The macroeconomic context: gender business cycles

Chapter 2

The macroeconomic context: gender business cycles

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Introduction

The objective of this chapter is to provide a description of the wider macroeconomic context that informs our assessment of gender inequality in the labour market. Employment is one of the labour market outcomes analysed in this book. How are gender employment rates linked to the overall economy? Does this relationship change during periods of economic recession and depression? Here, we describe the relationship between employment rates and the level of production of an economy, its Gross Domestic Product (GDP), and whether this relationship differs depending on whether we are analysing the employment rates of women or those of men.

This analysis is important because it sheds light on whether business cycles, namely periods of economic boom or recession, have a differential impact on the employment rates of men and women: i.e. are business cycles gender neutral? Moreover, if a relationship between the business cycle and the gender employment rate gap does exist, what might explain it?

The gender employment rate gap is calculated as the percentage difference between male and female employment rates, relative to the male rate. It is a relative measure of the labour market position of men and women. If it decreases, it implies a relative narrowing in the labour market outcomes of men and women, and arguably greater economic equality; and vice versa when the gap rises. We focus on employment rates, as opposed, for instance, to unemployment rates, because it can be argued that employment rates generally represent a better reflection of the relative labour market performance of men and women. In fact, unemployment rates are affected by a greater tendency of women to leave and re-enter economic activity between spells of employment, and are thus not always the best way to compare labour market outcomes. This is not to say that unemployment rates matter less than employment rates when looking at gender inequality in the labour market. Indeed,

unemployment rates would be the natural focus if the research question was to understand whether men and women have different employment outcomes once they decide to work.

Figure 2.1 shows UK GDP and the gender employment rate gap for the period 1971 – 2012. GDP being an exponential series, we show it using the natural logarithm, such that the slope is the approximate quarterly growth rate (left axis). Over this period, the gender employment rate gap decreased by approximately 30 percentage points with roughly half of this narrowing attributed to a rise in the female employment rate and the other half to a fall in the male employment rate.

Figure 2.1 about here: GDP and Gender Employment rate gap, UK, 1971-2012

Source: Blue Book for GDP series, and LFS for employment rates series

From this, we might be tempted to think that the gender employment rate gap and GDP move in opposite directions. However, the long-run narrowing in the gender employment gap cannot be attributed directly to GDP growth per se. The simple graphical approach seems to show another interesting relationship: the vertical shaded segments show the periods of economic recession, formally defined as two consecutive quarters of negative real GDP growth, and these appear to coincide with temporary reductions in the employment rate gap. In fact, if we remove the trend from the employment rate gap series, this would become even clearer. Therefore, it appears that we should question: is there a consistent relationship between fluctuations in output and gender employment rate gap? Are business cycles gender neutral?

In order to answer this question, we first look more closely at the employment rates of men and women during economic recessions We then look at the relationship between changes in GDP and men's and women's employment rates more generally, and whether this

relationship has remained constant over time or differs depending on different recessions and booms: is it typical? We finally attempt to explain the potential determinants of this relationship.

Key facts about gender employment rates and recessions

Having looked at the whole 1971-2012 period, we now isolate some distinct periods of time, starting with the latest economic downturns. Figure 2.2 shows the relative outcomes in employment for working age men and women (aged 16 to 64), during the latest recession.

Figure 2.2 about here: Gender Employment rate gap UK, 16-64, 2007Q1 - 2012 Q4

Source: LFS

Figure 2.2 shows that during the recession that started in 2008, the employment rate gap decreased substantially: the male employment rate decreased by 3.5 percentage points, whereas the female employment rate decreased by only 1.2 percentage points. 2010 appears to have been a turning point in this relative trend, although the lack of a robust economic recovery since then 2008-09 economic downturn – followed by the less pronounced recession in 2011-12 - has meant that the employment rate gap has not increased as much as the increase in 2010. Therefore, it does appear that men's employment rates have been impacted more adversely overall during the latest recessions, resulting in a narrowing of the gender employment gap.

Figure 2.3 shows the gender employment rate gap during the recession of the early 1990s.

Figure 2.3 about here: **Gender Employment rate Gap, UK, 16-64, 1990 Q1 - 1994 Q4**

Source: LFS

Figure 2.3 shows, within an overall downward long-term trend, a rapid narrowing of the gender employment rate gap during the economic downturn and a subsequent bottoming out.

Although this is just a sight test, based on two specific periods of economic contraction, it certainly prompts us to ask whether we expect changes in GDP to impact on men's and women's employment outcomes to different degrees. And if so, could we demonstrate that the relationship is consistent over a longer period of time, and for changes in GDP in any period of time? Therefore, the question becomes one of understanding the way in which changes in GDP are related to changes in employment over subsequent time periods, and whether or not this is different for men and women.

A first approach to understand the basic relationship between *changes* in GDP and employment rates with respect to time is to consider the correlation, or linear dependence, between the two time series. Figure 2.4 shows that over the last forty years, between 1971 and 2012, the immediate impact of changes in GDP is more strongly correlated with changes in men's than women's employment rates.

Figure 2.4 about here: **Relationship between GDP and Employment rates, UK 1971-2012**

Source: Authors' calculations, LFS and Blue Book Data

The intersection between the two lines, one for men's and one for women's employment rate, is consistent with what we have seen for the current recession: it implies a tipping point in the relative gender employment outcomes as a result of changes in GDP. Figure 2.5 and 2.6 also show that the same general relationship persists if we consider a period including only the latest significant economic downturn (2.5) and if we exclude it (2.6).

Figures 2.5 about here: Lagged employment vs. growth, 1997-2010

Figure 2.6 about here: Lagged employment vs. growth, 1971 – 1997

Source: Authors' calculations, LFS and Blue Book

This is a relatively crude analysis, however it does suggest that men and women's employment outcomes respond differently to economic recessions. Do we therefore have a strong case to conclude that business cycles are not gender neutral?

However, before we model this relationship more rigorously, we consider whether it depends on changes to the intensive margin of labour supply: is the result above due to the fact that women are more likely than men to adjust the hours they work? If that was the case, then looking, as we have done so far, at the relative employment rates between men and women, as opposed to total hours worked, might be misleading.

Figure 2.7 charts the year on year change in average actual hours worked for men and women, showing how the reduction in hours worked by men was greater than the reduction for women. Therefore, it is not the case that the relationship between employment rates and changes in GDP we have seen above is due to women modifying hours of work (the intensive margin of labour supply) more than men.

Figure 2.7 about here: Annual Change in Average Basic Actual Hours Worked, UK, Non-SA (2008 Q1 - 2010 Q3)

Source: Authors' calculations, LFS

The relationship between GDP and employment rates in the literature

The literature on business cycles is extensive, starting with the seminal contribution by (Burns, Mitchell et al. 1946), which defined and measured business cycles. However, there is very limited empirical research on whether the relationship between labour market outcomes (excluding pay) and business cycles differ by gender. Perhaps the first direct analysis is by (Clark and Summers 1981), who looked at demographic differences in cyclical employment variation in the U.S., and found that young workers bear a disproportionate share of cyclical fluctuations: more specifically, the employment of young women was more responsive to cyclical changes than the employment of older women, and this more responsive than the

employment of older men. (Blank 1989), whilst looking at the effect of the business cycle on the distribution of income, again for the U.S., found that the relationship between changes in employment and changes in GDP was stronger for women than for men of the same ethnic background. More recently,(Queneau and Sen 2008), considered the empirical evidence in eight OECD countries, not including the UK, and found evidence of gender differences in unemployment dynamics in Canada, Germany and the US. The latest contribution in this field is from (Peiró, Belaire-Franch et al. 2012), who looked at the relationship between unemployment and business cycle in the UK and the US, finding that cyclical changes extend their effect on unemployment over several quarters, and do so in a more intense way on male than female unemployment, although there is some evidence that this relationship has become less strong over time.

Therefore, although cyclical fluctuations in economic activity affect the labour market experience of all demographic groups, the limited available evidence surveyed above suggests that this effect appears to be differential: young individuals are impacted differently from old individuals, women differently from men. Although unemployment rates of different demographic groups move together, the levels about which they fluctuate and the amplitude of cyclical fluctuations appear to differ.

Unfortunately, there is virtually no study that directly attempts to explain why business cycles are not gender neutral.(Queneau and Sen 2008) put forward some reasons as to why the dynamics of female and male unemployment rates differ. These include gender differences in job search behaviour, differences in labour force attachment, the distribution of employment by gender across industries and institutional factors such as unemployment insurance system, provision of mandatory family benefits or the extent of gender discrimination in the labour market. However they do not offer any empirical investigation. Albanesi and Sahin (2013) analyse the possible determinants of the cyclical behaviour of the gender unemployment rate

gap, and conclude that it can mostly be explained by the distribution of work by gender across industries.

Modelling and estimating the relationship between business cycles and gender employment rate gaps.

The two main variables in our model are quarterly logarithmic GDP and employment rates. In its simplest form, we could consider estimating the following relationship:

$$ER_t = \alpha + \beta(L)\Delta GDP_t + \varepsilon_t \quad (2.1)$$

$$\beta(L) = \sum_{i=0}^{n} \beta_i L^i$$

where the quarterly male or female employment rate *ER* is regressed using Ordinary Least Squares against current and n lagged values of GDP growth(ΔGDP_t) . However, we briefly describe how to carry out a more nuanced but still relatively straightforward analysis.

One major issue with estimating (2.1) directly is that neither employment rates nor GDP are stationary time series[i]. In fact, the analysis of the relationship between these macroeconomic variables over time requires the use of dynamic filters to remove the trend component from the data, and therefore focus only on the short-term periods and frequencies, or the so-called cycle components.

Box 2.1: Trends and Cycles

Several different approaches are commonly used to extract the cyclical component of a time series, including taking the difference between the values of the variable at two subsequent time periods (i.e. first differencing), linear or quadratic trends removal and, more robustly, using dynamic filters, such as the Hodrick Prescott (HP) or Band Pass (BP) filters. There is an extensive literature on time series filters, for some insights and applications into the various filters see (Cogley and Nason 1995; Hodrick and Prescott 1997; Ravn and Uhlig

2002). For our purposes, and in line with most of the business cycle literature, we apply the HP filter. The HP filter removes a smoothed trend τ_t from some given data y_t by solving: $min \sum_{t=1}^{T}(y_t - \tau_t)^2 + \gamma[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2$, where $\gamma = 1600$ is typically applied ot quarterly data.
The residual, $c_t = y_t - \tau_t$, (deviation from trend) can in the context of GDP, be referred to as the business cycle component.

By de-trending the data series using the HP filter, we obtain the cycle component, or percentage deviation from trend GDP, (dev_t) and the de-trended employment rate series. The first differences of these de-trended series can then be treated as stationary. Using first differences also corrects for the existence of high collineraity among the cyclical components in successive quarters, which assists greatly when interpreting results (i.e. the series is approximate white noise). The explanatory variable therefore becomes the percentage point change in the deviation from trend GDP. We also suggest accounting for the autoregressive time series properties of the employment rate series. Finally, there is no theoretical reason why we should limit the number of lags to a particular value of n.

Therefore, a more robust model specification can be represented as:

$$\Delta ER_t = \mu(L)\Delta dev_t + \delta(L)\varepsilon_t$$

$$\text{or,} \quad \Delta ER_t = \sum_{i=0}^{\infty} \mu_i L^i \, \Delta dev_t + \sum_{i=0}^{\infty} \delta_i L^i \, \varepsilon_t \quad (2.2)$$

We can then characterise the relationship between changes to GDP and gender employment rates as follows[ii]:

$$\frac{\partial \Delta ER_{t+i}^{j}}{\partial \Delta dev_t} = \mu_i^j \quad , \qquad s \geq 0$$

The percentage point gender gap is expressed by:

$$Gap_t = ER_t^m - ER_t^f$$

And the changes in the gap by:

$$\Delta Gap_t = \Delta ER_t^m - \Delta ER_t^f$$

Therefore, the coefficients are

$$\frac{\partial \Delta Gap_{t+i}}{\partial \Delta dev_t} = \mu_i^m - \mu_i^f \ , \qquad s \geq 0$$

The results are shown in Figure 2.8

Figure 2.8 about here: Coefficients (μ_i^j) from estimated model

The estimation of the model does confirm that the relationship between business cycles and employment rate differs by gender. There is strong evidence that economic cycles and growth in the UK are not gender neutral: GDP changes are typically associated with greater changes in male than female employment.

Gender business cycles and gender segregation

We have seen how women's employment rates vary less than men's employment rates in respect to changes in GDP. This could be due to two factors: the first is that some economic sectors might be more sensitive to cyclical shocks than others; the second is that there are gender differences in employment by economic sector. If the more volatile economic sectors also have a disproportionate number of men in employment, then changes to GDP affect men's employment rates more than women's employment rates. In this case, cyclical fluctuations to GDP result in the differences in the employment dynamics we have observed earlier on. Therefore, here we focus on whether the level of segregation between men and

women across industries could explain the relationship between employment and business cycles that we have outlined above.

Figures 2.9 and 2.10 show the cycle component of quarter on quarter growth for the manufacturing sector (Figure 2.9) and the public Administration sector (Figure 2.10), up to 15 quarters after two recessions, one that started in 1990Q3 and the latest one started in 2008Q2. The charts do indicate that UK industry sectors have different levels of volatility: for instance, the Manufacturing sector is pro-cyclical – i.e. it grows and contract alongside the economy as a whole.

Figures 2.9 about here: Growth in manufacturing sector – detrended.

Figure 2.10 about here: Growth in Public Administration sector – detrended

Sources: Authors' calculations, ONS series, Hodrick-Prescott filter.

Public Administration sector, on the other hand, is a-cyclical. This is perhaps more clearly visible in Figure 2.11, which charts the fraction of volatility/cyclicality in GDP explained by various economic sectors against the relative weight of each economic sector in the total GDP of the economy. If the former is greater than the latter, the corresponding economic sector presents a disproportionately stronger association with volatility in GDP than the one we might expect considering its relative contribution to GDP. It is indeed the case that manufacturing, but also construction, wholesale and retail trade have a disproportionately strong association with economic volatility, while public administration, education, health services have a less strong association.

Figure 2.11 about here: Volatility in growth and GDP weight by industry sector.

Source: Authors' calculation, Blue Book

Figure 2.12 presents the employment rate by gender in each of the economic sectors, an indication of gender segmentation in work in the UK. Men do tend to work in the pro-cyclical and more volatile sectors of the economy and women dominate the low volatility, a-cyclical sectors.

Figure 2.12 about here: Gender Segmentation in work in the UK, by industry sector

Source: Annual Population Survey, 2007

Conclusions

In this chapter we have presented the wider macroeconomic context within which some forms of gender inequality in the labour market could be understood. We have seen that:

- The gender employment gap narrowed at the start of the recession but hit a turning point in 2010 and began to widen;
- This pattern is common for every recession in the UK for the last 40 years;
- Business/economic cycles are not gender neutral: GDP changes are typically associated with greater changes in male than female employment;
- Some industry sectors in the UK have a disproportionately strong association with economic volatility, and others have virtually no association;
- Volatile and pro-cyclical sectors tend to be male dominated, whereas women dominate sectors which have typically been more immune to the economic cycle;
- Therefore, male and female labour employment changes differ generally because they do different jobs, and this difference is exacerbated during recession and recovery.

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[i] This means that some parameters of GDP and employment rates, such as their mean, are not constant over time. The presence of non-stationary time series makes the estimation of the relationship between the two variables potentially biased and the regression spurious, meaning that variables that appear to be significantly related are so because they are trended: if we took the trend out, the relationship would become insignificant.

[ii] It is beyond the scope of this chapter to show how to recover the parameter estimates for μ_i^j from Equation 2.2.