

Does Okun's Law Hold for China? Some Empirical Evidence

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Abstract

This paper seeks to estimate the applicability of Okun's law to the situation in China between 1991 and 2020. A defining and most significant feature of this paper is that China's unemployment rate has been proxied by youth unemployment and urban unemployment. The stochastic properties test reveals that all the three variables follow I(1) process. The paper uses this knowledge to build data generating process (DGP), which is an outstanding contribution to international research into the steady state growth. Many researchers have pointed out that the poor countries catch up faster and, consequently, their growth rate should have a trend component to it. The applied regression model has proxied the trend when estimating the operation of the Okun's law. The inclusion of trend, strongly factual, is accounted for and reveals that Okun's law is valid for China. Apart from the OLS estimator for testing the Okun's law, the generalized method of moment estimator has also been used as another estimator with the first lag of both unemployment and GDP as instrumental variables. Empirical evidence supports the proposition that Okun's law is indeed valid in the case of China contrary to the conclusion of some studies.

Keywords

Unemployment Rate, China, Okun's Law.

JEL: C22, E24, E32.

Introduction

The underlying principle of the Keynesian revolution is that there always exists an excess capacity that should be used to create additional employment by pumping up aggregate demand. The government's role is to find ways of using this excess capacity (Klein, 2016). Active involvement of government in economic activity would inevitably lead to the creation of greater employment opportunities, which in turn should spur growth.

The rate of output growth in the Chinese economy since its liberalization has been around 10 percent. In the year 2014, China overtook the United States as the largest economy in terms of Purchasing Power Parity and is expected to surpass it in nominal terms by the end of this decade (Morrison, 2019; Lin, 2020). The question of factors and policies behind such a remarkable transformation has occupied the attention of economists over the last few decades. Stripped to its essentials, the excess capacity existed in China, due to the country's massive size, huge population and inadequate infrastructure; since 1978, the opening up of many sectors and expanding manufacturing bases were some of the key elements that provided the impetus for growth through efficient exploitation of the excess capacity organized by the Chinese policymakers. Most of the excess capacity, that has been mentioned, has been utilized. It is important to point out, however, that in 2014 growth in China started to decelerate (Lanteigne, 2015). Does it mean that the dwindling excess capacity will lead to reduction in the rate of employment generation in China?

The negative relationship between output and cyclical unemployment, first documented empirically by Arthur Melvin Okun in 1962, is known as Okun's law (Guisinger et al., 2018; Huang et al., 2020). By his assessment, a growth rate of two percentage points would lead to one percentage point decrease in the unemployment rate (Okun, 1962). A key parameter, the nature of the economic growth in terms of productivity, is always shifting; it is expected that the underlying relationship between unemployment and growth would also change.

The answer to the above question will therefore depend on the nature and strength of the Okun's coefficient in the case of China. Many factors might be involved in holding out the relationship between growth and employment, for instance, the role played by the labor market institutions¹, but in China it is the urbanization rate that has been the major driver of growth since the beginning of liberalization process. The speedy growth of the Chinese economy is mainly due to its rapid urbanization (Wang et al., 2018). Since the country liberalized its economy, the Chinese Communist Party has given highest priority to urbanization, as they consider urbanization to be central to economic growth. The rate of urbanization in China was around 18 percent in the year 1978 and this increased to 40 percent in 2003 (Chen, 2007). More than 60 percent of the population in China now lives in urban settings (Wang et al., 2021).

¹ Bertil Holmlund (2014) provides an excellent review of how the labor market institutions affects the rate of unemployment.

This study builds on the work of the previous studies (Huang, 2003; Ball et al., 2012; Gazi & Prieto, 2016; Feng, 2018; Abubakar & Nurudeen, 2019). The underlying conclusion is that the relationship between unemployment and rate of economic growth is stable and positive. In 2021, China was the only major economy that did not witness recession, in spite of being in a lockdown in some parts of the country. The unemployment rate, globally, increased drastically. During the pandemic, the underlying relationship between growth and unemployment has become a matter of intense speculation but the question of Okun's law needs to be explored.

From the political standpoint, the character of the relationship between growth and employment in the case of China is rather unique. Generating great employment opportunities in a democratic country is the basis on which many elections are held and often won. For the general public, having means and opportunities to get employment is of paramount concern. In a democracy, the political party that can do a better job at delivering such an outcome wins the election. As a one-party rule, the legitimacy of the Chinese Communist Party hinges on the existing positive linkages between growth and employment. In this context, the paper contributes to revealing the true relationship between output and rate of unemployment in the Chinese economy by exploiting the stationarity properties of the output that has grown exponentially. It is sometimes difficult for policy makers to control or exert the necessary degree of influence on the rate of unemployment. As they need to determine the degree of control over economy, the relationship between growth and unemployment rate is undeniably important from policy perspective.

The rest of the paper is as follows. Section 1 presents the literature review, which summarizes the previous theoretical and empirical research. The methodology is explained in Section 2. Section 3 discusses the results obtained in the course of the research. Then a conclusion is drawn and future research agenda proposed in the Conclusions section.

1. Literature review

1.1. Approaches to the estimation of the Okun's law

There are two approaches to the estimation of the Okun's law. The first presupposes the use of level series, also called the GAP model. The second approach involves the first difference of both series (Karadzic et al., 2022; Porras & Martín-Román, 2022). It is important to point out that unemployment can also be an explanatory variable and output or income can be a dependent variable in both cases. To understand the level version of the model, consider equation (1) below,

$$U - U^* = \eta(Y - Y^*) \quad (1)$$

where U and U^* are the realized unemployment rate and the natural unemployment rate. Similarly, Y and Y^* are the actual output that is produced and potential output or natural level of output. In the same vein, to understand the differenced version of the model, consider equation (2), shown below,

$$\Delta U_t = \xi(\Delta Y) \quad (2)$$

where Δ is the change or a differenced series. By the rule of thumb, a 1 percent increase/decrease in unemployment will lead to 2 percent increase/decrease in output. In other words, 1 percent increase in unemployment will lead to a deviation of GDP from its long run path.

1.2. Empirical literature review

The empirical evidence for the existence and validity of the Okun's law in the case of Chinese economy is mixed. Several socio-economic reasons, unique to the Chinese economy, are perhaps the reason why the Okun's law is not found to be holding in some empirical studies (Yin & Zhou, 2010; Wu-Liu, 2012).

In developing countries, the higher rate of growth of the country leads to an increase in the rate of urbanization, which in turn gets captured by the rate of growth of registered and formal employment. By many reckonings, China is still a developing country but has seen rapid and vast migration of people from rural to urban areas in the last two decades. Nonetheless, the level of urbanization is nowhere near the level that prevails in advanced countries. The use of the Okun's law without factoring in the rate of urbanization is bound to lead to the conclusion that the relationship between (un)employment and growth is not holding in the case of China. The original Okun's law is perhaps not so applicable in the case of China where the level of urbanization is still very low compared to advanced economies (Liu et al., 2018). The empirical evidence by Xuan (2003) has shown this in the case of China by constructing index of employment for three different sectors; still the revised Okun's law does not seem to hold out in the case of China.

Yin and Zhou (2010) also show that the Okun's law does not work for China. They argue that high employment in China could well be down to the fact that there are labor-intensive industries in the Chinese economy that anyways employs large quantities of labor. The Chinese labor market is dependent on economic growth in the countries to which it exports its merchandise. In other words, economic upturn in the United States appears to be more impactful in relation to the employment rate in China. Yin and Zhou (2010) came up with so-called Generalized Okun's law that they count more applicable in the case of China, as compared to the standard Okun's law more applicable to the case of developed countries.

It is essential to point out that the Chinese economy started to slow down in 2014. Since that time, no large-scale increases in employment have been observed. Basically, it is the rural to urban migration that is affected as a result of slowing growth rather than

the jobs in the urban China. In the short-term, the transfers of labor from agricultural areas are correlated significantly with the economic cycles (Feng, 2018).

On the other hand, Peijiang (2014) was able to show that a 1 percentage point increase in urban registered unemployment leads to a 1.98 percent decrease in GDP, which means that the Okun's law is valid for the Chinese economy. Yet, the paper was cautious about interpreting the Okun's coefficient because there is a tendency that it might overestimate the impact of registered unemployment rate on GDP. One of the main fundamental reasons for the Chinese growth story was the presence of demographic dividend. The number of people of the working age started to decrease from the year 2015 (Li et al., 2017). Therefore, the central issue is whether growth is translating into commensurate increase in the rate of employment in China or not.

The empirical literature on the inclusion of youth unemployment in the Okun's law in BRICS countries is available for India. The study that empirically examined the relationship between unemployment and output in India confirmed that although Indian output was growing, the growth was jobless because it was not up to the threshold level that ensures a decline in unemployment (Abubakar & Nurudeen, 2019). There is some evidence that the youth employment rate is the most affected during downturns since the early entrants to the job markets are the first to lose their jobs when there is a slump in economic activity.

However, before the results that has been estimated is put forth, it is useful to reveal the relationship between growth and employment in China.

A novel attempt, from the methodological standpoint, was made by including the trend in the output growth. The growth theory according to Solow (1956) provides a realistic theoretical explanation for the catching up process. This has been taken into account by the inclusion of trend component. That needs to be seriously investigated in the case of China since it demonstrates a classical and prototype example of the catching up process.

2. Methodology

The growth rate of the nominal GDP has been used as a proxy for the output. Both the youth unemployment and the urban unemployment rate were used for estimating the Okun's law. The data was extracted from the economic research by the Federal Reserve Bank of St. Louis and all the series spanned from 1991 to 2020. The Augmented Dickey Fuller test (Dickey & Fuller, 1979) henceforth, (ADF) and Dickey Fuller generalized least square test (Elliott et al., 1996; Leybourne et al., 1998), henceforth DF-GLS, have been used in order to test the stochastic properties of the series. The specification of the ADF (1979) has been shown in (3).

$$\Delta Y_t = \alpha + \rho Y_{t-1} + \phi + \sum \nu \Delta Y_{t-n} + e_t \quad (3)$$

The series will be considered to be stationary if the probability value is negative and less than 5 percent. Elliot et.al (1996), introduced DF-GLS test in order to address some of the disadvantages found in KPSS (1992). Therefore, the test is used in order to validate the finding of the ADF (1979). This test assumes two components in the model given in equation (4) below,

$$Y_t = \alpha d_t + U_t \tag{4}$$

where $U_t = U_{t-1} + e_t$ and e_t follow a normal distribution and αd_t is thus the deterministic component of the model. The null hypothesis will be accepted in favor of unit-root if $\alpha = 1$ and if $\alpha < 1$ then the alternative hypothesis is accepted. Using both these tests would help to determine the stochastic properties of the series.

The estimation of the relationship between output and unemployment was conducted using the OLS estimator. The specification of the regression used to estimate the parameters of the constant, represented by α_1 , trend which is represented by α_2 has been shown in (5).

$$Y_t = \alpha_1 + \alpha_2 t + \alpha_3 X_t + e_t \tag{5}$$

Where Y_t is the dependent variable and X_t is the independent variable, α_1 and α_3 measures the average and slope of the relation, and α_2 is the deterministic component of the model while e_t is a white noise assumed to be independent and identically distributed with zero mean and a constant variance. The Generalized Method of Moment estimator (GMM) was also used. The first lag of both the unemployment rate and GDP were used as instrumental variables.

3. Results and discussion

Table 1 captures the estimates of the stochastic properties of each series. The estimated t-statistic has been compared with the tabulated values at a given level of significance. The unemployment rate and youth Unemployment are stationary at first difference. Similarly, the GDP series is also first difference stationary and it is significant at

Table 1. Stochastic Properties of the Variables

Variables	ADF Statistics		DF-GLS		Decision
	Level	First Difference	Level	First Difference	
Unemployment	-2.437	-3.295***	-2.309	-3.359**	I(1)
GDP	-1.871	-4.122***	-2.048	-3.453**	I(1)
Youth Unemployment	-1.339	-3.950***	-2.131	-3.918*	I(1)

Source: Computed by the Authors.

5 percent level of significance. For the DF-GLS test, the results shows that all the variables are first difference stationary. Essentially, the results of the DF-GLS seem to support the evidence of the ADF. The main takeaway from here is that all the variables become stationary at first difference.

The estimated linear regression model has been presented in table 2, shown below. The underlying assumption of the data generating process (DGP) favors intercept and trend for all the series in the unit-root test. The regression model included intercept as well as the trend in the estimation. The regression model is therefore specified and estimated using equation (3) above. The estimation testifies the significance of both constant and trend. Keeping in line with the objective of the paper, GDP was taken as the endogenous series to find out if the GDP's targeted growth of 8.5 percent can be achieved given the World Bank's position. This is firstly assessed by a linear regression model using an ordinary least square (OLS) estimator. The results have been presented in table 2, shown below. Additionally, the generalized method of moment (GMM) estimator was employed in order to check and assess the robustness of the regression result, reported in table 3. The regression result shows that 1 percent increase in unemployment leads to 3.96 percent decrease in Chinese GDP. This is further assessed with a GMM estimator, and it shows quantitatively, that 1 percent increase in unemployment will decrease Chinese GDP by 4.68 percent; both OLS and GMM estimates are significant at 1 percent level of significance. Given the targeted growth of GDP by 8.5 percent pronounced by the World Bank, our regression model showed that the rate of unemployment would decline by 0.05 percent; this implies that unemployment would turn out to be 4.95 percent by the end of 2021 considering 5 percent unemployment rate existed in 2020. While our GMM model showed that 8.5 percent growth rate would instead increase unemployment by 1.591 and the rate of unemployment would turn out to be 6.59 by the end of 2021 fiscal year. Youth unemployment for the ages of 16-24 is higher in China than for the age group beyond 24 years.

Table 2. Regression Model Estimates

Variables	Coefficient	Standard Error	T-Statistics	Probability Value
Constant	8.72	1.26	6.920	0.0001
Trend	8.35	3.84	21.72	0.0001
Unemployment Rate	-3.96	4.31	-9.20	0.0001

Source: Computed by the Authors.

Table 3. GMM Model Estimates for the Overall Unemployment

Variables	Coefficient	Standard Error	T-Statistics	Probability Value
Constant	1.05	1.83	5.74	0.0001
Trend	9.05	5.05	17.92	0.0001
Unemployment Rate	-4.68	5.97	-7.84	0.0001

Source: Computed by the Authors.

Table 4. Regression Model Estimates for Youth Unemployment

Variables	Coefficient	Standard Error	T-Statistics	Probability Value
Constant	8.22	1.25	6.55	0.0001
Trend	9.78	5.71	17.12	0.0001
Unemployment Rate	-2.01	2.30	-8.79	0.0001

Source: Computed by the Authors.

Table 5. GMM Model Estimates for Youth Unemployment

Variables	Coefficient	Standard Error	T Statistics	Probability Value
Constant	1.05	1.83	5.745	0.0001
Trend	9.05	5.05	17.92	0.0001
Unemployment Rate	-4.68	5.97	-7.842	0.0001

Source: Computed by the Authors.

Conclusion

The estimate of the regression points to Okun's law holding in the case of China. The inclusion of trend, for which there is a strong theoretical justification due to Solow (1956), does indeed seem to make a difference in the case of China when it comes to analyzing the relationship between employment and output. The evidence seems to point to the existence of firm relationship between employment and output. Apart from the OLS estimator for testing the Okun's law, the generalized method of moment estimator was also used as the other estimator where the first lag of both the unemployment and the GDP were used as the instrumental variables. Empirical evidence supports the conclusion that Okun's law is holding in the case of China contrary to the results of some studies. This paper incorporates another version of the generalized version of the Okun's law, with the trend of the output growth; it is more applicable to emerging or developing market economies, which will catch up faster with developed countries. One can propose two promising lines of future research. Firstly, the behavior of the Okun's coefficient over the course of the business cycle can be explored for the BRICS countries. The other line of research assumes that the Okun's coefficient BRICS countries changed after the pandemic.

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