International migration's effects on labor market

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1 Introduction

An estimated 281 million people, approximately 3.6% of the world's population, currently live outside their country of origin. An increasing number of persons leave their homes for a complex combination of reasons; however, the most common and obvious one is for the labor markets. A majority of immigrants come from developing states due to government incompetence, economic instability and limited opportunities to earn money. Therefore, migration is one of the ways to escape poverty and improve the financial status of households.

Nowadays, academic researchers study the economic gains of this phenomenon, such as a rise in productivity and contribution to taxes. Migrants increase potential output both in their original countries by sending remittances and in host countries by enlarging the size of the labor force and creating demand. At the same time, much of the policy debate surrounding immigration deals with the possibility that immigrants "take jobs away" from native workers and perhaps hamper the economic progress of some groups in the receiving states (Borjas, 1989). In the early 2000s, Canada and Australia, whose economies were greatly influenced and shaped by international migration, held discussions regarding immigration and unemployment because the public and some policy-makers believed that foreign workers were responsible for low employment. In addition, among several theoretical models that try to explain why international migration begins, two of them - "Dual labor market" and "Cumulative causation" - claim that immigration leads to higher unemployment.

However, there is no generally accepted opinion on the direction and degree of impact of international migration on unemployment. In the literature, there are studies that have concluded that migration has a positive effect on unemployment, as well as studies that have found a negative relationship between them (Kilic et al., 2019).

Accordingly, this work is primarily focused on defining whether there is a correlation between international migration and unemployment or not. The results are expected to show no correlation or a negative correlation because plenty of studies have stated that immigration positively affects productivity (high productivity means high employment). Hence, I will also examine a correlation between net migration value and GDP as a supportive element to my first question to draw a more accurate conclusion.

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Data

The observations are represented by countries from different continents, and the variables are represented by the real GDP rate, net migration values and unemployment rate. The period is 1991-2021, and the data sources used in this paper are taken from International Labor Organization, United Nations Children's Fund data and the World Bank.

1.1 Literature Review

The literature regarding the effects of international migration follows various strands. Some of them attempt to describe the migrations' initiation and consequences through theoretical models without any factual evidence. Other studies are heavily based on empirical information within a theoretical framework.

Firstly, I reviewed all the theories concerning the topic to obtain a general idea of what might be affected by migration and what outcomes it might lead to. Massey et al. (1993) investigated a fragmented set of theories that had developed largely in isolation from one another. As a result, proposed models employ different concepts, various assumptions and frames of reference to explain why international migration begins and continues. For instance, neoclassical economics conceives of movement as an individual decision for income maximization, while dual labor market theory generally ignores micro-level processes, focusing instead on forces operating at much higher levels of aggregation.

Nevertheless, we need empirical data and statistical analysis to establish a clear link between emigration and presumed issues such as unemployment or benefits, namely GDP growth.

One of the most popular studies about the impact of international migration on labor markets in Canada was conducted by Islam (2007). He covered the period of 1961-2002, and his results were as follows: the causality tests indicated no relationship between migration and unemployment, and the cointegration test showed that there was no increase in total unemployment due to migration. Kilic et al. (2019) examined the effects of immigration on unemployment in 23 OECD countries selected between 2000 and 2015 by using the panel data analysis method. According to the findings, migration was observed to have a negative effect. GÜNDOĞMUŞ & BAYIR (2021) used panel regression analysis and concluded that international migration had no statistically significant effect on unemployment in 27 European states between 2000-2017. Moreover, increases in GDP, public expenditures, education expenditures and wage rises result in employment growth. In contrast, Edo (2015) used micro-level data to reveal the influence of international migration on the French labor market and claimed that it had negative effects on employment.

Two studies by Taylor et al. (1996) discussed direct and indirect ways by which migration is able to increase productivity in both sending and receiving countries. Simionescu et al. (2016) analyzed the relationship between the GDP and the net migration using the comparative approach represented by the panel data and Bayesian analysis for the period 1991-2013 in Central and Eastern European states. A negative correlation was recorded between net migration and the real GDP.

2 Data set

This study endeavors to find a correlation between migration and unemployment in 17 selected countries that have different levels of income and are from various continents. The analysis covers the period of 1991-2021 and uses annual data. Figures belonging to the study are obtained from three different sources. International migration data is taken from United Nations Children's Fund data, the unemployment rate from the Labor Organization, and economic growth from the World Bank database.

The net migration rate is expressed as the difference between the number of immigrants and the number of emigrants (people leaving an area) divided by the population in a given year. The unemployment rate shows the share of workers in the labor force who do not currently have a job but are actively looking for work in a particular year. Economic growth is represented by nominal GDP, which measures the monetary value (USD) of final goods and services produced in a country in a given period of time, and by annual GDP growth rate, which compares the year-over-year change in a country's economic output.

Table 1: Summary Statistics

	Mean	Std.Dev	Min	Median	Max
female_unemployment_rate	7.46	4.65	0.50	6.10	31.40
gdp_growth_rate	3.54	4.69	-36.39	3.74	15.33
gdp_per_capita	12796.36	15508.11	110.46	5788.86	68158.58
gni_growth_rate	3.39	4.98	-36.16	3.35	17.75
gni_per_capita	12458.61	15729.37	110.00	4825.00	66050.00
male_unemplyment_rate	6.26	3.63	0.70	5.50	28.70
migration_rate	0.62	4.16	-35.72	0.23	17.36
total_unemployment_rate	6.74	3.86	0.60	5.80	27.50
year	2006.00	8.95	1991.00	2006.00	2021.00

The model was estimated with 527 observations. Table 1 shows descriptive statistics for variables. According to the summary statistics, while the average total unemployment rate was 6.74, the lowest and highest unemployment rates were 0.60 and 27.50 in the sample, respectively. The average migration rate variable was 0.62. This series indicated the highest migration rate at 17.36 and the lowest one at -35.72. The GDP per capita variable had an average of USD 12796.36 in the period discussed. In addition, the highest GDP growth rate was 15.33 and the lowest one was -36.39, with an average rate of 3.54.

3 Data Analysis

Figure 1 displays migration and unemployment rate in 6 countries around the world over the period of 1991-2021. From Figure 1 we can observe that Australia and Canada have experienced overall declining unemployment with some fluctuations since the 1990s. The

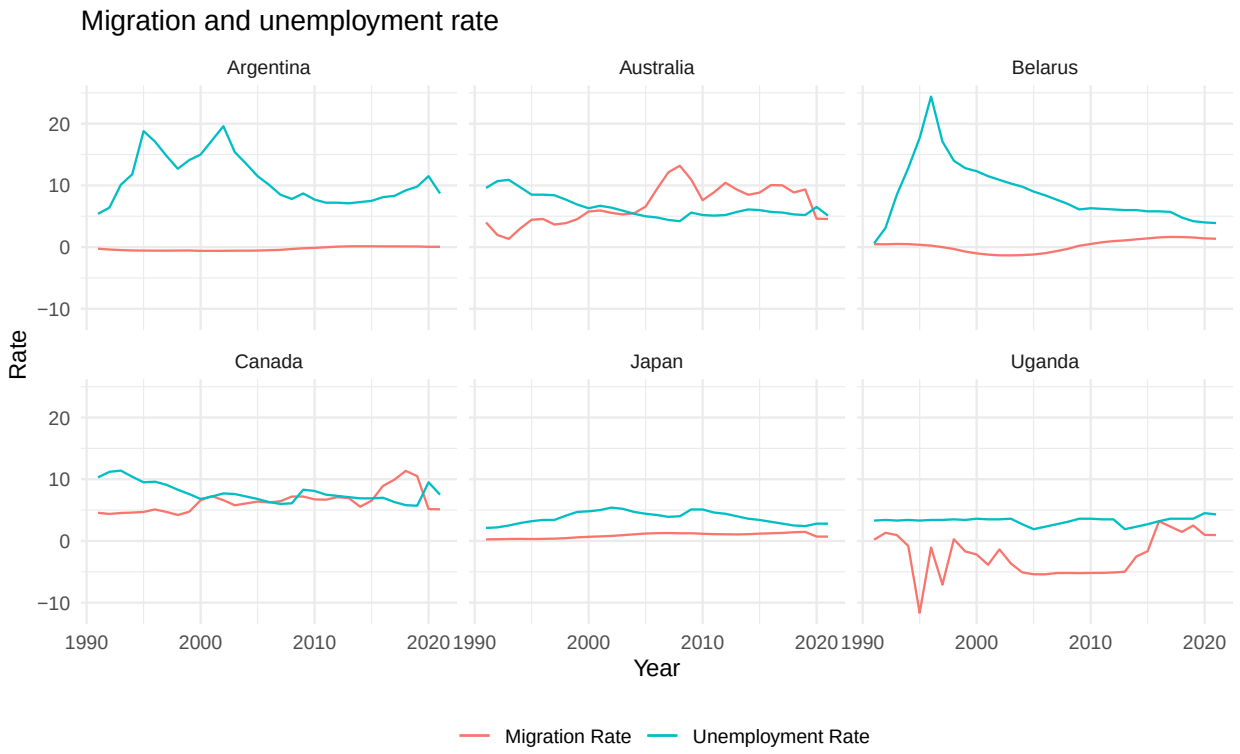

Figure 1: Migration and unemployment rate

unemployment rate in another high-income country, Japan, and low-income Uganda fluctuated between 2% and 6% for a given period. Upper middle-income states had a relatively high unemployment rate in the mid-1990s, but it fell years later. As mentioned before, Canada's and Australia's economies were shaped by international migration, and, as evidence, we can see a slight increase over time in migration with some expansion and contraction levels for both countries. Belarus and Argentina had low migration values, close to zero, which is expected for developing nations because people prefer to move to wealthier ones. Japan had low value as well, but it was mostly related to limited cultural assimilation and the integration of foreigners into society, not to economic issues. Uganda, which is considered to be a least developed state, had a negative migration rate for most of the period, which is explainable as people left for better job opportunities. So far, looking at graphics, we can not establish any relationship between net migration value and unemployment rate.

The second question raised in this paper is whether there is a correlation between migration and GDP. A positive correlation between them would be a useful element to support the first question in case we get a negative correlation between migration and unemployment and vice versa. Because, for example, if increasing immigration boosts production levels, then expanded production improves employment. However, according to Figure 2, not every state's high immigration rate leads to the labour market's enlargement. Figure 2 illustrates that positive migration values had almost no impact on the Argentinian, Belarusian and Japanese economies. To this list, we can also add Uganda, which showed positive patterns between net migration and GDP growth only in 1998-2003 and 2014-2021. In contrast,

Figure 2: Migration and GDP growth rate

Canada and Australia indicated generally positive relationships between immigration and GDP, except for 2008-2009, when there was a huge economic crisis.

3.1 Methodology

First of all, we compared the means of migration with the help of Pairwise testing in 6 countries chosen for the data analysis section. Secondly, this study endeavored to analyze the relationship between migration and unemployment in 17 states through the Pearson correlation coefficient (r). It is the most common way of measuring a linear correlation. It is a number between –1 and 1 that measures the strength and direction of the relationship between two variables. However, in order to use it, we needed to check if the covariation was linear and if the data from each of the two variables (x,y) followed a normal distribution. If the data do not follow a normal distribution, another type of analysis is suggested.

3.2 Findings

3.2.1 Pairwise Test

Pairwise comparison is a method for analyzing multiple population means in pairs to determine whether they are significantly different from one another. Table 2 displays the results

Table 2: Pairwise test

.y.	group1	group2	n1	n2	statistic	df	p	p.adj	p.adj.signif
migration_rate	Argentina	Australia	31	31	-12.8730663	30.58201	0.00e+00	0.000000	****
migration_rate	Argentina	Belarus	31	31	-2.7407435	35.23682	1.00e-02	0.143000	ns
migration_rate	Argentina	Canada	31	31	-20.3410332	31.70016	0.00e+00	0.000000	****
migration_rate	Argentina	Japan	31	31	-12.9342252	56.32107	0.00e+00	0.000000	****
migration_rate	Argentina	Uganda	31	31	3.5005788	30.47068	1.00e-03	0.022000	*
migration_rate	Australia	Belarus	31	31	11.3750460	36.53819	0.00e+00	0.000000	****
migration_rate	Australia	Canada	31	31	0.7516697	48.37478	4.56e-01	1.000000	ns
migration_rate	Australia	Japan	31	31	10.7595643	30.98148	0.00e+00	0.000000	****
migration_rate	Australia	Uganda	31	31	11.2625213	59.33616	0.00e+00	0.000000	****
migration_rate	Belarus	Canada	31	31	-16.5258644	47.52365	0.00e+00	0.000000	****
migration_rate	Belarus	Japan	31	31	-3.1996290	38.70934	3.00e-03	0.041000	*
migration_rate	Belarus	Uganda	31	31	4.1853880	35.30945	1.80e-04	0.003000	**
migration_rate	Canada	Japan	31	31	16.6633982	32.86334	0.00e+00	0.000000	****
migration_rate	Canada	Uganda	31	31	12.7124523	45.41842	0.00e+00	0.000000	****
migration_rate	Japan	Uganda	31	31	5.3567512	30.79379	7.90e-06	0.000118	***

of pairwise testing. We got a p-value greater than or equal to 0.05 only in 2 cases, other comparisons indicated statistical significance. Not to mention, we obtained extremely significant value in 9 cases out of 15. When a result is identified as being statistically significant, this means that you are confident that there is a real difference or relationship between two variables, and it's unlikely that it's a one-off occurrence.

3.2.2 Shapiro-Wilk test

Next, we created a scatter plot to show a positive linear relationship between migration and unemployment rate measured for the same individuals(Figure 3). Then we ran the Shapiro-Wilk test for normality. The null hypothesis was that "data are normally distributed". Our p-value was less than 2.2e-16, meaning less than 0.05, so we rejected our null hypothesis. We repeated the same steps for migration and GDP and obtained a negative linear relationship between them(Figure 4) along with p-value was less than 2.2e-16. Since our data had not been normally distributed, we were not able to use the Pearson correlation test.

3.2.3 Simple linear regression

Because we had already defined linear relationships, we decided to focus on linear regression analysis. Simple linear regression is a regression model that estimates the relationship between one independent variable and one dependent variable using a straight line. We took the migration rate as an independent variable and unemployment and GDP rate as dependent variables. The regression used ordinary least-squares (OLS) algorithm to fit the linear model:

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$$

where β_0 and β_1 are the regression coefficients and ε_i are the error terms.

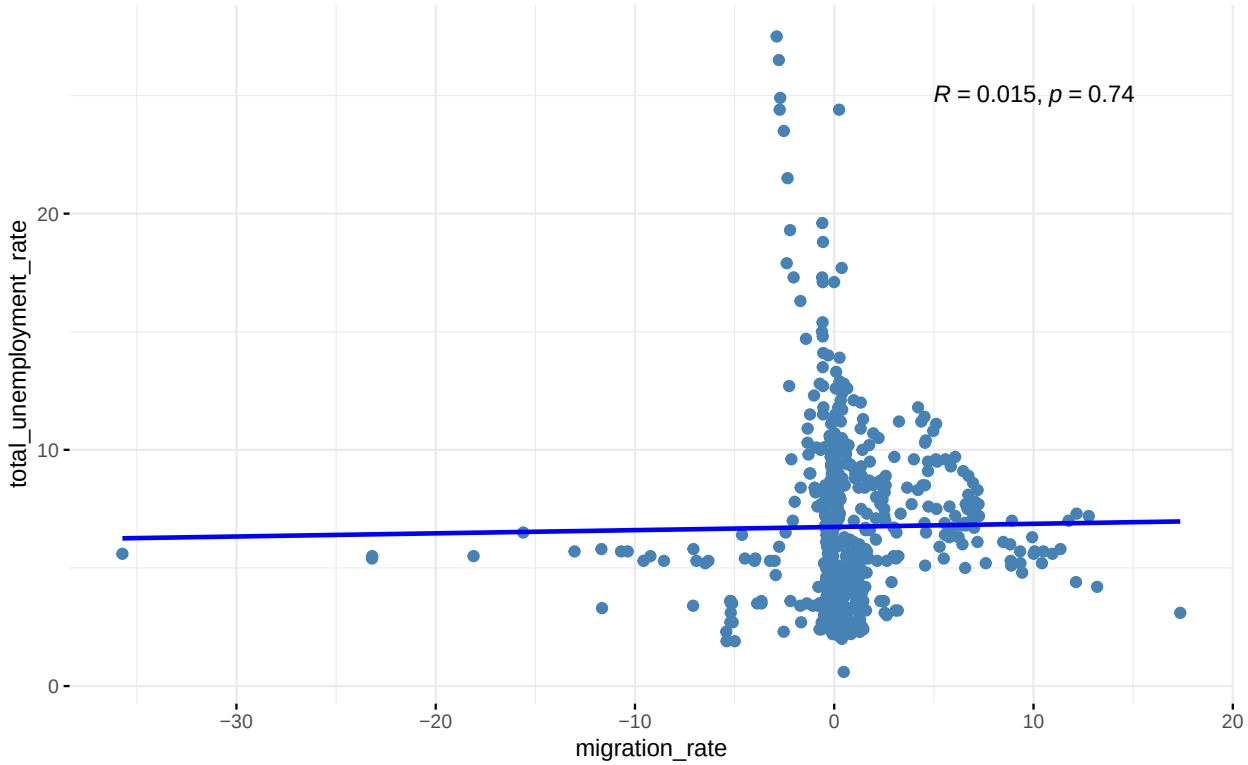

Figure 3: A positive linear relationship

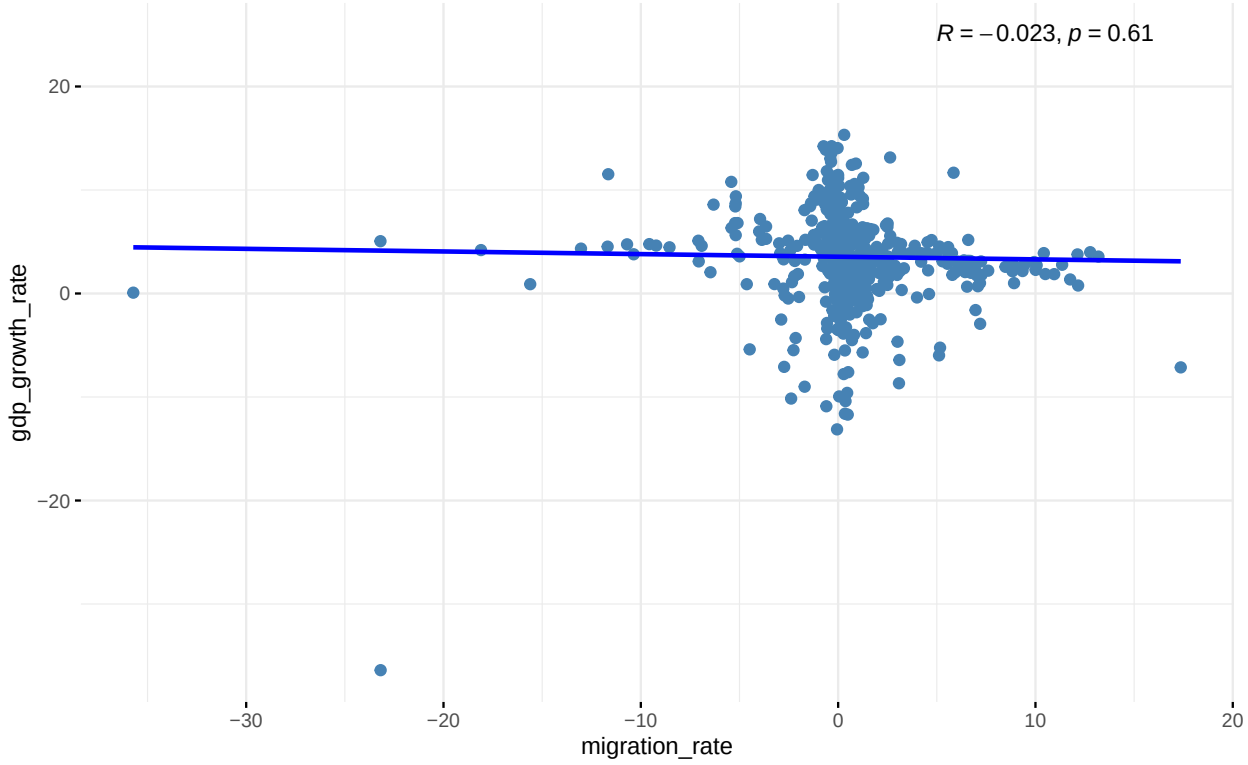

Figure 4: A negative linear relationship

Table 3: Simple linear regression

term	estimate	std.error	statistic	p.value
(Intercept)	6.7350818	0.1702275	39.5651865	0.0000000
migration_rate	0.0134558	0.0404920	0.3323079	0.7397894

Figure 5 illustrates linear regression analysis, and Table 3 shows the results of the Ordinary Least Squares Regression. Our null and alternative hypotheses for β_0 and β_1 are:

$$H_0 : \beta_0 = 0 \quad H_A : \beta_0 \neq 0$$

$$H_0 : \beta_1 = 0 \quad H_A : \beta_1 \neq 0$$

Based on the p-value we reject null hypothesis, and estimate coefficient of intercept is statistically different than zero and significant. Similarly, estimate coefficient for migration rate data is statistically significant. Our dependent variable in the regression is unemployment rate, so if migration rate increases one unit, it will increase unemployment rate by 0.02 units. If migration rate is 0, unemployment rate equals to 6.74.

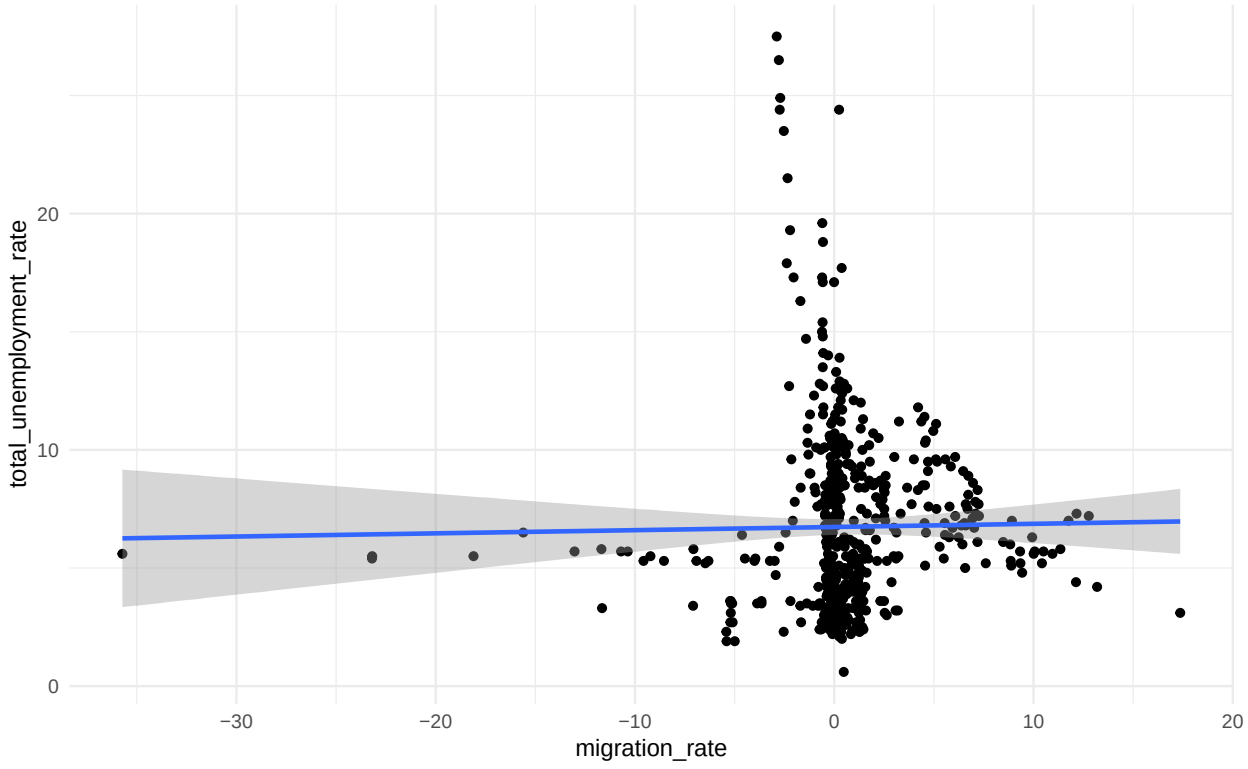

Figure 5: linear regression

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