Gender Equality and the Sustainability of Steady State Growth Paths

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1. Introduction

The basic concern that motivates this paper is the potential trade-off between gender wage equality and economic growth in developing countries. While some evidence suggests that gender equality may enhance long run growth prospects (e.g., Hill and King 1995; Tzannatos 1999; Klasen 2002; Knowles, Lorgelly, and Owen 2002), in the short-run, higher female wages can be contractionary (Blecker and Seguino, 2000; Seguino 2000a, 200b). And yet ideally, we’d like to observe both more equality and more growth in developing economies. But if more of the former in fact causes less of the latter, then clearly this can become an obstacle to advocating for increased gender wage equality on the grounds of other criteria, such as equity (see Seguino 2006, pp. 1—5 for further discussion).

This paper draws attention to a possible solution to this dilemma. It shows that, if we begin with a sufficiently high rate of growth (relative to potential), then even if increasing gender wage equality does reduce growth, this can be an unequivocally good thing if the growth rate is thus made more sustainable in the long run, in the sense that potential and real output grow at the same rate. In other words, we can find ourselves in a “win-win” situation where increasing gender wage equality results in increased growth.

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1 It may seem unrealistic to characterize the poorest developing countries as falling into this category, but some do (to wit, China and Vietnam) as do numerous middle income countries such as South Korea, Taiwan, Malaysia, and Singapore.
sustainability of the growth rate, making it easier to advocate for increased equality as an end in itself.

The remainder of the paper is organized as follows. The next two sections construct developing country models of balance of payments equilibrium growth, technical progress, and potential output. They incorporate salient features of gender differences in household behavior and labor market outcomes. The subsequent section demonstrates how gender equality can be used as an adjustment mechanism to achieve sustainable long-run growth, while the penultimate section addresses political economic concerns associated with reducing male relative economic power. The final section concludes with some observations on the contributions of this modeling exercise to current debates in the gender and macroeconomics literature.

2. A Balance of Payments Constrained Growth Model for Developing Countries

The analysis in this section develops a model of balance of payments constrained growth (BPCG) that is modified from the form originally described by Thirlwall (1978, 1979) to allow for certain features of production, pricing and import demand that are specific to developing economies. We begin by specifying export, import and pricing equations as follows:

\[ X = A \left( \frac{EP_f}{P} \right)^\psi Y_w^\varepsilon \]  \[ 1 \]

\[ M = B \left( \frac{P}{EP_f} \right)^\eta \left( \frac{W_m}{W_F} \right)^\theta Y^\alpha \]  \[ 2 \]

\[ P = (1 + \tau) \frac{W_F N_F}{Y_F} \]  \[ 3 \]
where \( X \) denotes total exports (in real terms), \( A \) and \( B \) are positive constants, \( E \) is the nominal exchange rate (specifically, the price in domestic currency of one unit of foreign currency), \( P_f \) and \( P \) are the price of foreign- and domestically-produced tradables, respectively, \( Y_w \) denotes world income (in real terms), \( \psi \) is the (foreign) price elasticity of demand for exports, \( \varepsilon \) is the (foreign) income elasticity of demand, \( \eta \) is the price elasticity of imports, \( \theta \) is the elasticity of imports with respect to the gender distribution of income, and \( \sigma \) is the income elasticity of import demand. \( M \) is total imports (in real terms), \( W_M \) and \( W_F \) are male and female nominal wages, respectively, \( Y \) is domestic (real) income, \( N_F \) denotes total employment in the tradable sector and \( Y_F \) is the real output of the tradable sector.

The export and import demand functions in equations [1] and [2] respectively differ from their canonical form in BPCG theory in just one key respect: the inclusion of a direct effect of relative nominal wages \( (W_M/W_F) \) on imports in equation [2]. The inclusion of this term is explained by: (i) the “consumption effect” found in semi-industrialized economies (SIEs), according to which men spend proportionally more of their income on luxury goods that are more likely to be imported, so that a redistribution of wage income towards men will boost imports (Seguino, 2006, p.10); \(^2\) and (ii) the evidence that men spend more of their income on luxury goods than women is surprisingly consistent across a varied set of developing economies (Haddad, Hoddinott, and Alderman 1997; Hoddinott and Haddad 1995; Quisumbing and Maluccio 2003; Xu 2007). Luxury goods are both domestically produced (e.g., alcohol, cigarettes, gambling), and imported (consumer electronics, automobiles, cell phones). While we hypothesize that a redistribution to men worsens the import bill via consumption effects based on some class-based evidence (Dutt 1984) firm conjectures require empirical evidence. As yet, however, we know of no empirical evidence that directly links higher relative male income to an increase in the import bill.

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\(^3\) Note that if:

\[
W = W_F N_F + W_M N_M
\]

represents the total wage bill, then the female wage share can be written as:
“production effect” found in low-income agriculturally-dependent economies (LIAEs), as a result of which increasing women’s bargaining power in the household (proxied by a rise in women’s relative wages), allows women to augment the time they devote to production of their own (import substituting) subsistence crops (Darity 1995; Udry, Hoddinott, Alderman, and Haddad 1995; Blackden and Bhanu 1999; Quisumbing 2005).

Equation [3], meanwhile, is a simplified version of the pricing equation for domestically produced tradables found in Blecker and Seguino (2002, p. 104). Equation [3] assumes for simplicity that export industries rely exclusively on female labour (i.e., that men are employed only in the production of non-tradables), and that intermediate goods do not feature in the calculation of unit prime cost to which the mark up is applied in the determination of prices. Inspection of equations [1] and [3] reveals an indirect relationship between female wages and exports because of a “cost effect”: increasing female wages will increase the cost and hence (assuming the mark up is fixed) the price

\[
\omega_F = \frac{W_F N_F}{W} = \frac{W_F N_F}{W_F N_F + W_M N_M}
\]

\[\Rightarrow \omega_F = \frac{1}{1 + \alpha \frac{W_M}{W_F}}\]

where \(\alpha = \frac{N_M}{N_F}\) is taken as given. This assumption reflects a kind of gendered fixed coefficients production process, due to job segregation by gender, rigidified by gender norms and stereotypes. It then follows that:

\[
\frac{d\omega_F}{d(W_M / W_F)} = \frac{-\alpha}{\left(1 + \alpha \frac{W_M}{W_F}\right)^2} < 0
\]

In other words, the female share of the total wage bill is decreasing in the male-female wage ratio: any increase in the latter will result in a redistribution of wage income away from women and towards men, ceteris paribus. Hence \(\theta > 0\) in equation [2] will pick up the “consumption effect” described above.

\footnote{Equation [3] thus better reflects the structure of a SIE than a LIAE. See Seguino (2006, EN 9).}
of domestically produced tradables, thus lowering exports.\(^5\) Note that we deliberately overlook the possibility of an efficiency wage effect here, as a result of which an increase in female wages leads to a more-than-proportional increase in the efficiency of female labour, so that unit labour costs (and hence the price of tradables) ultimately decline.\(^6\)

This is because the resulting stimulus to exports provided by such an efficiency wage effect will ultimately boost growth in the model derived from equations [1]—[3] below. This, in turn, would make it “too easy” to advocate for reduced gender wage inequality, because, by creating a direct relationship between equality and the equilibrium rate of growth, it would mean that any reduction in gender wage inequality is necessarily also conducive to the equilibrium rate of growth.\(^7\)

As the preceding discussion suggests, our model appeals to features of both SIEs and LIAEs. The results that follow, then, can be thought of as applying to a less developed region (LDR) comprising both SIEs and LIAEs, rather than to a single less developed country (LDC) [which presumably can be either an SIE or a LIAE, but not both].

Using lower case letters to denote the proportional rates of growth of variables, it follows from [1]—[3] that:

\(^5\) A flexible mark-up, sensitive to foreign price competition, may be lowered as female wages rise, thus resulting in a profit squeeze effect on investment. For Kaleckian models with a flexible markup on export goods see Blecker (1989) and Blecker and Seguino (2002). In this model, for simplicity, we ignore this possibility, although it should be noted that such a response could attenuate the negative effect of higher female wages on export demand. The capacity of a flexible markup to cushion the negative demand-side effect of higher female wages is, however, likely to be quite small for two reasons. First, a lower markup will depress investment spending and, second, many export firms in developing countries are integrated as small producers into the global commodity chain, and operate with already very small profit margins.

\(^6\) We could, of course, include an efficiency wage effect that increases the efficiency of female labour less than proportionally with respect to the female wage, so that the cost effect identified above (which associates rising female wages with rising unit labour costs in the tradables sector) is still observed. But this would add nothing of value to our analysis.

\(^7\) Of course, if this is in fact the case, then developing countries should immediately and unequivocally act to reduce gender wage inequality by raising female wages as a straightforward mechanism for raising the equilibrium rate of growth and hence the growth of the standard of living of all members of their societies.
\[ x = \psi (e + p_f - p) + \varepsilon y_w \]  
\[ m = \eta (p - e - p_f) + \theta (w_M - w_F) + \sigma y \]  
\[ p = w_F - q \]

where \( q \) denotes the rate of growth of labour productivity and (in the formulation of equation [6]) we assume for simplicity that \( q_F = q_M = q \). \(^8\) Substituting equation [6] into equations [4] and [5], we arrive at:

\[ x = -\psi w_F + \psi (q + e + p_f) + \varepsilon y_w \]  
\[ m = (\eta - \theta) w_F - \eta (q + e + p_f) + \theta w_M + \sigma y \]

These equations help to isolate the impact of male and female nominal wage growth on export and import growth. Hence note that:

\[ \frac{\partial x}{\partial w_F} = -\psi < 0 \]

\[ \frac{\partial m}{\partial w_F} = (\eta - \theta) \]

\[ \frac{\partial m}{\partial w_M} = \theta > 0 \]

The first of these partial derivatives reflects the cost effect discussed earlier, while the third reflects the workings of the consumption and production effects. The second partial derivative – the sign of which is ambiguous – depends on all three effects. If \( \eta > \theta \), the cost effect dominates and increasing female wage growth will raise the growth of imports. But if \( \eta < \theta \), increasing female wage growth will reduce the growth of imports, as the consumption and production effects dominate the cost effect.

\(^8\) The reader is reminded that we are assuming a fixed mark up in the derivation of [6].
Our BPCG model is completed by introducing the familiar balance of payments constraint:

\[ XP = EP \]

which states that the value of exports must equal the value of imports. It follows from this equality that:

\[ x + p = m + e + p_f \]  \[9\]

When combined with equation [6], this last expression yields:

\[ x + w_f = m + (q + e + p_j) \]  \[10\]

Finally, substituting equations [7] and [8] into [10] and solving for \( y \) yields:

\[ y = \frac{(\eta + \psi - 1)(q + e + p_j) - (\eta + \psi - 1 - \theta)w_f - \theta w_M + \varepsilon y_w}{\sigma} \]  \[11\]

where we assume that \( \eta + \psi > 1 \) – i.e., that the Marshall-Lerner conditions hold.\(^9\)


Two interesting comparative static results follow from [11]. First:

\[ \frac{\partial y}{\partial w_M} = -\frac{\theta}{\sigma} < 0 \]

This tells us that raising the rate of growth of male wages \textit{ceteris paribus} will unambiguously reduce the rate of growth, because of the consumption and production effects. Note, however, that:

\(^{9}\) For many developing countries that are import dependent, the Marshall Lerner condition does \textit{not} hold, and devaluations can be contractionary (see, for example, Krugman and Taylor 1978). Indeed, there seems to be evidence that at least in the short run, contraction is likely. As will be made clear below, however, failure of the Marshall-Lerner conditions to hold mean that reducing gender wage inequality will be conducive to the equilibrium rate of growth – making it easier to advocate for reductions in inequality. Once again, then, the purpose of our assuming here that the Marshall-Lerner conditions \textit{do} hold is to avoid constructing a model in which it is “too easy” to advocate for reduced gender wage inequality because there is a straightforward, direct relationship between equality and the equilibrium rate of growth.
\[
\frac{\partial y}{\partial w_F} = -\frac{(\eta + \psi - 1 - \theta)}{\sigma}
\]

The sign of this second partial derivative is ambiguous. If \( \eta + \psi - 1 > \theta \), then the cost effect dominates the consumption and production effects, and \textit{ceteris paribus}, raising the rate of growth of female wages will cause the rate of growth to decline. But if \( \eta + \psi - 1 < \theta \), then the cost effect is dominated by the consumption and production effects. In this case, raising the rate of growth of female wages (\textit{ceteris paribus}) will cause the rate of growth to \textit{increase}.\footnote{Note that we will always observe this inequality if the Marshall-Lerner condition does not hold. Hence the claim made in the previous footnote – that our purpose in assuming that the Marshall-Lerner conditions \textit{do} hold is to avoid making it “too easy” to advocate for reduced gender wage inequality by creating a direct relationship between gender wage equality and the equilibrium rate of growth,.}

These results point to an important conclusion regarding gender equality and economic growth in the BPCG framework developed thus far: it is always possible to reconcile faster growth with increased gender wage equality as long as the latter is achieved by depressing the rate of growth of male wages (which will raise \( y \)) rather than increasing the rate of growth of female wages (which will have an ambiguous effect on \( y \)).\footnote{If we define the relative wage as: \( W_R = \frac{W_M}{W_F} \), then as has already been demonstrated, the female wage share will rise if \( W_R \) falls. In a dynamic context, this requires that: \( w_R = w_M - w_F < 0 \)

Hence in order to increase gender wage equality (as alluded to in the text), we must observe either a reduction of \( w_M \) or an increase in \( w_F \) sufficiently large to render \( w_R < 0 \).}

However, we are not convinced that reducing the rate of growth of male wages is the best strategy for reducing gender wage inequality. This is because, given the

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Note that in a long run, steady state equilibrium, we would expect to observe \( w_R = 0 \) – i.e., constancy of the relative price of male and female labour. Otherwise (given a constant value of \( \alpha \)) the female wage share will rise/fall continuously. Since the female wage share is bounded above and below, there are only certain conditions under which this is logically possible. Moreover, the stylized facts of growth in LDCs are not consistent with a continuously rising or falling female wage share: our reading of the empirical evidence is that there is no unambiguous trend in the female wage share in developing countries (UNRISD 2005). The effects of changing the rates of growth of male or female wages \textit{ceteris paribus} as discussed above are therefore best considered short run results.}
foreign rate of inflation and the exchange rate, a reduction in the rate of growth of male wages will depress the rate of growth of the male consumer real wage – possibly to the point that the level of the male consumer real wage will fall. And this sequence of events poses three potential problems. First, it may give rise to real wage resistance on the part of males, which may negate the efforts to reduce male wage growth (and hence gender wage inequality) in the first place. Second, if this real wage resistance does not occur, the result may be increased gender conflict (especially if men’s standards of living fall in absolute terms), from which women will suffer. Finally, even if neither real wage resistance nor increased gender conflict materialize, we would prefer to enhance gender equality without reducing the rate of growth (much less the level) of real income for men, bearing in mind the relatively low levels of per capita real income earned by all workers in LDRs and the desire to enhance these incomes over time.

3. Technical progress and the potential rate of growth

In this section, we extend the growth model developed in the previous section by adding descriptions of technical progress, the potential (Harrodian natural) rate of

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12 We label this case “conflictive gender equality,” whereby improvements in women’s relative status come about through absolute declines in male economic status. Evidence on the gender effects of achieving gender equality by this route is sparse and tends to be context-specific. Chant (2000), for example, notes the negative effect on gender relations of falling male wages and access to employment in Costa Rica in the 1990s. Susan Faludi’s (1991) Backlash underscores the negative response to women’s economic empowerment in the United States. Naila Kabeer (2000) describes the efforts that Bangladeshi women who take up work in the garment manufacturing make to maintain a demeanor of subservience in the home toward the male head of household so as not to disrupt patriarchal norms of male authority. Each of these cases speaks to the underlying dominance of patriarchal norms which, when contested, produce gender conflict. While there is as yet no empirical evidence to our knowledge on the conditions that shape the intensity of backlash, intuitively, it would seem that female economic advancements are likely to face less resistance under either of two conditions. The first is if higher female wages (or a higher female wage share) are achieved in the context of a stable rate of growth of male wages and employment. The second (and less ideal) is if increased gender wage equality is attained without provoking a decline in average real male wages or increases in unemployment.
growth, and the relationship between the actual and potential rate of growth. These are as follows:\(^\text{(13)}\)

\[
q = \beta + \gamma y \\
y_p = q + l \\
y = y_p
\]

where \(y_p\) is the potential or natural rate of growth, \(l\) is the (assumed given) rate of growth of the labour force and all other variables are as previously defined. Equation \([12]\) is the Verdoorn Law, describing technical progress as a function of the actual rate of growth (due to dynamic increasing returns – the Smith-Young-Kaldor dictum that “the division of labour depends on the extent of the market”) and the parameter \(\beta\). The latter can be understood as capturing influences on productivity other than the actual rate of growth – including variables that measure female relative economic status at the household level.

Gender equality’s impact on long-run productivity growth occurs via several channels. As women’s control over economic resources rises, their bargaining power in the household increases. That power, in turn, has been found to have a positive impact on the share of household expenditures on children’s health, nutrition and education, improving the quality of the labor supply in the long run (Haddad, Hoddinott, and Alderman 1997). Greater gender equality in education also raises productivity as a result of allocative efficiency. Hence increased educational investments in females reduces selection distortion, by reducing investments in males with lower aptitudes. Finally, note that

\(^{13}\) This extension of the BPCG framework is based on the work of Palley (2002). See also Setterfield (2006).
technical progress in equation [12] is Harrod neutral, which is consistent with the assumption that production is characterized by a fixed capital-output ratio, $v$.

Equation [13], meanwhile, describes the potential rate of growth as the sum of the rates of growth of productivity and of the labour force. This follows from the identity:

$$Y_p = \frac{Y_p}{N^{FE}} \frac{N^{FE}}{L} \frac{L}{POP} \text{POP}$$

where $Y_p$ denotes the maximum level of output that can be produced at full employment ($N^{FE}$), $L$ is the total labour force, $POP$ denotes population, and it is assumed that both the full employment rate of employment ($N^{FE}/L$) and the labour force participation rate ($L/POP$) are constant so that $POP = l$. Finally, equation [14] is the “golden rule” for sustainable steady state growth. This golden rule is derived from the following measure of capacity utilization:

$$u = \frac{Y}{Y_p}$$

from which it follows that:

$$\beta \gamma = u(y - y_p)$$

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14 Note that the association of $Y_p$ with $N^{FE}$ here involves the implicit assumption that $K / Y_p \geq v$, where $K$ is the total capital stock in existence. In other words, output is never capital constrained, but is instead only ever constrained by the effective demand for goods and hence labour.

15 There is evidence that greater gender equality lowers fertility, and because women’s unpaid labor burden declines, female labor force participation rates rise. Labor force participation then could be modeled as a positive function of the female wage rate. The latter’s effect on potential output via the labor force participation rate is analogous to its effect via $\beta$. For simplicity, we omit this complication from our model as it does not qualitatively alter the results.

16 Note that combining equations [12] and [13] yields:

$$y_p = \beta + l + \gamma y$$

In other words, our model involves an endogenous natural rate of growth in the style of Leon-Ledesma and Thirlwall (2000, 2002). The positive impact of gender equality on both $\beta$ and $l$ reflects the supply-side effect that has been emphasized in much of the gender and macroeconomics literature (Folbre 1994a; Blackden and Bhanu 1999; Elson 1991).
It can now be seen that the golden rule in [14] will result in $\& u = 0$. This is the only plausible steady state rate of growth of $u$, since $u$ is bounded above and below and thus cannot expand or contract indefinitely at a constant rate.

The first thing to note is that our introduction of the technical progress function in equation [12] modifies the BPCG equilibrium growth rate derived in the previous section (equation [11]). Hence combining equations [7], [8], [10] and [12] yields:

\[
y = \frac{\mu (\beta + e + p_f) - (\mu - \theta) w_f - \theta w_M + \varepsilon w}{\sigma - \mu \gamma}
\]  

[15]

where $\mu = (\eta + \psi - 1)$ is the Marshall-Lerner condition. Note that it follows from [15] that:

\[
\frac{\partial y}{\partial w_M} = -\frac{\theta}{\sigma - \mu \gamma}
\]

and:

\[
\frac{\partial y}{\partial w_f} = -\frac{\mu - \theta}{\sigma - \mu \gamma}
\]

In other words (and assuming that $\sigma > \mu \gamma$ ) introducing equation [12] into the solution for the BPCG equilibrium growth rate affects the size but not the sign of the key comparative static results relating to gender wage inequality derived in the previous section.  

17 Note that the inequality stated above is empirically plausible, given that it is commonly understood that $\gamma < 1$ and since we may even observe $\mu = (\eta + \psi - 1) = 0$. Bahmani-Osogee and Kara (2005) provide estimates of export and import price elasticities for a number of developed and developing economies. For most developing countries in the sample (e.g., Colombia, Pakistan, and Turkey) estimates of $\mu$ range from 0.27 to 0.65.
However, the introduction of equations [12]—[14] has a second and more serious impact on our BPCG model: the model is now over-determined. Hence note that, in addition to equation [15], we can also solve equations [12]—[14] to derive a second expression for the equilibrium rate of growth:

\[ y = \frac{\beta + 1}{1 - \gamma} \]  \hspace{1cm} [16]

This means that the BPCG equilibrium growth rate (given by equation [15]) and the equilibrium rate of growth that satisfies the golden rule (given by equation [16]) will only be equal if:

\[ \frac{\mu(\beta + e + p_f) - (\mu - \theta)w_r - \theta w_{ml} + \epsilon y_w}{\sigma - \mu \gamma} = \frac{\beta + 1}{1 - \gamma} \]  \hspace{1cm} [17]

It is possible, but highly unlikely, that this condition will be satisfied. Figure 1 below – in which \( \bar{y}_B \) denotes the BPCG equilibrium growth rate corresponding to the particular rate of growth of world income, \( \bar{y}_w \), and:

\[ \Omega = \frac{\mu(\beta + e + p_f) - (\mu - \theta)w_r - \theta w_{ml}}{\sigma - \mu \gamma} \]

– illustrates an initial situation in which the condition in [17] is not met.

[FIGURE 1 GOES HERE]

4. Gender wage equality to the rescue?

Palley (2002) and Setterfield (2006) specify a variety of adjustment mechanisms capable of solving the problem identified in the previous section by ensuring that either \( y \) and/or \( y_p \) adjusts in response to \( y \neq y_p \) until the condition in [17] is satisfied. The point of this section is to propose a new adjustment mechanism that, if operative, is capable of
achieving the same end, but this time in a manner that also involves an increase in gender wage equality.

The mechanism in question operates in the labour market. To begin with, suppose that:

\[ w_F = w_F(u) \quad , \quad w_F' > 0 \]  \[ \text{[18]} \]

and

\[ M = \varphi (w_F - w_M) \quad , \quad \varphi < 1 \]  \[ \text{[19]} \]

According to equation [18], the rate of growth of female wages is increasing in \( u \), our measure of capacity utilization. Recall that:

\[ u = \frac{Y}{Y_p} \]

so that:

\[ \Delta = u(y - y_p) \]

So \( u \) rises whenever \( y > y_p \). Given equation [13] and the fact that:

\[ y = q + n \]

where \( n \) denotes the rate of growth of employment, it follows that:

\[ y > y_p \]

\[ \Rightarrow q + n > q + l \]

\[ \Rightarrow n > l \]

which, in turn, implies that the rate of employment \( (N/L) \) is rising. In other words, equation [18] simply says that female wage growth increases as the labour market tightens – as in a traditional wage inflation Phillips curve.
Meanwhile, equation [19] suggests that the rate of growth of male wages will increase by some fraction, $\varphi$, of any difference between female and male wage growth. The idea behind equations [18] and [19] is that a tightening of the labour market will first lead to an increase in female wage growth (equation [18]), followed by an (eventually) commensurate increase in male wage growth (equation [19]) – so women are the “wage leaders” and men the “wage followers” in the labour market. For the transitory period during which $w_F > w_M$, $W_R = W_M / W_F$ will fall and hence $\omega_F$ – the female wage share – will rise (as demonstrated earlier). But as soon as the equality of $w_M$ and $w_F$ is restored by equation [19] and steady-state conditions (with $\Delta w_M = 0$) are regained, relative wages and the female wage share will cease to change.\(^{18}\) In short, the dynamics of equations [18] and [19] ensure that whenever $y > y_p$ so that $\Delta$ is positive and the labour market tightens, there will be a general increase in wage growth (male and female) consistent with a once-over but permanent compression of male-female relative wages and hence a once-over but permanent increase in women’s share of wage income.\(^{19}\)

It is important to note at this point that we are not necessarily suggesting that equations [18] and [19] are already features of most LDRs. Instead, our analysis in this section is designed to identify a mechanism in the labour market which, if operative, will resolve the problem of reconciling the actual and potential rates of growth identified in section 3, and in a manner that involves an increase in gender wage equality. To the extent that this mechanism is not already operative the obvious question that arises is:

\(^{18}\) As noted earlier, this ensures that the results of our model are consistent with sustainable steady state growth outcomes. See the discussion in Footnote 11.

\(^{19}\) Wage inflation Phillips curves in open, developing countries are likely to have a flatter slope than in more closed economies (Gruben and McLeod 2003). Firm mobility plays a role: higher wages cause mobile firms (which tend to be labor-intensive exporters) to relocate or buyers in the global commodity chain to source from lower wage countries (Seguino 2007).
what policy interventions could we entertain that would instate equations [18] and [19] and thus make the mechanism operative? We will return to discuss this question in greater detail in section 5 below.

In the meantime, we are now in a position to demonstrate the significance of augmenting our growth model with equations [18] and [19]. Consider once again the outcome depicted in Figure 1, where the condition in [17] is clearly not satisfied. The equilibrium rate of growth $y_B$ is not sustainable since, with $y = y_B > \frac{\beta + n}{1 - \gamma} = y_p$, we will observe $\mu u > 0$ which, as discussed earlier, is not feasible as a steady state outcome. But now consider what will happen to growth as a result of equations [18] and [19]. Recall that:

$$i\& = u(y - y_p)$$

so that in response to the situation in Figure 1, both female and (subsequently) male wage growth will increase in equations [18] and [19]. Now note that:

$$\frac{d\Omega}{dw_F} = \frac{\partial \Omega}{\partial w_F} + \frac{\partial \Omega}{\partial w_M} \frac{dw_M}{dw_F} = -\frac{(\mu - \theta)}{\sigma - \mu \gamma} + \frac{-\theta}{\sigma - \mu \gamma}$$

$$\Rightarrow \frac{d\Omega}{dw_F} = -\frac{\mu}{\sigma - \mu \gamma}$$

Notice that, regardless of whether or not the cost effect outweighs the consumption and production effects – i.e., regardless of the sign of $\frac{\partial \Omega}{\partial w_F}$ – the total impact on growth of an increase in the rate of growth of female wages (as captured by $\frac{d\Omega}{dw_F}$ above) is now

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20 The derivative that follows is evaluated at a point consistent with the labour market having regained steady state equilibrium conditions – i.e., $\mu = 0$. At this point, the total change in $w_M$ is equivalent to the total change in $w_F$ created by equation [18], so that $dw_M = dw_F \Rightarrow dw_M / dw_F = 1$. 

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unambiguously negative. In other words, thanks to the operation of equations [18] and [19], the problem of \( y > y_p \) illustrated in Figure 1 is self-correcting. Whenever the actual (BPCG equilibrium) rate of growth is greater than the potential rate of growth, the labour market will tighten, resulting in an increase in the rates of growth of female and (with a lag) male wages. These latter outcomes will have two effects. First, there will be a once-over reduction in gender wage inequality, as the temporarily faster rate of growth of female wages relative to male wages reduces \( W_R = W_M / W_F \) and thus increases the female wage share. Second, there will be a reduction in the actual rate of growth, as a result of the increase in the rates of growth of both female and male wages. This, in turn, will reduce the (unsustainable) gap between the actual and potential rates of growth.

The various processes outlined above (tightening of the labour market, falling gender wage inequality and a falling rate of growth) that unfold in response to \( y > y_p \) will continue until the gap between the actual (BPCG equilibrium) and potential rate of growth is eliminated. At this point, the condition for sustainable steady state growth in equation [17] will be realized, and the associated BPCG equilibrium growth rate – now equal to the natural rate of growth – will be a sustainable long run equilibrium growth rate. This situation is illustrated in Figure 2, where \( \Omega' \) corresponds to the rates of growth of female and male wages associated with the steady state value of \( u \), and \( y'_B \) denotes the BPCG equilibrium growth rate that now corresponds to the particular rate of growth of world income, \( \bar{y}_w \).\(^{21}\)

[FIGURE 2 GOES HERE]

\(^{21}\) In the parlance of Setterfield (2006), the resulting model is one of quasi-supply-determined growth, since \( y \) adjusts towards \( y_p \) in the process of satisfying the golden rule.
However, $\Omega$ is not the only parameter of our model that may be affected by the operation of equations [18] and [19], and the impact of these equations on gender wage equality. Hence following on from our earlier discussion of the determinants of $\beta$ in the Verdoorn Law, suppose that we write:

$$\beta = \beta(W_R), \quad \beta' < 0$$

where (as before) $W_R = W_M/W_F$ is the relative male-female wage rate. Suppose further that we begin again with the situation depicted in Figure 1, where the condition in equation [17] is not satisfied. We have already established above that with $y = y_B > \frac{\beta + n}{1 - \gamma} = y_p$, we will observe $d\equiv u(y - y_p) > 0$, as a result of which both female and male wage growth will increase (via equations [18] and [19]) resulting in a reduction in $\Omega$ and hence the BPCG equilibrium growth rate. However, because equations [18] and [19] will also reduce the male-female relative wage, $W_R$, (and hence raise the female wage share), equation [20] ensures that a second mechanism will also be at work. Specifically, by increasing $W_R$, the response of the economy to $y > y_p$ will also involve an increase in $\beta$ and hence (via equation [16]) the rate of growth that satisfies the golden rule. The gap between $y$ and $y_p$ is now being closed both by reductions in the actual (BPCG equilibrium) rate of growth, and by increases in the potential rate of growth. As a result, the condition for sustainable steady-state growth in [17] will eventually be realized at a
growth rate that lies somewhere between \( y_B \) and \( y_p = (\beta + l)/(1 - \gamma) \). This situation is depicted in Figure 3.\(^{22}\)

\[\text{FIGURE 3 GOES HERE}\]

The upshot of this extension to our analysis is that increasing gender wage equality may increase the sustainability of long run growth by reducing the actual rate of growth and by raising the potential rate of growth. As such, and taking as given the effects of equations [18] and [19] on the actual rate of growth discussed earlier, the price to be paid for sustainable growth (in terms of reductions in the actual rate of growth) is lower the stronger is the mechanism in equation [20]. As we will see below, this result may be of some significance when we come to reflect on the practical possibility of instituting equations [18] and [19] in LDRs.

5. The political economy of increasing the sustainability of growth by reducing gender wage inequality

The results above describe a reconciliation of the actual and potential rates of growth (and hence an increase in the sustainability of long run equilibrium growth) consistent with (indeed, resulting from) a decrease in gender wage inequality – specifically, a decrease in the steady state value of \( W_R = W_M / W_F \) and an accompanying increase in the steady state female wage share, \( \omega_F \). Hence although increased gender wage equality reduces the rate of growth, this is not altogether a bad thing: since \( y > y_p \)

\(^{22}\) The model may now be referred to as one of quasi-demand-determined growth, since some (but not all) of the burden of adjustment involved in reconciling the actual and potential rates of growth is born by the latter (rather than by the demand-determined actual rate of growth alone). Note that if, as we hypothesized earlier, greater gender equality raises the labor force participation rate \((l \text{ rises})\), potential output bears an even greater share of the burden of adjustment. Such an outcome would make gender equality more palatable to men, easing as it does the negative effect on aggregate demand and thus employment.
initially, a decline in the rate of growth will help to make the growth process more sustainable in the long run. Moreover, the extent to which the actual rate of growth must fall in order to reconcile \( y \) and \( y_p \) is mitigated by the positive impact of gender wage equality on the potential rate of growth. Rather than observing a simple trade off between gender equality and growth, then, we instead observe a new type of positive sum outcome, wherein increased gender equality increases the *sustainability* of the long run equilibrium growth rate. This direct relationship between gender equality and the sustainability of growth makes it easier to advocate for increased gender equality as an end in itself.

One potentially interesting policy implication of all this is as follows. In the analysis above, the coincidence of increased gender wage equality and increased sustainability of the equilibrium growth rate is crucially dependent (*inter alia*) on the operation of equations [18] and [19] (the female wage inflation Phillips curve and the male wage growth “catch up” equation). If the mechanisms in equations [18] and [19] are not sufficiently strong in actually existing economies, then the results above provide a rationale for using policy interventions to boost female wage growth ahead of male wage growth whenever the labour market is tightening. Several mechanisms might used to achieve this goal. Higher minimum wages differentially impact workers in low wage industries and these tend to employ a disproportionately large share of women. Protections that allow workers to organize would have a similar effect, especially if these rights were extended to workers in export processing zones. Unemployment insurance that extends to the types of jobs women hold would raise their reservation wage, increasing their bargaining power vis-à-vis employers. Though not exclusively under the
control of national governments, labor standards and decent work agreements would also help (Berik and Rodgers 2007).

In this way, the model developed above can be thought of as a prescriptive rather than a descriptive device: it draws attention to mechanisms that, if they did exist, would reconcile increased gender wage equality with increased sustainability of the long run growth rate – a positive sum outcome that facilitates promotion of gender equality as an end in itself. Ultimately, then, the model can be interpreted as a basis for advocating for policies that make the labour market work in conformity with equations [18] and [19], which basically describe an institutionalist-type “leader-follower” labour market, in which better organized workers lead with wage claims, and others follow the pattern established by the leading sector. The essential purpose of policy in this case would be to empower women in LDRs sufficiently to make them the wage leaders in the labour market.

But can gender inequality be reduced without creating a male backlash? This is a ponderous question. Gender norms that ratify male social dominance can inhibit progress towards gender equality if men resist the loss of authority and control that results from females’ greater control over resources. Aside from the social norms that inhibit change, men’s superior economic position enhances their bargaining power, thus enabling them to collect rents from female labor—whether from their greater access to the best paid jobs, or their ability to shift unpaid labor in the household onto women, who therefore bear the

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23 “Better Factories Cambodia” is an example of a trade-linked scheme that offered increased US market access to Cambodia in return for the government improving labor standards enforcement. The program focused on the garments and textiles industries in which, as elsewhere, workers are largely female. Berik and Rodgers (2007) find evidence that such schemes can improve labor standards adherence without hindering export growth or job growth.
greatest burden for the production of children as “public goods” (Folbre 1994a; Braunstein 2008).

That said, gradual closure of gender gaps may not be strongly conflictual due to imperfect information (the time lag in identifying shifts in average wages). Further, such shifts may be more palatable so long as closing wage gaps is not contractionary, with men losing both absolutely (as employment declines) and relatively. It may take a good deal more effort, however, to ensure that men accept the reduction in the actual rate of growth that accompanies increased sustainability of growth. This trade off between the rate of growth and the sustainability of growth, with redistribution towards women reducing the former but increasing the latter, suggests a knife’s edge of social relations. For it to be successful as a strategy, it would require males to have a long time horizon in evaluating their individual well-being. Such an attitude would be easier to cultivate in countries with sound social safety nets, reducing the degree of economic insecurity that can fuel distributional conflicts.

6. Conclusions

Despite the growing international interest in promoting gender equality, little research has been conducted into the macroeconomic feasibility of policies that would close gender wage gaps. More generally, the role of gender wage inequality in

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24 Note that this problem does not emerge in our model. In the transition towards a sustainable steady state equilibrium, the unemployment rate will continue to fall as long as actual rate of growth exceeds the potential rate, and will then become stationary. Unemployment will not therefore increase, but will instead stabilize at an indeterminate rate. This may still produce gender conflicts if the male unemployment remains very high, as it has, for example, in the Caribbean.

25 The situation described here is analogous to Bhaduri and Marglin’s (1990) conflictive stagnationism, whereby a redistribution towards wages boosts short-run macro performance but decreases the rate of growth. The question we confront is: will men be sufficiently far sighted to accept a lower but sustainable rate of growth in place of higher but unsustainable growth?
influencing macroeconomic outcomes has only recently begun to receive attention. This paper attempts to address that lacuna by developing a long-run growth model that incorporates both supply- and demand-side effects of changes in the gender wage gap. The result is a very different version of endogenous growth model, that highlights the real world problems of inequality and distributional conflict.

 Numerous economists have exclusively emphasized the supply-side benefits of greater equality—as, for example, when higher relative female wages which increase women’s bargaining power improve the quality of the next generation of workers. But these analyses do not assess the potentially negative effect of increased gender equality on the demand-side, and, in particular, on the balance of payments constraint on growth. Where women are concentrated heavily in labor-intensive export sectors, efforts to promote gender equality can harm the trade balance. This poses a serious macroeconomic constraint to greater equality. However, the model developed in this paper shows that, even so, gender equality can actually play a salutary role in promoting sustainable growth.

 While the model is developed with the structure of developing economies and gender divisions of labor in those countries in mind, we recognize that the adjustment mechanisms proposed here have not been studied previously. Nor do we fully understand the extent to which male resistance might subvert their workings. How to best attenuate male resistance to loss of economic dominance is a question that requires careful consideration and more research. Our goal here is more limited—and that is, to identify

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26 In a departure from others in this area of inquiry, Seguino (2000, 2002) emphasizes the role of gender inequality in stimulating exports, thus generating foreign exchange to import technology-intensive imports that raise productivity and stimulate long run growth.
mechanisms by which gender quality may play a positive macroeconomic role in the long run.
References


Figure 1: Violating the Golden Rule: Example of an Unsustainable BPCG Equilibrium Growth Rate

\[ p = \frac{\gamma y + y}{\Omega y B} \]
Figure 2: Narrowing the Gender Gap with Demand-Side Adjustment to a Sustainable BPCG Equilibrium Growth Rate

\[ y_B = \frac{\beta + l}{1 - \gamma} \]

\[ y = y_p \]
Figure 3: Demand- and Supply-Side Adjustments in Response to a Narrowing Gender Wage Gap

\[ y' = y_p \]

\[ y_B = \frac{(\beta' + l)}{(1 - \gamma)} \]

\[ (\beta + l)/(1 - \gamma) \]

\[ y_w \]

\[ y' = y_p \]

\[ y = y_p \]

\[ \Omega \]

\[ \Omega' \]