Underemployment And Public Investment In Ecuador, National And Regional 1 Comparative Analysis

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Abstract:

Background: The effect on the direct use of public investment in key infrastructure works such as electricity, roads, among others, has been evaluated. For every US\$1 million of public spending on infrastructure creates 16-30 jobs in relatively low-developed countries. In addition, the construction of infrastructure reduces transaction costs via greater connectivity between markets, increasing GDP and reducing poverty. Public expenditure has an effect on aggregate demand, stimulating growth and employment. In the face of a rise in the wages of low-skilled workers in one branch of activity, an increase in the amount demanded of the other.

Data and Methodology: The data were obtained in 2007, 2014 and 2022 in the framework of the household survey system of the National Institute of Statistics and Censuses (INEC). INEC has been carrying out the National Survey on Employment, Unemployment and Underemployment (ENEMDU) since 1993, and it has been continuously applied. The study domains are National, Urban-Rural, 5 major cities (Quito, Guayaquil, Cuenca, Machala and Ambato) and 24 provinces of Ecuador. The effective housing coverage for 2022 was 105,848 homes nationwide and, in Northern Planning Region 1 (RNP1) is 16,168 homes in four provinces. The statistical test used is Ji-square (χ 2), which allows through non-parametric methods, to evaluate goodness-of-fit tests.

Results: Adequate or full employment growth in the RNP1 (4.6%) is lower than the national one (6.1%) in times of public investment boom. The growth of underemployment, at a time when public investment is declining, is relatively important at both the national level (13.9%) and at the RNP1 level (12.4%) (p<0.01), with a significant deterioration in the quality of life of the population in both geographical areas.

Conclusions: Public sector investment in employment generation is crucial; at times of public investment boom, adequate or full employment in the modern sector grows and underemployment or any precarious form of employment decreases. The fall (increase) in the percentage of employed people is accompanied by a fall (increase) in labour income, both nationally and in the RNP1.

Key Words: Labour dynamics, public investment, labour participation, labour income.

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I. Introduction

Ecuador need to increase the demand for labor through public or private sector investment to absorb their structural surplus of available low-skilled workers, known as underemployed and informal. The problem of Latin American countries in the labor market, rather than unemployment, is the existence of too many underemployed (about 60% of their EAP), in Ecuador it is 60.8% by 2022.

High levels of underemployment prevent individuals from leading a dignified life, which results in some signs of the crisis, such as: first, waves of migrants fleeing Ecuador to find better days for their families. From January to December 2021, about 81,000 Ecuadorians left and in September 2022 alone 21,000 left; by 2023, about 20,000 Ecuadorians migrate monthly; second, in 2022, intentional homicides reached the record of 4,603, which was 83% more than in 2021, placing Ecuador as one of the most violent in the Americas with a rate of 25 crimes per 100,000 inhabitants.

The governments announce, periodically the execution of large public investment to give a turn to the economic cycle that is slowed, however, at the moment we have not reached the production level of 2019, ie prepandemia. Nor does it emphasize the structural causes of underemployment, which has more to do with the economic development model that is not clearly assumed and still less consensual.

The objective of this article is to analyse comparatively the impact of public spending on underemployment and on labor income, both nationally and in the Northern Planning Region 1 (RNP1). The RNP1 corresponds to the territory that involves the provinces of Carchi, Imbabura, Esmeraldas and Sucumbíos. Economic theory indicates that it is possible to improve employment conditions, through the increase of household consumption, business investment or public expenditure; The increase of these variables generates expansion of

aggregate demand, which translates into job creation. The source of information is INEC, through microdata from the ENEMDU Survey, whose sample was more than 100,000 households nationwide.

Next, we make a brief conceptual review, and of public spending as a percentage of GDP, then we study the impact of the expansion of public spending on employment, comparatively between the national level and that of the RNP1 between 2007, 2014 and 2022. The theoretical framework and methodology are then reviewed and the dynamics of the labour market in the two areas of national and RNP1, that is to say in terms of variations, employment and wage levels in the branches of activity in which public investment predominates, such as construction and education. Finally, the conclusions; it should be noted that construction is a key branch in this study, because in addition to being sensitive to fiscal spending, it is intensive in low-skilled labor. In this context the manufacturing industry is added as a control variable or counter-factual, because, in this, in general, the private sector is present, but not the public, so it is important to follow its evolution.

Conceptually, the total population is divided into working age (PET) population (15-65 years old), as well as those not of working age; PET is divided into: inactive (housewives, students and pensioners among others) and in the economically active population (EAP). The EAP is divided into employed (full or suitable, underemployed, informal and other employed) in addition to the unemployed.

When evaluating the effect of public investment on direct employment in key infrastructure works such as electricity, roads, schools, hospitals, water and sanitation, Moszoro (2021) used a panel for 41 countries in 19 years, finding that it is estimated that US\$1 million of public spending on infrastructure creates 3-7 jobs, in advanced economies, 10-17 jobs in emerging economies, and 16-30 jobs in low-developing countries; comparing public spending of \$1 million on Research and Development (R&D) says it generates 5-11 jobs in OECD countries; green investment and investment with a higher R&D component have a greater impact on employment; Moreover, it estimates that one percent of global GDP in public investment can create more than 7 million jobs

In relating the construction of infrastructure to poverty, some authors such as Saavedra (2007), argue that there is a long-term link between these variables, the regional economy emphasizes that the construction of infrastructure, reduces transaction costs via greater connectivity between markets, generating agglomeration economies that increase GDP and reduce poverty.

The economy of economic growth shows the impact of construction on the living conditions of the poorest (by generating employment), as well as the effects of the reduction of market power in certain industries resulting from better infrastructure (elimination of isolated markets). In summary, according to Keynes (1936), public expenditure exerts an effect on aggregate demand, stimulating economic growth and employment.

Granizo (2018) points out that underemployment in Ecuador is increasing due to reductions in the percentage of public spending on construction, with people moving from the formal to the informal sector. Martínez (2018) points out that in Mexico, the price level, the production of the service sector and the minimum wage impact on informal employment.

Albert (1997) using surveys of official households, points out that there is a certain margin for regional and local dispersion of the salaries of Spanish civil servants, since some components of the salary depend on the characteristics of the work; regional and local governments can decide which wage supplements apply to different jobs.

García-Pérez (2005) in an article that provides a measurement of wage gaps in the Spanish public sector using data from the European Union Household Panel, showed that the balance between what private companies pay in the local market and what the public sector pays differs in different areas of the country. It adds that public sector wage differences between regions are mainly due to differences in performance, not differences in characteristics and selection effects, and are not constant between gender, educational levels or occupations (Garcia-Perez & Jimeno, 2005).

From the microeconomic perspective, the labour market of low-skilled workers, from the manufacturing and construction branches, can behave as substitute goods, that is to say, in the face of changes in the wages of workers in a branch, affects the demand for both; because these low-skilled workers of the aforementioned branches, faced with a rise in the salary of workers of one of them causes an increase in the amount demanded of the other (Pindyck & Rubinfeld, 2009)in addition to the subsequent increase in wages.

From the macroeconomic perspective, Hatano (2010) empirically studies the effects of public investment on private investment, pointing out that there is a historical perspective in which it is natural that there is a positive relationship between private and public investment and when estimating an error correction model, it measures the "crowding - in" effect of public investment on private investment.

In the Ecuadorian labor market, it must be taken into account that the legal minimum wage (SML) is an important benchmark, since it is the threshold from which it is defined whether a person is an occupied in the modern, informal or underemployed sector. At the level of the SML the amount offered is greater than the amount demanded (Pindyck & Rubinfeld, 2009), so there are pressures for the wage to continue to vary. The MLS is not necessarily fair or dignified, and it is difficult to decrease in an extreme fixed exchange rate regime such as dollarization.

Pindyck (2009), analyzing the US economy in the 1990s, points out that the wages of high-income skilled workers have risen considerably, while the wages of low-income unskilled workers have fallen somewhat in real terms. In the Ecuadorian case, it is observed that the employed linked to the education branch, we suppose a majority of the population qualified, have greater income inequality. Why has inequality in income distribution increased so much in the last two decades? The answer lies in the supply and demand of workers (Pindyck & Rubinfeld, 2009). While the supply of skilled workers, such as engineers, scientists, managers and economists, has grown slowly, demand has risen dramatically, pushing up wages.

II. Data and Methods

This analysis addresses the relationship between public investment, labour dynamics and women's participation, based on a set of data obtained in 2007, 2014 and 2022 in the framework of the household survey system of the National Institute of Statistics and Censuses (INEC), whose thematic module on the labour market is regularly implemented on a monthly basis. INEC (2022) has been running the National Survey of Employment, Unemployment and Underemployment (ENEMDU) since 1993. The ENEMDU is of continuous application, which is carried out the twelve months of the year, since 2018 specific improvements are proposed to the sample design of the Survey. The sampling technique of ENEMDU in 2022 is similar to that used in previous years and corresponds to a probabilistic sampling in two stages, with geographical stratification by study domains and urban and rural area. The estimators associated with the design are calibrated by a population projection calculated according to demographic methods.

The effective housing coverage by socioeconomic stratum by 2022 (INEC, 2022) was 105,848 homes nationwide; and in the RNP1 it is 16,168 homes in the four provinces. ENEMDU has as domains of study and representation, National, Urban-Rural, 5 major cities (Quito, Guayaquil, Cuenca, Machala and Ambato) and 24 provinces of Ecuador. To have a robust statistical analysis we work with the expansion factor for each analysis period, the expansion factor is a weighted, which allows you to multiply each selected element in the sample in order to get the estimate of the parameter at the level of the study domain it represents.

The 2022 ENEMDU interviewed 358,096 men and women nationwide. Economically active refers to individuals who are only employed or actively seeking employment (unemployed) at the time of the survey; the employed refers to those who are currently working for a pay or salary. The underemployed correspond to the employed, who have the following attributes: they fulfill a working time, but they would like to work more hours; also, there are those who have a level of income below the legal minimum wage (US\$400.00); also full employees (informal sector, own account); or, unpaid employees; and, employees without classification among the employed. The underemployed population surveyed, with these attributes, amounted to 102,204 individuals, 52,492 men and 49,712 women.

Statistical analysis

In the first instance, a descriptive analysis is performed for each year with information from the ENEMDU on the condition of activity of the population over 15 years of age, based on the revised literature (Pila Guzmán & Déleg Guazha, 2023), the following hypotheses are proposed:

H0: No significant differences in activity condition (Adequate/Full Employment, Underemployment due to insufficient working time, Underemployment due to insufficient income, Other unfulfilled employment, Unpaid employment, Unclassified employment, Open unemployment, Hidden unemployment) that men and women have.

H1: There are significant differences in the activity status of men and women. To compare the hypotheses, the statistical tests are applied for each period investigated and each study domain (national or RNP1). The statistical test used is Chi-square (χ 2), which allows through non-parametric methods, to evaluate goodness-of-fit tests (Lind et al., 2014):

Formula:

$$\chi^2 = \Sigma \left[\frac{(f_0 - f_e)^2}{f_e} \right]$$

With k-1 degrees of freedom, where:

K es el número de categorías.

 f_0 is the frequency observed in a particular category.

 f_e is the expected frequency in a particular category.

Data was analyzed using SPSS version 20 (SPSS Inc., Chicago, IL). Student's *t*-test was used to ascertain the significance of differences between mean values of two continuous variables and confirmed by nonparametric Mann-Whitney test. In addition, paired *t*-test was used to determine the difference between baseline and 2 years after regarding biochemistry parameters, and this was confirmed by the Wilcoxon test which was a nonparametric test that compares two paired groups. Chi-square and Fisher exact tests were performed to test for differences in

proportions of categorical variables between two or more groups. The level P < 0.01 was considered as the cutoff value or significance.

III. Result

Figure 1 shows that public expenditure for 2007 represented 16% of GDP, growing by about 10%, to 26.2% of GDP in 2014; then in 2022 it fell by 4% to 22.2% of GDP. The level of expenditure relative to GDP is highest in 2014. Figure 2 shows clearly that there is an inverse relationship between the growth of public expenditure (Ln Public Expenditure) and the variation of underemployment (Ln Underemployment).



Source: Central Bank of Ecuador and Economic Commission of Latin American and Caribbean (ECLAC) and INEC ENEMDU 2007-2022.

Figure 2 also shows that the coefficient of determination (R^2) is not, it should also be noted that public expenditure is the lowest in 2007 and that the highest is in 2019 (3.33), although in that year underemployment is also high (3.85), although not at the level of 2022 (3.94), which allows us to state that it is not enough for expenditure to be high, to alleviate underemployment, it is also necessary to direct that expenditure towards sectors that are labour-intensive and low-skilled, such as construction.

Economically Active Population:

The following shows the number of employed and unemployed, as well as the percentage with respect to the EAP; placing the last two columns the difference of individuals in each category, for the periods 2014-2007 and 2022-2014.

National. - Period 2007 - 2014

In table 1a, between the years 2007 and 2014, the employed grew by more than 808 thousand individuals, going from 2.7 million in 2007 to 3.5 million employed in 2014 at the national level; also growing the non-performing (informal) employment 420 thousand people, going from 1.5 million individuals in 2007 to 1.92 million in 2014. It is also important, in the years mentioned, the decrease of underemployment (underemployed due to insufficient working time or income, unpaid employment, other unfulfilled employment and unskilled employment) in the order of 93,1 thousand underemployed equals a decrease of -4.9% of the EAP.

National. - Period 2014 - 2022

In the same table 1a, following the national level, between the years 2014 and 2022 the figures of adequate or full employment and underemployment, show us a completely different picture, adequate or full employment decreased by -534,000 individuals, going from 3.54 million in 2014 to 3.01 million in 2022. The number of unfilled employees rose by 625,000, from 1.92 million in 2014 to 2.55 million in 2022. The most alarming is the growth of underemployment due to insufficient working time, which grows by 736 thousand people, going from 759 thousand people in 2014 to 1.5 million people in 2022.

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Employed / Unemployed - Year	2007		2014		2022		Difference 2014-2007	Difference 2022-2014
I Jier I I Jier I	Frecuency*	%	Frecuency*	%	Frecuency*	%	Frecuency*	Frecuency*
Adequate/Full Employment	2.737.159	43,2%	3.545.802	49,3%	3.011.800	36,0%	808.643	-534.002
Underemployment due to insufficient working time	860.315	13,6%	759.651	10,6%	1.496.089	17,9%	-100.664	736.438
Underemployment due to insufficient income	295.557	4,7%	166.123	2,3%	122.757	1,5%	-129.434	-43.366
Other not full or suitable employment	1.504.001	23,7%	1.924.634	26,8%	2.549.766	30,5%	420.633	625.132
Unpaid employment	557.147	8,8%	508.476	7,1%	893.980	10,7%	-48.671	385.503
Unclassified employment	65.155	1,0%	16.421	0,2%	16.504	0,2%	-48.734	83
Open Unemployment	193.225	3,0%	216.941	3,0%	234.246	2,8%	23.716	17.304
Hidden unemployment	123.472	1,9%	56.472	0,8%	32.696	0,4%	-67.000	-23.776
Economically Active Population	6.336.031	100,0%	7.194.521	100,0%	8.357.837	100,0%	858.490	1.163.316
Total Population	13.682.305		16.148.648		18.183.483		2.466.343	2.034.835

Table 1a. - Economically Active Population -National: 2007, 2014 and 2022- Percentage of the EAP.

Source: ENEMDU, December 2007, 2014 and 2022. [online database] https://ecuadorencifras.gob.ec/labor/ Note: *Sig.< 001

Northern Planning Region 1.- Period 2007 - 2014

Table 1b, in which the EAP of the RNP1 is distributed, shows an adequate employment growth for the years 2007 and 2014, in the order of 54.7 thousand employed, of another not full employment (informality) 36.1 thousand employed and a significant fall in underemployment, both from that due to insufficient working time (-4.7 thousand employed) and from insufficient income (-3.06 thousand employed).

Table 1b. - Economically Active Population -Northern Planning Region 1: 2007, 2014 and 2022- Percentage of the EAP.

	Employed / Unemployed - Year	2007		2014		2022		Difference 2014-2007	Difference 2022-2014
	Frecuency*	%	Frecuency*	%	Frecuency*	%	Frecuency*	Frecuency*	
	Adequate/Full Employment	175.069	35,4%	229.756	40,0%	214.332	28,0%	54.687	-15.425
	Underemployment due to insufficient working time	66.436	13,4%	61.664	10,7%	134.352	17,6%	-4.772	72.688
	Underemployment due to insufficient income	22.854	4,6%	19.791	3,4%	21.883	2,9%	-3.063	2.093
	Other not full or suitable employment	148.494	30,0%	184.600	32,1%	239.643	31,3%	36.106	55.042
	Unpaid employment	56.296	11,4%	47.980	8,4%	117.896	15,4%	-8.316	69.916
	Unclassified employment	2.388	0,5%	519	0,1%	-	0,0%	-1.869	-519
	Open Unemployment	12.127	2,5%	23.356	4,1%	29.840	3,9%	11.229	6.484
	Hidden unemployment	10.968	2,2%	6.679	1,2%	6.885	0,9%	-4.289	206
	Economically Active Population	494.632	100,0%	574.345	100,0%	764.830	100,0%	79.713	190.484
	Total Population	1.154.494		1.416.718		1.605.634		262.224	188.916

Source: ENEMDU, December 2007, 2014 and 2022. [online database] https://ecuadorencifras.gob.ec/labor/ Note: *Sig.< 001

Northern Planning Region 1. - Period 2014 - 2022

Table 1b highlights the growth of underemployment due to insufficient working time in 72.7 thousand employed, followed by the increase in unpaid employment (69.9 thousand employed) and other unfilled employment (55 thousand busy).

Adequate or full employment and underemployment

As can be seen from Figures 3a and 3b, in the period of the highest growth in investment and/or public expenditure, between 2007 and 2014, full or adequate employment at national level, compared to the EAP, is growing by 6,1%, being the decrease of underemployment of -4.9% of the total employed; but in the years that public investment or spending decreases, adequate employment decreases by -13.2% and underemployment soars in relation to the EAP increasing by 13.9%. This reality is repeated in the RNP1, since in the period of growth of public expenditure (2007-2014) adequate employment in relation to the employed, grows by 4.6% and underemployment decreases by -5.2%; whereas in the years when a timid growth of the public sector or a decrease is previewed.



Next, it analyses for the national level and that of the RNP1, the dynamics of the labour market, looking

at the variations over time, both of the ability to generate employment and of the remunerations to the workers through the labour income or salary. The branches studied are, on the one hand, those most linked to public sector investment, such as construction and education, and on the other hand, the most related to the private sector, such as the branch of manufacturing as a control variable, in addition, the conclusions of the study will be detailed.

Labour market dynamics in manufacturing, construction and education: National and Northern Planning Region 1

Manufacturing, construction and education in the national labour market National: 2007 vs. 2014

The difference in employment in the three branches of economic activity at the national level, comparing the years 2007 and 2014 in the three branches of activity was positive or growing, namely in manufacturing, construction and education employment grew, as shown in Figure 4a, Employment increased by 8.7% in manufacturing, 7.6% in construction and 0.9% in education.



Figure 5a. -Differences in Monthly Labour Income (wages) of Employed Population by quartiles, according to branches of activity, US\$ dollars



Source: ENEMDU, December 2007, 2014 and 2022. [online database] https://ecuadorencifras.gob.ec/labor/ Note: *Sig.< 001

In this respect, economic theory tells us that in the face of a growth in public investment, it should be translated into an increase in the employed population; moreover, when the demand for labour is displaced, it will put pressure on the wage increase. However, what can be expected with regard to the wages or income of the employed who entered the labour market in these branches of activity? Looking at chart 4a, effectively, between 2007 and 2014, for all three branches, labour income grew in the three quartiles. In manufacturing and construction growth is between US\$125 and US\$185, while in education income growth is higher nationally, as these grow between US\$276 and US\$325 in the three quartiles.

National: 2014 vs. 2022

On the other hand, when looking at the performance in the labor market between 2022 and 2014, we observed in graph 4a that the number of employed in manufacturing and education decreased by -1% and -0.7% respectively. The increase in the number of employed persons in the construction sector is only 1.7%, which is quite different from the figures obtained in the analysis carried out above. Regarding labor income or wages, in the three branches the average wage decreases in the first two poorest quartiles, growing in the third quartile by just US\$ 10, US\$ 40 and US\$ 20 in manufacturing, construction and education, respectively.

Manufacturing, construction and education in the labour market of the Northern Planning Region 1 RNP1: 2007 vs. 2014

Employment growth in manufacturing and construction in the RNP1 between 2007 and 2014 reached 5% and 11,6% respectively as shown in Figure 4b, and labour income increased between US\$ 90 and US\$ 265 in both sectors (Figure 5b), relatively higher than the national average revised in the previous section, especially in the third quartile.

In the education sector there is a decrease in the employed population between 2007 and 2014, but in turn there is evidence of a greater growth in labour income if we compare between the three sectors analysed, which is in line with the growth of national labour incomes (Graphs 4b and 5b). In this regard, economic theory indicates that in education there was an increase in demand, but also a decrease in the labor supply in this branch, possibly due to a greater requirement of the individuals enrolled in this branch, which forced them to change their activity, including others with better qualifications and expertise, resulting in a net decrease in the number of employed and a significant increase in labour income.





RNP1: 2014 vs. 2022

The RNP1 shows a small growth of employed workers in manufacturing (1.8%) and education (4%), with a notable drop in construction (-5.6%) as shown in figure 4b, fall also evidenced in the labor income of those employed in the construction sector in the order of -55% to fall in the first, second and third quintiles in -US\$ 70, -US\$ 145 and -US\$ 79 respectively, It is certainly evidence of the strong impact on the construction of a fall in public investment.

IV. Discussion

The policy maker faces a trade-of, which is summed up in the dilemma of using state resources for investment in public works, or not doing so, in order to avoid falling into fiscal deficit and reduce the sustainability of public management. In the Ecuadorian case, this public investment represents an alternative to the inability of the private sector to absorb the available workforce, whose supply is abundant, especially those with low levels of qualification. Employment generation through public sector investment is definitely crucial; at times of public investment boom, adequate or full employment in the modern sector is growing and underemployment or any

precarious form of employment is decreasing, as seen at both the national and RNP1 levels, which means an increase in the quality of life of the population. Entering the labour market as a full-time, suitable or modern-sector worker implies having access to all the rights that a decent job requires: membership of social security which gives access to the pension system when the worker retires, paid leave, thirteenth salary, among other benefits.

Although the growth of adequate or full employment in the RNP1 (4.6%) is lower than the national one (6.1%) in times of good public investment; the growth of underemployment, at a time when public investment is declining, is relatively important both at the national level (13.9%) and RNP1 (12.4%), with a significant deterioration in the quality of life of the population in both districts. In other words, in countries such as Ecuador, characterized by a small open economy, dollarized, heavily dependent on a non-renewable natural resource such as oil, the capacity of the public sector to absorb surplus labour, cannot be replaced by the presence of the private sector. As the absence of the public sector was noted, it has unfortunate consequences, such as those we now live in Ecuador and were outlined in the introduction to this document.

In general, it was observed that the fall (increase) in the percentage of employed people is accompanied by a fall (increase) in labour income, both nationally and in the RNP1. In the education sector an exception to this trend is observed, due to the perceived decrease (negative displacement) of labour supply in that branch, this results in an increase in labour income, as a result of the decrease in the number of employed persons. The latter phenomenon is most noticeable in the RNP1; then, in 2022, at the time of declining public investment, the market tends to balance in the education sector in the RNP1 growing both at the level of the employed population and at the level of labour income.

During the boom in public investment (2007 - 2014), the growth of the employed in the manufacturing sector at the national level (8.5% of the employed) and in the construction sector at the RNP1 level (11.6%) is more important, accompanied in both cases with an increase in labour income in the order of 45 and 50% respectively, considering the current legal minimum wage, which is around US\$400.

V. Conclusion

While dollarization has generated economic stability, with inflation of less than 3%, protecting the purchasing power of its citizens, it is an obstacle for the private sector to lead growth and employment generation, giving way to the public sector as the only short-term alternative capable of absorbing available labour. In addition, there is evidence that the activities promoted by the State, through its investment, as in the construction sector, is a source of encouragement for the revitalization of other sectors such as manufacturing, exclusive to the private sector. That is, contrary to the existence of an expulsion effect affecting the private sector, due to public sector investment; there is evidence of the existence of an attractive effect that energizes activities initiated with public resources that benefits the private sector and the generation of jobs.

In this context for a country like Ecuador the worst case scenario is that the public sector and its authorities ignore that they are a key agent in the creation of jobs.

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