

Bachelor Degree Thesis

**THE EFFECTS OF ITALIAN FISCAL POLICIES ON  
HOUSEHOLDS' CONSUMPTION AFTER THE 2008 CRISIS, AN  
ECONOMETRIC ANALYSIS.**

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## Abstract

How does government spending affect private consumption? Is it still sufficient to reason only in macroeconomic theories or does it depend also on households' response?

During the recent global economic crisis in Italy, private consumption and investment rates crowded out dramatically, mostly because of the difficult access to credit, the uncertainty towards the future and the continuous increases taxation burden. To recover the economy, the Government formulated several legislation packages. Therefore, the interest for government intervention and its expenditure's effects (government multiplier) has been deeply renewed in recent times. However, the debate on its efficiency is still open. Economists found interesting results, but these really depend on: data used in the econometric model, the period analyzed and the status of the Country (indebtedness, political stability, financing's method, etc.). By means of macroeconomic theory models (Keynes, Ricardo) and through a case analysis of Italian citizens' propensity to consume and to save, it is empirically exposed in this paper that Italian households tend to spend less as income increases. But, by evaluating the new Italian Prime Minister Matteo Renzi "bonus Irpef" policy, a quantile regression investigates in depth how much of income affects the different consumption quantiles. From the analysis it can be inferred that during crisis, even if provided with more and more resources, low-salary earners tend to modestly spend, likely because of the precarious job behind them and the low degree of confidence towards the future.

**Keywords:** government multiplier, marginal propensity to consume, quantile regression.

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# 1. Introduction

The interest for fiscal policies and their effects both on citizens' consumption and on national output is emphasized during periods of recession. Notwithstanding, the longstanding debate seems to be controversial and still nowadays there is no clear consensus among scholars. Indeed, it is to be said that the response of private demand results to be very dependent on personal assumptions, data used and other variables, such as regression's method, exchange rate regimes, financial status of the economy, period under scrutiny and variables included in the regression. For instance, fiscal expansions when the debt is unusually high may act differently if they increase the tendency of a sharp future retrenchment (Corsetti et al., 2012). Alternatively, government spending may act differently according to how households perceive it (RBC model and Keynesian model). As a matter of fact, the desired, unique and universal answer does not exist. Hence, the analysis on how Governments' actions performed must be taken in consideration on a case-by-case level, i.e. by looking at a specific country in a specific period. Economic trends change. This is one of the reason for which I choose, for my analysis, as country *Italy* and as period *2004-2014*. Moreover, with the establishment of the new Prime Minister Matteo Renzi, the political debate in recent years is fierce on economic issues. The contest includes matters such as boosting consumption (*bonus Irpef*), reducing unemployment rate (*Jobs act* legislation) or solving public debt, and others such as pensions, welfare, social amortization, etc...

It seems that there is only one finding scholars agree on: during periods of recession and periods of zero-lower bound, the effect of Government spending on national Output is larger than in periods of boom. That is so because of the larger government multiplier. The government multiplier is the usual way to measure the effectiveness of Government spending impact on GDP. It is measured in a variety of ways, but the main idea behind it is that a change in government spending in a given period,  $\Delta G$ , causes GDP to increase by a more than a proportional amount<sup>1</sup>. This mechanism occurs thanks to the government multiplier,  $g$ .

Most of the macroeconomic models studied in classes predict that an increase in Government expenditure will positively affect national output. But what is its effect on private consumption, the largest component of GDP (it accounts for more than two third of national output in developed countries)? It is empirically demonstrated that it depends either on households' perception of public spending first and on households' behavior. The two most important models of

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<sup>1</sup>For a given government expenditure amount, national output increases more than one-to-one. This is called the Keynesian government multiplier.

these qualitative predictions contrast each other: the Real Business cycle model (RBC) and the IS-LM model. The first one is based on Ricardian assumptions, which consist essentially in infinitely-lived households, who are likely to perceive government spending as a future increase in taxes. The two facts are linked in that, the first is financed by the second, which in turn, is paid in the following years by citizens. As a result, households prefer to save now, as a prediction of less disposable income in the future<sup>2</sup>. The second model instead, predicts that an increase in government spending in a given year, boosts households' consumption, and as a result, employment and aggregate utility increase as well. In this fashion, people look after only to current income and not to their resource lifetime (J.Gali, et al., 2007). Therefore, to clarify the final effect of an increase in government expenditure, it is clear that the answer lies in how the spending is financed, and thus how citizens perceive it. As it is discussed above, several papers investigated on a case-by-case level and they shed some light on whether government economic intervention is worth or not. For instance, Gali et al. (2007) empirically demonstrated that as government spending on one hand boosts consumption, on the other hand it causes investment either falls or does not respond significantly. The authors implemented a simple dynamic general model, in which they included exogenous variables for government spending, plausible calibrations of the fraction of rule-of-thumb consumers<sup>3</sup>, and stickiness price degree.

In this work, after presenting a complete overview over the Keynesian government multiplier, it is given a focused inquiry on Italian households income, indebtedness and consumption's habits after 2008. The theoretical argument would act as basis for the analytics of the empirical work on government multiplier first and for the description of the Italian households micro-data analysis then.

At the beginning of 2014, the new Government headed by Matteo Renzi stabilized in Italy. First of all, his mission was to infuse to Italian households confidence in the future. Hence, several legislations were enacted, such as the "bonus Irpef". In order to test whether the channel through which the Renzi Government intervened, an empirical work is presented. As in everything else,

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<sup>2</sup> The mechanism through which households' consumption will decrease is deeply explained in Aiyagari, Christiano, and Eichenbaum (1990), Baxter and King (1993), Christiano and Eichenbaum (1992), and Fatás and Mihov (2001), among others. These are called also neoclassical view and they assume that households' consumption responds negatively on an increase in government spending. In other words, the present value of disposal income in year  $t$  becomes lower and lower as government spends more.

<sup>3</sup> Galí, Jordi, J. David López-Salido, and Javier Vallés. "Understanding the effects of government spending on consumption." *Journal of the European Economic Association* 5.1 (2007): 227-270. Rule-of-thumb consumers are defined as people whom do not borrow or save, but they are assumed to spend all income fully. In Gali et al. (2007), rule-of-thumb consumers coexist with Ricardian infinite-time horizon consumers.

there is no free-lunch in public spending: government spends on X, while the opportunity Y is foregone and eventually the negative externality Z occurs (X, Y and Z may be seen for example as bonus Irpef/80€ bonus, restructure of the schooling system and increase public indebtedness, respectively); above all, there is no short-cut or simple solutions to solve the problem. Thus, to minimize the risk of failure, an analysis of the object (Italian households' characteristics) should be implemented *a priori*, in order to identify the best strategy to implement. Eventually, to check whether the enacted policy performed well, an analysis of the responses is evaluated *a posteriori*. This is one mechanism of policy evaluation.

This work is divided in three macro sections: the first one is an overview on what scholars think about the government multiplier and how Italian economy performed recently. Subsequently, as an introduction to the empirical work offered, a summary statistics is provided. Then, the last part contains the conduction of two analyses: the first one is a study through some macroeconomic variables, such as GDP and all its components, Italian public debt and employment. The scope is to test the effect, or at least the correlation, of GDP components, Debt and Employment on national output during the recent global financial crisis; the second work instead, is based on microeconomic data, such as Italian households consumption, income and working status. The important fact here is to understand how much of income affects consumption, because there are several other factors, e.g. psychology, liabilities, society, family, which may intervene. To inspect different consumers' consumption habits, a quantile regression on them will be presented. In the end, results will be shown and a conclusive part concludes the paper.

## 2. Literature review: What Scholars think about government multiplier

In general, endogenous boosting policies are divided into two categories: those arising from *demand-side* and those from *supply-side*.

Policies arising from demand-side include those policies intended to grow through the enhancement of internal *aggregate demand*, defined as the sum of all expenditures made by government, firms, individuals and Trade balance (Export-Import) in a given country. This is just what John Maynard Keynes in 1930s identified as unique solution which the Government should intervene in during recessions, since monetary policies are powerless in boosting the economy out of recession since interest rate is already close to zero (C. Nelson, 2006, J.B. Delong et L.H.Summers, 2012).

Demand side policies include:

1. **Boosting people's disposable income by cutting tax rates or giving financial aid as subsidies.** A clear example is the “bonus Irpef” enacted in 2014 by the Renzi Government in Italy. In the empirical work in household consumption (last section), it is given a more detailed analysis of its efficiency.
2. **Increasing the level of Government expenditure.** It is the most efficient way to recover a Country from crisis in the short-run. However, nothing is given as free-lunch: as severe consequences in the long-run, an increase in public debt burden will occur next year or, alternatively, households would stop to consume since the disposable income will diminish (increase in taxation): of course, it depends on the financing method.
3. **Cutting interest rates to encourage more borrowing and thus spending.** It refers mostly to what Central Banks enact for banks and financial institutions. Therefore, it is out of interest in this work.

On the other hand, supply side policies aim to boost the economy to grow, or in other words, to supply more. These are policies that should produce more and they must be more reactive to changes. They include:

1. **Cutting tax rates**, thus giving people incentive to work harder and in a more productive way. It is difficult to achieve during crisis periods.
2. **Promoting education and training** - as the workforce becomes more educated, their skills increase as well as production should increase. This kind of reform is especially productive

in the long-run. In Italy, as Toniolo maintains in his paper “Italy and the World Economy, 1861-2011”, Italian average years of schooling increased by 2.9% during last decade. But then he argues that, by considering the quality of teaching method, Italian education system scored poorly, i.e. one of the least countries in the OECD rankings (Toniolo, 2011). Maybe something more here should be done.

3. **Promoting R&D.** Spending on R&D will help the Country find new more efficient ways to produce. Also this third solution is exclusively effective in the long-run.

For what concerns Government expenditure to GDP, despite the Italian and the EU average trends follow the same path, likely because of the crisis spread like wild fire, the former experienced much higher Government debt to GDP recently than the latter did. Generally, Government debt as a percent of GDP is used by investors to measure a country ability to make future payments on its debt, thus affecting the country borrowing costs and government bond yields. Italy recorded a Government Debt to GDP of 132.10 percent in 2014. It averaged 111.04 percent from 1988 until 2014, reaching the all-time highest level of 132.10 percent in 2014 and a record low of 90.50 percent in 1988<sup>4</sup>. Fiscal programs adopted both in USA and in the European Countries were called for more than \$1000 billion per year (O.Blanchard, 2012) in in the form of new measures, tax reductions and spending increases (2009-2012). Countries were constrained to spend so much because of the counter mechanical effect of the crisis: a decrease in output leads automatically to a decrease in tax revenues and to an increase in transfer programs, such as unemployment benefits. But the increase in public expenditure was also the result of the specific measures in the fiscal program aimed at increasing private spending.

Since 2008, people have a difficult access to credit. Of course, this fact hampers economic activity. It may be the case that the economy cannot return to its pre-crisis trend. It is hard to think that the unemployment rate, which is now around 13% in Italy, is not much higher than the natural unemployment rate (desired target), which most economists put at less than 6% (before the financial crisis). Therefore, most economists point to the aggregate demand side the most important aspect to focus on. An apparently straightforward solution is to increase Government expenditure (or decrease in taxes), but it has three main negative implications: firstly, financing cost implications (previously there are some of them listed); secondly, in the liquidity trap, aggregate demand no longer depends on the real money stock and the economy cannot grow up through the movements

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<sup>4</sup> Information extracted from the website [tradingeconomics.com](http://tradingeconomics.com) and Eurostat.



described by the AS-AD model; lastly, every time Government spends money, private labor, capital and resources are used, thus no longer available to the private sector (resource displacement reasons). However, Central Banks and International regulatory authorities should control the banking system (Monetary policies). Therefore, they are out of control of the single Country. Eventually, in the medium-run, very low housing investment and thus a stable housing stock, together with a growing population, should in theory lead to an increase in prices and in housing investments in the future. Low purchases of consumer durables and of equipment now imply higher purchases later. This is usually what economists called the *pent up demand* effect: cars and machines break down and must be replaced. The demand that does not take place today is pent up and deferred, and as a result, output will increase in the future (Blanchard et al. 2012). Another interesting way to see whether Government expenditure positively affects economic growth is by looking at the “Rahn Curve<sup>5</sup>”. The inverse relationship described behind the “Rahn Curve” suggests that for low levels of government spending on basic public services (law and order and a judicial system to enforce contracts), economic growth is positive. But as public spending rises, its contribution to economic growth diminishes. Eventually, Government expenditure reaches a point after which it hampers economic growth.

The renewed importance for government intervention as fiscal stimulus during crisis regards, among the others, Valerie A. Ramey, Professor of Economics at *University of California*. With passion, self-denial and intensity, she did empirical research mostly on how government expenditure serves as stimulus for economic growth during her life. In particular, she conducted several experiments in order to implement her essay *Can government purchases stimulate the economy?* (V.A. Ramey, 2011). The main finding of her most important work is that, eventually, government expenditure affects national output through the government multiplier, but it depends on several factors: the type of government spending, its persistence, how it is financed and the state of the economy. For different cases, it has different magnitude. For example, in USA over 1950-2008, it lies between 0.8 and 1.5. Unfortunately, it is not always the case. Indeed, Galí, Lopez-Salido and Vallès (2007) obtained different multipliers, even values of 2.0, but they considered two assumptions: firstly that more than 50% of consumers do not behave optimally, resulting in a higher Marginal Propensity to Consume (MPC); secondly, that employment is demand-determined. This is the same as considering the “zero lower bound” situation described in the New Keynesian model. As Christiano, Eichenbaum and Rebelo showed, a deficit-financed increase in government spending increases expected inflation. Contemporarily, when nominal interest rates are kept constant, the

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<sup>5</sup> Richard Rahn, chief economist for the U.S. Chamber of Commerce in 1986.

increase in expected inflation decreases the real interest rate (Fisher equation), spurring the economy. During this time, government multiplier may peak at 2.3 (Christiano et al., 2011). Similar values for government multiplier (around 2.0) were found by the Klein-Goldberger model, which studied the case through the marginal propensity to consume. Other estimates gauge it roughly equal to 0.55 in the short-run and to 0.74 in the long-run.

Similarly to the Klein-Goldberger model, in this paper the research is conducted by analyzing private marginal propensity to consume. I want to describe what could be the real effects of the last Italian political actions to increase the level of the economy after the last financial crisis. An extensive answer cannot be achieved, but with some data on Italian economic performance, I hope to clarify and understand the best way to fuel up Italian Consumption.

It has to be stressed however that, all the studies agree on the fact that during expansion periods, government multiplier is always lower than the one during recessions: in the former, government multiplier ranges from -0.3 to 0.8 (Auerbach and Gorodnichenko), while in the latter, government multiplier ranges between 0.6 (Ramey and Shapiro, 1998) and 2.3 (Christiano, Eichenbaum and Rebelo). It should be understood that there is huge degree of uncertainty involved in these estimates. One of the hurdles in implementing a specific and true value for government multiplier is that it is difficult to use “natural experiment” techniques in (macro) economics questions. To solve this issue, Ramey (2011) explained how several papers usually use panel data to estimate the effects of government expenditure on GDP growth. Suppose the government transfers \$1 to Italy and finances it by increasing lump-sum taxes across all the State, the true aggregate multiplier is 0, because the taxes and transfers cancel eventually in the aggregate. However, as Ramey maintains, by running a panel regression with time fixed effects (which solve out the economy-wide increase in taxes) and by following the definition of government multiplier, when MPC is 0.6, the estimated multiplier is 1.5, even though the aggregate multiplier for the experiment results to be 0.

The study conducted by Cwik and Wieland (2010) reveals also some important results. In 2010, they implemented the paper *Keynesian spending government multiplier and spillovers in the Euro Area* (Cwik et Wieland, 2010) for the European Central bank. They investigated whether the package stimulus announced in 2009-2010 by the ECB aimed at boosting the Euro Area more than one-to-one succeed or not. They used five different macroeconomic models with Keynesian government spending effect, defined as “the public spending as stimulus for additional private consumption” by the authors.

If on one hand the government spending effect on growth rate of GDP is not so straightforward, on the other hand existing literature throws light on the effect of fiscal policies (increase in government expenditure) on employment. During recessions usually, there is an overall jobless situation, and the government intervention is urgent. Despite using very different identification methods, many studies found multipliers on purchases or transfers of about 1.5 to 1.9 for income, resulting in an implied cost of \$35,000 per job created (Shoag, 2010). To conclude, more research is needed to understand how the local multiplier could be extended to aggregate (universal) multiplier.

Below, in order to have a more complete topic's view, it is implemented a personal summary table with the main findings about the government multiplier in the recent years.

<b>Study</b>	<b>Sample</b>	<b>Identification</b>	<b>Spending Multiplier</b>
<i>Evans</i> (1969)	Quarterly, 1948-1962 USA	Based on equations of Wharton and Brookings model.	Slightly above 2
<i>Barro</i> (1981), <i>Hall</i> (1986), <i>Hall</i> (2009) <i>Barro-Redlick</i> (2011)	Annual, various samples, some going back to 1889; USA	Military spending as instrument for government spending.	0.6 - 1
<i>Ramey-Shapiro</i> (1998), <i>Edelberg, Eichenbaum, and Fisher</i> (1999), <i>Eichenbaum-Fisher</i> (2005), <i>Cavallo</i> (2005) <i>Ramey</i> (2011)	Quarterly, 1947 – late 1990s or 2000s; USA  Quarterly, 1939 - 2008 and subsamples; USA	Dynamic simulations or VARs using RameyShapiro dates. VAR using shocks to Government Spending.	0.6 – 1.2, depending on sample  0.6 to 1.2
<i>Auerbach</i> and <i>Gorodnichenko</i> (2011)	Quarterly, 1947 - 2008; USA	SVAR that controls for professional forecasts, Ramey.	Expansion: -0.3 to 0.8; Recession: 1 to 3.6
<i>Fisher-Peters</i> (2010)	Quarterly, 1960 – 2007; USA	VAR - shocks to the excess stock returns of military contractors.	1.5 based on cumulative effect
<i>Acconcia, Corsetti, Simonelli</i> (2012)	Quarterly, 1990-1999; Italy	Use of Instrumental variables at provincial level	1.2 - 1.8
<i>Romer-Bernstein</i> (2009)	Quarterly, USA	Private forecasting firm model	1.57
<i>Cwik, Wieland</i>	Yearly, EU Area	Five macroec. model with Keynesian features (price - wage rigidities)	4/5: less than 1 1/5: more than 1
<b>Average</b>			

*Source:* Personal research on Google Scholar and Valerie A. Ramey (2011).

**Table 1.** Summary of studies about Government multiplier.

The government multiplier is calculated in a variety of ways. There are listed some of them below, but the one it is used during the research is the third one, the reverse of the MPS method. Then, the government multiplier is calculated as:

1. either as the *peak* response of GDP with respect to the initial fiscal impulse

$$g = \frac{\max_n \Delta Y_{t+n}}{\Delta G_t}$$

2. or as the *impact* response divided by the impact impulse

$$g = \frac{\Delta Y_t}{\Delta G_t}$$

3. or as the reverse of the Marginal Propensity to Save

$$g = \frac{1}{1 - MPC}$$

Notwithstanding, the debate on government multiplier and, more generically, fiscal policies mechanism through which a Country may restart, mixes theory with practice. Now it is given an overview of the first, by following the Keynesian perspective, while in next sections the second will be analytically explored.

The theory part regards macroeconomic models, and it is taken as basis for the conduction of the research. In his pioneering work "The General Theory of Employment, Interest and Money" published in 1936, J.M. Keynes provides a completely new approach to the modern study of macroeconomics. In the new approach, his debates vary from employment to demand policies issues, and from the "military Keynesianism" to positive government intervention, which is essential to control the level of demand in the economy. He argues that aggregate demand is constituted by an autonomous component, investments, and an induced component, consumption. While consumption is a direct function and portion of income, savings being its complement, investments depend on expectations. Thus, following Keynes' reasoning and comparing it with facts on Italian recent economic activity, Investment has a significant effect on output and as a result people and Italian business have faith in the future. Both of them continue to invest (Investment rose on average by 0.3%) over 2010-2014 in Italy. Keynes explained then, because of the investment component, the level of production generated by the effective demand does not necessarily correspond to full employment. There may therefore exist economic stable equilibria associated with unemployment. Investment depends on the degree of confidence entrepreneurs have

on the future, which, according to Keynes, is mostly a psychological factor –and this is the reason why he calls it “animal spirits”. The degree of confidence functions as “barrier” to investment, by discounting the future flows earned by the investment. Not fully convinced that monetary policy could really help the economy out of the crisis, Keynes comes to the conclusion that the State should intervene actively in the economy to support the level of output and determine income distribution. Public investments should replace missing private ones and provide the system with adequate effective demand, thus increasing the level of production and employment and stimulating positive expectations of entrepreneurs. Government investments have to be financed through taxation or debt, taking advantage of the saving surplus unexploited because of depressed animal spirits. In Keynes’ view, when unemployment issue becomes enormous, public spending does not crowd out private spending but complements its current inadequate level. Autonomous components of demand (public spending and investments) have a multiplying effect on income, positively depending on the economy’s propensity to consume: it is the Keynes government multiplier’s mechanism. On the contrary, it is noticed that modern business cycle models, in both neoclassical and new Keynesian varieties, view private consumption as governed by "intertemporal optimization" (Corsetti et al., 2012). This generally implies that, unexpectedly, private consumption falls in response to an increase in government spending. As a result, output multipliers are considerably smaller than would be suggested by more traditional Keynesian analysis, which predicts a positive consumption response. By comparison with the findings shown in next section, the traditional Keynes prevision is consistent with the Italian government multipliers calculated in Italy during last financial crisis (1.62, 2.57 and 1.67), since they are utterly higher than 1.

By all means, the practice side of the debate instead, keeps the study lively, crisp and brisk, since an empirical analysis is developed in most of the existing papers. This is just what is shown next, after presenting a full summary statistics of the dataset used.

### 3. Summary statistics

The empirical work presented here is divided in two stages: the first one uses Italian macroeconomic variables, such as GDP, government expenditure, Italian public debt, Import, Export, private consumption, population level and employment. In addition to these, a sample extracted from *Banca D'Italia* database is extracted, in order to gather the Italian MPC over years. The latter is especially useful to measure the government multiplier in Italy during the recent financial crisis. The second stage instead, is based on a microeconomic analysis focused on the structure of Italian households resources composition. This second stage is entirely constructed by the survey composed by *Banca D'Italia* and enclosed in the document Survey on Households' Income and Wealth (SHIW). In what follows the two stages are presented thoroughly.

The dataset I personally composed is built with data extracted from the *Survey on Households' Income and Wealth* (SHIW) issued by *Banca D'Italia*. Despite the huge amount of existing empirical works on fiscal policies' effectiveness, it is "empty the box" on Italy's reaction to recent fiscal policies, probably because econometric studies prefer to analyze on several Countries for a more extended period of time. This is one of the reasons why the attention is exclusively focused on the new Italian legislations and actions taken after the 2008 financial crisis in order to boost the economy. Indeed, such a Country (Italy) and period (2004-2014) was still not empirically analyzed. Most of the subjects analyzed are either USA or the whole OECD Countries sample, over a long period of time (40+ years). For what concerns macroeconomic variables (GDP, employment, interest rate, etc..) at national level, data are directly downloaded from the online OECD library, which is publicly available.

Next section investigates the relation between government expenditure and GDP in Italy over 2004-2013. The variables used are accounted in quarterly intervals and they range from the first quarter of 2004 to the fourth quarter of 2013. The total number of observations is 40 per eight variables, producing the total number of observations  $n$  equal to 320. Thus, it is possible to infer, even though with some precaution, something. The macroeconomic variables are extracted from publicly available data on the OECD database. The eight variables are listed below:

- **GDP**: Italian GDP is measured in current prices and it is accounted in millions of national currency.
- **G**: Italian public expenditure also is measured in current prices and it is accounted in millions of national currency.

- **I**: Gross fixed capital formation/Investment. It is measured in millions of national currency, current prices.
- **IM** and **EX**: Italian Import and Export of goods and services. They are measured in millions of € and in current prices.
- **POP**: Italian population level. Inhabitants calculated in millions.
- **DEBT**: General Government Debt, calculated as a percentage of national GDP.
- **EMP**: total employment rate, calculated as the ratio between total population and number of employed people.

It has to be noted that, in order to have the last three variables (POP, EMP, DEBT) also in quarterly accounts, it is used the linear interpolation method. The reasoning goes like this: it is calculated the growth rate of the variable from a given year to the next; then this average growth rate is divided by 4, and finally, the variable measured at the beginning of the year is interpolated over the following three quarters. In other words:  $X_{t+1} = X_t (1 + \frac{r}{4})$ , where X is the variable to be interpolated; t is the first quarter, t+1 is the second quarter, etc.; r is the average growth rate in percentage, specific to the variable X. This adjustment is based on the assumption that the variables POP, EMP and DEBT follow a constant rate of growth within a given year.

Subsequently, in order to gather data on Italian households' income structure, the dataset from *Banca D'Italia the Survey on Household Income and Wealth (SHIW)* is downloaded. The survey started in the 1960s *with the aim of gathering data on the incomes and savings of Italian households. Over the years, the scope of the survey has grown and now includes wealth and other aspects of households' economic and financial behaviour such as, for example, which payment methods are used.* In this empirical work, the SHIW sample is considered between the year 2006 and 2012. The SHIW covers a sample of 8,151 families composed of 20,022 individuals. The questionnaire randomly is proposed to different families, from south to north of Italy, in order to deeply explore the composition of them and to create some statistical inferences. The questionnaire is 62 pages long, it is proposed every two years and it is divided in six sections:

- a. Composition of households
- b. Employment and incomes
- c. Payment instruments and form of savings
- d. Principal residence, other property and debt
- e. Household expenditure
- f. Supplementary pension funds and insurance policies



The dataset loaded on R is renamed with the label “households”. The 13 variables useful for this research are calculated in euro and as an average over the period 2006-2012. The sample covers 20,022 observations for each of the thirteen variables, since there are 20,022 respondents in the survey who fill to all the questions.

- **Y**: annual income
- **C**: annual consumption (on nondurables goods
- **S**: annual saving (complementary data,  $Y=C+S$ )
- **SEX**: binary variable (1=Male and 2=Female)
- **YL**: Payroll Income
- **YT**: Pensions and net transfers
- **YM**: Net self-employment income
- **YC**: Property income
- **PF**: Financial liabilities (liabilities to banks and financial companies, trade debt, liabilities to other households)
- **ETA**: Age in years
- **QUAL**: Employment Status (1=blue collar worker, 2=office worker or school teacher, 3=cadre or manager, 4=sole proprietor or member of the arts or professions, 5=other self-empl., 6=pensioner, 7=other self-employed)
- **Q**: Working status (1=employee, 2=self-employed, 3=not-employed)
- **AREA3**: geographical area (1=Nord, 2=Center, 3=South and Islands)

However, some drawbacks in data sampling emerged over years. This happened because the low-quality information coming mostly from general sample surveys, as the SHIW in this case. G. Cifaldi and A. Neri (2013) argued that in the SHIW dataset, some of the variables are either underestimated (consumption) or overestimated (savings). Moreover, they found that these measurement errors are particularly accentuated for high levels of income. Therefore, in this work it has to be stressed *a priori* that consumption rates for low-income households is higher than predicted by the SHIW.

## 4. Analytics I: Tax and Government expenditure multiplier

In this section it is given an overlook on the Italian situation after the crisis, by analyzing GDP, government spending, public debt burden and consumers and business confidence. It serves primarily as a basis for the study on the Italian government multiplier.

As it has been extensively explained before, the theory suggests that government undertakes fiscal policies, that is changes in level of taxation or government expenditure, mainly with the scope of promoting the achievement of a macroeconomic objective. Withal, fiscal policies increase the level of GDP in two ways: directly and indirectly. The direct effect is straightforward because when governments lower taxes, consumers have more disposable income; similarly, when the government spends more on goods and services, the population, which provides those goods and services, receives more money. Therefore, fiscal policies make a nation wealthier and thus increase aggregate output. Per contra, the indirect effect is a little bit underhand. The indirect effect is induced by the so-called multipliers, which amplify the effect of a decrease in tax or equivalently an increase in government expenditure. The two multipliers are called *tax multiplier* and *government multiplier*. Both of them are based on some parameters, such as private willingness to consume. The marginal propensity to consume, or MPC, is a measure of that willingness. It is defined as “the amount of an additional dollar of income that a consumer will spend on goods and services”. It lies between zero and one, where small MPC values produce a large amount of savings and a small amount of consumption and large MPC values instead, stand for small amount of savings and a large amount of consumption. Of course, when taxes decrease, consumers will spend a larger amount of their income in goods and services compared to the period in which taxes were higher.

The main five categories in which government may supply services to people are: health, education, welfare, housing subsidy and general services. It can be figured out by analyzing data that these activities provided by the government are relatively new: they were extensively developed after the industrial revolution. Specifically, government expenditure increases over time: for example, at the beginning of the nineteenth century, government expenditure in a developed country, calculated as a fraction of GDP, was only 10%, while nowadays it reaches 55%. Government expenditure has invaded new territory as urbanization becomes apparent. To sustain a certain qualitative level of life's standard to its citizens, public intervention has started to supply ever more private goods. A part from history, once again the size of the effect of a change in government expenditure increases thanks to the government multiplier.

$$\text{Change in GDP} = \frac{\Delta G}{1 - MPC}$$

$\Delta G = \text{change in government expenditure}$

$MPC = \text{Marginal propensity to consume}$

For example, when MPC is 0.7, an increase in Government expenditure, G, of €100 million increases GDP by €300 million. This occurs through the government multiplier effect. But how is that possible in reality? When government intersperses money in the economy, e.g. either by building new roads or improving the health or the education system, population has more disposable income: they spend less in the services newly supplied by public authorities. This increase in disposable income leads people to spend part of it and save the rest. The money that citizens spend goes back into the economy and, possibly, somebody else will spend them. This process continues until, eventually, the final change in output created by an increase in government expenditure is significantly larger than the initial amount of government expenditure itself.

In order to calculate the Italian government multiplier, it is taken into account the average Italian households' income and consumption over the period 2006-2012, from the data provided by the SHIW. The formulas used to calculate the Italian multiplier  $g$  are:

$$g = \frac{1}{1 - MPC} \quad \text{and} \quad MPC = \frac{C_{t+1} - C_t}{Y_{t+1} - Y_t}$$

C=Consumption and Y=Income

The results for the Italian government multiplier are summarized in the table below and they are divided in different periods:

Period	Mean (g)	Standard deviation (g)
2006-2008	1,628	48,0814
2008-2010	2,573	87,635
2010-2012	1,6702	52,903

**Table 1.** Government multipliers in Italy, 2006-2012. Values realized by means of data extracted from SHIW, Banca D'Italia.

From table 1, we can see the values for the government multiplier over the period 2006-2012. Just before the financial crisis, the government multiplier was around 1.63, meaning that, through the government multiplier, one euro spent more by the Italian Government, will increase GDP by 1.63 euro in 2008. The same mechanism applies to the following two periods: in 2008-2010, the government multiplier measures 2.57, while in 2010-2012, it decreased again until 1.67. The above mentioned findings are *de facto* supported by the existing literature described in the previous section “What scholars think about government multiplier”: either in recession, in high indebtedness status or when taxes are used as financing method (all three absolutely consists with the Italian case), government multiplier is significantly higher than 1. At the bottom of these results there is a huge quantity of literature: Romer-Bernstein, 2009; Evans, 1969; Fisher-Peters, 2010 and Auerbach and Gorodnichenko (2011). However, as it is possible to see from the third column in table 1, the significance of these findings shrinks: the standard deviation of all three analyzed multiplier is really high. Likely, this is caused by the high volatility of the sample analyzed (households in the SHIW sample are part of very different income earner categories), and the simple approximation of the formula. However, to match formulas with facts and, more specifically, to see whether the theoretical government multiplier matches macroeconomic data, a regression between Italian GDP and government expenditure over the period 2008-2012 is run on R. It was chosen this particular period under scrutiny because it is just when the Government force issue is particularly accentuated. Economists’ attentive consideration is strong in these cases. The results, traced with the statistical software R, are presented below<sup>6</sup>:

```
> summary.rob (lm (GDP ~ G))
```

Coefficients	Estimate $\beta_i$	Std. Errors	z value	pr(> z )
(intercept)	177200	173300	1.022	0.307
Gov.exp	2.7	2.142	1.261	0.207

Heteroskedasticity robust standard errors used

Multiple R-Squared: 0.2459, Adjusted R-Squared: 0.1084 F-Statistic: 1.589 on 1 and Inf DF, p-value: 0.2074

**Table 2 and Figure 1.** Relationship between Government expenditure (independent variable) and GDP (dependent variable) in Italy, averaged on 2006-2012.

From the table 2, the first point to be noted is that the results are weak. Nonetheless, the graph shows a positive correlation between the variables GDP (dependent variable) and government

<sup>6</sup> In order to obtain heteroskedastic standard errors, *devtools* and *github* packages were downloaded and used.

expenditure (independent variable). The cloud of points is quite spread. In addition, from the table it is possible to see that the coefficient on G, government expenditure, is positive and it measures 2.7: one billion spent more by Italian Government, causes GDP to increase by 2.7 billion. In a sense, it may be seen as the government multiplier, because also in this optic the effect of public spending increases more than proportionally GDP. However, the coefficient on G is not statistically different from 0 and the regression shows an R squared really low, 0.25, meaning that the regression takes almost nonsense, or at least, government expenditure cannot explain alone GDP growth. Therefore, it is needed to include more explanatory variables to improve this model and to understand which variables most likely explain GDP. This is what is presented next.

The implementation is based on the following regression:

$$GDP = \beta_0 + \beta_1 G + \beta_2 I + \beta_3 EX + \beta_4 IM + \beta_5 POP + \beta_6 DEBT + \beta_7 EMP + u$$

>summary.rob (lm (GDP~ G+I+IM+POP+DEBT+EMP))

Coefficients	Estimate $\beta_i$	Std. Errors	z value	pr(> z )
(intercept)	-1119000***	66550	-16.819	<2e-16
Gov.exp	0.9652	0.8534	1.131	0.2581
INVESTM	0.6892*	0.374	1.842	0.0655
EX	0.6539***	0.1859	3.45	0.000561
IMP	-0.1712	0.2856	-0.6	0.5488
POP	0.01872***	0.001977	9.472	<2e-16
DEBT	-77.14	267.8	-0.288	0.772377
EMP	2107	2594	0.812	0.4167

Heteroskedastic robust standard errors used

Multiple R-Squared: 0.878, Adjuste R-Squared:0.8549

F-Statistic:3997 on 8 and Inf DF, p-value: <2e-16

**Table 3.** Regression on R between Italian macroeconomic variables, such as: GDP, Government expenditure, Investment, Export, Import, expressed in billions; Population expressed in thousands; Government debt and employment expressed as percentage.

The analysis of table 3 starts from the first variable, the mere subject of this work, G. Historically, Government expenditure grew over time in Italy. Therefore, it is very important to empirically see how it affects GDP. The coefficient in front of this variable,  $\beta_1$ , measures 0.965, meaning that as Government spends 1 billion more, the effect on GDP would be 0.9652 billion more, everything else held constant. Since the coefficient is smaller than 1, it is inferred from this regression that during crisis, government spending's effect is not fully incorporated and transferred to GDP. Its t-value is 1.131, thus  $\beta_1$  is not significantly different from zero. The second variable is

INVESTMENT and its coefficient  $\beta_2$  is 0.6892, statistically significant at 5%. This result is in contrast to the Keynesian thought: the crisis creates huge uncertainty for the future and as a result it is a barrier to investment. Households and firms rely on expectation. From this regression, we can see a contrasting result: Italian households and firms trust in the Government. They continue to invest, despite the dramatic situation of the crisis. Even though the coefficient is quite small (0.6539), it is still positive. The third variable is EXPORT,  $\beta_3$  is 0.653 and it is statistically significant, even at 1%. The other interesting variable is DEBT, which has a negative coefficient  $\beta_6$  of -77.14. It suggests that Italian public debt, hurts GDP, everything else held constant. This is explained mostly by the negative perception of foreign investors towards Italy. In the end, the high Italian public debt is not only important in internal accounts because of the financing costs and their negative externalities (e.g. lower consumption today as a prevision of future taxes) but also in external ones, because of the declassification of Italy in foreign investment perspective. It is important to note that to overcome and to relax the assumption of homoskedasticity, heteroskedastic standard errors are used. This specific case occurs when the variance of the unobservable term  $u$ , given the independent variables, is not constant. In other words, heteroskedastic standard errors are used mainly to control the variability of the error term (or some omitted variables), which is correlated with some of the seven variables included. *Expected inflation* may be one example of omitted variables, therefore present in the error term, correlated with an explanatory variable, IMPORT: when expected (future) inflation rises, current national imports increase as a prediction of a future increase in prices.

## 5. Analytics II: Consumer's perception of fiscal policies

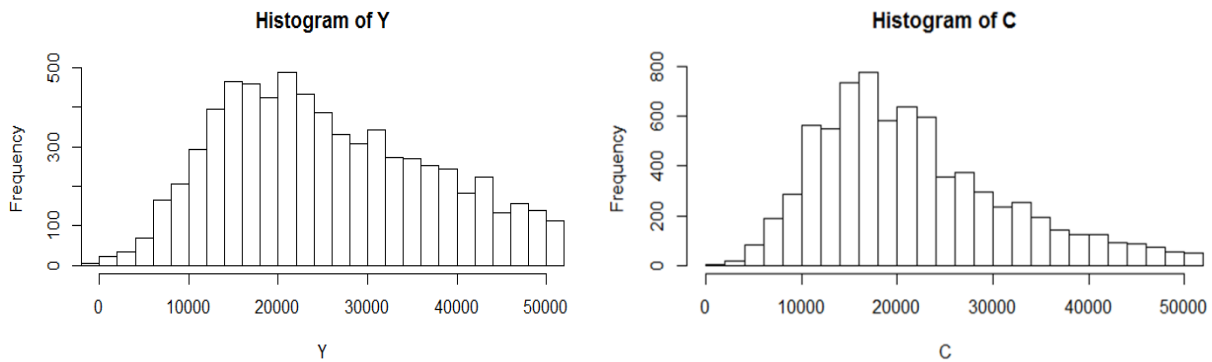
In the table below, it is implemented a summary statistics of the variables extracted from the SHIW sample. The command `summary(households)` is launched on R and some of the outputs showing the minimum value, maximum value, 1<sup>st</sup> quartile, median, 3<sup>d</sup> quartile and the mean are presented below.

```
>summary(households)
```

Variable	Min.	1 <sup>st</sup> qu.	median	mean	3 <sup>rd</sup> qu.	Max.
<b>Y</b>	-8,643	17,176	26,184	31,806	39,685	810,219
<b>C</b>	40	14,500	20,400	23,469	28,800	246,100
<b>S</b>	-94,656	826.5	4,680	8,156	12,098	775,219
<b>Sex</b>	1	1	2	1.514	2	2
<b>YL</b>	0	0	6,105	12,054	20,000	251,000
<b>YT</b>	-20,000	0	660	8694	14602	429,770
<b>YM</b>	-20,000	0	0	4327	0	800,000
<b>YC</b>	-18,572	2,213	5,457	6,728	8,593	202,642
<b>PF</b>	0	0	0	9640	0	2,500,000
<b>ETA</b>	0	27	48	46.1	64	104
<b>QUAL</b>	1	3	6	5.072	7	7
<b>Q</b>	1	1	3	2.385	3	3
<b>AREA3</b>	1	1	2	1.914	3	3

**Table 4.** Summary statistics of the sample households. It includes all the variables used in the micro analysis conducted in next section. The sample is composed by data of Italian households averaged on 2004-2012, the last available SHIW dataset. Legenda of the variables is given in the section “summary statistics”.

Moreover, the complete sample distribution for the two main variables, households Income Y and Consumption C, is represented below:



**Graph 1.** Distribution of the Italian average income (2006-2012) on the left and of the Italian average Consumption (2006-2012) on the right. Sample composed by 6504 observations. Values ranging from 0 to 50,000 euros per annum.

From the graph it is possible to see that the two distributions roughly approximate a normal Gaussian distribution. In the distribution of Y, the mass of the distribution is slightly concentrated to the right, thus the distribution is said to be skewed to the right. This is so because most of households in the sample, representing the whole population, earn annual income starting from 10,000€ per year. In other words, it is rare to have data on households who earn very low annual values (5,000-6,000 euros) relative to the whole sample. On the other hand, the distribution of C has most of the values concentrated on small values, the first quartile is closer to the mean than the Income's first quartile is to the Income's mean. Almost 60% of the whole sample tends to consume less than 24000€ per year on average over the period 2006-2012. Probably this is why Italian government set to this amount the ceiling annual income for the 80€ bonus policy. In details, the law decree number 66/2014 art.1, published in the Official journal n.95 on 24th of April (also called bonus Irpef), is addressed to regular employee with a minimum salary of 8000€ and a maximum salary of 24000€. He or she would receive 80€ per month (24000€, 25000€ and 26000€ income earners will receive 60, 40 and 20€ per month, respectively) by him or her employer permanently, i.e. for an undefined period of time.

As I said before, the interesting period is the one from 2006 to 2012, the latest year of available data. Therefore, analyzed data on income do not include the additional 80 euro, provided by the decree 66/2014 (*bonus Irpef*), but to see the decree's effects, it is important analyzing the features of Italian habits. Unfortunately, SHIW Data sample exists for every two years. Composed by 6,542 observations, I firstly divided the sample in four main categories, depending on the level



of income<sup>7</sup>. The first category is composed by 746 observations, and the level of annual income ranges from 0 to the first quartile (17,180 euro). The second bracket is composed by 2,853 observations, resulting the largest of the four, and annual income ranges from the first quartile, 17,180, to the mean 31,810. Effectively, this group together with partial of the first are the subjects of this study because they consists in households entitled to receive the bonus Irpef. In the sample they counts for 2627 observations. The third category ranges from the mean, 31,810, and the third quartile, 39,680. It includes 1023 observations. The last and richest category is the one in which annual income is greater than 39,680, the third quartile. The number of observations here is significant, i.e. 1,920, and it is the second largest category of the four.

Variable name	Mean Value (Standard Deviation)			
	<17180	[17180,31810]	[31810;39680]	>39680
<b>Income (Y)</b>	8,373 (2778)	23,946 (4127)	35,586 (2256)	61,225 (39621)
<b>Consumption (C)</b>	10,212 (4737)	20,076 (6489)	26,411 (8024)	38,337 (18466)
<b>Saving (S)</b>	-1,906 (5502)	3,870 (6250)	9,175 (7995)	22,887 (34738)
<b>Observations (N)</b>	746	2,853	1,023	1,920

**Table 5.** Summary statistics of the variable Income, Consumption, and Saving averaged over 2006-2012, Italy. Data are extracted from the SHIW dataset. Income includes property income YC (instead by looking at income at net of property income, the mean becomes 25,078 euro).

In order to understanding how different categories of Italian households spend during crisis, three regressions on R will be showed below, each one with focus on the different quartile of the variable income. To get the variable income's measure to be more consistent with the international standard, I subtracted property income YC from total income Y. Moreover, QUAL and Q will not appear in the tables below because these variables are included in the adjusted sample, to get a narrower view of the group under subject. It means that, since they are not the target of the bonus Irpef, for the variable Q the values 2 and 3 and for the variable QUAL the values 4,5,6,7 are withdrawn from the sample. First category's results are:

<sup>7</sup> Income (Y) is calculated as the average of the respondents' Incomes over 2006-2012.

```
>summary.rob(lm( c2~ y2+sex2+pf2+eta2))
```

Coefficients	Estimate $\beta_i$	Std. Errors	z value	pr(> z )
<b>(intercept)</b>	5825.17**	2325.16	2.505	0.0122
<b>Y2</b>	0.81627***	0.21481	3.799	1.09e-06
<b>Sex2</b>	-743.53***	329.63	-2.256	0.0241
<b>Pf2</b>	0.05373**	0.02512	2.139	0.0324
<b>Eta2</b>	-4.73599	6.6451	-0.713	0.476

Heteroskedastic robust standard errors used, Multiple R-Squared:0.0522, Adjusted R-Squared: 0.03215; F-statistic:41.48 on 4 and Inf DF, p-value: <2.2e-12

**Table 6.** Regression run on R. The category analysed ranges from the first quartile and the mean of the variable Income.

This table presents the results of the relation between the dependent variable c2 and four explanatory variables, i.e. y2, sex2, pf2, eta2. It is interesting to see the first coefficient on y2: it is 0.81627, meaning that as an individual coming from a poor family earns 1€ more, on average and keeping all other factors constant, he will spend 0.81€ more. In fraction, he spend more than 80% of its annual income. The coefficient is statistically different from zero since z-value is 3.799., therefore it is quite robust. If we use this result to evaluate the specific case of the “bonus Irpef”, which contemplates giving a monthly 80€ bonus to households whom earn less than 26,000€ per year, then the effect of this policy is significant: by receiving 1920 euro per year (80euro x 12 months=1920 euro), the poor class on average spends 1,568 euro of it. The remaining amount of 352 euro is saved for next months. This result is not so favourable, because it is likely caused by the households’ fear for the future effect, that is a future increase in taxes is expected.

```
>summary.rob(lm( c3~ y3+sex3+pf3+eta3))
```

Coefficients	Estimate $\beta_i$	Std. Errors	z value	pr(> z )
<b>(intercept)</b>	7599*	3954	1.922	0.0546
<b>Y3</b>	0.5161**	0.1097	4.706	2.53e-06
<b>Sex3</b>	93.07	492.9	0.189	0.8502
<b>Pf3</b>	0.01935	0.0193	1.622	0.1048
<b>Eta3</b>	2.699	11.22	0.24	0.81

Heteroskedastic robust standard errors used , Multiple R-Squared: 0.03078, Adjusted R-Squared: 0.02699, F-Statistic: 25.68 on 4 and Inf DF, p-value: <2.2e-16.

**Table 7.** Regression on R. The category analysed ranges from the mean to the third quartile of the variable income.

```
>summary.rob(lm( c4~ y4+sex4+pf4+eta4))
```

Coefficients	Estimate $\beta_i$	Std. Errors	z value	pr(> z )
<b>(intercept)</b>	18020***	4158	4.333	1.47e-05
<b>Y4</b>	0.2949***	0.08674	3.399	0.000676
<b>Sex4</b>	46.65	639.1	0.073	0.94181
<b>Pf4</b>	0.003759	0.004258	0.883	0.377
<b>Eta4</b>	3.649	15	0.243	0.8078

Heteroskedastic robust standard errors used, Multiple R-Squared: 0.01323, Adjusted R-Squared: 0.009369, F-Statistic: 13.08 on 4 and Inf DF, p-value: 1.191e-10.

**Table 8.** Regression on R. The category analysed ranges from the third quartile to the last percentile of the variable income.

It has to be stressed that the marginal propensity to consume of poor individuals (recall: 81% of annual income), is the lowest among all the other categories: the coefficient on y3 is 0.51 and the one on y4 is 0.30 (both are significant). Of course, this is explained by the fact that the low-income category still has to buy (nondurable) primary goods, such as food, clothes and machines and to pay rental fees, for instance. But these goods are of course of lower quality with respect to the ones of high-income categories. Moreover, all categories' MPC decreased during the recent crisis period (source: prediction of ISTAT), because of the pent up effect previously described. Rich categories have surely more resources and more accessibility to them, for example because of owning an house or more access to financial aid (less interest charging). It has to be stressed also that the coefficient on SEX4 and SEX3 becomes positive, but not significant: we cannot reject the hypothesis that during crisis male and female consume the same amount of euros in a year.

## 5.1. Quantile regression

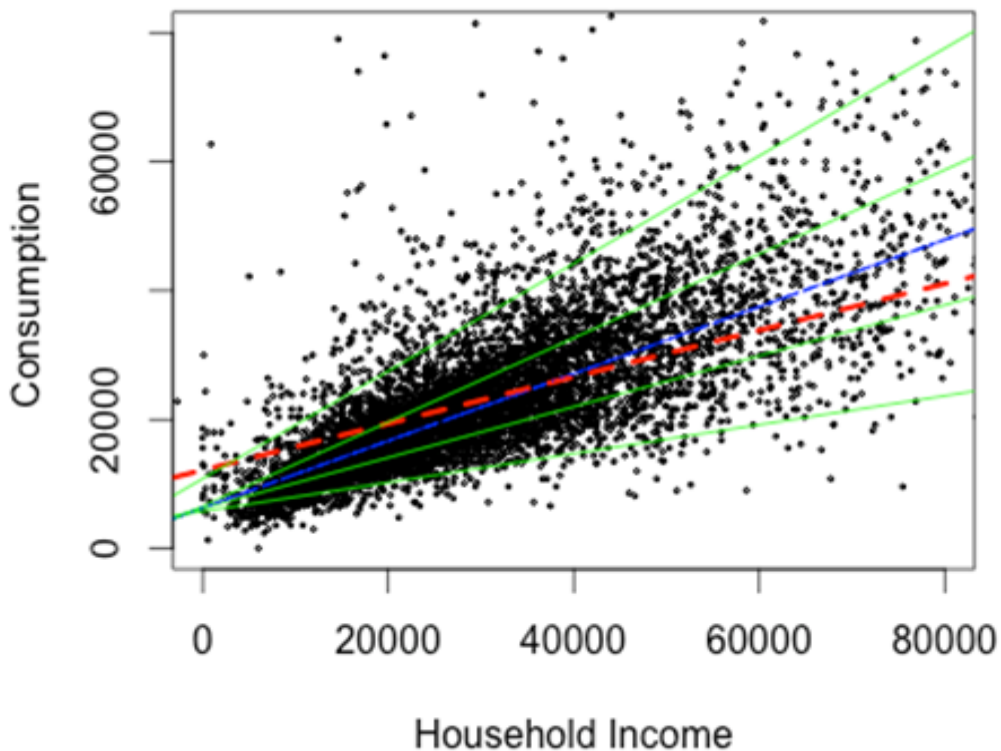
To better understand the effectiveness of fiscal policies aimed at recovering the Country's economy, by boosting private/households consumption, it is not only needed to reason in terms of standard macroeconomic models, e.g. Keynesian models, IS-LM model, but also in terms of real consumers' perception and response to enacted legislations, e.g. liquidity constraint features and precautionary save. In fact, in reality, consumers tend to respond differently to changes in their economic resources, either as a consequence of an increase in income or an increase in taxes. Since the beginning of February 2014, the new and youngest Italian prime Minister ever, Matteo Renzi, was called to a tough job. Many reasons aggravated the post-crisis consequences in Italy. One of them was inadequacy of *ex ante* political actions (government instability and fragmentation), which caused in Italy a recession deeper and longer than in any other country. Soon after taking charge, he announced, and actually enacted, several policies to boost consumption (demand) of households brought down by the economic crisis. Indeed, to stimulate and support recovery of the Italian economy, he worked on several important reforms as those on labor and education.

To understand how effective such reforms can be, it may be important to investigate households' perception and response to fiscal policies, by analyzing how, according to their specific attitudes and preferences, they will probably react in response to enacted legislations, which is what my contribution tries to do with respect to income subsidies to stimulate consumption. To this purpose, a quantile regression is conducted in the following on an Italian sample between households consumption levels and their income levels.

Roger Koenker and Gilbert Bassett introduced the quantile regression method for the first time in their paper "Regression Quantiles" (1978). Quantile regression process is a useful and evolving tool in statistics and econometrics, quite effective in comparing inferences of an independent variable (X) on the different dependent variable's (Y) percentiles. The data on the Italian households sample are computed as an average over 2008-2012 and include households income as the independent variable (X) and households consumption as the dependent variable (Y). In fact, in this particular case, we are not interested in the mean of the *household consumption* variable, but in some other statistics. Interesting questions for example are "what affects the 1<sup>st</sup> quartile or the 95<sup>th</sup> percentile of the distribution on consumer?". This approach is justified because, as we have previously observed from the Italian household histogram, the composition of consumption is skewed to the left and the median income value (26,000) is lower than the mean value (31,800). Moreover, in comparison with OLS, quantile regression is implemented because of

its higher robustness against large household income outliers values. The commands launched on R are:

```
> install.packages("quantreg")  
> library(quantreg)  
> plot(Y, C, cex=0.25, xlab="Household Income", ylab="Consumption  
Income", xlim=c(0,80000), ylim=c(0,80000))  
> abline(rq(C~Y, tau=0.5), col="blue", lty=8)  
> abline(lm(C~Y), lty=2, col="red", lwd=3)  
> taus<-c(0.05,0.25,0.75,0.95)  
> for(i in 1:length(taus)) {abline(rq(C~Y, tau= taus[i]),  
col="green")}
```



**Figure 2.** Scatterplot on R with the package “quantreg”: Quantile regression Fit of the Household Income and Consumption Data. It shows Household consumption vs. Household Income for a

sample of 7,725 2008/2012 Italian households. The red line is OLS, the blue line is Median regression and the four green lines are the different quantiles regression lines.

From figure 2 it is possible to see several lines with different slopes which overlap a cloud of points: a dotted red line, representing the OLS, a blue line, representing the median regression line, and then four superimposed green lines, representing different percentiles (5th, 25th, 75th and 95th) regression fit. They are similar, although not the same: the scatter plot includes all the coloured lines with slope bounded between zero and 1. It means that as the Italian household income increases, consumption increases as well, even if less than proportionally. In details, the OLS line (red line) has a lower slope and a higher intercept than the median regression line: this suggests that the former predicts a softer income effect on consumption than the latter. In other words, the “median income” household (blue line) tends to consume less for low levels of income than the average household the OLS predicts, while he tends to consume more for high levels of income than the average household the OLS predicts. Because of the higher slope, it is also true that the “median consumer” is more affected by its own level of income than the consumer predicted by OLS.

Rather than predicting the mean of consumption, quantile regression process looks at its quantiles. Quantile regression outputs are shown through the four green lines (plus the above discussed blue line) in the graph: the closest to the x-axis is the 5th percentile regression line and it represents how the 5th percentile of households’ consumption is affected as their income increases: the line is really flat and it may be so because the low interference with income. Strictly speaking, it seems that the low levels of consumption do not really depend on the level of income, but may be affected by other variables, such as financial liabilities, geographical area, quality of life, family members, how income is generated and number of family income earners. However, all these variables are not taken into account in this work because they are out of its scope. In this work instead, since recent Italian legislations, in trying to boost private consumption, focused on increasing the level of income of the Italian households with low income, it is analysed how much of income affects private consumption. The next green line refers to the 25th percentile of the household consumption variable. Still, it is flatter than all the above lines (it has the same intercept as the blue and the 75th percentile green line but it lies below them), meaning that, also in this case, relatively low levels of consumption tend not to really depend on levels of income. Looking at these results, it can be inferred that levels of consumption do not exclusively depend on levels of income, but also we may assume on personal choices. Therefore, there exists a large quantity of relatively

rich households who do not consume so much as should be expected from their high income, but instead they tend to consume the same quantity of relatively poor households. The last two lines represent the 75th and 95th percentile regression between household consumption and household income. It has to be noted that they are the steepest among all the lines. In fact, these two regression outputs reveal a stronger relationship between the two variables, meaning that for high levels of private consumption, the financial status of the household must be high as well. Contrary to the result previously found, the high dependency here is straightforward: vigorous inputs, resources and, more generally, more solid background must accompany high levels of consumption. As a matter of fact, as on the one hand poor households cannot afford to spend the same as richer ones, on the other hand rich households can spend such low levels of annual consumption as poor ones, because they save the rest. Another possible reason in explaining the dichotomy between the low relationship between the role of income and low consumption levels is that many rich households choose not to smoothly consume a large fraction of their income, but they prefer to postpone purchases, also because of the uncertain future. Moreover, the post-crisis trend has stolen to the pre-crisis middle class many individuals, becoming the new (post-crisis) relatively poor class. This retrenchment is perceived more than its absolute value: if middle-class income (purchasing power, disposable income) decreased by 20%, then the willingness-to-spend decreased by much more, likely because of the low trust in institutions, low protection and the messy (financial) moment. But these reasons are only perceptible, and thus out of scope here.

A tentative interpretation of the counterintuitive result emerging from the analysis is presented below.

We need to observe that the sample analysed refers to Italian households who have had an income (unemployed are not included) before and during the crisis. We can assume that they were characterized by a certain propensity to consume when the crisis started and, as consequence, their attitude was to spend in consumption a fraction  $c$  of their income  $Y$ . We can also assume that, according to economic theory, different quantiles of households in terms of income had different propensities to consume and that those with lower income would spend a higher share of it in consumption (higher propensity). From a different perspective, this means that, if we took one at a time growing quantiles of consumption and proceed with a by-quantile-of-consumption regression of consumption on income, we should find steeper slopes (higher propensities to consume) for lower consumption quantiles.

Yet, this is not the case with our household sample. An opposite outcome emerges and is shown on the graph: flatter slopes (lower propensities to consume) for lower consumption quantiles. This means that for lower levels of consumption (lower consumption quantiles), as income increases (within the consumption quantile), propensity to consume remains low. Individuals with low consumption, even if provided with a higher income, would continue to save part of it (by putting aside money, by leaving them in bank account, etc.). On the contrary, for higher consumption quantiles, the slopes of the regression line are higher than those representing lower quantiles: richer individuals consume a bigger share of their income, when provided with additional money.

A possible explanation for this behaviour is that households with lower levels of income and consumption but high propensity to consume before the crisis have changed their minds during the crisis and reduced their propensity to consume becoming afraid that they may lose their (maybe precarious) job because of the crisis and don't have enough savings to live on. Thus, if now their income grows, they would mostly save the increase rather than spend it in consumption. Households belonging to higher quantiles of consumption, on the contrary, will feel safer with their incomes and levels of savings accumulated in the past and therefore will not reduce their propensity to consume.

Assuming this interpretation as valid, if the goal of the government was to stimulate the economy by giving a subsidy in cash (80 euros per month) to lower consumption (income) households, the result actually achieved may turn out to be poor. Frightened by the crisis, households belonging to the lower quantiles of consumption would most likely save the money rather than spend it. The ten billion euro spent in this way by the Government should have probably been spent more effectively financing a different fiscal policy. If the Government wants to stick to consumption policy anyway, a better idea could have probably been providing lower consumption quantiles of households with selective consumption coupons of an 80 euro value rather than with subsidies in cash. Selective consumption coupons mean coupons not substitutable for money.



## 6. Conclusion and improvements

The aim of this work is to investigate how much government expenditure is effective at boosting private consumption and overall national output. Many economists studied these effects using panel data regressions, but they eventually reach different results: the universal answer does not exist. Rather, they agree on the fact that public spending effect is higher in recessions and in periods of zero-lower bound than in booms (Auerbach and Gorodnichenko, 2010, V.A Ramey, 2011). With this as a basis, we saw through the recent Italian case that government expenditure increases more than proportionally national output. Indeed, government multipliers were calculated by means of SHIW (*Survey on households Income and wealth, Banca D'Italia*) and OECD macroeconomic data, resulting in values of 1.623, 2.57, 1.62 in 2006-2008, 2008-2010, 2010-2012 respectively. They are consistent to what the large majority of economists agree on: during periods of recession, low interest rate and high public indebtedness, government expenditure (financed by taxes on households in subsequent periods) increases GDP. Then, based on SHIW (Survey on households income and wealth) data, a micro analysis evaluated for different categories of income, the consumption rates of Italian households during the recent global crisis. The results are:

- The marginal propensity to consume of prudent individuals (controlling for PF, financial liabilities) decreases with household resources. In other words, richer people tend to consume less than poorer (roughly 0.29 euros vs. 0.81 euros for each additional euro), everything else kept constant.
- “Liquidity-constrained” consumers, that is people with low income, exhibit higher marginal propensities to consume than households who can, for instance, access to credit markets to smooth consumption. Nevertheless, to compare with professor Jappelli and Pistaferri, who studied the effect on consumption of a change in income in USA (2010), it should be stressed that the logic of our results is consistent.

In addition to the analysis previously described (based on level of income), the composition of the household’s resources may also matter. For example, by taking into consideration households burdened with an amount of financial debt, they probably will save more and more as the government enacts some fiscal policies and redistributes income. It is plausible that they are more willing to reduce their debt burden rather than spending (precautionary behavior). For all these reasons, the role of government is not quite easy when the implementation of fiscal policies becomes urgent: under an accurate analysis, it is possible to get along the best channel through

which the policy is most effective. In other words, by knowing some features of the population, e.g. marginal propensity to consume and to save, the design of optimal fiscal-stimulus packages is on the way (T. Jappelli, L. Pistaferri, 2010).

One of the many purposes in this work is the evaluation of the subsidy “bonus Irpef” legislation, enacted by the Renzi Government in 2014. To get an estimated parameter of its effectiveness, it is studied the composition and the habits of Italian households through the quantile regression. Effectively, the quantile regression reveals some interesting facts, but several conclusions can be inferred from it. My interpretation is one of the many: output shows that low-income worker (i.e. who receive 80 euros per month, as the “bonus Irpef” predicts), even if provided with higher resources, they tend to consume less than high-income earner. This happens because they have a weaker background (lower family resources, precarious job, low skills, etc.), and thus more fear, than high-income earners. Of course, the latter could afford to spend much more than the former, because a high salary is associated (on average) with a safe job. Therefore, we can estimate that this strong result is contrasting with most of microeconomic theories, which predict instead that marginal propensity to consume is greater for poorer individuals, since they have many goods and services to buy. To boost Italian consumption, the “bonus Irpef” should be given in forms of selective coupons to the low-income bracket of the Italian population.

In the end, there are may be interesting developments and improvements in the issue of government intervention during crisis. One of them may be the further implementation of the dataset, by including variables on subjective expectations of the future and the trust in institutions for instance. Another alternative study may be a narrow analysis on “which other way\ the government could have employed the resources in?” In this particular case, the interest shrank on the opportunity cost of the legislation, e.g. its monetary costs and its future impact. For what regards the quantile regression, an improvement could be isolating the effect of “wealth” on income, because as it is possible to see from figure 2, there are a lot of points in the scatterplot that consists in low-income values but high consumption values (reasons could be: tax evasion, fiscal benefits, fixed assets income or wealth effects). In this optic, there is space to further evaluate the composition of households in Italy, by monitoring consumption rates in the short term: it will be possible only after the release of the new SHIW dataset in September 2015.

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