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BRIEF

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Where in the World are Crops Grown?

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Location matters when it comes to assessing the economic and environmental aspects of agriculture (Beddow et al. 2010). Soils and climate vary over the landscape with direct, and often profound, consequences for agricultural productivity performance, production risk and the environment. As the world's population becomes increasingly urbanized, the physical (and economic) accessibility of food is affected by the changing local and global geography of agricultural production vis-à-vis food consumption. Given the important agricultural production and food access implications of geographical location, precisely where in the world are crops grown?

Agriculture is arguably the most geographically expansive economic sector on earth. There is an estimated 13.0 billion hectares of land worldwide (FAO 2016), of which 37.9 percent (4.9 billion hectares) was used for agricultural purposes in 2013 (FAO 2016). Setting aside the agricultural areas directly devoted to livestock production, crops were cultivated on just 11.9 percent (1.6 billion hectares) of the world's land surface, or roughly 46.8 percent of the 3.6 billion hectares deemed edaphically and climatologically suitable for crop cultivation (IIASA 2000; Pardey et al. 2014).

Geographical Concentration

In 2013, the world harvested $1.64 trillion (2004-6 average PPP agricultural prices) worth of crop production (FAO 2016). While agriculture is pervasive on the planet, many geographically sensitive economic and agro-ecological factors cause the spatial concentration of production within that broad geographical extent to be especially pronounced (Table 1). In 2013, just two geopolitical regions, the High-Income countries and the East Asia and Pacific region, accounted for 44.6 percent of the world's harvested crop area, 50.4 percent of global crop production by weight, and 56.2 percent by value. East Asia and Pacific was the most dominant region, where 22.0 percent of the world's cropped area was located in 2013, 29.4 percent of crop production by weight, and 34.7 percent of crop output by value. In contrast, while sub-Saharan Africa accounted for 15.1 percent of the world's total harvested area that same year, the region accounted for only 7.9 percent of the total value of crop production (VoCP), a reflection of lower yields and lower valued crops compared with crops grown in Asia (and other parts of the world).

Table 1. Regional production statistics, 2013

Region	Production		
	Area	Quantity	Value
		(percent)	
East Asia & Pacific (EAP)	22.0	29.4	34.7
High Income (HI)	22.6	21.0	21.5
South Asia (SA)	18.0	14.7	14.9
Latin America & the Caribbean (LAC)	11.8	19.3	11.3
Sub-Saharan Africa (SSA)	15.1	7.4	7.9
Europe & Central Asia (ECA)	7.2	5.2	5.8
Middle East & North Africa (MENA)	3.4	2.9	3.9

Source: FAO (2016).
Note: In 2013, 8.36 billion metric tons of crops, valued at $1.64 trillion (2004-6 PPP dollars), were harvested from 1.29 billion hectares. Includes data for 212 countries and 157 crops.

Just four countries—in descending order of importance, China, India, United States and Brazil—accounted for a little more than half the entire world's crop production (by value) in 2013, with China and India alone accounting for over one-third of the total (Figure 1, Panel a). The top 20 crop producing countries grew three-quarters of the global VoCP, while the bottom 100 producing countries (home to 187.7 million people, or 2.6 percent of the world's 2013 population) produced a tiny 1.0 percent of the world's VoCP (Table 2). One-fifth of the bottom 100 producing countries were located in sub-Saharan Africa. Even within sub-Saharan Africa, crop production is highly concentrated. Just five countries accounted for half of the $129.5 billion of crop output in that region in 2013: Nigeria (26.8 percent), Ethiopia (5.9 percent), Tanzania (5.8 percent), Ghana (5.6 percent) and South Africa (5.4 percent). Three-quarters of this region's crop value was produced in 12 (of 47) countries.

Production by Pixels

Not only is crop production spread unevenly among geopolitical regions and countries around the world, it is also disbursed unevenly within the borders of any particular country. For example, Figure 2, Panel a shows the dispersion of crop production value among countries within sub-Saharan Africa, ignoring differences in the geography of production *within* each country. Countries shaded dark orange accounted for a relative small share of sub-Saharan Africa output value in 2005; those

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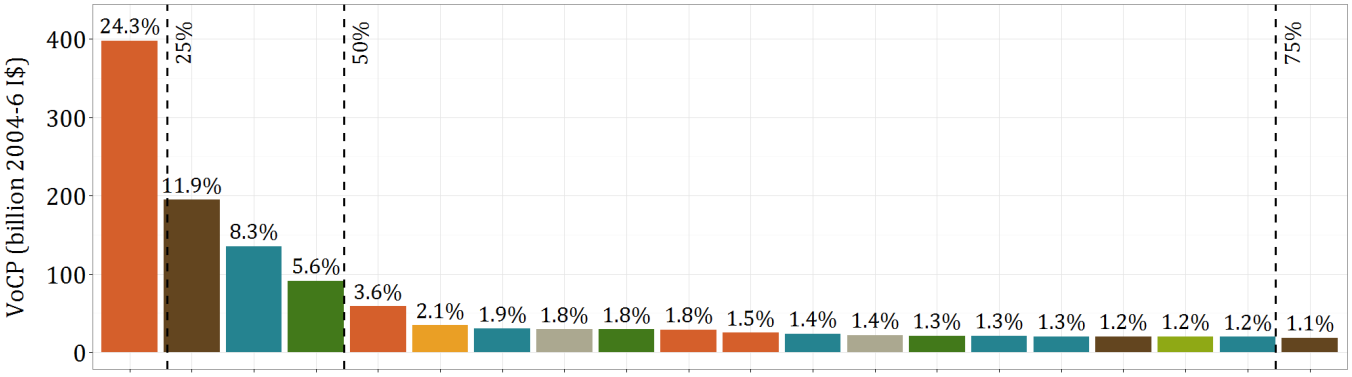
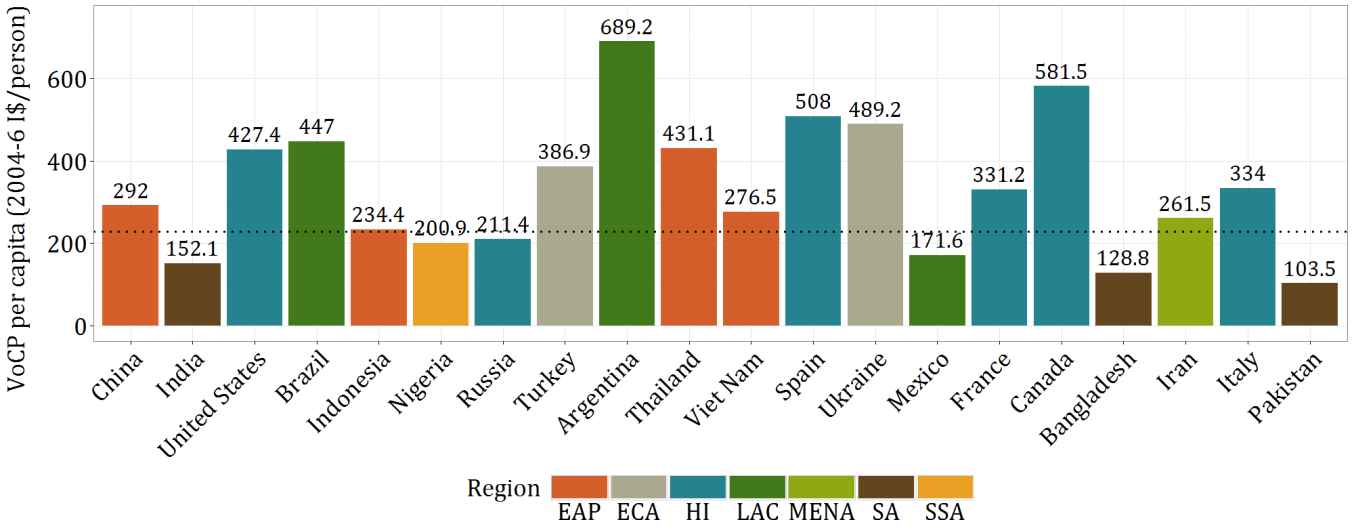
Figure 1: Value of crop production by top twenty producing countries, 2013

Panel a: VoCP



Panel b: VoCP per capita



Source: FAO (2016).
Note: Includes data for 212 countries and 157 crops. The black dotted line in Panel b represents the global average value of crop production per capita ($228.1/person). See Table 1 and Figure TN-1 for regional designations.

Table 2. Share of crop value and population, 2013

Crop Producing Countries	VoCP	Population	VoCP per Capita Mean	Min	Max
	(percent)		(2004-6 Intl.$ per person)		
Top 5	53.7	47.6	257.2	152.1	447.0
Top 10	63.1	54.6	263.2	152.1	689.2
Top 20	76.0	66.9	259.3	103.5	689.2
Bottom 100	1.0	2.6	88.0	0.4	839.2

Source: FAO (2016).
Note: Includes data for 212 countries and 157 crops.

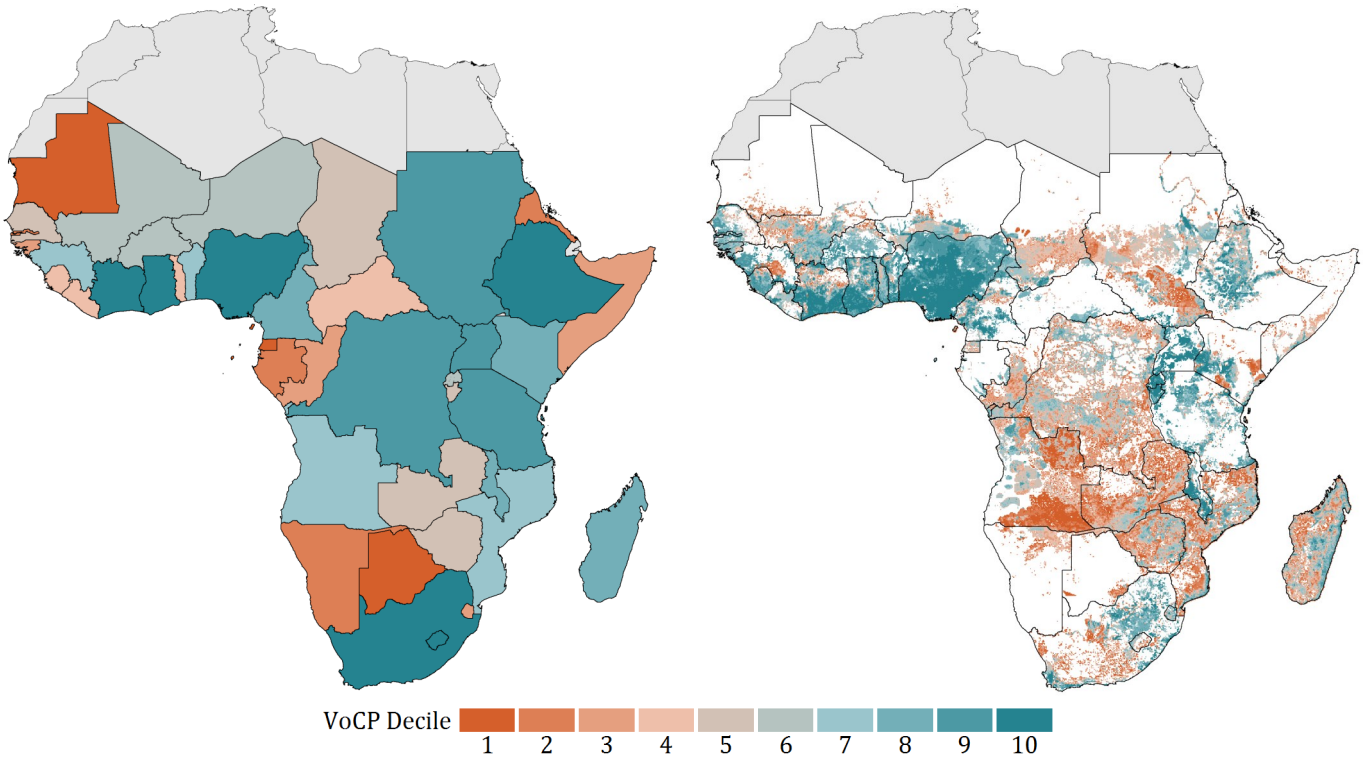
countries shaded with increasingly darker blue accounted for increasingly larger shares of the regional total. The top five producing countries (darkest blue) in 2005 were (in descending order) Nigeria, South Africa, Côte d'Ivoire, Ghana and Ethiopia, reflecting both the amount and composition (and, thus, relative unit price) of their output vis-à-vis other countries in sub-Saharan Africa. The 2005 versus 2013 country shares are of similar orders of magnitude and both reveal a spatially concentrated pattern of production, albeit with some shift in the shares and rank order of countries. In 2005, Nigeria alone accounted for 31.8 percent of the region's total VoCP (slightly more than its 2013 share), while the remaining four countries each accounted for between 4.9 to 6.0 percent of total crop output.

Figure 2, Panel b provides a much higher resolution spatial representation of the geographical extent of VoCP throughout sub-Saharan Africa than Panel a. Here crop production data are mapped by 5 arc-minute (approximately 10 kilometers at the equator) pixels rather than by country. Once again, pixels accounting for smaller shares of the regional output value are shaded dark orange; those with increasingly larger shares are increasingly darker blue. While every country in sub-Saharan Africa was involved in crop production in 2005,

Figure 2: Value of crop production in sub-Saharan Africa by country and by pixel, 2005

Panel a: By country

Panel b: By pixel



Source: Authors' construction based on You et al. (2016).

54.3 percent (i.e., 156,884 of the total of 288,955) pixels throughout the region produced no crops that year (area shaded white). These are likely to be areas that are too dry, too hot, too hilly or too distant from markets to support crop production.

Moreover, a highly ranked country in terms of crop production does not necessarily imply all the regions *within* that country are similarly high ranked. For example, not only did Nigeria account for the region's largest share of crop output by value in 2005, 49.3 percent of the country's 10,262 production pixels fell within the highest production decile within the region (i.e., visually, most of the country's cropped pixels were shaded darkest blue in Figure 2, Panel b). However, in stark contrast, while South Africa was the region's second largest crop producing country in 2005, only 10.3 percent of the country's 6,896 producing pixels fell amongst the region's top producing decile (see decile number 10, the dark blue shaded areas in the south-westerly and north-easterly parts of the country) while 13.9 percent of the country's pixels were amongst the region's lowest producing decile (see decile number 1, shaded darker orange in the central part of South Africa).

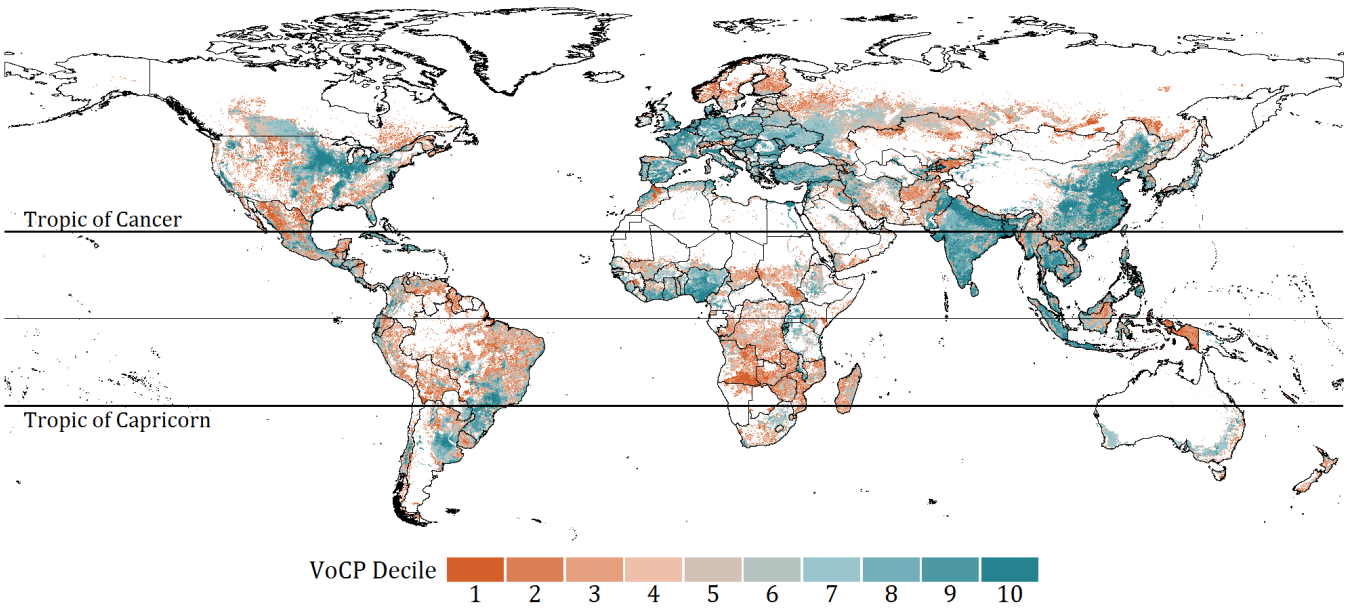
Crop Location and Concentration

Figure 3 gives an alternate, pixilated view of crop production worldwide. Once again the pixels are grouped into equally-sized (in geographical terms) deciles according to their share of global crop production (by value) with the smaller shares at the orange end of the spectrum, larger shares at the blue end. The pixels shaded white support no crop production. The top decile by value (darkest blue in Figure 3) accounted for 55.4 percent of total VoCP and consisted mainly of maize and soybeans in the United States, sugarcane in Brazil, rice and vegetables in India, rice in Bangladesh and Indonesia, and vegetables, rice, temperate fruits, maize, wheat, tropical fruits and cotton in China. The lowest decile by value (orange in Figure 3) accounted for 0.03 percent of total VoCP and consisted mainly of soybeans in Canada, vegetables and wheat in the United States, cassava, rice and beans in Brazil, temperate fruits in Norway, potatoes, vegetables and wheat in Russia, and cassava in Angola.[1] Figure 3 reveals not only the variation by geopolitical region in the location of crop production, but also the spread of production among temperate and tropical areas of the world.

These geopolitical and climatological (temperate versus tropical) differences in the concentration of production are further visualized in Figure 4, which plots the

[1] SPAM2005 includes crops such as apples, pears, stone fruits and berries in its temperate fruit category, crops such as citrus fruit, melons, avocados, pineapples and papayas in its tropical fruit category, and crops such as cabbage, lettuce, spinach, tomatoes, squash, broccoli, garlic and carrots in its vegetable category. A complete list of the FAO crops included in each of the SPAM crop aggregates can be found in Wood-Sichra et al. (2016).

Figure 3: Worldwide crop production by pixel, 2005



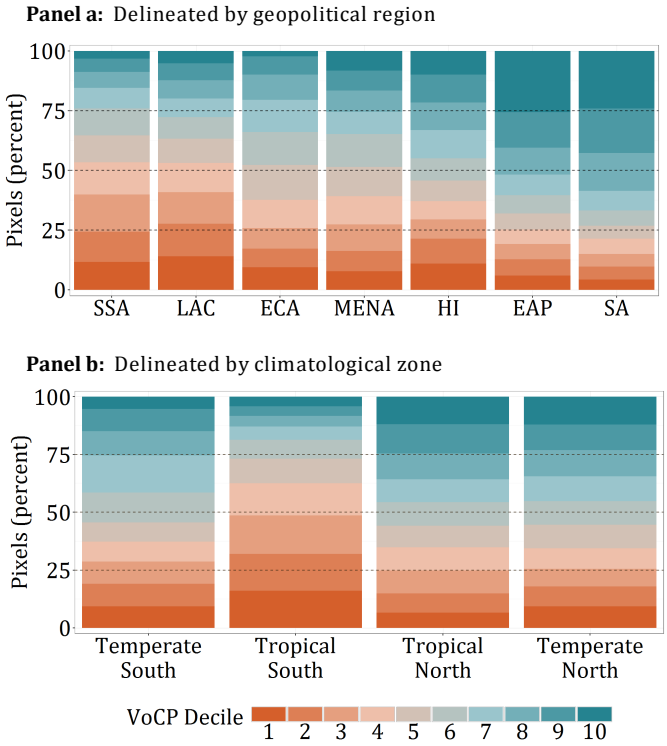
Source: Authors' construction based on You et al. (2016).

percentage of pixelated production grouped into deciles by value and arranged by geo-political region (Panel a) and by climatological zone (Panel b). Sub-Saharan Africa (SSA) and Latin America and the Caribbean (LAC) are dominated by pixels with smaller shares of the global total VoCP—64.7 percent of the pixels in sub-Saharan Africa and 63.2 percent of the pixels in Latin America and the Caribbean are in the lower five deciles (shaded orange). East Asia and the Pacific (EAP) and South Asia (SA) are dominated by pixels with higher value of production (shaded blue); approximately one-quarter of the pixels in each of these two regions fell in the world's highest decile of production. The high-value pixels in these two regions alone (specifically those in the top decile) accounted for 33.6 percent of the total global VoCP. Looking at the geography of global crop production through an agro-ecological lens, Panel b in Figure 4 shows that production in the tropical south falls predominately in the world's lower valued pixels—73.1 percent of the pixels in this zone are in the bottom five (shaded orange) deciles of production—while production in the northern temperate and tropical zones and the temperate south are more evenly distributed among the world's lower and higher valued production pixels (shaded orange and blue, respectively).

Latitudinal Perspectives—Irrigated verses Rainfed Crops

By value, 32.0 percent of the world's 2005 crop production was grown under irrigated conditions, the rest (68.0 percent) was rainfed. Figure 5 gives a latitudinal representation of crop production, differentiated by irrigated versus rainfed systems. Panel a plots the share of global crop production by value that falls within each latitude, ranging from 55 degrees south (the most southerly latitude of crop production) to 71 degrees north (the northern most latitude of production). Panel b provides the same information, this time for sub-Saharan Africa

Figure 4: Concentration of pixelated production by geopolitical region and climatological zone, 2005



Source: Authors' construction based on You et al. (2016).
Note: See Table 1 and Figure TN-1 for regional designations in Panel a.

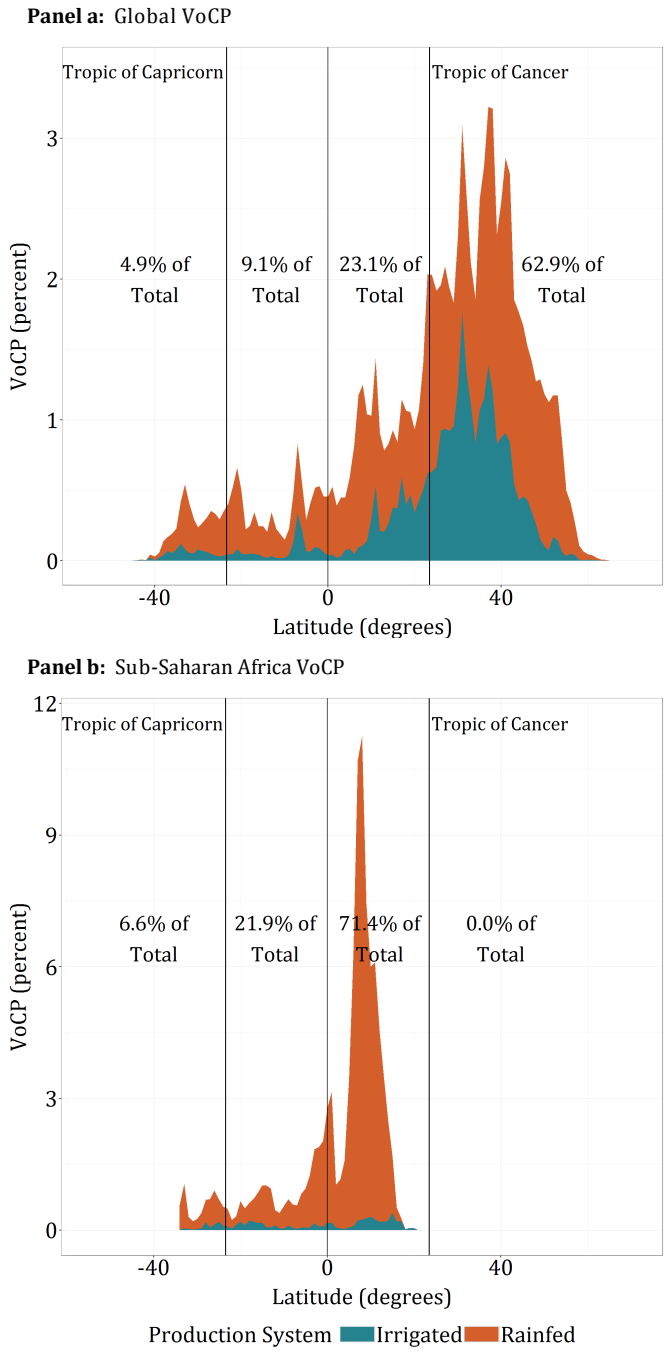
where crop production occurs within a much more limited latitudinal range from 34 degrees south to 23 degrees north of the equator.

The bulk of global crop production (86.0 percent) occurred north of the equator, with the majority of the world's crop production (62.9 percent) located in the temperate north (Figure 5, Panel a). The tropical north accounted for a further 23.1 percent of global crop production, with just 9.1 percent of production taking place in the tropical south and only 4.9 percent in the temperate south. With only 26.1 percent of the world's total land area (and 16.7 percent of the total harvested area) located south of the equator, the discrepancies between the northern versus southern crop shares are to be expected (You et al. 2016; CIESIN 2016). Like crop production in aggregate, both rainfed and irrigated agriculture is concentrated in the temperate northerly latitudes. The temperate north accounted for 70.9 percent of the world's irrigated crop production (and 59.2 percent of its rainfed output). The share of irrigated crop production was 20.6 percent in the tropical north zone, 5.3 percent in the tropical south and 3.3 percent in the temperate south.

There are three prominent spikes in the latitudinal shares of global crop production, namely at the 31st, 37th and 41st northern latitudes. An estimated 3.1 percent of production (by value) occurs at the 31st latitude north and consists primarily of vegetables in Egypt, rice in India, and rice, vegetables and tropical fruits in China. The 37th latitude north (accounting for 3.2 percent of production) consists primarily of vegetables, temperate fruits, cotton and maize in the United States, temperate fruits in Iran, and vegetables, temperate fruits, wheat and maize in China. At the 41st latitude north (2.9 percent of the total), production consists mainly of maize and soybeans in the United States, cotton in Uzbekistan, and vegetables and temperate fruits China.

Driven by Nigeria, the majority (71.4 percent) of crop production value in sub-Saharan Africa occurred in the tropical north (Figure 5, Panel b). The tropical south accounted for a further 21.9 percent, with just 6.6 percent in the temperate south. Very little, just 6.6 percent, of the region's crop production (by value) was produced under irrigated conditions spread fairly evenly across the region's cropping agro-climatologies. The three most prominent spikes in the latitudinal shares of sub-Saharan Africa crop production are at the 1st (3.2 percent of total), 8th (11.2 percent) and 11th (6.1 percent) northern latitudes. Production at the 1st latitude north consists primarily of cassava in the Democratic Republic of the Congo, plantains and sweet potatoes in Uganda, and maize in Kenya. Production at the 8th latitude north consists primarily of yams in Ghana, root crops in Ethiopia, and yams, cassava, tropical fruits and vegetables in Nigeria. At the 11th parallel north, production is dominated by yams, vegetables, groundnuts, sorghum, rice, pearl millet, cowpeas, cassava and maize in Nigeria, as well as yams in Benin.

Figure 5: The latitudinal geography of rainfed versus irrigated crop production, 2005



Source: Authors' construction based on You et al. (2016).

Geography of People versus Production

At first blush, the location of crop production tends to go hand in hand with the location of population. For instance, using country-level data, there is a generally strong, positive, and, seemingly, linear-in-logs relationship between where in the world crops are produced and where in the world people (i.e., consumers) reside, largely irrespective of cross-country differences in per capita incomes (Figure 6, Panel a). However, while the VoCP

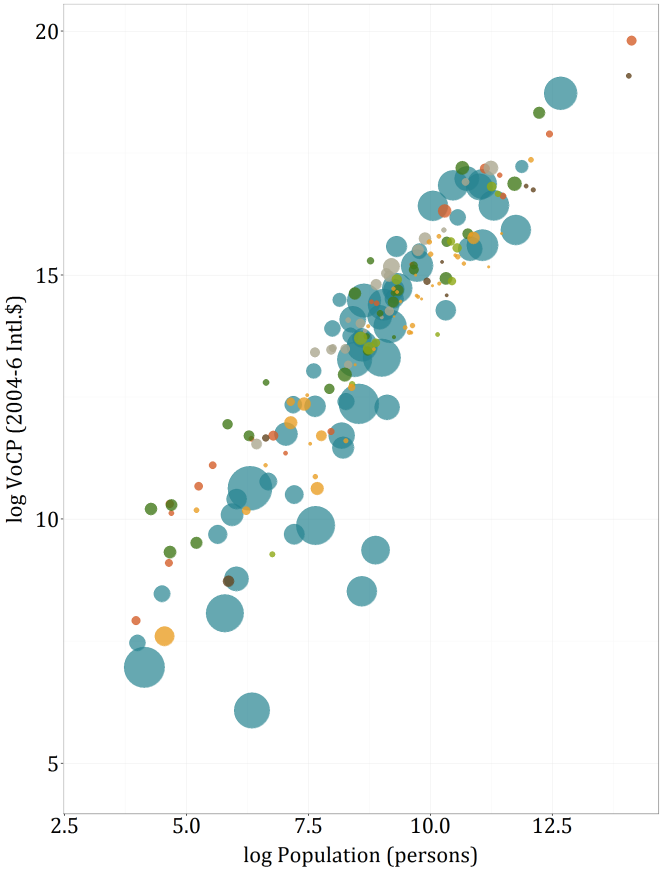
generally increases with population size, there is not a one-to-one relationship between per capita production and population at the country level. If this were so, VoCP per person would be roughly the same across countries, which clearly is not the case (Figure 6, Panel b). In fact, in general terms, a 1.0 percent increase in population was associated with a 0.2 percent increase in the VoCP per capita in 2013. However generalities do not hold for all countries, and there are some notable per-capita-production outliers, especially among the largest crop producers in the world (Figure 1, Panel b). For example, while China is the largest crop producer (by value) in the world, its VoCP per capita is significantly lower than other major producing countries such as Argentina, Canada, Spain, Ukraine and Brazil. While the majority of the food production in China is consumed within the country, the other five countries mentioned are net food exporters (World Bank 2016).[2]

Clearly, where people live and thus consume crops is but one determinant of the spatial pattern of crop production. Other factors such as the agro-ecological suitability of the land and its market accessibility also influence where crops are grown. Thus spatial variation in these economic and environmental factors leads to substantial spatial variation in the absolute amount of crop production. Moreover, the spatial disconnect between population and production is even more pronounced at the pixel versus the country level. Using country-level data (FAO 2016), the worldwide average VoCP per person in 2005 was $166/person, ranging from a low of $0.39/person (for Western Sahara) to $889/person (for the island of Niue in the middle of the South Pacific), with a standard deviation of $131/person. Using pixelated data, the corresponding worldwide mean of VoCP per person was $3,198/person, but the range around this average is much larger; just $0.25/person for a pixel in Morocco to $155,723/person for a pixel in Australia.

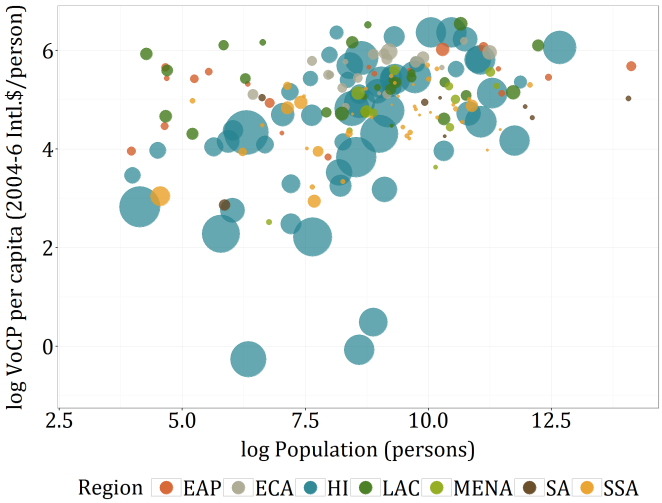
The pronounced pixel level variation in VoCP per person for the world's top 20 crop producing countries in 2005—in decreasing order of absolute production from left to right—is summarized in Figure 7. The length of each box delineates the interquartile range, extending from the first (bottom of box) to the third (top of box) quartile along the range of pixels measuring VoCP per person within a country. Each box is intersected by a line that indicates the median VoCP per person across all the pixels within a country. The lower and upper whiskers extend to the lowest and highest values within one and a half times the interquartile range. Any values beyond the whiskers are considered outliers. The median VoCP per person in the United States and Canada are relatively high, but there is also especially large variation in VoCP per person among all the pixels with each of these two countries (as can be seen by the first to third interquar-

Figure 6: Population versus crop production, 2013

Panel a: VoCP



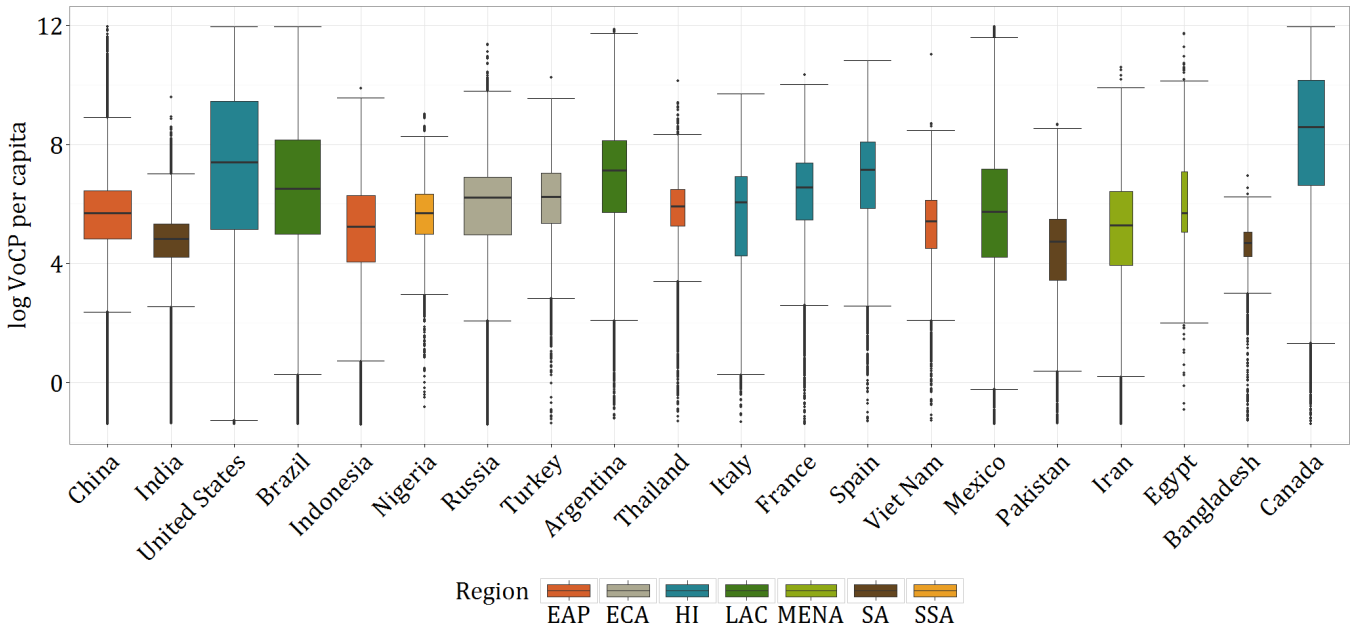
Panel b: VoCP per capita



Source: Value of crop production and population statistics from FAO (2016); GDP per capita from World Bank (2016).
Note: Bubbles denote countries and are sized in relation to GDP per capita in 2013. Plotted data are expressed as natural logs. See Table 1 and Figure TN-1 for regional designations.

[2] In 2013, China's share of net food exports (as a percentage of total value of agricultural production) was -9.9 percent. In the same year, the shares of Argentina, Canada, Spain, Ukraine and Brazil ranged from 27.4 percent (Spain) to 108.6 percent (Argentina) (World Bank 2016; FAO 2016). These particular shares can exceed 100 percent because net food exports include *processed* crops and livestock (valued in f.o.b. terms for exports and c.i.f. terms for imports that include substantial value added post-farm) whereas value of agricultural production consists solely of *primary* (largely unprocessed) crop and livestock production (valued with farm-gate prices).

Figure 7: Box plots of the pixelized value of crop production per capita, 2005



Source: Value of crop production from You et al. (2016); population from CIESIN (2016).
Note: Box width varies relative to the number of pixels reporting positive production values within a country. VoCP estimates plotted in natural log form. See Table 1 and Figure TN-1 for regional designations.

tile range, the length of each box). Alternatively, countries such as India and Bangladesh have much more spatial uniformity in the VoCP per capita within each country (i.e., boxes with much more limited lengths), albeit with relatively low production per person on average. These relationships vary across countries and regions with no obvious pattern.

Conclusion

The primary point of agriculture is to feed, clothe and fuel people, but just as population is spread unevenly around the world, so too is agricultural production. With some exceptions, at the geographical scale of a country there is a reasonably close (but by no means perfect) congruence between the location of people and the location of production. However, production and people are much less spatially congruent at more granulated (i.e., pixelated) geographical units. The biological basis of agriculture means that spatially variable factors like soil, climate and pest and disease pressures play an important role in shaping the geography of global crop production along with spatially sensitive economic factors, including access to markets, the absolute and relative prices of inputs and outputs, and the policy environment within which agricultural markets operate. All of these spatially variable ecological and economic factors are in a constant state of flux, and so the present geography of global crop production quantified and summarized in this brief is surely bound to change in the future, just as it has in the past.

References

Beddow, J.M., P.G. Pardey, J. Koo and S. Wood. 2010. "The Changing Landscape of Global Agriculture." Chapter 2 in J.M. Alston, B.A. Babcock and P.G. Pardey, eds. *The Shifting Patterns of Agricultural Production and Productivity Worldwide*, CARD-MATRIC on-line volume, Ames: Iowa State University. Available at http://www.matric.iastate.edu/shifting_patterns/pdfs/chapter2.pdf.

CIESIN (Center for International Earth Science Information Network). 2016. Gridded Population of the World, Version 4 (GPWv4) Database. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDEC). Available from URL: http://sedac.ciesin.columbia.edu/data/collection/gpw-v4/sets/browse [Accessed 12 July 2016].

Doxsey-Whitfield, E., K. MacManus, S.B. Adamo, L. Pistolesi, J. Squires, O. Borkovska and S.R. Baptista. 2015. "Taking Advantage of the Improved Availability of Census Data: A First Look at the Gridded Population of the World, Version 4." *Papers in Applied Geography* 1(3): 226-234.

FAO (Food and Agriculture Organization of the United Nations). 2016. FAOSTAT Database Collections. Rome. Available from URL: http://faostat3.fao.org/ [Accessed 4 January 2016.].

IIASA (International Institute for Applied Systems Analysis). 2000. Global Agro-Ecological Zones Data set, Version1.0. Luxemburg. Available from URL: http://webarchive.iiasa.ac.at/Research/LUC/GAEZ/index.htm [Accessed 7 April 2016].

Pardey, P.G., J.M. Beddow, T.M. Hurley, T.K.M. Beatty and V.R. Eidman. 2014. "A Bounds Analysis of World Food Futures: Global Agriculture Through to 2050." *Australian Journal of Agricultural and Resource Economics* 58 (4): 571-589.

Wood-Sichra, U., A.B. Joglekar and L. You. 2016. "Spatial Production Allocation Model (SPAM) 2005: Technical Documentation". *HarvestChoice Working Paper*. Washington, D.C.: International Food Policy Research Institute (IFPRI) and St. Paul: International Science and Technology Practice and Policy (InSTePP) Center, University of Minnesota.

World Bank. 2016. World Development Indicators Database. Washington, D.C. Available from URL: http://data.worldbank.org/data-catalog/world-development-indicators [Accessed 31 May 2016].

You, L., U. Wood-Sichra, S. Fritz, Z. Guo, L. See and J. Koo. 2016. Spatial Production Allocation Model (SPAM) 2005 v2.3. *HarvestChoice Data Product*. Washington, D.C.: International Food Policy Research Institute (IFPRI) and St. Paul: International Science and Technology Practice and Policy (InSTePP) Center, University of Minnesota. Unpublished data [Accessed 20 January 2016].

Technical Note

Land-Use Statistics

Global statistics on land-use were primarily derived from FAOSTAT data on land inputs (FAO 2016). *Land area* is the total area in a country excluding inland bodies of water. *Agricultural area* is the sum of areas under arable land (i.e., temporary cropland, meadows and fallowed land), permanent crops and permanent meadows and pastures. *Cultivated area* is the sum of arable land and permanent cropland excluding temporary pastures. In 2013, 231 countries were included in the calculations of land-use statistics; mainland China, Hong Kong, Macau and Taiwan were treated separately.

Areas deemed suitable for cropping were derived from IIASA's (2000) Global Agro-Ecological Zones (GAEZ) data. Suitable area was derived as the sum of areas categorized as very suitable, suitable or moderately suitable under mixed input and rainfed conditions.

Pixelated data on water-free land (i.e., land excluding oceans, ice and inland water) used to calculate the number of pixels of land available in sub-Saharan Africa and the total land worldwide were sourced from CIESIN's (2016) Gridded Population of the World, version 4 (GPWv4) data on land and water area for 2010 grids.

Crop Production Statistics

The regional and country-level statistics on crop production in terms of area, quantity and value used in Tables 1 and 2 and Figures 1 and 6 were derived from FAOSTAT data (FAO 2016). *Area harvested* is the total area from which a crop is gathered, excluding any planted area with damaged or failed crops. *Production quantity* refers to the total domestic production weight of crop products calculated at the farm level. *Value of crop production* (VoCP) is derived by multiplying gross production in physical terms by 2004-6 average PPP agricultural farm gate prices provided by the FAO. In 2013, 212 countries were included in the calculation of VoCP statistics, 211 in the calculation of production quantity statistics and 210 in the calculation of harvested area statistics; mainland China, Hong Kong, Macau and Taiwan were treated separately.

The data on the pixelated VoCP used in Figures 3 – 5 and Figure 7 were sourced from HarvestChoice's (You et al. 2016) gridded Spatial Production Allocation Model (SPAM) 2005 v2r3 estimates of global crop production. These data include estimates of physical area, harvested area, production and yield at a 5 arc-minute resolution for 42 crops and crop aggregates under irrigated and rainfed production. SPAM2005 spatially disaggregates national and sub-national level crop statistics on area and yield using a cross-entropy optimization approach. VoCP is calculated by multiplying the estimates of production by FAO's 2004-6 average PPP agricultural prices. SPAM2005 is comprehensively documented in Wood-Sichra et al. (2016).

Population Statistics

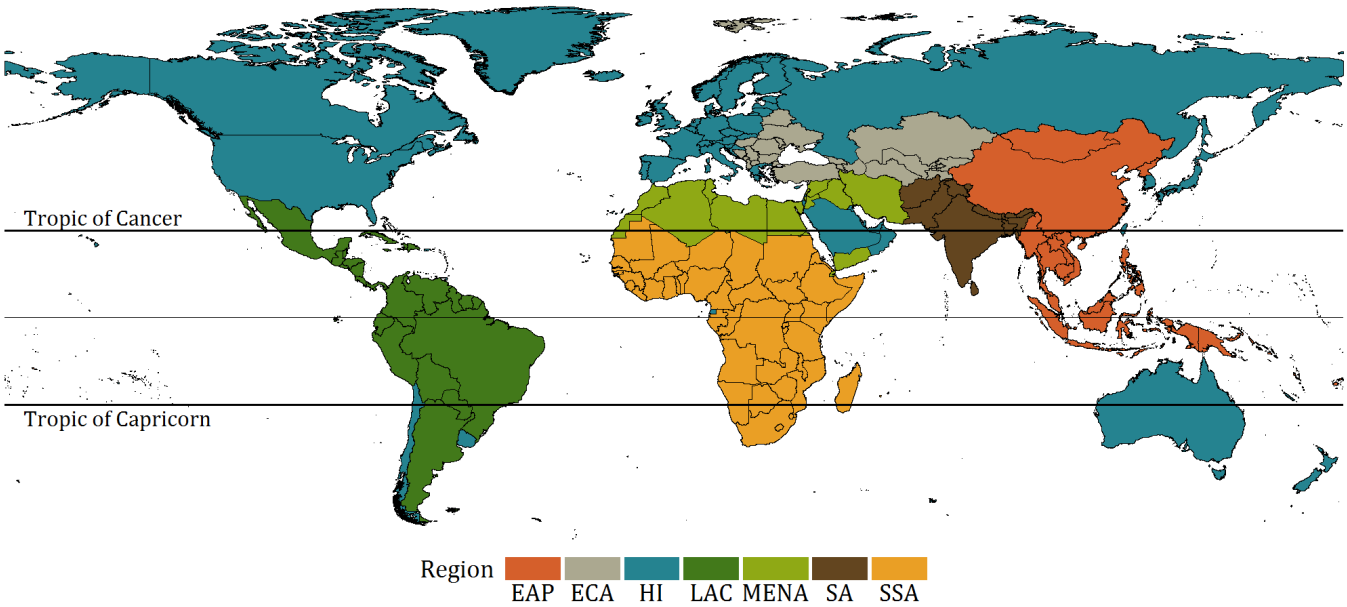
The country-level statistics on population used in Table 2 and Figures 1 and 6 were compiled by the United Nations, World Population Prospects (2015 Revision) and accessed through FAOSTAT (FAO 2016). *Total population (male and female)* is the de facto population in a country as of July 5, 2013. In 2013, all of the 212 countries for which we had VoCP data also reported population data.

Pixelated data on population counts used to calculate the VoCP per capita in Figure 7 were sourced from CIESIN's (2016) Gridded Population of the World, version 4 (GPWv4) 30 arc-second population count estimates (adjusted to reflect the 2015 revision of the United Nations' World Population Prospects country totals) for 2005 as documented by Doxsey-Whitfield et al. (2015). Outlier VoCP per capita estimates were addressed by discarding any pixels with a measured population of less than one person and then removing the bottom and top half percent of the remaining pixels with extreme value-per-person estimates from the series.

Income Statistics

The country-level statistics on income used in Figure 5 were taken from the *World Development Indictors* (World Bank 2016). *GDP per capita* is the gross domestic product (expressed in constant 2005 U.S. dollars) divided by the midyear population. In 2013, 212 countries reported VoCP and population data, although only 185 of these countries also reported GDP per capita estimates.

Figure TN-1: World Bank regional classifications, 2013



Source: Authors construction based on World Bank (2016).
Note: EAP – East Asia and the Pacific; ECA – Europe and Central Asia; HI – High Income Countries; LAC – Latin America and the Caribbean; MENA – Middle East and North Africa; SA – South Asia; SSA – Sub-Saharan Africa. The World Bank classifies Sudan as part of the Middle East and North Africa region; in our analysis, Sudan is included in the sub-Saharan Africa region.

Geographical Classifications

Regional: The regional classifications introduced in Table 1 and used throughout the brief are based on the World Bank classification system (World Bank 2016) and are mapped in Figure TN-1.

Climatological Zones: The climatological zone classifications introduced in Figure 4 and used throughout the brief are based on Tropic of Cancer, equator and Tropic of Capricorn latitudes. Areas north of the Tropic of Cancer in Figure TN-1 are classified as Temperate North; areas that fall between the Tropic of Cancer and the equator are classified as Tropical North; areas that fall between the equator and the Tropic of Capricorn are classified as Tropical South; and areas south of the Tropic of Capricorn are classified as Temperate South.

VoCP Deciles: The VoCP decile classifications introduced in Figure 2 and used throughout the brief are calculated as the ranked order of countries or pixels by VoCP parsed into 10 ranked bins that each include one tenth of the respective country or pixel totals. Thus countries or pixels in the lowest ranked decile include 10 percent of the respective countries or pixels that have the lowest ranked VoCP.

Latitudinal: The latitudinal classifications used in Figure 5 are calculated by rounding the latitude coordinate of each pixel to the nearest integer. Thus, each pixel is classified according to one-degree latitude bins. Global production ranges from 55 degrees south in Chile to 71 degrees north in Norway.

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