Documentation on the JST Database Update 2016-2020*

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This documentation provides detailed information on the 6^{th} release of the JST database in the year 2022. First, we introduce major changes in the main macroeconomic variables. Afterwards, we provide information on the extension of government bill, government bond, equity, and housing returns data from 2016 to 2020 based on the paper "The rate of return on everything, 1870-2015" (abbreviated as RORE) by Jordà et al. (2019).

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1 Main Data Update

There are four important updates regarding the Main Macroeconomic Data update. First, the discontinuation of some IMF series that had to be replaced by other data sources. Second, the addition of Ireland to the dataset. Third, the major revision on the GDP and related series. Finally, the addition of three new macroeconomic variables based on two recent studies by Gabriel (2021) and Jordà et al. (2022), who are members of the Macrofinance and Macrohistory Lab.

In the previous release of the JST Database, many variables relied on IMF data, some of which were discontinued. To update the series while insuring it's consistency, we used the IMF's original data source for updating the desired variables. The variables affected by the discontinuation are short-term interest rates, long-term interest rates, narrow money and broad money. The new data sources can be found in the updated documentation.

In this new update, the JST database now covers 18 countries following the addition of Ireland. While some information is still being gathered and will therefore not be included in this release, we have a sufficiently rich coverage on most variables that we are happy to disseminate.

1.1 GDP

Macroeconomic variables are known to be continuously revised and updated as new information is presented to national statistical offices. The current accounts variable was subject to major revisions in many of the countries covered in the JST Database for the last years. The revision of the current accounts, among other things, impacted the nominal GDP series, which was also revised. Naturally, other variables were also subject to data revisions namely, investment-to-GDP ratio, debt-to-GDP and real GDP per capita. Consumption per capita was also subject to minor revisions. The variables have been updated to reflect the most recent data available.

1.2 Unemployment Rate and Nominal Wages Index

This release includes two new variables: the unemployment rate and nominal wages, the latter indexed in 1990. These variables are based on the long-run dataset assembled by Gabriel (2021) that studies the wage inflation - unemployment tradeoff, the original Phillips curve. A detailed description of how the variables were constructed and the sources used for the construction thereof can be found in the Online Appendix of Gabriel (2021), which is provided along with the rest of the documentation available in our website.

When possible, the *unemployment rate* is defined as the percentage of unemployed in the total labor force. Most countries had no unemployment insurance system until after the World Wars. Hence, citizens without a job had little incentive to enroll in a labor bureau since there was no compulsory unemployment insurance. The earlier data, build upon the previous caveat and present unemployment rates within smaller subsets of the active population such as trade

unions or within people insured against unemployment. The underlying assumption is that the unemployment growth rates within smaller subsets of the active population are the same (or at least, highly correlated) as the national unemployment growth rate. The most recent data follows the preferred definition and is based on either the Current Population Survey or the EU Labour force survey from the International Labour Organization (ILOSTAT). As a complement, data from the National Statistics agencies ensure the robustness of the series.

When possible, the *nominal wage* series is an index of the average earnings of all employees. However, the earlier data may build upon series of specific sectors according to their availability. I construct this nominal index using old publications of statistical offices, financial history books, and articles. The most recent data is based on the International Monetary Fund (IMF) wage index series and the Organization for Economic Cooperation and Development (OECD).

1.3 Corporate Debt

The variable Corporate Debt is also a new addition to the Database. The variable is based on the long-run dataset covering business lending by banks and financial markets assembled by Jordà et al. (2022) that study whether corporate debt has amplified past recessions. This variable includes bond market debt and credit from non-bank financial intermediaries. Whenever available the series includes liabilities of non-corporate business as well. The construction of the variable varies from pre-WW2 to post-WW2 years. A detailed description of how the variable was constructed and the sources used for the construction thereof can be found the in Online Appendix H of Jordà et al. (2022), which is provided along with the rest of the documentation available in our website.

2 RORE update

In this section, we present the updated rates of returns based on the paper "The rate of return on everything, 1870-2015" (Jordà et al., 2019). During the update, there has been changes in the previous data on total bond returns of Australia, Finland, Italy, Japan, Netherlands, and Norway during 1988-2020. You will find more details on this in Section 2.2. Also, note that for some countries, not all data were available for the full 2016-2020 period. We specify this in the documentation as well.

2.1 Government bill returns

We follow the approach of Jordà et al. (2019) and utilize yield on Treasury bills, i.e. short-term, fixed-income government securities. Whenever data on Treasury bill returns are unavailable, we rely on either money market rates or deposit rates of banks. Table 1 presents the detailed data sources of the bond bill rates of countries included in the JST database.

Table 1: Data sources: Bill returns, 2016-2020

Year	Data description	Data source
Australia	Interbank rate (3-months rates and yields)	OECD Main Economic Indicators
Belgium	Interbank rate (3-months rates and yields)	OECD Main Economic Indicators
Denmark	Money market rate	International Financial Statistics
Finland	Interbank rate (3-months rates and yields)	OECD Main Economic Indicators
France	Money market rate	International Financial Statistics
Germany	Interbank rate (3-months rates and yields)	OECD Main Economic Indicators
Italy	Government bill rate	International Financial Statistics
Japan	Deposit rate	Bank of Japan
Netherlands	Interbank rate (3-months rates and yields)	OECD Main Economic Indicators
Norway	Deposit rate	International Financial Statistics
Portugal	Interbank rate (3-months rates and yields)	OECD Main Economic Indicators
Spain*	Money market rate	International Financial Statistics
Switzerland	Deposit rate	Schweizerische Nationalbank (SNB)
United Kingdom	Deposit rate	Bank of England
United States	Money market rate	International Financial Statistics

Notes: * Data is missing for 2018.

2.2 Bond returns

For all countries, we update both total bond return and yield to maturities of government bonds that are issued in local currency. As in Jordà et al. (2019), we target the maturity of around 10 years throughout 2016-2020. For country-specific yield to maturities, we utilize 10-year benchmark government bond redemption yields from the OECD Statistics that are available for all countries in the RORE database.[1] For total bond returns, we use different data sources, which we present in Table 2. Note that in Jordà et al. (2019), total government bond returns of Australia, Finland, Italy, Japan, Netherlands, and Norway are estimated using micro-level data on government bonds. We adapt this method and extend their existing micro-level dataset with latest bond information up to 2020 and re-estimate total returns of the respective countries from 1988 to 2020. This explains the differences of the updated total bond returns series from the previous version.

2.3 Equity returns

Starting from 2016, we update equity returns series (total returns, capital gains, and dividend returns and yields) using Fama-French excess return factor provided by Kenneth R. French. A

[1] https://stats.oecd.org/

Table 2: Data sources: Bond total returns, 2016-2020

Year	Data description	Data source
Australia	Average of total returns on micro-level Australian government bonds, targeting 10-year maturity	Datastream
Belgium	Total return on Belgium benchmark 10-year government bond index	Datastream
Denmark	Total return on Danish benchmark 10-year government bond index	Datastream
Finland	Average of total returns on Finnish government bonds, targeting 10-year maturity	Own calculation
France	Total return on French benchmark 10-year government bond index	Datastream
Germany	Total return on German benchmark 10-year government bond index	Datastream
Italy	Average of total returns on Italian government bonds, targeting 10-year maturity	Own calculation
Japan	Average of total returns on Finnish government bonds, targeting 10-year maturity	Own calculation
Netherlands	Total return on Netherlands benchmark 10-year government bond index	DataStream
Norway	Average of total returns on Norwegian government bonds, targeting 10-year maturity	Own calculation
Portugal	Average of total returns on Portuguese government bonds, targeting 10-year maturity	Own calculation
Spain	Total return on the Spanish benchmark 10-year government bond index	Datastream
Sweden	Total return on the Swedish benchmark 10-year government bond index	Datastream
Switzerland	Total return on Swiss benchmark 10-year government bond index	Datastream
United Kingdom	Total return on the United Kingdom benchmark 10-year government bond index	Datastream
United States	Total return on the United States benchmark 10-year government bond index	Datastream

detailed description of the estimation method is provided by Fama and French (1993) and on the website of Kenneth R. French Data Library.[2] Specifically, the database provides data on total returns ($R_{i,t}^{equity}$), as well as returns without dividends, i.e. capital gains ($cg_{i,t}^{equity}$). Using these two measures, we are then able to calculate equity dividend yields as

$$d_{i,t}^{equity} = R_{i,t}^{equity} - cg_{i,t}^{equity}. \tag{1}$$

Kenneth R. French Data Library covers almost all countries in the JST database except for Portugal and the United States.[3] Therefore, for Portugal, we follow the previous data source of Jordà et al. (2019) and utilize the Portuguese Stock Index of all shares to calculate total equity returns, and Euronext Lisbon close price index to calculate capital gain rates. For the US, we utilize data by Robert Shiller, which is available on the website of Robert Shiller.[4] We calculate growth rates of the S&P Composite Price Index to calculate capital gain rates and the growth rate of nominal dividend serves as dividend yields. The sum of these two rates results in US total equity returns.

Finally, we test the comparability of the Fama French equity returns data with those of Jordà et al. (2019). Figure 1 presents the comparing results for total equity returns and Figure 2 equity capital gain rates of Australia, France, Germany, Italy, Sweden, and UK.[5] Reassuringly, both time series align very well.

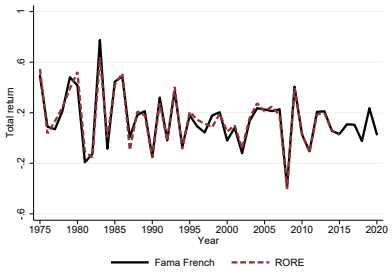
[2] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[3] For the US, the database only provides data on total excess returns and no data on excess returns excluding dividends.

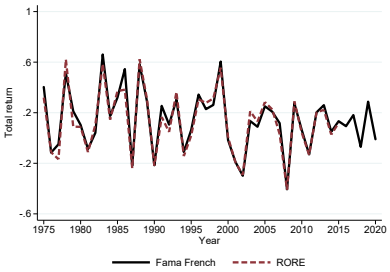
[4] http://www.econ.yale.edu/ shiller/data.htm

[5] We do not present the results for all countries in the documentation. Nevertheless, RORE equity returns and Fama-French equity returns are very similar for all countries in the JST database.

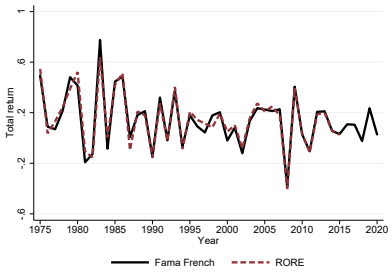
Figure 1: R^{equity} comparison: Fama-French vs. RORE



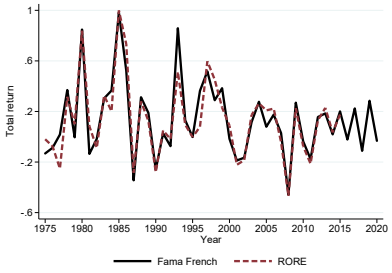
(a) Australia



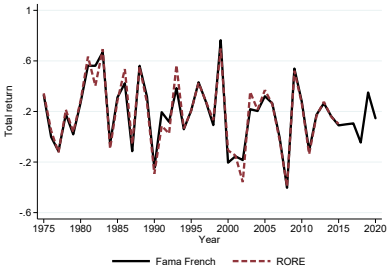
(b) France



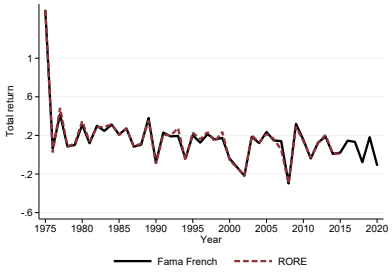
(c) Germany



(d) Italy

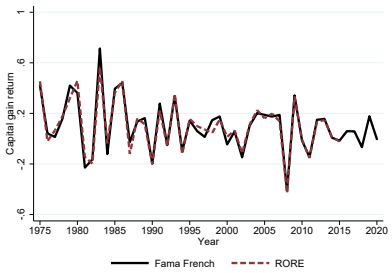


(e) Sweden

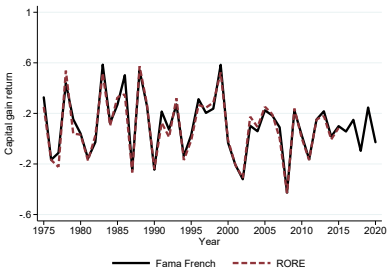


(f) United Kingdom

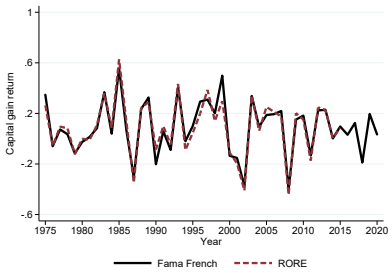
Figure 2: cg^{equity} comparison: Fama-French vs. RORE



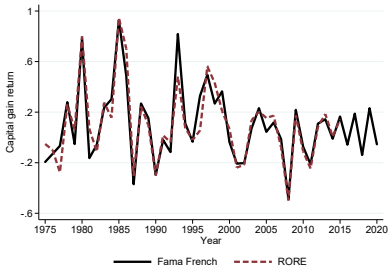
(a) Australia



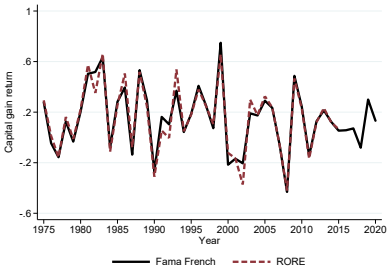
(b) France



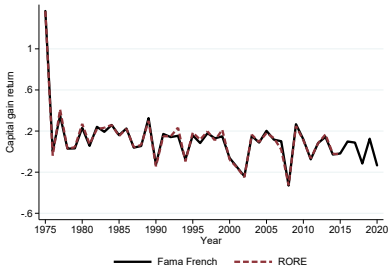
(c) Germany



(d) Italy



(e) Sweden



(f) United Kingdom

2.4 Housing returns

We apply the rent-price approach of Jordà et al. (2019) to update housing returns and rental yield rates during 2016-2020.[6] The advantage of the rent-price approach is that all returns are calculated based on the rent-price ratio of a benchmark year, such that we only necessitate growth rates of prices and rents to extend the returns series up to 2020.[7] All data of country-specific nominal house price indices are downloaded via OECD Statistics.[8] Data on country-specific rental price indices are extracted by various sources that we present in Table 3.

2.5 Composite returns

We also update composite returns of Jordà et al. (2019) such as the rate of return on safe assets, risky assets, and aggregate wealth, as weighted averages of the individual asset returns. For each asset class, we utilize their outstanding stocks in a given country as weights. For government debt (bill and bonds), we utilize data on public debt-to-GDP, which is available in the JST database. For housing, we obtain value of total dwellings (as % of GDP) for all countries from the OECD Statistics.[9] In Table 4 we present the data availability for value of total dwellings. Note that for Switzerland, data on total dwellings are not available. For equity, we use various data sources based on Kuvshinov and Zimmermann (2022) to collect data on stock market capitalization (as % of GDP). Table 5 presents the data sources of stock market capitalization.

[6] For a detailed description of the rent-price approach, please see Documentation - Returns Data on https://www.macrohistory.net/database/.

[7] The assumption is that there is no need to correct for changes in the housing stock.

[8] https://stats.oecd.org/

[9] Balance sheets for non-financial assets of the respective countries.

Table 3: Data sources: Rent price indices, 2016-2020

Year	Data description	Data source
Australia	Weighted average of eight capital cities	Australian Bureau of Statistics
Belgium	CPI: Indexes by product group from 1998	Belgisches Statistikamt
Denmark	CPI (2015=100) by commodity group and unit	Statistics Denmark
Finland*	Rent index (2015=100) and average rents per square meter	Statistics Finland
France	Annual HICP: Actual rentals paid by tenants	Statistics France
Germany	CPI: Jahre, Klassifikation der Verwendungszwecke des Individualkonsums	Statistisches Bundesamt (DESTATIS Genesis)
Italy	Nic annual average: Ecoicop classification	Italian National Institute of Statistics (Istat)
Japan	CPI 2015-Base Consumer Price Index	Statistics Japan
Netherlands	CPI: Rent increase for dwellings	Database of Statistics Netherlands (Statline)
Norway*	03014: Consumer Price Index	Statistics Norway
Portugal	The Harmonized CPI "Actual Rentals for Housing (04.1)"	Federal Reserve Economic Data
Spain**	04110 Actual rentals paid by tenants	Statistics Spain
Sweden*	CPI, annual averages (by COICOP), 1980=100	Statistics Sweden
Switzerland	04.1/2 Miete	Switzerland Federal Statistical Office
United Kingdom	RPI: housing: rent (Jan 1987=100)	Office for National Statistics
United States	Rent of primary residence in U.S. city average, all urban consumers, not seasonally adjusted	Federal Reserve Economic Data

Notes: *Data is missing for 2020
** Data is missing for 2019 and 2020

Table 4: Value of total dwellings (% GDP), data availability during 2016-2020

Year	Data availability
Australia	From 2016 to 2020
Belgium	From 2016 to 2020
Denmark	From 2016 to 2020
Finland	From 2016 to 2019
France	From 2016 to 2020
Germany	From 2016 to 2020
Italy	From 2016 to 2020
Japan	From 2016 to 2020
Netherlands	From 2016 to 2020
Norway	From 2016 to 2019
Portugal	From 2016 to 2019
Spain	From 2016 to 2018
Sweden	From 2016 to 2019
Switzerland	No data published
United Kingdom	From 2016 to 2020
United States	From 2016 to 2020

Notes: Data source: OCED Statstics 9B. Balance sheets for non-financial assets - N1111: Dwellings

Using these weights, we are able to calculate composite returns. For safe assets, we follow the assumption of Jordà et al. (2019) and assume total public debt is divided equally into bonds and bills. Then, the safe asset return is

$$\text{Safe return:} \quad R_{i,t}^{safe} = \frac{R_{i,t}^{bill} + R_{i,t}^{bond}}{2}. \tag{2}$$

Risky asset returns are the weighted average of equity returns and housing returns. Weights w represent the share of these two asset holdings in the respective country i at year t, where $w_{i,t}^{equity} + w_{i,t}^{housing} = 1$. We then calculate risky returns as:

$$\text{Risky return:} \quad R_{i,t}^{risky} = R_{i,t}^{equity} \times w_{i,t}^{equity} + R_{i,t}^{bond} \times w_{i,t}^{housing}. \tag{3}$$

Finally, we also construct a measure on total return on wealth as the weighted average of returns on risky assets (equity and housing) and safe assets (bonds and bills). Again, the weights w are scaled such that $w_{i,t}^{equity} + w_{i,t}^{housing} + w_{i,t}^{bill} + w_{i,t}^{bond} = w_{i,t}^{risky} + w_{i,t}^{safe} = 1$.

$$\text{Return on wealth:} \quad R_{i,t}^{wealth} = R_{i,t}^{risky} \times w_{i,t}^{risky} + R_{i,t}^{safe} \times w_{i,t}^{safe}. \tag{4}$$

Table 5: Data sources: Stock market capitalization (% GDP), 2016-2020

Year	Data source
Australia	World Federation of Exchanges
Belgium	World Federation of Exchanges
Denmark	ECB Statistical Data Warehouse, Security Issues Statistics
Finland	ECB Statistical Data Warehouse, Security Issues Statistics
France	ECB Statistical Data Warehouse, Security Issues Statistics
Germany	Bundesbank database (Series BBK01.WU0178)
Italy	ECB Statistical Data Warehouse, Security Issues Statistics
Japan	World Federation of Exchanges
Netherlands	World Federation of Exchanges
Norway*	World Federation of Exchanges
Portugal	ECB Statistical Data Warehouse, Security Issues Statistics
Spain	World Federation of Exchanges
Sweden	ECB Statistical Data Warehouse, Security Issues Statistics
Switzerland	Swiss Stock Exchange
United Kingdom*	ECB Statistical Data Warehouse, Security Issues Statistics
United States	World Federation of Exchanges

Notes: Capitalization data include all country-specific firms listed in their respective countries.
* Data is missing for 2020

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