Time Use and Gender in Africa in Times of Structural Transformation[1]

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Many African countries are still in the early stages of structural transformation. Typically, as economies move through the structural transformation, activities once conducted within the household are outsourced to the market. This has particular implications for women's time use. In this paper, we document that current patterns of female time use in home production in several African countries closely resemble historical time use patterns in the US. We highlight two stylized facts about women's time use in Africa. First, in North Africa, women spend very few hours in market work and female labor force participation overall is extremely low. Second, although extensive margin participation of women is high in sub-Saharan Africa, women tend to work in the market for only a few hours each week, with the rest of their work hours spent in home production. These two facts suggest two types of constraints that could slow down the reallocation of female time from home to market as economies grow: Social norms related to women's market work, and a lack of infrastructure (e.g. household infrastructure and childcare facilities) to facilitate marketizing home production. We discuss recent empirical evidence related to each set of constraints and highlight new avenues for research.

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Changes in time allocation are central to the process of economic development. As an economy develops, a substantial portion of activities that were once conducted within the household—for example, cooking, producing clothing and household goods, providing child- and eldercare—are outsourced to the market. This shift in activity from home to market has implications for how women and men spend their time. When unpaid household work can be outsourced to the paid market sector, this tends to generate additional compensated female jobs, improving gender equality in labor market outcomes and in the home. And, when individuals can choose to allocate their time between home and market based on their talents, the economy as whole benefits from reduced labor misallocation.

The process of structural transformation, in which production shifts across the agricultural, manufacturing, and services sectors, is linked to the emergence of new types of labor market opportunities for women. Typically, as an economy grows and the service sector expands, home production can be more easily outsourced to the market via a process of marketization. Two market jobs are often created: one for the woman who is able to reduce her time in home production and another in the service sector, which itself tends to be intensive in female labor.

In this paper, we examine these links between time allocation, structural transformation, and marketization of home services in Africa using both macro and micro data. It impossible to think about women's market work in a growing economy without thinking about women's work in the home, and how the latter constrains or facilitates the former. Our aim is not to speculate on potential sources of economic growth in African countries or the triggers for structural transformation, but rather to draw attention to the understudied links between home and market work in Africa and discuss potential barriers to the smooth transition of time out of the home and into market work when the economy grows. A key point we emphasize is that tracking changes in the allocation of time across the development process will require more time use surveys collected from a wider range of African countries and for more years in each country.

We start by defining home production and provide a macro-level picture of how female market work has shifted across sectors in Africa since the 1970s. Over the last fifty years, the share of female workers in agriculture on the continent has shrunk, while female employment in services has grown.

Next, we draw out two patterns about the nature of women's work in Africa. First, women in countries of North Africa have especially low labor market participation rates and very low market hours. Second, in much of sub-Saharan Africa, high female labor force participation

coexists with low average market hours and high home production hours.[2] The majority of women's market work in Africa is unpaid, occurring on family farms and in own-account or family firms. Family farms and family firms allow women to combine home and market work at the same location; this pattern of female employment was also evident in the mid-19th century US (Ruggles 2015).

Because so many hours are devoted to home production each day among African women, we investigate the nature of this work. A key contribution of this paper is that we assemble microdata from time-use surveys across four African countries at different levels of development to show that the allocation of home production hours across different activities closely resembles historical time use patterns in the US in the 1920s and in the 1960s.

With these key features in hand, we discuss some of the constraints and opportunities involved in moving towards a more efficient and equitable allocation of labor time in Africa. We highlight two key frictions that could slow down the marketization of home production in Africa: 1) much of sub-Saharan Africa lacks infrastructure to manage necessary household work, including physical infrastructure for household utilities and transportation to the market, and child- and family-care services; and 2) in North African countries in particular, social norms about women's market work restrict the reallocation of female time across home and market.

Although most high-income economies have already passed through the stages of structural transformation, many African countries are in the early stages of this process. There is still a large knowledge gap regarding women's time use and time allocation on the continent. Observing how women in Africa allocate time between home and market provides an opportunity to deepen our understanding of the process of structural transformation. Moreover, because many African countries are still in the early stages of structural transformation, understanding and addressing barriers to women's time reallocation from home to market across these countries is a first-order problem with implications for aggregate output and welfare.

Home Production and Structural Transformation

Time in home production is defined as the time spent on the production of goods and services for own (not market) use. Reid (1934, p. 11) provides a still-relevant definition:

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[2] Heath and Jayachandran (2018) provide a recent review of female labor force participation patterns across the developing world, updating the work of Mammen and Paxson (2000) in this journal.

> It consists of those unpaid activities which are carried on, by and for the members, which activities might be replaced by market goods, or paid services, if circumstances such as income, market conditions, and personal inclinations permit the service being delegated to someone outside the household group.

As Reid (1934, p. 47) observed, many home activities in now-developed economies have been transferred to the market through the process of *marketization*:

> As time went on, one form of production after another, spinning, weaving, sewing, tailoring, baking, butchering, soap-making, candle-making, brewing, pre-serving, laundering, dyeing, gardening, care of poultry, and other tasks have wholly or in part been transferred to commercial production. In addition, childcare, education, and the care of the sick are now to a large extent carried on by paid workers.

Typical modern-day examples of these home production activities are cooking, cleaning, laundry, and child- and eldercare. In many African countries, collecting wood and water for use in the household is also part of home production.[3]

The marketization process that Reid describes is closely linked to structural transformation of a developing economy, namely the decline in agriculture, a hump-shaped rise and fall in manufacturing employment, and rising services along the development path. Such patterns have been well-documented both historically for developed countries and over large cross-sections of advanced countries (Kuznets 1966; Maddison 1980; Herrendorf et al. 2013). Lebergott (1993) documented this process of marketization with consumption expenditure data for the United States. Using harmonized cross-country time use data for recent decades, Freeman and Schettkat (2005) and Burda et al. (2013) documented the importance of marketization of home production in understanding market hours across rich countries.

There is some debate in the literature about whether Africa's structural transformation follows typical patterns.[4] Figure 1 shows how female employment in African countries has shifted across sectors since the 1970s. Each panel shows the sectoral employment shares for women in eleven African countries (each country time series shown in different colored markers) at different levels of real GDP per capita between 1970 and 2010. Data are annual, employment shares are computed over all women in the labor market, and workers include

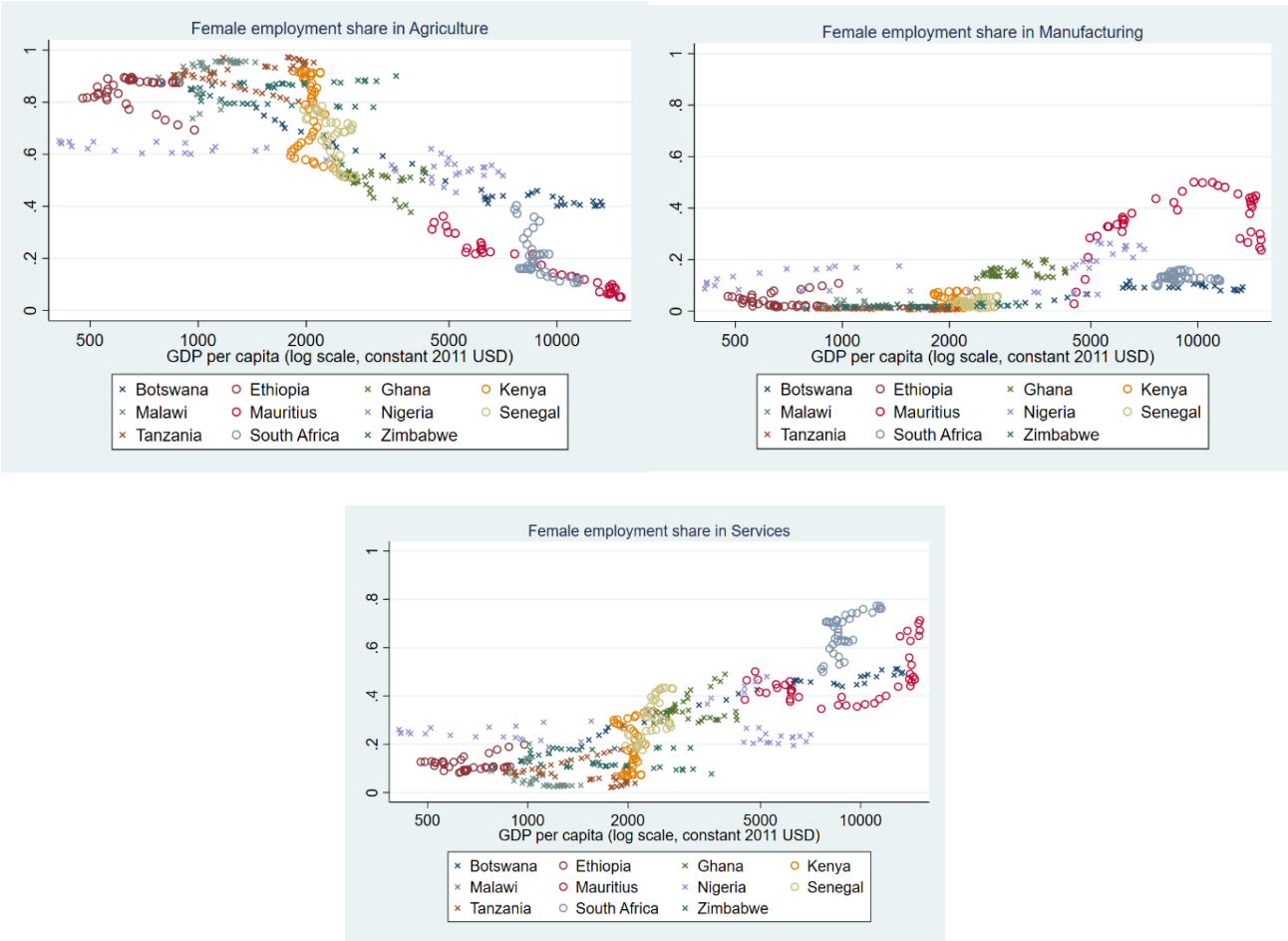
[3] Across African countries, there is ambiguity about whether wood and water collection should appear in the System of National Accounts (SNA) or not. For the purposes of this article, we count time spent in these activities as part of home production.

[4] Rodrik (2015) observes that today's developing countries see their manufacturing sector shrink at lower levels of GDP per capita than happened in developed countries historically, a feature termed "premature de-industrialization. However, using more recent data, Kruse et al. (2021) show that patterns of deindustrialization observed in Africa in the 1990s seem to have reversed since the late 2000s.

paid and unpaid workers (self-employed and family workers). The patterns in Figure 1 indicate that in countries and years in which income is higher, female employment shares in agriculture are lower, while employment in manufacturing (to a lesser extent) and in services (to a greater extent) is higher. Manufacturing jobs account for only a small share of female employment on the continent: Kruse et al. (2021) note that under 10 percent of all female jobs in Africa are in manufacturing.[5]

Figure 1

Female employment shares by sector and level of development in sub-Saharan Africa



Source: Annual data on female employment shares by sector for 11 African countries from the Africa Sector Database collated by the Groningen Growth and Development Centre. Real GDP per capita (2011 international dollars) from Penn World Tables v9.1.

[5] Male employment exhibits similar patterns across income levels and sectors (see online appendix Figure 5.1), with one exception: men's employment share in manufacturing exhibits a clearer rise when agriculture declines at low levels of real GDP per capita.

Notes: The 11 countries are Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania, and Zambia. De Vries et al. (2015) describe the construction of the Africa Sector Database. Gender-specific sectoral employment shares are constructed for each country and year between 1970 and 2010, and include all paid and unpaid workers (self-employed and family workers) enumerated in population Census data and national Labor Force Surveys. See Data Appendix for more details on figure construction.

The structural transformation in female jobs occurring in many African countries involves a shift from agriculture directly into the service sector. This is similar to the structural shifts in female employment in historical US data. For example, assembling data from 1860 to 2000, Ngai et al (2020) document that during this 140-year period, jobs for American women moved out of the agricultural sector and into the service sector, and female employment shares in manufacturing remained low throughout.

How is the shift of female employment towards services during the structural transformation linked to home production? Historically, in high-income countries, the expansion of service sectors has enabled households to outsource home production via the process of marketization (Ngai and Pissarides 2008; Rogerson 2008). Using 136 time–use surveys from 43 countries over the period 1960–2014, Bridgman et al. (2018) show that growth in market services across the globe is associated with a decline in home production hours. Moreover, growth in the service sector historically generated jobs intensive in both high-skilled and low-skilled female labor. These changes had important implications for the economic role of women.[6] For women, the shift in time use between home and market is as important as the shift across market sectors during the structural transformation. And at the macroeconomic level, misallocation of female time and talent across the home and market sectors can reduce aggregate output (Hsieh et al. 2019, Lee 2020).

How African Women Allocate Time between Home and Market

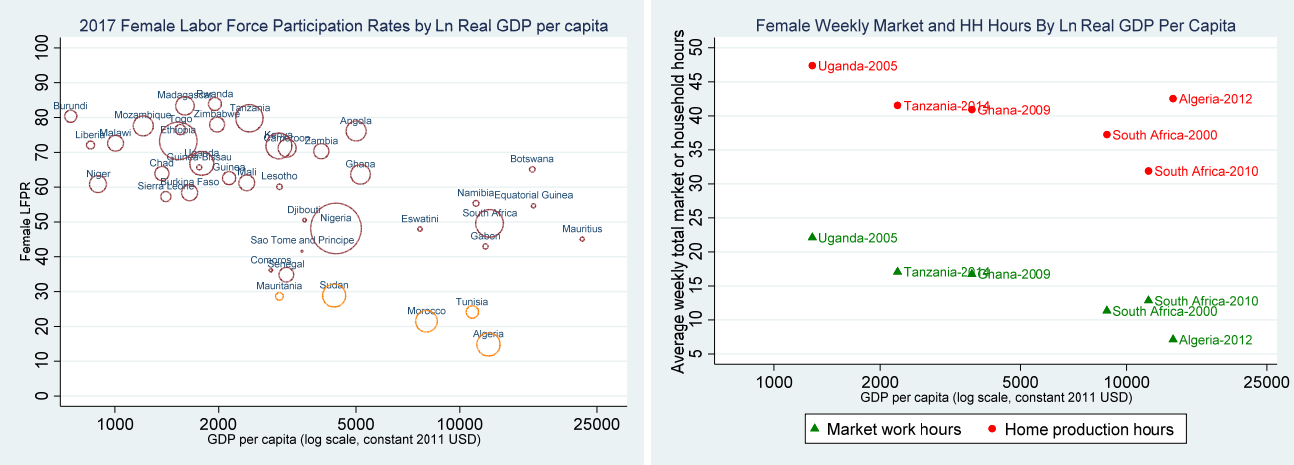
Participation in market work in Africa is linked to time spent in home production. Figure (2) reports patterns of female labor market participation and time use across market and home and how each varies with GDP in Africa.

Figure 2a illustrates how the female labor force participation rate among African countries varies with GDP. We use data on labor force participation from the International Labor

[6] For more discussion, see Mincer (1962)'s pioneering work on the role of home production for understanding female labor supply. Recent work in quantifying its importance includes Ngai and Petrongolo (2017) and Rendall (2018).

Organization (ILO); Gaddis et al. (2020) discuss some of the key challenges to measuring female labor force participation in sub-Saharan Africa.

Figure 2: **Extensive vs intensive margin labor market activity for African women**



(a) Female Labor Force Participation (b) Female market and home hours

Notes: In 2(a), circle sizes represent population, orange circles denote North African countries and red circles denote sub-Saharan African countries. In (2b), average market and home hours are reported for women aged 15 and older. We plot real GDP per capita on a log scale and label x-axes with the corresponding income per capita.

Source: Female labor force participation in (2a) is from the International Labor Organization. Average weekly market and home hours for women are from Bridgman et al. (2018) who use time use data to compute average hours for all women. Real GDP per capita (2011 international dollars) is from Penn World Tables v9.1.

Although this figure only captures cross-country variation, the variation is consistent with the declining part of the familiar U-shape in female labor force participation with development—that is, labor force participation of women (especially married women) first falls and then rises with per capita GDP (Sinha, 1965; Boserup, 1970; Durand, 1975; Goldin, 1986). None of the countries in Figure 2a have reach high-income country status yet, and there is considerable variation in female LFP even within income bands. For example, South Africa and Algeria each have relatively higher levels of per capita GDP, but whereas South Africa's female labor force participation rate looks more like other middle- and high-income countries, Algeria's female labor force participation rate is below 20 percent, the lowest in the world. The lack of upturn in the female labor force participation rate that we see in Figure 2a may be related to some of the barriers to women's market work that we discuss below.

Labor force participation does not clearly reveal the extent of female time spent in market activities. Figure 2b illustrates how many hours women spend in market work (green triangles) and household work (orange circles) in five African countries at different levels of GDP per capita. The data show average weekly hours of market and home work across all women,

including those who do and do not work in the market (or home) at all. To create this figure, we used the average weekly hours for women computed by Bridgman et al. (2018) who in turn compute these averages using microdata from each African country (we use the aggregated data from this paper because not all of the microdata is publicly available).

Comparing 2a with 2b is shows us that high female labor force participation coexists with low market hours and high home hours. For example, Uganda, Tanzania, and Ghana all have female labor force participation rates in excess of 60 percent. Yet the average woman in these countries works fewer than 25 hours per week in the market, and at least 32 to 48 hours per week in home production.[7] Market work is far from being a full-time job for women in these countries, and home production is at least the equivalent of a part-time job. On the other end of the spectrum, all of the countries with low female labor force participation (below 40 percent) are in North Africa. Figure 2b shows that for one North African country (Algeria), women work less than 10 hours per week, and report 40 hours of home time per week.

Figure 2b also shows that home production hours fall as income per capita rises (from 1,785USD in Uganda to 12,200USD in South Africa). Using a broader cross section of countries across the world, Bridgman et al (2018) show that female home hours decline to 25-30 hours per week once countries reach high-income status. Data from the American Time Use Surveys indicate that in 1965, the average woman in the US worked 40.6 hours per week in the home; this fell to 28.7 hours per week in 2010 (Aguiar and Hurst (2007) provide a detailed analysis of modern trends in US home production time). Home production hours among African women in the 2000s resemble average hours in home production among American women in the mid-1960s. Most African countries likely have a long way to go before income growth leads to meaningful reductions in home production time. Time use surveys collected for a wider range of African countries and for more years in each country would be immensely useful for tracking these changes in home production hours as countries change and grow.

Together, Figures 2a and 2b illustrate substantial heterogeneity in female labor force participation across regions, and show that many women tend to work a little in the market and a lot in home production. We next discuss two questions. Is there something about the nature of work in African countries that allows women to combine home and market activities? And, do constraints to women's market work differ across countries where extensive margin

[7] As in other countries, women in Africa spend more time in home production than men do (data not shown). Among the countries in Figure 2b, women spend two to four times as many hours in home production as men do.

participation is very low (like Algeria) compared with those countries where women participate at high rates but with few hours of market work (like Uganda)?

Combining Home and Market Work: The Role of Family Farms and Family Firms

In much of Africa, the large majority of women's time in market work is spent in unpaid family labor or own-account work. Most of these types of jobs – for example, growing vegetables on the family farm for market, producing meals for a family food stand, serving customers in a family business – are not remunerated. Yet these jobs offer location flexibility and hours' flexibility. They typically take place in the family home or close to it, or on the family farm, where childcare, eldercare, and other types of home production must also take place. This flexibility makes it possible to shift time between market and home production at low cost, and obviates the need for women to specialize in either the home sector or the market sector.

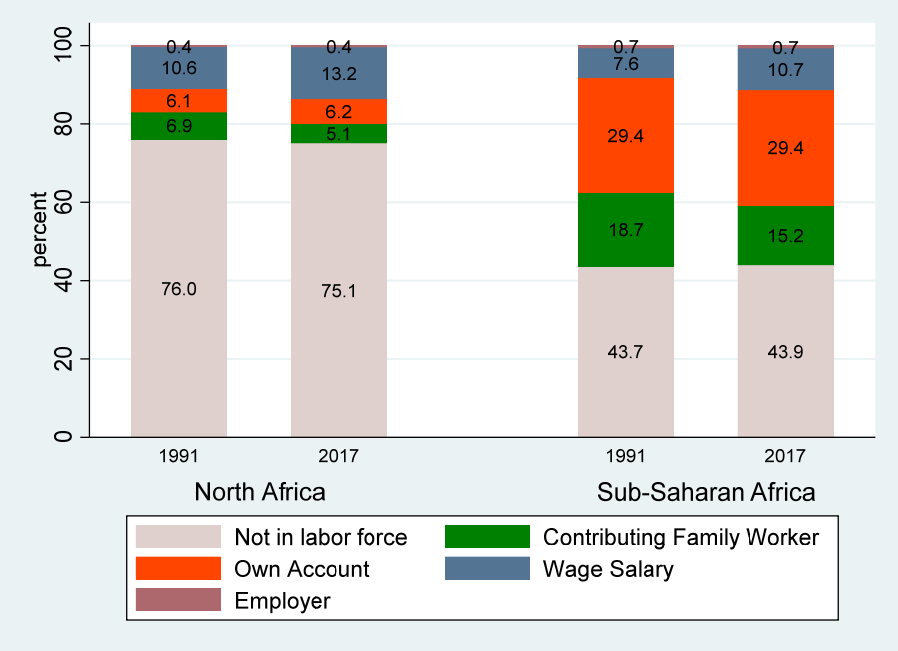
In Figure 3, we show two snapshots of the profile of market work for women in 1991 and 2017, separately for North Africa and sub-Saharan Africa. The categories shown in this graph are exhaustive: a woman is either not in the labor force (rose-colored area), or she is part of the labor force and working as an unpaid contributing family worker (green), an own-account or self-employed worker (orange), a wage-worker (navy), or an employer (maroon).

Aggregating across countries, the female labor force participation rate in sub-Saharan Africa is around 56 percent. The vast majority of women doing any market work in sub-Saharan Africa are still own-account workers or contributing family workers, and not wage earners. The figure paints a generally stagnant picture of extensive margin participation and of the types of jobs held by women; over time, there has been a small increase in the share of women doing wage work, and a small decline in women working as unpaid contributing family workers. This change is more notable in middle-income African countries, not shown separately here.

The employment pattern in low- and middle-income countries in Africa is consistent with what we see historically in developed countries. For example, Ngai et al. (2020) show the role that work on family farms and within-family firms plays in accounting for changes in female labor force participation over time in the US. As the structural transformation in the West occurred and family farms were consolidated into larger farms, home-based market work disappeared, and with it, the ability of women to easily combine home and market production. The current types of market work done by women in sub-Saharan Africa suggest that any forces that shift workers off of family farms or lead to consolidation of these smaller farms may also have large impacts on women's time allocation across market and home. If marketization of

home services is slow to materialize, moving away from family farms and firms could push women to withdraw from market work and reallocate hours towards home production.

Figure 3: **Composition of women's market work by region over time**



Source: Data on sector of market work and market participation are from the World Bank's World Development Indicators. See Data Appendix for details on each data series.

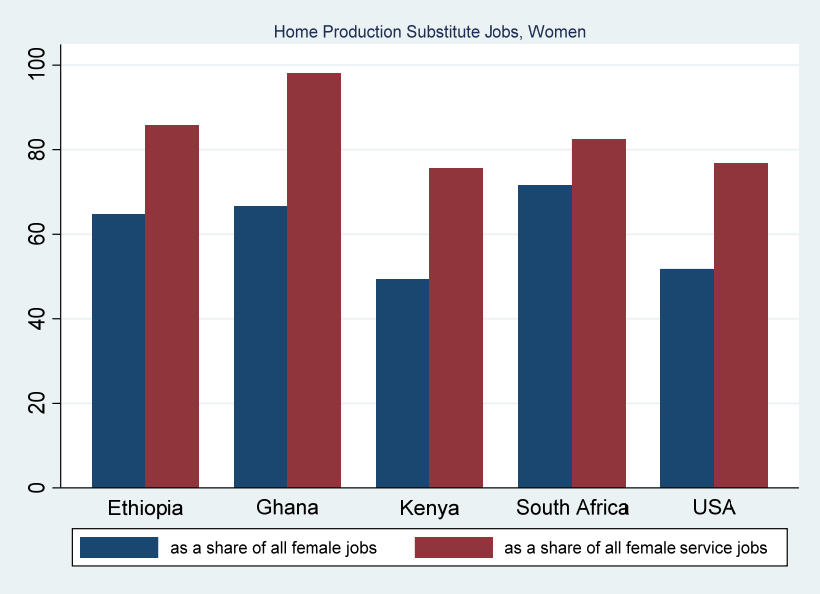
A notable aspect of Figure 3 is the stark difference in employment patterns across North African countries (including Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara) and the rest of the continent. The rate of female labor force participation for North African countries is around 25 percent, with the majority of this work being in wage employment. Family farms and firms do not play a large role in providing market opportunities for women in this region. Differences in social norms about what market work is acceptable for women may account for these large differences in women's time allocation in North Africa versus other countries. We return to this topic in the final section.

Service-Sector Jobs and Female Market Work in Africa

If structural transformation in Africa is to affect the way that women choose to allocate time across home and market, we need to know whether service sector jobs in Africa produce home production substitutes and generate female-intensive jobs at for women across the skills distribution. Evidence on the growth of female employment in these home-production suubstitute sectors (as a subset of the service sector) exists for developed countries (for example, Addati et al. 2018). These topics are an option area for research in African countries.

One way to measure the marketization of home production is to look at the share of service sector jobs that provide home-substitutable goods and services, like childcare workers, healthcare workers, cleaners, hotel workers, and restaurants. To illustrate how we might do this, we collect officially published statistics from South Africa, Kenya, Ghana, and Ethiopia in 2015 to capture female market work by sector. Figure 4 uses these data to graph the share of all female jobs (in blue) and the share of all female service sector jobs (in red) that could be regarded as home substitute activities. For comparison, we also plot female employment in home-substitutable sectors for the United States using similar data. Because the official statistics are aggregated at a fairly high level, we can only implement a broad definition of home-substitutable sectors, including: jobs in education, health and social work, arts/entertainment, domestic work for private households, and all other services (including personal services like food and accommodation, and miscellaneous repairs).

Figure 4: **Share of Female Market Jobs Producing Home Production Substitutes**



Source: We compiled data from official statistics of each country that were in turn each based on national household or labor force survey data. See Data Appendix for details of how we classified each type of job.

Note: Share of female employment (total, or in services) that could be broadly classified as home production substitutes. We define home-substitutable jobs to include education, health and social work, arts/entertainment, domestic work for private households, and all other services (including personal services like food and accommodation, and miscellaneous repairs), as well as wholesale and retail trade jobs. Service sector jobs excluded from home-substitutable jobs include: finance, insurance, and real estate; administrative and support services; information and communication; and professional activities. Public administration and defense are excluded from the denominator of both measures in Figure 4.

In all the countries shown here, women's market jobs that substitute for home production represent at least half of all of female jobs, and make up the vast majority of service-sector

work among women. In Ethiopia, Ghana, and South Africa, a larger share of all female jobs in the service sector are in home substitute work relative to the United States and Kenya.

At least in this handful of African countries, the marketization of some types of home production seems well underway. These jobs provide opportunities for women to choose to reallocate time away from home production, and towards market work. A natural and useful extension of this exercise would be to expand the sample to a larger number of African countries, and to consider how the share of marketized home production substitute jobs has changed over time within a set of developing countries for which there are data. An alternative way to calculate the extent of marketization, used in Ngai and Pissarides (2011), would be to begin with time-use surveys and make two calculations: the share of total market hours worked in jobs that produce home production substitutes and the share of total hours spent producing these services within the household (household hours). With multiple time-use surveys within a country, one could track marketization by observing how the location of time required for producing household services shifts out of the household and into the market.

Time in Home Production in Africa

The evidence in Figure 2b shows that in a subset of African countries, the average woman spends 32- 47 hours each week in home production, and only 7-17 hours per week in market work. To understand low market hours in these countries, it is important to have a better understanding of what is happening within the home. We next take a closer look at home production activities in a subset of countries for which we have the microdata from national time use surveys or from household surveys with time use modules. Only a handful of African countries (listed in the Data Appendix) have ever fielded such time use surveys that include data to estimate the extent of home production, and only since the 1990s. We use micro data from five of these surveys: two waves for South Africa and one each for Morocco, Ghana, and Sierra Leone. In the Data Appendix, we discuss time use surveys in more detail and how we use these data to construct weekly hours in home production.

The four African countries we study occupy three different geographic regions: South Africa in the south, Morocco in the north, and Ghana and Sierra Leone in the west. They also represent very different stages of economic development as measured by real GDP per capita (shown in Table 1). All of the African countries we examine, except for South Africa in 2010, are poorer in the 2000s than the US was in the 1920s. We compare the time use patterns in home production in these countries with time use patterns from the United States.

We focus on a sample of housewives in each country to understand the full extent of home production activities among those most responsible for these activities, and to compare current female time use in Africa to historical patterns among housewives in the historical US. Historical data on the US from the 1920s are taken from a Department of Agriculture report on surveys of American farmer housewives (Pidgeon, 1937). Among the surveys that we use for the other countries, only Morocco contains a self-reported housewife category. To construct a comparable sample of housewives for surveys other than the U.S. 1920s survey, we restrict samples to married women aged 15 to 59 who report not being in school or paid work in the last week and who report zero hours in market work and in education in the prior day.[8] The share of all women defined as housewives under this definition ranges from 12-18 percent in Sierra Leone, South Africa (2010) and the US (2010), up to 44-47 percent in Morocco and Ghana, and 100% in the 1920s U.S. data. This sample is clearly not representative of all women, but it lets us make some interesting historical comparisons, it captures an important share of women in most countries, and it gives us a detailed picture of all of the activities that home production involves, and their time intensity.

Table 1 shows average weekly hours spent on six broad categories of home production: Cooking/food preparation, collecting water and firewood, cleaning/care of household and gardens, laundry and repair of clothing, child and adult care, and general household management (which includes purchasing food, travel related to home production, and other tasks). The percent of total home production hours spent in each activity is in parentheses.

Three key facts emerge from this table, hinting at the possible barriers that African women may face in reallocating time out of home production and towards the market.[9]

[8] Note that the housewives sample in this section differs from the sample of all women used in Figure 2b. The zero hours of work or school restriction comes from the time use part of the survey and are available for all countries. The status of not being a paid worker or a student is a self-reported variable from a typical individual survey module; but these variables are not available for all countries. See Data Appendix for details.

[9] Table A.1 in the Appendix shows the same breakdown of work hours in home production activities for all women (not just housewives) aged 15-59 in each country.

Table 1: **Weekly Hours in Home Production among Housewives**

	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	53.3	45.7	48.5	45.7	45.7	45.8	49.2
Cooking	25.1	11.5	7.0	16.5	17.0	23.6	22.7	9.8
(% of total)	(49%)	(22%)	(15%)	(34%)	(37%)	(52%)	(50%)	(20%)
Collecting firewood, water	1.5 (3%)	0.0 (0%)	0.0 (0%)	1.9 (4%)	1.1 (2%)	0.5 (1%)	1.7 (4%)	1.9 (5%)
Cleaning	7.9 (15%)	14.4 (27%)	8.9 (20%)	13.1 (27%)	11.9 (26%)	6.5 (14%)	2.6 (6%)	4.9 (10%)
Laundry	11.5 (22%)	7.0 (13%)	3.45 (8%)	6.4 (13%)	5.4 (12%)	4.7 (10%)	2.2 (5%)	0.9 (2%)
Care of children, adults	3.6 (7%)	10.0 (19%)	15.7 (34%)	8.1 (17%)	7.2 (16%)	7.4 (16%)	9.5 (21%)	18.4 (37%)
Household management	1.7 (3%)	10.4 (20%)	10.6 (23%)	2.6 (5%)	3.1 (7%)	3.1 (7%)	7.1 (15%)	13.2 (27%)
Panel B	*Sample features*							
N	619	377	987	1,900	2,581	3,354	1,715	718
HH size	4.3	3.9	3.9	5.0	4.7	5.0	4.9	7.1
Housewives†	n/a	37%	18%	32%	16%	44%	47%	12%
Married women††	n/a	79%	54%	45%	38%	69%	56%	63%

Notes: [1] GDP per capita is measured in 2011 International Dollars using the Penn World Tables v7.1. GDP per capita in the US in the 1920s is from Maddison's data reported in Herrendorf et al. (2013). See text and Data appendix for definition of housewife. (†) Indicates the % of women in the overall sample defined as housewives; (††) indicates % of married women in the overall sample. 1920s US data are from a survey of 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).

Source: See Data appendix for details of data sources.

Fact 1: Modern US and African housewives work very similar home hours

African housewives do not work significantly more hours per week in the home than do modern American housewives. In fact, in some countries, African housewives work fewer hours. In the US in 2010, housewives spent on average 45.7 hours per week in home production: about the same amount of time spent by Moroccan (45.7 hours), Ghanaian (45.8 hours) and South African (2010) housewives. Only Sierra Leonean and South African housewives in 2000 report more hours in home production than American housewives in 2010.

One way to interpret the similarity in total home hours across African and US households in 2010 is that African women are combining the same total hours with less household capital and more household members, and hence are producing less total output of household services. African households certainly lack capital. Among the households in which these housewives live, only 4.3% (in Ghana) to 58% (in Morocco) have indoor plumbing. While most Moroccan households have access to electricity, only 12% of Sierra Leonean households do. Stove and refrigerator ownership is also low. One in twenty households in Ghana and 7 in 100 households in Sierra Leone have a stove; one in five households in Ghana and one in twenty households in Sierra Leone have a fridge. In contrast, by the mid-1960s, electricity and indoor plumbing were universal in the US and over 90% of households owned a fridge and stove.[10]

Apart from these differences in access to infrastructure between American and African households, there is a far larger share of housewives in African households. Table 1 shows that only 18% of American women are housewives, compared with 16-32% in South Africa, and 44-47% in Morocco and Ghana (Sierra Leone only has 12% of women classified as housewives). The share of housewives in South Africa, Ghana and Morocco in recent times is closer to the US share of housewives in the mid-1960s. This echoes the finding from Figure 2b, that weekly home time for the average African woman in our sample is closer to average home time among the average US woman in the mid-1960s.

The high share of African housewives working many hours in the home implies that there are potentially large time savings to be had among African housewives who transition out of home production and towards market work. Whether women are able to shift their hours away from home production services may depend on social norms around married women working

[10] Access to utilities and appliances are from the same African time use surveys and using data from Greenwood et al (2005), Vidart (2021), and the World Bank's World Development Indicators for the U.S.

in the market. Dividing the share of housewives by the share of married women in Panel B of Table 1 for each country, we see that over 56% of married women in South Africa (2000), Morocco, Ghana, and Sierra Leone are housewives compared with the 46% of married US women who were housewives in the mid-1960s. In the final part of this paper, we discuss how social norms in Africa about married women's market work may constrain time reallocation across home and market.

Fact 2: Composition of home hours differs between modern US and African and housewives

For most African housewives, the bulk of their time is spent cooking, cleaning, and laundry. In South Africa, Ghana, and Morocco, cooking absorbs between one-third to just over one-half of all home production hours. Cleaning (laundry) takes another 6-27% (5-13%) of home production time. In contrast, child- and elder-care take at most 21% of hours, and higher-skilled household management takes at most 15% of home production time.

Sierra Leone is a bit different to the other African countries. Although it is the poorest country by far, the composition of hours in home production reflects much higher loads of care work and household management, relative to other activities. One reason for this could be that households are much larger in Sierra Leone. The average household size is 7.1 in Sierra Leone, while the maximum household size in other countries is never larger than five.

The composition of home hours among modern US housewives is the exact reverse of South African, Ghanaian, and Moroccan housewives. Over half of home production hours in 2010 are spent in home management and in care work, with only 15% of hours spent cooking, 20% cleaning, and 8% doing the dreaded laundry. The first three columns of Table 1 demonstrate well-known historical facts about shifts in American time use throughout the 20th century. Housewife home production hours have fallen by about 11% percent between the 1920s and 2010 (Ramey (2000) notes even larger declines among all women). Cooking and laundry hours have shrunk dramatically, while time spent in family care activities and household management have more than quadrupled (Vanek 1973). Some activities have also disappeared: In the 1920s, American housewives spent 1.5 hours per week tending to the wood and water needs of their families, close to the 0.5-1.9 hours African housewives currently spend in these activities.

These historical shifts in the composition of home time in the U.S. reflect a combination of time-saving household innovations and the marketization of certain household activities that are amenable to mechanization; a structural transformation in the home. It is clear from the

comparisons in Table 1 that African households have not yet experienced this kind of structural transformation in the home.

Fact 3: African housewives cook, clean, and do laundry more like US housewives of the 1920s and 1960s

Housewives in South Africa, Ghana, Morocco spend their time much more along the lines of American women in the 1920s and the 1960s. In these three African countries, cooking, cleaning, and laundry are all highly time-intensive home production activities.

Across all surveys (excepting Sierra Leone and 2010 U.S.), cooking takes up the lion's share of time spent in home production. In South Africa, Ghana, and Morocco, housewives spend between 16.5 and 23.6 hours per week cooking for their families. South African housewives spend more time cooking each week than American housewives did in the 1960s; Ghanaian and Moroccan women look more like American housewives of the 1920s, spending upwards of 20 hours per week cooking. Cleaning time in the middle- and lower-middle income African households also resembles historical US patterns. Cleaning took around 8 hours per week for US farm wives in the 1920s, while South African and Moroccan housewives spend 6.5-13.1 hours per week in housecleaning. Similarly, laundry is as time-intensive in modern South Africa and Morocco as it was between 1965 and 2010 in the U.S.

The time intensity of cooking, cleaning, and doing laundry may be linked to the lack of marketized services - restaurants and grocery stories, laundromats and housecleaners, that can substitute for home production. It may also be linked to the lack of basic infrastructure and appliances, for example: without refrigerators for safe food storage, necessitates cooking must happen each day from scratch; the lack of water and washing machines for laundry necessitates time-costly cleaning of clothing. Investigating the availability of specific kinds of home production services and the access to basic infrastructure and appliances in African households would be a useful first step in exploring constraints to the reallocation of time from home to market. We take up these issues in the final section.

Reallocating Time: Constraints and Opportunities for Women in Africa

Structural transformation in market work has been on the rise in Africa since the late 2000s and is predicted to continue (Kruse et al. 2021). At the same time, total births per woman in sub-Saharan African fell from 5.75 to 4.62 in the two decades after 2000, while literacy among

15-24 year-old females in sub-Saharan Africa rose from 46 percent to almost 60 percent in the same period (according to World Bank Indicators data). These broad changes are likely to alter both the demand for home production services by households and the willingness of women to allocate time to home production relative to time in the market.

What are some of the constraints to, and opportunities for, women reallocating unpaid time from their own homes, into paid market work, should they choose to do so? In this section, we discuss two broad frictions that could be important impediments to the marketization of home production as an economy undergoes structural transformation. First, we consider gender-specific social norms about appropriate market work and legal barriers restricting where and how women can spend their time. Second, we consider differences in household technologies or care-work infrastructure (like public transportation and childcare) that could be a drag on reallocating time during any structural transformation of the economy.

Social Norms, Legal Barriers, and Female Time Allocation

Social norms about the appropriate nature of women's work, and legal barriers to women's work, restrict women's ability to work outside the home, to work in gender-mixed environments, or even to move about freely in the market place. For example, Jayachandran (2021) discusses how social norms in Islamic and Hindu societies affect what women can do in the market. A first-order effect of gender-specific social norms is on the extent to which women participate in market work at all. As one example of research in this area, Majbouri (2020) shows that female labor force participation is not sensitive to the fertility in the North African countries of Tunisia, Morocco, and Egypt, using twin births and sibling sex composition as instruments to estimate effects of having additional children. The implication is that social norms constrain female labor force participation more than high fertility.

Economists have only recently started to examine policies and test interventions that might relieve norms-based limitations on women's work. This work tends to either examine ways to boost women's formal work in the labor market within the constraints imposed by prevailing social norms, or to challenge social norms about appropriate women's work directly. Little of the prevailing evidence comes from African settings, although some studies in other parts of the world yield insights relevant for parts of Africa.

Social norms that restrict female mobility outside of the home may in part protect women from potentially dangerous public settings. For example, in many urban areas of developing countries, women are routinely harassed in public and on public transportation, and taking private taxis may be no safer. To allow women more freedom of mobility without changing the

norm directly, some countries have started to experiment with providing gender-segregated transportation. In North Africa, the metro system in Cairo, Egypt, provides women-only public transit facilities; other urban areas in Latin America and in East Asia have adopted similar policies. These policies profoundly affect the experience of female mobility. In Mexico City, access to female-only subway transportation substantially reduces harassment of female commuters (Aguilar et al., 2021) during hours when this transportation was available. In Rio de Janeiro, Kondylis et al (2020) show that one-quarter of women in their study were willing to pay a 20 percent premium to use the female-only bus transit. What remains is to show whether access to safer, female-only public transportation affects women's decisions to work in the market, at the margin.

Alternatively, although it may be difficult to change norms about how men and women work together, policy may have a role to play in incentivizing firms to pay the fixed costs of making workplaces more suitable for female workers. A recent example from Saudi Arabia is illustrative. Miller et al. (forthcoming) note that three-quarters of all private sector firms in Saudi Arabia employed no women in 2009. The authors hypothesize that because firms were legally obligated to provide separate physical and social spaces for male and female workers, the costs of integrating the labor force were too high. Yet, once firms were incentivized to hire Saudi nationals – itself a gender-neutral policy that had the unintended effect of increasing the relative demand for Saudi women – private firms paid these fixed costs and started hiring women. The share of women in the formal workforce tripled in four years (Miller et al. forthcoming). Here, government policy offered a way to coordinate on a new equilibrium, opening up space for women's market work to expand without changing social norms directly.

Can social norms—and particularly men's beliefs— about acceptable women's work be changed directly? In rural India, Bernhardt et al. (2018) show that the perceived social cost of women's work falls on men, and that husbands' opposition to female labor is associated with their wives' lower take-up of employment. However, correcting perceived social costs of having a wife work outside the home can cause norms to shift quickly. In Saudi Arabia, Bursztyn et al. (2020) find that while the majority of married men in their sample support women working outside the home, these men underestimate the support of other men for this idea. The large gaps between (men's) privately held opinions and (men's) publicly accepted norms about women working outside the home generates a friction that keeps women at home. The authors experimentally and randomly correct male beliefs about what other men believe about the place of women outside of the home. They show that this belief correction increases married men's willingness to help their wives search for jobs and the chances that these women take up temporary jobs outside of the home. This evidence of belief updating connects to a larger

literature about how information provision and exposure to role models can reduce some of the norm-based barriers to women's work (Jensen 2012; Jensen and Oster 2009).

Rather than challenging social norms about women in the market workplace, an alternative would be to challenge the social norm regarding who works in home production, by seeking to change the acceptability of this work among men. Work-in-progress by McGavock et al. (2020) tests this idea. In an ongoing experiment that modifies the intervention in Bursztyn et al. (2020), the authors collect first- and second-order beliefs from married men in rural Ethiopia about the acceptability of men participating in home production activities that are usually performed by women (like collecting wood and water). Initial evidence supports the findings from Saudi Arabia: men overestimate the social stigma associated with their own participation in home production tasks. Follow-up work should provide additional insights into whether randomly correcting men's beliefs about social sanctions can change male or female time in home production.

Finally, formal legal barriers on the demand-side of the labor market also prevent women from fully participating in market work, or simply reduce women's market wages, making it less likely that women would choose to move hours of work into the market. Hyland et al. (2020) document that women in North African and Middle Eastern countries have about half the legal rights of men. They show that gender inequality in the eyes of the law predicts worse labor market outcomes for women: higher gender wage gaps and a lower female labor force participation rate.

In short: Social norms are an important constraint on how women are able to allocate time between home and market, and likely play a large role in some parts of Africa, particularly in North Africa. A long line of research has documented changes in social norms about women's work in historical developed countries and in some developing countries (a non-exhaustive list of examples might begin with Fernandez and Fogli 2009; Doepke et al. 2012; Alesina et al. 2013). In the US historical experience, the social norms around and stigma attached to women working in dirty manufacturing jobs shifted dramatically after the 1950s and the rise of cleaner service sector jobs (Golding 1995). Along with policy steps discussed in this section, there is hope that social norms regarding women's work outside of home production may respond to changing economic conditions through the structural transformation in Africa.

Physical and Care-Work Infrastructure and Female Time Allocation

The constraints that women face in allocating time between home and market may differ when female labor force participation is already high. As discussed earlier, this situation is

widespread in sub-Saharan Africa, where most women combine low market hours and heavy time demands from home production. In this section, we address two questions: Could technological changes in home production (including easier access to clean water and fuel) save time worked in the home, allowing more hours to shift towards the market? If work shifts away from family farms towards the market place, how can countries prevent an exit from the labor force for those women who would like to continue working but have family responsibilities?

Economic theory is ambiguous on whether or how providing basic utilities to households will affect time spent in home or in market work: it depends on the relative productivity of labor in the home and market work, and on the demand (and the income elasticity) for home production services. In developed countries, there has been an ongoing debate about whether access to durables that improved productivity of labor in the home increased women's ability to do market work (as in Greenwood et al., 2005), or led to increased demands for home production done by women (as in Reid 1934; Vanek 1973; Mokyr 2000).

The more recent empirical evidence is also mixed. Randomized trials in urban Morocco (Devoto et al. 2012) and rural Kenya (Kremer et al. 2011) show that improved access to clean water reduced time spent in home work, but none of the released time translated into more female market work in either country. In contrast, Meeks (2017) shows that new water infrastructure in rural Kyrgyzstan substantially reduces time spent in home production and shifts this time into the market and leisure. Dinkelman (2011) shows that grid electrification in South Africa changed the nature of home production in rural areas, with newly electrified homes relying more on electrical appliances for lighting, cooking, and heating. New access to electrification also increased net female employment. In that paper, evidence pointed towards a net increase in labor supply driving increased female market work. Yet in other settings like Kenya and India, researchers have found modest positive to zero impacts of electricity on female market work (for a review of recent work on effects of household electrification in this journal, see Lee et al. 2020).

Electricity might directly increase the demand for female labor over generations, by changing the types of market work women can do and incentivizing educational attainment. Vidart (2020) shows that US electrification in the late 1800s and early 1900s raised the return to hiring skilled workers and drew women out of the home. As these new jobs raised the returns to education, women responded by investing in more schooling. This link between infrastructure and investment in human capital, and then to employment in higher-skilled sectors – part of the structural transformation – is an under-explored area in African settings.

In the African context, releasing female time into the market may require simultaneously lifting a number of home production constraints. For example, access to efficient cookstoves may not alone reduce female time in home production if there is no way to store prepared food (refrigeration), or if someone still needs to take care of children. This point naturally leads to a consideration of an important complementary constraint on how women can use their time: the need for safe, quality child-care, or elder-care.

The lack of access to marketized home production services, in particular childcare, likely constrains market hours and type of work chosen by women. Without childcare infrastructure, working when children are young requires market work that is amenable to interruption, has extreme flexibility, and is easy to access from a home base. Ironically, these characteristics almost perfectly describe jobs on a family farm and self-employment in home-based businesses in the informal sector – the kinds of jobs that women in Africa are *already* likely to occupy.

Does a lack of childcare partly account for the high prevalence of self-employment among women in developing countries? Does it also help us understand why there is so much variation in how women respond to changes in infrastructure and electricity? Heath (2017) highlights that the answer may depend on broader family structure. Using panel data from urban Ghana, she shows that with the arrival of a child, the women who drop out of the market workforce tend to have no other family members who can help with child-care, while those who remain and work more hours rely on older female relatives or elder children for childcare. Her paper implies that childcare constraints influence time allocation among a cross-generational array of women: mothers and their sisters, grandmothers, and older daughters.

Although self-employment offers great flexibility in hours or work, it does not always offer great flexibility in location. Delecourt and Fitzpatrick (forthcoming) show that while almost 40 percent of female self-employed in Uganda bring their babies to work, no self-employed men report doing so. Women bringing their infants to work earn lower profits than men and then childless women. Their evidence suggests that women with young children are more likely to be stocked out of products that require them to travel for replacement - hence, the lack of childcare constraints affects investment decisions at the level of the small firm.

Might childcare subsidies help to promote women's market work in developing countries? In urban Kenya where a private market for childcare exists, Clark et al. (2019) use a randomized controlled trial to show that subsidizing access to private childcare raises female employment by 8.5 percentage points. The subsidy both raised the labor force participation of married women, and nudged unmarried mothers to take up more regular and inflexible hours jobs. Ongoing work in rural Burkina Faso by the World Bank (2021) tests whether providing

mobile childcare facilities (tents and childcare workers) for women in public works programs affects labor market participation of women. In this case, because the work itself -- digging ditches and clearing public lands – moves around, so does the childcare. More evidence would be extremely useful in shedding light on how households cope with the arrival of young children, and which women are most constrained on the intensive margin of market work by the requirements of childcare.

Simon Kuznets (1966, p. 157) noted that in order for economies to grow, they must undergo a process of structural transformation: "A high rate of modern economic growth is attainable only if the required marked shifts in industrial structure are not too impeded by resistance - of labour and of capital, of people and their resources in the old and accustomed grooves." Understanding the factors that keep African women's time in the "old and accustomed grooves" of home production or unpaid family work is an exciting new area for research, which would benefit from greater application of time use surveys on the continent.

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Online Data Appendix

Time use and Gender in Africa in Times of Structural Transformation

Taryn Dinkelman and L. Rachel Ngai

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.

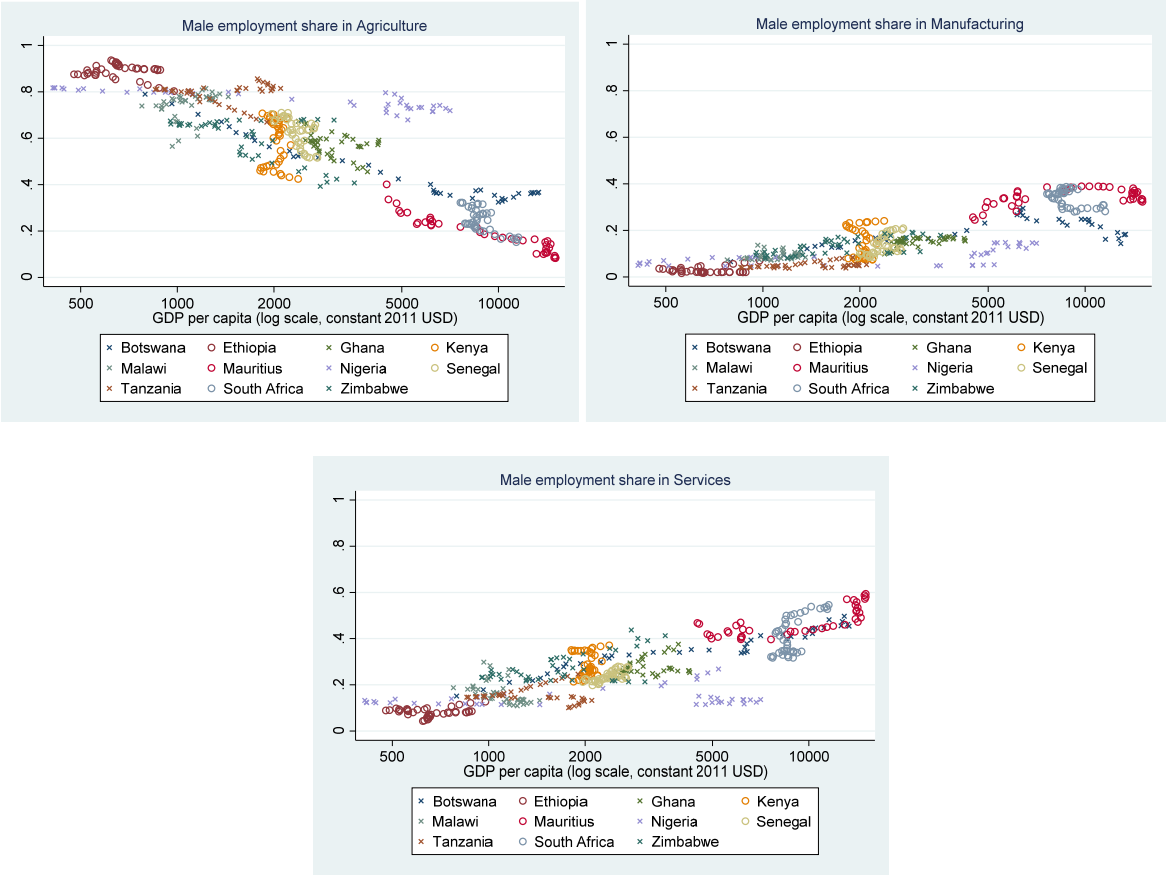
In addition to this ambiguity, it is challenging to measure women's work in Africa since most women work in unpaid agricultural activities. Employment shares in agriculture are highly volatile over the agricultural cycle in some parts of the continent. The effects of this are noticeable in LFS surveys. 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.