Online Data Appendix

Time use and Gender in Africa in Times of Structural Transformation

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1. Measuring home production historically and today

The current standard for measuring time inputs into home or market production is to use a time use survey. Survey respondents report activities in specific time increments (e.g. 15 minutes) for each of the 24 hours in a day. Time in specific activities can be aggregated to broader categories, and aggregated across weekdays to construct a weekly total. Because these surveys are costly to administer, usually only one or two individuals per household are randomly selected for participation.

Historically, the US has conducted small time-use surveys among specific populations. They provide useful data points for building a picture of how time use has changed over decades. For example, at the turn of the century, Leeds (1917) surveyed 60 families in Pennsylvania to document how they spent time on keeping small farm animals, making clothes and preserving food for their own use. Two decades later, Reid (1934) wrote about the disappearance of these activities. Using various time use surveys collected by U.S. Bureau of Home Economics, Vanek (1973) documented the transformation of home activities from 1924 to 1968, revealing the convergence to modern day home activities in developed countries.

In recent decades many countries have started conducting surveys with a more representative sample of the whole country. The first nationally representative time-use survey became available for the US in 1965 and the American Time Use Survey began in 2000. Effort has been made to harmonize time use surveys across countries such as those of the Harmonised European Time Use Survey (HETUS) (including 23 European countries) and the Multinational Time Use Survey (MTUS) (including 24 countries across continents). The eleven African countries that have so far dedicated time use surveys or complete time use modules embedded in regular household surveys include: Algeria (2012), Benin (1998,

2015), Ethiopia (2013), Ghana (2009), Madagascar (2001), Mali (2008), Mauritius (2003), Morocco (2011), South Africa (2000, 2010), Tanzania (2006, 2014) Tunisia (2005) (see Charmes (2017, Table 3.1 and 3.2) for details). Not all of surveys are publicly accessible.

2. Practical issues with measuring home production time

In most modern time-use surveys, respondents are asked to flag whether an activity completed in a given window was the primary or secondary activity; in some, though, only the primary activity information is collected. For example, someone could be cooking dinner as the primary activity and watching kids as the secondary activity. Time diaries can be completed contemporaneously, or using the recall method for time use in the prior day.

Often, one or two individuals in each household are selected randomly to participate in these surveys. Participants tend to be 15 years or older in developed country surveys, and 10 years or older in developing countries. This difference raises an issue of whether children work in home production and/or in the market. The issue of how children shift from being workers to being in school is beyond the scope of this paper: see Edmonds (2005) and Edmonds et al. (2009) for examples of how child time allocation and work shifts in the process of trade-induced economic growth.

There is some ambiguity about whether wood and water collection should show up in a country's System of National Accounts (SNA). Some African countries include one or both activities as part of unpaid market work, while others count these activities as home production time and therefore not part of the SNA. For the purposes of this article, we count time spent in these activities as part of home production.

3. Constructing time use data for Table 1

For the 1920s data from the US, we use direct reports of mean weekly hours of work among American housewives taken from Pidgeon (1937). In that report, hours are report for four states (Oregon, South Dakota, Montana, and New York); we aggregate these up to generate a single average for each entry in the table, weighted by the number of observations from each state. Except for time spent collecting firewood and water, these average hours per week values look similar to Ramey's (2009) values by category.

For the US data from 1965 and 2010, we download time use data from the Multinational Time Use Survey data at IPUMS www.mtusdata.org/mtus/. The MTUS

provides average time use by country and year. We choose variables that map to the definitions in our Table 1 and restrict the sample to married women ages 15-59 with zero market hours and schooling hours. We also exclude women who report their status as full-time worker or student.

To complete the table, we obtained micro data for four countries and five survey years. South Africa, Ghana, and Morocco all have nationally representative time-use diaries, which means they capture reports on hours of work for the reference day. Sierra Leone captures weekly time use data in broad activity categories as part of a nationally representative labor force survey. We choose the sample of married women who are aged 15-59 who report either that they are full-time housewives (in Morocco) or who report zero hours of work or schooling (the other countries) and (if the variables exist) do not report being in paid employment or in school in the past week.

For South Africa, Ghana, and Morocco, we aggregate information from each person by activity to compute the average amount of time spent on each activity on each day of the week, and then sum across days of the week to compute a measure of weekly hours. For Sierra Leone, we trim the data to exclude extreme values of time spent in home production.

Across all surveys, there is likely some measurement error, both because of recall bias and because of how the data were collected. For instance, in the US 2010 survey, except for time spent on childcare, no time spent on secondary activities is collected. This means that some home production time in secondary activities could be uncounted. In the other countries with time use diaries, secondary activities are more likely to be included in these measures. For example, in South Africa, respondents listed up to three activities per half hour and we assign a share (30 minutes, 15 minutes, or 10 minutes) of time to each activity based on the number of activities listed. In Ghana, respondents listed up to five activities per hour along with the time spent on each activity. Where activities were listed simultaneously, we split the time allotment equally across activities.

For comparison to Table 1, we present Table A.1 below. We expand the sample in each country in Table A.1 to include all women aged 15-59, regardless of marital status, work status, or school enrollment status.

Table A.1: **Weekly Hours in Home Production among All Women**

	USA	USA	USA	South Africa	South Africa	Morocco	Ghana	Sierra Leone
	1920s	1965	2010	2000	2010	2011	2009	2003
GDP p.c. [1]	$7,134	$18,130	$41,376	$5,873	$7,509	$3,621	$1,953	$641
Panel A	*Weekly hours*							
Total hours	51.3	40.6	28.7	31.8	29.7	37	39.4	44.3
Cooking	25.1	8.3	4.3	11.7	11.2	19.6	18.1	8.7
(% of total)	(49%)	(20%)	(15%)	(37%)	(38%)	(53%)	(46%)	(20%)
Collecting firewood, water	1.5 (3%)	0.0 (0%)	0.0 (0%)	1.8 (6%)	0.7 (2%)	0.9 (2%)	1.1 (3%)	2.4 (5%)
Cleaning	7.9 (15%)	10.7 (26%)	5.4 (20%)	7.6 (24%)	7.7 (26%)	5.5 (15%)	2.4 (6%)	6.5 (15%)
Laundry	11.5 (22%)	5.1 (13%)	2.1 (7%)	4.1 (13%)	3.4 (11%)	3.9 (11%)	2.4 (6%)	1.1 (3%)
Care of children, adults	3.6 (7%)	6.2 (15%)	8.5 (29%)	5.0 (16%)	4.1 (14%)	4.5 (12%)	7.8 (20%)	11.6 (26%)
Household management	1.7 (3%)	10.3 (25%)	8.6 (30%)	1.5 (5%)	2.7 (9%)	2.6 (7%)	7.5 (19%)	13.9 (31%)
Panel B	*Sample features*							
N	619	1,024	5,399	5,887	15,717	7,607	3,648	5,761
HH size	4.3	3.6	2.8	4.9	5.0	5.2	4.9	7.1

Notes: [1] GDP per capita is measured in 2011 International Dollars using the Penn World Tables v7.1. We measure GDP per capita in the US in the 1920s using Maddison's data reported in Herrendorf et al. (2013). Weekly hours are weighted averages calculated for women aged 15-59. (†) Indicates the % of married women in the overall sample. The 1920s US data are from a survey of only farm housewives. Variable definitions: Cooking (food preparation, clean up, fetching wood and water); collecting firewood and water; cleaning (care of house, gardens); laundry (mending, laundry, making clothes); care (of children and adults in the household); household management (buying food, shopping, home management, travel for home management, other).

4. Challenges to defining and measuring women's work in the market

There is some ambiguity in how to measure women's home production and market work in African countries.

First, home production is supposed to be part of the Extended System of National accounts, and some types of home production and unpaid family work could be part of market activity according to the System of National Accounts (SNA). However, definitions are not applied consistently across Africa, and countries do not always document how they treat home production in the SNA.

Conceptually, home production that produces goods and services for the market (e.g. growing crops in the family garden to sell at market) should be part of market work as defined in the System of National Accounts, even if it is unremunerated. In early development stages, home production and working on the family farm or in the family business are important, and both are unpaid work. It is the emphasis on "own use" that differentiates home production from the latter which is referred as "market-oriented" establishment and is included as part of formal labor supply by the International Labor Organization (ILO). Although this distinction is conceptually clear, it is often difficult to measure in practice, since home businesses may produce goods and services for own use as well as for market.

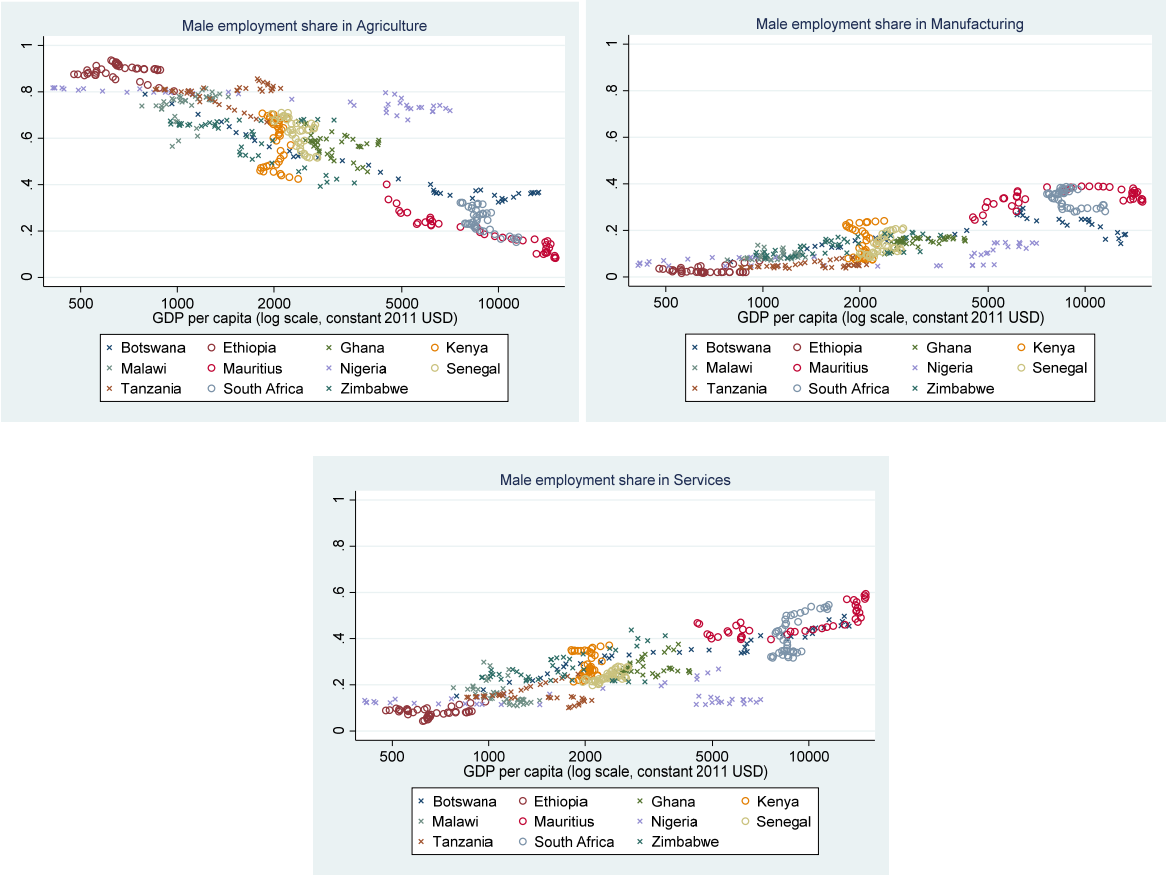
In addition to this ambiguity, it is challenging to measure women's work in Africa since most women work in unpaid agricultural activities. Employment shares in agriculture are highly volatile over the agricultural cycle in some parts of the continent. The effects of this are noticeable in LFS surveys. In one example (Burkina Faso), measured agricultural employment shifts from 30 percent to 80 percent during the course of a year. Perhaps most troubling for the measurement of female LFP is that after 2013, the ILO recommended changing the definition of labor force participants to include only those who work for pay or profit. Because most women work in unremunerated family or farm jobs, this change in definition could significantly reduce employment figures in agriculture (Gaddis et al. 2020).

5. Data sources and definitions for figures and tables

5.1. Figure 1: Sectoral employment shares in Africa

To construct Figure 1, we used data from the Africa Sector Database produced by the Grönigen Growth and Development Centre. The Africa Sector Database captures formal and informal employment data for all individuals 15 years and older, including all paid employees, self-employed workers, and (unpaid) family workers. The data come from population census data. Values for intervening years are interpolated using employment patterns from nationally representative LFS surveys as benchmarking points; where these do not exit, ILO modelled estimates for sectoral employment shares are used. See de Vries et al. (2015) and De Vries et al. (2021) for more detail. We use data from for Botswana, Ethiopia, Ghana,Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania, and Zambia. The following figure shows sectoral employment for men in these countries:

Figure 5.1: **Male employment shares by level of development: SSA countries 1970-2010**



Notes: Employment share data by sector for 11 African countries from the Africa Sector Database (de Vries et al., 2015). Real GDP per capita (2011 international dollars) from Penn World Tables v9.1.

5.2. Figure 2

In Figure 2(a), we plot female labor force participation rates by African countries at different levels of GDP using LFP data from the ILO (modeled estimates) and Penn World Tables data for real GDP in 2011 international dollars (PWT Version 9.1).

We used data from Bridgman et al. (2018) to construct the time use graphs in Figure 2(b). The data are available for download from Herrendorf's website. We use all of the non-imputed time use data from available African countries. To look at how time use changes with level of development, we match the country-year level data with data on real GDP per capita from the 9.1 version of the Penn World Tables. Real GDP is measured in 2011 International Dollars.

5.3. Figure 3

To construct the composition of employment by job type for women, we used the following series from the World Bank databank databank.worldbank.org/home.aspx:

- SL.FAM.WORK.FE.ZS for share of contributing family workers
- SL.EMP.MPYR.FE.ZS for share of employers
- SL.EMP.SELF.FE.ZS for own-account/self-employed workers
- SL.EMP.WORK.FE.ZS for share of wage workers
- SL.EMP.TOTL.SP.FE.ZS for the employment to population ratio

Each of these is an ILO modeled estimate. We back out the share of own account workers by using the World Bank's definition: Own account workers are Self-employed minus employers minus contributing family workers.

Then, to construct the figure we multiple each job type category by the employment to population ratio and construct the share of women not in the labor force. We both the number of women in each job category as a share of all women, along with the share of women not in the labor force, in Figure 3.

5.4. Figure 4

To construct the share of female jobs (and share of female service sector jobs) that produce home substitutable goods or services, we created a consistent (albeit broad)

definition of home-production substitute jobs and all service sector jobs using occupation definitions.

We defined all home-production substitute jobs as those in the following occupations:

- personal services (including food and accommodation)
- wholesale and retail trade and miscellaneous repair
- health services (human health and social work activities)
- education
- art/entertainment/recreation
- work in private households

All service sector jobs include all home-production substitute jobs and:

- professional/scientific/tech activities
- admin and support services
- arts, information and communication
- finance and insurance
- real estate

From both definitions, we exclude public administration and defense, and compulsory social security occupations.

We applied these definitions to data from official reports published by the National Statistics Offices in South Africa, Kenya, Ghana, and Ethiopia, and from the BLS for the US. We restricted to employment statistics to women in the reported age groups available for each country. Note that these official employment numbers likely undercount total employment in African countries, where informal sector jobs are prevalent and not as carefully documented.

Data sources and sample characteristics:

- Kenya: Kenya National Economic Survey 2017, Table 4.2. Females aged 15-64, formal sector.
- South Africa: Quarterly Labour Force Survey 2015, Table 3.1. Females aged 15-64, all wage employment in formal and informal sectors.
- Ghana; Labour Force Survey 2015, Table 4.6. Females 15 and older in formal wage employment in urban areas
- US: BLS Current Population Survey 2015. Females 16 and older in formal wage employment.