

Youth Bulges and Youth Unemployment in Developing Countries

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Abstract

The transition from age structures dominated by children to age structures concentrated in working ages may have mixed economic consequences. The “demographic dividend” may be an important contributor to economic growth. But the path to the demographic dividend must pass through the “youth bulge,” with increases in the proportion of younger workers potentially increasing youth unemployment and social unrest. We analyze the economics and demography of the youth bulge –how youth demography is changing and how it affects youth unemployment – using data for 154 countries. We show that the simple relationship between youth bulges and youth unemployment across countries and within countries over time is very weak. Estimating regressions including year fixed effects and country fixed effects, however, we find a strong positive relationship between the youth share of the working-age population and youth unemployment. This suggests that the youth bulge may be an important factor in youth unemployment.

Introduction

The changes in age structure that have accompanied the dramatic demographic changes of the last fifty years have a number of economic implications. One of the most important demographic changes is the shift toward an older age structure as a result of rapid declines in fertility in most developing countries. Discussions of the economic consequences of this population aging are not entirely consistent. On the one hand, the shift toward an older age structure has been identified as a “demographic dividend,” with a concentration of population in the working ages potentially contributing to faster economic growth (Bloom and Williamson 1998, Bloom et al. 2000, Lee and Mason 2011). On the other hand, the increasing share of young workers as a share of the working-age population, another dimension of the same demographic shift, has been cited as potentially contributing to youth unemployment and social unrest (Urdal 2006, Assaad and Levison 2013). T

The links between youth demography and youth unemployment are worthy of analysis, given the importance of youth unemployment as a policy issue throughout the world. The ILO’s 2013 analysis of youth employment trends estimated a global youth unemployment rate of 12.6%, with an estimated 73 million young people unemployed (ILO 2013a). Youth unemployment tends to be substantially higher than adult unemployment in all countries. The ratio of youth unemployment to overall adult unemployment is estimated at 2.7, similar to the ratio in recent years (ILO 2013a). Many discussions of youth unemployment talk about the demography of youth populations. The rapid population growth experienced by many developing countries in the 1960s and 1970s produced very young populations (Lee 2003, Lam and Marteleto 2008, Lam 2011). Many developing countries are currently experiencing a peak in their youth populations (Assaad and Levison 2013). It is important to consider the potential impact of large and growing youth populations on youth unemployment and other labor market outcomes.

This paper explores the demography and economics of the “youth bulge,” with particular focus on the links between youth bulges and youth unemployment. We begin by reviewing some of the previous research on cohort size and labor market outcomes, most of which has been done in high-income countries. We then provide an overview of the demography of youth populations. In order to understand the economics of changes in youth demography, it is important to understand the forces that have produced today’s large youth cohorts. We look at trends in youth demography for major regions and countries, and discuss how these trends can be related to alternative definitions of the youth bulge. We then discuss what dimensions of youth demography are likely to be important from the perspective of the youth labor market. We then look empirically at the relationship between youth unemployment and the most widely used measure of

the youth bulge – the proportion of 15-24 year-olds in the working-age population. As we will see, the empirical relationship is quite weak when we compare countries in the cross-section. Youth demography *per se* explains very little of the large differences across countries in youth unemployment rates. Youth demography also cannot explain recent trends in youth unemployment within countries. The overall trend has been for unemployment to increase at the same time that the youth share of the working-age population has been declining in most countries. When we estimate regressions that include year fixed effects and country fixed effects, however, we estimate a relatively strong positive relationship between the youth share of the working-age population and the youth unemployment rate.

Previous Research

The “youth bulge” has often been cited as a factor affecting political unrest (Cincotta 2005, Urdal 2006). Urdal (2006), for example, finds that countries with relatively large youth populations are more likely to experience domestic armed conflict and terrorism. The youth bulge has frequently been mentioned in discussions of the “Arab Spring” (LaGraffe 2012). One of the mechanisms frequently mentioned for a link between the youth bulge and political unrest is that large youth cohorts may contribute to high youth unemployment. Direct evidence on a link between the relative size of the youth population and youth unemployment is quite limited, however, especially in developing countries.

Studies on the relationship between cohort size and labor market outcomes in high-income countries have often found that larger cohorts experience worse labor market outcomes. A large literature focused on the early labor market experience of the large baby boom cohorts that entered the labor market in the 1960s and 1970s in North America and Europe (e.g. Welch 1979, Berger 1985, Bloom et al. 1987, Zimmermann 1991). The broad consensus of these studies was that larger cohort size was associated with some combination of lower entry-level wages and higher unemployment relative to older workers, with differences across countries in the extent to which wages or unemployment showed the largest effects of cohort size.

Korenman and Neumark (2000) used data for 15 OECD countries from 1970-94 to combine variation across countries with variation across time to look at the impact of “cohort crowding” on youth labor markets. Their estimates suggest that a higher youth share of the working-age population leads to higher youth unemployment relative to adult unemployment. Shimer (2001), using state-level data for the United States, found the surprising result that an increase in the youth share of the working-age population reduces both the youth unemployment rate and the prime-age adult unemployment rate. Drawing on predictions from a search model of the labor

market, he attributed this result to the fact that high fractions of young people in the labor force lead to increased labor market flexibility.

There has been relatively little research analyzing the impact of cohort size on labor market outcomes in developing countries. Behrman and Birdsall (1988) found that being in a large cohort had negative effects on labor market outcomes of unskilled men in Brazil. Lam (2006) and Assaad and Levison (2013) showed that the youth proportion of the working-age population has declined in many developing countries, the result of rapid fertility declines. Fares et al. (2006) analyzed data for 93 countries and found little evidence that larger youth cohorts had worse labor market outcomes. This paper explores these issues in greater detail, using more recent data for a larger set of countries.

Data and definitions

Our demographic estimates are based on estimates and projections in the U.N.'s *World Population Prospects: 2010 Revision* (United Nations Population Division 2011). The youth unemployment data are taken from the International Labour Organization's Key Indicators of Labour Markets (KILM) online database (ILO 2013b). Coverage of the unemployment data varies substantially across countries. We have unemployment data for 42 more developed countries and 112 less developed countries. We also draw on aggregate economic indicators from the Penn World Tables 7.1 (Heston, Summers and Aten 2012). We use age 15-24 as the definition of the youth labor force age, following most international literature.

Measures of the youth bulge

Figure 1 shows three different measures of the youth labor force for five countries – Brazil, Egypt, India, Indonesia, and Nigeria. The left panels show the absolute size of the 15-24 age group. The middle panels show the growth rate of this group, while the right panels show the 15-24 age group as a proportion of the working-age population (15-64).

As seen in the left panel of Figure 1, the population aged 15-24 recently hit a peak in Brazil and Indonesia, a pattern that is typical of many countries that have already experienced rapid fertility decline (World Bank 2006, Lam 2006). This is one sense in which there is a “youth bulge” – the absolute number of young people is at a peak and starting to go down in many countries. India has not quite hit this peak, but it is close to a peak and is projected to have very low growth of the youth population in the next 20 years.

From an economic perspective the growth rate of the youth labor force is probably more important than the absolute size, since it is rapid entry of young workers that is most likely to put pressure on the labor market. Looking at the middle panels in Figure 1, Brazil, Egypt, India, and

Indonesia all have much slower growth of the youth labor force today (close to zero) than they did in the 1970s, when the youth labor force grew at over 4% per year.

As seen in the right column of Figure 1, the population aged 15-24 as a proportion of the working-age population (15-64) has also been falling in all five of the countries shown. In Brazil, India, Indonesia, and Egypt, the proportion has fallen from around 35% in the 1970s to around 25% today. Egypt, where the youth bulge has been linked to unemployment and political unrest, looks similar to the Asian and Latin American examples, with roughly zero growth of the youth labor force after 2005 and with steady declines in youth's share of the working-age population since the 1970s. In many ways it is hard to see evidence of a current youth bulge in the first four countries in Figure 1. While the youth populations are large, they were growing much faster and were a larger share of the labor force (and population) 30-40 years ago. Most other Latin American and Asian countries look quite similar to these four countries (Lam, 2006).

Sub-Saharan Africa, represented in Figure 1 by Nigeria, looks much different than the rest of the world. While the other countries in Figure 1 will have little or no growth in the youth labor force in coming decades, Nigeria's youth labor force will grow from 35 million in 2015 to 63 million in 2040. The growth rate has fallen from its 1995 peak of 3.4%, but will stay around 2% until 2030. The youth share of the working-age population is falling, but at a much slower rate than in the other countries. Youth will still be above 1/3 of the labor force in 2040.

It is important to note that neither the growth rate of the youth labor force nor the youth share of the working-age population that we see in Nigeria are out of the ordinary. Similarly high rates can be seen in the other four countries in Figure 4 in the 1970s and 1980s. We would find similar patterns if we looked at a wide range of other countries in the world. The unusual thing about the African case is that these rates show very little decline. While they have dropped from their peak levels, they are still very high and are projected to remain high for the next several decades. This is because of the slow pace of fertility decline in Africa (Bongaarts 2008).

Figure 2 shows the youth proportion of the working-age population for all countries with a projected population exceeding 40 million in 2015. Looking at the youth ratios in 2015, the range across countries is very large. The highest ratio among countries with population over 40 million is the Democratic Republic of the Congo, where almost 40% of the working-age population will be 15-24. At the other extreme, the lowest ratio in 2015 among countries with over 40 million population is Spain, where youth will be less than 15% of the working-age population.

Comparing the youth ratios for 1975 and 2015 in Figure 2, we see that many developing countries have experienced large declines. Vietnam, for example, went from having one of the highest youth ratios in the world in 1975 – 38% -- to the relatively low ratio of 24% in 2015.

Brazil, China, Indonesia, and Thailand had similar large declines, reflecting the rapid declines in fertility in these countries in the 1970s and 1980s (Lam and Leibbrandt 2013). In high-income, low-fertility countries such as Spain, Russia, Italy, Germany, and Japan, youth are only around 15% of the working-age population, with large declines in the youth ratio between 1975 and 2015.

A number of sub-Saharan African countries have had slow declines in fertility (Bongaarts 2008). These continuing high fertility rates create very young age structures, and youth continue to be a very high proportion of the working-age population. In Nigeria, Tanzania, Ethiopia, and Democratic Republic of Congo, the youth ratio was already at a high level of around 35% in 1975, and has increased since then.

Figure 3 shows the annual growth rate of the youth population in 1975 and 2015 for the same set of countries (ranked by the growth rate in 2015). The DRC has the fastest growth in 2015 at 3% per year. While this is a high rate of growth (implying a doubling in 23 years if it remained constant), we see in the figure that many countries that are currently middle income countries experienced growth rates even higher than this in 1975. Many developing countries currently have close to zero growth rate of the population 15-24.

Youth demography and youth unemployment

We now turn to the question of whether there is an empirical relationship between youth bulges and youth unemployment. It is important to point out that data on youth unemployment is much less extensive and less reliable than data on youth demography. While there are many assumptions and modeling decisions involved in the U.N.'s population estimates and projections, there is a great deal more structure and temporal smoothness to rely on in estimating the growth rate of the 15-24 year-old population than there is in estimating unemployment rates in countries that only have occasional labor market surveys. Measuring unemployment is also difficult, even with good labor market survey data.

We begin by looking at the cross-sectional relationship between youth unemployment and the youth proportion of the working-age population. Figure 4 shows scatterplots of youth unemployment against the youth ratio (the population aged 15-24 as a proportion of the population aged 15-64), using the most recent measure of youth unemployment available for a wide range of countries. We limit the analysis to countries with measures after 2000; most of the measures are from 2008, 2009, or 2010. As is clear from Figure 4, there is no strong evidence from simple cross-sectional evidence that countries with higher youth ratio have higher youth unemployment. The relationship in Africa is actually negative, with the high youth ratios in countries like Burkina Faso, Benin, and Sierra Leone associated with relatively low rates of youth unemployment, at least as measured in the surveys used in the ILO data. Of course there are

many difficult methodological issues in estimating youth unemployment in these highly rural agrarian countries. But taken at face value the youth bulge would seem to be a poor candidate for explaining cross-country differences in unemployment in Africa. Note that the North Africa countries of Algeria, Tunisia, Morocco, and Egypt have some of the lowest youth ratios in Africa. South Africa, with its very high youth unemployment, also has one of the lowest youth ratios on the continent.

In addition to uncertainty about the data, there are other reasons why we should not make too much of the patterns shown in Figure 4. Many factors affect youth unemployment, and the simple cross-sectional relationship may be misleading. A better way to look at the issue is to analyze whether increases in the youth ratio in a given country are associated with increases or decreases in youth unemployment in that country. Most of the countries shown in Figure 4 have multiple observations of unemployment in the ILO data. Figure 5 looks at how the youth ratio and youth unemployment changed between the 1990s and 2000s. The figure shows the difference between the average 2000-09 youth unemployment and the average 1990-99 youth unemployment, plotted against the difference in between the average 2000-09 youth ratio and the average 1990-99 youth ratio (35 more developed countries and 67 less developed countries have unemployment data for at least one year in both the 1990s and 2000s in the ILO KILM series).

Figure 5 shows that there is a slight positive relationship between the change in the youth ratio and the change in youth unemployment. The OLS regression line has a positive slope, implying that countries that had larger increases in the youth ratio had larger increases in unemployment, although the slope is close to zero and is not statistically significant.

It is clear from Figure 5 that in most countries (80 of the 102 countries shown) the youth share of the working-age population decreased between the 1990s and the 2000s. This is the result of rapid fertility decline in developing countries and of population aging generated by low fertility in high-income countries. Slightly more than half of those countries that experienced declining youth ratios experienced increases in youth unemployment. For the most part Figure 5 shows only a weak relationship between changes in youth ratios and changes in youth unemployment.

Regression Analysis

The graphical analysis in Figure 4 and Figure 5 suggest that the proportion of youth in the working-age population does not in and of itself do much to explain differences in youth unemployment across countries or changes in youth unemployment over time. This does not necessarily mean that the youth ratios are not having an impact on youth unemployment, however. A more complete view can be provided by using regression analysis to look at the

relationship between youth ratios and youth unemployment while controlling for other important factors such as the overall growth rate of the economy. We might be concerned, for example, that the decline in youth ratios in recent years coincided with a period of global recession, weakening what might otherwise have been a larger decline in youth unemployment in response to the proportion of youth in the working-age population.

Table 1 presents results of regressions using a number of different specifications. Following previous literature such as Shimer (2001), our dependent variable is the natural logarithm of the youth unemployment rate and our main independent variable is the natural logarithm of the population aged 15-24 as a proportion of the population aged 15-64 (the youth ratio). The coefficient on the log of the youth ratio can thus be interpreted as an elasticity.

We begin with a simple regression for a cross-section of countries, using only the most recent observation for each of 154 countries. We estimate a negative elasticity of -0.621, implying that a higher proportion of youth in the labor force leads to *lower* youth unemployment. This is not surprising given the patterns shown in Figure 4. Regression 2 adds the growth rate of GDP to the regression, a way to control for whether the country is in an economic expansion or contraction. This slightly lowers the absolute value of the elasticity, but it still implies that a 10% increase in the youth ratio would lead to a 5% reduction in youth unemployment.

Regression 3 uses all of the observations for every country and adds country fixed effects to the regression. The KILM data have multiple observations for most countries. The average number of years is 11, with 86% of countries having at least 2 years of data. Among the developing countries the average number is 8 years, with 81% having at least 2 years. Including country fixed effects means that we are looking at how changes in the youth ratio are associated with changes in youth unemployment within countries. We continue to estimate a statistically significant negative relationship, although it is considerably smaller in magnitude than in Regressions 1 and 2. The impact of GDP growth is now more precisely estimate, and implies that a 10% increase in GDP growth is associated with a 7% lower youth unemployment rate.

Regression 4 includes both year and country fixed effects. This means that we are looking at deviations in a given year from the overall unemployment level in that year (taking account, for example, of a global recession or expansion) and are also looking at deviations from a country's overall average unemployment rate (taking account of the fact that some countries have persistently higher or lower unemployment rates). This is the approach taken in Shimer (2001). We now estimate a strong *positive* relationship between the youth ratio and youth unemployment. The elasticity of 0.711 implies that a 10% increase in youth's share of the working-age population is associated with a 7% increase in the youth unemployment rate. Including the year effects

clearly has a dramatic effect on our estimates. They allow us to deal with the fact that there have been large overall trends of rising youth unemployment and falling youth ratios. These trends tend to obscure what actually appears to be a strong positive relationship between youth ratios and youth unemployment.

The elasticity of 0.7 estimated in Regression 4 is a much stronger relationship than that identified in previous research (e.g. Farest et al. 2006). To illustrate what an elasticity of 0.7 would mean, note from Figure 2 that Tanzania will have a youth ratio that is 2.6 times the youth ratio of Spain in 2015 (37% compared to 14%). With an elasticity of 0.7, this implies that Tanzania would have a youth unemployment rate that is 1.8 times that of Spain in 2015, assuming it was only the youth ratio that differed between the two countries. In fact, the youth unemployment rate in Tanzania in 2006, the most recent year with data in the ILO series, was 8.8%, compared to a youth unemployment rate in Spain in 2006 of 17.0%. In other words, Spain's unemployment was almost twice as high as Tanzania's, the opposite of what would be predicted by the youth ratios alone. Obviously many other factors affect unemployment rates in addition to the relative size of the youth population (as is clear in Figure 4). But the regression estimates suggest that the size of the youth population may be important, even though its effects are often obscured by many other factors.

In Regression 5 we estimate the regression using only the sample of high-income countries (42 countries with 887 country-year observations). The elasticity for this sample is even higher, around 1.0. This implies that a 10% increase in the youth ratio implies a 10% increase in youth unemployment. In Regression 6 we estimate the regression using the sample of low-income and middle-income countries (112 countries with 882 country-year observations), the elasticity falls to 0.3 and is not statistically significant. The ILO data provide far from complete coverage of countries or years for developing countries, but with 882 country-year observations the coverage should be good enough to estimate the relationship between youth ratios and youth unemployment, especially given the large changes in youth ratios in recent decades in developing countries. The regression analysis does not find strong evidence that youth ratios have played an important part in driving youth unemployment in developing countries, even though they seem to be quite important in high-income countries.

Conclusions and future directions

The youth bulge has been widely cited as an explanation for youth unemployment in low-income and middle-income countries. There has been little empirical analysis of the youth bulge, however, especially with regard to youth unemployment. Our results suggest that the youth bulge is unlikely to play an important role in understanding the current challenges in youth

unemployment. If it is the youth fraction of the working-age population that creates pressure on youth labor markets, then most developing countries have much lower pressure today than they did 30-40 years ago. We get a similar picture if we look at the growth rate of the youth population. Many developing countries have already reached a peak in the youth population, with current growth rates either below zero or rapidly heading there. The important exception to these patterns is Sub-Saharan Africa, where the growth rate of the youth labor force is projected to remain high for at least two more decades.

Looking at ILO data on youth unemployment, we find very little relationship between youth's share of the working-age population and the youth unemployment rate when we look across countries. Our regression estimate of this cross-section estimate is actually negative and highly significant. We also estimate a negative relationship between youth ratios and youth unemployment when we look at the change over time within countries. The patterns appear to mask what may be an important positive relationship, however. When we include both year fixed effects and country fixed effects we estimate an elasticity of youth unemployment with respect to the youth share of the working-age population of 0.7. This implies that a 10% increase in youth's share of the working-age population would increase youth unemployment by 7%. This seems to be mainly driven by the high-income countries, however. When we estimate the regressions separately we estimate an elasticity in high-income countries of 1.09, compared to a statistically insignificant 0.32 in all other countries.

These results are preliminary. In the final version of the paper we will investigate the econometric relationship in more detail, including the use of additional control variables. We will also look for non-linearities in the relationship. In the full version of the paper we will also talk more about the economics of the labor market and the role of complementarity versus substitutability of older workers for young workers. We will also consider the possible offsetting effects of the decline in child dependency that is associated with the increase in the proportion of young people in the labor force. We will also dig more deeply into the empirical relationships and will talk about why Africa's experience looks so different from other developing countries.

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Figure 1. Youth labor force (age 15-24), 1960-2040
 Size, annual growth rate, and proportion of labor force

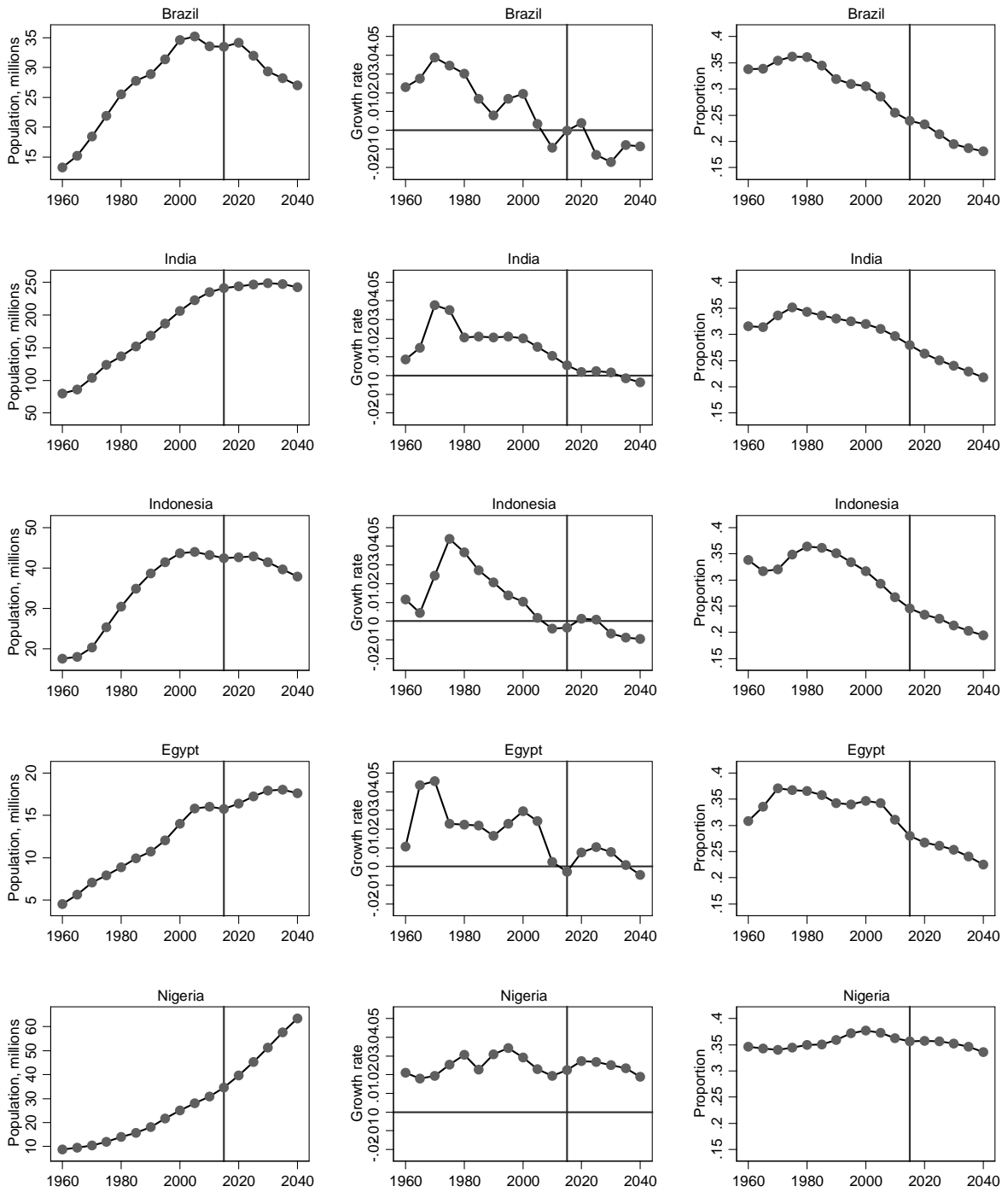


Figure 2. Population 15-24 as proportion of population 15-64, 1975 and 2015
 Countries with population over 40 million in 2015

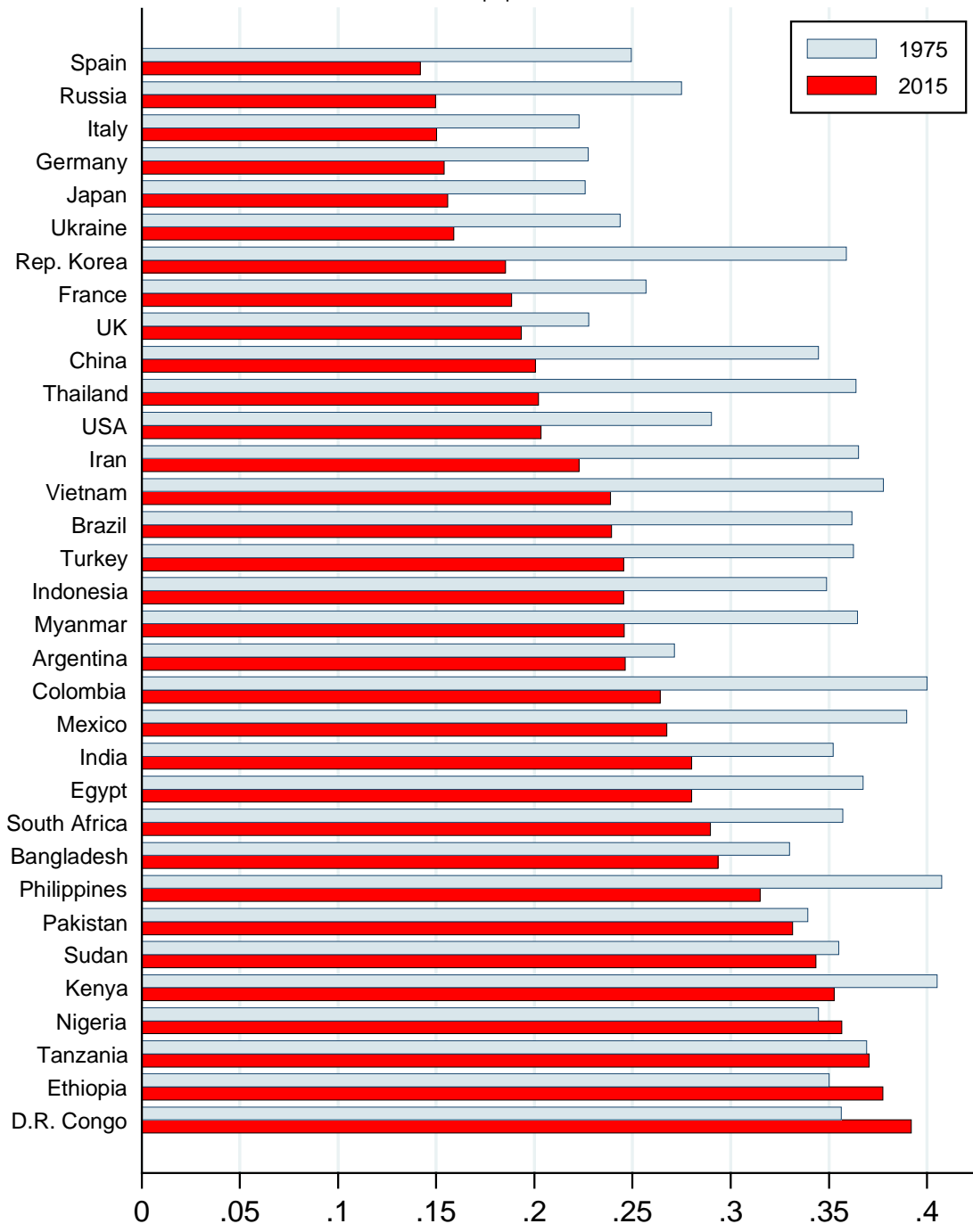


Figure 3. Annual growth rate of population 15-24, 1975 and 2015
 Countries with population over 40 million in 2015

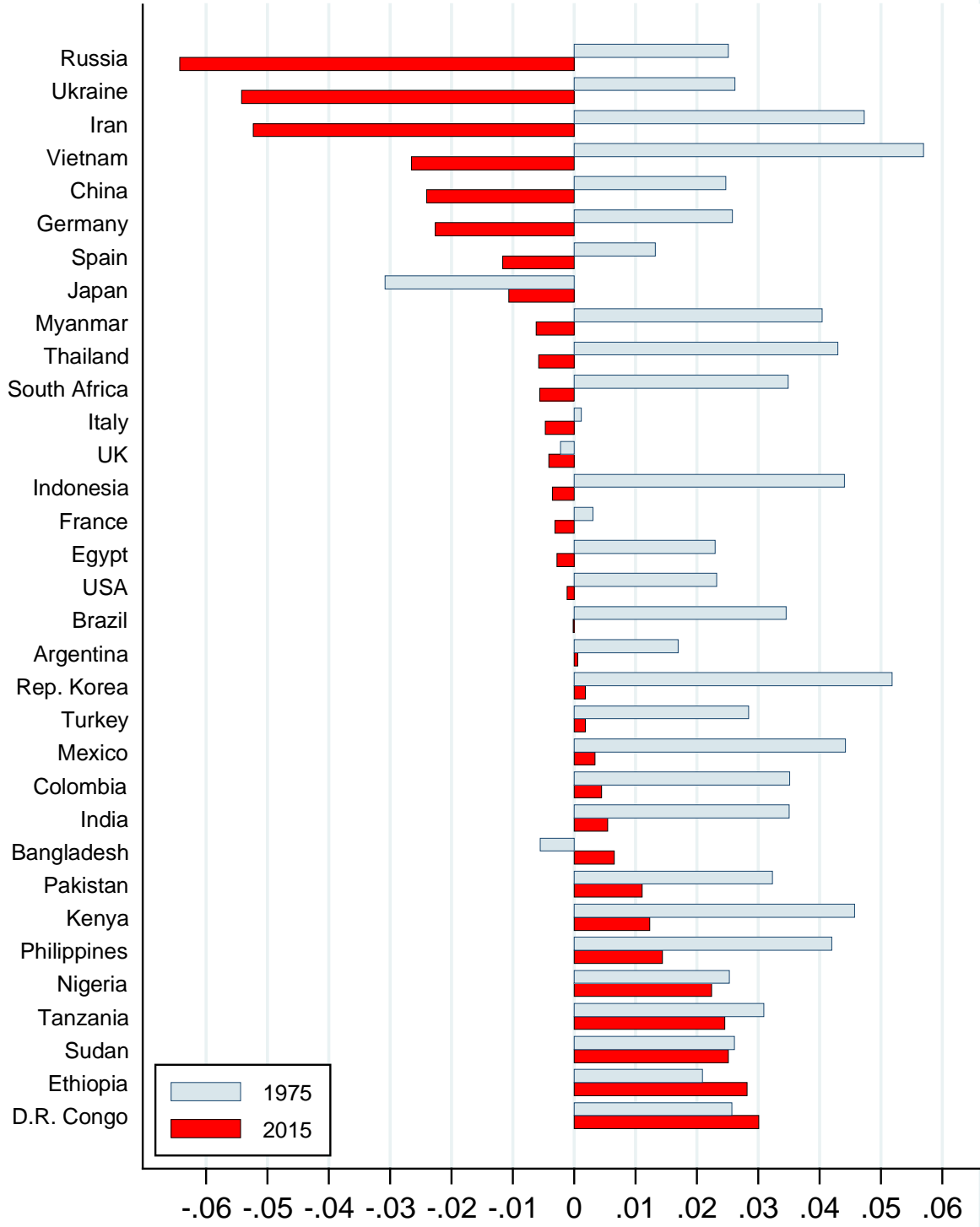


Figure 4. Youth unemployment and youth ratio (Prop. 15-24/Pop. 15-64)
 Year with most recent data, 2000-2010

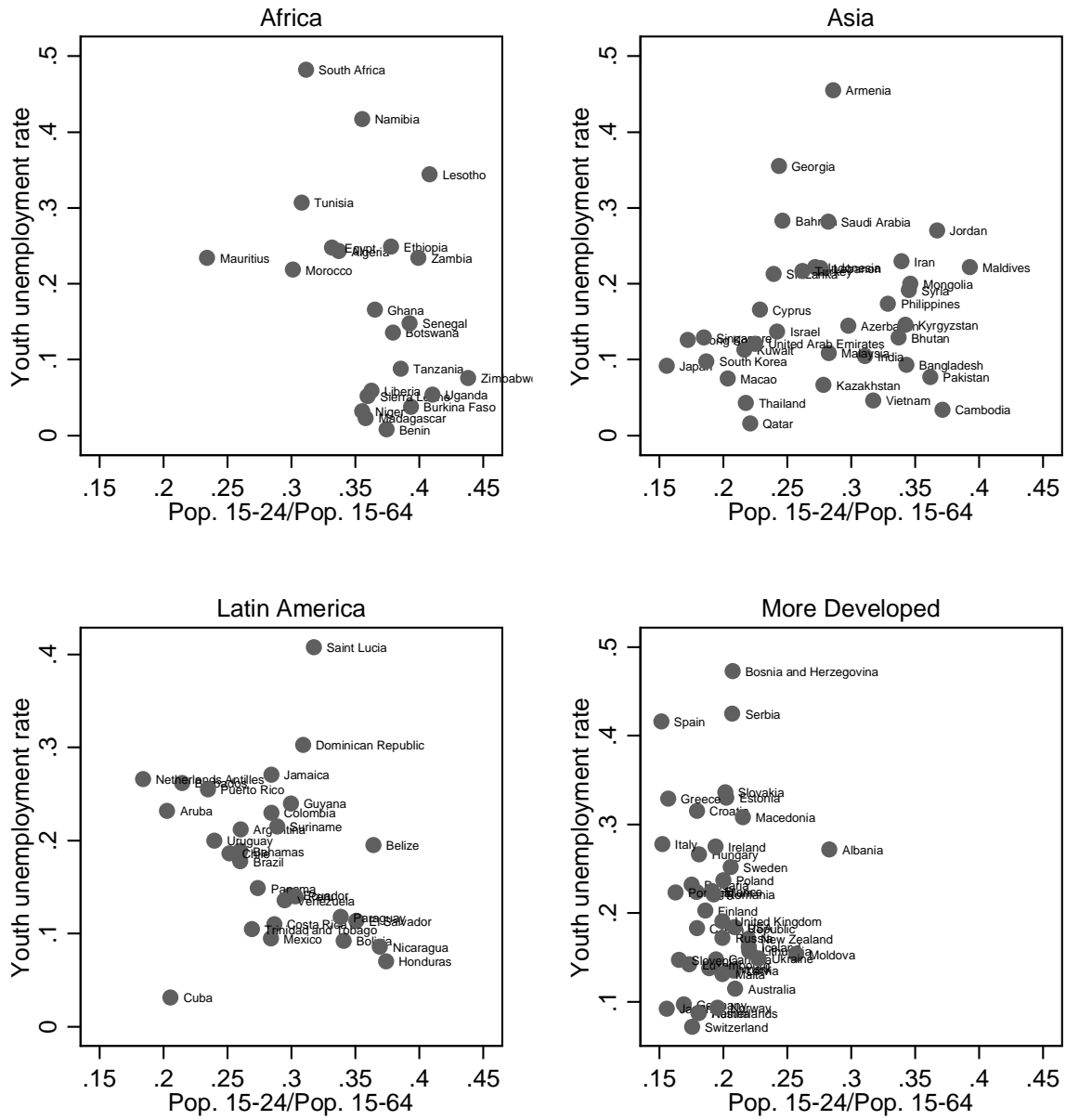


Figure 5. Change in youth unemployment rate by change in youth ratio
Mean for 2000-2009 minus mean for 1990-1999

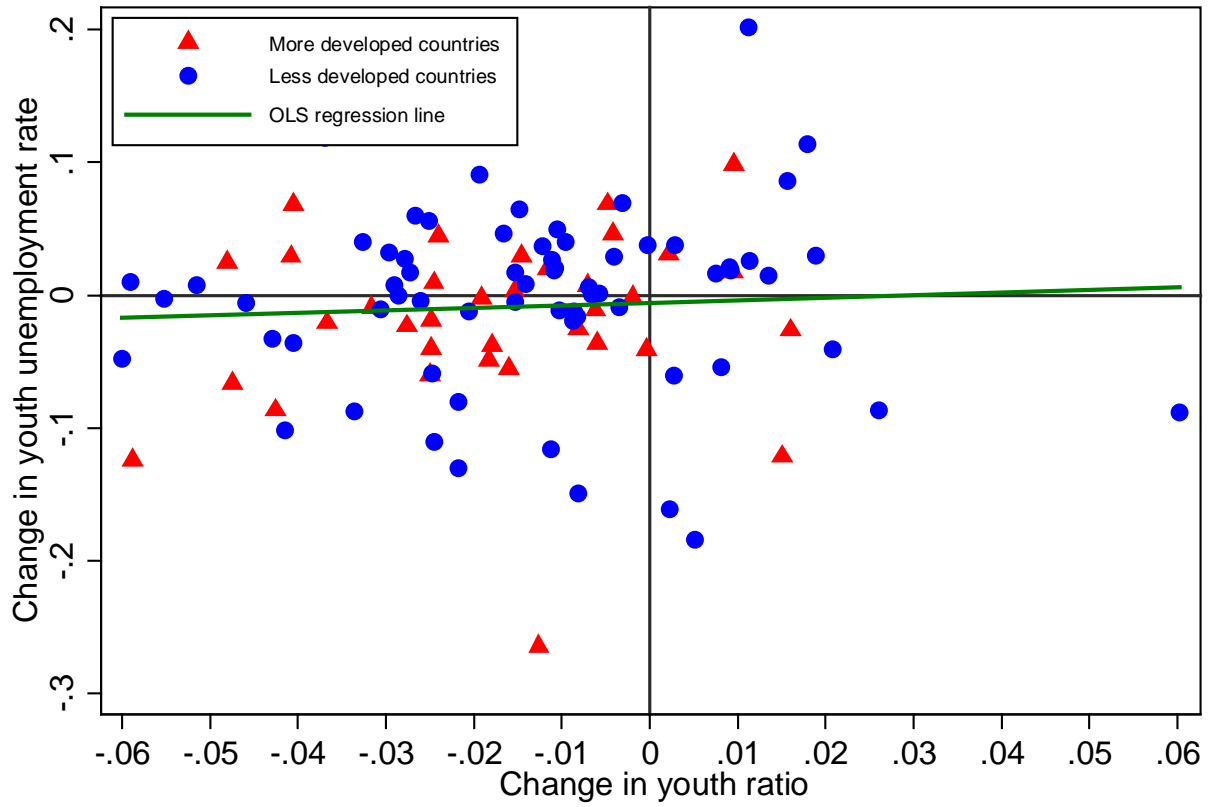


Table 1. OLS regressions of the log of the youth unemployment rate on the log of the population 15-24 as a proportion of the population 15-64

	Cross-section using most recent observation	Country Fixed Effects	Country and Year Fixed Effects	More Developed Countries	All Other Countries	
	(1)	(2)	(3)	(4)	(6)	
Log(Pop. 15-24/Pop. 15-64)	-0.621 [0.238]***	-0.586 [0.241]**	-0.163 [0.077]**	0.711 [0.140]***	1.09 [0.190]***	0.323 [0.213]
Growth rate of GDP		-2.005 [1.855]	-0.757 [0.249]***	-0.97 [0.263]***	-0.957 [0.510]*	-1.066 [0.334]***
Observations	154	145	1769	1769	887	882
R-squared	0.05	0.06	0.78	0.8	0.75	0.84

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%