Rio Social Change 2009-2016:
Is There a Pre-Olympic Legacy?

www.fgv.br/fgvsocial/rio2016/en

Executive Summary

The project's prime objective is to measure the evolution of the Rio population's living conditions after the Rio 2016 Olympics announcement. Our assessment is based on microdata from public use household surveys[1]. We analyzed several areas such as education, labor, housing, public utilities, transportation, digital inclusion and social development. Another goal is to act as an *ombudsman* of the Olympics social impact in Rio, making the results transparent to society. The project website cps.fgv.br/frio2016 provides user-friendly softwares that allows anyone to cross different sets of information and turn them into useful knowledge.

Rio won the contest to host 2016 Olympic Games against global cities like Chicago, Madrid and Tokyo, not because of its economic strength or its logistics infrastructure already established, but by the capacity of the Olympics transform the city. The term Olympic legacy generally refers to the projection of the prospective gains to be enjoyed by the city after staging the sports mega-event. In this sense, Rio choice could maximize the Olympic legacy. It has been common to observe different analysis of the impact of the Olympics on concrete objects of desire as tourism, sports infrastructure and even the environment. Sometimes it includes intangible elements as the value of the city as a brand or the soft power of the country, characteristic that, in other times, we used to boast about. However, we have little assessment on the direct social impact.

Yet, in the gap between the announcement and staging the event, have there been any relevant inflexions perceived in the historical data of the city of Rio de Janeiro? Was there any Olympic turnaround in the life of the Rio citizen? In other words, how was the local population impacted during the preparation period for the

[1] For most items, data was used for the first time ever for the Rio de Janeiro municipality scope in isolation.

Games? For example, was there any change in the home, school, work, transportation and so on? Who benefited most from the changes – were they the men or women? Or even the young, middle-aged or elderly?

Staging a global event in a territory once described as a "divided city" poses huge challenges in terms of inequality. What changes were made at the base of the Rio social pyramid? And did income distribution improved or deteriorated? Did it advance farther or less than in the other municipalities of *Greater Rio*[2]? These are empirical and factual questions studied with a vast collection of public microdata as yet unexplored in the sphere of the municipalities of the capital or metropolitan peripheries. Opening up such social data for Rio de Janeiro permits us to scientifically investigate the existence or not of a pre-Olympic social legacy. The website of the project provides user-friendly devices to help each of the users to crosscheck information of interest and transform it in its own practical knowledge.

We used a vast array of microdata to build a detailed empirical diagnosis of the day-to-day living conditions of the population in the municipality of Rio de Janeiro. We measured whether there was a shift in trend of each dimension after the Rio 2016 announcement, assessing if this shift is positive or negative. We looked at the simple evolution of the indicators over time, as well as at the change controlled by comparable attributes, such as gender, age, immigration, household size, education of spouse and husband that are ahead of households, and so on. This permit us to compare similar people at different points in time, separating the effects of a demographic composition in the observed changes. At a third instance, we compared the *carioca*[3] controlled changes vis-à-vis the other municipalities in *Greater Rio* in order to check whether there was relative progress. We used as benchmarks of the immediate pre-Olympic period the years 2008 to 2014 from the traditional *PNAD*. In the case of data of per capita income and based on it, namely poverty and inequality, we arrived at 2016 by intermediation of the *Continuous PNAD* and administrative records. A key point is to analyze to what extent the prevailing economic crisis has already affected the living conditions in the city.

[2] Rio metropolitan area.
[3] One who was born in Rio municipality.

The period before the Olympic announcement, in turn, is approximate, in the *PNAD*, for the 1992 to 2008 data. The idea is to check the possibility of an earlier downward trend related to the indicators. Combining the periods before and after the Olympic announcement, for each dimension analyzed, we tested to see whether previous trends had continued, checking if these trends were positive or negative. Or whether the trajectory is V-shaped or its inverse. This is the core issue pursued throughout this study.

General Results Abstract:

Changes in the quality of life in Rio after the Olympic announcement can be summarized in a final social scoreboard of **36** advances and **2** setbacks, these related to the commuting time for those who live in the city.

Of these 38 indicators, 24 are comparable before and after the announcement. Comparing econometrically the Rio changing patterns in relation to a control group made up of all other municipalities of the *Greater Rio*, it is noted that, after the announcement, the same score above was **18**-**1** in favor of Rio, with 5 statistical draws.

However, before the announcement of Rio2016, that is, from 1992 to 2008, the ultimate social score was **7**-**10** with 7 draws. So there was a negative trend on the growth of comparable indicators of the city that was reversed after the Olympic announcement**.**

Main Results:

Income and Labor – We began with income-based social measures, since the virtue of the *Continuous PNAD* (PNADC) and administrative records has allowed us to extend the data to May 2016. Let us see; the Olympics seem to have continued the upward trend of the Rio economy, or at least the income of the *cariocas*. Between 2008 and 2016 the per capita income in the municipality rose 30.3% against 18.2% of the other *Greater Rio* municipalities, and less than 20% for Brazil as a whole. And two thirds of Rio´s city growth occurred in the last three years. In other words, the Rio economy, from the people's viewpoint, took some time to take off after the announcement of the Olympic venue, but once on course the growth continued. In this interim, as a result of the Brazilian crisis, a drop in the price of oil and Petrobras, income came to a halt on the outskirts of *Greater Rio*.

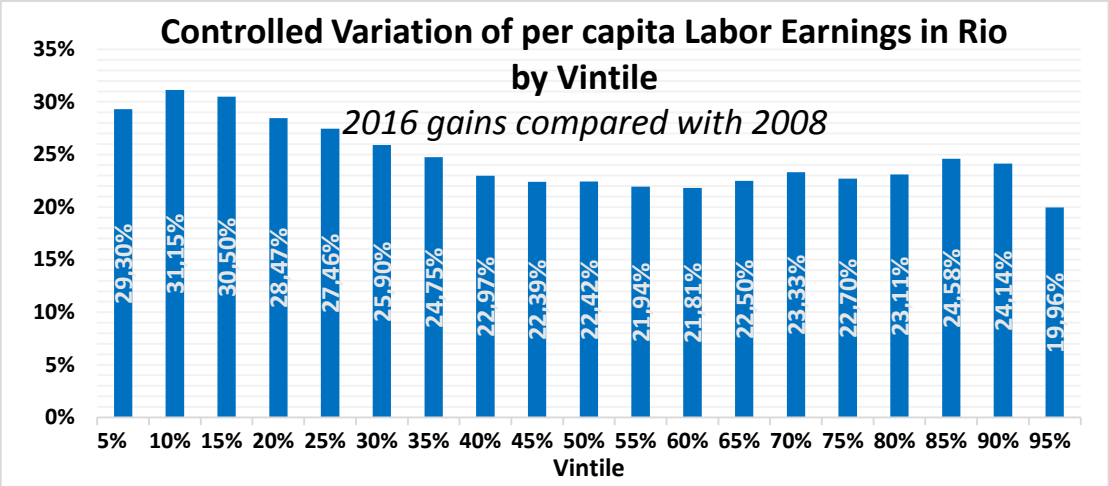
Inequality of per capita income fell from 0.55 in 2008 to 0.5438 in 2016, the lowest level in Rio historic data. Note that the internal inequality in the municipality is greater than that in the country as a whole – for example, in 2014 it was 0.546 in Rio de Janeiro capital against 0.515 in Brazil. From this point there is little decline in Rio inequality, but at least it does not rise, as indicated by the income inequality of Brazilian labor. That is, as in the rise of income, the data are consistent with the idea that the Olympics have helped maintain the achievements also in the fight for inclusive growth.

The main driving force of income distribution has been the labor market, which accounts for 82% of the Rio's growth against 44.7% of the periphery. Of the 27 Brazilian capitals and 9 metropolitan peripheries, Rio has the highest increase in individual labor earnings since 2013[4]. Almost the entire rise in unemployment of the municipality was due to the increase in the population that returned to the labor market looking for a job. According to demographic forecasts, the problem is the proportion of the working-age population, which is now dropping at ever-faster rates since 2016.

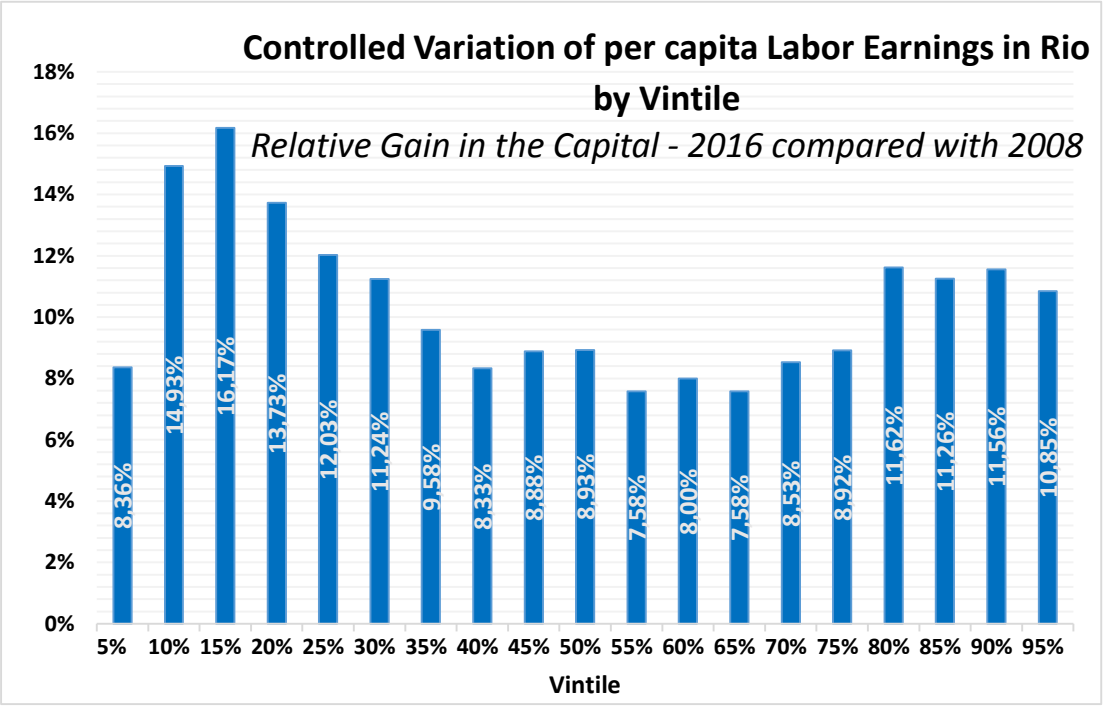
Our controlled exercises show that, in the pre-Olympic period, earned income increased throughout the income distribution, and stronger at the base. For example,

[4] Here the period is from 2013 to 2016, when income fell in 31 of these 36 places. The increase in Rio city unemployment is explained by the increase in the participation rate as a component of labor supply.

the income of the poorest 5% rose 29.3% against 19.96% of the richest 5%, as shown in the following graph.



In the last stage, we analyzed to what extent the municipality's data, vintile by vintile, varied by more or less than the corresponding data for the *Greater Rio* de Janeiro outskirts. For example, with the sociodemographic changes neutralized, namely the education of the heads of households and others characteristics, the poorest 5% in Rio had a real gain of 29.3% in comparison with its peers in the rest of the metropolitan area. The graph below shows that this same group had an 8.36% higher leap in earned income than the poorest 5% on the periphery and so on.



In the controlled comparison with the other municipalities on the *Greater Rio* outskirts, there is a statistically significant gain throughout the earned income distribution. This gain is particularly strong at the distribution base, especially for the poorest 15%, reaching 16.17%. In other words, more than half of the total labor earnings perceived by this share of Rio population differed in relation to their peers in the other municipalities of the Rio metropolitan area. This indicates not only a degree of progressivity but also sustainability of the gains achieved, by the fact that they have been obtained from labor and not from municipal, state or federal public transfers, for example.

General Results:

Trend After Olympics Announcement:

In short, we have a scoreboard with the results divided in three columns corresponding to the three empirical analyses over the period between the announcement and the Olympics realization. To assess whether the relevant indicator of a topic had improved, we used three criteria:

1) **change –** simple comparison of each indicator before the Rio2016 announcement (2008) with its last available data (typically 2014 or 2016). A sort of competition between the *carioca* society with itself to see if each dimension of the picture has improved in the period after the Olympics announcement. For example, taking the case of income, we see that there was a 30% improvement in the period after the announcement.

2) **controlled change –** similar to the preceding criterion, but keeping the people's sociodemographic characteristics constant in the comparison. We compared each group of people with their peers over time. These groups are organized by predetermined variables in the period in question, such as gender, age and race, or others with little change, such as immigration status and education of heads of households. In our competitive analogy, we took into account differences between people that can affect the result. For example, higher parents education facilitates their children's school performance. Using this criterion, we observed that the income of the same *cariocas* at different moments in time rose 12.90%.

3) **controlled difference-in-difference –** it goes a step further from the preceding criterion and compares the change with a control group composed by the other municipalities in *Greater Rio*. In this case, we compared the *carioca* film with the film of the control group. It is a dynamic competition of changes between peers in different geographic areas. In this criterion it is not enough to be better, but rather it is necessary to be even better than the others.

Results for Rio de Janeiro municipality after the Olympics announcement:

Criterion 1) Simple evolution (2008-2016*): **36** x **2** **(means 36 advances and 2 setbacks)**

Criterion 2) Controlled change (2008-2016*): **32** x **3** & **3 statistical draws**

Criterion 3) Controlled relative changes (2008-2016*): **23** x **5** & **10 draws**

Source: FGV Social/CPS with PNAD and Continuous PNAD microdata/IBGE

Post Olympics Announc. Social Scoreboard

Area of Interest		1) Cariocas Changes	2) Cariocas Conditional# Changes	3) Cariocas Relative## Conditional# Changes
Pub. Serv.	*Sewerage*	⇧	⇧	⇩
	Sewage in River or Lake	⇧	⇧	⇧
	Piped Water	⇧	⇧	⇧
	Garbage Collected Directly	⇧	⇧	⇧
	*Electricity**	⇧	⇧	⇧
Housing	*Density per bedroom*	⇧	⇧	⇧
	Three or more inhabitants per bedroom	⇧	0	⇧
	Financed own house	⇧	0	0
	Own house with bathroom	⇧	⇧	⇧
	Washing machine	⇧	⇧	⇧
Transport	*Transport Time (Direct to Work)*	⇩	⇩	0
	Transport Time evaluated in Wage	⇩	⇩	⇩
	Has a Car	⇧	⇧	⇩
	Has a Motocycle	⇧	⇧	0
	Has a Car and a Motocycle	⇧	⇧	0
Digital Incl.	*Used Internet in the last 3 Months*	⇧	⇧	⇧
	Used Internet in the last 3 Months – 15 years or +	⇧	⇧	0
	Has a Personal Cellphone	⇧	⇧	⇩
	Has a Computer with Internet at home	⇧	⇧	⇩
	Has a Cable TV	⇧	⇩	⇧

by sex, age, color, immigration, household size, parents education
in relation with the remaining part of the Metropolitan Area of Rio de Janeiro

Post Olympics Announc. Social Scoreboard

Area of Interest		1) Cariocas Changes	2) Cariocas Conditional# Changes	3) Carioca Relative## Conditional# Changes
Education	*Years of Schooling – Total Population*	⇧	⇧	⇧
	Years of Schooling - 15 years or +	⇧	⇧	0
	Years of Schooling - 5 to 14 years	⇧	⇧	⇧
	Attends School - Below 15 years	⇧	⇧	⇧
	Goes to Public School - Below 15 years	⇧	⇧	⇧
	Goes to City (Municipal) School - Below 15 years	⇧	⇧	⇧
	Goes or Concluded College - 25 years or +	⇧	⇧	0
Labor	*per capita Household Labor Earnings*	⇧	⇧	⇧
	Contributes for Public Social Security	⇧	⇧	0
	Has a Private Pension Fund - 15 years or more	⇧	0	⇧
	per capita Household Labor Earnings – Microentrepreneurs	⇧	⇧	⇧
	per capita Household Labor Earnings – Wage earners	⇧	⇧	⇧
Social Develop.	*per capita Household Income – All Sources*	⇧	⇧	⇧
	per capita Household Income – Social Secutiry or BPC	⇧	⇧	0
	per capita Household Income - Others Sources	⇧	⇧	0
	per capita Household Income – (Total – Economy of Scale 0.5)	⇧	⇧	⇧
	Poverty - FGV Social Line	⇧	⇧	⇧
	Extreme Poverty - US$1,25/day PPP Line	⇧	⇧	⇧

Before X After Olympic Announcement

We now compare the movements of the series before and after the announcement of the Olympics, applying the so-called method of difference in differences. This implies reducing the dimensionality of the comparison because in the set of 38 indicators we have, only 24 are available before and after the announcement. The synthesis of comparison results can be seen below.

One last question: the Pattern of Changes changed between before and after Rio2016 announcement?

Social Scoreboard – Comparable Changes Before X After 2008

1) Cariocas Changes:
Before Announcement (1992-2008): 18⬆ x 6⬇
After Announcement (2008-2016#): 23⬆ x 1⬇

2) *Cariocas* Conditional Changes:
Before Announcement (1992-2008): 13⬆ x 5⬇ and 6 draws
After Announcement (2008-2016#): 20⬆ x 1⬇ and 3 draws

3) *Cariocas* Relative Conditional Changes:
Before Announcement (1992-2008): 7⬆ x 10⬇ and 7 draws
After Announcement (2008-2016#): 18⬆ x 1⬇ and 5 draws

We use these 24 indicators comparable before and after the announcement of the Olympic. Using “criterion 3)” to compare econometrically Rio changing patterns relative to a control group comprised of the remaining municipalities of the *Greater Rio*, it is noted that after the announcement the social scoreboard was 18-1 in favor of Rio with 5 statistical draws. However, before the announcement of the Olympics, that is, from 1992 to 2008, the social scoreboard was 7-10 with 7 draws. Therefore, the number of rising trends more than doubles and regression cases fall to one-tenth in comparison before and after the Olympic announcement. So we conclude that there was a negative trend on growth in a number of comparable indicators of the city that was reversed with the announcement of the Games. In particular, 6 of these indicators cannot reject the hypothesis of a trajectory of evolution "V" shaped in Rio: worsening before and improving after Rio2016 announcement.

Before and After Olympics Announc. Complete Social Scoreboard							
Area of Interest		Before Announcement (1992-2008)			After Announcement (2008-2016)		
		1) Carioca Evolution	2) Cariocas Conditional# Changes	3) Carioca Relative## Conditional # Changes	1) Carioca Evolution	2) Cariocas Conditional # Changes	3) Carioca Relative## Conditional # Changes
Pub. Serv.	*Sewerage*	⇧	⇧	⇩	⇧	⇧	⇩
	Sewage in River or Lake	⇩	⇩	0	⇧	⇧	⇧
	Piped Water	⇧	⇧	⇩	⇧	⇧	⇧
	Garbage Collected Directly	⇩	⇩	⇧	⇧	⇧	⇧
	*Electricity**	⇧	⇧	⇧	⇧	⇧	⇧
Housing and Transport	*Three or more inhabitants per bedroom*	⇧	⇧	⇩	⇧	0	⇧
	Financed own house	⇩	⇩	⇧	⇧	0	0
	Own house with bathroom	⇩	0	⇩	⇧	⇧	⇧
	Washing machine	⇧	⇧	⇩	⇧	⇧	⇧
	Transport Time (Direct to Work)	⇩	0	⇩	⇩	⇩	0
Education	*Years of Schooling – Total Population*	⇧	⇧	⇩	⇧	⇧	⇧
	Years of Schooling - 15 years or +	⇧	⇧	⇩	⇧	⇧	0
	Years of Schooling - 5 to 14 years	⇧	0	⇩	⇧	⇧	⇧
	Goes to School - Below 15 years	⇧	⇧	0	⇧	⇧	⇧
Labor and Social Develop.	*Has a Private Pension Fund*	⇩	⇩	⇧	⇧	0	⇧
	per capita Household Labor Earnings#	⇧	⇧	⇧	⇧	⇧	⇧
	per capita Household Labor Earnings – Microentrepreneur#	⇧	0	0	⇧	⇧	⇧
	per capita Household Labor Earnings – Wage earners#	⇧	⇩	0	⇧	⇧	⇧
	per capita Household Income – All Sources#	⇧	⇧	⇧	⇧	⇧	⇧
	per capita Household Income – Social Secutiry or BPC#	⇧	⇧	0	⇧	⇧	0
	per capita Household Income - Others Sources#	⇧	0	⇩	⇧	⇧	0
	per capita Household Income–(Total – Economy of Scale 0.5)#	⇧	⇧	⇧	⇧	⇧	⇧
	Poverty - CPS/FGV Line#	⇧	⇧	0	⇧	⇧	⇧
	Poverty - US$1,25/day PPP Line#	⇧	0	0	⇧	⇧	⇧

Source: FGV Social/CPS with PNAD and Continuous PNAD microdata