

Version

1

HISTORICAL CROSS-COUNTRY
TECHNOLOGY ADOPTION DATASET

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Help file &
User Guide

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HCCTAD Help File and User Guide

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Disclaimer:

The HCCTAD data and programs are provided as is. The authors and their employers are not responsible for mistakes in the dataset or programs. If you find any mistakes in the data or bugs in the program please report them to Bart Hobijn.

The views expressed in this manual are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System as a whole.

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Introduction

The Historical Cross Country Technology Adoption Dataset is a dataset that was collected to allow for the analysis of the adoption patterns of some of the major technologies introduced in the past 250 years across the World's leading industrialized economies.

Technological progress has been at the heart of the economic growth experienced by most of the World's economies. Unfortunately, very little cross-country data is available on the adoption of various technologies across countries over the last few centuries. The aim of the Historical Cross Country Technological Adoption Dataset (HCCTAD) is to provide such a dataset.

Installation and operation

The HCCTAD dataset comes with its own software to extract data and to perform some basic data-analysis. This chapter contains a brief description of the software, how to install it and how to operate its basic functions.

The HCCTAD application is meant to give you convenient access to the Historical Cross Country Technology Adoption Dataset that we have compiled. The program is fully menu driven and allows the user to extract data from the dataset, as well as generate several types of custom graphs that could be useful when analyzing the data. The HCCTAD application cannot be run independently. Instead it has to be loaded into Excel. The advantage of having this as an Excel application is that it allows for the immediate analysis of the data that are extracted using the wealth of analytical tools available in Excel¹.

System requirements

The HCCTAD application is an Excel workbook driven by a set of macros. In order to run the application properly, you will need to have:

- A PC with Windows installed.
- Excel 97 or a later version.
- For the help function to work, you will need Adobe Acrobat Reader.
- In Excel 2000 or later, make sure that the protection level is medium, such that you are allowed to run macros. If not, Excel will refuse to run the application. To check, go to the Tools⇒Macros⇒Security menu and activate the Security level tab. Set the security level to medium (recommended) or low. When you change this setting you will have to quit Excel and reload it for the setting to take effect.

Excel 2000 or later

In order to allow Excel to run the macros that drive the HCCTAD application, you will have to set the security level to medium

¹ The ZIP file also includes an ASCII file with the raw data. A description of that file is at the end of this chapter.

Installation

All you have to do to install the HCCTAD database is to unzip all the files in the zipfile HCCTAD.zip to one directory. It is preferred that you unzip the HCCTAD-files to a separate directory, although the program will also work when included in a directory with other files. There is nothing more you have to do to install.

To run the HCCTAD application, you have two options:

- Double-click the file HCCTAD.xls in the Windows Explorer and the file will be opened in Excel.
- Open Excel first, or if it is already open, and then load the workbook HCCTAD.xls into Excel.

In order for the help function in the worksheet to work, make sure that this file is in the same directory as the Excel file (a version of this file should have been unzipped together with the HCCTAD Excel workbook). Whenever you choose the help function in HCCTAD it will start Adobe Acrobat (Reader) and load this file.

Using the HCCTAD software

HISTORICAL CROSS COUNTRY TECHNOLOGY ADOPTION DATASET

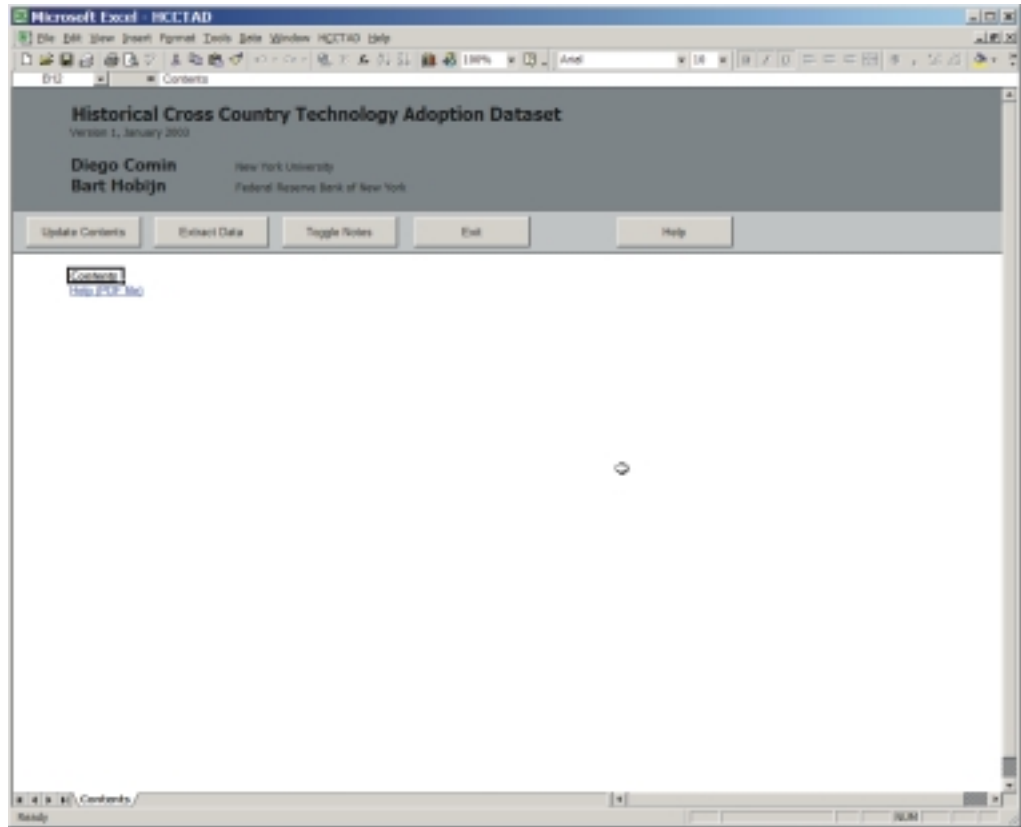


FIGURE 1 The HCCTAD main worksheet

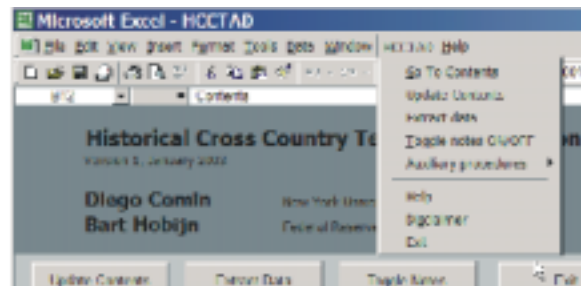


FIGURE 2 The HCCTAD menu

The menu offers the same options as the main buttons, namely to update the contents sheet, extract data, toggle the data notes sheet on and off, help, and exit. Besides these options the menu offers a bit more functionality. It offers the option to go to the main Contents sheet, without having to click the Contents sheet tab. In order to do so, use the “Go To Contents” option. It offers the option to read the disclaimer, which states that the authors are not responsible for mistakes in the data and programs. Finally, it has a submenu with auxiliary procedures. These auxiliary procedures are procedures

HISTORICAL CROSS COUNTRY TECHNOLOGY ADOPTION DATASET

that turned out to be useful in the analysis of the data. The current version has two of them:

Timelines: This procedure offers you to make a plot of time series for either one technology and several countries, or several technologies for one country. The time series that are plotted simply depict the availability of data for the combination of country-technology for a particular year. This plot is generated in a new worksheet. At the end of the procedure you are given the option to give it the name you desire.

Distance plots: This function generates a new worksheet with time series that measure “adoption lags”. Adoption lags are measured as follows. Let X_{it} be a measure of technology adoption for country i at time t .

Pivot tables

The sheet that contains the extracted data is an Excel pivot table. Pivot tables are very flexible and you can rearrange the data by dragging and dropping the elements in the rows and the columns. More information on Pivot tables is available at

<http://www.microsoft.com/office/previous/xp/columns/column11.asp>

ASCII file

If you prefer not to use the Excel application, you can use the ASCII file HCCTAD.txt which is also provided in the zip file. The first column of the file contains the variable, the second the year and the other columns correspond to the countries. Missing values are encoded as ‘.’.

**HISTORICAL CROSS COUNTRY
TECHNOLOGY ADOPTION DATASET**

Troubleshooting

The following is a list of problems that you might encounter and possible ways to solve them.

Problem: Excel does not allow me to run the macros in the workbook.

Solution: Check whether you have set the macro security level to medium or low. Please refer to the system requirements section for instructions on how to do so.

Problem: Worksheet does not run or I get error messages when running it.

Solutions: The two most reasons for this are

(i) Your version of Excel is not compatible. The application is developed for Excel for Windows, version 97 or later.

(ii) You are running the application while other workbooks are open that interfere with it. Close all other workbooks and try again.

(iii) Some of the crucial components of the application have been changed after you downloaded it. Just download it again and reinstall.

Problem: Some menus and windows 'drop off' the screen.

Solution: This has most likely to do with your Windows display settings. Try and change them to a higher resolution. If that is not possible on the computer you are running the application, your best bet is to find a better computer.

Problem: I exited the HCCTAD file in a non-standard way (e.g. your computer froze) and started Excel again. When I did so, the HCCTAD menu was still there and when I loaded the HCCTAD workbook there were two HCCTAD menus.

Solution: When exited properly, the HCCTAD application will remove all versions of the HCCTAD menu. Hence, just reload the HCCTAD application and close it properly.

If you encounter any other problems, please report them to [Bart Hobijn](#).

Description of data

The following is a general description of the available data series. The dataset has three dimensions. Just like many other datasets in economic growth it covers a set of countries over a (long) period of time. What is very different is that the dataset covers an array of different technologies and their adoption patterns.

Years, countries, and technologies

The HCCTAD covers technology adoption along three dimensions, namely over time, cross-country, and cross-technology.

In terms of time, the dataset covers nearly two and a half centuries. With its first observations on the size of the merchant fleets dating back to 1788 and its most recent observations being from 2001.

Because of data availability and reliability issues, the set of countries covered in the dataset is limited to the leading 23 industrialized countries in the World. These are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States.

Not all these countries have existed or had the same shape over the whole period covered in the data. Countries like Belgium, Finland, and Ireland came into existence after 1788, while Austria, Germany, and even the United States have seen major changes in their borders. In most cases we have maintained the definition of the countries adhered to by our datasources. This implies that in the early years, data reported for Belgium, Finland, and Ireland are imputed. The early data for Austria are generally for Austria-Hungary. For Germany we mostly have the convention that our data up till World War II covers Germany, between WWII and reunification it covers West-Germany. An exception to this is the data on steel, which are even for West-Germany before WWII.

The remainder of this chapter contains a description of all the variables in the dataset with a reference to their respective sources.

**HISTORICAL CROSS COUNTRY
TECHNOLOGY ADOPTION DATASET**

Aviation - PKM, Commercial aviation, million passenger kilometers. *Source*: Mitchell (1998a,b,c)

Aviation - TKM, Commercial aviation, million freight ton kilometers. *Source*: Mitchell (1998a,b,c)

Commercial cars, Thousands of commercial vehicles. *Source*: Mitchell (1998a,b,c)

Constraint on Executive, A seven category scale, from 1 to 7, with a higher score indicating more constraints. Score of 1 indicates unlimited authority, score of 3 indicates slight to moderate limitations, score of 5 indicates substantial limitations, score of 7 indicates executive parity or subordination. *Source*: Acemoglu et. al. (2002).

Energy output, 10 MWhrs of electricity output. *Source*: Mitchell (1998a,b,c) and World Bank (2001).

Exports, Exports in 1000 current U.S. Dollars. *Source*: Banks (1976).

Exports - 2, Exports in millions of local currency. *Source*: Mitchell (1998a,b,c)

Freight traffic on railways, Million metric tons of freight transported on railways. *Source*: Mitchell (1998a,b,c) and World Bank (2001).

Freight traffic on railways - 2, Million metric ton kilometers of freight transportation by railways. *Source*: Mitchell (1998a,b,c) and World Bank (2001).

Imports, Imports in 1000 current U.S. Dollars. *Source*: Banks (1976).

Imports - 2, Imports in millions of local currency. *Source*: Mitchell (1998a,b,c)

Industrial robots, number of industrial robots used in manufacturing sectors. *Source*: IFR (various years). *Note*: Some countries have slightly different definitions of what exactly is an industrial robot. Especially Japan seems to overreport the number of robots in the IFR survey.

Length of railway line open, measured in km. *Source*: Mitchell (1998a,b,c)

Literacy rate, fraction of population above 15 that is able to read and write. *Source*: Banks (1976)

Mail, million units handled. *Source*: Mitchell (1998a,b,c)

Mobile phones, thousand of mobile phones owned. *Source*: World Bank (2001)

Nominal GDP, measured in millions of local currency. *Source*: Mitchell (1998a,b,c). Some of the early data is NNP rather than GDP. Please refer to Mitchell (1998a,b,c) for all the details.

**HISTORICAL CROSS COUNTRY
TECHNOLOGY ADOPTION DATASET**

Number of ships - all, number of ships in the merchant fleet. *Source*: Mitchell (1998a,b,c). This series is highly incomplete. For most countries it is more preferable to use the equivalent total tonnage series.

Number of ships - motor, number of motorships. *Source*: Mitchell (1998a,b,c). This series is highly incomplete. For most countries it is more preferable to use the equivalent total tonnage series.

Number of ships - sail, number of sailships. *Source*: Mitchell (1998a,b,c). This series is highly incomplete. For most countries it is more preferable to use the equivalent total tonnage series.

Number of ships - steam, number of steamships. *Source*: Mitchell (1998a,b,c). This series is highly incomplete. For most countries it is more preferable to use the equivalent total tonnage series.

Number of ships - steam and motor, number of steam- and motorships. Some countries do not distinguish between steam- and motorships. For them there is this aggregate. *Source*: Mitchell (1998a,b,c). This series is highly incomplete. For most countries it is more preferable to use the equivalent total tonnage series.

Passenger traffic on railways, in millions of passengers. *Source*: Mitchell (1998a,b,c)

Passenger traffic on railways - 2, in millions of passenger kilometers. *Source*: Mitchell (1998a,b,c)

Personal computers, thousands of PCs. *Source*: World Bank (2001)

Phones, thousands of mainland phones. *Source*: Mitchell (1998a,b,c) and World Bank (2001)

Population, measured in thousands of persons. *Source*: Maddison (1995) and World Bank (2001). Data through 1994 are taken from Maddison and then are extrapolated based on population growth rates taken from the World Bank's (2001) World Development Indicators. For early years, missing data has been interpolated assuming a constant population growth rate between observations.

Primary enrollment, measured as number of students in primary school as a fraction of the population in the age range 5-14. *Source*: Banks (1976) and Mitchell (1998a,b,c). The number of students enrolled is taken from Banks (1976) while the population in the age range 5-14 is taken from Mitchell (1998a,b,c). For missing years this population is interpolated assuming a constant growth rate of the population in this age group. *Note*: Historical education measures are notoriously unreliable because of the different definitions of primary and secondary education across countries and the way the number of pupils are measured. We have found that the primary enrollment rates that

HISTORICAL CROSS COUNTRY TECHNOLOGY ADOPTION DATASET

we constructed here have a very low correlation with those reported by the World Bank (2001) for the overlapping years in the beginning of the 1970's.

Private cars, Thousands of privately owned vehicles. *Source:* Mitchell (1998a,b,c) and World Bank (2001)

Protection for capital, A seven category scale, from 1 to 7, with a higher score indicating more constraints. Score of 1 indicates no protection, score of 3 indicates slight to moderate protection (e.g. city charters), score of 5 indicates substantial protection (e.g. legislative representation for merchants), score of 7 indicates complete protection (e.g. merchants control the executive). *Source:* Acemoglu et. al. (2002)

Radios, thousands of radios 'owned'. *Source:* Banks (1976). This series has well-known definitional problems. For some countries this is the number of radios owned for others it is the number of radio-permits. We have compared this with the data from Mitchell (1998) and the World Bank (2001) and none of these series seems to match up very well.

Real GDP, measured in million 1990 international Stone-Geary dollars. *Sources:* Madisson (1995) and Kraay (2000). Data through 1994 are taken from Madisson and then are extrapolated based on real GDP growth rates taken from Kraay (2000).

Secondary enrollment, measured as number of students in secondary school as a fraction of the population in the age range 15-19. *Source:* Banks (1976) and Mitchell (1998a,b,c). The number of students enrolled is taken from Banks (1976) while the population in the age range 15-19 is taken from Mitchell (1998a,b,c). For missing years this population is interpolated assuming a constant growth rate of the population in this age group. *Note:* Historical education measures are notoriously unreliable because of the different definitions of primary and secondary education across countries and the way the number of pupils are measured. We have found that the secondary enrollment rates that we constructed here have about a 0.6 correlation with those reported by the World Bank (2001) for the overlapping years in the beginning of the 1970's.

Steel – acid Bessemer, thousands of metric tons of crude steel produced using acid Bessemer method. *Source:* UNECE (various years) and IISI (various years)

Steel – basic Bessemer, thousands of metric tons of crude steel produced using basic Bessemer method. *Source:* UNECE (various years) and IISI (various years)

Steel – open hearth, thousands of metric tons of crude steel produced using open hearth furnace. *Source:* UNECE (various years) and IISI (various years)

Steel – blast oxygen, thousands of metric tons of crude steel produced using blast oxygen furnace. *Source:* UNECE (various years) and IISI (various years). Only from 1960 did the UNECE separately measure steel production in blast oxygen furnaces.

**HISTORICAL CROSS COUNTRY
TECHNOLOGY ADOPTION DATASET**

Steel – electric, thousands of metric tons of crude steel produced using electric arc furnace. *Source*: UNECE (various years) and IISI (various years)

Steel – other, thousands of metric tons of crude steel produced using other non-classified methods. *Source*: UNECE (various years) and IISI (various years). Before 1960 this classification also contains steel produced in blast oxygen furnaces. This is particularly relevant for Austria and Germany.

Telegraph, number of telegrams, in thousands. *Source*: Mitchell (1998).

Textiles – mule spindles, thousand of mule spindles in operation. *Source*: Saxonhouse and Wright (2000) and IFMCSMA (various editions)

Textiles – ring spindles, thousand of ring spindles in operation. *Source*: Saxonhouse and Wright (2000) and IFMCSMA (various editions)

Tonnage - all, total tonnage of registered merchant ships. *Source*: Mitchell (1998).

Tonnage - motor, total tonnage of registered motorships in merchant fleet. *Source*: Mitchell (1998).

Tonnage - sail, total tonnage of registered sailships in merchant fleet. *Source*: Mitchell (1998).

Tonnage - steam, total tonnage of registered steamships in merchant fleet. *Source*: Mitchell (1998).

Tonnage – steam and motor, total tonnage of registered steam- and motorships in merchant fleet. Some countries do not distinguish between steam- and motorships. For them there is this aggregate. *Source*: Mitchell (1998).

Trade - Country, dyadic trade data, i.e. sum of imports and exports of particular country measured in millions of current US Dollars from and to the country listed in the dataset. *Source*: Barbieri (1998)

Trade - Country, total trade, i.e. sum of exports and imports, measured in millions of current US Dollars. *Source*: Barbieri (1998)

Urbanization, Percentage of population living in urban areas. *Source*: Acemoglu et. al. (2002)

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