DISCUSSION PAPER SERIES

Labor Market Discrimination and the Macroeconomy

Muhammad Asali
Rusudan Gurashvili

DISCUSSION PAPER SERIES

Labor Market Discrimination and the Macroeconomy

Muhammad Asali
ISET, IZA and Columbia University

Rusudan Gurashvili
National Bank of Georgia

ABSTRACT

Labor Market Discrimination and the Macroeconomy

Using Integrated Household Survey data from Georgia, we measure the observable and discriminatory ethnic wage gap, among male and female workers, and the gender wage gap, among Georgians and non-Georgians. The gender wage discrimination is larger than the ethnic wage discrimination. In the second estimation stage, these wage discrimination estimates are used in a general-to-specific vector autoregression framework to test for the Granger causality between discrimination and growth. A general, negative, bidirectional Granger causality is found between these two variables: in the long-run, discrimination reduces economic growth, and economic growth lowers discrimination. Also, we find that higher unemployment rates are associated with increased ethnic wage discrimination–in line with the predictions of Becker's theory of discrimination.

JEL Classification:	J71, O43, J15, J16
Keywords:	labor market discrimination, transition economies, growth, granger causality

Corresponding author:
Muhammad Asali
International School of Economics at Tbilisi State University (ISET)
16 Zandukeli Street
Tbilisi
Georgia
E-mail: muhammad.asali@gmail.com

Labor Market Discrimination and the Macroeconomy

1 Introduction

Discrimination, in all its forms and in labor markets in particular, inhibits the productivity and growth of the country (Asali et al. 2018, Bandiera and Natraj 2013). This is mainly the result of the misallocation of resources, as that explains much of the variation in income and productivity across and within countries (Munshi and Rosenzweig 2016). Likewise, inasmuch as discrimination induces feedback effects, where the group discriminated against is incentivized to underinvest in growth-promoting factors like schooling, meaning that the growth and productivity of the country are indirectly harmed by the incidence of labor market discrimination (Klasen and Lamanna 2009).

The benefits from brain gain, moreover, are severely limited in a country which is perceived as highly discriminatory (e.g., against minorities or immigrants), since such country would be avoided by the highly-skilled immigrants. Furthermore, there are voices in the literature stating that increased equality and economic growth complement each other (Stiglitz 2012). Likewise, the notion that a mere measure of wealth or GDP is not a good measure for the economic performance of a country is widely acceptable now. Stiglitz (2012) postulates that sustainability and an increase in the living standards for all citizens are better indicators of the economic performance of the country. Beside the several usual measures called for by this need, like providing public goods, improved infrastructure, better rules and regulations and enforcement of these, better corporate governance, anti-discrimination and anti-trust laws and stronger workers' rights are most highlighted in this endeavor.

Studies that explored the relationship between ethnic or gender labor market discrimination and major macroeconomic variables, like growth and unemployment, are a scant few. To the extent of our knowledge, there are no studies which related to both types of discrimination simultaneously,

while exploring their relationship to the macroeconomy. This paper contributes to the literature in that it provides the first measures of labor market disparities in Georgia across ethnicities and genders. The study also relates different wage discrimination measures to macroeconomic variables like economic growth and unemployment. It studies both directions of Granger causality: from discrimination to economic growth, and from growth to labor market discrimination. It also provides methodological guidelines that can be used to facilitate research in similar areas or for answering questions similar in nature. Unemployment is used to test one of the main implications of discrimination theory, namely that discrimination tends to dissolve in tight labor markets (Becker 1957).

The paper finds large unexplained wage gaps between Georgian and non-Georgian workers (and more so among males than among females), and large unexplained wage gaps across male and female workers (and more so among Georgians than among non-Georgians). The gender wage gap is larger than the ethnic wage gap. While the ethnic wage gap among male workers averages 32% in the study period (twenty percent of which is unexplained), the gender wage gap is 64% among Georgians and 32% among non-Georgians.

The study also finds that ethnic and gender wage discrimination Granger-cause economic growth—an increase in either type of discrimination leads to a reduction in economic growth. Likewise, higher growth rates, for the most part, lead to lower labor market discrimination. It also provides evidence to support the theoretical prediction of Becker's (1957) theory of discrimination, in that higher unemployment rates are associated with an increased level of ethnic wage discrimination in the labor market.

2 Related Literature

We relate to the main two types of labor market discrimination that we explore in this study, namely gender discrimination and ethnic discrimination. Nonetheless, it is worth emphasizing that there are other forms of discrimination that might be present in the labor market like that based on religion, sexual orientation, beauty, or age, among others.[1]

2.1 Gender discrimination

Klasen et al. (2009) consider the impact of female discrimination in education and employment on economic growth. The authors consider 93 countries of the following regions: Middle East and North Africa (MENA), Latin America and the Caribbean (LAC), East Asia and the Pacific (EAP), Industrialized countries members of the OECD, South Asia (SA), Sub-Saharan Africa (SSA), and Eastern Europe and Central Asia (ECA) in 1960-2000, but focus on the highest (education/employment) gender-gap regions: MENA, SSA and SA. While they found that both the employment gender gap and the education gender gap had a negative effect on economic growth, they reported that employment gender gaps had a much stronger impact. Excluding SSA and LAC countries from the analysis, due to the 1990s economic downturn in these regions, they found equally strong negative effects of employment and education gender gaps on growth. They also concluded that the MENA's gender gap had been mainly derived from disparities in employment, while in the SA region educational disparities had been the driving force behind the observed gender gaps.

Seguino (2000) investigated the effect of the gender pay gap on economic growth in 20 semi-industrialized export-oriented countries.[2] Covering the 1975-1995 time period, the study found

---

[1] Adams (2004), for example, studied the effect of 'affirmative action' laws against age discrimination, and found them to be effective for the targeted group, although marginally at the expense of older workers outside the age range of the covered groups.

[2] The 'gender pay gap' for a country was simply defined as the difference between the overall average wage of males and the average wage of females.

that under different specifications a 0.1 increase in the gender wage gap induced on average a 0.12 percentage point increase in GDP growth. In another specification the effect amounted to 0.72 percentage points. In contrast to previous studies, Seguino (2000) found that in semi-industrialized countries in particular, gender discrimination had a positive impact on economic growth.

Schober et al. (2011) criticized the Seguino (2000) study on the grounds that the used data were not adequate for addressing the research question. They advocated the use of micro-level data for the study of gender gap effects—so to control for individual characteristics, and thus human capital differentials between the genders. In their first chosen sample, Schober et al. (2011) focus on 16 countries out of the 20 investigated by Seguino (2000)—the selection being solely based on the availability of meta information. Then they augmented the sample with countries that were qualitatively similar to the semi-industrialized countries. In their last sample, the authors pool all the countries with accessible meta information, a total of 54. For the most part, the study showed that gender pay gaps had a negative impact on growth.

Bandiera et al. (2013) criticized macro level cross section studies for several reasons. First of all, there might exist reverse causality problems between gender gaps and economic growth.[3] Differences in the level of discrimination among countries might be caused by differences in their stages of development. For example, higher economic growth of a country is related to higher technological development that decreases the comparative advantage of men in terms of having better physical strength. Thus, through this channel economic development will promote gender equality. Secondly, most of the cross-section studies omit important explanatory variables. Because of omitted variable bias, the impact of gender gaps on growth is exaggerated in most

---

[3] Unfortunately, in these studies the distinction between 'gap' and 'discrimination' is not emphasized—they use the terms interchangeably, when they are inherently different (albeit correlated).

cases. Fertility, health, savings, trade liberalization and "good institutions" are frequently omitted variables from growth regressions, but there is a need to include them. The reason for excluding them is sample size constraints. Thirdly, most of the studies assume that gender inequality affects economic growth by the same mechanisms in each country and time period, which is not a reasonable assumption. Country and time specific characteristics probably have the most significant effect on the mechanism through which discrimination effects growth. Thus, the unique coefficient that is estimated by different cross-section studies does not tell us much and their external validity is limited. Macro analyses can only catch general patterns that cannot be used for policy implications for different countries. Research on the topic, therefore, should be performed using micro-level data only.

Ferrant and Kolev (2016) studied the effect of gender discrimination in social institutions on long-term growth. Discrimination was measured using the OECD Development Centre's Social Institutions and Gender Index (SIGI). They concluded that gender discrimination in social institutions had a negative effect on the income of a country. Furthermore, the effect was stronger in lower income countries. This effect worked through lowering total factor productivity and decreasing women's activity in the labor and educational markets. The authors also estimated that, because of discrimination, society lost 12 trillion USD (about 16% of the world income at the time). They estimated that a gradual decrease of gender discrimination in social institutions would lead to an increase in the global growth rate by 0.03-0.6% by 2030.

In a theoretical study, focusing on the relationship between statistical discrimination and economic growth, Garcia-Minguez and Sanchez-Losada (2003) found that the effect of discrimination on growth was negative. Sedgley and Elmslie (2006), accounting for the different distributions of skills, found that anti-discrimination policies would increase the marginal benefit of skill

accumulation, and thus increase the return to education, leading to high-skill accumulation that would manifest in increased economic growth. Therefore, the authors conclude that policies to decrease discrimination have positive effect on growth if these are directed at the most educated groups; ambiguous effect if applied uniformly across skill groups; and negative effect if they favor the lower-skilled workers relative to their higher-skilled counterparts.

2.2 Ethnic discrimination

Kingston et al. (2013) studied the relationship between ethnic discrimination in the Irish labor market and recession. They studied two distinct years: a boom year, 2004, and a recession year, 2010. The survey was based on self-reported discrimination: workers reporting whether they had been discriminated against during the last two years or not.

The study investigated two stages of discrimination: during job search, and on the workplace. Their main finding was that immigrants were facing higher levels of discrimination at all stages, while searching for a job or on the workplace—no matter whether the country was experiencing an economic boom or recession. Besides, the study found that not all immigrants were treated similarly. In particular, Africans and EU nationals of minorities faced the most discrimination. They found no evidence to support the hypothesis that discrimination would increase after 2004, with the increased flow of immigrants and the onset of the recession. In fact, discrimination during job search decreased between 2004 and 2010 (from 12.6% to 8.6%), and on-the-job discrimination decreased from 10.6% to 9.9%. This finding convinced the authors that the Irish labor market had been experiencing statistical discrimination (which tends to wither with time, as employers get to know the workers and their abilities better).

6

Rich (2014) surveyed a large collection of field-experiment discrimination studies, and found that discrimination existed in many markets (for example, labor markets and products markets) and across a multitude of demographic groups (ethnicities, gender, race, minorities, etc…). Yet, not pointing out to any relationship between macroeconomic variables (like growth or unemployment) and discrimination, in any of the surveyed studies, shows that the evidence about this relationship is relatively scant in the literature.

Finally, in a field experiment study in Georgia, Asali et al. (2018) measured the extent of employment discrimination (at the hiring stage) both among different ethnic groups, and among the different genders. The study found a large (113%) ethnic gap in callbacks by employers, yet no evidence for gender discrimination in employment. Likewise, there was no evidence to support intra-ethnic background discrimination (for example between Azerbaijani and Armenian applicants). Incidentally, the authors also found that the number of callbacks decreased with unemployment, yet non-Georgians were more affected, yielding a positive relationship between ethnic discrimination and unemployment.

Asali et al. (2018) conjectured that the absence of evidence to support gender employment discrimination was disguising gender earnings discrimination at a later stage: while employers were not discriminating against females at the hiring stage, they would be discriminating against them in wages, once hired. The current study, finding a larger gender wage gap than ethnic wage gap, lends support to their conjecture.

3 Data and Descriptive Analysis

We build a panel of cross sections from eleven Integrated Household Survey data files, from the year 2006 to 2016. The original household survey files were provided by GeoStat, the statistical office of the republic of Georgia.[4] The data were then augmented by macro variables, like the GDP per capita, consumer price index, national interest rate, exchange rate, capital formation, the deflator, the population, and the saving rates, from the GeoStat statistics database as well as the National Bank of Georgia.[5]

Self-employed individuals were excluded from the sample. Nominal wages across the years were converted to real comparable wages, expressed in Georgian Laris (GEL) of 2010, using the consumer price index.[6] Education and marital status variables were adjusted to accommodate the changes in the definitions of these variables across the years.[7]

Table 1 summarizes the main working variables from the household survey data files, of all years. The table shows the averages (along with standard deviations and standard errors of the means) of all the variables for the whole sample, as well as for the relevant subgroups of the sample: Georgian males and females, and non-Georgian males and females.

[TABLE 1]

---

[4] See the GeoStat page for description of these data and the methodology of data collection: http://www.geostat.ge/index.php?lang=eng.

[5] See the respective pages on the web: http://pc-axis.geostat.ge/PXWeb/pxweb/en/Database/?rxid=c767738c-fe00-4f2d-af31-4ec0e7156f65, for GeoStat; and https://www.nbg.gov.ge/index.php?m=304, for the National Bank of Georgia.

[6] A 1 USD was equivalent to about 1.75 GEL in 2010.

[7] For example, marital status categories were associated with different numbers across the years; or individuals were grouped differently in terms of schooling levels (e.g., 0-6 in one year, yet 0-3 and 4-6 in the other).

The overall average monthly wage being 384 GEL, males of all ethnicities earn more than females. Likewise, Georgians of all genders earn more than their non-Georgian counterparts. In particular, the monthly wage of a Georgian male is on average 52.4% higher than that of a Georgian female, and 40.2% higher than the wage of a non-Georgian male. The ethnic gross gap among females is 21.9%, while the gender gap among non-Georgians is 32.5%.

The average age of workers is 42.9 years, with male workers almost two years younger than female workers of all ethnicities, and non-Georgian workers of both genders are one year older than their Georgian counterparts. The percentage of male workers who are married is largely higher than that of female workers (by 16 percentage points among Georgians, and by 25 percentage points among non-Georgians). Most jobs and workers are located in urban markets and in the capital city of Tbilisi in particular.[8]

About 55% of workers have some college education or higher, but that is unevenly distributed among the different ethnic groups. While the percentage is 51.7%-63.2% among Georgians (males and females), only 26.9%-38.2% of the non-Georgian (male and female) workers have some college education or higher. Georgian workers have longer working weeks, and male workers of all ethnicities have longer working weeks than female workers.

---

[8] Inside Georgia, however, the different ethnic groups are not evenly distributed. For example, most ethnic Armenian groups live in Samtskhe-Javakheti region and most ethnic Azerbaijani groups live in Kvemo-Kartil region.

4 Empirical Strategy

4.1 Wage Gaps and Discrimination

The estimation in this paper is carried out in a two-stage procedure. In the first stage we estimate the extent of wage discrimination between males and females, or between ethnic Georgians and non-Georgians. In the second stage we use the first-stage gap estimates to explore their relationship with macroeconomic variables like economic growth and unemployment.

The first-stage wage gap estimation and decomposition is carried out using the Blinder-Oaxaca decomposition technique, as follows:

$$lnw_1 - lnw_0 = \left(\bar{X}_{1,-C} - \bar{X}_{0,-C}\right)\beta^*_{-C} + [\bar{X}_1(\beta_1 - \beta^*) + \bar{X}_0(\beta^* - \beta_0)] + (\bar{C}_1 - \bar{C}_0)\beta^*_C \qquad (1)$$

$\bar{X}_j$ is a vector of the average values of all the variables in X for group j (j is 1 for Georgians in the ethnic gap analysis, or is 1 for males in the gender gap analysis; and $j = 0$ for the respective counter group—non-Georgians or females). This vector encompasses all control variables (explained later), including the categorical industrial and occupational affiliation variables. The vector $\bar{X}_{j,-C}$ excludes the industrial and occupational affiliation variables—which are represented in the vector $\bar{C}_j$.

The first term in Equation (1) is the "explained wage gap," that measures how differentials in human capital and job characteristics variables contribute to the observable wage gap. The middle term in square-brackets measures the "unexplained gap," which is generally associated with labor market discrimination. Interchangeably, in this study, we refer to this last component as the

unexplained gap, or the discriminatory gap. The last term in the equation measures the wage gap that is attributable to occupational segregation.[9]

The left-hand-side variable is the average of the log monthly wage; and the subscript (0 or 1) refers to the analyzed groups in each case: 1 represents Georgian and 0 represents non-Georgian, when we analyze the ethnic wage gap. Otherwise, 1 stands for male and 0 stands for female, when we analyze the gender wage gap. The vector of coefficients β^* refers to the "nondiscriminatory wage coefficients," which is estimated from the wage regressions as applied to the pooled sample of both groups under consideration (Oaxaca and Ransom 1994).[10]

The wage equation used for the Blinder-Oaxaca wage decompositions is of the form: $\ln w_{it} = \alpha + X_{it}\beta + \epsilon_{it}$, where $\ln w_{it}$ is the log of the real monthly wage of individual i at quarter t, where $t \in [Q1/2006, Q2/2006, \dots, Q4/2016]$, and X is a vector of control variables that includes age, age squared, educational categories, regional categories, weekly working hours categories, urban categorical variable, martial status, one-digit occupation variable, and one-digit industry variable.

The regional categories cover the main regions of Georgia: Kakheti, Tbilisi, Shida Kartli, Kvemo Kartli, Samtskhe-Javakheti, Adjara, Guria, Samegrelo-Zemo Svaneti, Imereti, Racha-Lechkhumi, Kvemo Svaneti, and Mtskheta-Mtianeti. There are 16 different industries represented, as follows: Agriculture, hunting and forestry, fishing; Mining and quarrying; Manufacturing; Production and distribution of electricity, gas and water; Construction; Wholesale and retail trade, repair of motor vehicles and personal and household goods; Hotels and restaurants; Transport and communication;

---

[9] See Asali (2010) for introduction and explanation of this term.

[10] There are other alternative ways to estimate the nondiscriminatory coefficients, and thus the unexplained wage gaps, which render different interpretations to their causes and consequences. Two of which are the 'civil rights experiment' and the 'enrichment experiment,' as suggested in Asali (2010). For ease of exposition and brevity, in this study we use only the pooled-regression method. Nevertheless, the results are not qualitatively sensitive to the method of estimation.

Financial intermediation; Real estate, renting and business activities; Public administration; Education; Health and social work; Other community, social and personal service activities; Private households employing domestic personnel; and Extra-territorial organizations and bodies.

For purposes of data comparability across the years, the educational groups of "bachelor or equivalent," "master or equivalent," and "doctor or equivalent" were merged into one category—tertiary education.

Estimation was carried out for each quarter from 2006 till 2016, separately for each of the four groups: male-Georgians, female-Georgians, male-non-Georgians, and female-non-Georgians. Overall this amounts to 44 estimates of wage gaps for each subgroup.[11]

4.2 Growth and Discrimination: The Direction of Granger Causality

We use the (unexplained, discriminatory) wage gaps estimated in the first stage, to estimate the relationships between (gender or ethnic) discrimination and the macroeconomic variables. In particular, in a Vector Autoregressive (VAR) approach, as modified to cover asymmetric General-to-Specific (GETS) models (Asali et al. 2017), we test for the existence and direction of Granger causality between economic growth and discrimination. We also estimate the short-run and the long-run effects of each variable on the other; as well as the cumulative impulse response for each of these variables.

---

[11] We have considered the issue of self-selection in the female wage equations but there seems to be no statistical evidence that self-selection has any effect on the results, thus the analysis abstracts from this type of correction. See Asali (2010) for introduction on how to correct for selectivity in Blinder-Oaxaca decompositions.

The estimated gaps are also used in a simple distributed-lag model to test the labor market tightness hypothesis of discrimination: that is, whether in tighter labor markets, when discrimination becomes more costly to the employer, the extent of discrimination diminishes.

We estimate a basic Vector Autoregression (VAR) model, in which the main variables are economic growth and discrimination. The economic growth rate is the year-to-year quarterly growth of real GDP per capita. Discrimination estimates are taken from the first step, in the following categories: Ethnic discrimination among males, ethnic discrimination among females, gender discrimination among Georgians, and gender discrimination among non-Georgians.

Using information criteria (Akaike's and Bayesian information criteria, in particular) and likelihood ratio tests we arrive at an optimal lag structure of 4 periods. We thus start by estimating the following symmetric VAR:

$$Growth_t = \sum_{i=1}^{4} \alpha_i Growth_{t-i} + \sum_{i=1}^{4} \beta_i Gap_{t-i} + Z_t \phi_{Growth} + \varepsilon_{Growth} \quad (2)$$

$$Gap_t = \sum_{i=1}^{4} \gamma_i Growth_{t-i} + \sum_{i=1}^{4} \delta_i Gap_{t-i} + Z_t \phi_{Gap} + \varepsilon_{Gap} \quad (3)$$

where Gap is one measure of the discriminatory wage disparities (for example, the unexplained ethnic wage gap among male workers, or the unexplained gender wage gap among non-Georgians). $Growth$ is the year-to-year quarterly growth rate of the real GDP per capita.

The vector Z includes a set of exogenous variables such as capital formation, saving rates, national interest rate, exchange rate, product deflator, inflation rate, the share of Tbilisian population, and a time trend. ε_{Growth} and ε_{Gap} are the error terms which are allowed to be correlated across equations.

Although the emphasis here is on Granger causality, an evidence of no serial correlation in the VAR error terms renders the main lagged variables weakly exogenous, which in turn means that their coefficients can get genuine causality interpretation (not only Granger causality). See Asali et al. (2017).

Zellner's Seemingly Unrelated Regression (SUR) is the efficient method to estimate this system of equations, utilizing the correlations among the errors across the different equations. It is also necessary when testing cross-equation coefficients. Yet in a symmetric VAR, when the two equations have the same set of variables in the right-hand side, there is no efficiency to be had by using SUR, in which case OLS estimation of each equation separately is appropriate and equally efficient; hence the latter method is used in this study.

To test whether the unexplained wage gap (discrimination) Granger causes economic growth, we test the joint significance of the β coefficients in Equation (2). To test whether economic growth Granger causes discrimination we test the joint significance of the γ coefficients in Equation (3).

The Short-Run Effect of discrimination on economic growth, due to a temporary change in discrimination during the last 4 periods, is defined as the sum of all the marginal effects in the preceding periods. That is,

Short-run effect of discrimination on growth$= \sum_{i=1}^{4} \beta_i$

Short-run effect of growth on discrimination$= \sum_{i=1}^{4} \gamma_i$

The long-run effects take into account the dynamics of the dependent variable within each equation, yet ignores the reaction of the other variable from the second equation. In the long-run, and within each equation, the marginal effects are all grouped together (i.e., no distinction between the time t and the time $t - i$, for any finite i), providing the following long-run effects:

14

Long-run effect of discrimination on growth$= \frac{\sum_{i=1}^{4} \beta_i}{1 - \sum_{i=1}^{4} \alpha_i}$

Long-run effect of growth on discrimination$= \frac{\sum_{i=1}^{4} \gamma_i}{1 - \sum_{i=1}^{4} \delta_i}$

Finally, the estimator which takes into consideration the reaction of each variable to the other in the long-run, and thus the simultaneous dynamics of both equations, is given by the Cumulative Impulse Response (CIR) which is defined as follows:[12]

Cumulative Impulse Response (CIR) (effect of discrimination on growth):

$$CIR_{gap \rightarrow growth} = \frac{\sum_{i=1}^{4} \beta_i}{(1 - \sum_{i=1}^{4} \alpha_i)(1 - \sum_{i=1}^{4} \delta_i) - \sum_{i=1}^{4} \beta_i \times \sum_{i=1}^{4} \gamma_i}$$

Cumulative Impulse Response (CIR) (effect of growth on discrimination):

$$CIR_{growth \rightarrow gap} = \frac{\sum_{i=1}^{4} \gamma_i}{(1 - \sum_{i=1}^{4} \alpha_i)(1 - \sum_{i=1}^{4} \delta_i) - \sum_{i=1}^{4} \beta_i \times \sum_{i=1}^{4} \gamma_i}$$

The symmetric VAR is then adjusted, using a General to Specific (GETS) methodology in the manner suggested by Asali et al. (2017), where the lagged main variables (growth and gap), whose coefficients' t-statistics fall below 1 in absolute value are dropped iteratively.[13] The effects are then estimated from the constrained set of coefficients of the GETS specification. Testing nonlinear combinations, and cross-equation combinations, of coefficients, like the LR effect or the CIR, necessitates the use of the delta method to estimate the standard errors necessary for statistical inference.

---

[12] This is effectively the solution of the VAR system. See Asali et al. (2017) for details.
[13] The cutoff of $|t| = 1$ is inspired by the Haitovsky rule (Haitovsky 1969).

4.3 Labor Market Tightness and Discrimination

One of the important implications of Becker's (1957) theory of discrimination is that discrimination cannot persist in tighter labor markets. When the economy flourishes, there is more demand for labor rendering irrational discriminatory acts costly to the employers. The basic model we estimate to see this relationship is of the form:

$$Gap_t = \beta_1 U_{t-1} + \beta_2 U_{t-2} + \beta_3 U_{t-3} + \beta_4 U_{t-4} + X_t \gamma + v_t \quad (4)$$

Where Gap_t is a measure of ethnic or gender discrimination (the unexplained wage gap) in quarter t. U_{t-1} stands for the unemployment rate in the previous quarter—and similarly are defined $U_{t-2}, U_{t-3},$ *and* U_{t-4}. X_t includes a constant, the inflation rate, and a time trend. The coefficients of interest here are $\beta_1, \beta_2, \beta_3,$ *and* β_4, representing the dynamic marginal effects of unemployment on the level of labor market discrimination. Their sum represents the cumulative effect of unemployment on discrimination.

The implication of Becker's theory is that these coefficients, or their sum, are positive: higher unemployment rates, thus less tight labor markets, are associated with higher wage gaps. The positive marginal or cumulative effects render tighter labor markets (i.e., lower unemployment rates) leading to more efficient employment decisions, thus driving discrimination down.

The model is estimated, in the fully-specified form and the GETS form, for the unexplained wage gaps of each type within each group: ethnic discrimination among males and females; and gender discrimination among Georgians and non-Georgians.

5 Empirical Results

5.1 Wage Gaps Decomposition and Discrimination

For each quarter from Q1/2006 to Q4/2016, we used the Blinder-Oaxaca decomposition to estimate the unexplained wage gap (interchangeably wage discrimination) between male and female workers, or between ethnic Georgian and non-Georgian workers, along with the other components (the explained gap, and the occupational segregation gap). Figure 1 shows the estimated gross (ethnic or gender) wage gap, the occupational segregation component, and the unexplained gap for each quarter, among each subgroup.
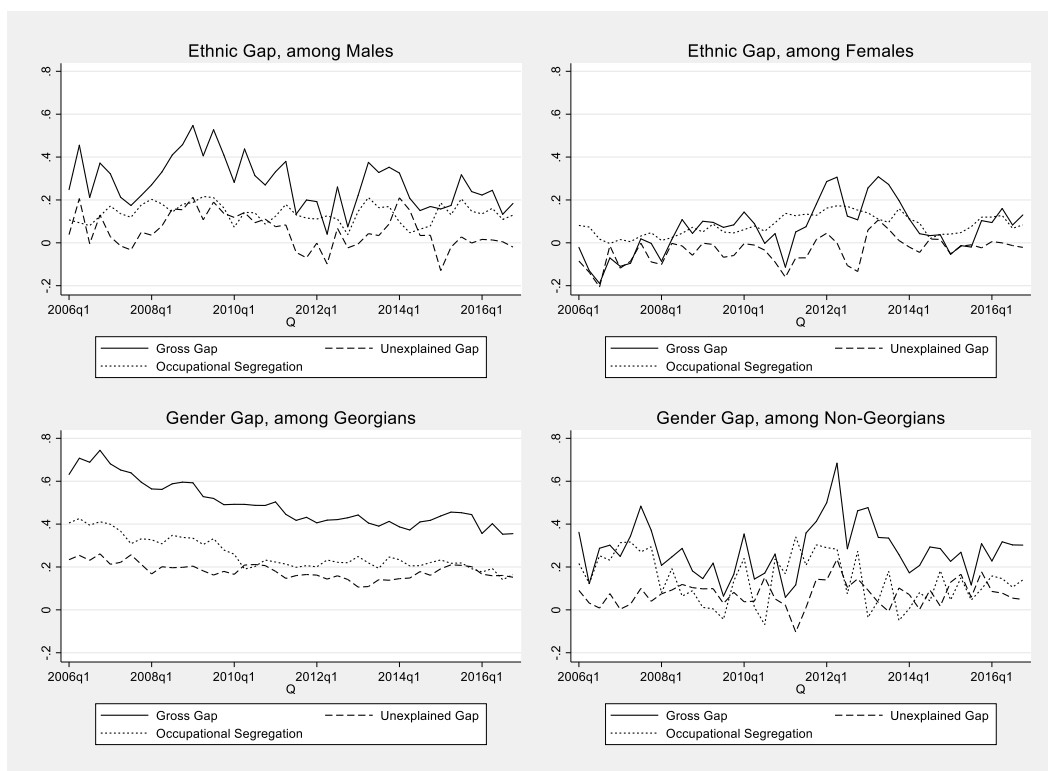
Figure 1: Ethnic and Gender Wage Gaps, by Gender and Ethnicity

The baseline wage regressions used in these Blinder-Oaxaca decompositions include occupational and industrial dummy variables, rendering the unexplained wage gap free from any occupational segregation concerns.

The above figure shows clearly that the gross gender wage gaps and potential gender discrimination are much larger than the ethnic wage gaps. Yet, at least among Georgians, the gender wage gap seems to have been declining during the last decade. Also, it is evident from the figures that the job and individual characteristics (e.g., human capital variables) cannot explain most of the observable wage gap. The major part of the gap is thus attributed to unexplained factors which may include discrimination along with occupational segregation.

The overall average of the ethnic gap among males is 32.2%; 21.2 percentage points (or two thirds) of this gap are associated with discrimination and occupational segregation. Moreover, the male-female average observable wage gap among Georgians is almost 64%, of which 56 percentage points (or 88%) are associated with occupational segregation and discrimination. The latter hovers around 20% of the overall gender wage gap among Georgians. Generally speaking, more than two thirds of the ethnic wage gap *cannot* be explained by differentials in human capital variables between the different ethnic groups; and about 80-90% of the gender wage gap cannot be explained by differentials in human capital variables between males and females. Nonetheless, the gender wage gap among Georgians has been exhibiting a downward trend in the last decade.

5.2 Discrimination and Economic Growth: Granger Causality Tests

Estimation results of the VAR system in equations 2 and 3, to explore the discrimination-growth relationship, are found in Tables 2-5. Table 2 reports the effects of the unexplained ethnic wage gap (ethnic discrimination) on economic growth (estimation of Equation 2), for the whole sample as well as separately for male and female workers. The estimation is first carried out for the fully-

specified model with 4 lags of growth and 4 lags of gaps; then, a general-to-specific approach is applied to the model yielding the more parsimonious (GETS) model.

[TABLE 2]

We focus on the coefficients of the lagged "gap" variables in this estimation. These measure the effect of the unexplained ethnic wage gaps (or simply 'discrimination') on the economic growth of the country. Individually, these coefficients are mostly negative, yet are not statistically significant except for the shorter models within each gender group.

However, the Chi-squared test for the joint significance of these coefficients is statistically significant in all the shorter models, at the 5% level for the whole sample, and at the 1% level within the sample of male or female workers. This result implies that ethnic discrimination in the labor market Granger causes economic growth. The short-run effect, the long-run effect, and the cumulative impulse response are also reported in the table. All these, in most specifications and for all the subsamples, are negative and highly statistically significant. In other words, ethnic labor market discrimination negatively affects the economic growth of the country.

Consider, for example, the GETS results for the whole sample and the gender subgroups. The long-run effect of -0.09, which is statistically significant at the 5% level, implies that a 10 percentage points increase in the ethnic discrimination lowers the economic growth by 0.9%. Among male workers this effect is 1.45% and among female workers it is almost 3%.[14] These effects are highly statistically significant (at the .01% and .8% levels).

---

[14] Notice that the long-run effects are highly non-linear transformations of the coefficients from the different regressions: sum of gap coefficients divided by (1 minus the sum of growth coefficients). Likewise, the unexplained gaps in the overall sample are not a simple weighted average of the individual (male or female) gaps. Hence, the overall effect (on the whole sample) does not have to be a weighted average of the effects in the subsamples of males and females.

The cumulative impulse response, which takes into account the whole dynamics of the system, and the reaction of each of the major variables to the other, implies that in the long-run the cumulative effect of ethnic discrimination is negative, and highly economically and statistically significant: a 10 percentage points increase in ethnic discrimination among male workers reduces economic growth by 1.3 percentage points; and by 7.3 percentage points if the discrimination surge happens among females.

Table 3, which is the result of estimating equation (3), where the ethnic wage gap is the dependent variable, shows that the Granger causality is indeed a two-way causality, but only statistically significant among male workers. That is, for male workers, higher economic growth of the country inhibits the level of ethnic discrimination in the labor market.

[TABLE 3]

Tables 4 and 5 report results for the effect of the gender wage gap on growth and vice versa. As is clear from Table 4, gender wage gaps Granger cause economic growth only among Georgian workers (the test of the joint significance of the effects is significant at the 1.2%). In the long-run, a 10 percentage points increase in the gender discrimination among Georgians lowers the economic growth by 7.5 percentage points.

[TABLE 4]

While it is evident from Table 5 that the Granger causality also goes back from economic growth to gender discrimination among Georgians: that higher growth reduces the gender discriminatory wage gap among Georgians, surprisingly enough we observe a positive and marginally significant effect of economic growth on the gender wage gap among non-Georgians.

[TABLE 5]

20

Higher growth rates seem to reduce the ethnic wage gaps among male workers but increase the gender wage gap among non-Georgians. This observation is consistent with the possibility that healthier economy benefits non-Georgian males more than proportionately, compared to Georgian males or non-Georgian females, thus reducing the ethnic gap among males, but at the same time increasing the gender wage gap among non-Georgians.

5.3 Discrimination and Labor Market Tightness

Equation 4 is estimated in Tables 6 and 7. Table 6 reports the effects of unemployment on the ethnic wage gap in the overall sample as well as among male and female workers; and Table 7 reports the effects of unemployment on the gender wage gap in the overall ample as well as among Georgian and non-Georgian workers.

[TABLE 6]

The effect of unemployment on the ethnic wage gap is jointly statistically significant for the whole sample as well as among males and among females. The sum of the coefficients of the lagged unemployment variables is positive and statistically significant in the overall sample as well as in the sample of male workers. In particular, a permanent increase of 10 percentage points in the unemployment rate increases the ethnic wage gap among male workers by 18.9 percentage points, effectively harming the non-Georgian male workers disproportionately more than their Georgian counterparts. This finding is in line with the predictions of the Becker's (1957) theory of discrimination: tighter labor markets reduce the extent of wage discrimination.

Interestingly enough, at least among Georgian workers, higher unemployment rates seem to *decrease* the extent of gender discrimination, as this appears in Table 7.

[TABLE 7]

The effect is highly statistically significant only among Georgian workers. A permanent increase of 10 percentage points in the unemployment rate reduces the extent of gender discrimination among Georgians by about 12.9 percentage points. Consistent with this finding is that the non-Georgian workers absorb most of the consequences of the downturn, yet among Georgian workers the male wages respond more than their female counterpart.

6 Conclusion

This paper explores the extensive and the intensive margins of the ethnic and gender labor market discrimination in Georgia; it also explores the relationship between the found measures of discrimination and the macroeconomy as a whole, in terms of economic growth and labor market tightness (as proxied by the unemployment rate). This relationship is studied using a general-to-specific vector autoregression approach.

The paper finds large unexplained wage gaps between Georgian and non-Georgian workers (and more so among males than among females), and large unexplained wage gaps among male and female workers (and more so among Georgians than among non-Georgians). The extent of the gender unexplained wage gap, or gender discrimination, is by orders of magnitude larger than the measured ethnic discrimination. In particular, ethnic discrimination is a major issue mostly among male workers, with a gross gap of 32%, 20 percent of which is unexplained by human capital variables or by occupational segregation. Gender discrimination, on the other hand, is a major issue in both ethnicities, Georgians and non-Georgians, but rampant among Georgians: the gross gender gap is 64% among Georgians (20% unexplained by human capital variables or occupational segregation), and 32% among non-Georgians (8% unexplained).

22

This finding lends support to the conjecture of Asali et al. (2018), who postulated that the absence of gender discrimination at the hiring stage was hiding a massive gender discrimination in wages in a later stage, once hired.

While the found large wage gaps in Georgia do not arise as a surprise, given the cultural and social background of the country—as a nationalistic and patriarchal society, the effects of discriminatory practices do not come at no cost: both the ethnic and the gender wage discrimination are found to harm the economic growth prospects of the country in the long run.

The relationship between economic growth and discrimination seems to be bidirectional: economic growth Granger causes, and reduces, discrimination, and discrimination Granger causes, and reduces, economic growth. Finally, we found evidence to support the implications of the discrimination theory of Becker (1957), in that higher unemployment rates are associated with an increased level of ethnic wage discrimination in the labor market. Gender wage discrimination does not seem to hold the same outcome—at least among Georgians. Non-Georgians seem to be the most affected by economic downturns, followed by Georgian males and then Georgian females.

References

Adams, Scott J. 2004. "Age Discrimination Legislation and the Employment of Older Workers." *Labour Economics,* 11(2): 219-241.

Asali, Muhammad. 2010. "Jewish-Arab Wage Gap: What are the Causes?" *Defence and Peace Economics*, 21(4): 367-380.

Asali, Muhammad; Abu-Qarn, Aamer; and Beenstock, Michael. 2017. "The Cycle of Violence in the Second Intifada: Causality in Nonlinear Vector Autoregressive Models." *Journal of Applied Econometrics* 32(6): 1197-1205.

Asali, Muhammad. Pignatti, Norberto. Skhirtladze, Sophiko. 2018. "Employment Discrimination in a Former Soviet Union Republic: Evidence from a Field Experiment." *Journal of Comparative Economics* 46(4): 1294-1309.

Bandiera, Oriana, and Natraj, Ashwini. 2013. "Does Gender Inequality Hinder Development and Economic Growth? Evidence and Policy Implications." *World Bank Research Observer,* 28(1): 2-21.

Becker, Gary. 1957. "The Economics of Discrimination." The University of Chicago Press: Chicago.

Ferrant, Gaelle, and Kolev, Alexandre. 2016. "Does Gender Discrimination in Social Institutions Matter for Long-term Growth? Cross-country Evidence." OECD Development Centre Working Paper 330.

Garcia-Minguez, Patricio, and Sanchez-Losada, Fernando. 2003. "Statistical Discrimination and Growth: Should We Subsidize Discriminated Against Workers?" *Economics Letters,* 79(2): 255-261.

Haitovsky, Yoel. 1969. "A note on the maximization of $\bar{R}^2$." *American Statistician*, 23(1), 20–21.

Kingston, Gillian, and McGinnity, Frances. O'Connell, Philip. 2013. "Discrimination in the Irish Labour Market: Nationality, Ethnicity and the Recession." Geary Institute Working Paper 201323.

Klasen, Stephan, and Lamanna, Francesca. 2009. "The Impact of Gender Inequality in Education and Employment on Economic Growth: New Evidence for a Panel of Countries." *Feminist Economics,* 15(3): 91-132.

Munshi, Kaivan, and Mark Rosenzweig. 2016. "Networks and Misallocation: Insurance, Migration, and the Rural-Urban Wage Gap." *American Economic Review*, 106 (1): 46-98.

Oaxaca, Ronald; and Ransom, Michael. 1994 "On Discrimination and the Decomposition of Wage Differentials." *Journal of Econometrics* (61)1: 5-21.

Rich, Judith. 2014. "What Do Field Experiments of Discrimination in Markets Tell Us? A Meta-Analysis of Studies Conducted since 2000." IZA Institute of Labor Economics Discussion Paper 8584.

Schober, Thomas, and Winter-Ebmer, Rudolf. 2011. "Gender Wage Inequality and Economic Growth: Is There Really a Puzzle?" *World Development,* 39(8): 1476-1484.

Sedgley, Norman. Elmslie, Bruce. 2006. "Discrimination and Growth: The Distribution Across Skills Matters." *Economics Letters,* 90(2): 194-199.

Seguino, Stephanie. 2000. "Gender Inequality and Economic Growth: A Cross-Country Analysis." *World Development,* 28(7): 1211-1230.

Stiglitz Joseph. 2012. *The price of inequality,* New York: W.W. Norton & Company.

Table 1: Summary Statistics of the Main Variables

		Georgian		Non-Georgian	
	All	Male	Female	Male	Female
Real Monthly Wage	383.86	468.13	307.21	333.98	252.1
	(351.96)	(388.76)	(303.05)	(265.99)	(181.4)
	[0.43]	[0.69]	[0.57]	[1.53]	[1.11]
Age	42.94	41.99	43.81	43.1	44.92
	(13.31)	(13.55)	(12.79)	(14.55)	(13.38)
	[0.02]	[0.02]	[0.02]	[0.08]	[0.08]
Married (%)	67.63	75.26	59.16	79.04	53.8
	(46.79)	(43.15)	(49.15)	(40.71)	(49.86)
	[0.06]	[0.08]	[0.09]	[0.23]	[0.31]
Lives in Tbilisi (%)	41.54	39.81	43.09	36.78	51.16
	(49.28)	(48.95)	(49.52)	(48.22)	(49.99)
	[0.06]	[0.09]	[0.09]	[0.28]	[0.31]
Urban (%)	74.09	72.04	76.78	66.26	78.67
	(43.81)	(44.88)	(42.22)	(47.28)	(40.97)
	[0.05]	[0.08]	[0.08]	[0.27]	[0.25]
Upper Secondary (%)	22.26	27.46	12.85	44.92	34.78
	(41.60)	(44.63)	(33.47)	(49.74)	(47.63)
	[0.05]	[0.08]	[0.06]	[0.29]	[0.29]
Tertiary (%)	55.01	51.74	63.24	26.93	38.2
	(49.75)	(49.97)	(48.22)	(44.36)	(48.59)
	[0.06]	[0.09]	[0.09]	[0.26]	[0.3]
Weekly working hours (%)					
21-40	42.19	39.3	47.1	29.18	38.6
	(49.39)	(48.84)	(49.92)	(45.46)	(48.68)
	[0.06]	[0.09]	[0.09]	[0.26]	[0.3]
41-60	36.04	40	31.99	35.32	33.19
	(48.01)	(48.99)	(46.64)	(47.8)	(47.09)
	[0.06]	[0.09]	[0.09]	[0.28]	[0.29]
>60	6.81	9.35	4.08	7.85	4.67
	(25.20)	(29.12)	(19.79)	(26.89)	(21.11)
	[0.03]	[0.05]	[0.04]	[0.16]	[0.13]
Observations	78,483	37,960	33,199	3,981	3,343

Notes: Samples are extracted from the Integrated Household Surveys of Georgia (GeoStat) and include workers with strictly positive earnings, from the years 2006-2016. The real monthly wages are expressed in Georgian Laris (GEL) of 2010, adjusted using the consumer price index. Main entries are the means of the respective variables. Standard deviations and standard errors of the means are enclosed in parentheses and in brackets, respectively. Means and standard errors are calculated using the personal statistical weights provided in the data.

Table 2: The effect of the unexplained *ethnic* wage gap on economic growth

	All		Male		Female	
	Full	GETS	Full	GETS	Full	GETS
$Growth_{t-1}$	0.234	0.254*	0.080		0.138	
	(0.147)	(0.131)	(0.264)		(0.216)	
$Growth_{t-2}$	0.077		0.003		0.236	0.293**
	(0.097)		(0.142)		(0.180)	(0.140)
$Growth_{t-3}$	0.037		0.011		-0.0001	
	(0.100)		(0.150)		(0.144)	
$Growth_{t-4}$	-0.480***	-0.454***	-0.570***	-0.547***	-0.538***	-0.579***
	(0.070)	(0.069)	(0.124)	(0.105)	(0.115)	(0.099)
Gap_{t-1}	-0.046	-0.048	-0.072		-0.080	-0.081
	(0.046)	(0.047)	(0.107)		(0.089)	(0.072)
Gap_{t-2}	0.057	0.061	-0.066	-0.093*	0.049	
	(0.042)	(0.039)	(0.053)	(0.047)	(0.092)	
Gap_{t-3}	-0.044	-0.054	-0.110	-0.132***	-0.015	
	(0.035)	(0.033)	(0.072)	(0.047)	(0.055)	
Gap_{t-4}	-0.071	-0.068	-0.033		-0.261*	-0.300***
	(0.053)	(0.050)	(0.060)		(0.130)	(0.093)
Male	0.010	0.010				
	(0.008)	(0.008)				
Year 2008	-0.059**	-0.057**	-0.071	-0.082***	-0.067*	-0.077***
	(0.025)	(0.024)	(0.045)	(0.022)	(0.035)	(0.018)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.341**	0.345**	0.331	0.470**	0.496*	0.600***
	(0.160)	(0.148)	(0.265)	(0.224)	(0.256)	(0.181)
Observations	80	80	40	40	40	40
Adjusted R^2	0.791	0.796	0.751	0.784	0.800	0.824
χ^2, joint sig. of Gap	6.670	9.418**	4.989	12.124***	9.051*	10.520 ***
coefficients (pv)	(.154)	(.050)	(.288)	(.002)	(.060)	(.005)
SR Effect	-0.105*	-0.108**	-0.281*	-0.224***	-0.306	-0.381**
(pv)	(0.061)	(0.042)	(0.075)	(0.002)	(0.178)	(.012)
LR Effect	-0.092**	-0.090**	-0.191***	-0.145***	-0.263	-0.297***
(pv)	(0.036)	(0.025)	(0.008)	(0.000)	(0.145)	(.008)
CIR	-0.160**	-0.171**	-0.178**	-0.126***	-0.138*	-0.730***
(pv)	(0.038)	(0.035)	(0.043)	(0.000)	(0.055)	(0.001)

Notes: The dependent variable is the year-to-year quarterly GDP per capita growth rate in the current (*t*) quarter, $Growth_t$. Data are quarterly. Other controls include a time trend, capital formation, saving rate, national interest rate, exchange rate, product deflator, inflation rate, and the share of Tbilisian population in the total population. SR Effect is the short-run effect, LR Effect is the long-run effect, and CIR is the cumulative impulse response. "Full" refers to the fully specified dynamic model (with symmetric four lags of Growth and four lags of Gap). "GETS" refers to the "General-to-Specific" model, where each lagged variable with a t-statistics (in absolute value) below 1 is dropped iteratively. See text for details. Robust standard errors in parentheses.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 3: The effect of economic growth on the unexplained *ethnic* wage gap

	All		Male		Female	
	Full	GETS	Full	GETS	Full	GETS
$Growth_{t-1}$	0.272		-0.221		0.261	
	(0.359)		(0.472)		(0.341)	
$Growth_{t-2}$	-0.523	-0.422	-0.733	-0.729*	-0.181	
	(0.335)	(0.314)	(0.444)	(0.360)	(0.286)	
$Growth_{t-3}$	0.322		-0.217		0.108	
	(0.296)		(0.440)		(0.269)	
$Growth_{t-4}$	-0.132		-0.486*	-0.576**	-0.162	
	(0.230)		(0.265)	(0.250)	(0.194)	
Gap_{t-1}	0.475***	0.434***	0.043		0.136	
	(0.118)	(0.101)	(0.213)		(0.189)	
Gap_{t-2}	-0.034		0.100		-0.576***	-0.542***
	(0.130)		(0.168)		(0.182)	(0.162)
Gap_{t-3}	0.020		-0.143		-0.057	
	(0.106)		(0.161)		(0.141)	
Gap_{t-4}	-0.044		-0.390**	-0.345**	-0.398***	-0.425***
	(0.112)		(0.166)	(0.133)	(0.138)	(0.125)
Male	0.045**	0.043***				
	(0.019)	(0.014)				
Year 2008	0.062	0.041	0.038	0.066	0.087*	0.063**
	(0.043)	(0.031)	(0.064)	(0.049)	(0.044)	(0.027)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.337	0.670	-0.027	-0.057	0.147	0.300
	(0.639)	(0.509)	(0.826)	(0.749)	(0.573)	(0.415)
Observations	80	80	40	40	40	40
Adjusted R^2	0.455	0.488	0.531	0.595	0.430	0.504
χ^2, joint sig. of $Growth$ coefficients (pv)	5.782	1.811	9.151*	10.787***	2.870	-
	(0.216)	(0.178)	(.057)	(0.005)	(0.580)	
SR Effect (pv)	-0.061	-0.422	-1.656**	-1.305***	0.027	-
	(0.915	(0.183)	(0.038)	(0.004)	(0.964)	
LR Effect (pv)	-0.105	-0.747 (0.211)	-1.192***	-0.970***	0.014	-
	(0.914)		(0.010)	(0.001)	(0.964)	
CIR (pv)	-0.094	-0.667 (0.209)	-1.045*	-0.730***	0.012	-
	(0.903)		(0.057)	(0.001)	(0.952)	

Notes: The dependent variable is the unexplained ethnic wage gap in quarter *t*, Gap_t. Data are quarterly. Other controls include a time trend, capital formation, saving rate, national interest rate, exchange rate, product deflator, inflation rate, and the share of Tbilisian population in the total population. SR Effect is the short-run effect, LR Effect is the long run effect, and CIR is the cumulative impulse response. "Full" refers to the fully specified dynamic model (with symmetric four lags of Growth and four lags of Gap). "GETS" refers to the "General-to-Specific" model, where each lagged variable with a t-statistics below 1 is dropped iteratively. See text for details. Robust standard errors in parentheses.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 4: The effect of the unexplained *gender* wage gap on economic growth

	All		Georgian		Non-Georgian	
	Full	GETS	Full	GETS	Full	GETS
$Growth_{t-1}$	0.306**	0.302**	0.266	0.277*	0.315	0.290
	(0.138)	(0.137)	(0.221)	(0.161)	(0.229)	(0.191)
$Growth_{t-2}$	0.094	0.085	-0.027		0.106	
	(0.085)	(0.082)	(0.212)		(0.148)	
$Growth_{t-3}$	0.112	0.128	0.003		0.094	
	(0.102)	(0.091)	(0.191)		(0.177)	
$Growth_{t-4}$	-0.481***	-0.477***	-0.283***	-0.313***	-0.496***	-0.473***
	(0.066)	(0.065)	(0.075)	(0.079)	(0.116)	(0.112)
Gap_{t-1}	-0.085	-0.073	-0.602**	-0.581***	-0.070	
	(0.055)	(0.049)	(0.259)	(0.206)	(0.079)	
Gap_{t-2}	0.005		0.484	0.509	-0.025	
	(0.055)		(0.309)	(0.300)	(0.071)	
Gap_{t-3}	0.043		-0.746**	-0.700**	0.089	0.100
	(0.066)		(0.335)	(0.281)	(0.102)	(0.081)
Gap_{t-4}	-0.003		-0.194		0.010	
	(0.058)		(0.349)		(0.052)	
Georgian	0.004	0.007				
	(0.010)	(0.007)				
Year 2008	-0.052**	-0.052**	-0.084*	-0.080**	-0.050	-0.054
	(0.025)	(0.025)	(0.042)	(0.035)	(0.042)	(0.037)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.333*	0.367**	1.384	1.093*	0.294	0.366
	(0.177)	(0.165)	(0.834)	(0.569)	(0.270)	(0.243)
Observations	80	80	40	40	40	40
Adjusted R^2	0.777	0.786	0.801	0.819	0.708	0.749
χ^2, joint sig. of *Gap* coefficients (pv)	2.547 (0.636)	2.175 (0.140)	10.967** (0.027)	10.897** (0.012)	2.117 (0.714)	1.516 (0.218)
SR Effect (pv)	-0.040	-0.073	-1.059	-0.773	0.005	0.100
	(0.593)	(0.145)	(0.149)	(0.102)	(0.974)	(0.229)
LR Effect (pv)	-0.042	-0.076	-1.017*	-0.746*	0.005	0.085
	(0.598)	(0.169)	(0.073)	(0.064)	(0.974)	(0.152)
CIR (pv)	-0.058	-0.102	-2.158	-1.757	0.003	0.060
	(0.564)	(0.182)	(0.342)	(0.184)	(0.965)	(0.116)

Notes: See notes of Table 2.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 5: The effect of growth on the unexplained *gender* wage gap

	All		Georgian		Non-Georgian	
	Full	GETS	Full	GETS	Full	GETS
$Growth_{t-1}$	0.466**	0.451**	0.147	0.136	0.970**	0.821**
	(0.225)	(0.219)	(0.124)	(0.117)	(0.421)	(0.370)
$Growth_{t-2}$	-0.362**	-0.373**	-0.309**	-0.299**	-0.206	
	(0.171)	(0.166)	(0.147)	(0.112)	(0.291)	
$Growth_{t-3}$	0.015		0.116		0.264	
	(0.176)		(0.140)		(0.317)	
$Growth_{t-4}$	0.008		-0.045		0.147	
	(0.149)		(0.126)		(0.264)	
Gap_{t-1}	0.282*	0.297**	0.468*	0.453*	-0.025	
	(0.149)	(0.134)	(0.257)	(0.223)	(0.160)	
Gap_{t-2}	0.172	0.193	-0.055		-0.023	
	(0.166)	(0.153)	(0.229)		(0.145)	
Gap_{t-3}	0.074		0.018		-0.097	
	(0.157)		(0.224)		(0.164)	
Gap_{t-4}	-0.247*	-0.227*	0.004		-0.499***	-0.470***
	(0.144)	(0.130)	(0.180)		(0.165)	(0.144)
Gerogian	0.072***	0.074***			0.970**	0.821**
	(0.020)	(0.019)			(0.421)	(0.370)
Year 2008	0.066**	0.065**	0.031	0.031*	0.131**	0.118**
	(0.032)	(0.031)	(0.020)	(0.017)	(0.061)	(0.052)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-0.596	-0.516	-0.259	-0.228	-1.081	-0.862
	(0.436)	(0.377)	(0.403)	(0.201)	(0.818)	(0.701)
Observations	80	80	40	40	40	40
Adjusted R^2	0.600	0.616	0.641	0.698	0.220	0.354
χ^2, joint sig. of *Growth* coefficients (pv)	6.877	7.262**	5.732	7.866**	6.610	4.931**
	(0.143)	(0.026)	(0.220)	(0.020)	(0.158)	(0.026)
SR Effect (pv)	0.127	0.078	-0.092	-0.163	1.176*	0.821**
	(0.676)	(0.742)	(0.659)	(0.292)	(0.068)	(0.035)
LR Effect (pv)	0.177	0.105	-0.162	-0.299	0.715**	0.558**
	(0.667)	(0.739)	(0.720)	(0.407)	(0.025)	(0.034)
CIR	0.181	0.109	-0.187	-0.371	0.732**	0.496**
(pv)	(0.627)	(0.709)	(0.687)	(0.436)	(0.015)	(0.021)

Notes: See notes of Table 3.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 6: The effect of unemployment on the unexplained *ethnic* wage gap

	All		Male		Female	
	Full	GETS	Full	GETS	Full	GETS
$Unemployment_{t-1}$	0.405		-1.094		1.904*	1.815**
	(0.978)		(1.301)		(0.980)	(0.882)
$Unemployment_{t-2}$	0.748	1.116**	1.594	1.889**	-0.099	
	(1.043)	(0.553)	(1.627)	(0.776)	(1.152)	
$Unemployment_{t-3}$	-0.400		0.317		-1.118	-1.233
	(0.978)		(1.362)		(1.184)	(0.913)
$Unemployment_{t-4}$	0.516		1.175		-0.143	
	(0.908)		(1.321)		(0.797)	
Male	0.091***	0.091***				
	(0.015)	(0.015)				
Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-0.240*	-0.212*	-0.188	-0.198	-0.201	-0.207
	(0.140)	(0.124)	(0.203)	(0.183)	(0.130)	(0.126)
Observations	88	88	44	44	44	44
Adjusted R^2	0.279	0.300	0.120	0.160	0.325	0.359
χ^2, joint sig. of $Unemployment$ coefficients (pv)	5.30 (0.258)	4.07** (0.044)	10.35** (0.035)	5.92** (0.015)	4.49 (0.343)	4.53* (0.10)
Sum of unemployment coefficients (pv)	1.268** (0.039)	1.116** (0.047)	1.991** (0.024)	1.889** (0.020)	0.544 (0.343)	0.582 (0.299)

Notes: The dependent variable is the unexplained ethnic wage gap from the quarterly Oaxaca decomposition. Additional variables included are inflation and a time trend. "Full" refers to the fully-specified model with 4 lags of unemployment; while "GETS" refers to the General-to-Specific Model, where lagged unemployment with a t-statistic below 1 (in absolute value) is removed. See text for details. Robust standard errors in parentheses.
* Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Table 7: The effect of unemployment on the unexplained *gender* wage gap

	All		Georgian		Non-Georgian	
	Full	GETS	Full	GETS	Full	GETS
$Unemployment_{t-1}$	0.158		-0.795*	-0.770**	1.110	
	(0.852)		(0.455)	(0.312)	(1.376)	
$Unemployment_{t-2}$	-1.277**	-1.221**	-0.297		-2.257**	-2.031**
	(0.550)	(0.501)	(0.356)		(0.916)	(0.805)
$Unemployment_{t-3}$	1.031	1.079*	0.384		1.678*	1.813**
	(0.671)	(0.601)	(0.469)		(0.962)	(0.696)
$Unemployment_{t-4}$	-0.621	-0.590	-0.579	-0.521	-0.664	
	(0.584)	(0.565)	(0.385)	(0.328)	(0.872)	
Georgian	0.108***	0.108***				
	(0.010)	(0.010)				
Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.259**	0.266***	0.491***	0.490***	0.135	0.173
	(0.106)	(0.093)	(0.056)	(0.055)	(0.172)	(0.131)
Observations	88	88	44	44	44	44
Adjusted R^2	0.564	0.569	0.629	0.639	0.138	0.153
χ^2, joint sig. of *Unemployment* coefficients (pv)	8.595*	8.230**	24.395***	23.799***	8.234*	7.879**
	(0.072)	(0.041)	(0.000)	(0.000)	(0.083)	(0.019)
Sum of unemployment coefficients (pv)	-0.710	-0.732*	-1.287***	-1.291***	-0.132	-0.218
	(0.128)	(0.086)	(0.000)	(0.000)	(0.862)	(0.726)

Notes: The dependent variable is the unexplained gender wage gap from the quarterly Oaxaca decomposition. Additional variables included are inflation and a time trend. "Full" refers to the fully-specified model with 4 lags of unemployment; while "GETS" refers to the General-to-Specific Model, where lagged unemployment with a t-statistic below 1 (in absolute value) is removed. See text for details. Robust standard errors in parentheses.
* Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.