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The constraints that bind (or don't)

Integrating gender into economic constraints analyses

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The constraints that bind (or don't): Integrating gender into economic constraints analyses

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I. Introduction

Around the world, the lives of women and girls have improved dramatically over the past 50 years. Life expectancy has increased, fertility rates have fallen, two-thirds of countries have reached gender parity in primary education, and women now make up over half of all university graduates (UNESCO 2019). Yet despite this progress, some elements of gender inequality remain incredibly sticky, resistant to change. Access to economic opportunities is one such domain. Women opt out of the labor force in many countries due to structural barriers, social norms, and childrearing responsibilities. When women do work, they often choose flexible, part-time jobs to accommodate their unpaid care burden. These positions are typically lower skilled and lower paid. When women work in formal, paid employment, they earn less than male counterparts, even controlling for age, education level, and sector. Female farmers and entrepreneurs tend to be less productive than males due to limited access to land, capital, knowledge, and technology. These gaps in economic opportunities persist across all countries and income levels.

Understanding the unique barriers women face in accessing economic opportunities, and how these gendered barriers interact with larger structural forces, can help strengthen rigorous, evidence-based approaches to poverty reduction and growth promotion. The gender gap in poverty is widest during women's reproductive years, when there are 122 women for every 100 men living in poor households (Munoz Boudet et al. 2018). Children account for 44 percent of the poor, with girls overrepresented among this group. Efforts to promote women's economic participation during these years can thus raise the income levels of the poor, leading to tangible impacts on household consumption as well as child health and wellbeing. Women's economic empowerment also matters for growth. At the extreme, when women are not permitted to work, a country misses out on half of its productive labor force. But even when barriers are not this severe, women's reduced labor force participation matters. When women self-select out of the workforce due to care work, social norms, or discrimination, firms lose out on a pool of skilled workers, and instead hire less-skilled men to take their place. This shift results in real losses in productivity. Beyond the impact on immediate growth, women's economic empowerment matters for future growth. When women bring in additional income, they invest in their children's health, education, and nutrition, raising the human capital of the next generation.

While most development organizations and increasingly most governments tout the importance of women's economic empowerment, they often struggle to integrate gender analysis into their diagnostics and prioritization processes. There are several reasons for this challenge. First, due to the systematic and entrenched nature of gendered barriers, it is often difficult to identify the root cause of gender inequalities and even more difficult to estimate the aggregate economic returns that would come from addressing them. Second, the full returns to removing gendered barriers typically materialize over the long term, while short-term effects may be more modest. In a world characterized by short-term development budgeting and planning horizons, this usually works against action toward gender equality. Third, as pointed out by Ianchovichina and Leipziger (2019), within the world of economic development policymaking, those advocating for gender equality and those focusing on economic growth often do not collaborate effectively and tend to move on parallel tracks. Finally, many practitioners mistakenly believe that integrating gender into development strategies equals a

focus on women, instead of recognizing that a systematic gender approach is about bringing a gender lens to the analysis of any development issue. Sometimes, applying such a lens will suggest that gender inequality itself is a major constraint to economic development, while at other times, gender may emerge as an important but not first-order priority issue. In this paper, we will try to illustrate this point by integrating a gender lens into one highly used growth diagnostic and prioritization tool, the Hausmann, Rodrik, and Velasco (HRV) growth diagnostic, which is currently used in some form by the Millennium Challenge Corporation (MCC) and United States Agency for International Development (USAID) in their strategic planning.

Tools like the HRV are important because they can help users identify what obstacles are most constraining to economic growth in a specific country context and can thus be used to rank country needs on an empirical basis. Because of their practicality and pragmatism, these tools are useful for government policymakers and development practitioners alike, helping them direct resources toward the challenges that will yield the biggest impact. A big drawback of these tools, however, is that they are not designed to take larger inclusion dynamics into account (typically ignoring gender, ethnicity, or other factors shaping inclusion). Yet these inclusion dynamics are often critical to development, poverty alleviation, and inclusive, pro-poor growth. The tools are also silent on the deeper historical and political forces that shape institutions and policies. Development organizations are well aware of these shortcomings and try to make up for them in the next steps of the program design process—for example, by conducting beneficiary assessments to look at distributional impacts of interventions or by carrying out parallel institutional analysis. But by this point in the process, it is often too late for such findings to impact the identified constraints or sectors for intervention. Furthermore, such segmented analysis makes it difficult to capture the interactions between inclusion and power dynamics, which in turn shape institutions and policies.

We submit that these larger inclusion dynamics are important to include within growth constraints diagnostics, and indeed at times may even change the identified constraints to growth in an economy. We attempt to engender the HRV to see if the tool is flexible enough to take some of these broader inclusion concerns into account, using gender as a starting point, while still helping policymakers prioritize among a suite of needed reforms. We then apply our new framework to a test-case country, Malawi, to see how the tool works in practice. We conclude by drawing out some larger lessons learned about how gender can be better integrated into growth diagnostics and country-level prioritization moving forward.

II. What is the Hausmann, Rodrik, Velasco (HRV) growth diagnostic?

Hausmann, Rodrik, and Velasco (2005) argue that the main challenge developing countries face is how to increase and sustain economic growth. Building upon critiques of the Washington Consensus, they start from the premise that there is no one-size-fits-all approach to development; the types of reforms necessary to jump-start economic growth vary by context. Furthermore, they understand that policymakers do not want to be handed a laundry list of needed reforms; they need to know how to prioritize policy options in an environment of finite fiscal resources and political will. The authors thus develop a framework to help identify policy

priorities by determining the most binding constraints to economic growth in a country—constraints that if eliminated would yield the largest returns.

The first step in applying a growth diagnostic is to set the context for the analysis by identifying the key growth-related question or economic failure in the country (Hausmann et al. 2005; Hausmann et al. 2008; Dixit 2007). This requires looking at the country's historical growth path and current economic structure to understand better the country's past successes or failures and its future prospects. This narrative allows one to then frame the key growth question or challenge, which in turn shapes the subsequent analysis. For example, for a country that has experienced strong growth and economic diversification, the key challenge may be how to sustain such growth and broaden its beneficiaries. For a country that has seen weak growth and low human development outcomes for the past decade, the key growth question may be how to jump-start growth and build human capital.

Having identified the key growth question, the analyst then turns to the HRV growth diagnostic tree to search for the potential drivers of improved growth performance (see Figure 1). This "decision tree" derives from a simple growth model that allows for different types of distortions and starts from the premise that sustained economic growth requires mainly private investment and entrepreneurship. The degree of investment and entrepreneurship in an economy, in turn, depends upon returns to those investments, the appropriability of said returns, and the cost of financing those investments. The tree is not so much a methodological framework as it is an organizational tool, a mechanism to guide the analyst through a list of possible constraints to look at in a given economy. The tree helps the user identify the most serious constraints to growth in a country—or "binding" constraints. A factor is considered binding if its supply is low relative to high demand, and if releasing said constraint would yield the largest impact on growth, relative to other constraints. At each node on the decision tree, the user is asked to assess supply and demand dynamics by answering a series of four questions (see Table 1). The analyst uses these tests to assess the relative importance of different constraints.[1]

Table 1. Four Tests of Hausmann, Rodrik, and Velasco (HRV) Growth Diagnostic

No.	Question
1	Is the price of the lacking factor high?
2	Do changes in its availability tend to move aggregate investment or growth?
3	Do economic agents incur significant costs or risks to circumvent the constraint?
4	Are individuals or businesses that rely heavily on the constraining factor unable to thrive?

Source: Hausmann et al. (2008).

Specifically, Hausmann, Rodrik, and Velasco (2005) suggest using the following equation to assess the welfare impacts of reducing a given constraint:

$$\frac{du}{d\tau_j} = -\lambda_j + \sum_i \lambda_i \left(\frac{\partial [\mu_i^s(\tau, \ldots) - \mu_i^p(\tau, \ldots)}{\partial \tau_j} \right)$$

The first term of the equation, λ_j, measures the direct effect, or marginal welfare benefit, of reducing distortion τ on aggregate welfare (u). Since not all constraints are equally binding, the

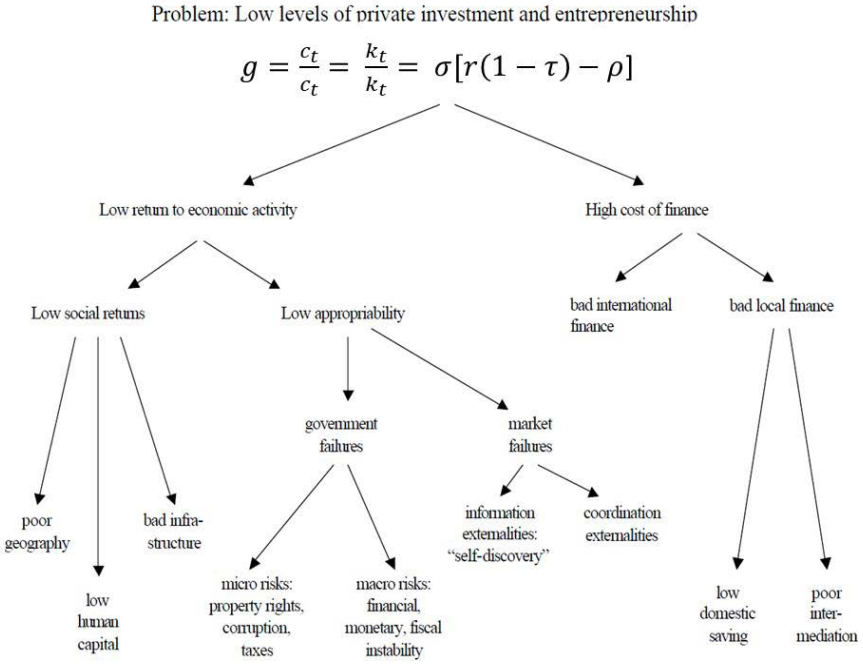
[1] Dixit (2007), building on HRV's work, suggests weighting the potential constraints in a Bayesian manner to help identify the most important constraints to growth. See Table 1 on pg. 151 of Dixit (2007) for further explanation of this approach.

more costly the distortion, the higher the magnitude of λ_j. The second term of the equation measures the effect of removing distortion τ_j on other distortions in the economy, or the downstream interactions. This effect is measured by the weighted sum of the gap between the social (μ^s) and private (μ^p) valuations of an economic activity. If reducing distortion τ_j reduces other distortions at the margin, there may be additional welfare gains beyond the direct effect of λ_j from removing said constraint. However, if reducing distortion τ_j increases other distortions, this result diminishes the welfare impact of reducing τ_j, and in some cases, may even produce an overall welfare loss.

After identifying the most binding constraints in an economy, the next step is to derive an explanation for the existence of those constraints. That is, one must build an empirical causal narrative (or "syndrome") that explains the constellation of symptoms and outcomes previously identified in the analysis. The idea of "syndromes" or causal narratives was first spelled out in Dixit (2007), with subsequent development in Hausmann et al. (2008) and Pritchett and Sharma (2008). A syndrome can and should help explain multiple identified constraints; for example, low human capital, weak property rights, and bad local finance might all be explained by the underlying syndrome of the underinvesting state. Such a focus on syndromes can help identify underlying cross-cutting failures as well as potential interaction between constraints, and also can add a degree of depth to the analysis.

The final step in the application of the HRV diagnostics is the transition to the design of interventions, or what Hausmann et al. (2008) called the "therapeutics." That is, the design of policies and/or projects that will correct the syndromes and release the constraints identified in the diagnostics phase.

Figure 1. Hausmann, Rodrik, and Velasco (HRV) growth diagnostic[2]



Source: Hausmann et al. (2005)

[2] The HRV model begins with the above equation, where g is the rate of growth in the economy, c is consumption, k is capital, r is the rate of return on capital, τ is the tax rate on capital, p is the interest rate, and σ is the elasticity of consumption. Based on this model, Hausmann et al. (2005) posit that growth in a country could be low because the expected private return of asset accumulation, $r(1-\tau)$, is low, or because of cost of finance, p, is high.

III. Engendering the HRV

While the practice of growth diagnostics has evolved over the past 15 years, the approach is still criticized for focusing too narrowly on growth and not sufficiently on the distribution of said growth (especially in high-poverty settings—see Ianchovichina and Lundstrom [2009]). Constraints are not distribution neutral; the potential success of lifting a constraint—impacts on growth and, indeed, wider poverty alleviation and development incomes—depends upon who is bound by said constraint and who is able to reap the benefits.

The idea for our paper originated in a series of discussions with the MCC gender and economic teams about how to integrate gender more effectively, and perhaps inclusion more broadly, into their constraints analysis. MCC has adopted the HRV model as the basis of its economic analysis, which it uses to determine country investment priorities. Once a country is selected for an MCC Threshold (a smaller grant for policy or institutional reforms) or Compact (larger, five-year grants), the MCC country team uses the HRV to identify two or three binding constraints to private investment, entrepreneurship, and growth. These findings drive the Compact and Threshold development processes and subsequent sectors for MCC investment.

In parallel to the constraints analysis, the gender team at MCC conducts a social and gender analysis to identify how norms, policies, and institutions shape differential access to assets and economic opportunities. While these findings are included in the country team's constraints analysis, the gender assessment is more likely to impact the downstream phases of the Compact/Threshold development process, beginning with the analysis of root causes of a growth constraint. Rarely does it impact the identification of binding constraints to growth.

Integrating a gender lens into the HRV analysis itself, rather than exploring these issues in parallel gender and social analyses, could allow development actors like MCC to bring gendered economic inequalities into the conversation much earlier in the Compact and Threshold development process, potentially allowing larger inclusion dynamics to impact the identified constraints to growth. But in order to integrate these considerations, it is necessary to "engender" the HRV diagnostic itself. In this paper, we attempt to "engender" the HRV decision tree, pointing out where a gendered lens might yield different results in assessing constraints to growth. While this analytical exercise is carried out using gender as the unit of analysis, a similar approach could be used to assess how constraints impact broader inclusion dynamics, such as the incomes of the bottom 40 percent, rural populations, the poor, ethnic minorities, and other marginalized groups.

So, how could gender inequalities impact growth in the HRV framework? From the key growth equation of the HRV (cited on page 3 above), we can see that gender gaps themselves may act as a binding constraint on growth, such that reducing them would yield a large direct effect on aggregate welfare (λ_j in the equation) relative to other constraints. Alternatively, gender gaps may not be binding themselves, but may interact with other constraints in an economy, showing up in the second term of the equation, as suggested by Ianchovichina and Leipziger (2019). This interaction means that in some cases removing a (non-gender) binding constraint may have positive secondary impacts on gender-related distortions, such that removing the constraint yields additional downstream welfare gains. In other cases, gender distortions may not rise to the level of a binding constraint (smaller λ_j), but if left unaddressed, could negatively interact with interventions to release other binding constraints, reducing aggregate welfare gains. All of these possibilities suggest that engendering the diagnostics process may yield

important insights as to the interactions between gender distortions and other distortions in the economy—insights that could modify the final prioritization of constraints.

In undertaking this exercise, we build upon an earlier attempt to engender the HRV by Roncolato et al. (2017). We first created our tree in isolation, and then compared it to their version, which gave us a useful external validity check. While we do not agree on all points with Roncolato et al., their inclusion of the care economy and their reinterpretation of the natural capital node informed our own iteration.

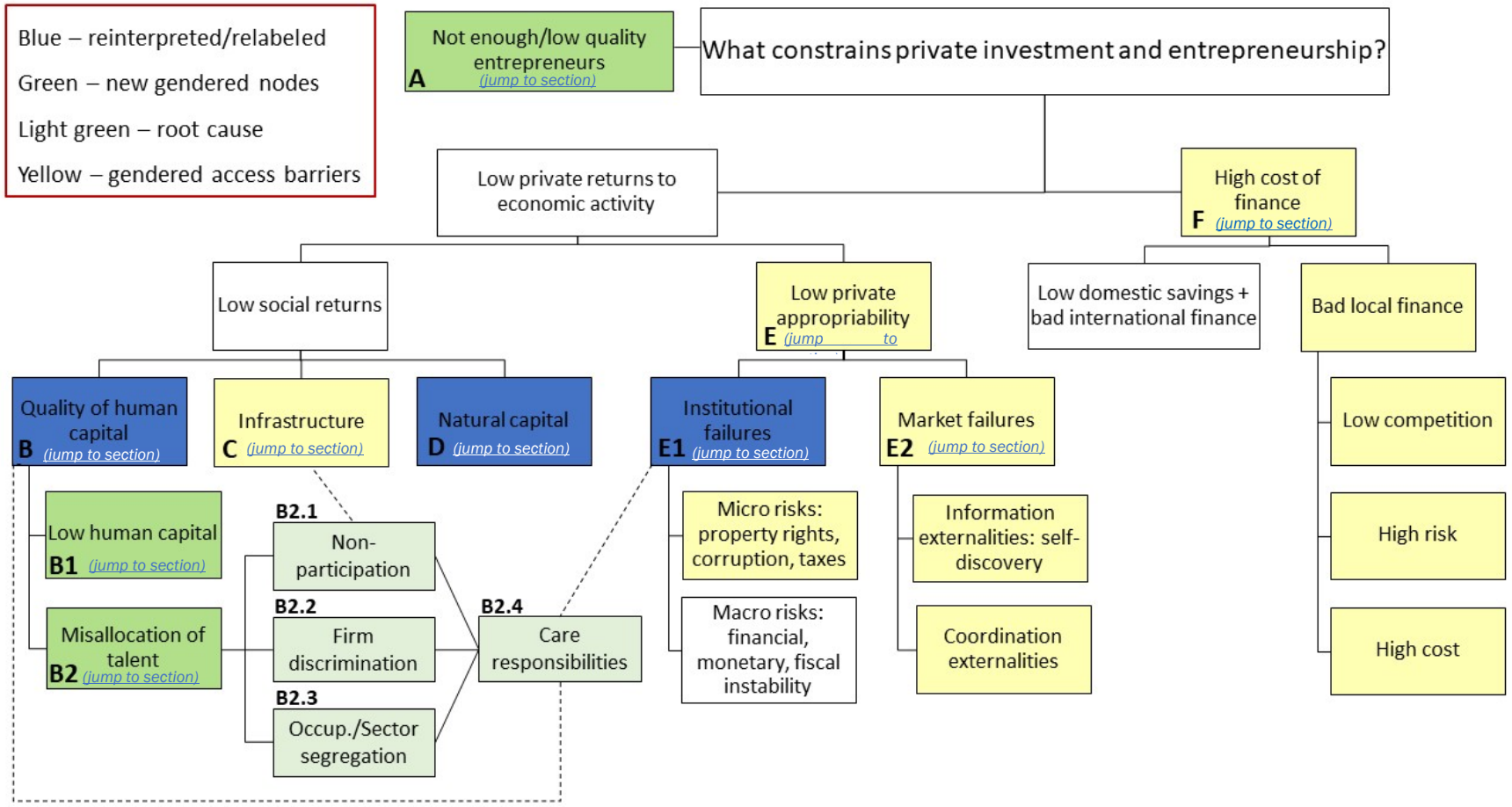
USAID has also applied a gender lens to the HRV in their Women's Entrepreneurship Diagnostic (de Santos 2013). Their model adapts the four questions from the original HRV, this time asking what keeps women specifically from investing in their businesses to spur firm growth. The tree itself remains the same, and the user additionally asks questions about what might constrain female-led firms at each juncture relative to male-led firms. Importantly, de Santos (2013) includes a list of potential data sources for each node on the tree, contributing to the buildup of gender-disaggregated data repositories. While capturing gender-specific barriers to entrepreneurship is an important aspect in our own tree, we argue that a full gender approach looks not only at women as entrepreneurs, but women as wage workers, consumers, and potential labor force participants. Gender-specific constraints on many nodes impact not only women's ability to invest in and appropriate profits from their firms, but also to engage in employment activities and participate in the economy more broadly. We do appreciate the practical utility of tying each node to a data source, and thus try to integrate the same approach into our own framework.

With a similar objective in mind, Ianchovichina and Leipziger (2019) pursue a slightly different approach to "engendering" growth diagnostics. Their approach essentially superimposes a women's economic empowerment filter onto the results of a standard growth diagnostic. By then giving additional weight to those constraints that more effectively address women's economic empowerment in a particular country context, they are able to reprioritize the original results of the growth diagnostics along the lines of what they refer to as a "gender-enhanced" growth analysis. Their approach focuses on identifying which constraints, if lifted, will yield the largest positive secondary interactions with gender distortions, the second term of the growth equation. It is simple, practical, and effective, and substantially less data- and analysis-intensive than what we propose in this paper. One drawback is that by focusing on the constraints emanating from a more standard growth diagnostic, this approach may miss some fundamental ways in which gender inequality directly constrains growth.

Using the original tree as a starting point, we engender the HRV, labeling where in the diagnostic a gendered lens might provide different insights into potential constraints. We then attempt to identify the types of evidence one could bring to bear to assess if a constraint is binding under the HRV's four tests. As we go through the tree (see Figure 2), we distinguish between four types of revisions, similar to Roncolato et al. First, we add new nodes to the tree where we feel that a specific gender constraint is not captured in the original version. Second, we tease out root causes of certain constraints where we feel that additional specificity helps the user accurately identify the real constraint. Third, we reinterpret and relabel nodes, either changing the label to better articulate what the node is trying to capture or expanding the underlying scope of the node in order to incorporate a new, gender-specific angle. Fourth, we identify nodes where gender-specific access barriers have the potential to make the node a constraint for women, even when it may not be a constraint for the economy as a whole.

In the section that follows, we explain the rationale behind our engendered revisions to the HRV and present evidence tying gender gaps on each new node to real growth costs along the lines of the four tests developed by Hausmann et al. (2008). In the spirit of a "guide" and with the goal of being helpful to potential users of this engendered HRV, we also suggest what data sources and types of data analysis can be used to assess if each node is a constraint to growth.

Figure 2. Engendered HRV



A. Not enough/low-quality entrepreneurs (new gendered node)

The HRV tree starts with the question "What constrains private investment and entrepreneurship in a country?" Implicit in this initial premise is the belief that there are enough high-quality entrepreneurs in the economy. Firm-level growth is constrained by low returns, appropriability, or financing, rather than a dearth of quality entrepreneurs. The question of entrepreneurial skill is not captured here nor anywhere else in the tree. Yet there is a growing body of evidence that suggests that the quality of entrepreneurship affects both firm output and productivity.[3]

Entrepreneurial quality could be low because of low human capital in a country. Or it could be low because entry into entrepreneurship is not based on underlying entrepreneurial talent, but instead is based on other factors (connections, ethnicity, gender, or even necessity).

The literature on misallocation suggests that in the absence of explicit distortions, individuals efficiently distribute themselves between entrepreneurs, employees, and self-employment depending on their abilities and preferences. In turn, entrepreneurs hire the efficient number of employees given their abilities. The resulting distribution of individuals across occupations, and of firms across sizes, maximizes the productivity of the economy and the returns to factors. But if distortions are present, the distribution of individuals across occupations and the size distribution of firms is suboptimal: Some individuals who should be employees are entrepreneurs (or vice versa), while some firms are larger (or smaller) than they should be given their underlying productivity. The resulting misallocation of capital and labor lowers aggregate productivity and distorts the returns to factors (Hsieh and Klenow 2009).

Let's apply this argument to gender. In all regions of the world, women engage in entrepreneurship at lower rates than men (see Table 2). One explanation for this is that women are less talented entrepreneurs than men. But this is inconsistent with the empirical literature on managerial performance and entrepreneurship, which suggests that while women and men may differ in leadership and management styles, there are no systematic differences in results (Eagly et al. 1995; Chaganti and Parasuraman 1996; Menzies et al. 2004). A second, more likely, explanation is that while entrepreneurial talent is equally distributed between men and women, women face greater barriers to becoming entrepreneurs. When high-quality female entrepreneurs are not able to enter, lower-quality male entrepreneurs take their place. This lowers the average quality of entrepreneurs in the economy. It also reduces overall returns because the firm-level management is worse than it would be under more-skilled female managers. This argument was first developed and tested by Esteve-Volart (2004) for India.

[3] See for example Bloom et al. (2010), Bloom and Reenen (2010), Bender et al. (2018), and Maloney and Sarrias (2014).

Table 2. Share of employment in entrepreneurship by gender and region, 2018

Region	Female	Male	Gap
Middle East and North Africa	9%	17%	8%
East Asia	26%	37%	11%
Europe and Central Asia	11%	19%	8%
Latin America and the Caribbean	29%	35%	6%
Southeast Asia and the Pacific	32%	38%	6%
South Asia	46%	64%	18%
Sub-Saharan Africa	51%	57%	6%

Source: ILO Stat (2019). Entrepreneurs defined as employers or own-account workers.

To assess the degree of misallocation these gaps represent and whether such gaps have an impact on growth, we look at the occupational choice model of Cuberes and Teignier (2016), which, building on the theoretical insights from Esteve-Volart (2004), estimates the productivity and growth costs of gender gaps in entrepreneurship and workforce participation across countries. Under an occupational choice model, output is a function of labor, capital, span of control technology, and a productivity parameter. More-skilled mangers are more productive, leading to greater output per worker. Less-skilled managers, on the other hand, lower profits and output. When females are excluded from entrepreneurship, or face significant barriers to entry, this lowers the quality of entrepreneurs in the economy, which has real costs for growth. Cuberes and Teignier estimate the average income loss from labor market gender gaps across 33 OECD countries and 106 developing countries (2016), and also produce more detailed models for the Balkans (2015) and Latin America and the Caribbean (2017). They calculate these losses by estimating the productivity gains a country would experience if female participation in entrepreneurship rose to the level of male participation—in essence simulating the impact of change over time, which is test 2 of the HRV. The largest losses are found in South Asia, where the gender gap in entrepreneurship results in a long-term loss of 10 percent, East Asia (-8 percent) and the Middle East and North Africa (-8 percent). These income losses are even larger when gender gaps in workforce participation are taken into account as well.

Testing whether gender gaps in entrepreneurship may matter to growth in the HRV

A first step is to look at labor force participation rates by gender, share of employers by gender, and share of self-employed workers by gender. In the absence of gendered barriers, the probability of a woman being an entrepreneur should be the same as or close to that of a man. If instead the probability of observing a female entrepreneur is significantly less than that of a male entrepreneur, this suggests at the very least a need to dig deeper into why that might be the case. Do women have much lower human capital than men? Are entrepreneurship opportunities limited to some (male-dominated) sectors or to specific regions? Or are there other specific barriers to entry for women? Then one can ask whether it is likely to matter: How big is the difference? Are there observable productivity differentials between male-led and female-led firms? A simple simulation exercise can yield an estimate of the magnitude of the productivity loss associated with this gap. Adding some measures of the skills and education of male and female entrepreneurs allows for further refinement of the estimates. For their exercise, Cuberes and Teignier used data from the International Labor Organization's (ILO) Key Indicators of the Labor Market (KILM) database. As a short cut, one could also directly utilize

the extensive analysis Cuberes and Teignier (2015, 2016, 2017) have produced on this subject and pull country-level productivity cost estimates from the annexes of their papers.

As an illustration of this type of analysis, consider data extracted from the work done by Cuberes and Teignier (2015) for the countries of the Balkans (Table 3). First, the table shows the enormous gaps by gender in participation in economic activity—whether as workers, entrepreneurs, or self-employed. Second, there are large income and productivity costs associated with these gaps, calculated as the ratio between output or income per worker in a country with no gender gaps and observed output with given gender gaps. It is important to note that because male labor force participation in some of these countries is also low and unemployment high, a simple demand-supply analysis that ignores quality and skills differences among male and female labor may conclude that, yes, female labor force participation is low but it is not a binding constraint since there is a lot of unused male labor and hence no "labor supply" constraint. This example perfectly illustrates the perils of assuming that labor is homogenous: A misallocation of talent with serious growth effects may appear non-binding because of the implicit assumption of homogenous labor. As Ostry et al. (2018) point out, not only is labor not homogenous in skills, but in fact male and female labor skills are complementary, and hence standard models which assume that they are interchangeable underestimate the impact of greater gender inclusion on growth.

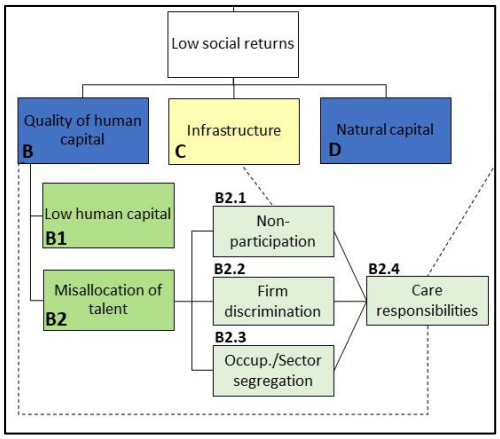
Table 3. Economic losses due to low female labor force participation and entrepreneurship in Balkans

Country	Labor force participation friction (% women excluded)	Employer friction (% women excluded)	Self-employed friction (% women excluded)	Income loss from all gender gaps	Income loss from entrepreneurs hip gap
Kosovo (2012)	68.6%	83.1%	75.2%	28.2%	8.7%
Albania (2012)	50.2%	29.6%	38.7%	19.9%	2.9%
Bosnia & Herzegovina (2013)	38.4%	48.1%	13.9%	16.4%	4%
Croatia (2009)	20.5%	38.5%	0%	9.7%	3%
Macedonia (2011)	34.8%	49.2%	71.7%	15.8%	4.8%
Serbia (2010)	31.8%	68%	68.4%	16.2%	6.9%

Source: Cuberes and Teignier (2015)

(return to tree)

B. Quality of human capital (relabeled node)



The "low human capital" node in the original HRV tree encompasses a wide array of factors that could inhibit a firm's ability to get the human capital it needs. To better integrate a gender lens into the analysis, we relabeled the "low human capital" node "quality of human capital," unbundling some of the assumptions and causal channels within the human capital bucket into their own independent nodes ("low human capital" and "misallocation of talent") in order to assess the root causes of human capital constraints.

Human capital could be a constraint for firms because overall human capital levels are low. There may or may not be a gendered component to this barrier. Both men and women could have low educational attainment, which restricts the pool of skilled candidates in the workforce. Alternatively, there could be gendered barriers to acquiring human capital. Girls could face additional obstacles in accessing educational opportunities (as is, in fact, still the case in parts of Sub-Saharan Africa and South Asia, and especially among low-income households). These gendered barriers would lower overall human capital in the economy and also push women into low-skilled, low-paid occupations. While low human capital may not be an immediately binding constraint in highly agricultural economies, as countries go through structural transformation, skills deficits will become a large inhibitor to growth in the future. Indeed, a recent Brookings report suggests that Africa's structural transformation depends upon moving into higher value-added services, a shift that is currently impeded by both gender and skills barriers (Africa Growth Initiative 2020). Thus, long- versus short-term time horizons matter greatly here, as educational investments take 20 years to bear fruit.

Human capital could also be a constraint for firms because the talent that is present in the economy is misallocated. There are many potential root causes of this misallocation. Certain groups, such as women, could be opting out of the labor force, removing themselves from the labor talent pool. Firms could discriminate against certain groups in hiring, and thus miss out on a pool of skilled workers due to social norms, bias, or misinformation. Workers may also self-sort into different occupations or sectors based on social norms rather than talent, leading to a mismatch in the labor force.

The result of either low human capital or a misallocation of talent in the economy is that firms cannot get the quality of workers they need. However, these are two distinct constraints to growth, with very different policy solutions.

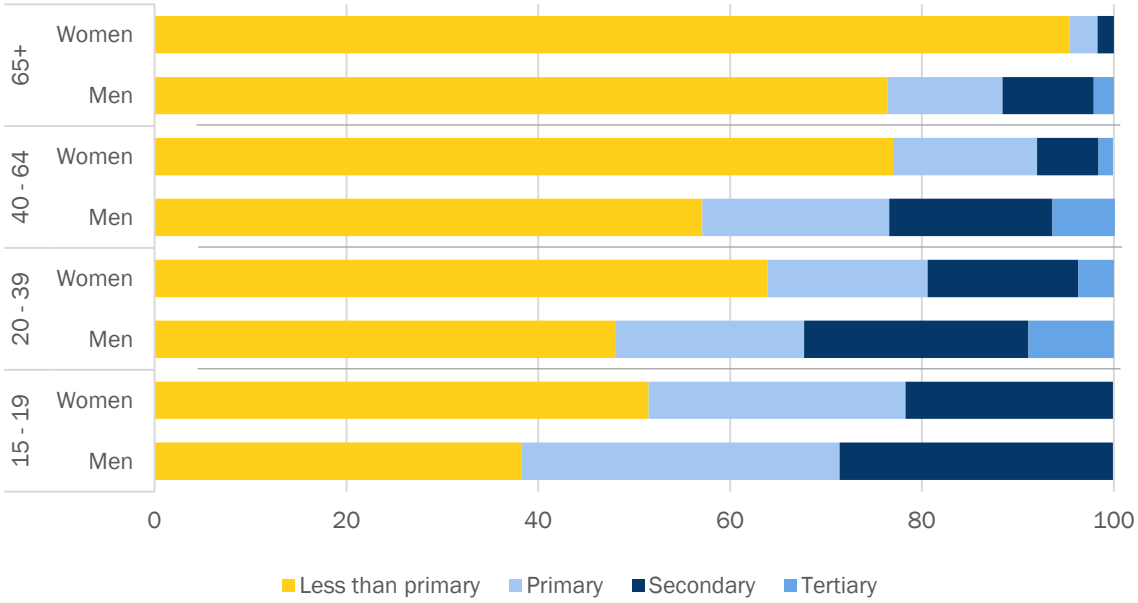
(return to tree)

B1. Low human capital (new gendered node)

The most obvious reason for firms not finding the skills they need is low educational attainment in the workforce. This could be a gender-neutral constraint, or educational disparities could be concentrated among particular groups, such as the poor, rural populations, women, or ethnic

minorities (or where these groups overlap). Here we focus on gender educational gaps, but the analysis applies to other sub-populations as well. Although the gender gap in schooling has shrunk dramatically across the globe over the past 20 years, substantial schooling gaps between boys and girls persist in Sub-Saharan Africa and South Asia. And while schooling gaps have closed among younger cohorts, gender gaps in educational attainment among the stock of workers in the labor force are much higher due to unequal access to schooling in the past. In Cote d'Ivoire, for instance, 64 percent of women age 20-39 have completed less than primary school, compared with 48 percent of men (see Figure 3). The country's overall low human capital, exacerbated by gender gaps in educational attainment, results in real costs to economic growth; indeed, 37 percent of firms identified an inadequately educated workforce as a major constraint to growth in 2016, potential evidence for test 1(high price of the factor) of the HRV (World Bank Enterprise Surveys 2019).

Figure 3. Educational attainment by age and gender, Cote d'Ivoire 2015



Source: Wittgenstein Centre for Demography and Global Human Capital (2018)

Low human capital is not just a result of low school completion rates. It is also a result of low learning and poor-quality schools. Evidence suggests that students' family background is a major predictor of student learning—rich children perform much better than poor children (World Bank 2018b). In South Africa, for instance, third-graders in poor households are an estimated three years of learning behind those in rich households (Spaull and Kotze 2015). Other research suggests that school quality is a large driver of the learning gap; in Pakistan, the difference in test scores between low- and high-performing schools is 24 times the gap between rich and poor students (Das et al. 2006). There is some evidence of gender gaps in learning outcomes, though the evidence is recent and still fairly weak. Gunewardena et al. (2018) find that men outperform women in cognitive skills in Bolivia, Colombia, Ghana, and Kenya, while women outperform men in Georgia and Ukraine. However, when looking at non-cognitive skills such as emotional stability, extraversion, and risk-taking, they found no significant gender pattern. Using the new World Bank dataset on educational quality, Altinok et al. (2018) estimate the female learning premium by country, conditional on school

enrollment. As of yet, they find no clear or large learning gaps by gender. So while poor learning outcomes also contribute to low human capital in a country, the gender dimensions of this are not yet well established.

However, boys and girls may learn different types of skills in school. Children often sort into different educational streams by gender. This self-selection is largely driven by social norms and attitudes as opposed to innate talent. The 2012 World Development Report (WDR) on gender found that girls outperform boys in reading in all countries, but boys tend to perform marginally better than girls in math and science. This could be due to learning gaps, or it could be due to the types of skills girls and boys have been socialized to concentrate on while in school, often the result of gender stereotypes about intelligence held by teachers, parents, and community members that children internalize. Indeed, a 2015 OECD report found that girls' underperformance in fields of study related to science and information and communications technology (ICT) was not the result of aptitude, but a lack of confidence in their abilities. This often leads girls to self-sort out of these disciplines; women are still vastly underrepresented in science, technology, engineering, and math fields (STEM) (World Bank 2018b). This self-sorting has real long-term economic costs. The educational streams boys sort into tend to be more highly skilled, and hence higher paid in the workforce. There is a growing digital skills gap between men and women—globally, men use the internet at 12 percent higher rates than women, and 200 million fewer women own mobile phones than men (ITU 2017; OECD 2018). Yet research indicates that digital literacy is a key skill needed for the workforce of the future. Thus, when girls sort into less skill-intensive educational tracts, it limits their long-term labor force opportunities and earning potential. It also deprives firms of potential talent and the economy of potential sources of innovation. According to a recent study by Accenture and Girls Who Code (2016), demand for computer scientists and data analysts in the U.S. is expected to outpace supply by 2025, which should drive up the shadow price for STEM skills, evidence for test 1 of the HRV. Increasing female participation in STEM could help fill this gap and boost economic growth. An EU report estimates that closing the gender gap in STEM would increase GDP per capita by 2.2 to 3 percent, and create over 1 million new jobs by 2050, simulated evidence for test 2 of the HRV (EIGE 2017).

Testing whether low human capital among women lowers overall human capital

To assess the types of educational gender gaps that may exist, one can start by looking at educational completion rates for secondary and tertiary education by gender. The new World Bank educational quality dataset, which has data for 100 developing countries disaggregated by gender, socio-economic status, and urban/rural location, can then help assess if learning gaps exist across different sub-populations. One should also look at field of study by gender, alongside sector/occupational distribution, to help assess if educational sorting is directing women into less-lucrative jobs. One can look at the gender breakdown of enrollment/completion rates at technical and vocational education training (TVET) institutions, a growing focus for many development organizations. Focus group discussions with women who opt out of traditionally male fields of study may help shed light on gendered barriers to entry. A Mincer wage regression, using labor force survey data, can help one look at the returns to education by gender. Depending on data availability, this can be done for returns to cognitive as well as non-cognitive skills, as in Gunewardena et al. (2018). If returns are high and are higher for women (as is the case in many developing countries), this could provide evidence for test 1 of the HRV. One can assess demand for skilled workers by looking at enterprise or employer surveys to identify if firms feel that there are skills gaps in the workforce that impede

firm growth. Evidence of circumvention of a human capital constraint, test 3 of the HRV, might show up in firms importing high-skilled workers from overseas. In countries where women have made large gains in educational attainment in the last two decades, one could look at firm productivity by presence of female workers to assess if an increase in skilled workers is correlated with improved productivity and growth—evidence for test 2 of the HRV.

(return to tree)

B2. Misallocation of talent (new gendered node)

Firms may not get the right skills because the talent that is present in the economy is being misallocated. As discussed above, when workers are not sorted into the sectors and occupations for which they are best suited, this leads to a mismatch in the labor market and lowers overall productivity. The solution to such a constraint is not more education, but rather removing barriers that keep skilled workers from sorting into high-productivity firms. These barriers include social norms, unpaid care responsibilities (which stem from social norms and institutional/market failures to provide alternative child care options), poor infrastructure, and safety concerns. Since gender constraints are often cross-cutting, releasing human capital constraints may require addressing constraints on other branches of the tree as well. In order to understand how misallocation with a gender dimension occurs, we disaggregate the constraint into three potential root causes: non-participation, firm discrimination, and occupational/sectoral sorting. We argue that unequal care responsibilities, stemming from social norms about appropriate roles for men and women, undergird all of these factors, limiting the time women have available for paid work opportunities. As more countries reach gender parity in education, misallocation, as opposed to low skill, is more likely to be the true driver of human capital constraints in an economy.

B2.1) Non-participation: Female labor force participation is lower than male participation in all regions in the world. The gap ranges from 10 percentage points in North America to 55 percentage points in the Middle East and North Africa (World Development Indicators 2019). There is strong evidence that women drop out of the labor force during childbearing years. The gender gap in employment rates in all regions increases when children under six years old are present in the home. Child care responsibilities often force women to stop working, and many fail to re-enter the workforce once their children are out of the home. When looking at labor force participation rates by gender across education levels, it is clear that a large portion of skilled women opt out of the workforce in some countries. For instance, in Bangladesh, only 57 percent of women with tertiary education are in the workforce, compared with 93 percent of men with the same level of education (see Table 4). The issue is thus not low human capital—women have the skills necessary to participate—but rather structural factors, societal norms, or familial obligations that cause women to opt out. Losing out on this cadre of skilled workers carries a real economic cost in terms of efficiency, productivity, and output.

The economic impact of this opting out is substantial. Mateo Diaz and Rodriguez-Chamussy (2016) estimate the productivity losses due to women staying out of the labor market in Latin America. Using a similar model to Cuberes and Teignier (2016), and assuming current returns to education remain constant, they estimate GDP losses from 3.5 percent in Mexico to 16.8 percent in Honduras, based on education levels of women outside the workforce.

Testing whether non-participation may matter to growth in the HRV

To assess if misallocation is an issue, one first needs to look at employment or labor force participation rates by gender and education level, to see where and at what skill level women are opting out of the workforce. This supply side picture can then be matched with measures of demand for skills such as those drawn from firm surveys or from vacancy data. In a context of a structurally transforming economy, one would pay special attention to demand for skills from firms in the higher valued-added sectors and to male/female employment in those. Estimates of returns to education by level and gender could also be used to assess whether there is a mismatch between supply and demand for skills and whether that has a gender dimension. Using enterprise or employer surveys, one could also look at changes in productivity over time to see if they are correlated with increased female labor force participation rates, evidence for test 2 of the HRV.

Table 4: Labor force participation rate by gender and educational attainment

Country	Gender	Primary	Secondary	Tertiary
Bangladesh (2017)	Female	39%	29%	57%
	Male	89%	66%	93%
Benin (2011)	Female	73%	42%	57%
	Male	84%	48%	71%
Egypt (2017)	Female	10%	26%	16%
	Male	39%	74%	88%
Guatemala (2017)	Female	40%	62%	76%
	Male	84%	88%	91%
Indonesia (2017)	Female	47%	54%	81%
	Male	78%	87%	94%
Kosovo (2016)	Female	10%	23%	50%
	Male	67%	54%	66%
Malawi (2017)	Female	35%	47%	61%
	Male	48%	63%	77%
Peru (2017)	Female	70%	67%	82%
	Male	84%	84%	95%

Source: ILO STAT (2019)

B2.2) Firm discrimination: Discrimination can stem from multiple sources. There may be legal work restrictions that treat men and women differently. According to the World Bank's Women, Business and the Law index, 45 percent of countries have laws that constrain a woman's decision to join and remain in the labor force in some way (Women, Business and the Law 2019). Female labor force participation rates are lower in countries with gendered industry and work-hour restrictions (World Bank 2012). There may be social norms that give preference to male workers over female workers due to ingrained ideas of the male breadwinner-female homemaker dichotomy. Employers may discriminate in hiring based on these ideas, or other employees and customers may indirectly enforce these gender roles. Male workers may not want to work alongside female workers due to cultural or religious norms, implicitly changing employers' hiring practices. Men may also be hesitant to work for female managers, limiting the pool of employees for female firms. Firm biases may become more apparent when jobs are scarce and large numbers of men are out of work. There may also be information failures

in an economy that lead employers to misjudge female worker productivity, and thus discriminate against them in employment. In firms or sectors with low female presence, employers may lack data points to assure them that women make good workers. Indeed, in South Africa, a study found that a reference letter from a former employer doubled women's likelihood of being hired but had no effect for men (Carranza and Pimkina 2018). Furthermore, there may be fears of additional costs associated with female employees due to maternity leave and child care absences.

Testing whether gender discrimination may matter to growth in the HRV

Discrimination creates the same wedge in the labor force as opting out, but the driving factors, and hence potential solutions, behind the two root causes differ. Audit studies can help assess whether employer biases are creating gendered barriers to employment. The Oaxaca-Blinder decomposition is a technique used with labor force survey wage data to assess what portion of the gender wage gap is explained by demographic and firm characteristics, and what portion remains unexplained, which could indicate discrimination. If firms report a shortage in skilled labor, yet one sees high rates of skilled women emigrating overseas, this might indicate that women are attempting to circumvent barriers to productive employment and discrimination, evidence for test 3 in the HRV. One can also look for evidence of change over time for test 2 of the HRV, especially if gender norms have been shifting, by looking at variance in firm productivity by presence of female workers. Enterprise or employer surveys can reveal what types of firms tend to hire more women—large versus small, formal versus informal, higher versus lower productivity. One could look at how productivity is correlated with female labor force participation or female presence in formal firms. One might also look at geographic variation and dispersion in firm productivity in areas where gender norms are stronger versus where they are less strong. However, the extent to which gender biases are internalized by firms themselves may limit one's abilities to observe such behaviors. But the inability to observe them does not mean that such distortions do not exist.

B2.3) Occupational/sectoral segregation: Firms may not get the right skill due to occupational or sectoral segregation. Women self-select into different sectors than men. Educational sorting and social norms about the appropriate type of work for men and women may undergird this choice. A recent survey in Malawi found that 35 percent of male entrepreneurs and 23 percent of female entrepreneurs felt that women should work in a sector suitable for women, as opposed to the most profitable sector (World Bank Africa GIL and FCI 2019). This sector choice makes a difference. Using data from Facebook's Future of Business survey, a recent study found that men working in male-dominated sectors earn 116 percent more than women working in female-dominated sectors (World Bank 2019b). Self-selection may also lead women to concentrate in the informal sector, though there is mixed evidence that there is a gender dimension to this choice. Even within sectors, women and men sort into different occupations. Women tend to work in lower status and lower paid positions relative to men—nurses versus doctors, teachers versus principals. Research suggests that women's choice of jobs is often driven by non-monetary preferences such as leave benefits, work-hour flexibility, and availability of part-time work (Currie and Chaykowski 1992; Chowdhury et al. 2018). They are often willing to forgo higher wages to circumvent larger structural constraints that make it difficult to balance paid work with child care responsibilities.

This sorting implies that workers are not employed in the sectors or occupations that they are best suited for. Researchers find that females are mismatched more often than males

(Addison et al. 2017). Firms, and the economy as a whole, would be better off if the most skilled labor worked in the relevant sector or occupation.

Hsieh et al. (2019) use the Roy model of occupational choice to assess how changing demographics among high-skilled workers has impacted overall growth. They look specifically at the entrance of women and African-Americans into high-skilled occupations in the U.S. from 1960-2010. They measure the impact of three frictions in the labor market: market discrimination, occupational preferences, and barriers to human capital accumulation. They submit that these frictions act as a tax on individual earnings, raising the shadow price of labor force participation for women and minorities. While these barriers have decreased for some higher-skilled occupations like doctors and lawyers, large barriers still exist in low-skilled occupations like secretaries and construction workers. They look at the correlation between the relative wages by occupation and the intensity of female/minority employment in that occupation, running wage regressions on female/minority participation rates with occupational dummies. They find that one-quarter of GDP per capita growth from 1960-2010 can be explained by the improved allocation of talent in the labor force, largely driven by the entrance of white women into highly skilled occupations (e.g., by the relaxing of gendered occupational barriers to high-skill occupations), evidence for test 2 of the HRV.

Many studies have looked at what characteristics enable women to circumvent the institutional, social norms, and familial forces that undergird occupational sorting and thereby enter male-dominated sectors. Women who enter male-dominated sectors tend to earn higher wages and run more productive firms; indeed, a recent study finds women in male-dominated sectors earn 66 percent higher profits than those who stay in traditionally female sectors (World Bank 2019b). The study finds that women who work in male-dominated sectors have similar educational levels and, surprisingly, lower entrepreneurial identity than those in female sectors. They are, however, more likely to be younger, married, and have a strong male support network than their female sector counterparts. Thus, innate talent or skill does not seem to determine women's self-selection into these higher-paid sectors—socio-economic and familial circumstances often drive the decision.

Testing whether occupational/sectoral sorting may matter to growth in the HRV

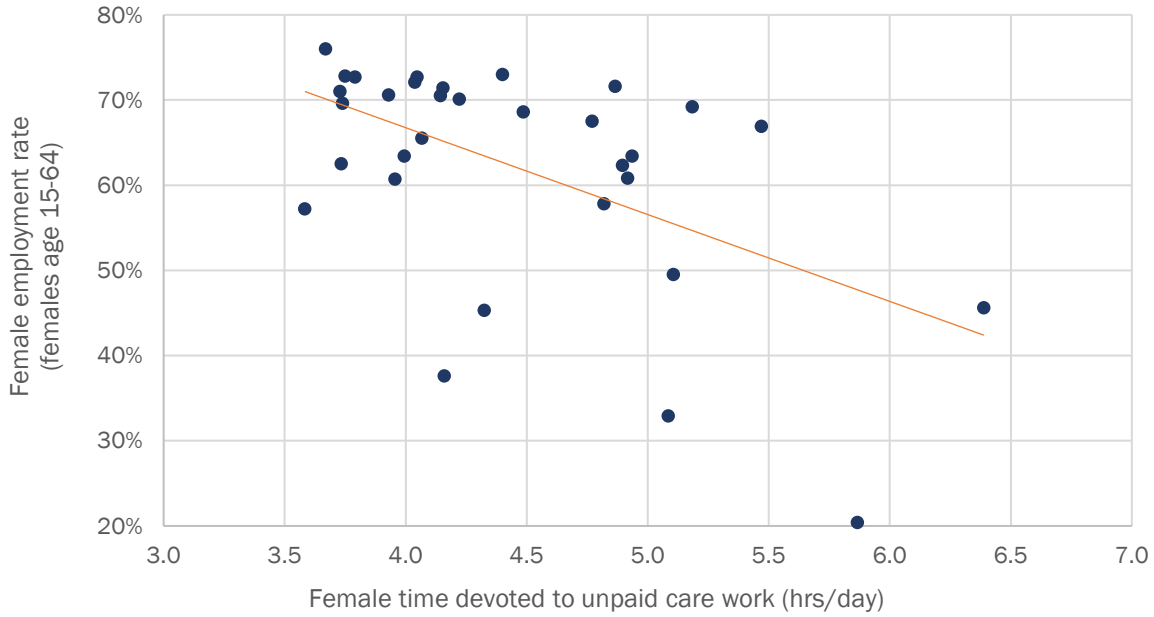
In order to assess if occupational/sectoral sorting undergirds the misallocation of human capital in an economy, one can look at occupational/sectoral concentration by gender. Estimating a similar model to that used by Hsieh et al. (2019) for developing countries is data intensive, but could be done for those that have regular, high-quality labor force surveys. One would simply need data on the gender composition and relative wages by gender in each sector or occupation. If one has time series or geographic variation, one could look at the correlation between female concentration in higher-paid sectors and productivity/earnings, evidence for test 2 of the HRV. Similar to the World Bank (2019b) paper, one could also look at relative wages of men and women in traditionally male- versus female-dominated sectors, to see if those women who are able to make it in male-dominated sectors earn higher wages, potential evidence for test 4 (ability to thrive when less dependent on constraining factor). One could use a Oaxaca-Blinder decomposition, disaggregated by sex of firm owner, to isolate the wage impact of the sector from human and physical capital inputs, to assess what enables these women to "make it" in these sectors.

B2.4) Cross-cutting issue—Care responsibilities: Women's care duties contribute to the misallocation of talent. Women are more time-poor than men; they devote more time to unpaid

care work in all countries in the world. In India, for instance, women spend almost 10 times as many hours on unpaid care work per week as men. This affects social returns to economic activity by lowering the amount of time women and girls have available to participate in paid work and educational opportunities. Indeed, time spent on care work and household duties is negatively correlated with female labor force participation in OECD countries (see Figure 4). It leads women to choose informal or flexible work positions, which typically have lower productivity, to circumvent care work constraints. Much of the gender gap in secondary and tertiary school completion rates can be explained by household care responsibilities and early marriage that keep girls from finishing their education. This misallocation of talent, as discussed above, has a large impact on growth. It also may reduce the health and well-being of the future workforce.

Women's care duties also affect the appropriability of private returns. Female entrepreneurs and farmers have less time to invest in their businesses/farms than males due to care responsibilities. Across Africa, significant gender gaps in hours worked by male and female entrepreneurs are found in Benin (18 percent), Ghana (13 percent) and Nigeria (11 percent) (World Bank Africa GIL and FCI 2019). Another issue may be continuity of time available. Though there is little data available, anecdotal evidence suggests that day-long trainings may be difficult for women to attend, as they need to be home to make lunch for their husband and children.

Figure 4: Women's unpaid care work and employment rates, OECD countries, latest year



Source: OECD Gender, Institutions and Development Database (2019)

Care responsibilities also feed back into the overall quality of human capital in the economy. The investments parents, often mothers, make in their children's health, well-being, and education raises the human capital of the next generation. Care duties have a cost in women's time, but they also have a benefit to society. There is a real monetary value to care work—economic production activities are not possible without reproductive labor. Thus, from a growth standpoint, this issue is not that women perform care work, but the assumption that care work

is women's work may lead to a misallocation of talent in the economy. While some women enjoy care work, others may want to work outside the home and reallocate care responsibilities to others. Highly skilled women might be better off hiring someone to take care of their children while they go to work, but due to social norms and structural constraints, these women end up opting out of the labor force, working part-time, or working in lower productivity, more flexible occupations to accommodate both paid and unpaid work.

The time-use gap between men and women is driven by a lack of redistribution of care work—whether to fathers, state support for care work, or private sector provision of care services. School hours rarely align with normal working hours, thus even women with school-age children have limited hours during the day with which to participate in paid labor. The gap is also driven by a lack of female bargaining power in the home, typically undergirded by social norms. Women's time constraints are also exacerbated by poor infrastructure. A lack of piped water and electricity increases the amount of time women spend each day on household duties. Distance from markets and limited access to public transportation also constrain women's time. The time it takes to transport goods to and from the market is time they are away from their children and thus must find others to take over their care work responsibilities, raising the shadow price of economic participation for women. This time gap translates into real productivity losses. Indeed, female farmer plot productivity is 26 percent lower than men's in Democratic Republic of the Congo, where the presence of young children in the home is associated with lower productivity for women, but not for men (Donald et al. 2018).

Reducing women's time constraints, and hence raising female labor force participation and enabling better matching between employers and workers, has potentially large impacts on growth. The impact of relieving these constraints may be greater in places with shrinking working-age demographics. Researchers estimate that increased female labor force participation could help offset the economic effects of rapidly aging populations in places like Japan, South Korea, and Europe (Crebo-Rediker et al. 2015; Bussolo et al. 2015). In Japan, for instance, the workforce is expected to shrink by 30 million by 2050, reducing potential growth by one-quarter of a percentage point each year (Steinberg and Nakane 2012). If Japanese female labor force participation rates rose to 70 percent, the average for G7 countries, GDP per capita would grow by 5 percent over the next 20 years, offsetting the quarter-percentage point decline. If female participation were raised to the level of northern European countries, GDP growth would be even higher.

Testing whether care responsibilities may matter to growth in the HRV

To assess the impact of care responsibilities on misallocation of talent in the economy, one needs time-use data by gender, specifically time spent on child care, domestic work, and market work. A low level of leisure time alongside high levels of both paid and unpaid work, particularly among poorer women, could indicate that care is a constraint to human capital allocation. Looking at labor force participation or employment rates by gender and parental status can help shed light on the role that caregiving duties have on a woman's choice to participate. Childrearing duties raise the shadow price of labor force participation for women, especially in the absence of alternative child care options to circumvent this constraint. Women often engage in part-time labor, or run businesses out of their home, to circumvent care work constraints. Thus, data on full-time versus part-time employment rates by gender, as well as wage employment versus self-employment or home production by gender can provide evidence for test 3 in the HRV. If data is available, one could look at the correlation

between female labor force participation rates/earnings and availability of alternative child care arrangements, such as early childhood development (ECD) care. One should also look at the relationship between female labor force participation and girls' secondary and tertiary completion rates to ensure that girls are not dropping out to substitute for their mothers' care work as they enter the workforce.

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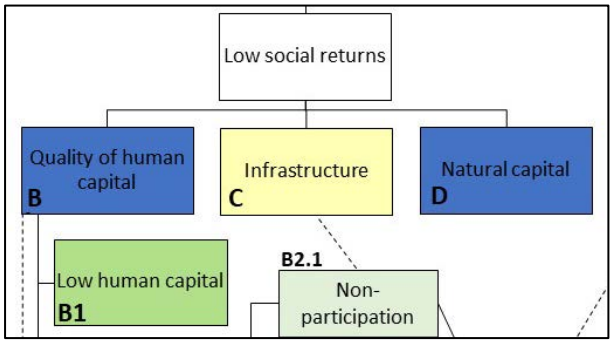
C. Infrastructure (gendered access barrier)



Key infrastructure bottlenecks may affect women more than men due to women's time poverty. Without electricity or piped water, women spend more time each day gathering firewood and water, which limits the time they have available for paid work. Low-quality roads and transportation services, as well as safety concerns along these corridors, restrict women's ability to access markets, education, and labor force opportunities, as women are more likely to rely on public transportation or travel by foot than men (World Bank 2012). Poor ICT infrastructure (exacerbated by gender gaps in access to technology and digital skills) limits entrepreneurs' ability to gather information about markets, prices, and deliveries. Thus, infrastructure constraints can interact with information and network failures, making these market failures more binding for women than for men. Additionally, low mobile phone penetration and connectivity may hamper financial inclusion through mobile money providers, which may be particularly impactful for women who face additional barriers in accessing traditional financial services.

Fontana and Natali (2008) find that women disproportionately benefit from infrastructure investments. Investments in water and sanitation, transportation, and energy can reduce women's unpaid care burden and increase child health outcomes, giving women more time to engage in paid labor. Indeed, rural electrification led to a seven percentage point increase in female labor force participation in Bangladesh and a nine percentage point increase in female employment in South Africa (Zhang 2019; Dinkleman 2011). Likewise, Seguino and Were (2014) estimate that infrastructure investments in Tanzania, specifically in water and electricity, could raise women's incomes by 17.7 percent by alleviating some of their time poverty constraints. Studies like this provide potential evidence for test 2 of the HRV.

Transportation constraints may also have differential impacts on women because women may be more concerned about safety than men. Recent evidence from India suggests that women choose to attend lower-quality colleges along safer transportation routes to circumvent sexual harassment on their commute (Borker 2018). The study finds that this choice results in a 20 percent decline in the present discounted value of women's post-college salaries—evidence for test 3 of the HRV. Improved transportation services can encourage greater female labor force participation, entrepreneurship, and even educational investments by giving them a safe way to access these opportunities.

Taken together, this evidence also suggests that including potential secondary impacts on female economic activity into the constraints analysis may increase the relative "bindingness"

of an infrastructure constraint that disproportionately affects women (e.g., in the HRV equation the return to removing constraint τ_j will be higher once the secondary impacts are taken into account than the λ_j alone would suggest).

Testing whether gender differential impacts of infrastructure may matter to growth in the HRV

To assess if infrastructure is a binding constraint, it is important to look at the downstream impacts and mutually reinforcing nature of infrastructure and other potential constraints. Fontana and Natali (2008) look at data from time-use surveys and integrated labor force surveys to assess time and earnings losses due to infrastructure barriers. We argue that additional time, safety, and distance constraints should be thought of as an additional tax on infrastructure for women, raising the shadow price. Borker (2018) uses university enrollment data, student survey data, travel route data available from Google Maps, and a mobile application that crowdsources safety information in Delhi to assess the impact on the prevalence of sexual harassment on different commute routes. She looks for evidence of circumvention of transportation constraints such as women taking longer, less direct, or more expensive routes to school; attending lower-quality schools than they could have given their test scores; and the distance female versus male students are willing to travel for school. Obviously, social norms around female travel also play a role in these decisions; thus, a specialized survey or focus group discussion may be needed to assess the gendered dimensions of barriers to transportation access. Since infrastructure is often stronger in urban versus rural areas, one could also look for correlations between past infrastructure investments in cities and greater female labor force participation, employment, or educational attainment to assess the potential impact of lifting infrastructure constraints in other areas—evidence for test 2 of the HRV.

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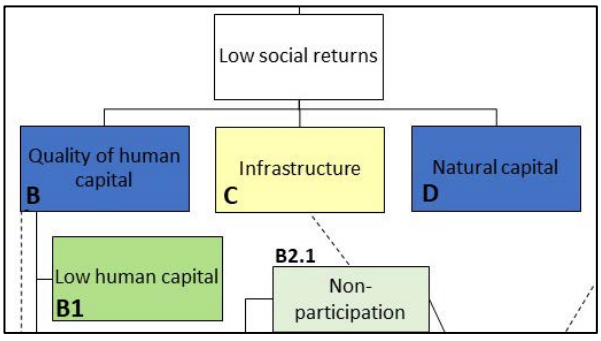
D. Natural capital (reinterpreted node)



As articulated by Roncolato et al. (2017), we suggest expanding the natural capital node to include not only poor terrain, climate/environmental risks, and resource scarcity, but also governance aspects of natural resource management. Research suggests that greater female participation in these decisionmaking bodies can actually improve resource management. Agarwal (2001, 2010) looks at the impact of female participation in community forest groups in South Asia. She finds that overexploitation of forests by commercial logging is more likely when women have less power in community decisionmaking bodies. However, when women are active participants, forest usage tends to be more sustainable, and boards give greater priority to local usage needs. Roncolato et al. suggest that women may be more likely to internalize environmental externalities due to their different social roles, and thus may have longer time horizons when making natural resource decisions. Project Drawdown, a research organization that analyzes the most viable solutions to climate change, estimates the environmental impact of raising the productivity of female small-holder farmers to the level of men. They assert that when

agricultural plots are more productive and adopt better land-management practices, there is less pressure to deforest and clear additional land, which reduces greenhouse gas emissions. Even under their most conservative adoption rate scenario, they estimate that the increased productivity of female small-holder farmers could reduce carbon emissions by 2.1 gigatons by 2050, a net savings of $87.6 billion (Hawken 2017).

Natural capital depletion may impact women more than men. Women and girls are the primary firewood and water collectors, thus increased deforestation or pollution may cause them to travel farther to gather necessary fuel and drinking water. Women make up 43 percent of the global agricultural labor force and produce 60 to 80 percent of food in poorer regions of the world (FAO 2011; Grow Africa 2016). Thus, increased desertification, soil depletion, and water shortages acutely impact the livelihoods of women. Efforts to better manage natural resources and enhance farmer productivity can have real impacts on female small-holder farmers and their families, leading to increased household earnings and consumption.

Testing whether gender participation in natural capital management may matter to growth in the HRV

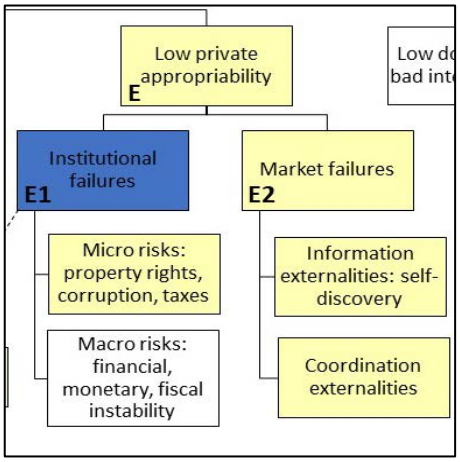
To assess the impact that gender dynamics might have on natural capital, one needs to look at data on natural resource depletion, as well as gender roles in decisionmaking bodies. Administrative data may have some information on natural resource governance. Satellite data on natural resource depletion is widely available, while a special survey or focus group discussion might be required to assess women's decisionmaking power in community management bodies. Looking at natural resource depletion change over time using satellite data, and its correlation with female participation in land-management bodies, can provide evidence for test 2 of the HRV. Project Drawdown provides some costing methodology for estimating the climate mitigation impacts of greater female involvement in land management—potential evidence for test 1 of the HRV.

(return to tree)

E. Low private appropriability (gendered access barrier)

Low private appropriability stems from government failures or market failures, which diminish an entrepreneur's ability to capture and retain profits. Such failures may be gender neutral, or they may affect female and male entrepreneurs differently. It is thus important to look at gender-specific barriers to private appropriability when assessing constraints to growth.

Female-managed plots and female-run firms tend to be less productive than male-run firms. Several studies suggest that women farmers use fewer inputs than men, which seems to explain the bulk of the gender gap in productivity. Women run smaller firms and farm smaller plots than men (World Bank 2012). Female farmers use less fertilizer, irrigation, on-farm mechanization, extension services, and labor than males (World Bank and ONE Campaign 2014). Female entrepreneurs have less access to capital and devote fewer hours to their businesses than men, likely due to women's unpaid care work constraints (World Bank Africa GIL and FCI 2019).



These differences represent a failure of institutions and markets to provide equally for men and women.

There is more diversity of opinion as to whether men and women get different returns on the same inputs. Some studies suggest that time scarcity may lower women's returns in agriculture. In Ethiopia and Uganda, for example, women get lower returns than men from agricultural extension services (World Bank and ONE Campaign 2014). This could suggest that these services better meet the needs of male farmers than female farmers. It could also indicate that women face additional constraints that limit the impact of extension services, including less time to invest in their farms. However, similar research on gender gaps in entrepreneurship suggest that women and men obtain similar levels of returns to inputs in most countries (World Bank Africa GIL and FCI 2019). This finding may represent how market and institutional failures affect agriculture and entrepreneurship differently. Fertilizer, for example, may require significantly more technical information about proper application to yield meaningful returns compared with firm-level inputs, such as business training or startup capital. Gendered differences in returns suggest that larger social norms, market failures, or institutional structures limit women's ability to make full use of the resources available to them.

Eliminating the gender gap in farm and firm productivity would lead to real growth in the economy. A report estimating the size and costs of the gender gap in agriculture finds that if female farmer productivity were raised to the level of male farmer productivity, GDP would grow by $100 million (1.85 percent) in Malawi, $105 million (0.46 percent) in Tanzania, and $67 million (0.42 percent) in Uganda, simulated evidence for test 2 in the HRV (UN Women et al. 2015). As illustrated by these estimates, when a large portion of the economy is based in agriculture, or when women make up a significant portion of the agricultural labor force, gender gaps may be an important constraint to growth, especially in the short term.

(return to tree)

E1. Institutional failures (relabeled node)

Following the 2012 WDR, we argue that the government failures node should be relabeled as institutional failures. The 2012 WDR looks at how social norms, informal, and other formal non-government institutions constrain women's access to economic opportunities, and how these institutions interact with other market and household forces to limit women's participation. While government failures certainly impact female entrepreneurs' appropriability (and at times government regulations may explicitly or implicitly discriminate against them), it is often these informal institutions and social norms that constrain women's access to land, capital, and inputs, leading to lower female firm productivity. Indeed, due to social norms and intra-household dynamics, women may not control the income they do earn, thus limiting the economic empowerment impact of greater labor force participation. While harder to capture and measure than strictly governmental failures, these larger institutional failures matter greatly, especially when looking at gender as the unit of analysis.

Land: Women have less access to land than men. Female farmers' plots tend to be smaller than men's, and they are more likely to be tenure insecure (FAO Gender, Institutions and Development Database 2019). In many countries, land titles are issued under the household head's name, which is assumed to be male. In patrilineal inheritance systems, land and other assets are transferred from fathers to sons, leaving daughters and widows in a precarious

situation, dependent on male relatives' beneficence. Women have been less likely to benefit from state-sponsored land redistribution schemes than men; indeed, women made up only 12 percent of beneficiaries in a study of 13 land reform programs in Latin America (Deere and Leon 2001). While some progress has been made amending national legislation to guarantee equal rights to land and inheritance under the law (though this is still extremely complex and difficult to get right), land holdings are often governed by customary law, which tends to be more resistant to change (FAO Gender, Institutions and Development Database 2019). This lack of land rights restricts women's ability to make decisions about the land they cultivate and limits their access to assets that can be used as collateral for financing (though credit markets often do not work well enough for farmers to use small-holder fields as collateral). Land tenure matters for economic growth and productivity. In an evaluation of a rural land-use program in Benin, where communities helped demarcate and formalize customary land rights, researchers found that female-headed households were more likely to let their land lie fallow post-intervention, important for replenishing soil nutrients. Formalization may have decreased women's fear that their land would be taken if they allowed it to go unplanted for a season (Goldstein et al. 2015). What's more, numerous studies have demonstrated a strong link between greater land tenure and higher agricultural investment and productivity (Besley 1995; Goldstein and Udry 2008; Banerjee et al. 2002; Do and Iyer 2008; Galiani and Schargrodsky 2010; Field 2007; Antle et al. 2003; De Laiglesia 2005).

Irrigation: Irrigation, a key agricultural input and driver of productivity, is often male-dominated. Qualitative research in Ethiopia, Ghana, and Tanzania suggests that women are more constrained in adopting and benefiting from irrigation technology than men (Theis et al. 2017). Men tend to hold the better plots of land located near the river, where it is easier to dig wells for irrigation. Irrigation technology is often labor intensive to set up, and men seem better able to marshal the household labor necessary to help with these efforts. Men tend to adopt new irrigation technology more readily than women. This could be because of information failures—new technology may be shared with male farmers by extension agents or through social networks, which women have less access to. Implementing better irrigation systems often requires initial upfront capital investments, which, due to gendered barriers in access to credit, may constrain women more than men. Tenure insecurity may exacerbate the above constraints; women may be less likely to invest in irrigation technology that increases the value of their land and hence makes it more vulnerable to takeover. Irrigation interventions often target female small-holder famers, yet many have failed to yield substantial impacts, as men continue to make decisions about crop choice and how to spend income from irrigated crops (Njuki et al. 2014). Yet better irrigation adoption clearly matters for growth: Using sustainable land practices increases plot production and household income, which women tend to reinvest in household consumption, health, and education expenditures, creating positive downstream spillover effects (Bryan and El Didi 2019). In order to identify where gender constraints may impact irrigation adoption, the International Food and Policy Research Institute (IFPRI) has developed a gender assessment tool to help development organizations integrate gender design elements into irrigation projects—a tool that users of this framework could utilize in their own work (Theis et al. 2018).

Extension services: Female farmers have less access to agricultural extension services than their male counterparts. These services often focus on improving productivity in high-value, export-potential crops, which tend to be male-dominated (World Bank 2012). Trainings may be offered in day-long sessions, which can limit women's ability to participate—women may be unable to leave their children for this long, or may need a break in the middle of the day to

return home to prepare lunch. Often, women lack information about when and where training sessions are being held—trainers may rely on word-of-mouth to attract participants, or assume that men will share the information gleaned with their spouses. Yet women have smaller and different social networks than men. Furthermore, extension officers are typically male, which may limit female farmers' access due to cultural norms or explicit discrimination. Globally, only 15 percent of extension officers are women, and this figure drops to 7 percent in Sub-Saharan Africa (Hertz et al. 2009; Williams 2003). This may limit women's access to new techniques, seed varieties, and agricultural implements that could increase their overall productivity. However, female extension officers may not be better. A study in Malawi found that female extension agents were able to learn and retain the same amount of information as men, but they were not as successful convincing others to adopt the new technology (Benyishay et al. 2016). Both male and female farmers viewed female extension agents as less capable, thus interventions to address gender gaps in inputs and knowledge must also contend with underlying social norms that may act as a constraint to adoption.

Labor: There may be legal restrictions that constrain women's ability to participate in the workforce. In 15 countries, women require the consent of a male relative to work (Women, Business and the Law 2019). There may also be restrictions on the types of industries and number of hours that women can work, with the stated goal of protecting the health of women and mothers (World Bank 2012). Gendered laws may require male permission for domestic and international travel and passport applications, which limits women's freedom of movement and ability to engage in work outside of the home. Such laws are associated with lower female labor force participation and higher occupational segregation in the workforce (World Bank 2012). Even some gender-neutral laws may have unforeseen negative impacts on women. For example, in Morocco and Tunisia government employees are legally barred from having any ownership stake in a private firm and thus must resign their post if they want to start a business. MCC focus group discussions revealed that this law was especially constraining for women, given their higher presence in public sector jobs—a culturally appropriate job for women. Some reported registering businesses under their husband's or other family member's name to circumvent the law, which decreased their control over business decisions and profits. As discussed above, laws that restrict women's access to employment opportunities result in a misallocation of talent in the economy, reducing overall productivity. A large body of research has looked at the correlation between gender discriminatory laws and female labor force participation, employment, and income (see Hyland et al. [2019] for a review of the literature).

Women may also face difficulties hiring male labor. A report on female farmers in Sub-Saharan Africa found that female-managed plots have less access to male household labor than male-managed plots (World Bank and ONE Campaign, 2014). Men are able to marshal household labor for help on their own plots, but do not seem to reciprocate on their partners' plots. Social norms may make it difficult for women to supervise men, which limits women's ability to hire workers to supplement household labor. Indeed, access to male labor may be one of the largest drivers of the gender gap in agricultural productivity, explaining 45 percent of the gender productivity gap in Malawi and 97 percent of the gap in Tanzania (see Table 5).

Table 5: Share of the gender gap in agricultural productivity explained by selected determinants

Determinant	Malawi	Tanzania	Uganda
Quantity of male family labor	45%	97%	-
High-value crop cultivation	28%	3%	13%
Use of agricultural implements	18%	8%	9%
Pesticide use	1%	12%	5%
Inorganic fertilizer use	5%	6%	3%

Source: UN Women et al. (2015). Note: Percentages do not sum to 100 because other determinants may be negative.

Testing whether gendered institutional failures may matter to growth in the HRV

A number of data repositories exist to help assess the gendered dimensions of institutional failures. The Women, Business and the Law index assesses legal barriers to women's economic and political participation in 187 countries. The FAO Gender and Land Rights Database contains data on gender-disaggregated land holdings, area, and tenure, as well as country-level profiles of legal and de facto property and inheritance laws. We submit that such discriminatory laws act as a tax on female labor, raising the shadow price of economic participation for women—potential evidence for test 1 of the HRV. Household surveys with an agricultural module, like the World Bank LSMS-ISA, contain information on agricultural inputs, extension services, and plot size for each household plot, and identify the gender of the plot manager. Using a Oaxaca-Blinder decomposition, one can tease out determinants of gendered productivity gaps in agriculture to assess if differential use of inputs or returns to said inputs explains the gap. If there are multiple survey years, one could look at change over time, specifically before and after the implementation of revisions to the legal code or the rollout of agricultural extension programs, to find evidence for test 2 of the HRV. The Gender Innovation Lab at the World Bank has also conducted a number of cross-country studies to assess drivers of gender productivity gaps in agriculture and entrepreneurship, from which country-level estimates could be taken (World Bank and ONE Campaign 2014; World Bank Africa GIL and FCI 2019).

(return to tree)

E2. Market failures (gender access barrier)

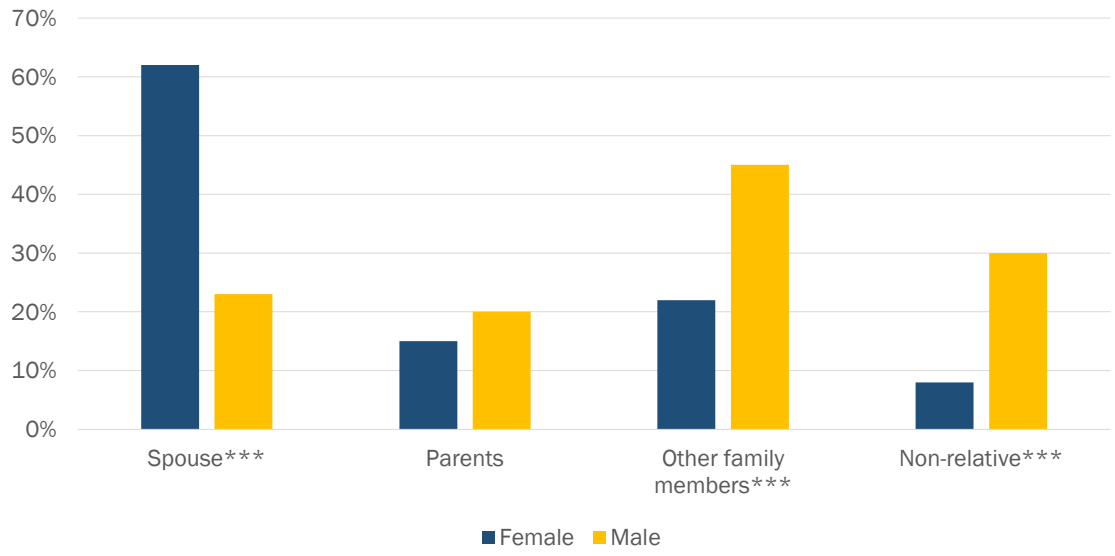
Market failures likewise may not be gender-neutral; information asymmetries, coordination failures, and barriers to entry may impact men and women differently, which affects their ability to reap returns from their businesses.

Information failures: Information failures can exacerbate gendered occupational and sectoral segregation, leaving women stuck in lower-paid, lower-productivity fields. In places with low female labor force participation, employers may lack information about potential female employee performance. Thus, they may discriminate against women in hiring due to inaccurate beliefs about their productivity, attendance rates, and the associated costs of maternity leave (World Bank 2012). Women may be more reliant on word-of-mouth for jobs, thus may be more constrained by information failures than men. Again, researchers find evidence of information failure in South Africa, where a reference letter from a former employer doubled women's likelihood of being hired but had no effect on men (Carranza and Pimkina, 2018). Female farmers may lack information about what types of crops yield the highest returns, instead

investing in lower-value, traditionally female crops (World Bank 2012). While information failures affect men as well, they are particularly harmful to women because these failures interact with other gendered barriers like smaller social networks, gender-segregated crop value chains, and limited access to agricultural extension services. Information failures may also interact with infrastructure constraints. Time, distance, and safety concerns may make it more difficult for women to access markets and regional hubs, where new knowledge, technology, and pricing information may be easier to obtain. Limited digital literacy and mobile phone penetration also hamper women's ability to circumvent information failures.

Access to networks: Women have smaller social and business networks than men, and these networks are predominately made up of other women (World Bank Africa GIL and FCI 2019). Women's networks are more likely to include family and less likely to include other service providers or entrepreneurs, who could provide connections to help grow their business (see Figure 5). Networks act as a conduit for spreading knowledge about new crop varieties, farming techniques, and business practices. They can provide entrepreneurs with access to credit, skills training, supply chain contacts, and potential customers. Limited networks thus limit women's ability to circumvent the information failures discussed above. Indeed, studies in Ethiopia and Uganda found that women who are able enter to male-dominated sectors had strong professional networks, often with male champions and supportive male family members (Alibhai et al. 2015; Campos et al. 2015). Women may face explicit barriers in joining more formalized networks such as rural cooperatives or farmers' organizations, which act as conduits for both information and connections. For example, married women are not allowed to join farmers' clubs in Malawi (Due and Gladwin 1991). Small-holder farmers use farmers' clubs to solve collective-action problems, pooling resources to access credit and agricultural extension services and to transport their goods to market. Exclusion from these entities thus limits women's access to productive inputs and markets and curtails their ability to circumvent other infrastructure and time-use constraints.

Figure 5: Share of Malawian entrepreneurs who were helped by networks



Source: World Bank Africa GIL and FCI (2019). Data from impact evaluation of business registration project (2011-2015).

Access to markets: Markets themselves may also work in ways that disadvantage women. Markets are often located in regional hubs or cities, which, due to time, transportation, and safety concerns can act as barriers for female farmers and entrepreneurs. In fact, these constraints raise the shadow price of market access for women. In a study looking at differences in market access between male and female cocoa farmers in Ghana, researchers found that while there was no gender difference in distance from local coffee markets, men were significantly more likely to own a bicycle, which aided in ease of access to these markets (Vargas Hill and Vigneri 2009). Thus, market access interacts with women's limited access to assets and transportation, which could provide a means of circumventing barriers to access. Women also face economies of scale problems. Since women tend to run smaller farms/firms than men, they face higher unit and transaction costs (World Bank 2012). Market fees are often fixed, rather than proportional to volume, and therefore become regressive for small holders (Fafchamps and Gabre-Madhin 2006). Women may have limited access to structured markets or wholesale retailers due to their size or the crops they grow (structured markets are more common for export crops, which are typically male-dominated). Selling to these larger distributors typically yields higher prices and is one way farmers circumvent transportation and market access constraints (Gondwe 2018). Once at markets, women often report experiencing harassment, especially at night, raising the shadow price of market participation (Nagoli et al. 2019). In order to circumvent this constraint, women may avoid selling their goods at larger regional markets or may depend on male relatives to sell their goods for them. Indeed, in the same study of Ghanaian coffee farmers, researchers found that male farmers sold a significantly higher proportion of their goods at market than women (Vargas Hill and Vigneri 2009).

Fertilizer markets, which are especially important for improving famer appropriability, are often gendered as well. Fertilizer is typically sold in large, 50-kilogram bags. Purchasing at this volume may be cost-prohibitive for small-holder farmers, but in addition, the physical size may be restrictive for female farmers to transport (Uttaro 2002; Croppenstedt et al. 2013). Fertilizer markets or distribution points may be located far away, adding transportation barriers that particularly harm women. As a result, women are less likely to use fertilizers and on-farm mechanization than men, which reduces their overall productivity.

Testing whether gendered market failures may matter to growth in the HRV

To assess if gendered market failures act as a constraint to growth, one needs to look at enterprise surveys or household surveys with an enterprise or agricultural module. First, one can look for evidence of productivity gaps between men and women. If one has data on wages, hours worked, sector of occupation, and basic demographic variables, one can run a wage regression, and then use the Oaxaca-Blinder technique to explain the difference in means between males and females. The results of the Oaxaca-Blinder can be a good starting point for further exploration of the root causes of the gender gap. For instance, if fertilizer seems to explain a large portion of productivity in agriculture, and women systematically use less than men, an analyst could use the HRV's four tests to explore what might be driving this difference in inputs. If fertilizer distribution points are located in regional hubs, if distribution times are in the middle of the day, or fertilizer is sold in large quantities that are difficult to transport by foot, these could be signs that women face a higher shadow price for fertilizer than men, evidence for test 1 of the HRV. One could also look for evidence of women's efforts to circumvent market failures, such as relying on male relatives to sell goods at market. One might also look at gendered membership in cooperatives, wholesale markets, and trade

organizations to see if farmers or entrepreneurs who utilize these groups, and hence through collective action are able to circumvent some market constraints, do better than those who do not. Many of the above gaps are best explained through specialized surveys or focus group discussions, which can help tease out gendered barriers to market access.

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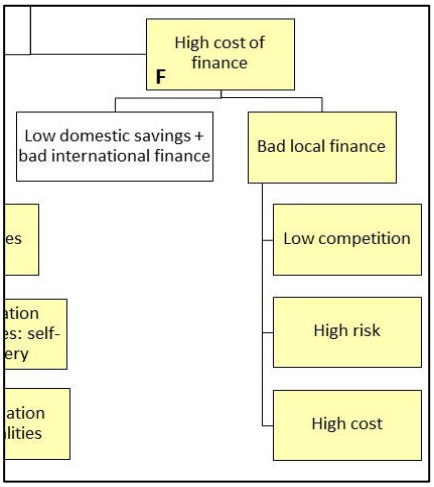
F. High cost of finance (gendered access barrier)

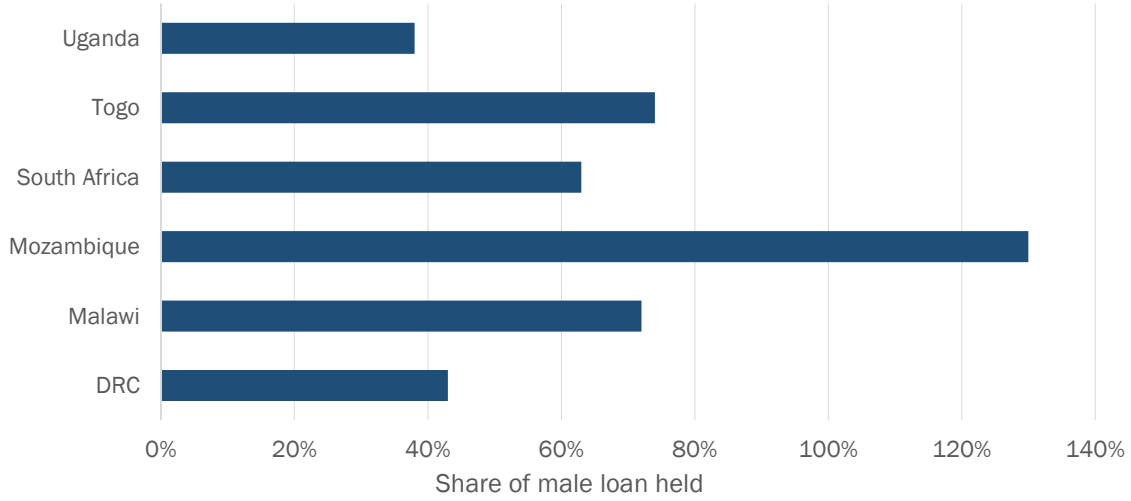


All entrepreneurs depend on financing and investment to expand their businesses. Yet due to gender-specific access barriers, women may be uniquely constrained by inadequate financing, even when economy-wide financing indicators seem satisfactory. We foresee two possible scenarios. First, the cost of or access to financing could be a constraint for everyone, but it may be a larger constraint for women who face additional obstacles in obtaining credit and investment because of their gender. For instance, if credit markets function poorly due to low liquidity, this drives the price of financing up and also allows banks demand more collateral. This affects both male and female borrowers. Yet because women have less collateral than men, poor functioning credit markets may be more constraining to women. While this would not change the identified constraint, it would likely affect the identified root cause, syndrome, and potential solutions. Second, the cost of or access to financing may not be a constraint for men, but it could be a constraint for women. A gender-blind approach that looks only at aggregate financial indicators might not be able to identify this constraint, especially if women have limited access to banking and entrepreneurship opportunities, and hence are underrepresented in economy-wide figures.

If the share of female entrepreneurs in an economy is low, their use of financial services will likely also be low, pointing to larger barriers to entrepreneurship in the economy. However, in places like Sub-Saharan Africa, where women make up over half of all entrepreneurs, one would expect women's access to finance to be on par with men's access. In all regions in the world, however, women borrow from formal institutions at lower rates than men.

Gendered access barriers could stem from a variety of sources. Institutional failures, such as laws that require male co-signers on female accounts, could restrict women's access. Limited land and inheritance rights may limit women's access to productive assets, which constrains their ability to put up sufficient collateral for loans. Market failures may likewise constrain women's access to finance. Female borrowers are often asked to pay higher interest rates than men and receive smaller loans, raising the shadow price of credit for women (see Figure 6). Banks may view them as a higher credit risk due to a lack of credit history or limited collateral (Muravyevy et al. 2009; Alesina et al. 2008). They may also lack information about women's potential performance as borrowers. In some cases, bank agents may engage in outright discrimination against female borrowers due to social norms and biases. This limited access to credit markets affects female entrepreneurs' ability to invest in and expand their businesses.

Figure 6. Loan amount held by female-owned businesses relative to male-owned businesses, 2015



Source: World Bank Africa GIL and FCI (2019). Underlying data from impact evaluation of a business registration project.

Most studies find that the gender gap in access to finance largely disappears after controlling for firm size, sector, and tenure. However, Presbitero et al. (2014), applying a tighter definition of firm ownership and management, find that female-led businesses are more likely to be credit-rationed than male-led businesses in the Caribbean. Utilizing a Oaxaca-Blinder decomposition, they find that observable differences between firms explain only a small fraction of the gender gap in access to finance in Barbados, Jamaica, and Trinidad and Tobago, suggesting that there is potential gender discrimination in the credit market.

Since female-owned firms are often smaller with fewer assets, they may receive less foreign direct investment (FDI) than male firms, a potential means of circumventing poor local financing. Interestingly, research suggests a correlation between FDI inflows and greater female entrepreneurship, perhaps due to knowledge spillover effects or female concentration in sales and service sectors, where more FDI flows. However, these results only hold when women have low barriers to entry in entrepreneurship, better access to finance, higher labor force participation rates, and higher educational attainment (Fang et al. 2019; Ouedraogo and Marlet 2018).

Testing whether gender gaps in access to finance may matter to growth in the HRV

To assess gendered barriers to finance, one needs to look at savings rates, credit access, and size of loans/collateral required by gender. If the shadow price of finance is higher for women than for men, this might manifest as women receiving smaller loan amounts than men (controlling for firm size), paying higher interest rates, or being required to put up more collateral. If one sees women relying on informal lending networks at higher rates than on formal institutions, financing capital investments with household savings, or saving in informal village savings groups, this might indicate that women are trying to circumvent barriers to formal financial access—evidence for test 3 of the HRV. This information is typically available from the Global FinDex and World Bank Enterprise Surveys, and users can request the underlying firm-level micro data.

(return to tree)

To summarize:

Bringing a gendered lens to the HRV tree can allow the user to integrate gender dynamics earlier on in the diagnostic process, potentially allowing these factors to impact the identified constraints to growth either directly or indirectly via their interaction with other non-gendered binding constraints. While this framework is not exhaustive, it can serve as an organizational tool to help guide the analyst through a list of possible ways in which a constraint may have differential gendered impacts. While not all nodes will be relevant in every country, where gendered barriers do show up, they can matter greatly for growth.

IV. Framework application—Malawi

Given that the HRV is used as a practical tool by development practitioners, we tried to apply the engendered framework to a test-case country to assess its utility. The goal of the exercise was to gauge the comprehensiveness of the tree, identify missing elements, pinpoint nodes where insufficient data exists for gender-disaggregated analysis, and ascertain if a gendered lens impacted which sectors were identified as binding constraints. We worked with MCC to select a test case, Malawi, from among their new group of Compact countries, and conducted our engendered analysis in parallel with their economic constraints analysis.

As argued by Hausmann et al. (2008), a first step in applying the HRV is to set the country context and identify the critical growth challenge. For this we draw on historical economic data and on the comprehensive analysis of growth and poverty reduction in Malawi recently carried out by the World Bank (2018c).

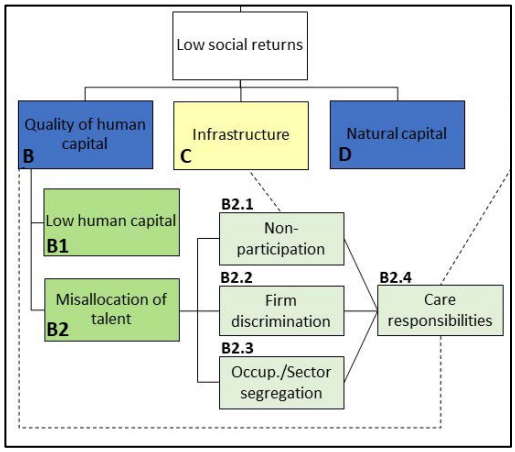
Malawi is one of the poorest countries in the world. In 2017, its income per capita was only $320 and 70 percent of its population was living below the extreme global poverty line of $1.90/day. The economy is heavily dependent on agriculture, which drives the livelihoods of two-thirds of the population and about one-third of GDP. Agricultural productivity is among the lowest in Africa, and fast population growth adds to the pressure on farm size and productivity. The country is also highly vulnerable to external climactic shocks. Malawi's growth performance has been volatile and weak, averaging only 1.5 percent per capita in real terms between 1995 and 2015. In terms of growth, poverty reduction, and human capital outcomes, the country has underperformed relative to its neighbors, despite being politically stable and free of conflict. The World Bank (2018c) attributes Malawi's stagnation to weak governance and institutions and to its competitive clientelist political environment, which favors short-term populist policymaking over much-needed long-term reforms.

Against this background, the key growth challenge in Malawi is how to ignite inclusive growth (which requires increasing productivity in agriculture and raising incomes in rural areas, where 95 percent of Malawi's poor live), while diversifying the economy and setting the institutional basis for more effective and transparent policymaking. Gender inequalities are high in Malawi and appear to impact a wide range of areas including agricultural productivity, opportunities in the non-farm sector, the demographic transition, and household resilience to shocks.

Given this context, Malawi provides a good test case for engendering the HRV and examining whether bringing a gender lens to the constraints analysis affects the results of the growth diagnostics process. Using our engendered HRV tree as a starting point, we work our way

through the branches to help identify possible constraints to increased agricultural productivity and economic diversification in Malawi. Rather than cover the entire tree here, we focus on a few select nodes where applying a gender lens made the biggest difference. For each area, we present evidence that a gender gap exists and attempt to estimate the cost of that gap on economic growth. While not an exhaustive application, we find that the framework helped us identify gendered barriers to access in the economy and yielded some different potential constraints to growth than those identified using the original HRV.

A. Low human capital



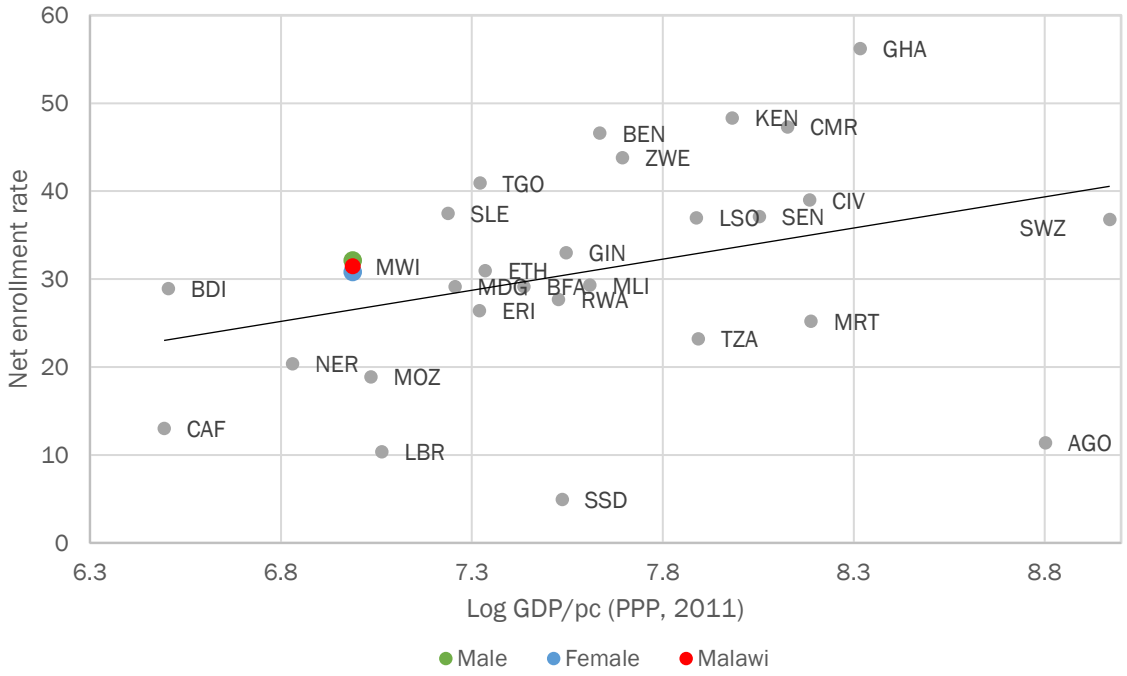
Beginning on the low social returns branch of the tree, we first look for evidence that the quality of human capital in Malawi constrains growth. Our first unbundled node, low human capital, focuses on whether the level of human capital in the economy is sufficient for firm needs. Low levels of education among the working-age cohort, poor secondary and tertiary enrollment rates, high fertility rates, and significant HIV prevalence keep human capital low in Malawi. This feeds directly into low labor productivity and low capacity for income diversification among the poor, which makes it difficult to reduce poverty. It also feeds back into high fertility rates, slowing the demographic transition in the country and with it the potential to harness that transition to drive higher growth.

Gender inequalities are an important contributor to this low human capital, as educational and learning outcomes appear strongly gendered (especially at the secondary and tertiary levels). But while gender gaps appear substantial and critically influence Malawi's poor human capital outcomes, the evidence is ambiguous on whether by themselves they represent a binding constraint to growth.

1. Education

While Malawi has reached near universal primary enrollment, high dropout rates and low progression to secondary school still limit human capital accumulation. Secondary enrollment rates were around 30 percent in 2016, similar to comparator countries for its level of GDP per capita but low relative to what the process of structural transformation is likely to demand in much of Africa (Africa Growth Initiative 2020) (see Figure 7). Dropout rates in secondary school are higher for girls than boys, likely driven by early marriage and childbearing.

Figure 7. Net secondary enrollment rates, Sub-Saharan Africa, most recent year



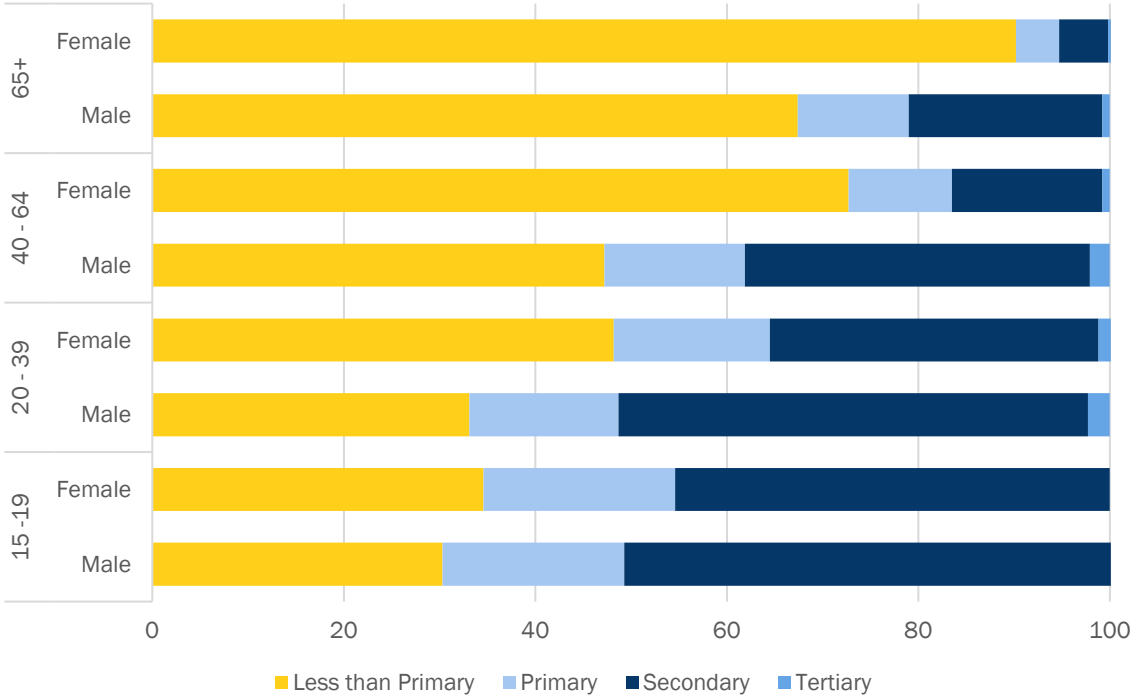
Source: World Bank Education Statistics database (2018)

Not only are enrollment rates low in Malawi, but overall learning is also low, with persistent gender gaps at all levels. In the latest round of Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) testing, Malawi ranked second to last in Sub-Saharan Africa in sixth-grade reading and math scores (SACMEQ 2007). While scores for both genders were low, boys scored higher than girls in both subjects. At the secondary level, boys outperformed girls on the secondary completion exam in four out of the last five years (Malawi Ministry of Education, Science and Technology 2016). There are many potential drivers of this gendered learning gap. While attendance rates are similar across genders, girls have more household responsibilities than boys, which may leave fewer hours for schoolwork. Almost 7 percent of girls age 12-14 and 4.5 percent of girls age 15-17 report spending more than 28 hours a week on household chores, compared with 2 percent and 1 percent of boys, respectively (Multiple Indicator Cluster Survey 2014).

Tertiary enrollment rates in Malawi are the lowest in Sub-Saharan Africa at less than 1 percent. The tertiary gender parity index is low at 0.6. In the population as a whole, there is 1 female for every 10 males with tertiary education (World Bank 2018c). Discriminatory school cultures, high financial costs, and domestic responsibilities may prevent women from pursing higher education opportunities (World Bank 2018c). Early marriage and childbearing likely also play a role. Malawi has one of the highest adolescent fertility rates in the world, cutting short many girls' educational trajectories and deterring efforts to reduce aggregate fertility rates.

While gender gaps in educational enrollment have narrowed among the younger generation, large gaps still exist among older age cohorts. For example, almost half of all women age 20-39 have less than primary education, compared with one-third of men (see Figure 8). What's more, 70 percent of men are literate, compared with only 55 percent of women (World Development Indicators 2019). These gaps affect the human capital and skills level of the labor force.

Figure 8. Educational attainment by age and gender cohort, 2015



Source: Wittgenstein Centre for Demography and Human Capital (2018)

Under the HRV model, a factor is considered a constraint to growth when demand is high and supply is low, leading to a high price of the factor. Across a number of indicators—enrollment, learning, and skills—human capital levels, especially for women, remain very low in Malawi. On the demand side, according to the most recent round of enterprise surveys, some 12 percent of firms feel that an inadequately educated workforce is a major constraint to growth (World Bank Enterprise Surveys 2019). This result is down from 22 percent five years earlier. Firms do not rank skill shortages at the top of their constraint list. This may reflect that skills themselves are not perceived as a binding constraint by firms. It may also reflect the fact that firms are operating at very low levels of productivity and efficiency due to scarcity of other factors, such as capital and knowledge, that are typically complementary to skills. The fact that Malawi currently ranks 133 out of 137 countries on the Global Entrepreneurship Index suggests that overall firm productivity and innovation are extremely poor (Global Entrepreneurship Index 2018) and perhaps that results in a lack of demand for skills.

The data suggests that both supply of skills and demand for skills may be low in Malawi. However, running a basic Mincer regression (with a Heckman correction for selection bias), which looks at wage income as a function of schooling and experience, on the latest round of labor force surveys reveals that returns to education are high—evidence for test 1 of the HRV. Relative to those with no education, those with secondary education receive a 54 percent boost in wages, and those with tertiary education more than double their earnings. These increments are high relative to regional comparators; returns to secondary education are 11 percent in Ghana and 18 percent in Uganda, and tertiary returns sit at 60 and 53 percent, respectively (see Table 6). Looking at gender-disaggregated results, the returns for females are even higher. This suggests that the supply of human capital is scarce relative to demand and that both private and social returns to education are very high. While at odds with the

results of the firm surveys, the Mincer regressions would tend to support the claim that human capital is a potentially binding constraint to growth.

Table 6. Returns to education

Country	Wage differential: no education versus secondary			Wage differential: no education versus tertiary		
	Total	Male	Female	Total	Male	Female
Malawi (2013)	54%	52%	70%	107%	106%	139%**
Ghana (2012)	11%	10%	19%	60%	59%	66%
Uganda (2016)	18%	16%	43%*	53%	54%	83%

Source: World Bank I2D2 dataset (2018), our calculations. Stars indicate statistical significance: ** 5%; * 10%

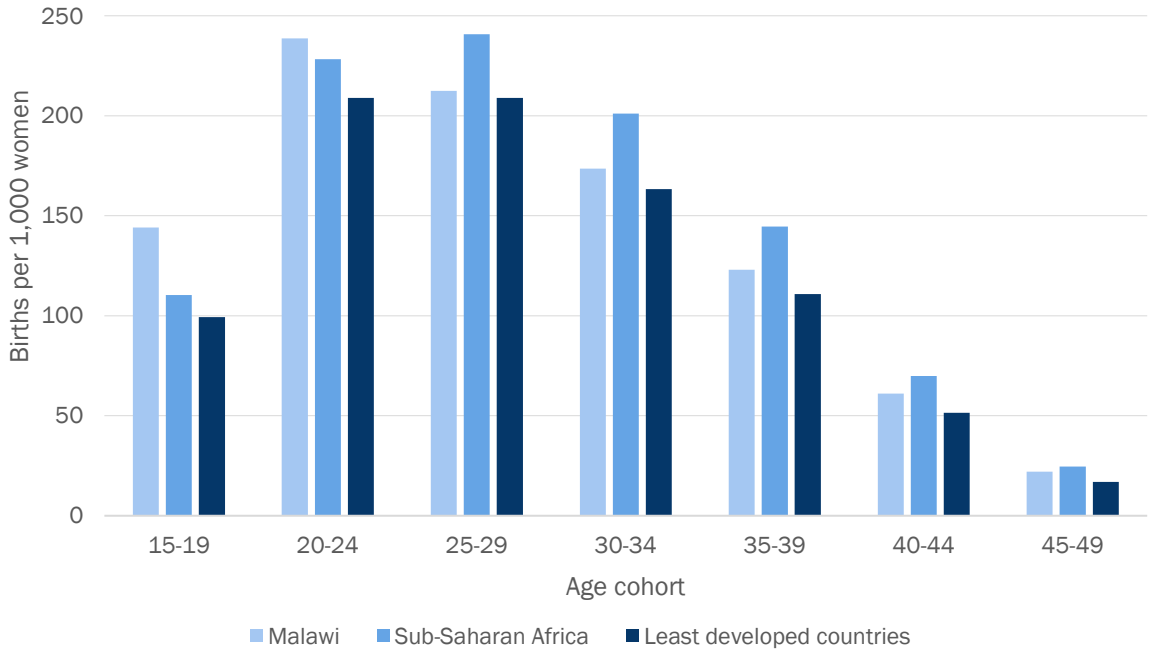
Whether human capital is a "binding" constraint to growth now or a constraint to future growth, the challenge with addressing skills constraints is that there is a 20-year time horizon for educational investments to pay off in terms of a more skilled workforce. This challenge means that even if human capital is not a binding constraint now, Malawi would need to invest now in increasing secondary and tertiary enrollments in order to prevent human capital from becoming a binding constraint in the future. Factoring in long-term investment horizons, such as is needed for education, is something that can be integrated into the HRV tool but is not always done.

2. Fertility

Malawi has an annual population growth rate of 3 percent, above the average for Sub-Saharan Africa. Its fertility rate sits at 4.5 births per woman, and its adolescent fertility rate is one of the highest in the region. Malawian girls age 15-19 have an average of 140 births per 1,000 women, compared with 110 in Sub-Saharan Africa and 100 in least-developed countries (see Figure 9). High fertility rates exert pressure on Malawi's scarce arable land and on its natural resources (with Malawi losing 19 percent of its forest cover in the last 25 years). These high rates also slow down the country's demographic transition and delay the potential growth dividend associated with the period when the working-age population grows faster than the dependent population (Brander and Dowrick 1994).

Malawi's high fertility rate is in large part a product of the low levels of education and lack of economic empowerment of women and girls. High fertility rates among adolescent girls, tied to early marriage and school dropout, are of special concern. The World Bank estimates that ending child marriage in Malawi would generate an additional $23 million a year, growing to $500 million a year by 2030, due to lower fertility rates and subsequent population growth, evidence for test 2 of the HRV (World Bank 2018a). They also estimate that that in 2015 alone, Malawian women lost $167 million in earnings due to early marriage, which caused them to miss out on additional years of education that would have yielded higher wages and better jobs. Hence, there is a vicious circle where low education and low economic prospects may drive young women into early marriage, which in turn increases their fertility rate and diminishes their educational attainment and economic opportunities. Beyond the cost to individuals, this circle also has a cost to society and to economic growth.

Figure 9. Age-specific fertility rates, 2010-2015 estimates

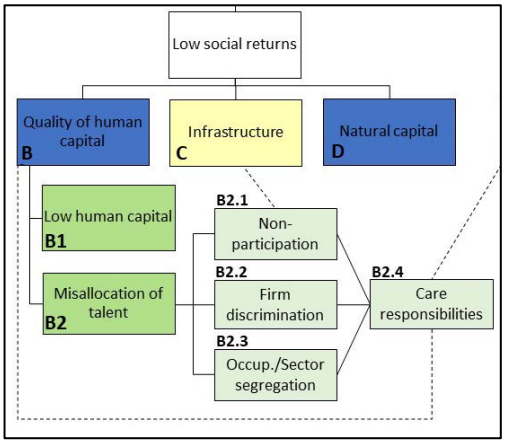


Source: World Population Prospects (2019)

B. Misallocation of talent

Returning to the quality of human capital node in our engendered HRV framework, the second sub-node examines whether the human capital that does exist in the economy is matched to its best uses. We add this node because the sorting of workers into jobs and occupations is often gendered, in a way that does not necessarily reflect skills but rather social norms about what jobs are appropriate for women. We therefore look at possible misallocation of talent in Malawi, and find evidence that women self-select out of, or are discriminated against in, wage employment. These findings matter because although Malawi's process of structural transformation is slow, there is evidence that wage jobs emerging outside agriculture are associated with higher productivity and higher incomes (World Bank 2018c). Though the gender gap in non-agricultural wage employment has been decreasing over time, in 2013, 13 percent of men were employed as paid workers, compared to 9 percent of women.

This gap in wage employment could reflect diverse factors, including differences in education between men and women. To take such potential differences into account, we run a set of employment regressions controlling for age, education level, location, and sector of employment, to assess the drivers of wage versus non-wage employment. Adding these controls does not help explain the gender gap in wage employment. On the contrary the gender gap widens, giving credence to the hypothesis that women face exogenous barriers or discrimination in accessing these "better" jobs. Using pooled data



from the 2010 and 2013 rounds of the Malawi household survey, we estimate that the conditional gender gap in non-agricultural wage employment is 3 to 12 percentage points and highly significant (see Table 7).[4] These figures are smaller than regional comparators—the gender gap in non-agricultural wage employment is 30 percentage points in Ghana, 23 percentage points in Uganda, 40 percentage points in Rwanda, and 26 percentage points in Tanzania. Education level is a clear predictor of wage employment likelihood, as is urban versus rural residence. Likewise, the probability of being in wage employment differs by sector. Working in the public sector, where many good wage jobs in developing countries lie, increases the likelihood of being a paid employee for men and women. Working in a sector other than commerce increases the probability of wage employment. However, women in manufacturing are less likely to be wage employees than their male counterparts; only 16 percent of women working in manufacturing are wage workers, compared with 43 percent of men. The majority of women who work in this sector are non-paid family workers. This may reflect the fact that the manufacturing sector pays higher wages, and men tend to get those jobs over women. Manufacturing jobs may also be seen as less suitable for women, due to ingrained ideas about the proper kinds of jobs for men and women. Manufacturing jobs may also have less-flexible hours than other sectors, which may lead women to self-select into other fields. On the other hand, women in services are more likely to be wage employees than their male counterparts, controlling for education and location—though the difference is less drastic than in manufacturing, with the majority of workers of both genders employed as wage workers.

When women are employed as wage workers, we find that they earn less than men. Controlling for age, education, location, and sector of employment (and using the Heckman correction to account for selection bias), we estimate that the gender wage gap is 8 to 10 percentage points. The wage gap in Malawi is sizable but is smaller than in some comparator countries such as Uganda and Ghana, where the gender pay gap tops 40 percentage points, controlling for demographic and occupational factors. Age and education level are associated with higher wages. Women with tertiary education receive a higher wage premium that men, which may indicate that those who are able to attain higher education and enter wage employment are the cream of the crop among workers.

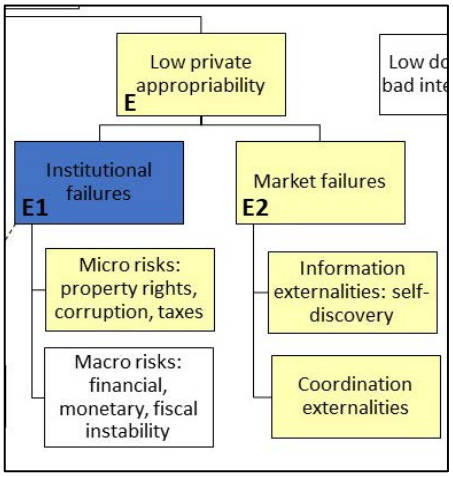
[4] When agriculture is included, the coefficients become slightly smaller (5 to 7 percentage points) and highly significant, suggesting that the gender gap in agriculture is smaller than in other sectors. This gap is about on par with regional comparators. We find that women are more likely to be self-employed or working as unpaid family labor on farms than men.

Table 7. Probability of wage employment (marginal effects), Malawi 2010-2013

VARIABLES	(1)	(2)	(3)	(4)
Female	-0.030***	-0.042***	-0.117***	-0.074*
	(0.004)	(0.006)	(0.018)	(0.040)
Age	0.001***	0.001***	-0.002**	-0.002**
	(0.000)	(0.000)	(0.001)	(0.001)
No education (relative to primary)	-0.022***	-0.033***	-0.075***	-0.122***
	(0.004)	(0.006)	(0.022)	(0.030)
Secondary	0.133***	0.119***	0.124***	0.145***
	(0.009)	(0.011)	(0.023)	(0.027)
Tertiary	0.259***	0.222***	0.153***	0.139***
	(0.015)	(0.018)	(0.028)	(0.037)
Urban	0.139***	0.152***	0.089***	0.108***
	(0.007)	(0.010)	(0.017)	(0.022)
Female x urban		-0.015**		-0.050
		(0.007)		(0.034)
Female x no education (relative to primary)		0.031***		0.106**
		(0.011)		(0.046)
Female x secondary		0.019*		-0.044
		(0.011)		(0.046)
Female x tertiary		0.046***		0.036
		(0.017)		(0.055)
Public sector			0.657***	0.651***
			(0.019)	(0.035)
Manufacturing (relative to commerce)			0.250***	0.349***
			(0.022)	(0.028)
Construction			0.565***	0.562***
			(0.015)	(0.018)
Transport			0.411***	0.404***
			(0.024)	(0.030)
Business			0.609***	0.629***
			(0.016)	(0.019)
Other services			0.451***	0.411***
			(0.019)	(0.026)
Female x public sector				0.061
				(0.161)
Female x manufacturing (relative to commerce)				-0.237***
				(0.034)
Female x construction				0.030
				(0.078)
Female x transport				0.038
				(0.068)
Female x business				-0.086
				(0.063)
Female x other services				0.148***
				(0.053)
Observations	49,490	49,490	15,304	15,304

Source: World Bank I2D2 dataset (2018), our calculations. Stars indicate statistical significance: *** 1%; ** 5%; * 10%

C. Low private appropriability

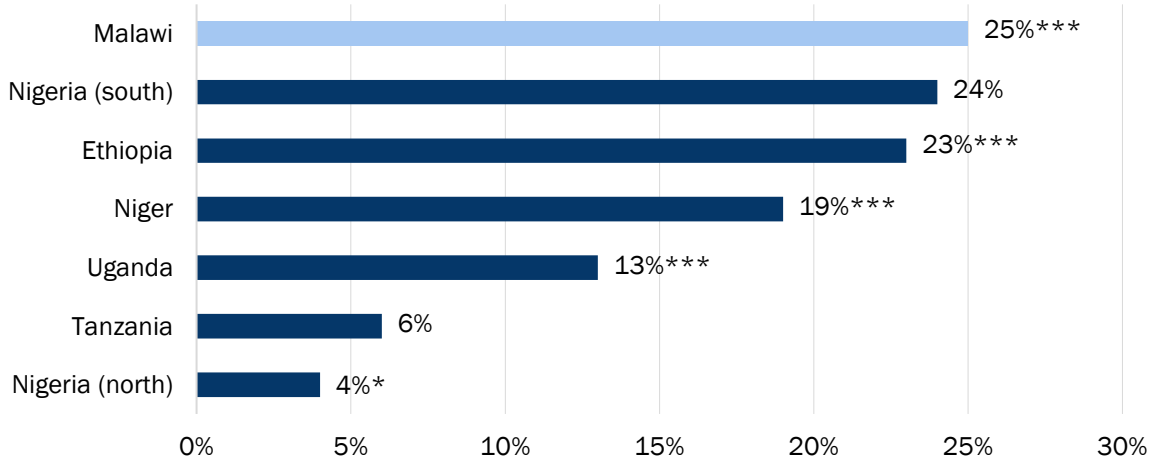


Returning to our key growth question, thus far we have suggested that low human capital may act as a binding constraint to growth in the near term and may limit the potential for economic diversification in the long term. Likewise, we suggest that labor force misallocation, specifically in wage employment, may act as a constraint to economic diversification as the country tries to move away from agricultural dependence. These factors both contribute to low social returns to economic activity in Malawi.

We now turn to the low private appropriability branch of the engendered HRV tree. Agriculture represents 30 percent of GDP and 65 percent of employment in Malawi. Yet overall agricultural productivity is low; the country is dominated by small-holder, subsistence farmers who rely on rain-fed agriculture, which is subject to heavy seasonal volatility. Given the importance of improving agricultural productivity for near-term growth prospects, especially for the incomes of the rural poor, we attempt to identify potential constraints to agricultural productivity in Malawi. As we suggest in the framework section above, we begin by using a Oaxaca-Blinder decomposition to explain the drivers of low agricultural productivity, and then use this identified list of potential constraints as a guide for further tests and analysis. We suggest that both institutional and market failures contribute to low agricultural productivity in Malawi.

While overall agricultural productivity is low, the gross gender gap in productivity is sizable, and much larger than any of Malawi's neighbors at 25 percent (see Figure 10). Using data from the 2010-2011 national household survey, the World Bank finds that the gender gap is largely driven by different levels of endowments between men and women. Female-managed plots are less likely to cultivate cash crops, they have less access to agriculture implements, and they use lower levels of male household labor than male-managed plots (Kiliç et al. 2013).

Figure 10. Gross gender gap in agricultural productivity (value of output), 2011



Source: World Bank and ONE Campaign (2014). Stars indicate statistical significance: *** 1%; ** 5%; * 10%

We attempt to replicate this study using the latest round of household survey data (2016-2017), to see if the previous findings are still robust. We find a gross gender gap of 19 percent, compared with 25 percent in the previous study. Controlling for plot- and individual-level characteristics, we find the conditional gender gap shrinks to 7.5 percent, compared with 4.5 percent before (Kiliç et al. 2013). While our topline estimate of the conditional gap is larger, our overall results largely mirror those of the earlier study. Access to inorganic fertilizer, male household labor, improved seeds, agriculture implements, export crop cultivation, and plot size all seem to matter for productivity. Using a Oaxaca-Blinder decomposition, we find that varying levels of inputs explains about half of the gender productivity gap in 2016-2017 survey, compared with 80 percent in the prior study (see Table 8). The other half of the gap remains unexplained, likely driven by differential returns, discrimination, and market and institutional failures. In the section that follows, we attempt to unpack some of the potential drivers of the gap illuminated by Kiliç et al. (2013) and by our replication, to see if any rise to the level of a binding constraint.

Table 8. Oaxaca-Blinder decomposition: Gender differential in plot productivity

Variables	Gender gap	Explained	Unexplained
Mean male-managed plot productivity	12.01***		
	(0.0173)		
Mean female-managed plot agricultural productivity	11.85***		
	(0.0243)		
Mean gender differential in agricultural productivity	0.158***	0.0817***	0.0764**
	(0.0298)	(0.0259)	(0.0351)
Log GPS-based plot area (ha)		-0.0913***	-0.126
		(0.0144)	(0.136)
Plot manager age (years)		-0.0100***	-0.139
		(0.00294)	(0.0861)
Plot manager years of schooling		-0.00446	-0.108**
		(0.00537)	(0.0539)
Log inorganic fertilizer use (kg)/ha		0.0107**	0.0183
		(0.00528)	(0.0163)
Log household male labor use (hours)/ha		0.0786***	0.390***
		(0.0182)	(0.0808)
Log household female labor use (hours)/ha		-0.0229***	-0.529***
		(0.00533)	(0.164)
Log household child labor use (hours)/ha		-0.00756***	-0.00694
		(0.00280)	(0.0254)
Log hired labor use (days)/ha		0.00998***	0.00737
		(0.00353)	(0.0115)
Log exchange labor use (days)/ha		-0.00673***	-5.27e-05
		(0.00220)	(0.00716)
Plot elevation (m)		0.0218***	0.256***
		(0.00439)	(0.0908)
Share of plot area under improved seeds		0.00172	-0.0401*
		(0.00135)	(0.0242)
Share of plot area under export crops		0.0295***	0.0112*
		(0.00451)	(0.00648)
Household size		-0.00860**	-0.139
		(0.00374)	(0.0908)
Access to non-farm labor income		0.00222*	-0.0180
		(0.00124)	(0.0622)
Household wealth index		0.0206***	-0.000669
		(0.00448)	(0.00120)
Agricultural implement access index		0.0342***	0.00971
		(0.00895)	(0.00773)
Agricultural extension receipt		0.000965	0.159***
		(0.00179)	(0.0603)
Central region (relative North)		0.0152***	-0.0554
		(0.00589)	(0.0344)
South region (relative North)		0.0141**	-0.00589
		(0.00669)	(0.0410)
Constant			0.356
			(0.289)
Observations	13,980	13,980	13,980

Source: Malawi Integrated Household Survey (2016-17), our calculations. Productivity measured as the log of gross value of plot output (Malawian kwacha/hectare). Stars indicate statistical significance: *** 1%; ** 5%; * 10%. Variables: plot area squared, plot manager/owner overlap, pesticide/herbicide use, organic fertilizer use, plot intercropped, distance from plot to household, child dependency ratio, access to non-farm/non-labor income, and distance to nearest Agricultural Development and Marketing Corporation (ADMARC) included in regression but not shown in table—all insignificant.

1. Market failures

One driver of the gender gap seems to be crop choice. Agricultural productivity varies substantially by crop and gender in Malawi. Men have statistically significant higher maize and groundnut yields relative to women. Women tend to concentrate in lower-productivity, lower-value crops like maize and pigeon peas, while men dominate tobacco, the major export crop (Malawi NSO 2017). These crop choices may be undergirded by social norms, as export crops are typically seen as men's domain. Yet such choices may also be the result of information and coordination failures. Women may replicate the crop choice of other women in their area, lacking information on which crops may yield higher profits. While most tobacco is sold at market, maize is predominantly grown for consumption, largely leaving female farmers out of the market ecosystem (Benson and Edelman 2016). Infrastructure and mobility barriers may act as a constraint to greater market access, and with smaller social networks, women lack the resources to circumvent these coordination challenges.

Some of the gender gap in agricultural productivity seems to be driven by barriers to market access. Agricultural markets, due to explicit and implicit barriers, seem to work differently for men and women in Malawi. Tobacco, for instance, is sold on regional auction floors, and farmers are responsible for getting their goods to auction (Andersson Djurfeldt et al. 2018). In addition, tobacco is typically sold in 100-kilogram bales. Due to time, mobility, and safety constraints, as well as the physical difficulty of transporting such large bales, women may be less able to access tobacco markets than men. In order to circumvent some of these transportation barriers, tobacco farmers often organize into 12- to 20-member producer clubs, where farmers pool their resources to gain access to credit, extension services, and transportation services. These groups allow farmers to overcome information asymmetries and coordination failures in the market. Yet due to social norms and outright discrimination, women are typically barred from these groups (Andersson Djurfeldt et al. 2018). Another means of circumventing market access constraints is selling tobacco on contract. As of 2017, almost 80 percent of tobacco farmers were under contract in Malawi (Shaba et al. 2017). Under a contract system, buyers facilitate farmer access to credit, which they can then use to buy inputs and access extension services. Farmers sell their tobacco directly to the buyers, who then transport it to regional markets and sell in higher volumes. Shaba et al. find that women are less likely to participate in contract farming than men, which further restricts their access to lucrative export crop markets.

Tobacco aside, most agricultural markets in Malawi have fixed fees, which do not increase proportionally with volume (Fafchamps and Gabre-Madhin 2006). This fee structure is regressive for small-holder farmers, who are predominantly women. While local markets are easier to access than regional auction floors, farmers still have to physically travel to markets to sell their goods, which may be particularly prohibitive to women due to time poverty, mobility, and safety concerns. Structured markets, where intermediary sellers buy goods directly from farmers and then transport and sell them at market, exist for cash crops, but are not common for other crops where female farmers are concentrated (Gondwe 2018). Such markets could limit the time and travel costs associated with bringing goods to markets.

2. Institutional failures

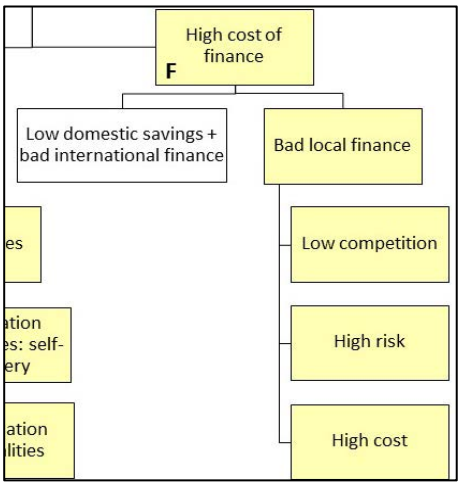
There is also evidence that institutional failures contribute to the gender gap in agricultural productivity. The Farm Input Subsidy Program (FISP) provided fertilizer and seed subsidies for small-holder farmers in Malawi, across approximately 1.5 to 2 million households. However,

studies find that due to poor targeting, the bulk of the subsidies went to households in the upper three quintiles of the income distribution (Chirwa et al. 2011). Furthermore, men made up the bulk of the recipients, as coupons were typically distributed to household heads. When women did receive coupons, they were for smaller amounts than those received by men. As Kiliç et al. (2013) and our results revealed, gender gaps in fertilizer usage are significant in Malawi. Some of this gap may be due to the failure of the FISP to adequately target female plot managers within households.

These gender gaps in agricultural productivity impose real costs on the economy. Using data from the 2010-2011 household survey, a recent report estimates that if the gender gap were eliminated and female farmer productivity were raised to the level of male productivity, simulating test 2 of the HRV, annual crop output would increase by 7.3 percent (UN Women et al. 2015). This increase amounts to 1.85 percent of annual GDP, or $100 million. Given that Malawi's GDP grew by only 3.8 percent between 2011-2015, undertaking reforms to reduce the gender gap in agriculture would have substantial impacts on the country's economic growth prospects (World Bank 2018c). Such reforms would also have large impacts on poverty reduction in the country, given that 70 percent of the country lives below the $1.90/day poverty line and predominantly works in agriculture. While Malawi's long-term growth prospects may rely on economic diversification away from agriculture, in the short term it is hard to imagine a growth path for Malawi that does not include improving agricultural productivity and, by extension, raising the incomes of the poor. This improvement will require addressing the sizable gender gaps in productivity, specifically around knowledge and inputs. Thus, we conclude that gender gaps in agriculture do act as a binding constraint on near-term growth.

D. Finance

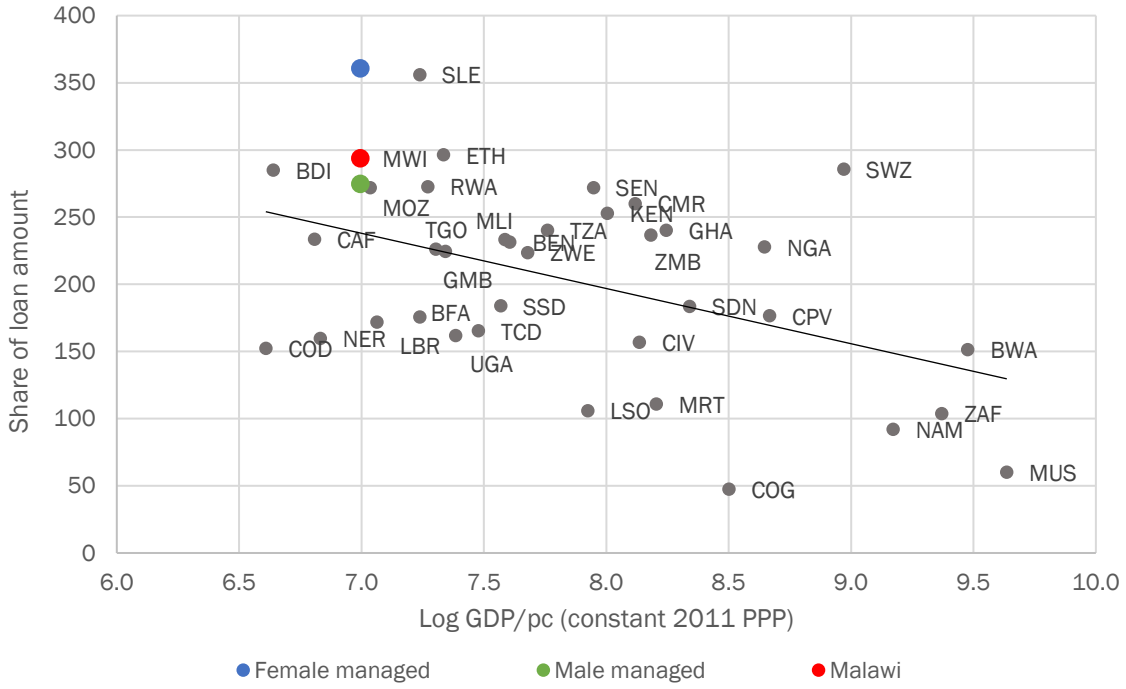
Thus far, we have focused on exploring what factors in Malawi might constrain low private returns to economic activity. Another factor contributing to low growth, however, could be the high cost of finance. We explore the potential gendered barriers to finance in Malawi to assess if finance is a binding constraint to growth.



Overall financial inclusion is low in Malawi, though rates are about on par with other comparator countries for its level of income. Seventy-three percent of adults are unbanked, with higher rates among rural populations and women (FinScope 2014). Anecdotal evidence suggests that rural unbanked women are not actively targeted by commercial banking services (Women's World Banking 2017). Yet data suggests women are just as likely to save as men. Indeed, women are typically the household financial managers, but are more likely to save informally, using village savings groups or saving at home (Global Findex 2017). This suggests that there may be gendered barriers to greater financial inclusion, such as physical distance (limited service coverage in rural areas, compounded by gendered transportation constraints), lower literacy levels, a lack of identification documents, and the perception that banking services are for the rich (Women's World Banking 2017).

Turning to female- and male-run enterprises, we find evidence that female-managed firms are significantly less likely to own a formal checking or savings account than male-managed firms, at rates well below the regional average (World Bank Enterprise Surveys 2019). However, this gap seems to be driven by firm size, tenure, and sector choice, as opposed to gender. Surprisingly, female-managed firms are more likely to have a loan or line of credit than male-owned firms. Yet when women do receive loans, they are typically for smaller amounts than those held by male-owned businesses. Malawian firms report high rates of collateral requirements for loans, higher than many of their regional neighbors (see Figure 11). We find some evidence that female-managed firms are required to pay more in collateral for loans then men, though this difference again seems to be driven by tenure and firm size.

Figure 11: Value of collateral required for loan, most recent year



Source: World Bank Enterprise Surveys (2019)

Overall, while financial inclusion is low for Malawi, and lower for women, the evidence does not suggest that gendered differences in access to finance are especially salient or a constraint to growth. However, as the economy diversifies in the future and access to finance broadens, these gender gaps may become more relevant. As the government and commercial banks work to expand coverage, they should keep these identified gender gaps in mind to ensure that access to finance is inclusive of women.

E. Does gender impact binding constraints to growth in Malawi?

As with all diagnostic tools, the engendered HRV is highly context-dependent and its application is data intensive. However, even using a data-constrained country like Malawi as a test case, we were able to identify large gender gaps in agricultural productivity linked to gender gaps in access to key inputs into the production process, and substantial gaps in human capital, earnings, and wage employment.

Critics of our approach might suggest that while these gender gaps are large, it is difficult to prove that they themselves are binding on growth. Thus, another approach, following Ianchovichina and Leipziger (2019), is to overlay our analysis of gender gaps on a set of pre-identified constraints to growth, to see if there are distortions that matter for both growth and women's economic empowerment. These distortions would then get "additional" weight in the prioritization process. For this exercise, we use the World Bank's Systematic Country Diagnostic (SCD) for Malawi as a starting point. The SCD identified weak governance and gender inequality as foundational issues inhibiting poverty alleviation and inclusive growth (World Bank 2018c). It argues that weak governance and institutions underlie both macroeconomic instability and poor policy implementation in the country. Gender inequality—low female agricultural productivity; high fertility and early marriage; gendered barriers to inputs and endowments; and limited access to secondary and tertiary education—keeps the country in a low-productivity trap and has strong links to poverty. In addition to these two foundational issues, the SCD sets out four priority pathways to help spur growth and poverty reduction. First, it argues for increasing agricultural productivity, given that agriculture is still the backbone of the economy and hugely important in the lives of the rural poor. Second, it advocates for diversifying the economy to support structural transformation, improve productivity, and create jobs. Here it specifically highlights the need for improved access to finance and increased infrastructure investments to spur private sector growth. Third, the SCD calls for taking advantage of the demographic dividend to build human capital. It recommends investing in reproductive health and family planning services, improving learning outcomes at the primary and secondary level, and prioritizing public health and early childhood development initiatives. Fourth, it suggests investing in social protection programs, risk mitigation strategies, and sustainable resource management to build resilience against shocks and promote environmental sustainability.

The SCD identified all these pathways as high priorities for promoting both poverty reduction and inclusive growth in Malawi. Based on our analysis, we likewise ranked each intervention's potential impact on women's economic empowerment and gender inclusion, giving it a high (3), medium (2), or low (1) score (see Table 9). The final column reflects a combined score, identifying interventions that have the greatest potential to have large direct effects on welfare (λ_j in the HRV growth equation), while also having positive second-order interactions on gender inclusion (second term of the growth equation). Using this approach, the following priority areas for reform emerge: increasing agricultural productivity, improving learning outcomes and skills development, and addressing constraints to gender equality. Hence, applying the Ianchovichina and Leipziger method yields a set of priorities that closely match the ones suggested by our analysis above.

Tellingly, the World Bank identifies gender inequality as a foundational issue that constrains both growth and inclusion in Malawi. This suggests, in line with our own analysis, that failure to close key gender gaps may result in large negative interaction effects with other non-gendered interventions, limiting the effect of lifting those constraints.

We believe that gender gaps in human capital, in access to inputs that determine agricultural productivity, and in access to wage employment are relevant to Malawi's future growth path in at least three key areas. First, the evidence suggests that Malawi's low levels of human capital, and especially the low levels of human capital among women and girls, contribute to high fertility rates, slowing the demographic transition and delaying its growth dividend. Second, barriers to women's employment in the wage sector decrease women's economic

opportunities and may be associated with a potential misallocation of skills and talent. This limits the impact of any intervention that aims to diversify the economy, improve productivity, and support greater structural transformation. Third, gender inequalities in farming contribute to the country's low agricultural productivity and resulting rural poverty. This last point matters especially because it is hard to envisage a pattern of structural transformation and growth in Malawi that does not involve fast growth in agricultural productivity, given the importance of the sector in total employment and the prevalence and depth of rural poverty in Malawi. Yet increasing agricultural productivity in Malawi will be impossible without explicit consideration of gendered barriers in access to inputs and knowledge.

Taken together these findings suggest that gender inequality matters to Malawi's economic performance and that reducing key gender gaps in education, employment, and agriculture could improve economic growth and poverty outcomes.

Table 9: Prioritization of constraints to growth and gendered growth constraints

Pathway	Specific priority interventions	Growth	Inclusion	Gender	TOTAL
Increasing agricultural productivity	Target public resources and interventions to promote commercialization and productive diversification in the agriculture sector	3	3	3	**9**
Diversifying the economy and creating jobs	Create a business-enabling environment to support structural transformation, increased productivity, and regional integration	3	2	3	8
	Increase access to finance	3	2	2	7
	Address infrastructure deficits to support private sector development and service delivery	3	1	2	6
Harnessing the demographic dividend and building human capital	Maintain the current momentum in demographic transition	3	2	3	8
	Improve learning outcomes at primary and secondary levels and develop productive skills of youth	3	3	3	**9**
	Improve the coverage, access, and quality of health services	2	3	2	7
	Mainstream Early Childhood Development (ECD)	1	3	3	7
Building resilience against shocks and enhancing environmental sustainability	Strengthen social protection programs	1	3	2	6
	Adopt risk-mitigation initiatives	3	2	2	7
FOUNDATIONAL ISSUES					
Gender inequality	Address key constraints to gender equality	3	3	3	**9**
Weak governance underlies macroeconomic instability and poor policy implementation	Establish commitment mechanisms to build and sustain the basics of sound economic and public financial management	3	1	1	5
	Mitigate governance constraints to policy effectiveness in priority areas	3	1	1	5

Source: Columns 1-4 based on World Bank (2018c, page 72); columns 5-6 our own estimates

V. Lessons learned

This paper shows that it is possible to engender growth diagnostics. Specifically, we adapt the HRV growth diagnostics tool to integrate key relationships between gender inequalities and economic growth and then apply the tool to Malawi to show how gender inequalities may constrain growth.

We acknowledge we are not agnostic in this paper—we start from the premise that it matters if women have greater access to economic opportunities. This is a good in itself from an equity and inclusion standpoint. It is also smart economics: Increasing women's access to economic opportunities is good for growth, and by extension, constraints that restrict women's access to labor force opportunities can have potential negative impacts on future growth prospects.

From the experience of applying the framework to Malawi, and despite our initial optimism about the potential to engender the HRV, we conclude that there are aspects of the HRV tool that limit its usefulness when it comes to integrating gender issues into a growth diagnostic. A first limitation is the HRV's emphasis on "binding" constraints to growth—that is, on constraints that if removed will quickly generate an increase in investment and growth. This approach is well suited to identifying problems where a factor is in short supply—say, credit or skilled labor—and where removing the constraint quickly generates an increase in the supply of the factor and in private investment. But it is not as well suited to identifying problems due to misallocation of resources such as women's talent or skills in a context of excess supply—for example, problems where the issue is not the aggregate supply of labor or entrepreneurship per se, but the quality composition of that supply. In our analysis we show that in many cases the distortions created by gendered barriers play out as a misallocation of talent or skills (such as when high-skilled women are shut out of high value-added occupations in favor of less-skilled men; or potentially highly productive female-led firms face credit constraints that less-productive, male-led firms may not face) rather than as a shortage of the factor itself. While a focus on composition/quality of supply and matching to demand can be integrated into the HRV, it adds to the complexity and data intensity of the exercise.

A second limitation is that the focus on "binding" constraints tends to prioritize short-term reforms—that is, reforms that will pay off quickly as opposed to over the longer term. A short time horizon downplays the importance of investments that may take a decade or two to pay off. This is definitely the case for investments in gender equality, which often require slow, parallel changes in social norms. But it also applies to issues such as investment in human capital or improvements in the quality of institutions, both of which may be given less importance in a binding constraints analysis than they would receive in a broader analysis of factors that matter for long-term growth and development.

A related issue is that the HRV is a static tool and not easily adapted to include the dynamics of a reform process. This matters for gender because changes in gender equality are, in effect, a form of institutional change that evolves over time. Pro-gender-equality change must take place in formal institutions (which may include government services, legislation, and courts), but also in informal institutions (social norms). This process, especially when it comes to social norms, is slow. But it is also foundational; it can generate benefits that allow other reforms to take place. It may, in fact, open new windows of opportunity for other, broader societal economic and political reforms (Rwanda is a classic example). It is difficult to integrate these longer-term foundational issues into an HRV framework.

In our engendered version of the HRV, we attempted to draw linkages between nodes in different branches of the tree to model some of the potential interaction effects of gender equality. While such linkages are clear intuitively, they are hard to capture in the HRV's four test questions. Gender is likely to appear as an interaction effect across nodes. Care responsibilities, for example, impact not only social returns but private appropriability and future levels of human capital. Capturing the diffuse effects of alleviating unpaid care work might make this rise to the level of a binding constraint in some places, but these downstream effects are hard to fit neatly into the model.

A final limitation of the HRV is its lack of attention to distributional issues. The HRV assumes that what is holding back growth is the lack of investment opportunities or the high cost of finance. There is little attention focused on how investment opportunities and investment resources are distributed across groups, and no attention given to issues of power and political voice, which play an important role in shaping policies, institutions, and even markets.

The HRV, by putting emphasis on aggregate economic growth, fails to capture the distributional, inclusion, and poverty alleviation effects of a given constraint. The relationship between poverty alleviation, growth, and inclusion is well documented (see Ravallion and Chen 1997; Adams 2002; Dollar and Kraay 2002; Dollar et al. 2013). Yet the HRV tests ask no distributional questions about who is most impacted by a constraint, and hence who would be most helped by its alleviation. In many countries, poverty itself may be a binding constraint to growth; in Malawi for instance, 70 percent of the population lives on less than $1.90 a day. Identifying which constraints have the largest impact on the poor could have huge effects on both poverty and growth, yet the HRV is not set up to capture this. Ianchovichina and Lundstrom (2009) argue that the HRV needs to be adapted in settings that have seen poverty stagnation alongside high growth. It is easier to make the case that gender, or inclusion more broadly, matters if the tool takes distributional and poverty alleviation effects into account alongside growth. An alternative approach to the HRV is the SCD now used by the World Bank Group to identify priority areas for support (World Bank 2019a). Like the HRV, the SCD seeks to identify the key bottlenecks to growth in a country, but rather than focusing on average growth per capita, it gives greater weight to growth of the bottom 40 percent of the population and explicit weight to poverty reduction. Unlike the HRV, the SCD also explicitly brings in sustainability—in its fiscal, environmental, and social aspects. Like the HRV, the SCD guidance note is a form of decision tree, and teams applying it are asked to rely on a foundation of empirical evidence (triangulating from existing data sources and existing empirical studies) to underpin their analysis. By giving explicit attention to distribution and sustainability issues, the SCD allows for greater integration of inclusion and gender issues than the HRV's growth-focused approach. The SCD also allows for greater interaction between growth and distribution, and between growth and sustainability. In this way, it is arguably a more complete tool than the HRV and one that, given the growing evidence on the tight relationship between growth and inequality, is better suited to understanding challenges in the development process. The big drawback of the SCD, relative to the HRV, is that the prioritization process is more complex and less intuitive. In effect, the SCD teams typically rely on an additional set of criteria to rank the potential priority areas that the analysis may reveal. These criteria include factors such as whether a reform is foundational or cross-cutting across sectors, the time horizon for the payoff, and the political support for the reform. But their use and interpretation is varied and potentially quite subjective.

The wider scope of the SCD allows gender, and inclusion issues more broadly, to rise to the surface of the analysis more easily. In effect, in Malawi the SCD highlighted many of the same gender gaps we found in our own analysis of Malawi. But the SCD went one step further in identifying gender inequality itself as a binding constraint to growth. This result suggests that development actors who are serious about integrating gender into the country prioritization process would do well to think more broadly about how to give equal weight to poverty reduction and inclusion dynamics in their analyses.

We acknowledge that carrying out an engendered HRV analysis does take additional time and adds complexity to the results. Given that development actors are often carrying out multiple country prioritization analyses at the same time, this time constraint could play a role in an organization's ability to operationalize the new framework. In addition, we acknowledge that data gaps may limit this framework's application in some places. Determining gender-specific shadow prices, as called for under the HRV's first test question, is difficult. Finally, we acknowledge that identifying which types of projects, policy changes, and investments might release the identified gendered constraints to growth may be less clear-cut than doing so for other, non-gendered constraints. We know which types of policy solutions might address frequent power outages and burdensome regulations that slow down export times. There is less conclusive evidence on what types of investments might create better jobs for women, shift social norms, and release women's time constraints. Indeed, the complexity of putting our engendered HRV into practice is its greatest drawback. A simpler, short-cut approach for development actors interested in integrating gender yet unable to commit to a whole revamp of the diagnostic, might be to adopt the Ianchovichina and Leipziger (2019) method, where a gender lens is overlaid on identified constraints to growth to help rank constraints that, when lifted, would have the largest impact on both growth and women's economic empowerment.

Yet even in a data-constrained environment like Malawi, we were able to find multiple data points that shed light on aggregate levels of and demand for constraints by gender, as well as cost estimates and examples of constraint circumvention—evidence that suggests lifting gender distortions may have a direct effect (λ_j) on aggregate growth. While not as clear cut as an aggregate economy-wide cost figure, we argue that this sort of data triangulation and evidence-informed judgment is required in the application of any country diagnostic model; our engendered HRV is not unique in this way. The HRV tree was designed as a guide, prompting the user to look for evidence of barriers to growth throughout the economic and policy environment. There will always be a level of judgment involved in the use of any such tool. The engendered HRV is likewise a guide to help policymakers think about where gendered barriers to access might impede productivity and growth. While gender itself will only occasionally rise to the level of a binding constraint (perhaps in countries where gender inequality is egregious, as in Afghanistan), the tool will help the user think about how gender interacts with various other constraints to growth in the economy.

Constraints are not distribution neutral—they affect some groups more than others. If a constraint is especially binding to a large group of the population, such as women, the poor, or rural residents, alleviating that constraint might have large impacts on the economy as a whole through its impact on poverty and the incomes of the bottom 40 percent. For development is about more than just growth. As Amartya Sen (1999) argues, "Development consists of the removal of various types of unfreedoms that leave people with little choice and little opportunity." Development should be thought of as an expansion of freedoms and opportunities for all parts of the population. A growth path that does not explicitly integrate all

parts of the population is not a growth path that leads to development. Thus, it is important to look at not only growth but poverty reduction and inclusion when setting country priorities. The HRV is a useful tool, but it is incomplete without a deeper rethink about how to elevate the importance of inclusion and poverty reduction in the analysis.

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