to compare the evolution of wealth and balance sheets across countries, and disentangle how harmonized measures of wealth components such as housing, financial assets and debt contribute to changes in wealth. In other sources, such comparisons are usually difficult, because concepts do not align across sources, such as wealth surveys and the national accounts.

Recent trends suggest that data on wealth and its distribution might become ever more important. The ratio of private wealth relative to national income has seen strong increases across countries toward the end of the 20th and the beginning of the 21st century, not only in Europe and the US, but also in China, Russia, Brazil and India[2]. Moreover, there are some global trends that suggest that the distribution of wealth is also in flux. The estimated share of wealth held by billionaires globally, for instance, has been rising in the last three decades[2]. The GC Wealth Project data warehouse[1] provides the infrastructure to appraise these trends, investigate country-specific patterns and study the role of public policy.

The GC Wealth Project data warehouse[1] is used in a series of companion papers. It has already informed research on inheritances and their taxation, where it offers a source of cross-national information on differences in tax regimes[3–5]. The database has already been employed to contextualize wealth distribution estimates within the broader literature[6]. There is also a documentation of the data warehouse available[7].

Methods

To produce the data warehouse[1], we first acquire raw data which comes in the form of official statistics, official survey data, corporate, government and academic research, as well as legislation and legislative information/documents provided by governments. All original data sources are referenced in the data warehouse where the *source* column in the metadata references the source (see Data Record section). The prevalence of different types of sources varies across themes. For example, legal documents are only relevant in the context of taxation. Once sources are identified and assessed, we discard those who are entirely based on fully imputed information.

Data processing involves data extraction in a first step, as the raw data comes in a variety of formats, including PDF documents, and other data formats. Subsequently, we harmonize the raw data. This involves, among other things, aggregating and classifying asset types into broader wealth concepts that can be compared across countries and sources. Monetary values are always shown in national currency, in nominal terms with no

Concept	Composition rule using codes	Composition rule
Net Wealth	(AN1) + (AN2) + (A_AF) - (L_AF)	(Produced non-financial assets) + (Non-produced non-financial assets) + (Financial assets) - (Liabilities)
Financial Assets & Fixed Capital of Personal Businesses	(AN1) + (AN2) + (A_AF) - (AN111) - (AN112) - (AN21111) + (AN1123)	(Produced non-financial assets) + (Non-produced non-financial assets) + (Financial assets) - (Dwellings) - (Other buildings and structures) - (Land underlying dwellings) + (Land improvements)
Debt	(L_AF3) + (L_AF4) + (L_AF5) + (L_AF6)	(Debt securities, liab.) + (Loans, liab.) + (Equity and investment fund shares, liab.) + (Insurance, pension and standardized guarantee schemes, liab.)
Cash, Deposits, Bonds & Loans	(A_AF2) + (A_AF3) + (A_AF4)	(Currency and deposits) + (Debt securities) + (Loans)
Stocks, Business Equities & Fund Shares	(A_AF5)	(Equity and investment fund shares)
Pensions & Life Insurance	(A_AF6)	(Insurance, pension and standardized guarantee schemes)
Fixed Capital of Personal Businesses	(AN1) + (AN2) - (AN111) - (AN112) - (AN21111) + (AN1123)	(Produced non-financial assets) + (Non-produced non-financial assets) - (Dwellings) - (Other buildings and structures) - (Land underlying dwellings) + (Land improvements)
Housing & Land	(AN111) + (AN112) - (AN1123) + (AN21111)	(Dwellings) + (Other buildings and structures) - (Land improvements) + (Land underlying dwellings)
Offshore Financial Wealth	(A_AXF)	(Financial assets held offshore)
Consumer Durable Goods	(XDHHCE)	(Consumer durables)

Table 1. Conceptual grid: Composition Rules for Various Economic Concepts.

adjustment to inflation. For micro data sources on wealth from household survey data, we compute indicators directly from the datasets. To that end, our approach makes use of survey weights at the household level and, for example, takes the multiply imputed data structure of the Luxembourg Wealth Study (LWS)[8] and the Household Finance and Consumption Survey (HFCS)[9] into account. This involves calculating statistics on each implicate separately and then taking the average across implicates. The only exception is Norway in the LWS. The underlying Norwegian data stems from administrative records rather than survey evidence. Therefore, no implicates are available. In general, the micro data from household surveys used in the data warehouse are highly harmonized across countries. However, some important differences remain. They include differences in the sampling procedures across countries (such as the degree to which wealthy households are oversampled). Moreover, specific wealth components may not be available in all countries - for instance, the coverage of "Life insurance and voluntary individual pensions" varies across countries.

The final step consists of assigning the variable codes used in the final database to all observations. Overall, the specific steps from the raw data to the final data warehouse depend on the thematic section of the data warehouse. Accordingly, the remainder of this section discusses each of the three databases in the data warehouse separately.

Wealth Topography. Several steps are necessary to compile cross-national data that capture the aggregate evolution of household portfolios of assets and liabilities. The final output is for each country and year a simple balance sheet, where aggregate wealth for different balance sheet items is reported in terms of comparable macro-categries. The macro-categories consist of a harmonized set of concepts, such as "Debt", "Net Wealth", "Housing & Land", or "Financial Assets & Fixed Capital of Personal Businesses". Each of the concepts is the sum of a set of more detailed balance sheet items (sub-components) from the national accounts (SNA2008/ESA2010), or their equivalents in cross-national official survey data or cross-national academic research that do not use the SNA2008/ESA2010 framework. Table 1 contains the main composition rules, that map the SNA sub-components into the concepts of the data warehouse. This is the conceptual grid. Equipped with the conceptual grid, two key steps are necessary to obtain consistent high-level balance sheets.

In a first step, the variables in each raw data source need to be mapped into the sub-components that are inspired by the Standards of National Accounts. The Supplementary Table S1 provides an overview of all sources used as raw data in the Wealth Topography Section. For raw data sources published by central banks and national statistical institutes that use the SNA2008/ESA2010 framework, the mapping of raw data into national accounting concepts listed in the conceptual grid is straightforward (automatic mapping). However, all other sources, including the Atlas of the Offshore World[10] and others[8,9,11,12] require a tailored approach (manual mapping). The mapping for each raw data source that contains the original variable names from the source data is provided with the replication code.

In a second step, we apply the composition rules to the sub-components. Since the individual sources differ in the levels of aggregation for the sub-components, there are deviations from Table 1 in some sources in practice. For instance, the concept "Stocks, Business Equity & Fund Shares" can be constructed from the sum of different variables. On the one hand, for some data sources, "Stocks, Business Equity & Fund Shares" is set equal to "Equity and investment fund shares (A_AF5)". On the other hand, when the aggregate variable is missing, we obtain "Stocks, Business Equity & Fund Shares" by summing up "Equity (A_AF51)" and "Investment fund shares/units (A_AF52)".

The database refers to aggregate values for each concept. Notably, it reports gross and net values.

Overall, this exercise yields harmonized data on net wealth, assets, and liabilities that can be compared across countries and sources. Importantly, we only harmonize concepts. As a result, there might be other factors connected to specific sources giving rise to differences in aggregates across sources. For example, many wealth surveys have limited coverage of the top of the wealth distribution. While approaches exist to use information from independent data sources to address this issue, we do not make such modifications to the data.

Wealth Inequality Trends. The information on wealth inequality trends in the data warehouse presents time series for the distribution of net wealth among households or individuals (the sum of financial and real assets minus debt). We extract the raw data from a variety of sources[8,9,13–66], including academic studies, government and corporate research, cross-national datasets, and official statistics. Supplementary Table S2 provides a complete overview of the raw data sources in the Wealth Inequality Trends Section. In some cases, it is possible to compute additional indicators purely from the reported data. For instance, if a source provides estimates for the wealth share of the richest 10% and the wealth share of the richest 1%, we calculate the wealth share of the next 9% (90th–99th percentiles) based on these estimates. For publicly available cross-national micro data sources on wealth, we produce our own estimates starting from micro data and following the provider estimation guidelines. This is the case for the LWS[8] and the HFCS[9]. For all other sources, we use the raw data as published.

In order to ensure consistency and high quality of the data, we limit the scope of the database in different ways. On the one hand, many sources provide several series of wealth inequality estimates. In such cases, the data that enters the data warehouse are the estimates that the authors refer to as their benchmark series. On the other hand, we do not include data series that are estimated using full imputation of wealth distribution. We consider a series as fully imputed if no data points of the series is estimated using micro data on wealth distribution. This affects some sources more than others, in particular the Credit Suisse Global Wealth Report[31] and the World Inequality Database. As a result, we drop estimates that are derived from predictions of cross-country regressions, for example. However, a data source is included in our warehouse as long as at least one year is estimated using actual micro-data information on wealth ownership, such as survey or administrative data.

The indicators that summarize wealth inequality trends are the Gini coefficient, the share of total wealth held by households, tax units, and individuals at different groups along the wealth distribution (such as the share of wealth held by the richest 10% of the population), as well as their average level of net wealth. Moreover, the database provides statistics on the threshold that is needed for an observational unit to belong to a given group. For example, we report the minimum level of net wealth required to be part of the top 10% of the wealthiest households in a given country and year.

In addition to multiple indicators on the distribution of net wealthr, the database also breaks down estimates by differen units of analysis if the underlying sources permit: Individuals, equal split adults (where household wealth is distributed equally among the head of the household and her/his spouse), tax units, and households.

Estate, Inheritances and Gift Taxes. The third database in the data warehouse offers a detailed account of the evolution of Estate, Inheritance, and Gift (EIG) Taxes both across countries and across the U.S. states. The dataset includes information on marginal tax rates, tax schedules, exemptions, and tax revenues of estate, inheritance, and gift taxes. The tax base of inheritance taxes are transfers received by an heir after the bequeather passes away, while the estate tax is levied on the estate of the decedent before it is divided between heirs. Gift taxes focus on inter-vivos wealth transfers. Throughout, we currently only document the statutory information valid in any given country for wealth transfers between parents and children. In fact, in drawing comparisons across countries it needs to be borne in mind that EIG taxes are often applied differently depending on the degree of kinship between donors and recipients. Future iterations of the database will attempt to accomodate this additional source of complexity in the tax structure.

We classify taxes into estate, inheritance or gift taxes. However, certain tax instruments in some countries do not map clearly into the simple classification that distinguishes estate, inheritance and gift taxes. Whenever this is the case, details are provided in the *notes* variable. Such cases include combinations of the three taxes. For example, in the United States, a combined gift and inheritance tax is operative, while in the United Kingdom or South Korea, only gifts made within a certain range of years before death are subject to taxation. Other ambiguous cases include taxes that are integrated with another tax, such as the Czech Republic's gift tax that is a part of the income tax. We code the tax status for estate, inheritance and gift taxes integrated with other taxes to zero. Moreover, in some countries, transfer taxes are administered at the sub-national level at least in parts (including the United States, Switzerland and Brasil). While there are flags that identify all countries where this is the case, the database contains more detailed information for the United States and covers inheritance taxes at the state level. In some states within the United States, transfers are not taxed. Still, we consider the interaction between national level tax rules and sub-national tax rules. Therefore, we report positive marginal tax rates and exemption thresholds but code the tax status to zero, indicating that no tax is levied over and beyond the existing federal taxation. While our dataset does not offer complementary estimates of wealth levels and inequality at the subnational level for the United States, such estimates are available elsewhere[67]. In the countries with exclusively sub-national tax regimes, we report no inheritance tax on the national level. It is possible that at a given time in a given place, no tax was in place. If no information on a tax is available in a country, we code the data missing. Only if either a source confirms that transfers are not taxed, or if the OECD Revenue Statistics[68] show zero revenue and no other data exists on the tax, we indicate that no tax is in place. If data on the date of implementation is available, we infer the absence of taxation for preceding dates from this information. Conversely, if we know of the abolition of a tax, we code taxation to be absent for all periods until there is information on a reintroduction. All series start in the year a given tax was first levied if that data is available, and otherwise in the year of the adoption of the transfer tax law.

Once a tax qualifies for inclusion in the database, the data extraction from raw data sources depends on the nature of the source data. Supplementary Table S3 provides a complete overview of all sources. Three types of sources enter the database. Tax revenue information, typically derived from the OECD Revenue Statistics[68], can be directly inserted into the database from the source data. We take the 4300 and 4320 series from the OECD data from 1965 onward. Absolute values are in local currency units, as well as revenues as a share of tax revenues and as a share of GDP.

In contrast to tax revenue data, information on tax codes and schedules require a greater degree of harmonization. This data comes from legal tax documents including legislation, legislative information and third party corporate[69–102], government[103–108], and academic[32,34,109–121] sources on tax codes. Harmonization is done along several dimensions.

First, we distinguish between lump-sum, flat, progressive, and bracketed progressive taxes – the latter referring to systems in which several tax rates are applied to different brackets of the tax base. The structure of tax progressivity can be inferred from the number of tax brackets with positive marginal rates. If no detailed information by brackets is available, we can infer this variable if specific sources identify the type of tax under assessment.

Second, exemptions are coded as reductions in the tax base in local currency units. In some cases, exemptions take other forms than reductions in the tax base, such as tax credits that are subtracted from the tax liability. If this is the case, we harmonize the exemption thresholds accordingly and provide details of the adjustments with the data in the variable *notes*. Harmonization involves treating the tax credit as an exemption that raises the threshold of the lowest tax bracket with a zero tax rate to the level of the tax credit. For full exemptions, we code the value −997. Finally, we also provide schedule-invariant information on the top marginal tax rates and the lower bound of the threshold where the top rate applies.

Third, information on tax schedules requires harmonization. Tax schedules are only made available in the database if unambiguous information exists (in terms of the tax rate as well as the lower and upper bound where a given tax rate applies). The harmonization of tax schedules across time and geographical units takes into account tax exemptions or equivalent reductions of the tax liability with a zero rate in the lowest bracket, and relies on local currency units. In the United States, for example, a tax credit is in place rather than tax exemptions. While the statutory schedule is progressive, the tax credit is so high (nearly 13 million USD as of 2023) that every bracket but the last is effectively within the tax credit range. Therefore (assuming no other deductions or credits apply), all amounts below (and many above) the last bracket would yield a final tax bill of zero. The result is a proportional tax rate that applies to relatively large estates of several million dollars. If two adjacent brackets have the same rate, they appear as one in the database. Sometimes the information on tax schedules is ambiguous in the raw data. For instance, certain sources provide only a range of the tax rate along the schedule (such as "10−30% inheritance tax"). If this is the case, we can only make use of the information that is evident - such as the tax rate in the lowest bracket (for "10−30% inheritance tax" that is 10%) and the highest bracket (30% in the example). Whenever information on tax schedules is reported in historical national currencies for a given year in the raw data, we apply the fixed conversion rate at that time in each country. In Chile, Uzbekistan and Zimbabwe, we do not have historical data in national currencies. Therefore, we use the market exchange rate. The conversion rates are available in the replication package.

Data Record

This section describes the structure of the GC Wealth Project data warehouse[1]. It provides an overview of the columns in the dataset. The data warehouse is available on Zenodo (https://doi.org/10.5281/zenodo.18601154) in comma-separated csv format (file name: warehouse_meta_v1_2_SciDatar1.csv) as well as dta format (file name: warehouse_meta_v1_2_SciDatar1.dta). It is licensed on an open access basis through a Creative Commons Attribution 4.0 International (CC BY 4.0) license. The data warehouse comes in long format with nine data columns and 21 columns of metadata. A complete list of the source data sets used to create the data warehouse is provided in the in the Supplementary Tables S1, S2, and S3 of this paper. The Supplementary Tables are also made available on the Zenodo repository with the warehouse (file names: Supplementary Table S1.xlsx, Supplementary Table S2.xlsx, and Supplementary Table S3.xlsx).

Data. Most importantly, there is the column *value*, that stores numerical values on the quantity of interest, like amounts in nominal currency, indices and shares. The column *varcode* details the nature of the variable referred to by any line of the dataset. While the *varcode* provides all information about the variable in a short format as set out below, we supplement this with another variable *longname*, that gives a description of the variable in plain language.

Further columns include geographical and temporal information, wealth distribution quantiles, and sources (*GEO*, *GEO_long*, *year*, *percentile*, *source*). Together with the *varcode*, the latter four columns uniquely identify every row in the dataset. The *GEO* column contains 2-character ISO codes for countries (*GEO_long* column refers to the full name). To identify sub-national geographical units, we use the country ISO code separated by an underscore from a second 2-digit code. For example, *US_RI* is the code for Rhode Island in the United States. The *year* column contains integer values, and the *percentile* column shows which part of the wealth distribution each observation represents in terms of wealth distribution quantiles. This is a string variable that takes values such as "p0p100" when observations refer to the whole population, which is common in the TOPO data. Other subgroups, as they appear in the INEQ variables or our data on taxation, can be defined using values between 0 and 100. For instance, the top 0.1% wealth share of the population would be referred to as "p99.9p100". Finally, the data warehouse also features a column labeled *notes*. This contains additional explanatory text, adding, for example, additional information on specific tax policies. We append to the published dataset another variable providing information on the last update of the entry (*last_update*).

Variable Types. The column *varcode* contains five main components to identify each variable in the data warehouse:[1] Thematic section, sector, variable type, concept and two section-specific digits. The five components are combined in the following way:

$$\underbrace{A}_{Section} - \underbrace{BB}_{Sector} - \underbrace{CCC}_{VariableType} - \underbrace{DDDDD}_{Concept} - \underbrace{ZZ}_{Section-Specific}$$

The first component (1-digit) defines the thematic section in which the variable belongs: the TOPO section (p), the INEQ section (t), as well as the section on EIGT (x).

Next, the 2-digit "Sector" component indicates the institutional sector for which data is provided. The levels of the "Sector" component differ between sections: Both INEQ and EIGT sections refer to the household sector, while the TOPO database also covers Non-Profit Institutions Serving Households (NPISH), and Household + NPISH jointly. In the EIGT section, the sector code identifies the tax in more detail. The first digit distinguishes estate, inheritance or gift taxes and the second specifies whether it applies to either everybody or the children of the deceased. A separate letter identifies taxes with insufficient information to distinguish the type of EIG tax. To refer to EIG tax information that does not belong to any specific sector (e.g., revenues or currency), we use a separate second letter.

The 3 digit component "Variable Type" refers to the type of variable that is measured. Naturally, certain levels of this variable are only present in specific sections. Gini coefficients and wealth shares only feature in the INEQ section (thresholds are also a variable type in the EIGT section). The TOPO section only includes aggregates and the "Variable type" gives details about the nature of aggregation. This is crucial, because the aggregation process can differ with respect to the treatment of transactions within one sector of the economy; some accounts are reported in a consolidated way. Consolidation refers to eliminating any transaction between units or sub-sectors within the same sector. As a result, all resulting transactions are transactions with other institutional sectors of the economy. A case in point is a loan from one household to another. In a consolidated account, this loan would be eliminated, while unconsolidated accounting would add the loan to both assets and liabilities of the household sector. If a source cannot be classified as consolidated or non-consolidated aggregate, we simply code aggregate as the variable type. In addition to thresholds, the EIGT section also contains the following variable types: (tax) rates, ratios, categorical variables (for example information on tax status indicating whether an estate tax is operative or not), totals (total tax revenue) and periods (e.g. year of policy adoption).

The 6-digit "Concept" component provides more detailed information about the variable being measured. In the TOPO section, the concept refers to the macro-categories that make up the balance sheets. For the wealth inequality series, concept always refers to net wealth. In the EIGT section, the concept is used to further define differences between three types of variables. First, for bracket invariant information, the concept dinstinguishes classifications of tax progressivity, indicators on whether a given tax is levied in any given year, dates when the tax was first levied and information on top marginal rates. Second, for revenue variables, the concept classifies flows by different bases (unity, total tax revenues and GDP). Third, for bracket-specific variables the concept can either be a lower bound, an upper bound or a marginal tax rate.

Finally, there is a 2-digit section-specific component that is used to further characterize the variable within a particular section of the data warehouse. In the TOPO section, this refers to the financial position of each concept. We distinguish gross assets, net assets and liabilities. In the INEQ section, the section-specific 2-digit code describes the unit of analysis (individuals, equal-split adults, tax units or households). In the context of the EIGT section, each variable is associated with a particular tax bracket. Bracket-invariant information is coded "00".

Metadata. Supplementing the set of core columns in the dataset, we provide metadata columns with the data warehouse[1]. The metadata reports a classification of the nature of the raw data used to derive all indicators, called *source_type*. Furthermore, it offers links (permanent, where possible) to the sources (*link*) and full bibliographical information (*ref_link* and *citekey*). We recommend that the bibliographical data provided through the *ref_link* is used for referencing (for example "Saez and Zucman (2016) accessed through the GC Wealth data warehouse[1]"). The metadata also has three variables for each of the five components of *varcode* (*d1_* to *d_5*), that contain the code in *varcode*, a label in plain language, as well as a description. For example, for the fist component of *varcode*, we have *d1_dashboard*, *d1_dashboard_lab* as well as *d1_dashboard_des*.

Technical Validation

To guarantee high data quality, we design a quality management strategy that is tailored to the nature of each thematic section. This is a sensible approach, because the procedures that convert the raw data to entries in the data warehouse differ between thematic sections (see Methods section). In the TOPO and INEQ sections, the technical validation ensures consistency from one data update to the next. By plotting and comparing discrepancies across different releases of the raw data, it is possible to establish whether valid graphs can be generated and whether variables exist in the old dataset but are missing in the new one. The algorithm logs missing variables and those that cannot be plotted for review.

In addition to tracking changes across data releases, we also ascertain that the data is plausible by comparing different sources. All estimates that we obtain directly from micro data in the TOPO and INEQ sections are benchmarked with data from other available sources that are also included in the dataset. Figure 1 shows the alignment between the ratio of the net wealth aggregate to nominal national income across different data sources. The figure highlights estimates that we obtain directly from micro data in color, and displays data from other sources in grey. In most countries, the estimates that are based on survey micro data track the trends evident from other sources well. However, the levels are not necessarily consistent across sources. This aligns well

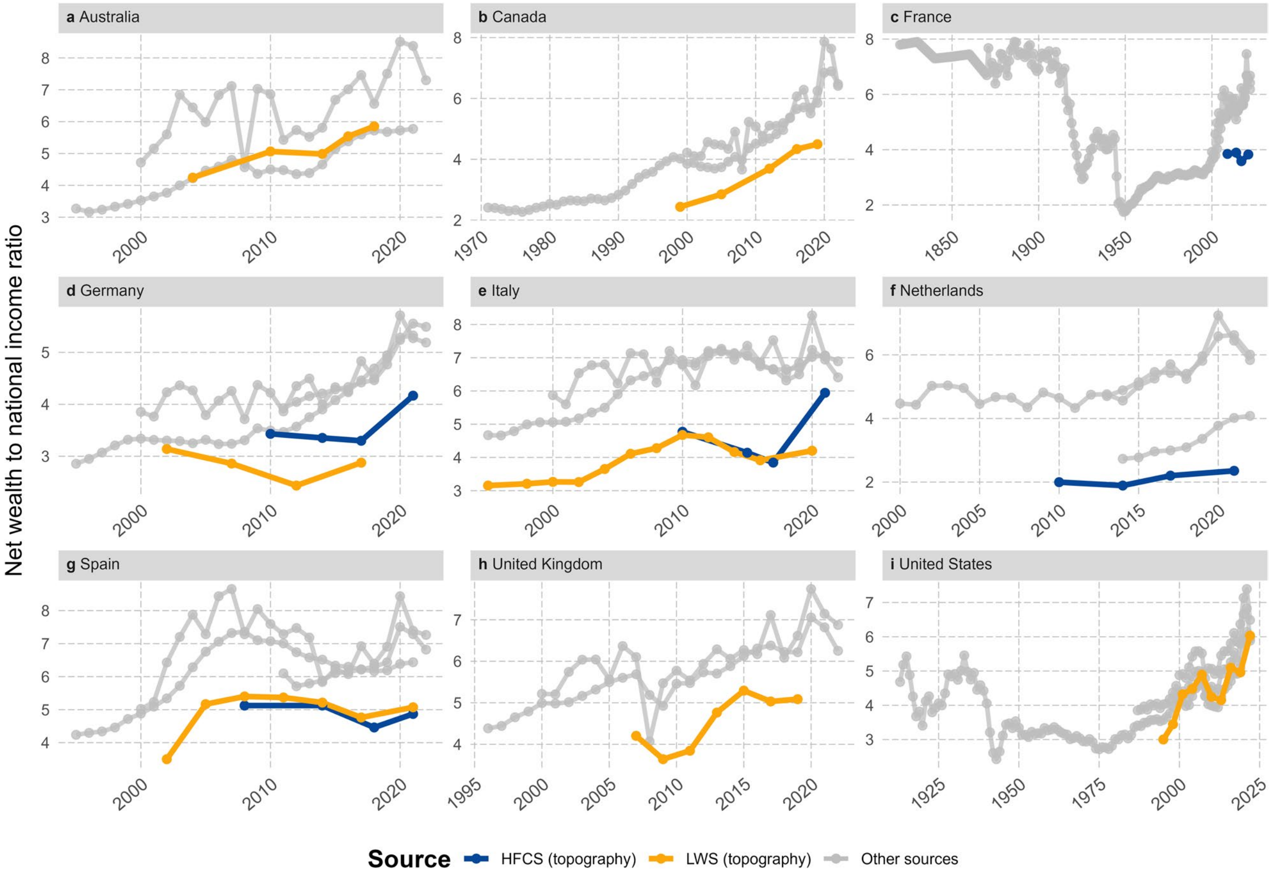

Fig. 1 Wealth Topography source comparison. *Note*: The figure plots the ratio of total net wealth to national income (y-axis) across countries over time measured in years (x-axis). Countries are selected based on the size of the economy and data availability. Own estimates based on micro data sources appear in yellow (LWS) and blue (HFCS).

with previous evidence suggesting that there is often a gap between aggregates that are obtained from wealth surveys and national accounts[122].

An analogous exercise to the benchmarking of aggregates in Fig. 1 can be performed for inequality trends. For a selection of countries, Fig. 2 plots the share of wealth held by the wealthiest 10% (of households, adults or tax units) in the population. The alignment between our micro data estimates and the wealth inequality series obtained from other sources varies. For example, in South Korea, the estimated share of wealth held by the top decile in the LWS is substantially lower than in in the other sources. To some extent, methodological differences can account for such gaps. For instance, in South Korea, the LWS series is based on households as the unit of analysis, while other units of analysis are used in the other series. Moreover, it is a well established result that wealth data from surveys (which includes the microdata sources analyzed here) is prone to underestimate wealth at the top of the distribution. This is mostly driven by the fact that rich households are less likely to participate in wealth surveys (differential non-response)[123]. Therefore, the top share computed from HFCS and LWS data can generally expected to be below the top shares computed from other sources. To put differences between series in context, we compile a detailed methodological table that describes how estimation approaches differ across sources.

In the Estate, Inheritance and Gift Tax section, information on EIG taxes is validated along two dimensions. First, we carry out checks regarding external consistency of our collected data using additional sources wherever possible. The feasibility of this approach depends on the availability of external sources, either from legal tax documents or third-party tax information. Second, the validation procedure considers internal consistency of harmonized information. This validation within the EIG section is based on a set of conditions. For instance, some countries report a positive value of EIG tax revenue despite not levying any EIG tax. If this is the case, country-years are checked individually, as revenue is sometimes collected from estates and bequests dating back several years.

Usage Notes

With new releases of the GC Wealth Project data warehouse[1], the repository on Zenodo will be updated. Note that the DOI is such that it always identifies the most recent version of the data.

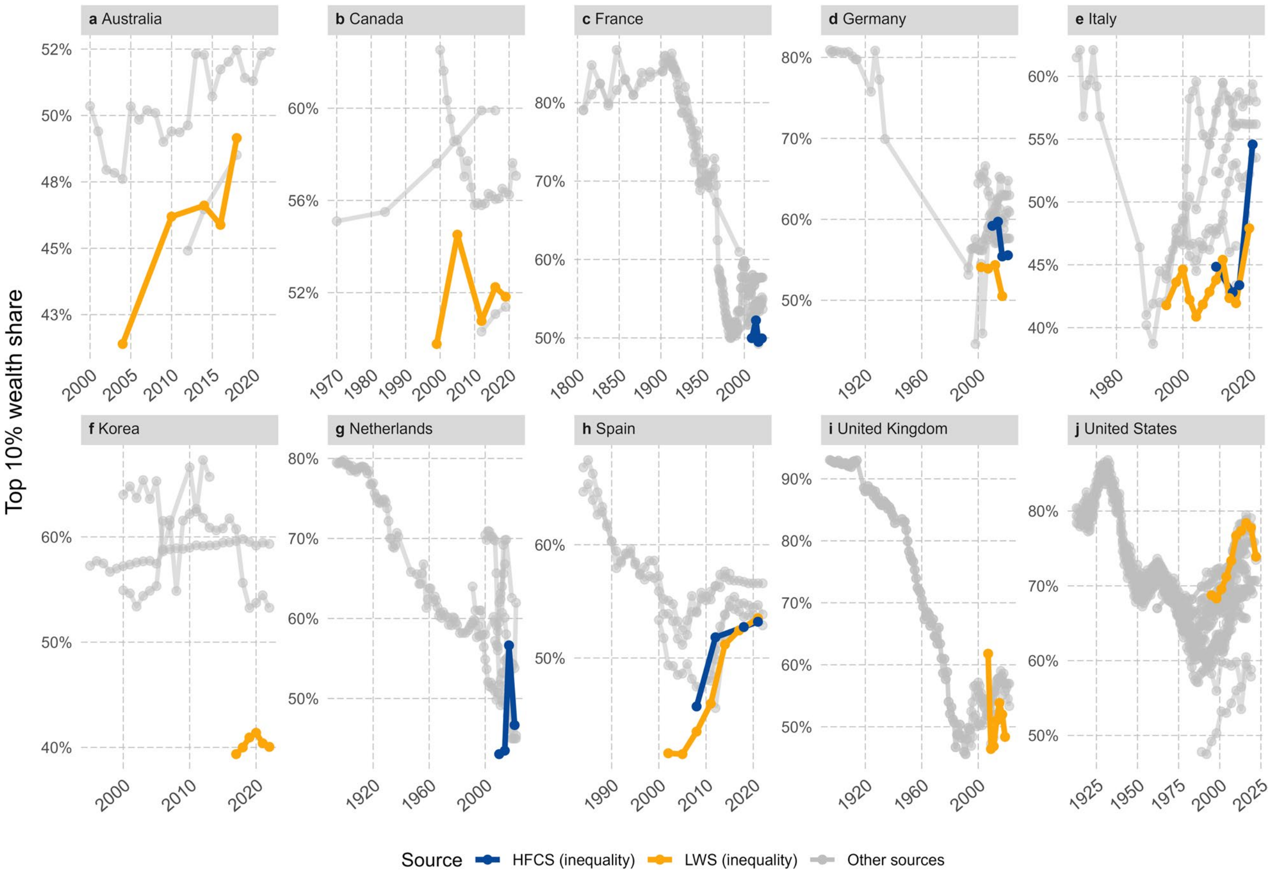

Fig. 2 Wealth Inequality source comparison. *Note*: The figure plots the share of net wealth held by the richest 10% (top decile) of the population irrespective of the unit of analysis (y-axis) across contries against time in years (x-axis). Countries are selected based on the size of the economy and data availability. Own estimates based on micro data sources appear in yellow (LWS) and blue (HFCS).

While users may download the entire data warehouse from Zenodo, we also offer a companion visualization dashboard online. The dashboard can be accessed online (https://wealthproject.gc.cuny.edu). It is structured in the three thematic sections. The website allows users to visualize different indicators over time and compare sources and different geographical units. The online tool can also be used to select a specific subset of the data for downloading, as it offers the option to download the data that underlies any plot that users compile. It also draws together background information from the metadata, such that users can gain an understanding of the context, assumptions and methods associated with the data in a quick and efficient way.

In addition to the repository with the dataset, we maintain a Github repository (https://github.com/gcwealth-project/warehouse) that does not only contain links to the data sets in different formats (.xlsx, .csv, .dta), but also offers users an extensive technical documentation about each database composing the GC Wealth Project data warehouse. The repository also contains auxiliary information for each section. For example, we include the source-specific methodological grids for the TOPO section, an extensive methodological table that details the methodological differences between different wealth inequality trend estimates, as well as the historical currency conversion table for the EIGT data. Moreover, the source code to generate the dataset and old versions of the dataset are available on the Github repository. Lastly, the Github repository features .bib files that contain all bibliographical information about the sources included in the data warehouse.

Data availability

The data warehouse is available on Zenodo (https://doi.org/10.5281/zenodo.18601154) in comma-separated csv format (file name: warehouse_meta_v1_2_SciDatar1.csv) as well as dta format (file name: warehouse_meta_v1_2_SciDatar1.dta). To review all original raw data sources, users are advised to consult the supplementary source tables (Table S1, S2 and S3). These tables are also available on the Zenodo repository (file names: Supplementary Table S1.xlsx, Supplementary Table S2.xlsx, and Supplementary Table S3.xlsx). We cannot provide the microdata from the HFCS and the LWS. The HFCS data is collected by the European Central Bank (ECB) and provided to researchers through scientific user files by the ECB. The data from the Luxembourg Wealth Study is made available to researchers through the LISSY remote execution system of the Luxembourg Income Study Cross-National Data Center. We construct aggregated secondary data from the existing micro data sets that were legally obtained from the data providers. The secondary data sets are made available with the other source data sets.

Code availability

The replication codes are located in the "Code" subfolder of the Github repository. The main repository features detailed guidance on running the replication code and additional necessary files. This includes the tables that are required to obtain the data provided in the data warehouse from raw data sources (source-specific conceptual grids, conversion tables for historical currencies). Download links for the original source data sets that are used as inputs for the replication code are also provided.

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Author contributions
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Competing interests

The authors declare no competing interests.

Additional information

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