Technical notes

Country income groups

This report uses the World Bank income classification to refer to particular country groups. The classification is based on gross national income per capita in 2016 and establishes the following four groups: low-income economies (USD 1,005 or less); lower middle-income economies (USD 1,006 to USD 3,955); upper middle-income economies (USD 3,956 to USD 12,235); and high-income economies (USD 12,236 or more).

More information on this classification is available at http://data.worldbank.org/about/country-classifications.

IP mappings

The case studies in chapters 2, 3 and 4 rely on mappings of patents and trademarks developed for this report. The patent data for these mappings come mainly from the WIPO Statistics Database, the EPO Worldwide Patent Statistical Database (PATSTAT, April 2017) and the USPTO Trademark Case Files and Assignment Datasets (2016). Key methodological elements underlying the mapping exercise include the following.

Unit of analysis

The main unit of analysis in patent data is the first filing of a given invention. Mappings include data on utility models whenever available. The date of reference for patent counts is the date of first filing. The origin of the invention is attributed to the first applicant in the first filing; whenever this information was missing an imputation strategy has been applied, as described further below.

The only departure from this approach occurs when analyzing the share of patent families requesting protection in each patent office (e.g., see figures 2.8 or 3.12). In this case, an extended patent family definition – known as the INPADOC patent family – has been used instead of the one relying on first filings. In addition, only patent families with at least one granted application have been considered for this analysis, and the date of reference is the earliest filing within the same extended family. The main rationale for using the extended patent family definition and imposing at least one granted patent within the family is to mitigate any underestimation arising from complex subsequent filing structures, such as continuations and divisionals, and from small patent families of lower quality such as those filed in only one country and either rejected after or withdrawn before examination.

The unit of analysis in trademark data is any filing for trademark protection at any of the sources employed – namely the USPTO, the Madrid System and the national offices included in WIPO's Global Brands Database. This definition includes trademarks for both products and services. It also includes renewals of existing trademarks and trademarks claiming a priority based on existing trademarks.

Imputing country of origin

When information about the first listed applicant's country of residence in the first patent filing was missing, the following sequence was adopted: (i) extract country information from the applicant's address; (ii) extract country information from the applicant's name; (iii) make use of the information from matched corporations (as described further below); (iv) rely on the most frequent first applicant country of residence within the same patent family (using the extended patent family definition); (v) rely on the most frequent first inventor's country of residence within the same patent family (again, using the extended patent family definition); and (vi) for some remaining historical records, consider the IP office of first filing as a proxy for origin.

Mapping strategies

The patent mapping strategy for each of the three sectors is based on existing evidence and experts' suggestions. Each strategy was tested against existing alternative sources whenever possible.

The coffee patent mapping is based on the following combination of CPC and IPC symbols and keywords sought in titles and abstracts.

IPC/CPC symbols: A01D46/06, A23C11/00, A23F5*, A23L27/00, A23L27/10, A23L27/28, A23N12/06, A23N12/08, A47G19/14, A47G19/145, A47G19/20, A47J42*, A47J31* and C07D473/12.

Including keywords: *coffe*; caffe*; espresso; cappuccino; robusta; arabica; fertilizer** AND *coffe*; fertilizer** AND *robusta; fertilizer** AND *arabica; coffe** AND (*arabica* OR *robusta*).

Excluding keywords: *coffee table; cleaning system for a coffee machine; coffee cream; coffee pot holder; coffee stirrer; coffee maker pod holder; coffee latte printer; coffer*; method and structure for increasing work flow; not a product selected*

from coffee; cosmetic; cleaning agent; washing agent; smart home; dietary fiber; repellent; residues; grevillea; food; malus; eucalyptus; hypsipyla robusta moore; health; wine; leaf; cannot place coffee cup; coffee stain; coffee car*; coffee by-products; coffee shop 510; extract; coffee owner board.*

These patents are classified in five segments of the coffee supply chain as follows:

Coffee farming: A01B; A01C1/00; A01C11/00; A01C13/00; A01C14/00; A01C15/00; A01C17/00; A01C19/00; A01C21/00; A01C5/00; A01C7/00; A01G11/00; A01G7/00; A01G9/00; A01H1/00; A01H3/00; A01H4/00; A01H5/00; A01M1/14; A01N25/00; A01N27/00; A01N29/00; A01N31/00; A01N33/00; A01N35/00; A01N37/00; A01N39/00; A01N41/00; A01N43/00; A01N45/00; A01N47/00; A01N49/00; A01N51/00; A01N53/00; A01N55/00; A01N57/00; A01N59/00; A01N61/00; A01N63/00; A01N65/00; C12N15/00.

Harvesting and post-harvesting: A01D46/06; A01D46/30; A47J42/00; B02B1/02; B02B1/04; C02F1/00; C02F3/00; C02F5/00; C02F7/00; C02F9/00; F26B11/04; F26B21/10; F26B23/10; F26B9/08; G01N7/22; G06K9/46; G06T7/40.

Raw material storage and transportation: A01F25/00; A23F5/00; A23N12/02; B03B5/66; B65B1/00; B65B3/00; B65B35/00; B65B7/00; B65G65/00; C02F1/00; C02F3/00; C02F5/00; C02F7/00; C02F9/00; E04H7/00; G01G1/00; G01G11/00; G01G13/00; G01G15/00; G01G19/00; G01G21/00; G01G23/00; G01G3/00; G01G5/00; G01G7/00; G01G9/00; G01N.

Bean processing: A01D46/06; A01D46/30; A23F3/36; A23F5/00; A23F5/02; A23F5/04; A23F5/08; A23F5/10; A23F5/12; A23F5/14; A23F5/18; A23F5/20; A23F5/22; A23F5/24; A23F5/26; A23F5/28; A23F5/30; A23F5/32; A23F5/36; A23F5/46; A23F5/48; A23L3/44; A23N12/10; A23N12/12; A47J31/42; A47J37/06; A47J42/00; A47J42/20; A47J42/52; B07B4/02; B07C7/00; B07C7/04; G01N27/62; G01N30/06; G01N33/14; G06K9/46; G06T7/40.

Final distribution: A23F3/00; A23L1/234; A23L2/38; A23P10/28; A47J27/21; A47J31/00; A47J31/02; A47J31/047; A47J31/06; A47J31/10; A47J31/18; A47J31/20; A47J31/26; A47J31/34; A47J31/36; A47J31/38; A47J31/40; A47J31/42; A47J31/44; A47J31/46; A47J31/54; B01D29/35; B01D29/56; B65B1/00; B65B3/00; B65B31/02; B65B31/04; B65B35/00; B65B7/00; B65D33/01; B65D33/16; B65D85/804; B67D1/00; G06Q10/00; G06Q50/00.

The trademark mapping strategy for the coffee industry in chapter 2 is based on the following keywords sought in trademark statement descriptions: *coffe*; caffe*; kaffe*; cafe*; kopi; espresso; cappuccino; robusta; arabica*.

The photovoltaic mapping is based on the following combination of CPC and IPC symbols relating to specific segments of the photovoltaic supply chain.

Silicon: C01B33/02*; C01B33/03*.

Ingots/wafers: C30B29/06.

Crystalline cells: H01L31/036*; H01L31/037*; H01L31/038*; H01L31/039*; Y02E10/541; Y02E10/545; Y02E10/546; Y02E10/547; Y02E10/548.

New material cells: H01L31/0687*; H01L31/073*; H01G9/20*; Y02E10/542; Y02E10/543; Y02E10/544; Y02E10/549; H01G9/200*; H01G9/201*; H01G9/202*; H01G9/203*; H01G9/204*; H01G9/205*; H01G9/2063; H01G9/209*.

Other cells: H01L31/052*; H01L31/053*; H01L31/054*; H01L31/055*; H01L31/056*; H01L31/058*; H01L31/06* (excl.H01L31/0687*); H01L31/07; H01L31/072*; H01L31/074*; H01L31/075*; H01L31/076*; H01L31/077*; H01L31/078*; H02N6/*.

Modules (concentrators): Y02E10/52*.

Modules (conversion): Y02E10/56*; Y02E10/58.

Modules (others): H02S*; H01L31/042*; H01L31/043*; H01L31/044*; H01L31/045*;H01L31/046*; H01L31/047*; H01L31/048*; H01L31/049*; H01L31/05; H01L31/050*; H01L31/051*; H01G9/2068; H01G9/207*; H01G9/208*.

Production equipment: (H01L31/1876*; H01L31/188*; H01L31/206*) OR ((C23C14*; C23C16*; C23C22*; C23C24*; B32B17*; B32B27*; B32B37*; B32B38*; H01L21/67*) AND (H02S*; H01L31*; C01B33/02*; C01B33/03*; C30B29/06; H01G9/20*; H02N6/*; Y02E10/5*)).

The trademark mapping strategy for the photovoltaic industry in chapter 3 is based on the following keywords sought in trademark statement descriptions: *solar panel*; photovoltaic*; *polysilicon*; fotovoltaic*; solar module; solarmodul**.

The patent mapping strategy for the smartphone industry in chapter 4 follows a narrow and a broad definition which are based on the following combinations of CPC and IPC symbols, respectively:

Narrow IPC/CPC symbols: H04M1/247; H04M1/2471; H04M1/2477; H04M1/72519; H04M1/72522; H04M1/72525; H04M1/72527; H04M1/7253; H04M1/72533; H04M1/72536; H04M1/72538; H04M1/72541; H04M1/72544; H04M1/72547; H04M1/7255; H04M1/72552; H04M1/72555; H04M1/72558; H04M1/72561; H04M1/72563; H04M1/72566; H04M1/72569; H04M1/72572; H04M1/72575; H04M1/72577; H04M1/7258; H04M1/72583; H04M1/72586; H04M1/72588; H04M1/72591; H04M1/72594; H04M1/72597.

Broad IPC/CPC symbols: F01L1*; F02P17*; F03G5*; F04C25*; F04D27*; F16C17*; F16H61*; F16K7*; F16M11*,13*; F21S2*; F21V23*,33*; F24B1*; F24F11*; F25B21*-23*; F28D15*; G01B7*; G01B11*; G01C1*,5*,17*-22*; G01D18*; G01G19*,23*; G01J1*,3*,5*; G01K1*,7*; G01L1*,7*,17*; G01M11*,15*-17*; G01N15*, 21*,27*,29*,33*; G01P15*&21*; G01R19*-22*,27*,31*-33*; G01S1*-5*,11*-15*&19*; G01T7*; G01V3*; G01W1*; G02B1*-9*,13*,15*,21*,26*-27*; G02C7*; G02F1*; G03B5*,13*-17*,21*,35*; G03F7*; G03H1*; G04B19*,47*;G04F3*; G05B1*,11*-15*,19*-21*,24*; G05D1*-3*,7*,23*; G05F1*,5*;G06F*; G06K5*-9*,15*-19*; G06N5*,99*; G06Q10*-50*,99*; G06T*; G07B15*; G07C1*,5*,9*,13*; G07F1*,7*,17*,19*; G08B1*-6*,13*,17*,21*-25*,29*; G08C17*,19*; G08G1*; G09B5*-9*,19*,21*,29*; G09C*; G09F3*,9*,15*,19*,27*; G09G3*,5*; G10G1*,7*; G10H1*,7*; G10K11*,15*; G10L13*-25*; G11B19*,20*,27*; G11C7*-13*,16*,29*; G21C17*; H01B1*,5*,7*,11*; H01C10*; H01F17*,27*,38*; H01G4*,5*; H01H11*,13*,25*; H01L21*-33*,43*,45*,49*,51*; H01M2*,4*,10*,12*; H01P3*; H01Q1*,5*-9*,19*,21*; H01R12*,13*,24*,31*,33*,43*; H01S5*; H02B1*,7*; H02H3*,7*; H02J1*,5*,7*,17*,50*; H02M1*,3*,7*; H02N2*; H03B5*; H03C7*; H03F1*,3*; H03G3*,7*; H03H9*,11*,21*; H03J7*; H03K3*,5*,17*; H03L7*; H03M1*,3*,11*,13*; H04B1*-13*,15*,17*; H04H20*,60*; H04J1*,3*,11*,13*; H04K1*,3*; H04L1*-12*,23*-29*; H04M1*,3*,7*-11*,15*-19*; H04N1*,5*-9*,13*,17*-21*; H04Q1*-9*; H04R1*-5*,9*,17*,25*,29*; H04S7*; H04W4*-92*; H05B33*,37*; H05K.

The trademark and industrial design mapping strategy for the smartphone chapter draws on an unpublished background report by Christian Helmers, June 16, 2017. Apple, Samsung Electronics and Huawei's industrial designs and trademarks were mapped using USPTO and EUIPO data. USPC class D14 was the starting point in USPTO industrial design data, and Locarno classes 14-03 and 14-04 in the EUIPO one. The resulting data were filtered into four categories – mobile phones, GUIs, display screens and icons – using the industrial design titles. A manual check was then performed for each design patent where it was unclear whether it was a smartphone design. Industrial designs used not only for smartphones were kept.

The trademark mapping strategy for the smartphones in chapter 4 is based on keywords sought in trademark statement descriptions, such as: *smartphone* and *handheld mobile digital electronic device*. Additional filtering was applied by manually checking individual filings to verify whether they were indeed related to smartphones. Trademarks were limited to those assigned to Apple, Samsung Electronics or Huawei.

Brands

The brand mapping strategy for the coffee industry in chapter 2 is based on Premium Quality Consulting™ data (www.pqc.coffee). These data identify the most valuable brands in the U.S. coffee industry and the wave they pertain to. Brands were associated with USPTO trademark data based on the name of applicants or the mark text.

Stakeholders

The stakeholder mapping strategy for the coffee industry in chapter 2 is based on the *UKERS Tea & Coffee Global Directory & Buyers Guide* (www.teaandcoffee.net/ukers-directory). These data identify the main companies and other stakeholders in the coffee industry. The directory's categories are recategorized to match the five segments of the coffee supply chain: coffee farming, harvesting and post-harvesting, raw material storage and transportation, bean processing, and final distribution.