Economics Bulletin

Volume 34, Issue 2

The Impact of Educational Attainment and Gender on the Inflation-Unemployment Tradeoff

Sandeep Mazumder
Wake Forest University

Abstract

Recent research has examined the link between rising educational attainment and its impact on inflation, via the equilibrium rate of unemployment. Studies such as Daly et al. (2007) have found that a measure of aggregate unemployment that has been adjusted for changes in the educational structure of the U.S. performs well in the Phillips curve, and that accounting for the level of education allows for superior estimation of group-specific Phillips curves. In this paper we consider what happens when the aggregate model is applied to a broader sample of countries, including both advanced and developing economies. We find that the education-adjusted unemployment gap does little to help estimate the inflation-unemployment tradeoff for a wider range of countries. Moreover, we find little evidence of a Phillips curve over the period of 1999 to 2008 for the developing countries in our sample. We also implement a gender-adjusted unemployment gap, and find that this variable is significant, but only because labor force shares have not changed substantially during the time period tested.

I am grateful to the editor John Conley and the anonymous referee for valuable feedback. Additionally, I would like to thank the discussants and seminar participants from the Economics of Global Poverty Seminar at Calvin College, August 2013, for their helpful comments. Address: Department of Economics - Wake Forest University - Box 7505 - Winston Salem, NC 27109. Email Addresses: mazumds@wfu.edu.
Citation: Sandeep Mazumder, (2014) ''The Impact of Educational Attainment and Gender on the Inflation-Unemployment Tradeoff'', *Economics Bulletin*, Vol. 34 No. 2 pp. 651-662.
Contact: Sandeep Mazumder - mazumds@wfu.edu.
Submitted: May 16, 2013. **Published:** April 02, 2014.

1 Introduction

Labor forces around the world have changed in substantial ways over recent years. For example, we see that the average worker is older, more educated, and more likely to be female than a few decades ago. This is especially true of advanced countries like the United States, where groups that previously had little access to education now enjoy more freedom to pursue higher education. This in turn raises a key question for macroeconomic policymakers: how much have these labor market changes influenced key indicators of the aggregate economy, such as unemployment and inflation?

A vast literature exists that documents the importance of age, gender, and educational attainment on labor market outcomes. However very little research has examined the impact of these changing trends on aggregate unemployment and inflation. The main example of recent research that has been done in this area is Daly et al. (2007) who examine the impact of educational attainment on the tradeoff between inflation and unemployment (i.e. the short-run Phillips curve) in the U.S. They find a measure of aggregate unemployment that has been adjusted for changes in the age and educational structure of the labor force performs well in a conventional Phillips curve. Furthermore, when estimating group-specific Phillips curves, they find that accounting for educational attainment enhances the ability of forecasters to make predictions about future inflation rates. Therefore, there is compelling evidence that the age structure and levels of education can be important in driving inflation, at least in the U.S. If it is truly useful–in terms of forecasting future inflation–to adjust unemployment for educational attainment in the Phillips curve, then it is important to check whether this is true of other countries around the world as well.

This paper extends the analysis of Daly et al. (2007) to a wider sample of countries for the period of 1999 to 2008, including both advanced and developing countries. We find that there is little-to-no evidence that adjusting the aggregate unemployment 'gap' for educational attainment helps determine aggregate inflation rates for advanced economies. This implies that there is little usefulness in adjusting aggregate unemployment for educational achievements from the perspective of forecasting future inflation. We also implement a gender-adjusted unemployment measure and find that this variable does significantly explain what drives inflation in the most developed countries, although we attribute this finding to a lack of variation in the gap between male and female unemployment rates since 1999. In addition our results indicate that the inflation-unemployment tradeoff does not exist among the developing economies in our sample.

Extending beyond the models tested in Daly et al., we also estimate a weighted average version of the Phillips curve to explore the role of each educational level and each gender on inflation, and find that secondary and tertiary educated workers play the largest role in determining prices in advanced countries, while in developing economies workers with only primary education play much more of a substantial role than in developed economies. Our results also indicate that over our sample period, it is not possible to ascertain whether male or female workers have a bigger influence on prices.

The rest of the paper is organized as follows: section 2 provides some brief background on this topic, and the model and results are presented in section 3. Finally we conclude in section 4.

2 Background

It was Perry (1970) who most notably first acknowledged how demographic changes could have an important impact on aggregate unemployment, and research thereafter has often adjusted the aggregate unemployment rate for changes in the age and/or gender composition of the labor force (for example see Tulip, 2004). Since the Phillips curve states that inflation depends on the unemployment gap (the deviation of aggregate unemployment from the natural rate of unemployment), this in turn means that demographic changes could influence inflation, particularly through their impact on wages.

However, while a great deal of research has examined the link between changing demographic trends with labor market outcomes and aggregate unemployment rates, few investigators have taken the next step of estimating the relationship between changing labor force characteristics with aggregate inflation rates. Daly et al. (2007) is one rare example of recent research that has seriously addressed this issue.

In their paper, Daly et al. argue that there are two important demographic changes that may possibly impact inflation. First, they consider changes to labor force shares across age groups, where in the U.S. we see unemployment rates vary widely across age groups. They reason that the baby boom generation has altered the age structure of the population in the U.S., particularly in the 1960s and 1970s where unemployment rates soared, but have since subsequently declined. Shimer (1999) undertook an exhaustive investigation into the changing age structure in the U.S., where he found that the rising labor share of young workers caused aggregate unemployment to rise by nearly two percentage points from 1959 to 1980, and a decline of almost one-and-a-half percentage points since then. Second, Daly et al. make the argument that changes to the levels of educational attainment among U.S. workers may also have implications for inflation. In particular, educational attainment rose since 1970, as measured by the number of workers with a college degree, while workers without a high school diploma saw a declining labor share. Given the relatively low unemployment rate for college-educated workers, and the high rate for those without a high school diploma, Daly et al. argue that these trends may be important for aggregate unemployment, and thus also for inflation.

Daly et al. (2007) estimate both aggregate and group-specific Phillips curves for the period of 1982 to 2006 and arrive at some important conclusions.[1] They find that incorporating educational attainment into the aggregate-level model does well, although the new activity variable does not do substantially better than the conventional aggregate unemployment gap. However the authors find that accounting for educational attainment does significantly improve results when estimating the model on (wage) inflation rates for specific groups of workers. Thus Daly et al. conclude that understanding the dynamics of the Phillips curve may be improved by accounting for the role of educational attainment, alongside the role of age.

3 Theoretical Model and Results

While we find the analysis of Daly et al. (2007) to be convincing, it is extremely unclear how applicable their model is to other countries in the world. In this paper we seek to test

[1]Note that Daly et al. (2007) adjust for both educational attainment and age in their paper, but the focus is on educational attainment since that is the part that was not yet tested before their research.

whether educational attainment is important for the inflation-unemployment tradeoff among both advanced and developing countries. In addition we also examine the role of gender. While some authors, such as Perry (1970) argue that gender can be important for the aggregate unemployment rate, Daly et al. (2007) choose to ignore this issue citing the Shimer (1999) argument that female unemployment rates are largely converged to male unemployment rates after 1980. This may be true of the U.S., but it may not be true of other countries in the world. This can be seen in figure 1 which shows average male and female unemployment rates for both the advanced and developing countries. The figure clearly shows that there has not been convergence among male and female unemployment rates, at least not in the absolute sense. In other words we cannot ignore the role of gender on unemployment by the same reasoning that Daly et al. (2007) argue applies to the U.S. Finally, we also examine the role that educational attainment and gender jointly playing in shaping the unemployment rate.[2]

3.1 Phillips Curve with Adjusted Unemployment Rates

We estimate a conventional Phillips curve along the lines of Gordon (1977) where the change in inflation for country i ($\Delta\pi_{it}$) depends on the deviation of unemployment (u_{it}) from its natural rate ($\widehat{u}_{it}$):

$$\Delta\pi_{it} = \alpha_i + \gamma(u_{it} - \widehat{u}_{it}) + \epsilon_{it} \tag{1}$$

where $\Delta\pi_{it} = \pi_{it} - \pi_{it-1}$. Inflation is measured in two ways: as the quarterly annualized percentage change in the consumer price index (CPI) and the GDP deflator. For the unemployment gap, we first estimate (1) using the aggregate unemployment rate, and thereafter adjust the unemployment rate according to: education, gender, and finally both education and gender. The adjusted unemployment rates are computed as in Daly et al. (2007), where:

$$u^a_{it} = \sum_{j\in J} \omega_{j0} \times u_{jt} \tag{2}$$

where u^a_{it} is the adjusted unemployment series for a given country, j represents a particular group (such as primary-educated workers), u_{jt} represents the unemployment rate for group j in period t, and ω_{j0} is the labor force share of a group in the base period.[3] In other words, the adjusted unemployment rate is the rate of unemployment if the labor force shares of a complete set of education groups (or gender groups) had remained fixed at their base year values.

Our data split unemployment rates and labor shares into education groups by primary, secondary, and tertiary levels of education, as classified by the World Bank. In addition, our data provide unemployment rates and labor force shares for male and female workers, while also splitting these gender-specific data into education groups. All data are annual and are taken from the World Bank, where our sample period is 1999 to 2008, with 30 advanced countries and 18 developing countries.[4] Finally to compute the natural rate of unemployment we follow

[2] Due to lack of data we are not able to examine the role of age across the countries in our sample.

[3] Base year is set at 1999. Note that allowing the labor force share to vary means that this formula yields the observed unemployment rate. This adjustment procedure assumes that group-specific unemployment rates do not respond to group-specific labor shares, known as the "exogeneity" assumption.

[4] According to the World Bank's own classification of country groups. The advanced economies in our sample are: Australia, Austria, Belgium, Canada, Croatia, Cyprus, Czech Republic, Estonia, Finland, Germany, Greece,

a technique that is commonly used in the literature (for example, see Claar, 2006); namely we apply the Hodrick and Prescott (1997) (HP) filter with parameter of one hundred.[5]

The results of estimating (1) can be seen in Table 1, where estimation is conducted using (country) fixed effects with White (period) robust standard errors. First consider the advanced economies: we see strong evidence of a conventional inflation-unemployment tradeoff, since the coefficient on the aggregate unemployment gap is highly negative and significant, with a coefficient magnitude of between -0.2 to -0.3 depending on which measure of inflation is used. However, the education-adjusted unemployment gap displays no such tradeoff, where γ is close to zero in both the statistical and economic sense. In other words, the finding of Daly et al. (2007) that educational attainment is important for the inflation-unemployment tradeoff may be true for the United States, but does not apply to other advanced countries when considering this group on a wider scale.

However, there is evidence that adjusted unemployment for gender may be important, since we obtain negative and significant coefficients for γ, with similar magnitudes to that obtained with aggregate unemployment. For the advanced countries, the average fixed weights that are attached to male and female unemployment rates in the base year are 56.1 and 43.9% respectively.[6] Therefore the fact that the gender-adjusted unemployment gap is significant for advanced economies suggests that male workers are exerting a substantial impact on prices, most probably through the channel of wage negotiations.

While this result is significant at first glance, figure 2 tempers this finding somewhat. In the figure, we see that the average aggregate unemployment and gender-adjusted unemployment rates move very similarly over the period of 1999 to 2008, while the education-adjusted unemployment rate stays at roughly 7.5% throughout.[7] Since aggregate and gender-adjusted unemployment behave so similarly, and since the labor shares are fixed at their base year values, this must mean that the gap between male and female unemployment rates has stayed roughly constant over this time period. The lack of variation in the gap between male and female unemployment rates during this time period in effect leaves the gender-adjusted unemployment rate almost identical to the aggregate unemployment rate. By this same logic, we see the education- and gender-adjusted unemployment rate is very similar to the education-adjusted unemployment rate, which once again is not a significant determinant of inflation in advanced countries.

Among the developing countries in the sample, we see from figure 3 that the gender-adjusted unemployment rate was actually higher than the education-adjusted unemployment rate, but this trend reverses after 2003. We also note that unemployment begins at a higher level among

Hong Kong, Hungary, Israel, Japan, Korea, Luxembourg, Macao, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and the United States. The developing economies tested are: Argentina, Bulgaria, Chile, Colombia, Costa Rica, Cuba, Georgia, Indonesia, Lithuania, Malaysia, Mexico, Peru, Philippines, Romania, Russia, South Africa, Turkey, and Ukraine.

[5]For robustness, we also compute the natural rate of unemployment using the Beveridge and Nelson (1981) decomposition, which is a method that has received some attention recently (see Kiley, 2013). This robustness check yields findings that are largely similar, indicating that the results in this paper are not contingent on the method of computing the natural rate of unemployment. The Beveridge-Nelson unemployment gap results are not reported in this paper but are available from the author upon request.

[6]60.1 and 39.9% for the developing countries in our sample.

[7]We normalize the adjusted unemployment rates to be equal in the base year, just as is done in Daly et al. (2007).

the developing economies as compared to the advanced economies. From the regression results in Table 1 we see that there is no evidence of a Phillips curve for developing economies, be it with aggregate unemployment or one of the adjusted unemployment rates. There are two potential explanations for this finding. First, the Phillips curve may be vertical for the developing countries in our sample, at least for this time period, where no short-run tradeoff existed between inflation and unemployment. It is entirely possible that the Phillips curve tradeoff between inflation and unemployment may very well appear if the model is estimated with supply shocks, which could be shifting the Phillips curve around in the short run. Future research should examine this idea more closely by estimating the model for emerging economies while explicitly accounting for country- or region-specific supply shocks. Second, it may be possible that the Phillips curve does not lend itself well to developing economies in a cross-country analysis, but instead country-specific Phillips curves may yet appear.

In summary, our evidence on advanced economies indicates that the Daly et al. (2007) conclusion about the importance of educational attainment on the inflation-unemployment tradeoff does not apply to the most developed countries, and we find this to be also true of developing economies.

3.2 Weighted Average Phillips Curves

We also estimate another type of Phillips curve to explore the role of each educational level and each gender individually on inflation, where we employ the type of Phillips curve suggested by Llaudes (2005), who examines the weighted average of short-term and long-term unemployment where he is concerned in differentiating among the different durations of unemployment and their effects on inflation. Here we modify that concept but for educational level and gender:

$$\Delta\pi_{it} = \alpha_i + \gamma(\beta_1(u^p_{it} - \widehat{u}^p_{it}) + \beta_2(u^s_{it} - \widehat{u}^s_{it}) + \beta_3(u^t_{it} - \widehat{u}^t_{it})) + \epsilon_{it} \tag{3}$$

$$\Delta\pi_{it} = \alpha_i + \gamma(\beta_1(u^m_{it} - \widehat{u}^m_{it}) + \beta_2(u^f_{it} - \widehat{u}^f_{it})) + \epsilon_{it} \tag{4}$$

Equation (3) modifies the Llaudes idea to look at the effects of unemployment among workers with primary (u^p_{it}), secondary (u^s_{it}), and tertiary (u^t_{it}) education, while (4) does the same for gender (u^m_{it} and u^f_{it}), where the weights on educational levels and gender are constrained to sum to one. The advantage of this approach is that it allows us to individually examine the impact of each educational level and gender on inflation more exactly, while we also do not have to impose the exogeneity assumption that is required in computing the adjusted unemployment rates of Daly et al. (2007).

The results for estimating (3) can be seen in Table 2. For the advanced countries, we see that there is weak evidence of an inflation-unemployment tradeoff with CPI inflation ($\gamma < 0$), although we find that the coefficient is statistically indistinguishable from zero. Interestingly we see that the biggest weight is assigned to secondary education with CPI inflation but to tertiary education with GDP deflator inflation. This may suggest that the difference in the inflation measures may be important for determining which educational groups exert the biggest pressure on prices. For example, the GDP deflator tends to put greater weight on the price of investment goods and government spending, and it may be that college-educated workers are the ones more likely to determine these prices. Future research should examine this issue further.

For the developing economies, we again see no existence of the Phillips curve, where GDP deflator inflation actually produces a significant coefficient for γ which is counter-intuitively positive. However what is interesting is that much more weight is assigned to primary educated workers in the developing economies, as compared to the advanced ones, although the GDP deflator results show that secondary and tertiary educated workers continue to exert a significant influence in prices in these particular countries. Put in another way, workers with a primary education seem to exert no influence on prices in advanced economies, but in developing economies they play a much more substantial role.

Finally, Table 3 reports the results for estimating (4). We continue to see that γ is negative and significant for the advanced countries, just as we found in Table 1, but we now see that the regression is unable to distinguish between male and female workers. For example the CPI inflation results attaches a higher weight to male workers, while GDP deflator inflation attaches a higher weight to female workers. This likely once again reflects the lack of variation in male and female unemployment rates over the sample period. Lastly, the developing economies results show no inflation-unemployment tradeoff, and weights attached to β_1 and β_2 that are not plausible, where multicollinearity appears to produce very large standard errors.

4 Conclusion

Recent research by authors such as Daly et al. (2007) has shown that educational attainment can alter the measurement of aggregate unemployment, which in turn can have implications for inflation according to the conventional short-run Phillips curve. The literature shows that this is empirically true when investigating the United States, but this question has not been examined for other economies.

In this paper, we address this issue using data on unemployment by educational level and gender from the World Bank. We find that there is no evidence that educational attainment matters for inflation in advanced economies. In other words, it seems doubtful that inflation forecasts can be enhanced by using a Phillips curve that implements an unemployment gap that has been adjusted for educational attainment. In our results, we do find that gender seems to be important in the model, but this result is contingent on the fact that male and female unemployment rates–while different in the absolute sense–have changed little in the relative sense over the sample period tested in this paper. Furthermore, we find no evidence that the inflation-unemployment tradeoff even exists among the developing countries in our data, at least when examined from a cross-country perspective.

We also estimate a weighted average version of the Phillips curve, where the magnitudes of the coefficients for the educational attainment-specific unemployment variables reveal that workers with only primary education exert no influence on prices in advanced countries, while the evidence indicates that they exert greater influence in developing economies. This may reflect the fact that the developing countries in our sample are involved in industries such as agriculture and manufacturing as opposed to the service industry which usually requires more formal education and training.

Future research should try to re-estimate the models in this paper using wage inflation as well as price inflation, while also incorporating the importance of the unemployment rates by age groups, since data limitations prevented these questions from being addressed in this particular paper. Following a similar theme, future research may wish to focus instead on just a few countries from the sample considered in this paper that have data spanning a longer time horizon, where we may see more impact of educational attainment on the inflation-unemployment tradeoff. In addition, closer examination of the informal sector of developing economies may yet reveal that an inflation-unemployment tradeoff may exist at certain levels of these economies, which the current data set is not able to examine.

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Figure 1: Male and Female Unemployment Rates-Advanced and Developing Countries

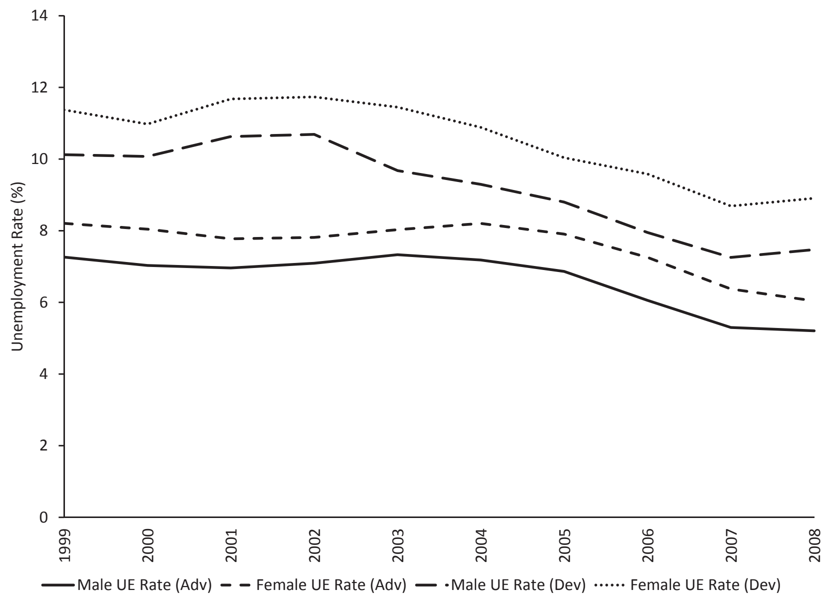

Figure 2: Adjusted Unemployment Rates-Advanced Countries

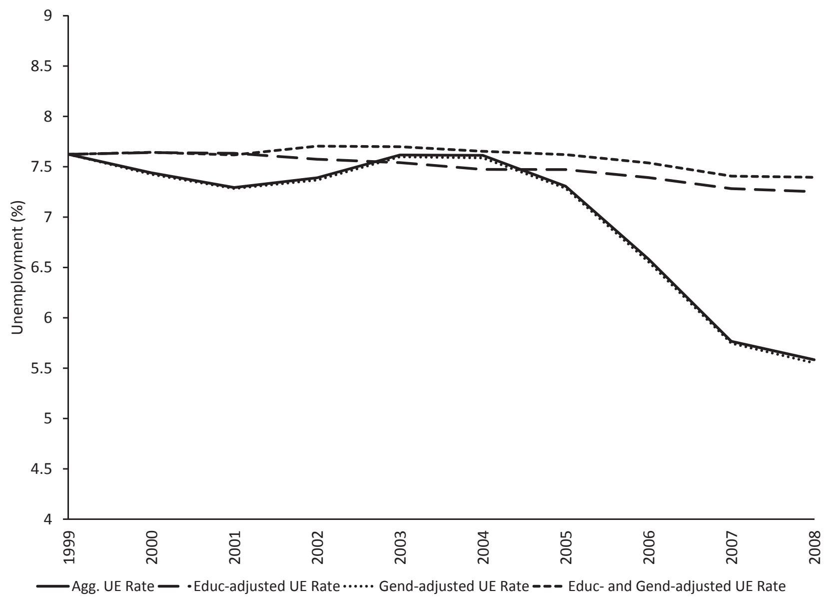

Figure 3: Adjusted Unemployment Rates-Developing Countries

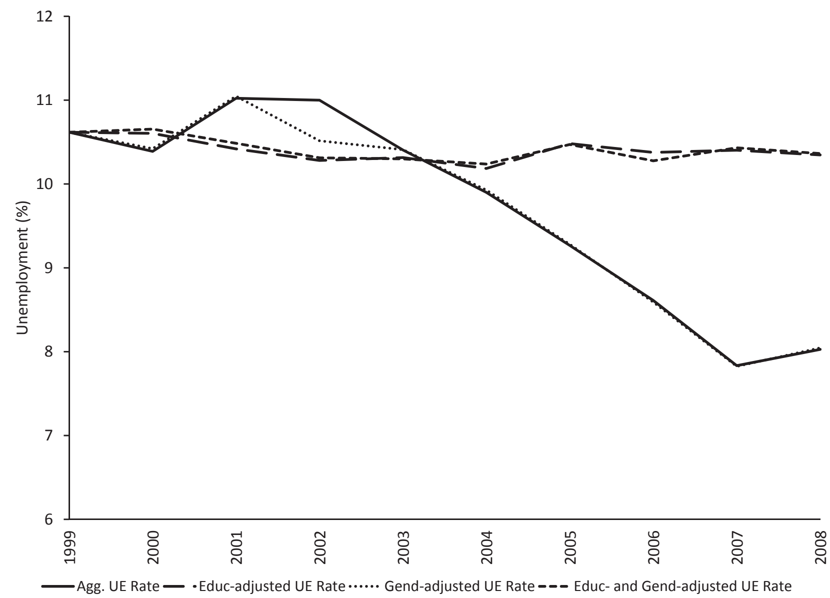

Table 1: Phillips Curve Results with Adjusted Unemployment Rates

$$\Delta\pi_{it} = \alpha_i + \gamma(u_{it} - \widehat{u}_{it}) + \epsilon_{it}$$

	Advanced Countries		*Developing Countries*	
(a) Aggregate Unemployment Gap				
	CPI Inflation	GDP Deflator Inflation	CPI Inflation	GDP Deflator Inflation
Coefficient for α	0.240	0.124	-1.048	-0.627
Standard Error	(0.002)***	(0.002)***	(0.037)***	(0.026)
Coefficient for γ	-0.319	-0.223	0.078	-0.219
Standard Error	(0.088)***	(0.090)**	(0.461)	(0.399)
$\overline{R}^2$	-0.023 [0.478]	-0.081 [0.291]	0.010 [0.321]	-0.017 [0.445]
(b) Education-adjusted Unemployment Gap				
	CPI Inflation	GDP Deflator Inflation	CPI Inflation	GDP Deflator Inflation
Coefficient for α	0.239	0.119	-1.054	-0.650
Standard Error	(0.004)***	(0.006)***	(0.011)***	(0.038)***
Coefficient for γ	-0.112	-0.009	0.077	0.060
Standard Error	(0.088)	(0.087)	(0.067)	(0.252)
$\overline{R}^2$	-0.048 [0.465]	-0.091 [0.285]	0.012 [0.322]	-0.017 [0.445]
(c) Gender-adjusted Unemployment Gap				
	CPI Inflation	GDP Deflator Inflation	CPI Inflation	GDP Deflator Inflation
Coefficient for α	0.239	0.124	-1.038	-0.649
Standard Error	(0.002)***	(0.002)***	(0.024)***	(0.022)***
Coefficient for γ	-0.323	-0.235	-0.044	0.125
Standard Error	(0.089)***	(0.089)***	(0.324)	(0.376)
$\overline{R}^2$	-0.022 [0.479]	-0.080 [0.292]	0.010 [0.321]	-0.017 [0.445]
(d) Education- and Gender-adjusted Unemployment Gap				
	CPI Inflation	GDP Deflator Inflation	CPI Inflation	GDP Deflator Inflation
Coefficient for α	0.234	0.120	-1.038	-0.640
Standard Error	(0.005)***	(0.002)***	(0.005)***	(0.007)***
Coefficient for γ	-0.023	-0.011	0.049	0.020
Standard Error	(0.024)	(0.015)	(0.077)	(0.172)
$\overline{R}^2$	-0.056 [0.461]	-0.090 [0.285]	0.012 [0.322]	-0.017 [0.445]
N	270	270	144	162

Note: $\Delta\pi_{it} = \pi_{it} - \pi_{it-1}$, where π_{it} is the quarterly annualized inflation rate, u_{it} is the unemployment rate, and $\widehat{u}_{it}$ is the natural rate of unemployment. The squared parentheses in the $\overline{R}^2$ row reports the fit of the model when the equation is estimated with lagged inflation on the right-hand side, namely $\pi_{it} = \pi_{it-1} + \alpha_i + \gamma(u_t - \widehat{u}_{it}) + \epsilon_{it}$. Fixed effects estimation is implemented with White (period) standard errors. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 2: Phillips Curve Results with Weighted Average of Education Levels

$$\Delta\pi_{it} = \alpha_i + \gamma(\beta_1(u^p_{it} - \widehat{u}^p_{it}) + \beta_2(u^s_{it} - \widehat{u}^s_{it}) + \beta_3(u^t_{it} - \widehat{u}^t_{it})) + \epsilon_{it}$$

	Advanced Countries		*Developing Countries*	
	CPI Inflation	GDP Deflator Inflation	CPI Inflation	GDP Deflator Inflation
Coefficient for α	0.239	0.126	-1.043	-0.583
Standard Error	(0.006)***	(0.004)***	(0.013)***	(0.009)***
Coefficient for γ	-0.111	0.154	-0.271	1.403
Standard Error	(0.110)	(0.106)	(0.311)	(0.318)***
Coefficient for β_1	0.030	-0.092	0.485	0.343
Standard Error	(0.157)	(0.138)	(0.379)	(0.099)***
Coefficient for β_2	1.109	-0.200	0.081	0.278
Standard Error	(0.698)	(0.544)	(0.203)	(0.095)***
Coefficient for β_3	-0.139	1.292	0.434	0.379
Standard Error	(0.811)	(0.653)*	(0.496)	(0.187)**
$\overline{R}^2$	-0.049 [0.468]	-0.079 [0.296]	-0.004 [0.317]	0.019 [0.469]
N	270	270	144	162

Note: u^p_{it}, u^s_{it} and u^t_{it} denote unemployment rates for those with primary, secondary, and tertiary levels of education respectively. The squared parentheses in the $\overline{R}^2$ row reports the fit of the model when the equation is estimated with lagged inflation on the right-hand side. Fixed effects estimation is implemented with White (period) standard errors. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 3: Phillips Curve Results with Weighted Average of Gender

$$\Delta\pi_{it} = \alpha_i + \gamma(\beta_1(u^m_{it} - \widehat{u}^m_{it}) + \beta_2(u^f_{it} - \widehat{u}^f_{it})) + \epsilon_{it}$$

	Advanced Countries		*Developing Countries*	
	CPI Inflation	GDP Deflator Inflation	CPI Inflation	GDP Deflator Inflation
Coefficient for α	0.239	0.124	-1.085	-0.622
Standard Error	(0.003)***	(0.004)***	(0.067)***	(0.065)***
Coefficient for γ	-0.323	-0.236	0.075	-0.177
Standard Error	(0.090)***	(0.087)***	(0.457)	(0.409)
Coefficient for β_1	0.462	0.584	8.053	-4.540
Standard Error	(0.504)	(1.149)	(42.444)	(14.982)
Coefficient for β_2	0.538	0.416	-7.053	5.540
Standard Error	(0.504)	(1.149)	(42.444)	(14.982)
$\overline{R}^2$	-0.027 [0.479]	-0.084 [0.292]	0.009 [0.325]	0.003 [0.463]
N	270	270	143	161

Note: u^m_{it}, and u^f_{it} denote male and female unemployment rates respectively. The squared parentheses in the $\overline{R}^2$ row reports the fit of the model when the equation is estimated with lagged inflation on the right-hand side. Fixed effects estimation is implemented with White (period) standard errors. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.