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Tax Reimbursement program to reduce VAT evasion: The Sao Paulo and Portugal programs experiences and possible applications in Italy

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Abstract

The purpose of this work is to assess an alternative solution to the VAT rate increase expected in 2019, which has been object of government maneuvers and postponements during the recent years, based in the results of two different value-added tax evasion reduction programs, one applied in the Brazilian state of Sao Paulo, and the other one, in Portugal. To achieve this goal, the results and methodologies of both programs were deeply analyzed and potential scenarios of the tax evasion reduction were identified. An estimate of the Italian VAT Gap to the interested economic sectors, based on the *'studi di settore'*, has been developed, and the reference programs results were applied to these business activities to understand the potential amount of taxes to be recovered from evasion. The research finds that, if the program is used only for VAT, more than 60% of the expected additional revenue, generated through the VAT rates increase, can be recovered using both reference programs. However, if the data gathered by the program is used to inspect other incomes taxes, the recovery was estimated between 26% and 32% of the Italian total tax gap. Finally, this study discusses the many benefits that may arise from the implementation of a similar program in Italy and suggests further analysis for potential other taxes revenues that could take advantage of such program.

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Introduction

Italy is among the countries with the highest tax burden and tax evasion in the EU (Eurostat, 2014). During the last decade, the weight of tax revenues on central and local governments' budget has increased due also to international obligations to maintain public debt and deficit below the requirements of the European Fiscal Compact agreement. In order to comply to these requirements, the Italian 2018's budget law ('*Legge di Bilancio*' 2018), contains that the VAT ordinary rate, today at 22%, will raise to 24,2% from the first day of 2019, then will grow to 24,9% from 2020 and 25% from 2021. A raise is planned to the VAT reduced rate as well, from the nowadays 10% to 11,5% starting in 2019 and to 13% from the beginning of 2020. Therefore, an already very high tax burden will become even tougher in the near future if an alternative solution is not found.

In the Brazilian state of Sao Paulo, a tax reimbursement program, called '*Nota Fiscal Paulista*', was created in 2007 to stimulate the invoice request by the citizens and consequently fight the ICMS (Brazilian VAT) tax evasion in the state. The program registration and use was very simple and, according to the Sao Paulo government, the results of the tax revenue increase were very good, and consequently, the program should be kept and expanded. The success of the program caused the expansion to other Brazilian states, that started to develop their own initiatives of tax reimburses programs and in 2017, eighteen out of the twenty-six, or approximately 70%, Brazilian states had a similar program active or under implementation whether at state or municipal level, being Bahia the last state to activate their initiative in December 2017.

The expansion crossed the ocean, and in 2014, the Portugal government launched their own tax reimburse program, which they declared to be inspired on the '*Nota Fiscal Paulista*', and since the '*e-fatura*' implementation, the Portuguese initiative has been collecting good results and is expanding the areas in which the citizens can request an invoice with their fiscal code.

Both programs, need a functional electronic invoices system, which is currently obligatory for operations with the Public Administration in Italy. According to the Italian 2018's budget law ('*Legge di Bilancio'* 2018), from 2019 on, the obligation will be extended to all business to business (B2B) and business to consumer (B2C) transactions and will travel through the interchange system (SDI), the same channel used for the electronic invoices of the transactions towards the Public Administration.

Other than Brazil and Portugal, other countries that have already adopted at least a VAT Lottery in order to fight tax evasion in the European Union and among the current members, are:

- Malta: 1997
- Slovakia: 2013
- Poland: 2015
- Greece: 2017

Outside of European union, countries such as China, Taiwan, Argentina and Chile are using similar VAT Lottery programs to improve the tax compliance.

Due to the success of these initiatives, this thesis was designed and developed to assess and evaluate the feasibility of similar programs in Italy, one based in the Sao Paulo model and another one based in the Portuguese version, given the differences among the countries involved in this study and the data available.

This thesis project was structured considering the results previously obtained and both the technological and the social and cultural component related to fiscal citizenship and tax morale.

This thesis is structured in five chapters, the first one, is an introductory chapter containing a context of tax evasion, an overview of the fiscal scenario, shadow economy and tax evasion of the involved countries, so as a closer look at the main tax involved in the program, which is the value added tax.

The second and third chapters consist in the explanation of the programs used in Sao Paulo ('*Nota Fiscal Paulista*') and Portugal ('*e-fatura*'), respectively. It will bring the description, evolution, expansion, results obtained and privacy implications encountered with these tax compliancy programs.

In the chapter number four, there's a description of the methodology used to estimate the results of such program in Italy.

The fifth chapter five and the conclusion will bring the numerical results and findings for VAT collection, other potential taxes, and the overall Italian scenario which could be benefited from this tax compliancy program.

1. Tax evasion and fiscal structures

Taxes are generally an involuntary fee levied on individuals or corporations that is enforced by a government entity, whether local, regional or national in order to finance government activities. The revenue which comes from the tax payment plays an essential role for the finances of a country. Indeed, tax revenues are the basic way a government can finance national expenditure and services to the population. At the same time, taxes are a very important factor that affects the financial decisions of every household and business.

In economics, taxes fall on whomever pays the burden of the tax, whether this is the entity being taxed, like a business, or the end consumers of the business's goods.

1.1. Context of tax evasion

In the attempt to answer the question why individuals evade taxes, the economic literature has taken inspiration from the economics of crime (Becker (1968)) and traditionally framed tax evasion as a gamble. The key assumption is that no individual, if allowed, would want to pay taxes. Evading taxes then essentially becomes a gamble that individuals may decide to play, depending on their degree of aversion to risk, the probability of being audited and the extent of the possible penalty. Specifically, this framework predicts high levels of tax evasion if agents face low audit probability or low penalties. This prediction is, however, in contrast to empirical observation. Tax evasion is, indeed, relatively low in many tax systems, in spite of low audit probability and small penalties. Moreover, even in those environments where evading taxes is possible and often a widespread behavior in the society, there are still individuals who act honestly. The literature has identified three possible explanations to this puzzle. One possibility is the existence of a divergence between auditing rates and detection probabilities. Another possibility is that individuals may tend to overestimate detection probabilities. Finally, individuals may be induced to comply because they experience forms of non-pecuniary motivation.

Indeed, in recent years, the interest of economists (but also sociologists, psychologists and political scientists) has gradually focused away from the question "why do people evade taxes?" to the question "why do people pay taxes?". Researchers have attempted to identify and measure the existence and extent of such non-pecuniary incentives, often referred as tax morale. Luttmer

and Singhal (2014) describe various mechanisms according to which tax morale may affect compliance. One mechanism is based on intrinsic motivation. In every society there are individuals who believe that paying taxes is a citizenship duty. In other words, paying taxes is a way to contribute to society's welfare and individuals may obtain private utility from it. Considering tax morale, in turn, helps also understanding why some individuals may find very difficult to pay taxes. Luttmer and Singhal (2014) describe reciprocity (the utility experienced from paying taxes that depends on the individual's relationship with the government) as another mechanism of tax morale. In those countries in which governments are considered particularly corrupted or inefficient, which is the case for Brazil, Italy and Portugal tax morale may, therefore, be very low. There is another important aspect of taxpayers' behavior related to tax morale and that is the role that social norms and reputation may play. The way society sees the pro-social actions of an individual may have an important reputational effect on the utility that the individual obtains from performing a particular task. Charity, voluntary work and donations are examples of actions that may improve individuals' reputation. Bénabou and Tirole (2006) show why standard financial incentives may be counterproductive in those situations in which reputation effects may induce motivated agents to reduce their pro-social effort, fearing to be seen as greedy by society. Indeed, reputation may play an important role when individuals have to consider reporting their income for tax purposes. If audited and found guilty of tax evasion, there may be a significant social cost, in addition to a standard fine, that the individual has to face. Similarly, if audited and found not guilty, the individual may be rewarded with a reputation of honesty and citizenship.

Inside the concept of tax compliance by social norm we can have the opposite effect, where the act of not issuing invoices in purchases was a behavior judged in the same way by all involved in the transaction and therefore supported by social approval. If non-compliance with tax obligations becomes widespread, then the social norm that taxes must be paid disappears.

Myles and Naylor (1996) and Traxler (2010) are examples of contributions in the literature that have attempted to incorporate tax morale directly into the Allingham and Sandmo (1972)'s framework. Essentially tax morale is modeled as an internalized social norm that makes tax evasion costlier, affecting the individuals' decisions under risk. These contributions employ a static approach to study the problem. However, introducing tax morale has often the effect of generating multiple equilibria. This poses the necessity to introduce dynamic adjustments to solve equilibrium selection problems and study the long run evolution of tax evasion. Indeed,

Luttmer and Singhal (2014) identify long run cultural factors as a significant variable that affects tax morale and compliance. This is important. When considering the effects of social norms and reputation on individuals' actions, a static model may be inadequate and the role played by a continuously evolving cultural framework should be carefully considered. It should be natural to think, therefore, of the individuals' decisions in a dynamic setting. As Besley and Persson (2014) also point out, the ability of a country to enforce compliance may be affected by sociological and cultural factors and, in turn, it may be a key factor defining the development trajectory of a whole economy. Most of the theoretical works on tax compliance to date are, however, "one-shot" in nature (Luttmer and Singhal (2014)).

Using the idea of tax morale, it is possible to observe that tax morale differs much between countries, even Latin American and Caribbean countries. According to Latinobarometro 2005, a survey that seeks to collect comparative data on values and beliefs in Latin America and the Caribbean, Brazil has a morale tax that is closer to the average in the region and well below the United States, where 86% of people think that any type of evasion is not tolerable.

The only paper that considers intrinsic motivation, social norms and reputation in a dynamic setting with tax evasion is Besley (2015). The paper is a dynamic extension of Bénabou and Tirole (2006) where individuals internalize in their utility the reputational benefit/cost of paying/evading taxes in the previous year. The authors assume that individuals every year need to decide whether to evade taxes. Their decision will depend on their intrinsic motivation, the extent of the fine if found guilty and the reputational cost of tax evasion. The authors also empirically study the effects of a temporary introduction of a poll tax in Britain. They show that tax evasion increased after the introduction of the poll tax (due to a negative effect in intrinsic motivation/reciprocity). Interestingly, tax evasion continued to persist even after the poll tax was abolished (possibly highlighting the dynamic effects of social norms produced by the existence of a social multiplier).

The effects of tax evasion are well known, such as social efficiency reduction, increase of public debt, information and competition distortions.

Considering the concept of social efficiency, the notion of Pareto efficiency says that a certain allocation of goods and resources is efficient for a company if it is not possible to obtain an alternative that improves the condition of at least one individual without making anyone else

worse. Tax evasion is a perfect scenario where one party will improve making another party worse its condition.

The subtraction and reduction of financial resources destined for the State, caused from tax evasion, also results in public debt increase. In the Italian case, this relationship seems clear. Until the late seventies Italian public accounts were in good condition, public spending, in relation to other developed European countries, was low so as the public debt compared to GDP. Since the early 1980s, the situation has changed radically, with an increase of the public spending that has increased from 30.3% in 1980 to 40.8% and in the public debt/GDP ratio, which has increased from 60% to 100%.

If the Italians had evaded taxes, from the 1970s, as much as the Americans, the public debt in Italy in 1992 would have been just over 80% of GDP, that is, about 30% less than the 1992 level (108%). If the Italians had evaded as much as the British, the public debt would have been just over 60% of the GDP, not far from the limit set by the Maastricht agreements; and figures in this range are obtained if you compare with other countries. (A, Alesina; M, Marè (2010))

This demonstrates how the growth of public debt is strongly influenced by the high rates of evasion, which limit the State by extracting resources and indirectly forcing it to indebt itself to perform its functions.

Evasion can also be related to the concept of unfair competition. In fact, if two entrepreneurs operate in the same sector and have similar economic characteristics, but only one of them pays the taxes, we can say that the latter is the victim of unfair competition from the other entrepreneur.

Therefore, also in this sense the evasion is pathological, since it affects the correct functioning of the market economy and mines the veracity of the information made public, increasing or decreasing the real profitability, on which any investments are based.

1.2. Brazil - Fiscal scenario, shadow economy and tax evasion

The fiscal model used in Brazil is very complex and there is a widespread perception that, in addition to the entire tax burden, companies have an associated cost involving the entire tax calculation process, with a strong impact on its personnel and technological structure.

According to the Doing business report 2018, published by the World Bank Group, Brazil appears in position 184 out of 190 countries in the paying taxes category due to the high tax burden and very high tax compliance complexity, showing the highest time required to prepare, file and pay (or withhold) the corporate income tax, value added or sales tax, and labor taxes, including payroll taxes and social contributions (in hours per year).

The tax burden in Brazil was equivalent to 32,4% of the GDP in 2016. The measurement of tax evasion, both in Brazil and in other countries, is full of complications and difficulties. The largest of these refers to the data available and its low reliability.

The group SINPROFAZ makes an annual report regarding the fiscal evasion in Brazil and the latest estimates were included in their 2016's report, where the percent evasion indicator for the Brazilian tax group was found crossing and weighting the Brazilian tax collection data with the evasion indicators found in other studies. The estimative by tax are shown in the table below:

Although there are a few dozens of taxes in Brazil, those listed in the table 1 are the main taxes. Almost 70% of total collected in Brazil is sent to the federal government, while 25% is sent to state governments, of which 80% is composed by the ICMS, which is the Brazilian VAT and is the target of the program '*Nota fiscal paulista*'.

Table 1: *Brazilian Tax Revenue and evasion by type*

	%GDP 2016 (1)	%Tax revenue (1)	Tax Evasion estimate - 2016 (2)	Total Amount evaded - 2016 (2) (R$ millions)
Total tax revenue	**32,38%**	**100,00%**		
Federal government taxes	**22,11%**	**68,28%**		
Income tax	5,69%	17,57%	28,0%	101.934
CSLL	1,10%	3,40%	24,9%	16.902
Industrialized product tax (IPI)	0,67%	2,07%	33,4%	14.994
Tax over international trades (II)	0,50%	1,54%	24,8%	7.813
PIS/PASEP/COFINS	4,06%	12,54%	22,1%	57.250
Other Federal taxes	10,09%	31,16%		
State government taxes	**8,23%**	**25,42%**		
ICMS	6,60%	20,38%	27,1%	112.724
Other state taxes	1,63%	5,03%		
Municipal government taxes	**2,05%**	**6,33%**		
IPTU	0,60%	1,85%		
ISS	0,87%	2,69%	25%	
Other municipal taxes	0,56%	1,79%		

Source: 1 - CETAD – Centro de Estudos Tributários e Aduaneiros do Ministério da Fazenda (link) / 2- SINPROFAZ (2017 (link)

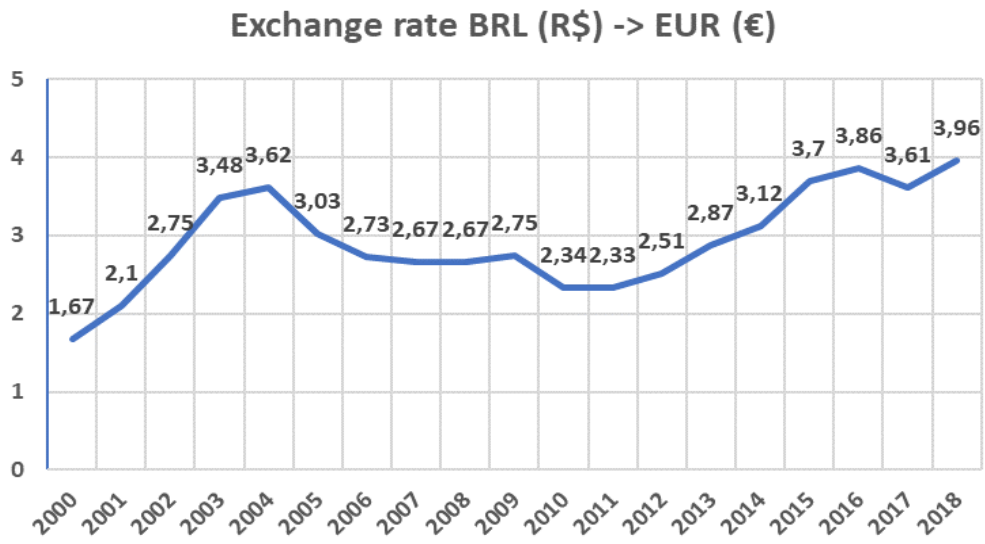
The cross-checking of the indicators adopted in this SINPROFAZ's study with the respective estimated amount of taxes resulted in an estimated average evasion of 22.9% of the collection, equivalent to R$ 474.4 billion or 7.6% of GDP in 2016. Comparing 2016 with the fiscal year of 2015, there was an increase in the estimated amount of evasion of R$ 24.3 billion.

The VAT tax, which is present in several countries and will be the focus of this work, is a tax that is based on the expense or consumption and taxes the "value added" on the transactions made by the taxpayer. In Brazil, it can be said, roughly speaking, that the corresponding to this tax is divided into three taxes: IPI (Industrialized Product Tax), within the competence of the federal government; ICMS (tax on operations related to the movement of goods and on services of interstate, intermunicipal and communication services), in the jurisdiction of the states; and ISSQN or ISS (tax on services of any nature, except for taxes included in the Circulation of Goods), which is the responsibility of the Municipalities. These taxes that would correspond to the VAT in Brazil, are responsible for almost 25.2% of the total tax burden and would have, according to the estimate presented in the previous topic, an indicator of evasion of the order of 27.4%.

Regarding the shadow economy, Friedrich Schneider, which will be presented in the next chapters, released a study in 2012 where the Brazilian shadow economy was estimated to be 36,6% of the Brazilian GDP in 2007.

Considering that this thesis will present some value in Brazilian reais, the chart below shows the historical exchange rate from Reais to Euro, in the last day of each year and for 2018 the data of the last day of February was used.

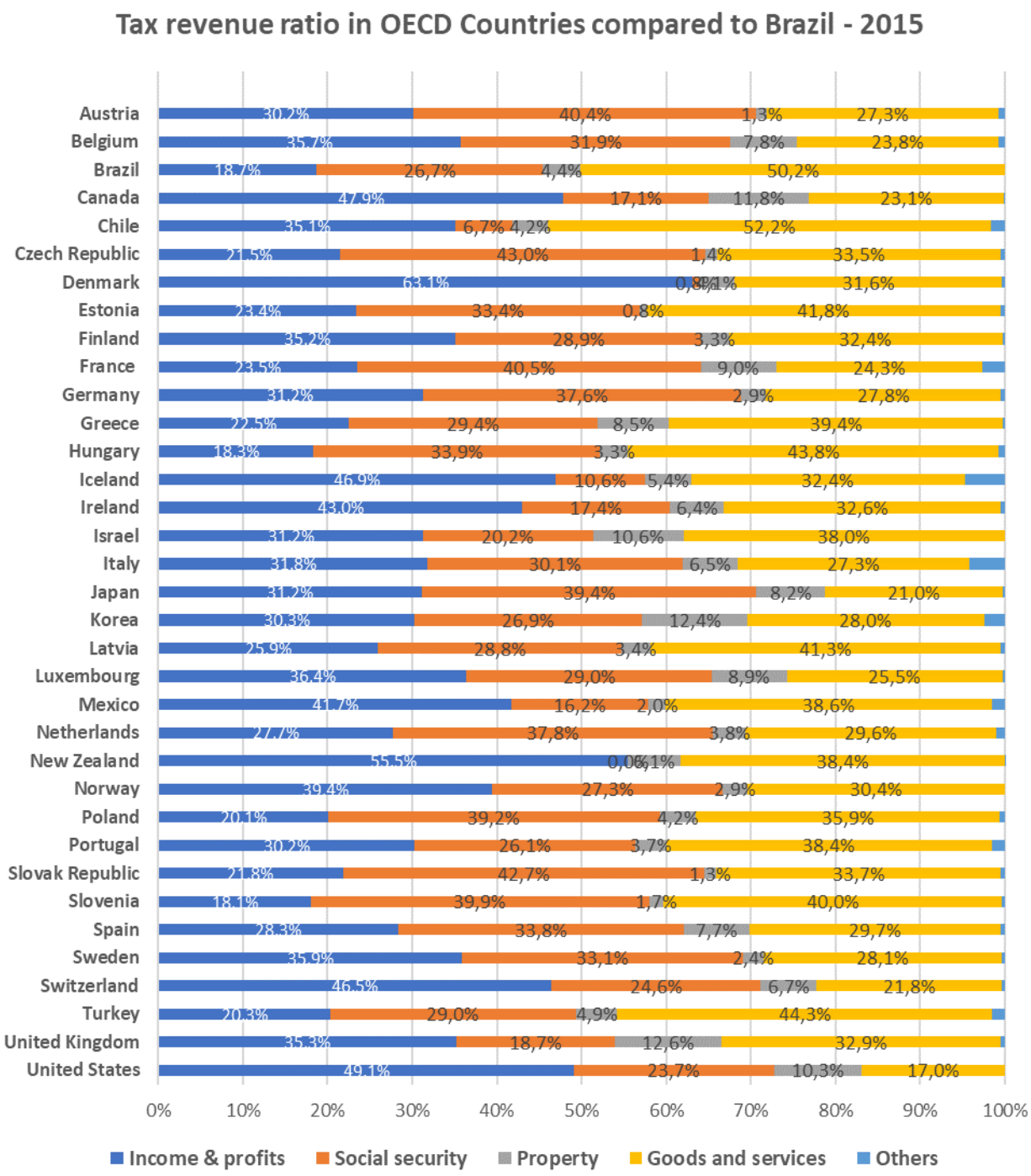
Figure 1: *Historical Exchange Rate BRL to EUR*



Source: OFX

The Brazilian tax structure, as we can note in the figure 2, is heavily dependent of the goods and services category, accounting for more than the half of all tax revenue collected in 2015. Also, we can see how are the tax structures for the other OECD countries.

Figure 2: *OECD Countries - Share of Tax revenue by country and type*



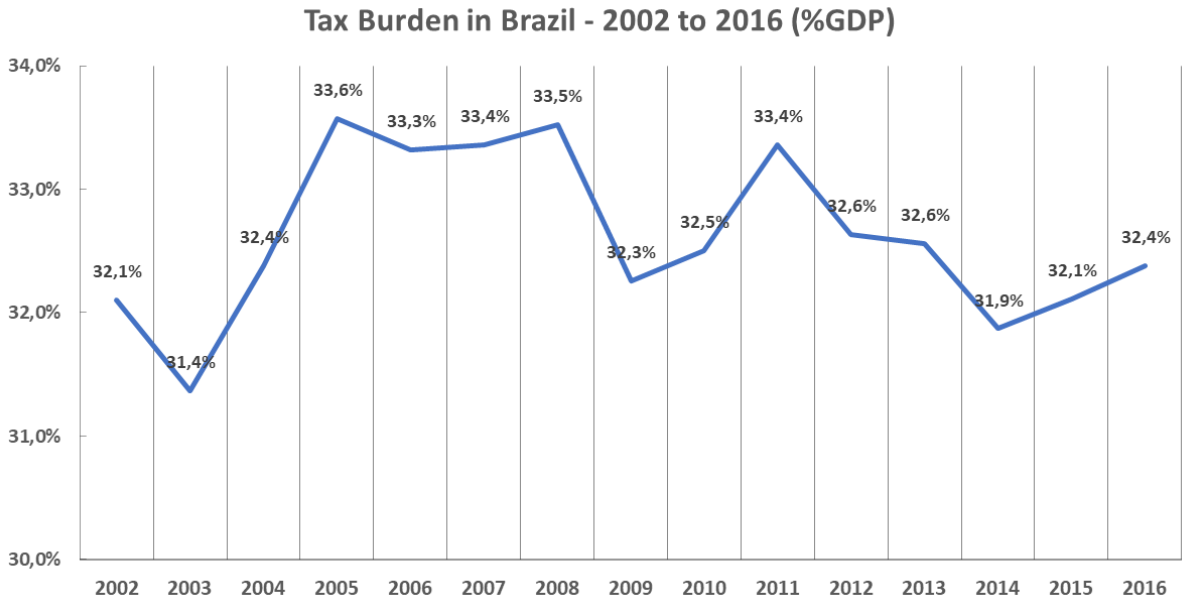
Source: OECD (2017). Revenue Statistics 1965-2016 (link) adapted to include Brazil data from CETAD – Centro de Estudos Tributários e Aduaneiros do Ministério da Fazenda (link)

1.2.1. Brazilian Tax Burden and VAT collection

Since the emergence of National States, society's demands have far exceeded the need for just national security. The military's protection of society, by itself, has become incredibly burdensome with technological advancement, always surpassing the billions of dollars, often reaching trillions in the budgets of leading countries in military technology such as the US and Russia. But beyond the military protection of society, public safety in general, health, education, public transport, housing, research, development and technological innovation have been included in the scope of the actions of the States, to stay on a short list. These items demand significant resources from society, since, after all, all rights have cost (Holmes, S.; Sunstein, C. (1999)).

Throughout the 20th century, most, if not all, countries in the world experienced a substantial increase in the tax burden. According to Oliveira (2010), between 1916 and 1920 the Brazilian tax burden was 7% of GDP, while at the beginning of the 21st century it is close to 33% of GDP. The chart below shows the historical data from 2002 to 2016, showing that the tax burden is steady between 31% and 34% in the last years.

Figure 3: *Tax Burden in Brazil from 2002 to 2016*



Source: CETAD – Centro de Estudos Tributários e Aduaneiros do Ministério da Fazenda (link)

If, on one hand, citizens demand from their respective states various collective services, on the other, companies, the greatest source of wealth generation in capitalist economies, demand

better conditions for production, less taxes and simpler tax rules in particular. Competitive pressure often leads to evasion.

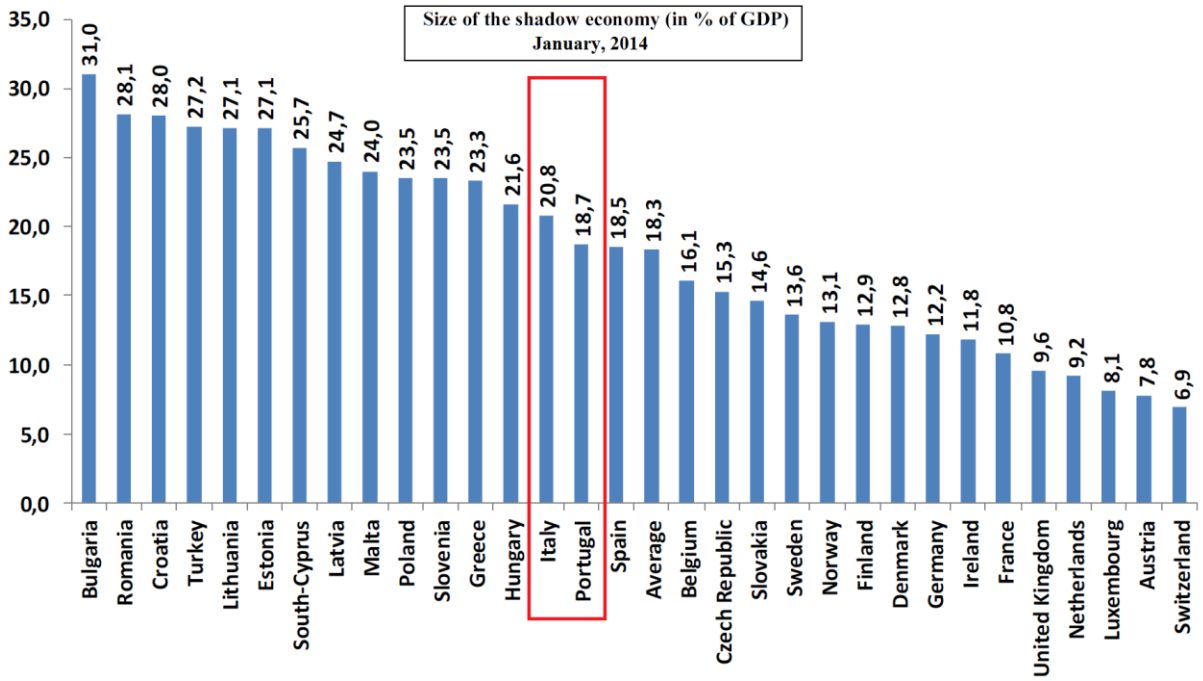
1.3. Portugal – Fiscal scenario, shadow economy and tax evasion

The Portugal government does not release any official report containing their estimates of taxes evasion in the country, because of this lack of data, this thesis will mainly report the Italian data. However, there are some studies which reports the shadow economy and estimates of taxes evasion in OECD countries. The three studies used in this document were all produced by Dr. Friedrich Schneider, which is one of the leading experts on the shadow economy.

The shadow economy comprises legal business activities that are performed outside the reach of government authorities, and does not include illegal activities and crimes, including drug dealing, smuggling, money laundering and embezzlement, or household enterprises that, by law, do not need to register with the government. According to the IMF, shadow economies and corruption are well-established in heavily regulated economies with weak administration. The phenomenon is much smaller in countries with strong, well-regulated and efficient government institutions.

The shadow economy activities typically fall into two categories that remain common across Europe. The first is undeclared work, which accounts for roughly two-thirds of the shadow economy. It includes wages that workers and business do not declare to the government to avoid taxes or documentation. Undeclared work is widespread in construction, agriculture and household services (such as cleaning, babysitting, elderly care and tutoring). The other one-third comes from underreporting, which is when businesses – primarily those that deal heavily in cash, such as small shops, bars and taxis – report only part of their income to avoid some of the tax burden.

Figure 4: *Size of the shadow economy (in % of GDP)*



Source: Schneider, F. (2015)

As we can notice in the figure 4, Italy and Portugal present very similar and above the average shadow economies rates in % of the GDP, according to the Schneider's 2015 study.

Table 2: *Tax Evasion (in % of GDP)*

Tax Evasion (in % of GDP) 2010	
Portugal	1.8 %
Italy	1.4%
Spain	1.1%
France	1.0%
Germany	1.0%
UK	1.0%

Source: Buehn, A.; Schneider, F (2012).

In a previous Schneider's report of European shadow economies, published in 2012, some estimates of the tax evasion for EU countries were released and in table 2 we can notice that the Italian has a tax evasion in % of GDP approximately 40% higher than the average among the top 5 EU economies, while Portugal shows an even higher value for this estimate.

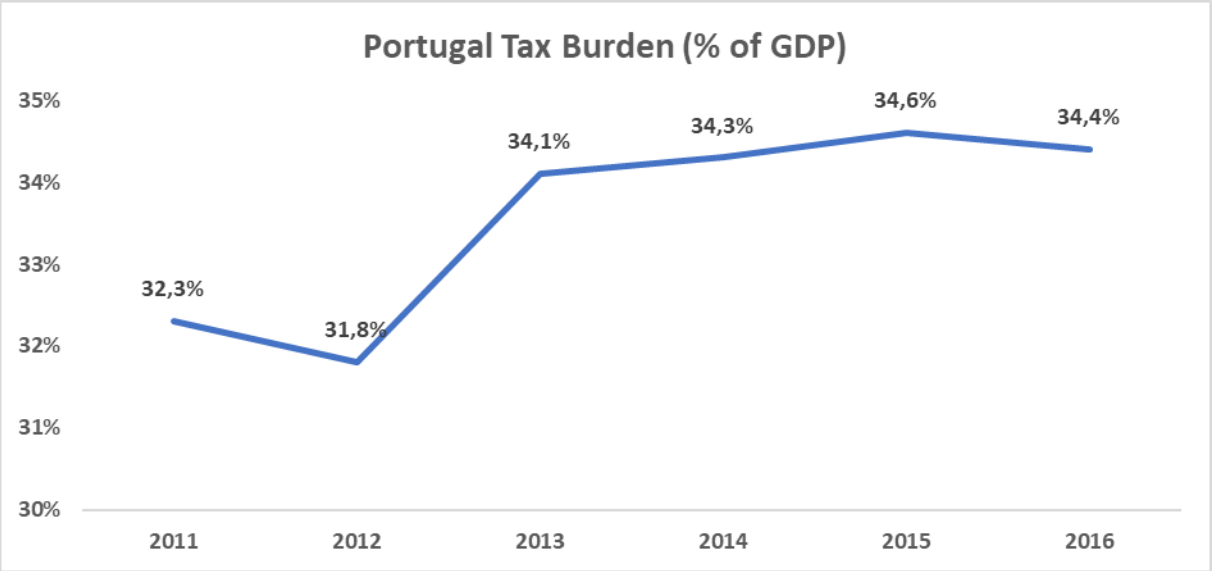
The methodology used for the calculation of tax evasion and shadow economies compared the size of the shadow economy estimated using surveys (microeconomic approach) with estimates derived – and most widely published – by the macroeconomic MIMIC-model and/or currency demand approaches. Further details of the methodology can be found in the reports published in 2012 and 2015.

1.3.1. Portuguese Tax Burden and VAT collection

The INE, which is the National Statistics Institute of Portugal, releases an annual report regarding the federal tax revenue, in which a deep analysis of taxes collection is published.

Regarding the Portuguese tax burden, it has increased nominally by 2.5% in 2016 following the 4.6% increase observed in 2015, reaching € 63.6 billion. However, the Tax Burden over GDP rate declined by 0.2%, to 34.4% of GDP, after the 34.6% rate registered in 2015.

Figure 5: *Portugal Tax Burden (% of GDP)*



Source: INE – Instituto Nacional de Estatística (2017)

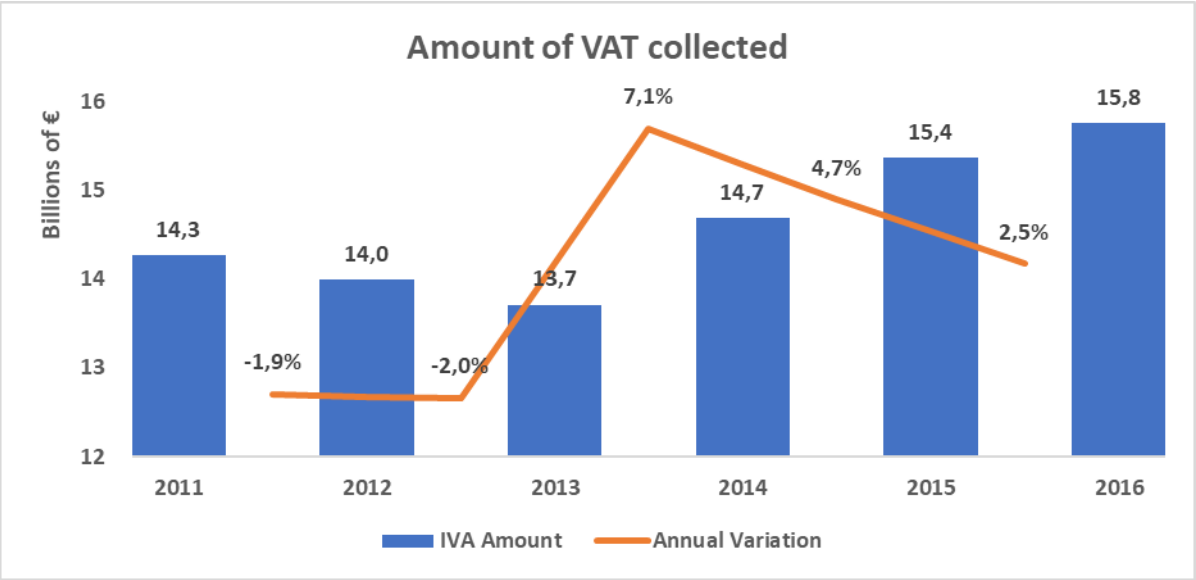
In order to compare the Portuguese tax burden with other European countries, one must consider that the Eurostat, which is the EU statistics institute, does not consider the taxes received by the institutions of the European Union (essentially customs duties, agricultural import duties and income taxes). Using this concept, the tax burden in Portugal was 34.2%, against the 34.4% rate if revenue from these taxes is included.

Using this methodology and comparing with other EU countries (EU28), Portugal remained in a position with a lower than average tax burden (34.2%), which was 39.2%. In 2016, Portugal was the 11th country with the lowest tax burden, immediately above Spain (33.8%), but lower, for example, to Greece (38.5%) and Italy (42.8%).

The Value Added Tax (VAT) accounted for 57.1% of indirect tax revenues in 2016 and VAT revenue increased by 2.5% (4.7% in 2015), totaling 15.8 billion of euros, this behavior of VAT

revenue is largely associated with the increase in private consumption of resident households, which increased by 3.3% in nominal terms in 2016. The VAT rate in Portugal has three different rates, which are 23, 13 and 6 percent.

Figure 6: *Amount of VAT Collected in Portugal*



Source: INE – Instituto Nacional de Estatística (2017)

The VAT weight among the indirect taxes has been variating from 57,1% (2016) to 59,6% (2012) during the 2011-2016 period, registering a decrease of 2,1% from 2014 to 2016. Compared with other European Union countries, Portugal is one of the countries where the relative weight of indirect taxes in the tax burden is high (tenth in 2016, with a weight of 43.1%), significantly higher than the EU28 average (34 ,2%).

1.3.2. VAT Gap

The VAT Gap indicator measures the difference between the so-called theoretical VAT, that is, the VAT that would result from applying the legal fees to the transactions recorded in the national accounts of the goods and services covered by this tax, and the VAT actually collected.

In this study it will presented the VAT Gap estimated by the INE, which is the Portuguese statistics institute, and then, the estimation published by the European Union commission.

1.3.2.1. VAT Gap results (INE)

The table 3 presents the results of the INE VAT GAP calculation for the period from 2010 to 2014. The average annual GAP was estimated at €1,60 billion, corresponding to 10.2% of the VAT charged. Following the significant increase in GAP of €2,2 billion (13.6% of VAT charged) in 2012, in the following two years there was a decrease to €1,71 billion in 2013 and €1,24 billion in 2014, the latter amount corresponding to 7.8% of the VAT charged. It should be noted that the reduction of GAP in 2014 reflects the increase of 7.1% of effective revenue compared to the increase of 3.3% of theoretical VAT.

Table 3: *INE – VAT GAP Results*

	Collected						
	Intermediary Consumption (€ billion)	**Families Consumption (€ billion)**	**Others (€ billion)**	**Total (€ billion)**	**Theoretical VAT (€ billion)**	**VAT GAP (€ billion and %)**	
2010	3,34	9,17	1,01	13,53	14,86	1,33	8,9%
2011	3,64	9,63	1,00	14,27	15,78	1,51	9,6%
2012	3,38	9,77	0,85	14,00	16,19	2,19	13,6%
2013	3,23	9,84	0,64	13,71	15,42	1,71	11,1%
2014	3,32	10,72	0,64	14,68	15,92	1,24	7,8%

Source: INE – Instituto Nacional de Estatística (2017)

It should be noted that reading these results requires some caution since the GAP assessed may not only reflect tax evasion phenomena but also other factors, for example: variations in payment timing, repayment and recovery of VAT debts, or errors associated with the necessary simplifications for the calculation of theoretical VAT.

1.3.2.2. VAT Gap results (IHS - European Union Commission)

Table 4: *IHS - VAT Liabilities and Gap - Portugal*

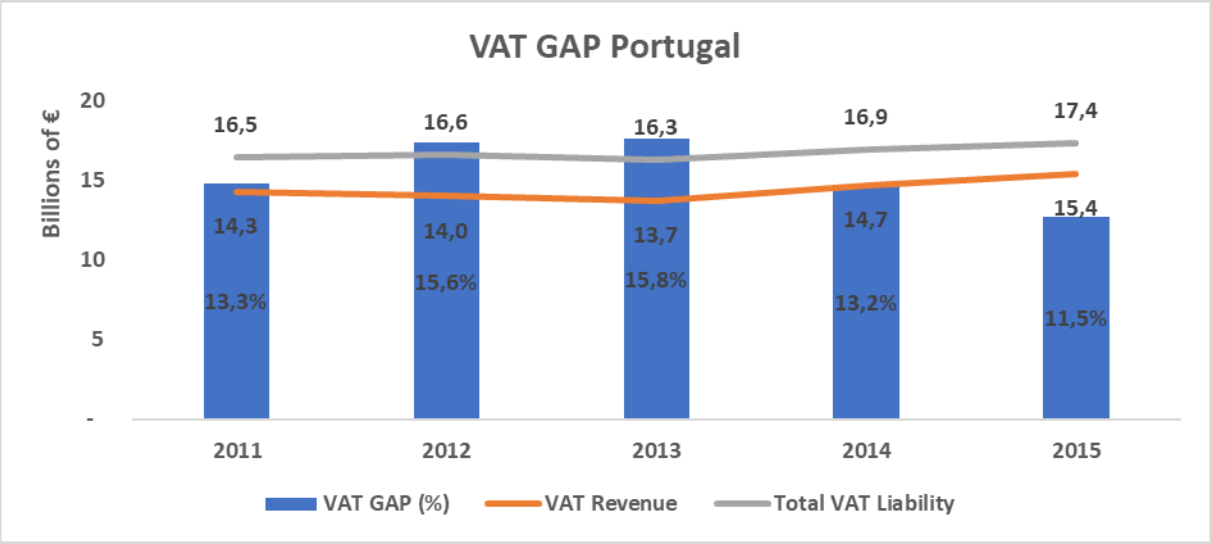
		2015
VAT Liabilitites	Household final consumption	13112 (75,5%)
	Government and Non-Profit Institutions Serving Household final consumption	265 (1,5%)
	Intermediate Consumption	2673 (15,4%)
	Gross Fixed Capital Formation	955 (5,5%)
	Net adjustments	352 (2,0%)
	Total VAT Liability	17.357
	VAT Revenue	15.368
	VAT GAP	1.989
	VAT GAP (%)	11,46%

Source: IHS – Institute for advanced studies (2017)

In the chapter 1.4.2, the Italian VAT GAP estimations were taken from the 'VAT gap study' published by the European Commission and produced by the IHS, that measures the difference between 'theoretical VAT', or the expected VAT revenue, and the amount actually collected in each country. If we use the same study to collect the data for Portugal, we will obtain similar results and behaviors for the VAT GAP to those published by INE, but not the same. According to this EU study, which we can see in the table 4, the household final consumptions has over 75% of the total VAT Liability for Portugal, therefore, a program to recover the evaded VAT should focus in this sector.

The VAT Gap decreased by over 4 percentage points in 2015 compared to 2013, which is the year when the e-invoice together with the tax reimburse program started and carried the gap to its lowest level since 2011. According to the study, half of the growth of VAT revenue can be attributed to the growing economy, with the other half due to increased VAT compliance. A chart summarizing the EU study for Portugal can be found in the figure 7:

Figure 7: *IHS - VAT Gap Portugal*



Source: IHS – Institute for advanced studies (2017)

1.4. Italy - Fiscal scenario, shadow economy and tax evasion

In Italy, the shadow economy and tax evasion are a serious problem for national economy and public finance. In 2014, the government estimated that the shadow economy corresponded to €194,4 billion, which had this value divided in the categories shown in the table 5.

Table 5: *Italian Shadow Economy*

Italian Shadow Economy (€ billion)				
	2011	**2012**	**2013**	**2014**
Shadow Economy (%GDP)	188,0 (11,5%)	189,2 (11,7%)	189,9 (11,8%)	194,4 (12,0%)
Of Which: Under-declaration	93,5	99,1	99,4	99,0
Of Which: Irregolar work	71,2	71,5	72,3	77,2
Of Which: Other	22,4	18,6	18,2	18,2
Total Value Added	1.470,3	1.448,0	1.444,1	1.457,9
GDP	1.637,5	1.613,3	1.604,6	1.621,8

Source: Ministero dell'economia e Finanze: Relazione sull'Economia non osservata e sull'evasione fiscale e contributiva Anno 2017

In Italy, out of the 41.3 million tax payers in 2011, only 0.1 per cent declared an annual income exceeding €300 thousand; 63% claims an annual income of less than €26 thousand, and 27%, by profiting from various types of deductions and tax reliefs, pay nothing. The widest opportunities to cheat fiscal authorities are available to entrepreneurs and autonomous; it is estimated that 56,3% of this category pay no taxes or less taxes than the amount due. (Murphy, 2011).

Italian tax administration is not famous for its effectiveness: with 5 million taxpayers suspected of smaller or larger scale of tax fraud, only 200 thousand inspections have been carried out. The biggest ally of dishonest taxpayers is the inefficient court system. A person has to wait 903 days for the first sentence of a taxpayer charged with tax fraud, and often the procedure is prolonged by appeals to higher instances, protests, etc. In effect only 1,7% taxpayers accused of tax crimes is ever arrested (Evasione fiscale, 2014).

The Italian Ministry of Economy and Finance releases an annual report called 'report of the non-observed economy and fiscal evasion', there we can find a deep analysis of the tax evasion in Italy, so as their estimates for the main Italian taxes. This report states that the taxes not received by the government was equivalent to 5,6% of the 2015's GDP, already not considering the employees IRPEF gap, which was not available for 2015 at the time of this thesis.

The data below includes only the most relevant taxes for this study, therefore, the breakdown of provincial taxes were not included, however, the share of tax revenue shown is according to the whole scenario.

Table 6: *Italian tax revenue and gap estimate by type of tax*

	Tax Revenue (€ million)	% of Tax revenue 2015	Tax Gap estimate (€ mi) - 2015	Tax Gap estimate (%) - 2015	Tax Gap estimate (% GDP) - 2015
Federal government taxes	**365.177**	**77,81%**			
IVA (VAT)	119.321*	25,42%	34.771	26,40%	2,10%
Of which: Non-declared VAT			26.350	20,00%	1,60%
IRES	33.574	7,15%	10.299	27,70%	0,60%
Of which: Non-declared IRES			8.920	24,00%	0,50%
IRPEF (Income Tax)	153.386	32,68%			
Self-employed and companies	12.328	2,63%	28.673	67,20%	1,72%
Of which: Non-declared IRPEF			27.144	63,70%	1,63%
Employee	141.058	30,06%	5.149**	3,8%**	
Rent Tax	2.012	0,43%	1.333	15,30%	0,08%
Regional government taxes	**75.842**	**16,16%**			
IRAP	28.121	5,99%	6.181	22,12%	0,37%
Of which: Non-declared IRAP			4.961	17,76%	0,30%
Regional additional IRPEF	11.332	2,41%	2.118		
Of which: Self-employed and companies non-declared IRPEF			2.005	63,70%	0,12%
Municipal government taxes	**24.592**	**5,24%**			
IMU	15.486	3,30%	5.195	26,90%	
Municipal additional IRPEF	4.384	0,93%	820		
Of which: Self-employed and companies non-declared IRPEF			776	63,70%	0,05%
Provincial government taxes	**3.661**	**0,78%**			

Source: Ministero dell'economia e Finanze: Relazione sull'Economia non osservata e sull'evasione fiscale e contributiva Anno 2017

*: The VAT amount shown if the gross prior to the adjustments due to reimbursements and compensations. The Net amount is € 96.851 million

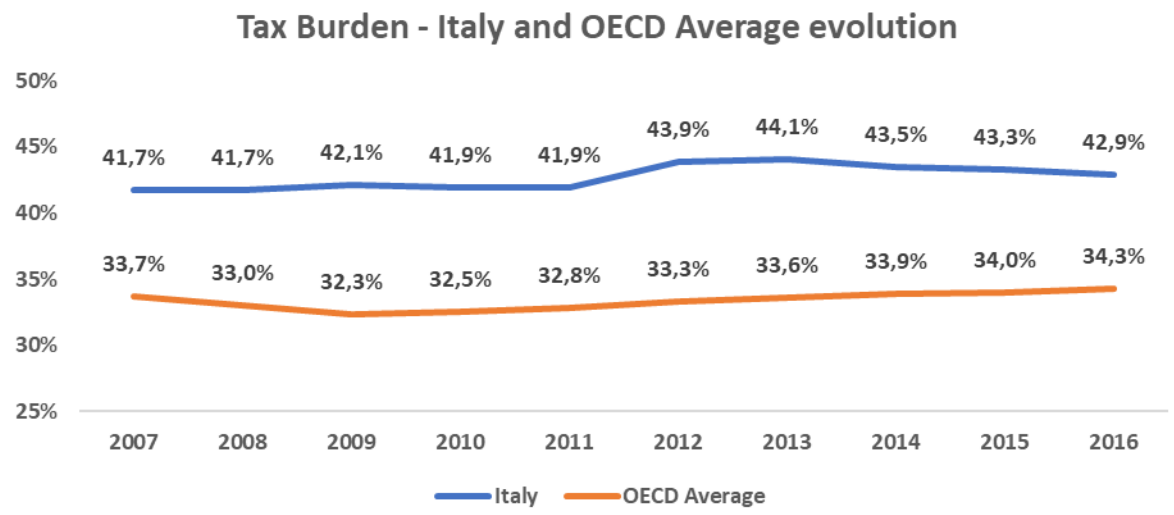
**: 2014 Data

As we can notice, the IRPEF for autonomous workers is the tax with highest evasion rate showing 67,6% of tax gap. This thesis study will mainly focus on the IVA (VAT) evasion, since the suggested program aims to reduce the consumption tax evasion, but the programs can be extended and cross-check the IRPEF, IRES and IRAP data in order to reduce their gap.

According to the OECD's annual Revenue Statistics report, the tax-to-GDP ratio in Italy is decreasing in the recent years, from 44.1% in 2013 to 42.9% in 2016, but grew by 1,2% if compared with the pre-crisis period. The corresponding figures for the OECD average have

seen an increase of 1.3 percentage points from 33.0% to 34.3% over the same 2008-2016 period. The tax-to-GDP ratio in Italy in 2016 has increased from 40.6% in 2000 to 42.9% in 2016. Over the same period, the OECD average in 2016 was slightly above that in 2000 (34.3% compared with 33.9%). During the period from 2000 to 2016, the highest tax-to-GDP ratio in Italy was 44.1% in 2013, with the lowest being 39.1% in 2005.

Figure 8: *Tax Burden - Italy and OECD Average evolution*



Source: OECD (2017). Revenue Statistics 2017 – Italy.

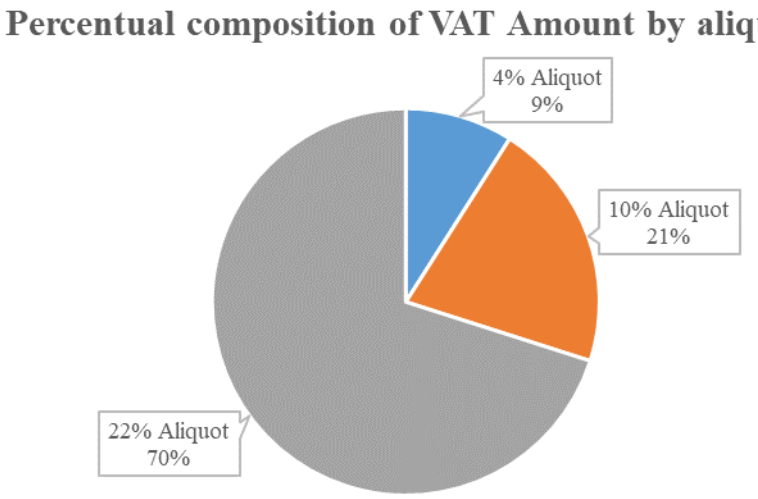
1.4.1. Italian VAT scenario

As of 2018, the VAT rates in Italy are divided into four different categories, 22, 10, 4 and 0 percent, the ordinary, reduced, minimum and zero, respectively. The products and services for each aliquot is shown below:

- **0%:** Museums, gardens and national parks; games, lotteries and bets; personal insurance; insurance related to means of transport; postal services; passenger transport by taxi; laboratory analysis; medical and dental services.
- **4%:** Flour and cereals, bread, rice, fresh and dried pasta and pasta preparations, fresh milk, cheese and dairy products, butter, margarine and other vegetable fats, olive oil, dried and refrigerated fruit, fresh or chilled vegetables, purchase of the first house or non-luxury homes, glasses or contact lenses, books, newspapers and periodicals, company and school canteens.

- **10%:** Bakery and confectionery products, breakfast cereals and other products based on cereals, meat, cured meats and other meat products, fresh and chilled or frozen fish and seafood, preserved milk, yoghurt, cheeses and dairy products, eggs, other food oils, dried or processed or preserved vegetables, sugar, jams, jams and honey, chocolate, confectionery and ice creams, sauces and seasonings, salt, spices and herbs, baby food, yeasts and other food preparations, coffee, tea, cocoa and chocolate powder, beer, non-luxury home purchase, different from the first house, goods for building renovation, building renovation, water supply, waste collection, electricity gas, medicines and pharmaceuticals including homeopathic, passenger transport on buses and rails, air and sea transport, cinemas, theaters and concerts, radio, TV and season tickets, plants and flowers, restaurants and pizzerias, hotels and pensions.
- **22%:** Ready meals in the food sector; mineral waters, non-alcoholic beverages, fruit and vegetable juices, sprits, wines and tobaccos in the drinks and tobacco sector; the entire clothing and footwear sector including clothing and footwear rental and repairs; all the mobile sector articles and services for the house, comprised carpets and bed clothes; all the household appliances and tools including repair, repair and maintenance of the house and garden tools; the whole sector of the goods and services of personal care from the hairdresser to beauty treatments up to watchmaking, jewelry and travel items such as bags and suitcases; legal and accounting services, animal and veterinary products, gardening items, telephone and fax services, audio-visual, computer, photographic and cinematographic equipment, devices for reception, recording, reproduction of sound and images, musical instruments, games, sports services, amusement parks, lessons and courses for recreational activities, bathing establishments, stationery and drawing articles, purchase of cars, motorcycles and bicycles, as well as spare parts and accessories.

Figure 9: *Percentual composition of VAT Amount by aliquot - Italy*



Source: Ministero dell'economia e finanze: Statistiche sulle dichiarazioni fiscal – Analisi dei dati IVA – Anno D'imposta 2015.

As we can notice in the pie chart above, 70% of the transactions amount came from the 22% aliquot, while the other two aliquots represented around 30%.

The table below, shows the size of the VAT collection and its gap, according to the Italian ministry of economy and finance estimates.

Table 7: *Italian VAT Gap prior to programs*

	2010	2011	2012	2013	2014	2015
Potential VAT (€ bi)	127,9	131,3	131,4	128,6	131,4	131,6
Non-declared VAT (€ bi / % of Potential VAT)	26,7 (20,9%)	28,5 (21,7%)	27,8 (21,1%)	26,5 (20,6%)	27,5 (20,9%)	26,4 (20,0%)
Declared but not paid (€ bi / % of Potential VAT)	6,9 (5,4%)	7,8 (5,9%)	8,4 (6,4%)	8,5 (6,6%)	8,8 (6,7%)	8,4 (6,4%)
Total VAT Gap (€ bi / % of Potential VAT))	33,7 (26,3%)	36,3 (27,7%)	36,2 (27,6%)	34,9 (27,2%)	36,2 (27,6%)	34,8 (26,4%)
Effective VAT received (€ bi)	94,3	94,9	95,2	93,6	95,2	96,9

Source: Ministero dell'economia e Finanze: Relazione sull'Economia non osservata e sull'evasione fiscale e contributiva Anno 2017

As we can notice, the gap is varying between 26 and 28 percent during the period analyzed, however we could notice a growth in the declared but not paid VAT, while we had a reduction of the non-declared VAT.

This study is focused into the recovery of the non-declared VAT, which was correspondent to € 26,4 billion in 2015.

1.4.1.1. VAT Aliquot increase and its impacts

Table 8: *Ordinary VAT Variation*

Ordinary IVA Variation	
January 1973	12%
February 1977	14%
July 1980	15%
November 1980	14%
January 1981	15%
August 1982	18%
August 1988	19%
October 1997	20%
September 2011	21%
October 2013	22%

Source: Agenzia delle Entrate (link)

The table 8 reports the variation of the ordinary VAT from its creation in 1973. As we can notice, since the 2008 public finances crisis, the VAT has grown by 2%.

The public finances problem is not resolved yet and the government has been postponing some VAT raises, which are necessary to comply with the budgetary rules. The postpones that happened since 2011 are summarized and explained in the following paragraphs.

Everything started at the summer of 2011, with the crisis of public accounts that would have led to the fall of the Berlusconi government in November, the decree law 138/2011 states for the increase of the VAT rate from 20 to 21% (which entails a greater revenue of € 700 million in 2011 and € 4.2 billion annually in 2012). The maneuver also includes a safeguard clause: if the government cannot find, by 30 September 2012, € 20 billion through rationalization of social spending, those resources will be found with a cut in tax relief or an increase in indirect taxes.

Monti takes the place of Berlusconi, and with the decree 'Save Italy' at the end of 2011, the government decided to lock the safeguard clause, which provided a VAT increase of 2%, starting from October 2012, in which the reduced rate should raise from 10% to 12%, and the ordinary from 21% to 23%; with a further increase of 0.5 points from 2014 to reach 12.5% and 23.5%, for the reduced and ordinary rates, respectively.

In the 2012's Spending Review the government decided to postpone the two-point increase of the two rates to July 2013, with a net effect of € 3.3 billion in 2012, € 6.6 bi in 2013 and € 9.8 bi for 2014 and 2015. The measure is further strengthened by the 2013 Stability Law, which provided a sterilization of a 1% increase in the ordinary VAT for 2013 and the complete sterilization of the reduced rate starting from the same year (with a decrease in revenue of € 4.4 billion in 2013 and € 2.3 billion in each year of the following two years).

The new legislature begins in 2013 and the troubled start is resolved with the birth of the Letta Government. This administration manages to recover the billion needed to postpone the increase of VAT from 21 to 22% from July to October.

In February 2014, the Renzi government took place and the 2015's stability law managed to sterilize further increases in VAT and fuel taxes. These measures would have led to an increase in revenues of €12.8 billion in 2016, €19.2 billion in 2017 and about €22 billion in 2018. The maneuver for 2017 manages to sterilize the VAT increase for the current year, but for next year the Gentiloni government (taking over from Renzi just a few days after the final approval of the 2017 budget law) would have to raise € 19.5 billion.

The 2018's budget law text provided the complete sterilization of the VAT increase for 2018, so the reduced rate could remain at 10% and the ordinary at 22%. However, the Renzi government has inherited the increase in VAT also for 2019: the reduced rate was expected to increase to 12% and the ordinary rate to 25.4%. With the 2018 maneuver, the government could find €6.1 billion for the partial sterilization in 2019.

As of march 2018, the reduced rate in 2019 should rise "only" to 11.5% and the ordinary to 24.2%. For the total sterilization of the 2019 increase, the next government, which has not been formed as of the writing of this thesis, will still have to find €12.5 billion.

Summarizing , the ordinary rate, today at 22%, will raise to 24,2% from the first day of 2019, then will grow to 24,9% from 2020 and 25% from 2021.

It's important to notice that there's a planned growth to the reduced rate as well, from the nowadays 10% to 11,5% starting in 2019 and to 13% from the beginning of 2020.

The figure 10 shows the impacts of the VAT raises planned for 2019, where the families' average monthly expenditure will grow 26,43€ or 1,36%, if we analyze the Italian average annual expenditure, we will see a growth of 317€ or 1,37%.

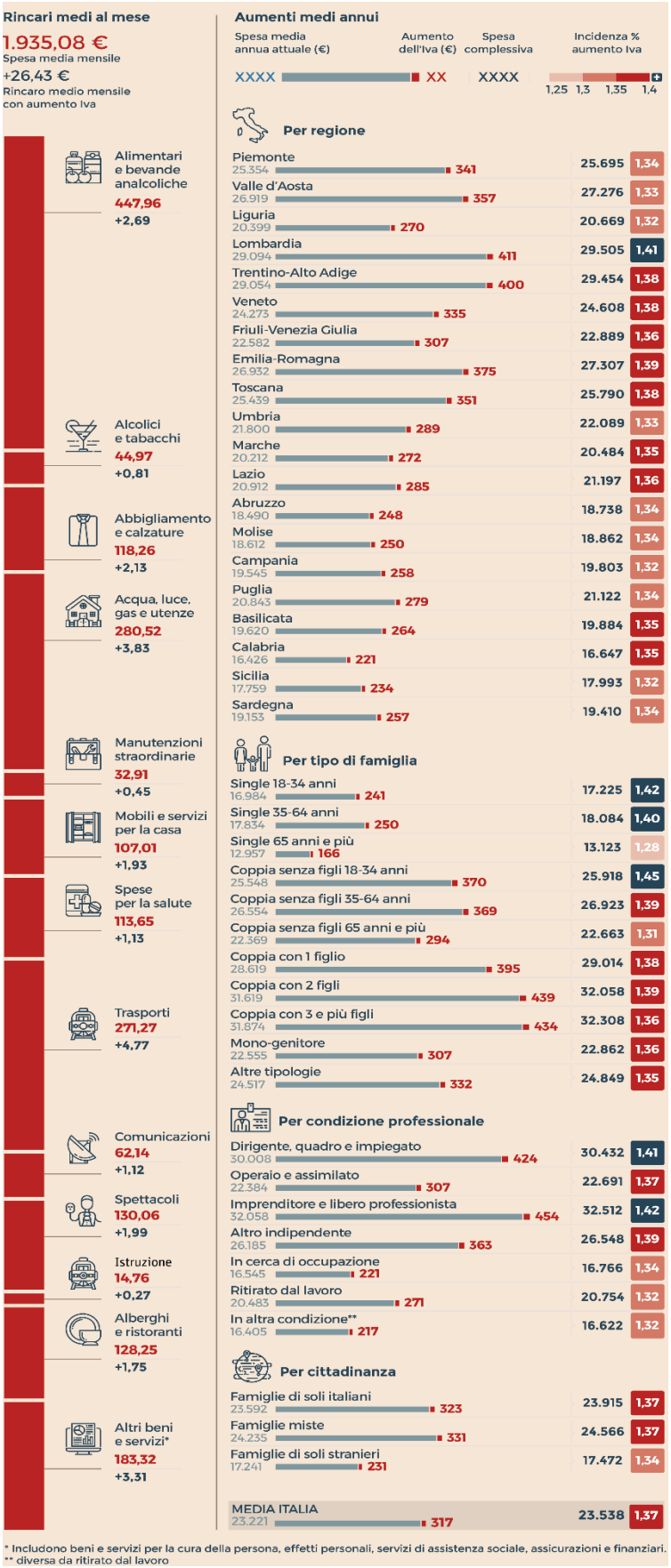
The government expects an additional revenue, to be generated with these VAT increases (10% to 11,5% and 22% to 25%), of € 19,5 billion.

Table 9: *VAT increases expected for next years - Italy*

	Ordinary VAT	**Reduced VAT**
2018	22%	10%
2019	24,20%	11,50%
2020	24,90%	12%
2021	25%	12%

Source: La Legge Per Tutti: Iva, quando aumenta dal 22 al 25%?

Figure 10: *VAT Increase impacts*



Source: Dell'Oste, C.; Parente, G. Quanto pesa il rischio di aumento dell'Iva sulla spesa delle famiglie. (link)

1.4.2. VAT Gap results (IHS - European Union Commission)

The 'VAT gap study', made by HIS and published by the European Commission measures the difference between 'theoretical VAT', or the expected revenue, and the amount actually collected in each country. Across the entire EU, the Commission calculated that a total of €151.5 was lost, but the differences between individual countries are large.

In terms of the actual amount of money lost, Italy topped the charts, with total evasion of VAT cost to Italy a staggering €35.1 billion in 2014, according to this EU-wide study. This means that Italy is responsible for almost a quarter of the total lost VAT revenues in Europe.

Table 10: *IHS - VAT Liabilities and Gap - Italy*

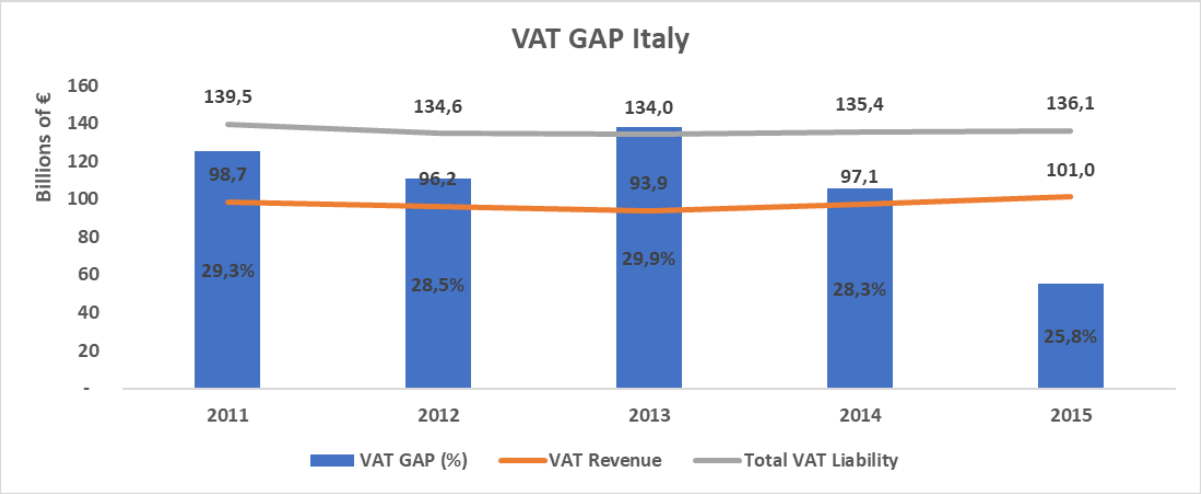
		2015
VAT Liabilitites (€ million)	Household final consumption	99158 (72,8%)
	Government and Non-Profit Institutions Serving Household final consumption	2003 (1,5%)
	Intermediate Consumption	18460 (13,6%)
	Gross Fixed Capital Formation	13370 (9,8%)
	Net adjustments	3136 (2,3%)
	Total VAT Liability	136.127
	VAT Revenue	101.034
	VAT GAP	35.093
	VAT GAP (%)	25,78%

Source: IHS – Institute for advanced studies (2017). Study and Reports on the VAT Gap in the EU - 28 Member States: 2017 Final Report. (link)

In Italy, the rate of evasion was 25,8%, a figure topped only in Greece, Lithuania, Slovakia and Romania. Sweden meanwhile came top of the class showing negative value regarding the VAT evasion, and because of this special condition, the country was removed from the figure 12.

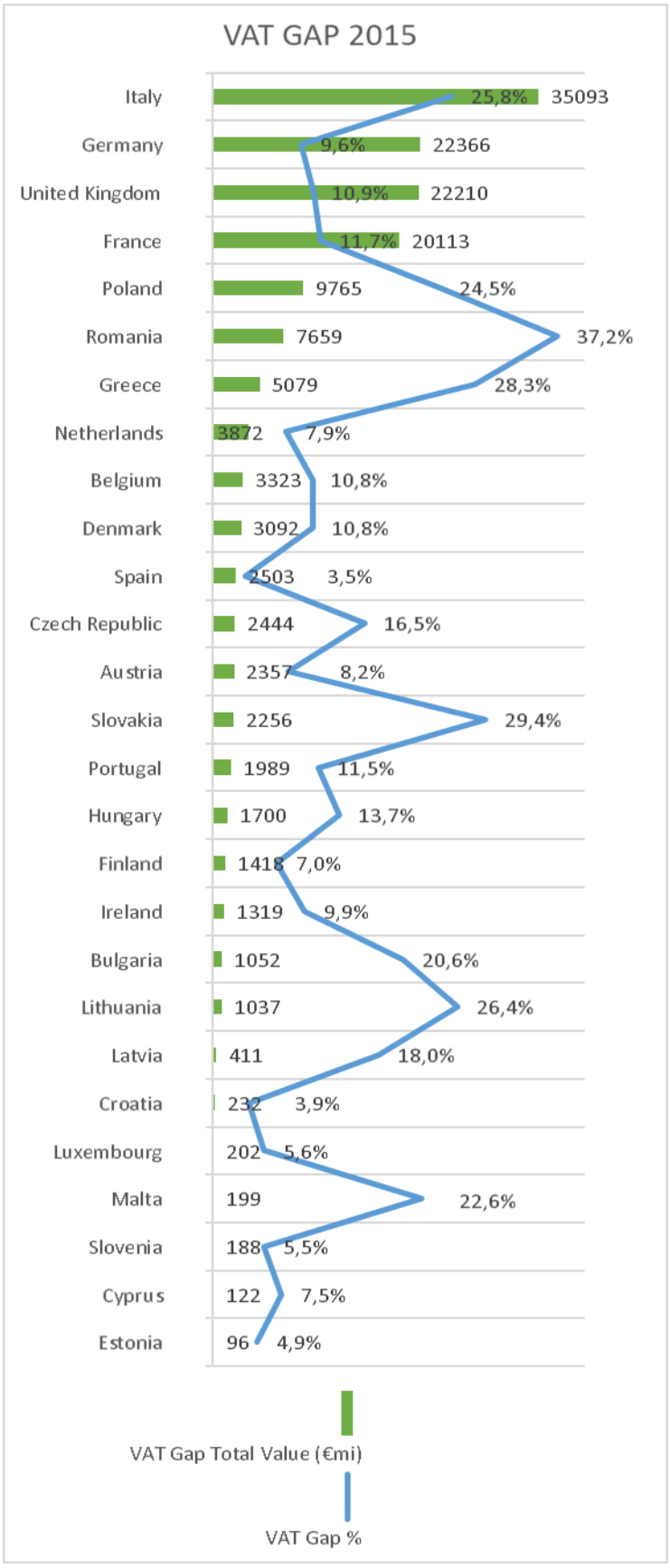
According to the VAT GAP Report, the 2 points VAT GAP reduction in 2015 can be mainly justified by the introduction of the VAT split payments system was implemented through the "Italian Stability Law". It requires public bodies to pay VAT directly into a special Treasury bank account. As we can see in the chart above, the main Vat liability in Italy, is the household final consumption, which corresponds to approximately 73% of the total liability.

Figure 11: *IHS - VAT Gap Italy*



Source: IHS – Institute for advanced studies (2017). Study and Reports on the VAT Gap in the EU - 28 Member States: 2017 Final Report. (link)

Figure 12: *IHS - Vat Gap 2015*



Source: IHS – Institute for advanced studies (2017). Study and Reports on the VAT Gap in the EU - 28 Member States: 2017 Final Report. (link)

1.4.2. Other potential interested taxes

This section will provide a briefly explanation of the additional taxes and their gap, that could potentially benefit from the tax evasion program suggested in this thesis, through the reveal of the tax bases which were not declared prior to the proposed programs.

1.4.2.1. IRPEF

IRPEF stands for '*Imposta sui Redditi delle Persone Fisiche*' which is the Italian Income Tax. As we can see in the table 1.4.x the tax appears in the federal, regional and municipal spheres, being the national, by far the most burdensome. If we consider the whole IRPEF amount, it represented 36,02% of the total Italian tax revenue for 2015.

The data about this tax is branched into two, the first is related to the autonomous and self-employed, while the other, regarding the employees. Almost all the Italian taxes gap data present in this study refers to 2015, however, the employee data was not available at the time when this thesis was written. We'll use 2014 data to make this initial analysis.

In 2014, the IRPEF total gap of this tax was of € 36,8 billion, of which the self-employed accounted for €31,6 billion, and the remaining € 5,2 belonged to the employees category. The propension to the gap is much higher in the autonomous with 67,6%, while the employees category had only 3,8%, because it is much harder to evade compared to the self-employed.

The table 11 shows the participation in the total amount of each income category from VAT number holders, which are called '*Partita Iva*' in Italian and can be considered the seld-employed and autonomous taxpayers.

Table 11: *Income composition of VAT number holders*

2011 IRPEF - Income composition declared by physical persons holders of VAT number (Partita IVA) by type	
Business income, professional or by participation in partnerships or similar	66,30%
Minimum Income	5,90%
Agricultural income	0,80%
Income of land and buildings	5,60%
Income from employees and assimilated	20,20%
Other Incomes	1,20%
Total	**100,00%**

Source: Ministero dell'economia e Finanze. Relazione sull'Economia non osservata e sull'evasione fiscale e contributiva Anno 2017. (link)

The category which may be affected by the programs proposed in this thesis is the one related to business income from the autonomous and self-employed taxpayers, because the program can make emerge the amounts evaded through under-declaration, which was estimated at €29,9 billion in 2015. If we use the 2011's 66,3% share found for this sector and assume that the gap is equally divided between the business activities, we arrive at a gap of €19,82 billion for this sector.

1.4.2.2. IRES

IRES stands for '*Imposta sul reddito delle società*', or in English, the corporate income tax. The aliquot decreased from the 27,5% used up to 2016 to the nowadays 24%. The tax represented 7,15% of the total Italian tax revenue for 2015.

The 2015 total gap for this tax was estimated at €10,3 billion, being €8,9 billion associated to under-declaration. This value excludes the financial sector, which presents, among other things, accounting rules and methods for determining income not comparable with other sectors, and the public sector, for which it is formulated the hypothesis of evasion absence.

1.4.2.3. IRAP

IRAP means '*Imposta regionale sulle attività produttive*', which in English can be translated to regional income tax. This tax represented 5,99% of the total 2015's tax revenue. The natural persons and their societies accounted for 18% of IRAP, while the capital societies had a 68% share. The non-commercial entities and public administration had the remaining 14% and the gap for this sector is estimated to be zero.

The 2015 total gap for this tax was estimated at €6,18 billion, being €4,96 billion associated to under-declaration from the interested taxpayers.

1.5. Estimates methodologies

In this sub-chapter, the methodologies used for the tax evasion estimates found in the chapter 1 will be presented divided by country and source.

1.5.1. Brazil

According to the SINPROFAZ group, the literature on tax evasion measurement is scarce in Brazil. The few existing studies address a single tribute or a small group of them. Each of these studies adopts its own methodology, according to the availability of data. The scarcity of data and its low reliability are among the greatest challenges to be faced by those who propose to estimate tax evasion.

The work done by the group, chose to adopt a model that would gather the indicators found in other studies, for each type of tax, in order to estimate an average indicator of evasion in Brazil. Of course, each of the studies has its own limitations due to the methodologies adopted and the availability of data, as previously discussed, but this was the way to have an estimate of the evasion level in Brazil.

The three sources of the methodologies used for the estimation are listed below:

a) Siqueira (2006): 'Evasão fiscal do imposto sobre a renda: uma análise do comportamento do contribuinte ante o sistema impositivo brasileiro'

The central point of this paper is to explain how taxpayer behavior affects the level of tax evasion of Personal Income Tax through the expansion of the Allingham and Sandmo (1972) model.

The model proposed by them describes the tax evasion as a portfolio decision-making process, using the theory of expected utility developed by von Neumann and Morgenstern. In this sense, they suppose that a representative rational taxpayer considers the income omitted (or income evasion) a risky asset, which depends on the possibility of the omitted detection and its consequent punishment, for consequently, maximize the expected utility function.

To test the proposed model, the mentioned author used some indicators which were based on data such as: 1) total number of declarations audited; 2) total number of taxpayers that have been only audited; 3) A proportion of 1 and 2

However, indicators like these have some limitations, which should be considered and weighted for possible extrapolation of the results of the experiment to the universe of taxpayers. The author himself enumerates the following:

1) the criterion of selection of taxpayers may be biased by previous indications of "evasion" and even of denunciations, since the results related to unreported income refer only to taxpayers inspected by the RFB, which is Brazilian equivalent of the USA's Internal Revenue Service;

2) Another constraint faced is that estimates based on RFB data relate only to respondents, not providing any information about non-respondents. As Franzoni (1999) has observed, non-declarants are an important part of the mitigating activity and not consider them may bias such estimates;

3) It is known that tax audits have a limited ability to detect evasion, especially in relation to incomes of the self-employed and those who only carry out cash transactions; thus, in some cases, the evaded values may be slightly higher than those estimated based only on audits;

4) Finally, it should be emphasized that studies based on sample surveys face many problems. Among them and the most important, is that the results depend crucially on the representativeness of the sample and eventual selection biases.

From the reference study, the tax evasion estimate for Personal Income Tax (IRPF) was used in this report, which was 34.09%, based on data from 1998 (1999 statement).

b) Paes (2011): 'O Hiato Tributário do Imposto sobre Produtos Industrializados Evidências Setoriais'

In this article, the author analyzed the IPI tax gap from a highly disaggregated source, the PIA - Product, and from detailed IPI legislation, to obtain estimates of the gap by economic sector between 2001 and 2007.

First, the author calculated the expected average rate of IPI for each sector. Later, having already had such sectoral rates, he made pertinent adjustments to the calculation of the legal collection, which is the expected collection obtained by applying the legal average rates on the basis of the tax. In this second phase, IPI tax credits on the acquisition of inputs, the benefits of the Manaus Free Trade Zone, as well as exemptions and immunities published by the Brazilian Federal Revenue (RFB) body are also considered.

Finally, we calculate the tax gap, which is the expected legal deducted from the collection.

It should be noted that the tax gap does not necessarily mean the presence of tax evasion, although this may be one of its main components. According to the author, sectors in which the presence of tax benefits is significant and whose benefits are particularly difficult to measure, may present larger gaps due to the difficulty in calculating estimates of the size of such benefits.

In addition, factors such as informality and the visibility of the sector for inspection can also contribute to the tax gap. Clearly the tax gap is the result of a complex set of factors related to institutional, legal and cultural aspects. The percentage of tax or tax gap found in this study were adopted, as a simplification for the work presented here, as a percentage of IPI evasion, and a weighted average of all the indicators found in the years evaluated by the work was obtained, reaching a percentage of 33.4%.

c) Amaral, Olenike, Amaral & Steinbruch (2009): ‘Estudo sobre a Sonegação Fiscal das Empresas Brasileira’, IBPT.

The purpose of this study, according to its own authors, is to estimate the amount of taxes evaded by companies in Brazil, as well as the indicator of tax evasion by sectors and by taxes.

The database used was the inspection reports of the RFB, the National Social Security Institute (INSS), the State Finance Secretariats and the Capital Finance Secretariats.

In this study, 9,925 tax assessments against companies of all sizes were analyzed, and in 26.84% of the cases, there were strong indications of tax evasion.

It is important to note that the use of the results of this type of study, which are, studies based on charges should be done with some caution, since the data may be biased by the distorted

sample without considering the cases where the evasion was not discovered. Oversight agencies generally do not make a random choice of companies to be audited, the most common practice is the adoption of some criterion indicative of circumvention to select the companies or that the monitoring is based on complaint.

From the conclusions of this study, parameters were extracted to estimate the evasion of all taxes present in the table 1, excluding the IPI.

1.5.2. Portugal

1.5.2.1. VAT GAP Estimation methodology (INE)

The possibility that a good or service may or may not generate VAT revenue depends on its use for domestic consumption or for export. Within the conceptual framework of the national accounts, the goods and services available in the territory which may generate revenue from this tax have the following uses: intermediary consumption (mainly companies and enterprises); final consumption (households); gross fixed capital formation (mainly companies and enterprises). The final uses in the variation of stocks and exports are not generators of VAT.

Since families cannot deduct the VAT paid on the purchase of goods and services, all household final consumption expenditure generates VAT, and the respective value is given by:

$$VAT\ FC = \sum_{c} (CF_c + T_c)$$

Where: VAT FC is the final consumption (households) VAT generated; Tc is the VAT rate 'T' corresponding to each product 'c', since the national accounts work with 433 products, that corresponds to a significant aggregation of the thousands of goods and services transacted in the market.

The expense of intermediate consumption (and gross fixed capital formation) is partly VAT-generator. The value generated depends on the rate charged on the products purchased and the possibility of VAT deduction. The revenue generated by these aggregates is expressed in the following formula:

$$VAT\ ENT = \sum_{p} (CI_p^r + FBCF_p^r) \times T_p) \times PR^r$$

Where: VAT ENT is the VAT generated by enterprises; CI_p^r is the intermediary consumption of the product 'p' by the field of activity 'r'; $FBCF_p^r$ stands for the expense in gross fixed capital formation in product 'p' by the field of activity 'r' and PR^r corresponds to the ratio of the activity exempt from VAT (without deduction right) and taxable activity of the field of activity 'r'.

The process of compiling national accounts, applying the method presented above, where 'T' is the legal VAT rate, leads to the estimation of the theoretical VAT for the underlying economic

activity. This value does not match the VAT actually charged. The difference between the two translates into the so-called VAT GAP.

1.5.2.2. VAT Gap Estimation methodology (IHS - EU Comission)

The "top-down" method that is utilized for VAT Gap estimation relies on national accounts figures. These figures are used to estimate the VAT liability generated by different sub-aggregates of the total economy. The VTTL is estimated as the sum of the liability from six main components: household, government, and NPISH final consumption; intermediate consumption; GFCF; and other, largely country-specific, adjustments.

In the "top-down" approach, VAT liability is estimated using the following formula:

$$VTTL = \sum_{i=1}^{N} (rate_i \times Value_i) + \sum_{i=1}^{N} (rate_i \times propex_i \times IC\ Value_i) + \sum_{i=1}^{N} (rate_i \times propex_i \times GFCF\ Value_i) + net\ adjustments$$

Where:

- VTTL is the VAT Liability
- Rate is the weighted average tax rate i.e. the effective rate;
- Value is the final consumption value,
- IC Value is the value of intermediate consumption,
- Propex is the percentage of output in a given sector that is exempt from VAT,
- GFCF Value is the value of gross fixed capital formation, and
- Index i denotes sectors of the economy.

To summarize, VTTL is a product of the VAT rates and the propexes multiplied by the theoretical values of consumption and investment (plus country specific net adjustments).

For the purpose of VAT Gap estimation, roughly 10,000 parameters are estimated for each year, including the weighted average rates for each 2-digit CPA (i.e. $ratei$ in the VTTL formula presented above) group of products and services and the percentage of output in a given sector

that is exempt from VAT for each type of consumption (i.e. $propexi$ in the VTTL formula presented above). For instance, the commission estimated weighted average rates in household, government and NPISH final consumption, as well as the percentage of output that is exempt from VAT. The main source of information is national accounts data and Own Resource Submissions (ORS), i.e. VAT statements provided by the Members States to the European Commission. In a number of specific cases where the ORS information was insufficient, additional data provided by the Member States was used. As these data are not official Eurostat publications, the commission declines responsibility for inaccuracies related to the quality of the data.

1.5.3. Italy

Two studies have been used as sources to produce this content regarding the tax evasion in Italy, the first one was the Annual report of the non-observed economy and fiscal evasion published by Italian Ministry of Economy and Finance, and the second is the 'VAT gap study' published by the European Commission, which is the same used for Portugal and the methodology is available at the section 1.5.2.2, so only the data of the Italian government is available in this section.

1.5.3.1. Italian Ministry of Economy and Finance Annual Report

In the annual report of the non-observed economy and fiscal evasion published by Italian Ministry of Economy and Finance, the estimate of the tax gap in the strict sense (pursuant to Article 2 of Legislative Decree No. 24 September 2015, No. 160), or the compliance gap, is developed for the main tax and local taxes, which represent approximately 76% of the potentially taxable tax revenue, and for contributions by employers and employees.

On the methodological basis of evasion estimation, international experiences highlight two main approaches. A first approach to calculate the tax evaded (so-called topdown) is based on the comparison between fiscal data and a corresponding macroeconomic aggregate (generally represented by the national accounting flows), which incorporates within it, an estimate of the non-observed economy, appropriately selected to build an encompassing theoretical tax base, with the purpose of comparing the base declared by the universe of taxpayers. In international best practices, the top-down method is applied above all in the quantification of the tax gap of indirect taxes (VAT, excise duties, etc.). In Italy, however, the presence of a tax on the value of net production, such as IRAP, also makes it possible to measure the tax gap of direct taxes through a top-down approach.

A second approach (so-called bottom-up) is based on sources of information originated from within the Administrations themselves, such as, for example, statistical surveys or random verification or verification programs, which can also be used to elaborate an estimate of the index of accuracy of declarations and risk profiles. This methodology is more robust for estimating the evasion of direct taxes; however, it is not commonly used because the random

audits involve an expensive allocation of the resources responsible for checks that could alternatively be used to concentrate on the cases of greater risk (as happens in Italy).

Article. 10-bis.1, paragraph 4, lett. b) of the Law of 31 December 2009, n. 196, defines a methodology for measuring tax evasion, referring to all the main taxes and contributions, based on the comparison between national accounting data and those acquired by the Tax Registry and the INPS. In other words, the choice of the legislator is due to the idea that a robust estimate of tax and tax evasion is possible through a quantification of the tax gap carried out using a top down methodology. Although the Commission has carefully assessed the possibility of estimating the tax gap through the bottom-up approach, all the methodologies used in the report are mainly top-down. The bottom-up methodologies for estimating direct taxes have however been carefully analyzed and have been considered worthy of further future developments, also considering the fact that the presentation of coherent alternative methodologies would ensure greater robustness to the estimates.

Article. 10-bis.1, paragraph 5, of the Law of 31 December 2009, n. 196 provides that, in order to estimate the tax and social security evasion, which is the difference between the taxes and the contributions actually paid and the taxes and contributions that would have been paid in a system of perfect fulfillment, excluding the effects of tax expenses, the Report should measure separately: a) the lost revenue resulting from errors of taxpayers in the declaration; b) the omitted deposits with respect to what has been declared; c) the gap between the declared tax and contributory bases and the theoretical deductions from the national accounting aggregates, distinguishing between the part of this gap attributable to tax expenses and the residual part, which is attributed to the concealment of tax bases; d) the lack of tax and social security revenue attributable to the difference between taxes and contributions actually paid and taxes and contributions that would have been paid in a system of perfect fulfillment, also net of the effects of tax erosion.

Compared to the methodology outlined above, two important aspects deserve to be highlighted, which clarify that the tax gap does not coincide with intentional evasion, but is wider, since the mere errors of calculation and interpretation of the rules and non-payment (if due only to liquidity crisis) are not attributable to the intentional tax evasion, the theoretical tax bases underlying the estimation of the submerged GDP, as estimated by Istat, do not fully represent the undeclared tax bases, even if purified from the effects of tax erosion. In fact, there are taxpayer behaviors that reduce the tax base, but which, by definition, are not included in the

estimates of undeclared added value (think, for example, of the tax deductions received to an extent not due).

In order to quantify the estimate of the tax gap with the top down method, a measurement of the unexecuted economy is required, for the part relating to the undeclared economic. To this end, the Commission has implemented the measures calculated by Istat (the Italian statistics institute) in the context of estimates of national economic accounts. The patterns and definitions set by the European System of Accounts (the SEC that as of September 2014, it is in force in the 2010 version), in fact, impose the accounting of the Non-directly Observed Economy (NOE) in the GDP, and in general in the economic aggregates. The SEC defines the economy not observed as originated: i) from the undeclared economic; ii) from illegal activities; iii) from the production of the informal sector; iv) the statistical submerged, deriving from shortcomings in the system for surveying and measuring activities. With regard to the inclusion of illegal activities, the rules of the System of Accounts are applied uniformly throughout the European Union, beyond the specific characteristics of national legislation; this principle was already present in the ESA 1995 on which previous versions of the accounts were based, but only with the introduction of the ESA 2010 has it been applied in all countries.

Regarding employers' contributions, the quantifications refer only to the actual contributions of employers and are based on the application to the various tax base estimates evaded by the contribution rates implicit in the calculation of the estimates of income from employment (regular) national accounts. The estimate of contributions to be paid by the worker is based instead on the rates of the law.

2. The Sao Paulo Program Experience

This chapter is focused in the '*Nota Fiscal Paulista*' program created by the government of the Sao Paulo state in Brazil. A description will be provided along with the results obtained since program implementation and which continues in operation in 2018, even if the program accumulated several changes during its lifetime.

2.1. Introduction and program description

The 1988 Constitution introduced important changes in relations between the Union, states and municipalities, which resulted in a strong decentralization of both expenditure and revenues. Regarding the tax system, the new Constitution gave the subnational governments autonomy to legislate, control resources and even set the tax rates, that is, the competence to institute and manage the respective taxes. The result of this increase in tax autonomy was: excessive bureaucracy, a low degree of transparency, and a lack of comparability data of taxpayers' economic and fiscal parameters.

As a way of reducing this inefficiency, the government changed the Constitutional Amendment no. 42 with the inclusion of Paragraph XXII to article 37 of the Federal Constitution, determining that the federal, state and municipal tax administrations should act in an integrated manner, which included the exchange of tax information and registrations.

In order to comply with the provisions of Constitutional Amendment no. 42. In July 2004, the First Meeting of Tax Administrators (ENAT) was held, which brought together authorities from tax administrations at different levels of government.

The purpose of the meeting was to seek joint solutions that "promote greater administrative integration, standardization and better quality of information; rationalization of costs and the operational workload in service; greater effectiveness of supervision; greater possibility of carrying out coordinated and integrated fiscal actions; greater exchange of fiscal information between the various governmental spheres; large-scale data crossing with standardized data and standardization of procedures ".

Two protocols of technical cooperation were approved in the ENAT: The Synchronized Registration Project and the Electronic Invoice (NF-e). The NF-e project had as its objective

the substitution of the systematics of emission of fiscal document in paper by the implantation of an electronic fiscal model. With legal validity guaranteed by the digital signature of the sender, it would be adopted nationally, simplifying the obligations of taxpayers, and enabling real-time monitoring by the commercial operations tax. Among the main objectives of the implementation of the NF-e program was also the improvement in the activity of inspection of operations involving ICMS and IPI, in order to reduce tax evasion of these taxes.

Since October 2005, with the approval of the SINIEF 07/05 adjustment, the Electronic Invoice (NF-e) and the Auxiliary Document of the Electronic Invoice - DANFE were instituted nationally.

In 2005, the NF-e pilot project was started, comprising the states of Goiás, Rio Grande do Sul, São Paulo, Bahia, Maranhão and Santa Catarina. The first NF-e with tax validity in the states of Goiás and Rio Grande do Sul was issued on September 15, 2006. Since then, the Electronic Invoice has ceased to be a pilot project and has become a mechanism for fiscal control, received by the Treasury Departments of several other states.

The technological innovation represented by the NF-e has made it possible to adopt other advances in the collection and inspection of collections, especially: (i) the implementation of the Public Digital Bookkeeping System (SPED), which allows for the due payment of government obligations ; (ii) the adoption of the System of Tax Replacement of the Tax on the Circulation of Goods and Services, according to which the withholding of taxes is done at the origin which facilitates the collection. Only with the NF-e was it possible to consider the complex system of ICMS rates, differentiated by state, allowing agreement among them to make the operation viable; (iii) the implementation of the '*Nota Fiscal Paulista*' and '*Nota Fiscal Alagoana*' programs that use the platform of the electronic fiscal document.

The '*Nota Fiscal Paulista*' Program started in October 2007, with restaurants and similar sectors, and expanded the sectors up to September 2009, when all the commercial sectors were participating of the program.

The government stated that the implementation cost was of R$ 30 million in 2007, which converted to 2018's BRL value would be equivalent to R$54,5 million, which corresponds to around € 13,5 million. The marketing expenditure up to 2009, was of about R$ 40 million, and if applied the same conversion as the one showed above, we would obtain € 18,4 million in

2018. The exchange rate used is R$ 4,06 for each euro, which was the rate valid in March, 22 2018.

It refunded up to 30% of the ICMS paid by the supplier in a commercial transaction, provided that the consumer is identified through his / her personal fiscal identification (CPF) or corporate register (CNPJ). It thus corresponds to an incentive mechanism for consumers to ask to the business establishment the tax document at the time of purchase. In addition to receiving the credits, the consumer still can receive cash prizes through a lottery. For each R$100 spent in the Sao Paulo state for each CPF, the citizen automatically receives a ticket for this lottery. It's important to clarify that if the commercial activity didn't pay the tax, the credit will not be generated to the final customer.

The direct devolution of tax collected, according to type of business and products, changed during the years, according to the estimated evasion rate, and the most updated values, as of February 2018, were divided in the following macro categories:

- **30%:** Bookstores, newsstands; Meat and fish stores.
- **20%:** Tires; Convenience stores; construction industry coatings, glass, sand, tiles; Photographic articles and telephony and communications equipment.
- **10%:** Restaurants; Bars; bakery and sweet-shops; Fruit and vegetable products.
- **5%:** Clothing and accessories; Perfumery and cosmetics; Sporting goods and electrical material.
- **0%:** Tobacco shops; Fireworks; Weapons and ammunition.

The amount of credit generated to the '*Nota Fiscal Paulista*' uses the following formula:

$$D = T \times F \times V/VT$$

Where:

- D= Distributed credit for direct reimburse and lottery
- T= Total amount of ICMS effectively collected from the commercial activity
- F= Factor of distribution (which varies from 30% to 0% depending of the type of the commercial activity)
- V= Invoice value

- VT= Total value of invoices issued by the commercial activity identified with CPF or CNPJ or any other NGO.

To make the process more transparent, the São Paulo State Treasury Secretariat (SEFAZ-SP) maintains an electronic portal in which the invoices released and the credits received are disclosed. Consumers can claim credits not received within the time period of 5 years, which allows the tax authority a speedy adjustment of the situation with the company issuing the tax document. In addition to these features, the portal also includes a tool which the citizens can easily report illegal behavior by the companies or stores which they tried to include their CPF.

All of this makes it possible for consumers to clearly, easily and concretely observe the benefits of fiscal citizenship, increasing trust in and adherence to the program.

2.2. Program Changes during brazilian economic recession

In 2015, Brazil started to face the worst economic recession of its history, registering a drop of 3,8% and 3,6% in 2015 and 2016, respectively. Therefore, the total collected tax amount has been reduced dramatically during these years. During the first semester of 2015, the Sao Paulo state had its ICMS revenue reduced by 4,1% in comparison to the first semester of the previous year.

In order to offset the drop of the ICMS revenue the Sao Paulo state government reduced the rewards of the '*Nota Fiscal Paulista*' program. We can find below the cuts, problems and modifications done to the program and the respective dates:

In 2015:

- The refunded rate of ICMS has been reduced to from 30% to 20% in July, 2015.
- The withdrawals of the direct reimburses were suspended for 6 months in 2015.

In 2016:

- The monthly lottery value was reduced from R$19,5 million to R$4,7 million, a 76% drop.

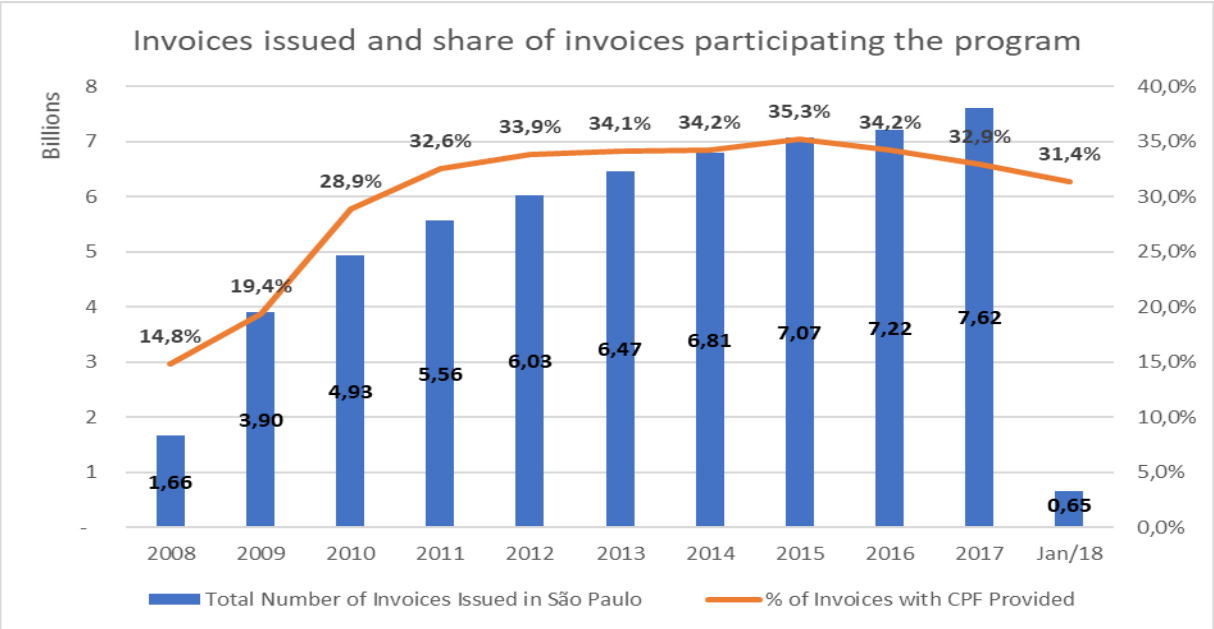
- The quantity of the lottery awards dropped from 1,6 million to 598, in order to reward higher values to the lottery winners.
- The maximum amount of the direct reimburse by invoice has been limited to 10 Fiscal units of Sao Paulo State, which was equivalent to R$235,5 in 2016.
- Bookstores, newsstands; Meat and fish stores returned to have 30% of the ICMS collected distributed, but a series of establishments had the rate reduced to 10%, 5% and up to 0.

In 2017:

- Only 40% of the credit generated through the direct reimburse will be available to the customer. The remaining 60% must be sent to an NGO (Non-Governmental Organization) or care entities.

These recent changes caused a drop in the share of invoices that had a CPF provided, since the customers are noticing the changes and losing interest in the program due to its reduced rewards. Therefore, the action of providing the CPF during the purchase process, and consequently making it slower, is becoming less attractive to the customers. We can see the effect of these changes in the charts below:

Figure 13: *Invoices issued and share of invoices participating the program*

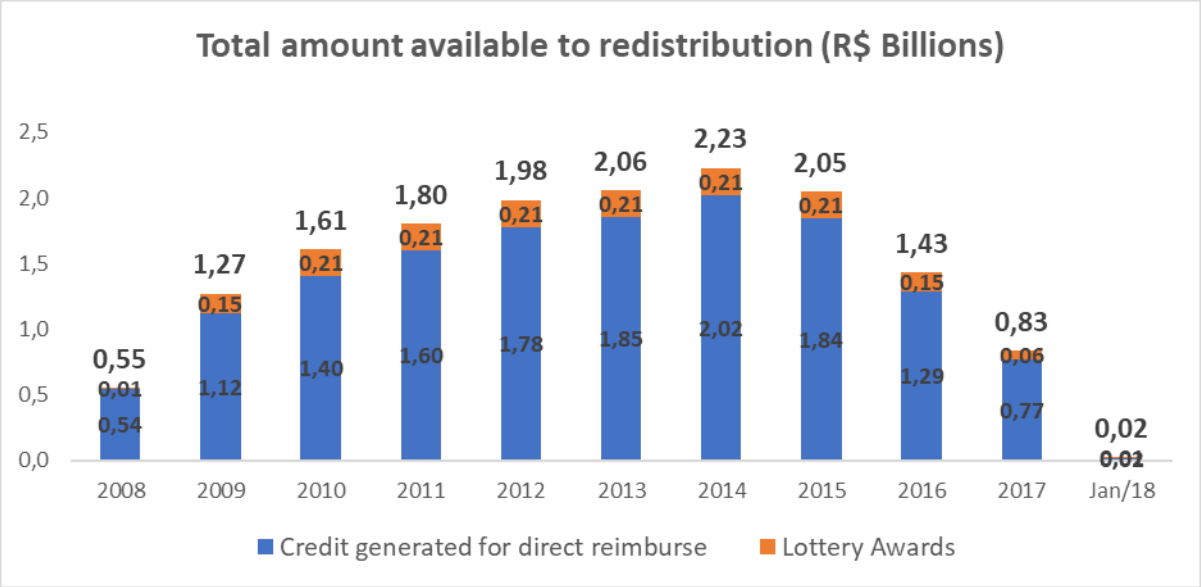


Source: Nota Fiscal Paulista Portal

As we can see the program registered a peak of 35,3% with CPF in 2015, exactly the same year in which the program cuts started, and in the following years started to register a consistent drop in the participation of the citizens using the program.

The total amount available to redistribution, which is the sum of generated credit available for direct reimburse plus the lottery awards, has been reduced drastically. The peak amount was reached in 2014, prior to the cuts to the program and reached its lowest value in 2017, showing a reduction of almost 63% in the period of 2014 to 2017. We can see the value divided by year in the chart below:

Figure 14: *NFP - Total Amount available to redistribution (R$ billion)*



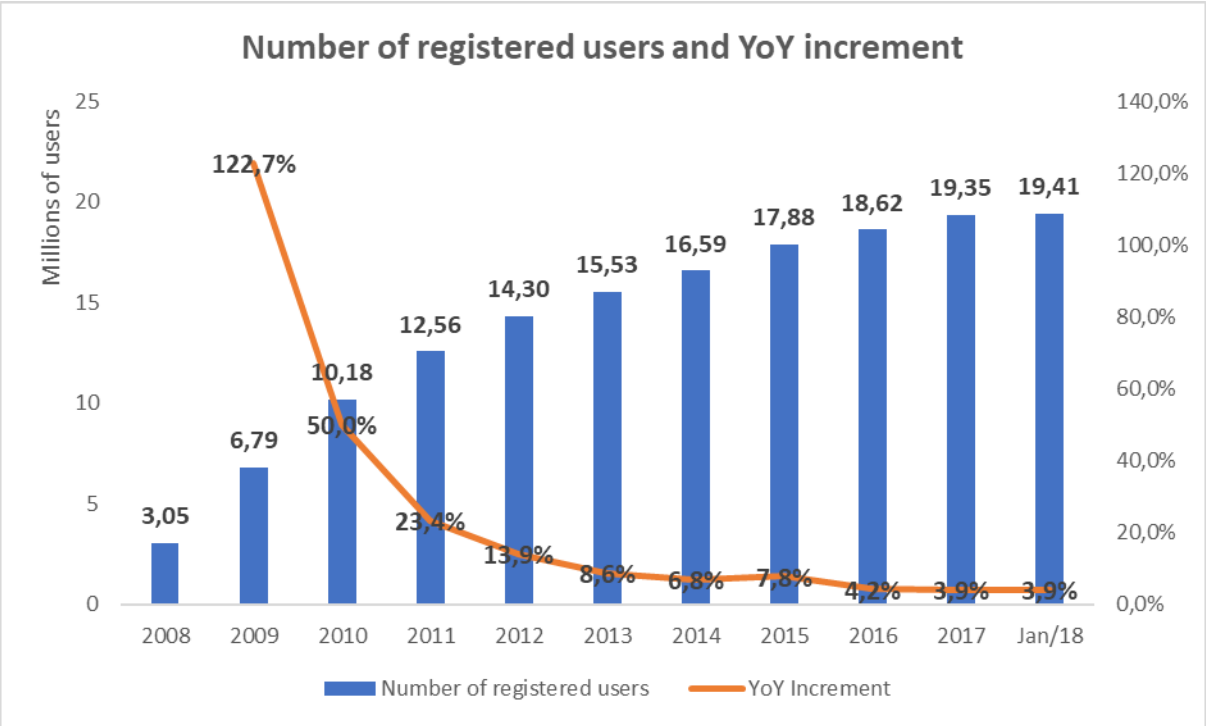
Source: Nota Fiscal Paulista Portal

Regarding the user base of the program, considering that the population of the São Paulo has been estimated in 43,5 million in 2016 and nearly 15% of the population have less than 19 years old, we have around of 37 million of citizens that could be considered the target customers of the program, and as of January 2018 the program had 19,41 million of registered users, this corresponds to more than a half of the population of the state with their CPF's registered into the program. People which are not resident in the state can also register their fiscal codes (CPF) in the program, even considering this the registered user base has shown incredible numbers since the program implementation.

The increment in the number of registered users also suffered a significant drop in the period of the program cuts. Considering that 2015 was the first year of the reductions and the news

haven't had been noticed by the majority of the population until some months after, it still registered a strong growth, however from 2016 the program had its userbase growth YoY halved in comparison to the period prior to the cuts.

Figure 15: *NFP - Number of registered and YoY increment*



Source: Nota Fiscal Paulista Portal

2.3. Program evolution and expansion to other Brazilian states

The first expansion of the program occurred in the Distrito Federal, which is not considered a state, because of its small size and peculiarities, such as the federal government territory. The model that most resembles the one from São Paulo in terms of the ease of access to information about the program. This began in August 2008.

The '*Nota Fiscal Alagoana*' program, with disclosure by the State of Alagoas Finance Department (SEFAZ-AL), began in November 2008 and worked similarly to the '*Nota Fiscal Paulista*' program including the direct reimburse and lottery rewards, but in 2016 the program removing the direct reimburse option. It has, however, less taxpayers registered so far and presents a degree of transparency lower than the São Paulo model, such as, for example, lack of information on the volume of distributed values.

Ceará, in December 2009, launched the program ‘Sua nota vale dinheiro’. Since 2012, the government started to require an invoice minimum amount of R$15 and kept the requirement of the invoice registration in the website in order to receive 0,5% reimburse promised by the government.

The Minas Gerais and Rio de Janeiro states implemented a program which required a sms message to be sent with the invoice data. Both programs were terminated in 2014, some years after their implementation.

In addition to the states, several cities implemented similar program in order to help boost their municipal tax collection.

In the table below, we can see a summary of the programs implemented in the Brazilian states that aim to increase the level of collection of ICMS from the stimulus to fiscal citizenship and were adopted during the period of analysis in January 2018.

Table 12: Tax reimburse programs in Brazil

	Program Start Date	Distribution	Distribution System	Total Distributed Value (R$)	Number of registered users	Registered Invoices	Registered Companies
São Paulo	October, 2007	Up to 30% of ICMS	Lottery + Direct Reimburse + NGO's + Taxes Discount	15.825.271.472	19.614.623	57.261.207.021	1.193.326
Distrito Federal	September, 2008	Started with 30% then became to 20% of ICMS in 2016	Direct Reimburse + Taxes Discount	883.363.439	1.085.884	514.238.896	122.794
Alagoas	November, 2008	Up to 30% of ICMS	Lottery	n/a	n/a	n/a	n/a
Ceará	December, 2009	0,5% of invoice amount	Direct Reimburse	n/a	n/a	n/a	n/a
Sergipe	November, 2011	n/a	Lottery + NGO's	n/a	125.760	478.669.208	n/a
Rio Grande do Sul	August, 2012	n/a	Lottery + NGO's	n/a	1.520.793	2.760.602.285	more than 300.000
Pará	September, 2012	% of total revenue of invoices with CPF	Lottery	6.941.800	194.499	n/a	287108
Paraná	April, 2015	30% of ICMS + Lottery	Lottery + Direct Reimburse	802.147.666	2.028.665	478.668.182	164.362
Goiás	May, 2015	n/a	Lottery + NGO's + Taxes Discount	n/a	n/a	n/a	n/a
Piaui	June, 2015	Up to 30% of ICMS	Lottery	9.762.926	199.691	n/a	n/a
Amazonas	August, 2015	n/a	Lottery + NGO's	n/a	253.184	59.353.708	n/a
Bahia	December, 2017	R$13.000.000 Annually	Lottery	200.000	172.316	1.222.569	645
Maranhão	Program being updated						
Rio Grande do Norte	Program under implementation						
Tocantins	Program under implementation (Municipal level program available)						
Rondonia	Program cancelled in 2015 due to technological infrastructure constraints. Introduced new program to benefit only NGO's						
Rio de Janeiro	SMS Program Cancelled in 2014 (Municipal level program available)						
Minas Gerais	SMS Program Cancelled in 2014						
Espirito Santo	State program not available (Municipal level program available)						
Acre	State program not available (Municipal level program available)						
Pernambuco	State program not available (Municipal level program available)						
Mato Grosso	Program not available						
Roraima	Program cancelled in 2017 due to technological infrastructure constraints.						
Santa Catarina	Program not available						
Mato Grosso do Sul	Program not available						
Amapá	Program not available						
Paraíba	Program not available						

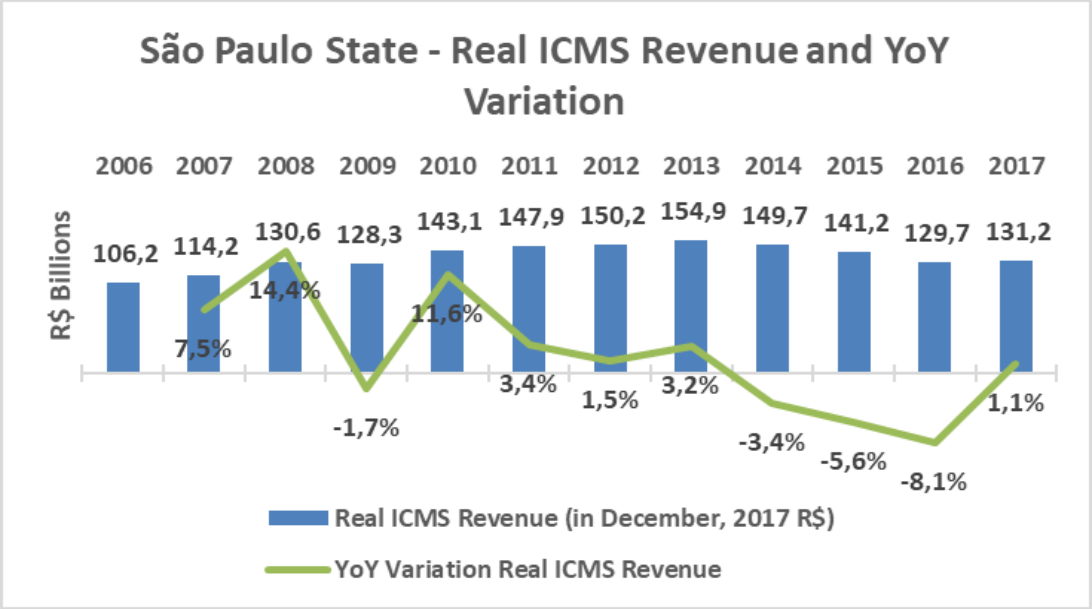
Source: Brazilian Tax reimbursement programs portals.

2.4. Results obtained with '*Nota Fiscal Paulista*'

The data regarding the direct results of the program in terms of collection of the ICMS in the state will shown an overview from the beginning of the program up to 2017, but will have an extra focus of the first three years of the program, which is the period from 2007 to 2009.

To start the observation, we have the figure 16 which shows the ICMS revenue in the state starting from 2006, two years prior to the effective start of the program, which started in 2008.

Figure 16: *SP State - Real ICMS Revenue and YoY Variation*



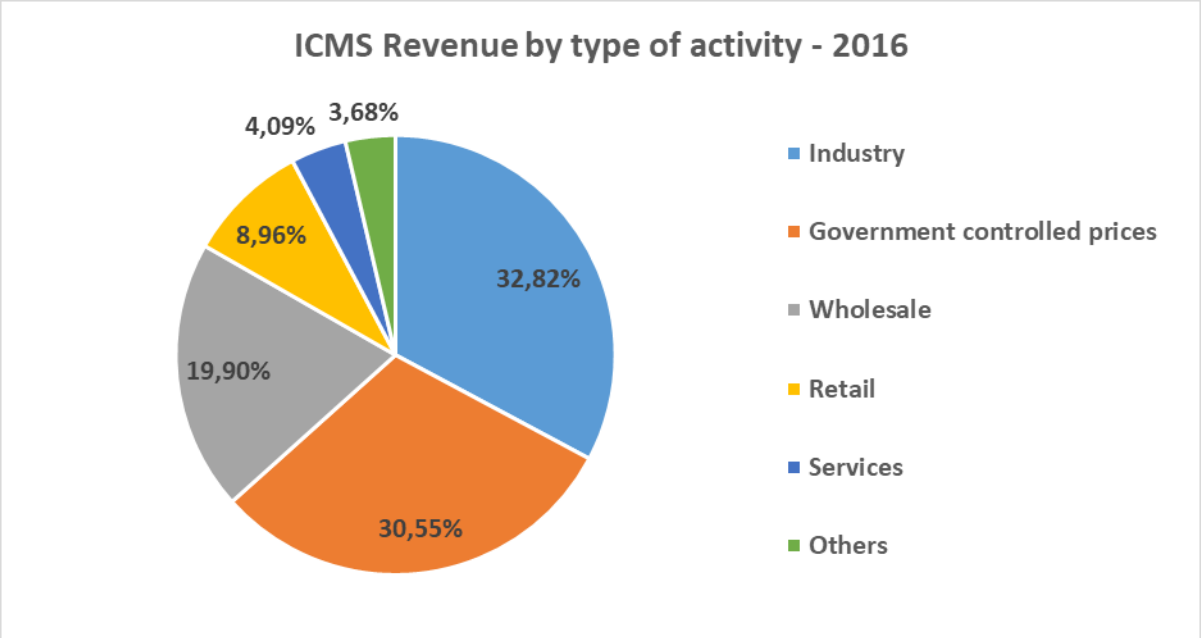
Source: Secretaria da Fazenda – Estado de São Paulo. Relatórios da Receita Tributária.

As noticeable, the Brazilian economic recession started to affect the ICMS revenue already in 2014, making it become 3,4% lower than the revenue obtained in 2013, the following two years didn't show any improvement, and only in 2017 a growth was registered. The lowest value reached during the recession was in 2016, which, in terms of ICMS revenue, was almost equivalent to the revenue of seven years back, in 2009, which was the second year of the '*Nota Fiscal Paulista*' program.

It is important to note that today most ICMS collection is in industry, wholesale, and in the government controlled prices sectors, included in this category are the fuel and electricity production and distribution and communications services. These three sectors are more concentrated and, consequently, easier to inspect. In this way, it would be reasonable to suppose that it is precisely in these sectors where there is a greater cost-benefit of the inspection

expenditure, these three categories represented 83,5% of the total revenue of ICMS in 2016. Retail, however, generates a smaller collection and is dispersed in a numerous of commercial establishments and, therefore, hampering the fiscal supervision. Thus, the focus of the '*Nota Fiscal Paulista*' program is mainly in retail, which represented 8,96% of the ICMS collected in 2016, a more dispersed sector and in which the state government's inspection effort would have a lower cost-benefit ratio. Thus, the program encourages taxpayers themselves to "act as tax inspectors", creating incentives for them to request invoices for their purchases.

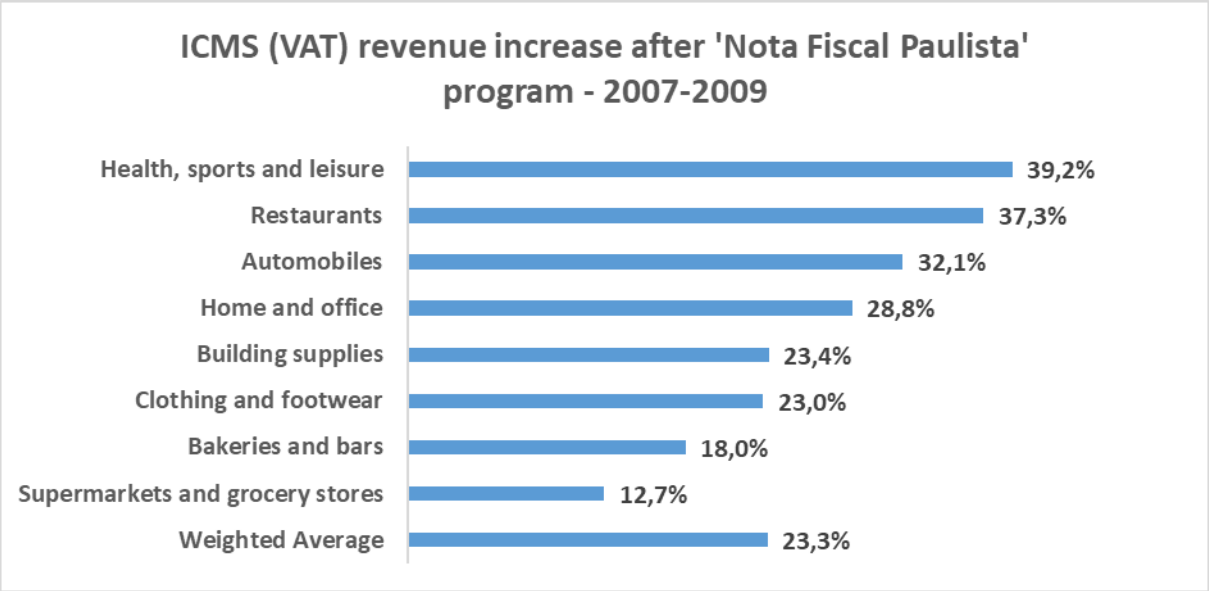
Figure 17: *ICMS Revenue by type of activity - 2016*



Source: Secretaria da Fazenda – Estado de São Paulo. Relatórios da Receita Tributária.

Regarding the direct impact of '*Nota Fiscal Paulista*' in the collection of ICMS, there are two publications from the State Department of Taxation and Finance, the first publication was in the beginning of 2010, where the government stated that using the program the government's revenue with ICMS grew by 23,3% in the commercial sector, and the net additional revenue, already discounting the credits generated by the program and the money invested in marketing of the program, was around R$800 million annually in average during the first two years of the program. This value corresponds to the whole ICMS revenue per year of the departments' stores or 50% of the ICMS collected from supermarkets in the state of Sao Paulo. The health, sports and leisure segment grew by 39,2%, restaurants grew 37,3%, but there were segments which didn't show an expressive growth such as supermarkets and grocery stores that had a lower growth of 12,7% between 2007 and 2009.

Figure 18: *ICMS revenue increase after NFP - 2007-2009*



Source: Watanabe, M (2010). SP Arrecada R$1,5 bi extra de icms com nota fiscal paulista.

The total increase amount was estimated at R$1,5 billion from to the beginning of the program in 2007 up to the end of 2009. this value corresponds to 2% of the total ICMS revenue of 2009 and 6,71% of the total amount of the retail and services sectors.

In September 2012, the government released another statement affirming that the program increased the tax revenue by 34.3% in retail, through the reduction of tax evasion, according to estimates by the Treasury Department. In addition to the gains in retail, it promotes the formalization of commercial operations throughout the production chain. This revenue growth exceeds the amounts distributed to consumers. The net gain since the beginning of the program was of R$ 3.18 billion.

In addition to the increase of the ICMS tax revenue, the government started to publish in their annual report, the data regarding the collaboration of the population and their reports of commercial activities which were not acting correctly. In the table 13 we can find these results summarized:

Table 13: *NFP - 2008-2016 User reports and Fines*

	2008 - 2012	2013	2014	2015	2016
Infraction notice	21808	33000	60.667	60.933	77.659
User number of reports	153611	189000	264.094	264.328	307.401
Suppliers fined	17538	26.000	49.112	49.328	60.478
Fines revenue (R$ million)	27,9	38,0	50,9	74,4	85,2

Source: Secretaria da Fazenda – Estado de São Paulo. Relatórios da Receita Tributária (Link)

The government also published that using the data collected with the program, they were able to cross-check the ‘simples nacional’ data, which is a facilitated and simplified tax regime for micro and small businesses with an annual gross revenue of R$ 3.6 million and that will reach R$ 4.8 million in 2018, which allows for the collection of all federal, state and municipal taxes in a single tax guide. The tax rate is separated into ranges according to the company’s annual revenue. This cross-check discovered an omission of revenue of 1.4 billion by the micro and small businesses between of 2009 and 2010.

3. The Portugal program experience

This chapter is focused in the program created by the government of the Portugal. A description will be provided along with the results obtained since the program implementation and which continues in operation in 2018, even if the program accumulated several changes during its lifetime.

3.1. Introduction and program description

In 2013 the Portuguese government started to use an electronic invoicing system called '*e-fatura*' which we will call e-invoice in this document, and at the same time, created a program similar to the '*Nota Fiscal Paulista*', which they also mentioned that was inspired in the one used in São Paulo. In the beginning, the program created in Portugal was much simpler compared to its Brazilian brother, instead of credits, the value generated through the program would be paid to citizens in the form of tax benefit, with the deduction of 15% of VAT applied, up to 250€ annually, to be reimbursed through the citizen annual income declaration (IRS) in five sectors of activity:

- Hotels, restaurants and similar;
- Maintenance and repair of cars;
- Maintenance and repair of motorcycles, of its parts and accessories;
- Hairdressers and beauty institutes;
- Veterinary activities (Included in 2016).

In order to have access to this annual tax benefit, the citizen should provide their Individual Tax Identification Number (NIF), the equivalent to the '*Codice Fiscale*' in Italy, during the purchase process, and then the credit generated would be available to the tax benefit after a simple confirmation using the registration created in the e-invoice website. In 2013, 9000€ should be spent and communicated with the NIF in these sectors to achieve the maximum benefit of 250€. In 2016, the veterinary activities have been included and started to benefit by the 15% reimburse. This specific reimburse program was created to reduce the tax evasion in these activities, and we will call it of Group 1 of reimburses.

Other reimburses programs through the IRS were already available prior to the Group 1, however they were not created to increase the collection of IVA and reduce the tax evasion. These reimburses are directed to the health, education, habitation, habitation loans, Retirement homes and other general familiar expenses, we will call them of Group 2 of reimburses. In 2015, the government started to require the NIF in the invoice in order to have the right to receive the any type of reimburse, in other words, for the Group 1 and 2 reimburses.

Table 14: *E-fatura - Deductions available and limits*

		Deduction %	**Deduction Limit (€)**
Group 1	Restaurants and Hotels	15	250
	Maintenance and repair of cars	15	
	Maintenance and repair of motorcycles	15	
	Hairdressers and beauty institutes	15	
	Veterinary activities	15	
Group 2	General familiar expenses	35	250
	Health	15	1000
	Education	30	800
	Habitation (Rent / Loans)	15	502 / 296
	Retirement homes	25	403,75

Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

Since April 2014, the government keeps active the 'Fatura da Sorte' lottery, which awards prizes, at random, to final consumers, who make purchases of goods or services in the national territory and require the issuance of invoice with their tax identification number (NIF), but the invoices for this lottery do not have a restriction of commercial activity in which it was generated, in other words, any invoice with the NIF can generate a ticket for the 'Fatura da Sorte' lottery. For each 10€ of invoices with the same NIF a coupon of the lottery is generated.

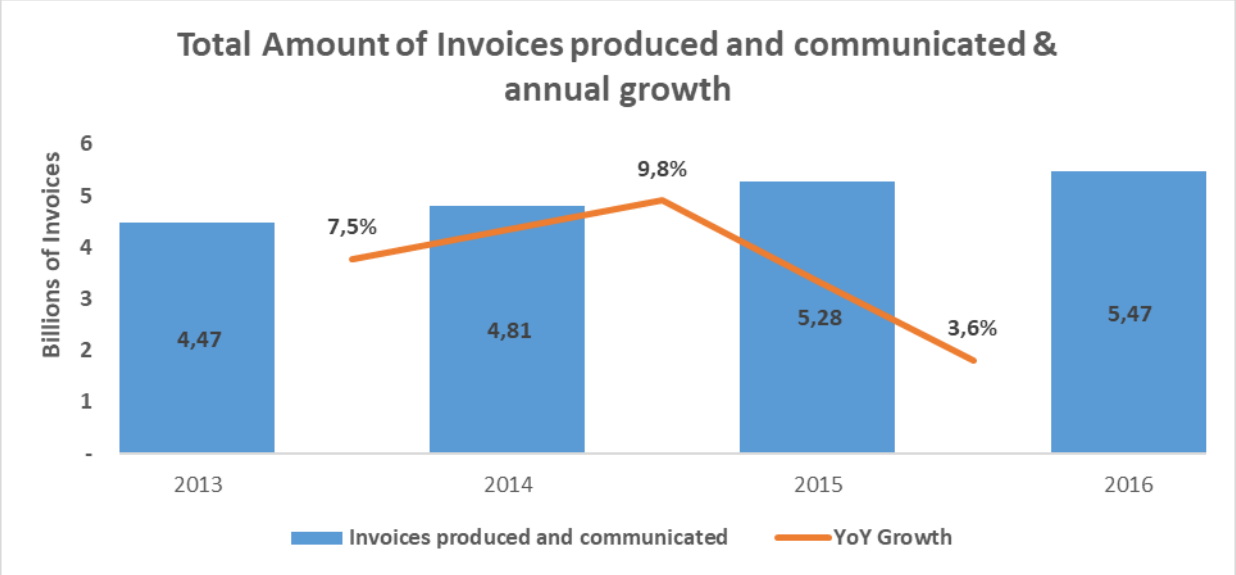
Before april, 2016 the lottery awarded weekly an Audi A4 and three Audi A6 every semester, then the awards were changed to one weekly prize of 35000€, three semiannual extraordinary prizes of 50000€. These money prizes are distributed in the form of treasury certificates and can be withdraw by the owner one year after its receipt.

3.2. Invoices and issuers growth

A total of 5,470,629,280 invoices were issued and communicated to the Fiscal Authority in 2016, an increase of about 3.6% compared to the same period of 2015, according to data extracted from the e-invoice system.

Since the implementation of the e-invoice system, in 2013, more than 20 billion invoices have already been communicated to the Fiscal Authority. We can find a chart below summarizing the data mentioned above:

Figure 19: *E-Fatura - Total amount of invoices produced and communicated & annual growth*



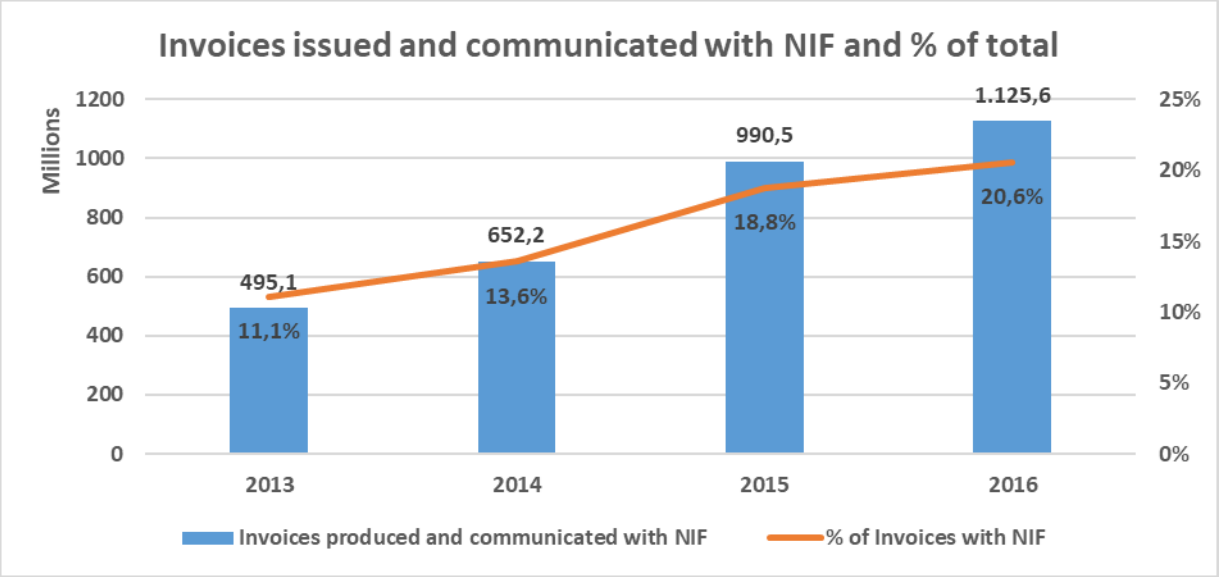
Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

It's worth to mention that partial data of 2017 is already available, and at the time of research, the period from January to mid-December shows an increase of 3,2% if compared to the same period of 2016.

In addition, the number of invoices issued with the Individual Tax Identification Number (NIF) is in a constant growth and already exceeded 1.1 billion invoices. In 2015, the communication of the NIF has seen a growth of more than 50%, mainly due to the introduction of the NIF communication requirement to access any type of reimburse introduced at the same year. The partial data available for 2017 (January mid-December) reports that the number of invoices issued with the Individual Tax Identification Number (NIF) exceeded 1,2 billion invoices, which represents 21,8% of the total number of invoices issued during the period. The figure 20

shows the annual number of NIF Invoices and its corresponding share inside the total number of invoices issued:

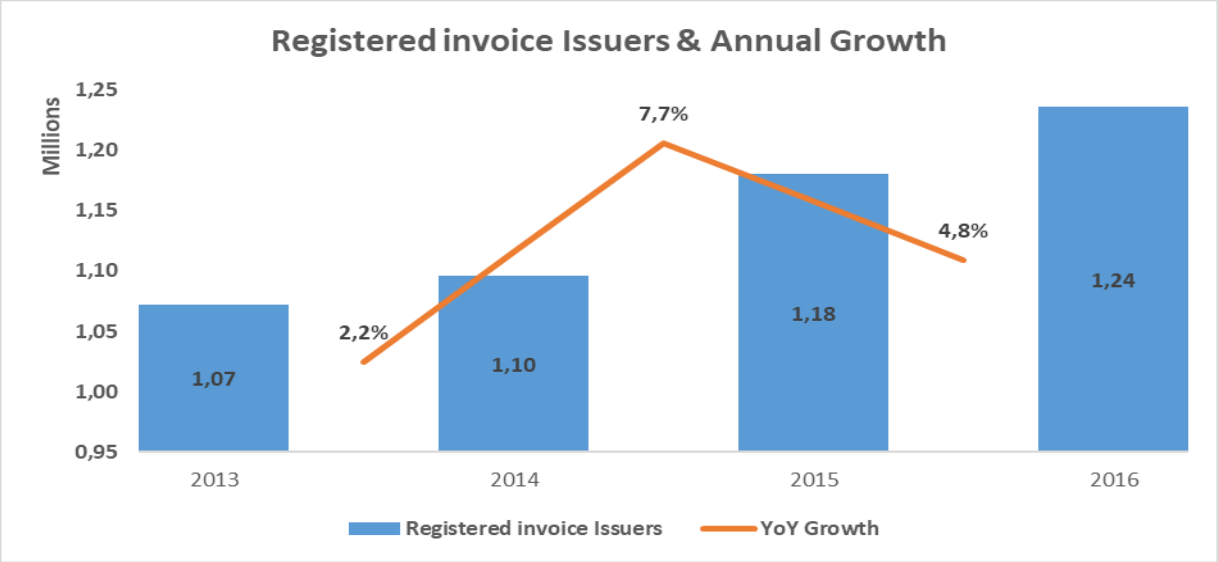
Figure 20: *E-fatura - Invoices issued with NIF and share of total*



Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

The number of invoice issuers reached 1,236,184 in December 2016 - an increase of almost 19% compared to 2013, as shown in the figure 21 chart. This indicator reveals the impact of the e-Invoice System in combating tax evasion. The number of companies growth reporting invoices to the Fiscal Authority is related to the NIF invoices required by the citizens.

Figure 21: *E-Fatura - Registered invoice issuers & Annual growth*

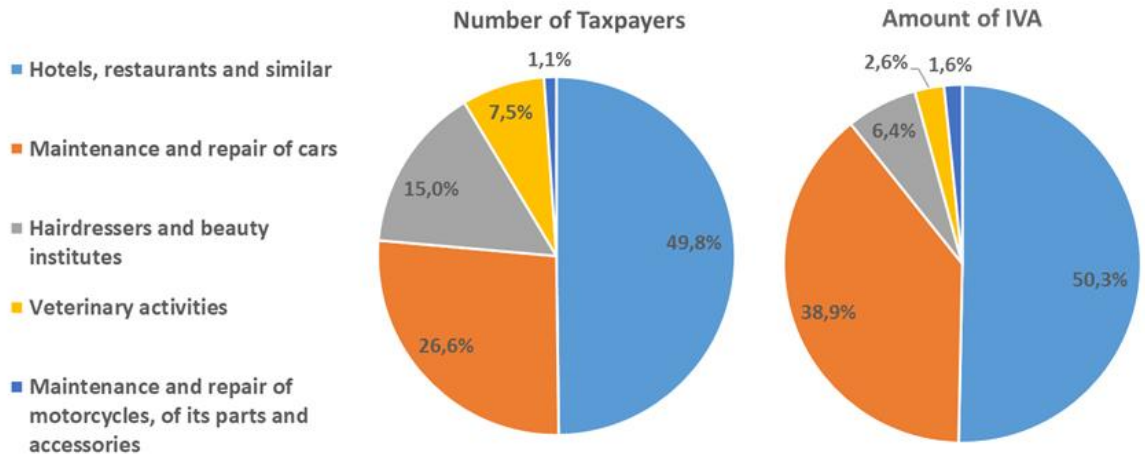


Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

3.3. Direct results of the Group 1 activities

Since the e-invoice system came into force in early 2013, there has been an increase in tax compliance with the invoices issued. The figure 22 shows the distribution of the number of taxpayers benefited and of the amount distributed by the five sectors of activity with 15% VAT reimburse, for a total of 67,231,141€ in 2016.

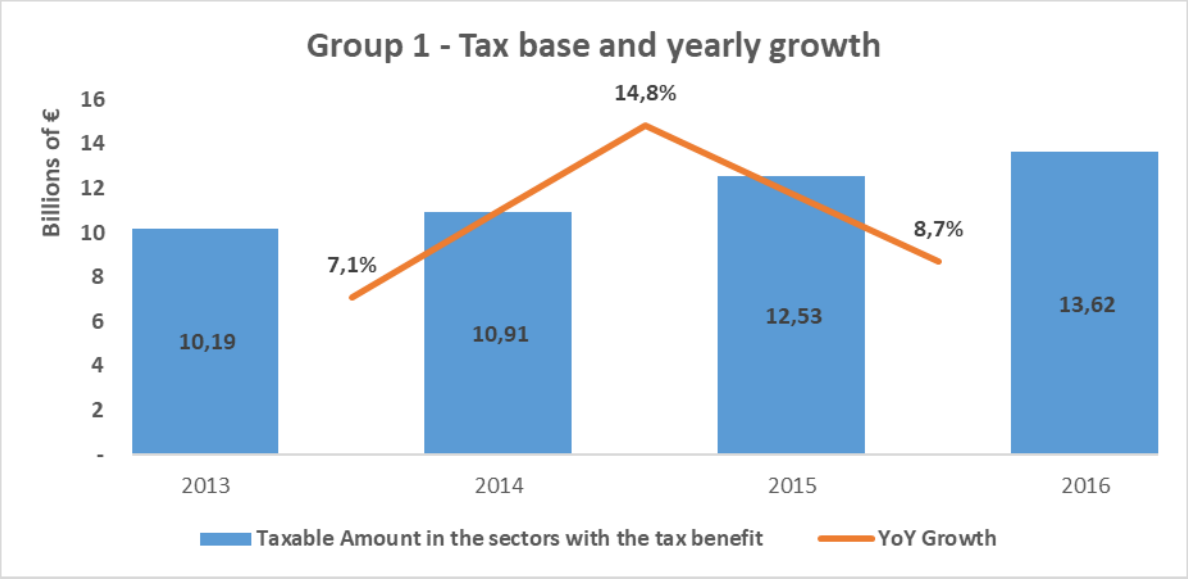
Figure 22: *E-Fatura - Group 1 - Share of taxpayers and amount of IVA by sector*



Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

The direct results can be seen in the growth of the tax base, which corresponds to the amount declared to the fiscal authority, and consequently, can be taxed for the group 1 activities.

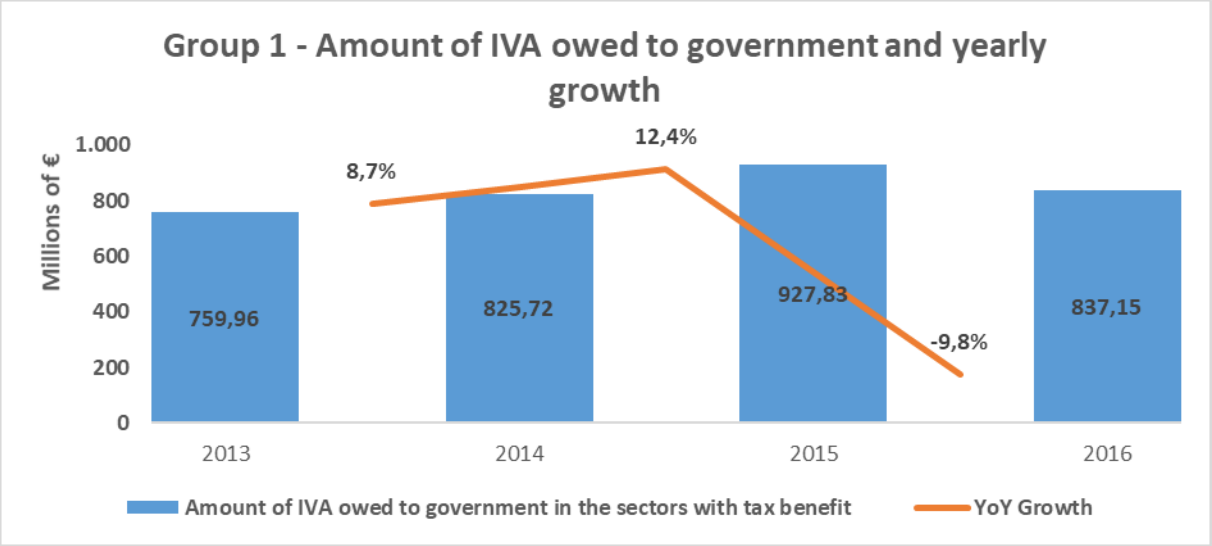
Figure 23: *E-Fatura - Group 1 – Tax base and yearly growth*



Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

The tax base showed a considerable growth after the introduction of program, showing a 2013-2016 rise of 33,7%, of which, the majority was not being reported prior to the program, and was considered evaded amounts. The same can be said to the amount of IVA collected of these sectors:

Figure 24: *E-Fatura - Group 1 – Amount of IVA owed to government and yearly growth*



Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

During the 2013-2015 the amount of IVA collected from group 1 sectors increased by 22,08%. In the second semester of 2016 the Portuguese government changed the IVA policy to the hotel, restaurants and similar activities sector which caused a gross reduction of €161,7 million (-43,8% compared to same period one year before). The policy reduced the IVA rate from 23% to 13% to food and some drinks in restaurants, and also, reduced from 23% to 6% the rate for hotels. The impact of these changes can be seen in the chart 24, however, the 2016 total amount collected of the group 1 activities was still higher than the result obtained in 2014, therefore we can say that the fight against the tax evasion had a high contribution to the possibility of IVA reduction in the sectors beneficiated. The reduction of IVA collected was partially offset by the employment boost generated, which only in the second semester of 2016, registered an increase of 7,5% in the total number of employees in this sector, resulting in 22,1€ million of social contributions increase and a decrease of 4,1€ from unemployment financial help, among other taxes to be considered which were not published until the write date of this thesis.

Table 15: *E-Fatura - Invoices and Fiscal Benefits evolution for Group 1 activities*

		2013*	2014*	2015**	2016	2017***
Hotels, restaurants and similar	**Invoices**	60.099.380	55.567.384	70.486.510	77.312.564	88.849.487
	Fiscal Benefit (€)	11.725.646 €	18.102.993 €	35.044.621 €	33.843.281 €	
Maintenance and repair of cars	**Invoices**	3.244.644	2.999.970	4.025.051	4.169.810	4.581.315
	Fiscal Benefit (€)	11.850.280 €	9.721.791 €	18.819.898 €	26.169.604 €	
Maintenance and repair of motorcycles	**Invoices**	100.706	93.112	117.352	127.836	151.355
	Fiscal Benefit (€)	722.033 €	365.330 €	707.223 €	1.104.602 €	
Hairdressers and beauty institutes	**Invoices**	3.968.076	3.668.850	4.568.773	5.184.495	5.871.509
	Fiscal Benefit (€)	1.115.041 €	1.871.328 €	3.622.604 €	4.332.690 €	
Veterinary activities (Included in 2016)	**Invoices**				1.698.762	2.975.509
	Fiscal Benefit (€)				1.780.964 €	

Sources: e-fatura Portal (link) and Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016; 2015; 2014 and 2013.

*: Invoices data for 2013 and 2014 divided by sector was not available. The average share from 2015 to 2017 was used together with the total amount of invoices issued in 2013 and 2014.

**: Fiscal Benefit data for 2015 divided by sector was not available, the shares of the previous year and the actual total benefit amount of 2015 were used

***: January to mid-December period

In the table 15, we can see the evolution in terms of invoices issued, with and without NIF, and fiscal benefits granted for the group 1 sectors. Both numbers are in constant growth for all sectors, with the fiscal benefit registering a stronger growth compared to the number of invoices issued. This means that the program has not reached a saturation point yet.

3.4. Direct results of the Group 2 activities

Table 16: *E-Fatura - Group 2 - Number of invoices issued by sector*

	2015	2016	2017* (Jan-Mid Dec)	Growth 2015-2017*
General familiar expenses	646,5	665,5	764,3	18,23%
Health	174,1	177,3	183,8	5,54%
Education	50,9	79,2	85,3	67,51%
Habitation (Rent / Loans)	1,1	2,0	2,5	130,53%
Retirement homes	1,8	2,2	2,5	43,17%
Total	**874,4**	**926,1**	**1.038,4**	**18,76%**

Source: E-Fatura Portal (link)

The table 16 shows the number of invoices (in millions) with NIF for the group 2 activities, and as we can notice, the growth during the first three years of the NIF requirement for the group 2 activities is consistent and reached an average of more than 15% during the period. This shows

that due to the existence of a benefit for requesting the invoice, the citizens started to request more invoices and the trend hasn't reached a saturation level yet.

3.5. Group 1 and 2 results relationship

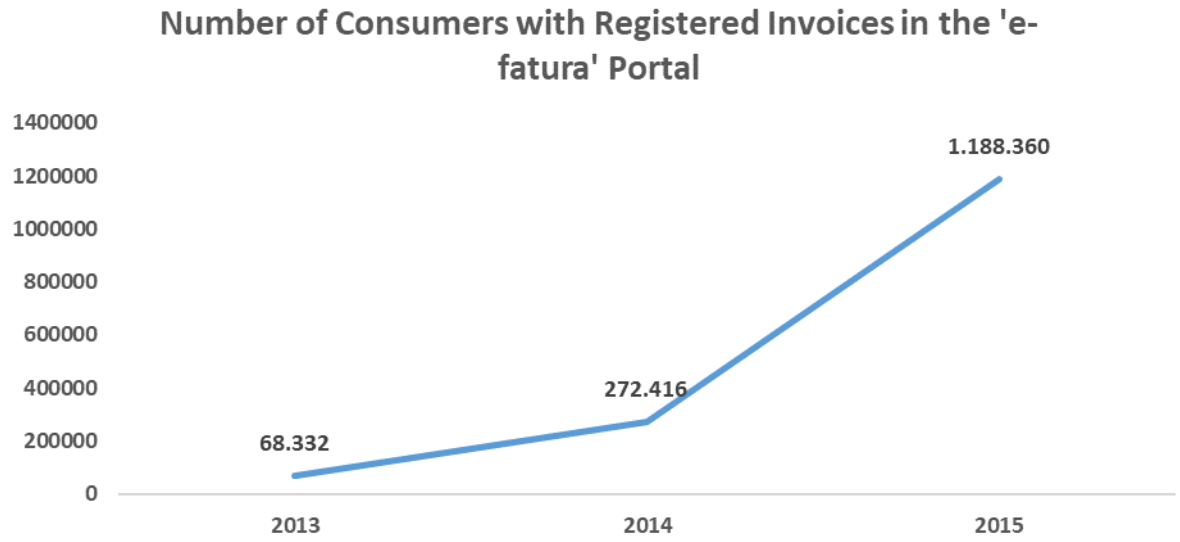
If we take a closer look at the figures 23, 24 and at the table 15, we can conclude that the strongest Group 1 growths happened in 2015, the same year when the NIF inclusion in the invoices became mandatory to access the Group 2 detractions.

In 2015, the figure 25 shows that the number of consumers with registered invoices in the portal showed a growth of more than 800 million users. This fact can be related to the Group 2 rule introduced in 2015. Consequently, these users had one less barrier to start to benefit from the group 1 15% VAT detraction, since they were already registered into the portal to obtain the benefit for the group 2 activities. As available in the first section of this chapter, in order to obtain the Group 1 15% VAT reimburse, the taxpayers just need to confirm that the invoices automatically sent to the portal with his NIF were correct.

Another important aspect to be considered is the statement of the Portuguese government, which claimed that with the introduction of the group 2 rule, the people which already benefited from the group 2 benefits prior to the e-fatura, created the habit to ask the NIF inclusion in their invoices, being them group 1, 2 or even to those not belonging to either of these groups, and consequentle, just to participate in the 'Fatura da sorte' lottery.

These two aspects explains the reason why the fiscal benefit almost doubled in 2015, and consequently, the tax base and VAT revenue for group 1 activities showed the double-digit growth shown in the figures 23, 24 and at the table 15.

Figure 25: *E-Fatura - Number of consumers with registered invoices in the 'e-fatura' portal*



Source: Gabinete do Secretário de Estado dos assuntos fiscais (2016). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2015.

3.6. Results of the 'Fatura da sorte' lottery

As already mentioned, the "Fatura da sorte" lottery is a component of the e-Invoice system and includes a set of measures designed to combat fraud and tax evasion. It is a project of fiscal citizenship, whose objective is to combat the informal economy, through citizen participation, representing its role as one of the success factors in this challenge.

The "Fatura da sorte" lottery awards prizes, at random as final consumers, who make purchases of goods or services in the national territory and require the issuance of invoice, with their tax identification number (NIF) for any type of activity.

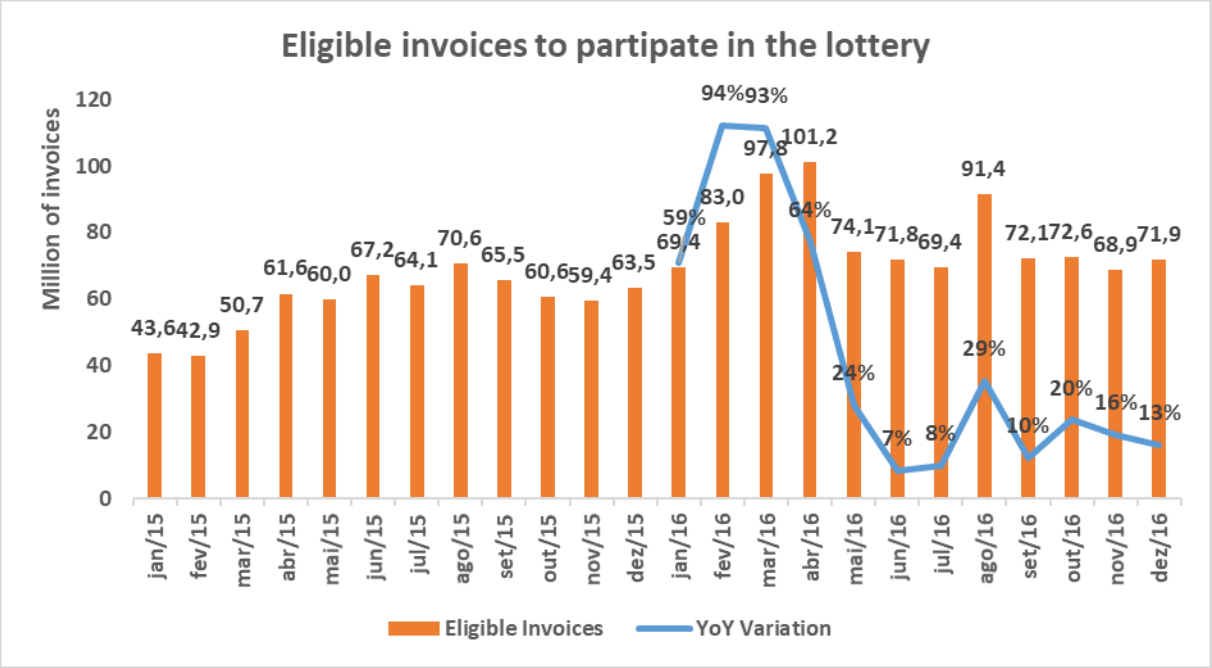
The prize draw began in April 2014 with the awarding of motor vehicles to the winners, but in April 2016 the prizes have changed and the value and object of the new premiums have been established, which began to be constituted by Treasury Certificates, called in portuguese of 'Certificados do Tesouro Poupança Mais' (CTPM), with a value of € 35,000 and € 50,000, in the regular and extraordinary draws respectively.

The change in the object of the premium for savings bonds issued by the Treasury Management Agency and the Public Debt - IGCP, EPE, in addition to translating into a simplification of procedures, also has the potential to stimulate the saving of households and promote state

savings products, while maintaining the objective of promoting tax citizenship in combating the informal economy and preventing tax evasion.

The strong participation of citizens is shown by the evolution of the number of consumers and the number of eligible invoices throughout 2015 and 2016, as can be seen in the following charts 26 and 27:

Figure 26: *E-Fatura - Eligible invoices to participate the lottery*

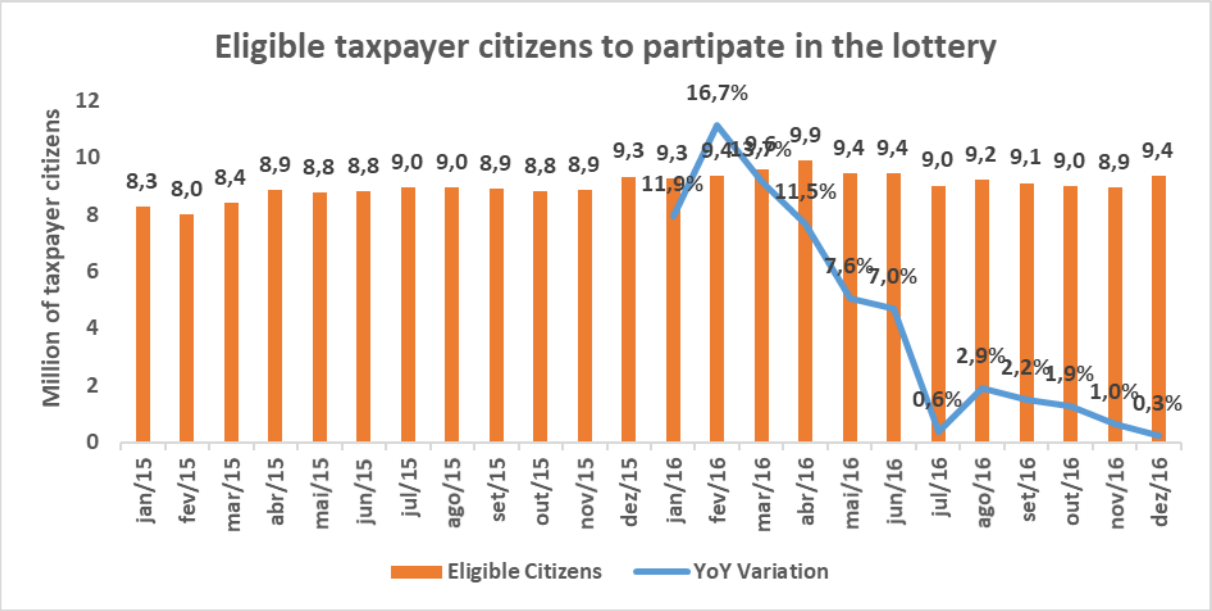


Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

The number of eligible invoices has shown a steady growth in the period between the beginning of 2015 and the end of 2016, for which we can see 65% growth. In April 2016, the number of invoices have hit a peak of 101,2 million. The YoY variation shows the growth occurred in the 2016 month against the same month but one year before.

The figure 27 is related to the number of consumers eligible for the draw, where the same monthly rule of YoY variation has been applied and a growth of 13,1% has been registered for the period analyzed. The number of eligible citizens seems to have reached a saturation, because the growth in not high as the the number of invoices, which provides us the perception that the number of eligible invoices per citizen is growing, showing that the citizens are getting more engaged with the '*Fatura da Sorte*' lottery.

Figure 27: *E-Fatura - Eligible taxpayers to participate the lottery*



Source: Gabinete do Secretário de Estado dos assuntos fiscais (2017). Relatório de atividades desenvolvidas "Combate à fraude e evasão fiscais e aduaneiras" 2016.

3.7 Privacy implication

According to Manuel Faustino, the first Income tax for singular persons (IRS) director of the Treasury, the e-invoice is a system that, on the side of taxpayers, "is very little transparent and very little in depth from the point of view of their rights and their guarantees", especially after the 2014 IRS reform.

The decree-law that created the e-invoice on January 1, 2013 introduced the 15% deduction that individual taxpayers could be entitled to if they chose to indicate the tax identification number (NIF) on the invoice of sectors considered at risk, such as catering and hospitality, hairdressing and vehicle repair.

Manuel Faustino says that it was a "benefit" for which the taxpayers "had a choice", since, if they wanted to benefit from this incentive, they indicated the NIF, but otherwise they did not indicate it. According to him this formula "was without prejudice to the deductibility of other expenses of the legal regime in force", as the National Data Protection Commission (CNPD) had recommended in 2012.

That year, prior to the launch of the e-invoice, the government then asked the CNPD to pronounce on the draft decree-law that would create measures to control the issuance of invoices and the creation of a tax incentive for the requirement of invoices by taxpayers. The CNPD considered that it was “a treatment of sensitive personal data because of it belonged to the private life of citizens" and that it was "essential to ensure that the individual taxpayer who chooses not to provide his / her NIF number to the issuer of the invoice, for reasons as safeguarding its privacy, could not be in any way penalized in relation to the benefits which could be obtained under the current legal regime”.

However, ‘as of January 1, 2015, with the new IRS, only invoices with NIF will be considered for deductions in IRS’, a situation that Manuel Faustino says was an ‘extremely significant mutation’ and ‘contrary to spirit of the data protection law’. Recalling that the CNPD was not called upon to assess the IRS reform, he believes that, in view of the 2012’s opinion, that committee ‘could never agree to this option’ because, ‘legitimately, the taxpayer is entitled to not to provide his NIF, but he also has the right not to be prejudiced in relation to the deductibility of the expenses’ that you can deduct in the IRS.

An official source of the CNPD stated that ‘only the invoices in which the NIF was provided are registered in the e-invoice, associated with a certain taxpayer’, and himself ‘can request the invoice issue as final consumer, that is, without registration of the NIF’. In addition, the entity stated that since there is a cap on annual deductions, ‘the taxpayer can manage and choose which invoices he wants to provide the NIF to access the benefits’. This same source indicated that in 2013, after ‘several complaints received’, it was verified that ‘more data was being processed by Fiscal Authority than the necessary’ and therefore ‘ordered the Fiscal Authority to take a set measures to remedy the situation’. In a second regulatory action, the CNPD concluded that the determinations were fulfilled.

In this way, the commission certifies that, ‘at this moment, the information that is visible in the e-invoice corresponds to the information processed by the Fiscal Authority’, which means that ‘the detail of the consumptions made is not recorded, but only the amount paid , the amount of VAT and the entity to whom it was paid’ and ‘only if the consumer provide his NIF on the invoice ".

The prosecutor Manuel Faustino also commented about who has access to this information. In 2012, the CNPD recommended that the information ‘should clearly provide a logical separation of personal information relating to each transaction, with limited access to inspection officials’ but the legislator's option was to follow the provisions of the General Tax Law (LGT). The LGT determines that the Fiscal Authority must ‘take the necessary security measures with respect to the personal data communicated, to prevent their consultation or misuse by any person or in any unauthorized form’ and also ‘ensure that access to personal data is limited to authorized persons within the scope of their legal duties’, without, however, restricting the access to the inspections officials.

4. Application to Italy - Methodology

This chapter presents the sources and methodology used to estimate the results which could be obtained in Italy, based in the '*Nota Fiscal Paulista*' and '*e-fatura*' results.

The first section, contains the sources used to obtain the data for Italy, while the second and third sections have the methodology, formulas and scenarios used for the Brazilian and Portuguese programs, respectively. The results were divided by the Direct VAT effects and the potential benefit that the program could bring to the collection of other taxes, such as the IRPEF, IRES and IRAP.

4.1. Data Sources used

The main sources used were the '*studi di settore*' and the VAT declaration statistics. The '*studi di settore*' was used since it is the only available data which contains the values declared by the taxpayers divided by business sectors and an estimated proportion of 'non-correct' taxpayers. This division was needed since the results presented in São Paulo and Portugal were not homogeneous across all the sectors, and, an understanding of the tax evasion behavior across the business segments was needed.

The VAT declaration statistics was used to estimate the share of the 4, 10 and 22 percent aliquots.

4.1.1. 'Studi di setore'

The '*studi di settore*', which, if translated from Italian means sector studies, are elaborated through economic and statistical-mathematical analysis techniques, which allow to estimate the revenues or the compensation that can be attributed to the taxpayer.

It is used for the assessment of self-employed workers and companies that do not exceed a certain limit set for revenues (currently equal to 7.5 million euro) regardless of the legal form. There are some exclusions to the '*studi di settore*', which are: cooperatives, activities which use substitute tax regimes, those that do not operate during the tax period under normal

conditions, for example, corporate restructuring operations, liquidation, start or termination of the activity and those whose tax period is less than a full year. For multi-activity companies, companies that carry out several activities in different sectors, the prevailing activity sector study is applied.

The sector studies are carried out by detecting, for each single economic activity, the relationships existing between the accounting and structural variables, both internal (production process, sales area, etc.) and external to the company or professional activity (demand trend, price level, competition, etc.). The sector studies also consider the characteristics of the area in which the company operates: they depend in fact of the place where the specific activity is located, the level of prices, conditions, operating procedures, existing infrastructures and usability, spending capacity, as well as the type of needs or the ability to attract demand. A questionnaire containing this data is compiled during the tax return declaration by the same taxpayers which have business activities with revenues or compensation not exceeding 7.5 million euro.

The '*studi di settore*' depends on the veracity of the data provided by the subjects involved (and by the possible corporate influences exercised by the trade associations) and by the efficiency of the controls performed by the Financial Administration.

The use of questionnaires poses the risk of obtaining information based on historical data, certainly not faithful and similar to what has already been presented in the tax declarations submitted by the same taxpayers. Another potential problem to be considered is that not all the taxpayers compile the questionnaire, in 2005 this number was equivalent to a quarter of theoretical total of taxpayers interested.

Due these imperfections, the '*studi di settore*' tool should have been replaced in 2018 by a tool called synthetic reliability indexes (Indici sintetici di affidabilità – ISA), but the tool change has been postponed to 2019. At the time of this research, in 2018, the 'studi di settore' is the only tool available which provides the required data divided by business activity to make the estimation desired by this thesis.

For the tax period of 2015, which will be the one used in this thesis, there were 193 different economic activities (sectors), each one with its own five-digit code, and that can be classified into four macro categories:

- Services (TF, UG, VG);
- Commerce (TM, UM, VM);
- Manufacturing (UD, VD);
- Professionals (TK, UK, VK)

The aspects extracted from the '*studi di settore*' 2016, which is related to the 2015 tax period, are the following:

- **Congruity:** The situation where the revenues or compensation declared are equal or higher than the estimated by the Italian Revenue Agency for this taxpayer (position), considering the results deriving from the application of the indicators of economic normality. If this condition is not met, the position is considered non-congruous.
- **Congruity ratio:** The proportion of congruous and non-congruous positions for the determined sector.
- **Declared and reference amounts:** The value declared by the taxpayers (congruous and non-congruous positions) and the amounts which the non-congruous taxpayers should have declared to become congruous.

This thesis will use the data above for the sectors in which the Brazilian and Portuguese programs were applied.

Considering the imperfections presented by the '*studi di settore*', this thesis will not consider the VAT gap estimates provided by the sector studies since they are much lower than those available in the EU Comission report and those published in the Report of the non-observed economy and fiscal evasion 2017 released by the Italian Ministry of Economy and Finance.

Since the results available for the Brazilian and Portuguese programs are based in the growth of the Value-added tax collected after the introduction of the respective programs, this study will use the declared amount available in the '*studi di settore*', calculate the estimated VAT of these declarations using the VAT Declaration Statistics explained in the section 4.1.2, and then, apply the results obtained in Brazil and Portugal.

4.1.1.1. Program based in the 'Nota Fiscal Paulista' – Sectors used

The sectors included in this simulation are those which are similar or the same as the activities that generate credits for the '*Nota Fiscal Paulista*' program in Sao Paulo.

Therefore, all the sectors related to manufacturing (Code D) were excluded, as well as the those related to health expenditures that, can be deducted from the IRPEF a percentage of the expenditure incurred (in most cases 19%) for the part exceeding the amount of 129.11 euro, and present a very low share of non-congruous positions, such as farmacies, psychologists, independent paramedics and medical studies (YM04U, WK20U, WK19U and WK10U respectively).

The number of sectors analyzed is 94 out of the 193 available, these sectors correspond to about 46% of the total amount declared to the 'studi di settore', and presente an average non-congruity rate of 41,59%.

These are the sectors selected to participate in the simulation based in the Brazilian program: WG36U, YG37U, YM05U, VG99U, YG61U, WG50U, WM11U, WG31U, YM01U, YG44U, WG34U, WM80U, VM88U, YM03U, YK21U, WM19U, WM06A, WM21E, WM84U, WG70U, WM09A, VM87U, YM15A, WM29U, VG57U, YM02U, WG33U, WM10U, WM85U, WM08U, WM23U, WG54U, WM21A, WG96U, WM22A, YM27A, YG67U, WM43U, WG83U, WM16U, WM41U, WM32U, WG78U, WM15B, WM37U, YM40A, WM83U, WM21B, WM82U, WG79U, WM20U, WM34U, YM28U, WM17U, YM27B, WG58U, WM24U, VM81U, WM22C, WM13U, WM09B, WM31U, WG76U, WM44U, WM21C, WM86U, WG95U, WM25B, WM42U, WM33U, VG98U, WM21D, WM22B, WM12U, WK22U, YM07U, WG48U, WG85U, WM48U, WM39U, WM18A, WM46U, WM18B, WM35U, WM40B, WM25A, VM47U, WM36U, WK26U, WG38U, WM30U, WM06B, WG46U and WK56U.

4.1.1.2 Program based in the 'e-invoice' – Sectors used

The sectors included in this simulation are those which contains the activities present in the Portuguese Group 1 up to 2015 explained and detailed in the third chapter, which are:

- Hotels, restaurants and similar;
- Maintenance and repair of cars;
- Maintenance and repair of motorcycles, of its parts and accessories;
- Hairdressers and beauty institutes;

These activities are those which received the benefit of 15% VAT deduction on the Income Tax declaration in Portugal during 2015.

The Italian simulation used the same activities which were selected in Portugal because, according to the Portuguese government, these sectors were chosen since the tax evasion were high so as the possible recovery rate applying the program.

In order to have the same sectors studied in this thesis, ten sectors that were directly correlated and similar to those benefited in Portugal were selected to participate in this simulation. The '*studi di settore*' used are and its non-congruity rates are: WG31U (46,96%), WG33U (51,56%), WG34U (54,54%), WG36U (48,99%), WG76U (41,07%), WG95U (48,76%), WG96U (48,55%), WM10U (39,12%), YG37U (52,43%) and YG44U (29,86%).

The average non-congruity rates, in Italy, for these sectors was of 46,18%, which is considerably higher than the '*studi di settore*' average of 36,05%.

Therefore, the number of sectors analyzed is 10 out of 193 '*studi di settore*' available, and correspond to about 10% of the total amount declared.

4.1.2 VAT Declaration statistics

The Italian Ministry of Economy and Finance releases the annual statistics related to the VAT declarations. This data will be used to define the share of 4, 10 and 22 percent VAT for each macrosegment of the Italian economy. The data used is related to the 2015 tax period.

Table 17: *VAT Aliquots distribution by sector - Italy*

Sezione di attivita'	Operazioni imponibili al 4%	Operazioni imponibili al 10%	Operazioni imponibili al 22%
	%	%	%
Agricoltura, silvicoltura e pesca	40,1%	47,9%	12,0%
Estrazione di minerali da cave e miniere	0,4%	1,1%	98,5%
Attivita' manifatturiere	8,4%	15,2%	76,4%
Fornitura di energia elettrica, gas, vapore e aria condizionata	0,0%	25,6%	74,4%
Fornitura di acqua; reti fognarie, attivita' gestione rifiuti e risanamento	0,2%	64,3%	35,5%
Costruzioni	13,9%	35,3%	50,8%
Commercio all'ingrosso e al dettaglio; riparazione di autoveicoli e motoci	11,5%	19,3%	69,2%
Trasporto e magazzinaggio	0,2%	17,8%	82,1%
Attivita' dei servizi di alloggio e di ristorazione	5,3%	88,6%	6,1%
Servizi di informazione e comunicazione	4,9%	1,0%	94,2%
Attivita' finanziarie e assicurative	0,8%	4,6%	94,6%
Attivita' immobiliari	6,8%	6,2%	87,0%
Attivita' professionali, scientifiche e tecniche	0,4%	1,8%	97,8%
Noleggio, agenzie di viaggio, servizi di supporto alle imprese	5,6%	8,4%	86,0%
Amministrazione pubblica e difesa; assicurazione sociale obbligatoria	14,2%	34,3%	51,5%
Istruzione	6,2%	4,3%	89,5%
Sanita' e assistenza sociale	56,3%	7,2%	36,6%
Attivita' artistiche, sportive, di intrattenimento e divertimento	0,3%	24,9%	74,7%
Altre attivita' di servizi	2,5%	5,0%	92,6%
Attivita' di famiglie e convivenze	24,5%	14,5%	61,0%
Organizzazioni ed organismi extraterritoriali	0,0%	4,2%	95,8%
Attivita' non classificabile	8,1%	0,0%	91,9%

Source: Ministero dell'economia e finanze Portal. Statistiche delle dichiarazioni 2016.

An assimilation of the sector analyzed and its correspondent macrosegment has been done in order to estimate the share of each aliquot for the sector studied.

4.2. Brazilian Methodology

Three scenarios were simulated to obtain the possible outcomes adopting a similar program in Italy. They were based on the numbers found in the '*studi di settore*', which had its operations schematics explained in the section 4.1.1.1, and the 'IVA' (VAT) declaration statistics found on the 'Ministero dell'Economia e Finanze' website.

The simulated scenarios are the following:

1- **Sao Paulo Scenario (Optimistic):** This scenario will show the VAT collection increase without a differentiation between congruous and non-congruous positions, in other words, the total amount of VAT collected from the sectors of the '*studi di settore*' analyzed will raise according to the results obtained in Sao Paulo. This scenario reflects what happened in Sao Paulo with the '*Nota Fiscal Paulista*' program and the ICMS collection;

2- **Intermediate scenario:** This one shows a differentiation between the congruous and non-congruous positions. Where only the non-congruous positions VAT revenue will grow as in São Paulo, while those for the congruous positions will raise by the result obtained in São Paulo divided by three.

3- **Pessimistic Scenario:** This analysis considers that only the difference between the non-congruous reference amount and the actual amount declared by the non-congruous positions will show the whole VAT revenue increase obtained in Sao Paulo. The congruous will raise by the result obtained in Sao Paulo divided by six while the declared amount of non-congruous will be divided by three.

4.2.1 Direct VAT results

4.2.1.1. Common Methodology

All the three scenarios will use the rules present in this section and further details regarding the difference in the methodology for the scenarios will be provided in the next sections.

The first aspect shared by the scenarios is the results by type of activity obtained with '*Nota Fiscal Paulista*' up to December 2009 since the program implementation at October 2007, however not all scenarios will use the whole value obtained in Sao Paulo. The weighted average (23,3%) was used for the sectors which didn't correspond to one of those with results available.

The implementation cost of € 13,5 million and marketing costs of € 18,4 million, as shown in the second chapter, were not considered.

The sector percentage of VAT redistribution is related to the share of non-congruous positions (NCP) in the '*studi di settore*', where the sector with higher percentage of non-congruous positions receives a higher redistribution, and vice-versa. The rule applied can be found in the table 18:

Table 18: *Redistribution Factors*

% of non-congruous positions (NCP)	Sector Percentage of Redistribution	Number of sectors
NCP > 50%	30%	7 (7,4%)
40% < NCP < 50%	20%	54 (57,4%)
25% < NCP < 40%	10%	32 (34,0%)
15% < NCP < 25%	5%	1 (1,1%)
NCP < 15%	Program not applied	0

Source: From author

The VAT declaration statistics was used to estimate of the VAT aliquot (4, 10 or 22 percent) proportion for each sector. As the activities available in these statistics are divided by macro segments and, consequently, the breakdown is not the same as the 'studi di settore', the sectors aliquot proportion were extracted from the correspondent macro segment.

For the three scenarios different program adoption rates, which is the share of invoices issued with a fiscal code (CPF), were used to simulate the different outcomes of the program direct cost. The adoption rates used are 25,85% (Sao Paulo adoption rate at December 2009), 35,77% (Sao Paulo peak adoption rate at October 2015), 50% and 75%. It's important to notice that this value was used solely for the direct cost of the reimburses, and it does not affect the VAT (IVA) collection, which varies according to the result obtained in Brazil in December 2009.

The lottery cost used was obtained from the relation of Total ICMS collected in 2009 (R$ 128,3 bi) and the prize awards amount distributed by the lottery in the same year (R$ 151,3 mi). The value obtained was 0,12% and if we apply the same schematic to Italy, using the VAT collected

in 2016 (€ 129,6 bi), we obtain €152,8 mi which corresponds to the amount that should be distributed through lottery awards.

4.2.1.2. Scenario 1 – Sao Paulo Scenario (Optimistic)

As previously explained, this scenario is based on the fact that the total ICMS collection grew by the values present in the figure 18. If the same is applied in Italy, we have the results present in this first scenario, where there is no differentiation between the congruous and non-congruous VAT revenue.

The formulas for this scenario are the following:

$$VAT_{t=0} = D * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$VAT_{t=1} = VAT_{t=0} * (1 + SG)$$

$$PDC = VAT_{t=1} * AR * SR + L$$

$$\Delta VAT_{net} = VAT_{t=1} - VAT_{t=0} - PDC$$

Where:

- $\boldsymbol{VAT_{t=0}}$ **and** $\boldsymbol{VAT_{t=1}}$**:** VAT collection prior (t=0) and during (t=1) the program;
- $\boldsymbol{D}$**:** Total declared amount by positions in the 'studi di settore' (Congruous + Non-congruous);
- $\boldsymbol{VAT_4, VAT_{10}}$ **and** $\boldsymbol{VAT_{22}}$: Proportions of each VAT aliquot obtained from the VAT declaration statistics macro segments;
- $\boldsymbol{SG}$: Sector ICMS growth obtained in Sao Paulo;
- $\boldsymbol{PDC}$: Program Direct Cost;
- $\boldsymbol{AR}$: Adoption rate, which varies from 25,85% to 75% obtained from 'Nota Fiscal Paulista' up to December 2009;
- $\boldsymbol{SR}$: Sector redistribution according to table 18;
- $\boldsymbol{L}$: Lottery Cost (€ 152,8 mi);
- $\Delta\boldsymbol{VAT_{net}}$: VAT Net revenue variation.

4.2.1.3. Scenario 2 – Intermediate scenario

The second scenario shows a differentiation between the congruous and non-congruous VAT revenues, where the first has its increase factor divided by three and the latter uses the whole value taken from '*Nota Fiscal Paulista*' results. Therefore, this second scenario was created based in the belief that the majority (2/3) of the congruous position declare the real amount owed while the non-congruous does not, and consequently, has a higher potential VAT to be collected.

The formulae for this scenario are the following:

$$CVAT_{t=0} = D_c * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$NCVAT_{t=0} = D_{nc} * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$CVAT_{t=1} = CVAT_{t=0} * (1 + SG/3)$$

$$NCVAT_{t=1} = NCVAT_{t=0} * (1 + SG)$$

$$PDC = (CVAT_{t=1} + NCVAT_{t=1}) * AR * SR + L$$

$$\Delta VAT_{net} = (CVAT_{t=1} + NCVAT_{t=1}) - (CVAT_{t=0} + NCVAT_{t=0}) - PDC$$

Where:

- $\boldsymbol{CVAT_{t=0}}$ **and** $\boldsymbol{CVAT_{t=1}}$**:** VAT collection for congruous positions prior (t=0) and during (t=1) the program;
- $\boldsymbol{NCVAT_{t=0}}$ **and** $\boldsymbol{NCVAT_{t=1}}$**:** VAT collection for non-congruous positions prior (t=0) and during (t=1) the program;
- $\boldsymbol{D_c}$ **and** $\boldsymbol{D_{nc}}$: Declared amount by positions in the 'studi di settore' for congruous and non-congruous positions respectively;

4.2.1.4. Scenario 3 – Pessimistic scenario

The scenario number three considers that the congruous and non-congruous will have an increase factor divided by six and three, respectively. The difference between the reference amount and the actually declared will be the only one which has the potential to rise such as the '*Nota Fiscal Paulista*' program. The reference amount is the amount that the positions should have declared to be classified as congruous. This scenario is used to simulate that the congruous and non-congruous declared amounts have a reduced VAT to be recovered, while the only potential area remains between the reference value and the declared amount of the non-congruous.

The formulae for this scenario are the following:

$$CVAT_{t=0} = D_c * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$NCVAT_{t=0} = D_{nc} * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$PVAT_{t=0} = (R_{nc} - D_{nc}) * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$CVAT_{t=1} = CVAT_{t=0} * (1 + SG/6)$$

$$NCVAT_{t=1} = NCVAT_{t=0} * (1 + SG/3)$$

$$PVAT_{t=1} = PVAT_{t=0} * (1 + SG)$$

$$PDC = (CVAT_{t=1} + NCVAT_{t=1} + PVAT_{t=1}) * AR * SR + L$$

$$\Delta VAT_{net} = (CVAT_{t=1} + NCVAT_{t=1} + PVAT_{t=1}) - (CVAT_{t=0} + NCVAT_{t=0}) - PDC$$

Where:

- $\boldsymbol{PVAT_{t=0}}$ **and** $\boldsymbol{PVAT_{t=1}}$**:** Potential VAT collection for difference between the reference and actually declared amounts prior (t=0) and during (t=1) the program;
- $\boldsymbol{R_{nc}}$**:** Reference 'studi di settore' amount used for non-congruous positions;

4.2.2 Other Potential taxes results

The taxes considered in this section are the IRPEF, IRES and IRAP, which were briefly explained in the section 1.4.2. The scenarios simulated are those explained in the previous sections. The recovery estimation methodology used for these taxes is based in the proportion of VAT recovered from the non-declared VAT gap, which is calculated using the following formula:

$$VATr_{\%} = VAT_{t=1}/VAT_{nd(t=0)}$$

Where:

- $\boldsymbol{VATr_{\%}}$**:** Proportion of VAT recovered from the non-declared VAT gap;
- $\boldsymbol{VAT_{t=1}}$**:** Gross VAT collected after program;
- $\boldsymbol{VAT_{nd}}$**:** Non-declared VAT amount prior to the program (t=0);

The estimation of the IRPEF which could be recovered using the program uses the following formulas:

$$IRPEFA_{ndbi(t=0)} = IRPEFA_{nd(t=0)} * IRPEFA_{bi(\%)}$$

$$IRPEFA_{rec} = IRPEFA_{ndbi(t=0)} * VATr_{\%}$$

Where:

- $\boldsymbol{IRPEFA_{ndbi(t=0)}}$**:** Non-declared Autonomous IRPEF from business income;
- $\boldsymbol{IRPEFA_{nd(t=0)}}$**:** Non-declared Autonomous IRPEF prior to program (t=0);
- $\boldsymbol{IRPEFA_{bi(\%)}}$**:** Non-declared Autonomous IRPEF business income share (66,3%);
- $\boldsymbol{IRPEFA_{rec}}$**:** Non-declared Autonomous IRPEF non-declared amount recovered;

As we can notice, the whole amount of the IRPEF non-declared was not used. Only the business income, professional or by participation in partnerships or similar share was considered, since it reflects the sectors that can be beneficiated by the program. This share is available at the table 11 and is equivalent to 66,3% of the total autonomous IRPEF gap.

Since the IRES and IRAP are taxes derived from the business income, such a share does not exist. The amounts that could not be beneficiated from the program were already excluded from the gap amount as explained in the section 1.4.2.2 and 1.4.2.3. Therefore, the formulas used for these two taxes are simpler and are shown below:

$$IRES_{rec} = IRES_{nd(t=0)} * VATr_{\%}$$

$$IRAP_{rec} = IRAP_{nd(t=0)} * VATr_{\%}$$

Where:

- $\boldsymbol{IRES_{rec}}$**:** Non-declared IRES amount recovered;
- $\boldsymbol{IRES_{nd(t=0)}}$**:** Non-declared IRES amount prior to the program (t=0);
- $\boldsymbol{IRAP_{rec}}$**:** Non-declared IRAP amount recovered;
- $\boldsymbol{IRAP_{nd(t=0)}}$**:** Non-declared IRAP amount prior to the program (t=0)

4.3. Portuguese Methodology

The three scenarios shown are based on the same methodology than those found for the program based in the '*Nota Fiscal Paulista*' results, which use the numbers found in the '*studi di settore*', that had its operations schematics explained in the section 4.1.1.2, and the '*IVA*' (VAT) declaration statistics found on the '*Ministero dell'Economia e Finanze*' website.

The three different scenarios are:

1- **Portugal Scenario (Optimistic):** This scenario will show the VAT collection increase without a differentiation between congruous and non-congruous positions, in other words, the total amount of VAT collected from the sectors of the '*studi di settore*' analyzed will raise according to the results obtained in Sao Paulo. This scenario reflects what happened in Portugal for the Group 1 Sectors.

2- **Intermediate scenario:** This one shows a differentiation between the congruous and non-congruous positions. Where only the non-congruous positions VAT revenue will grow as in Portugal, while those for the congruous positions will raise by the result obtained in Portugal divided by three.

3- **Pessimistic Scenario:** This analysis considers that only the difference between the non-congruous reference amount and the actual amount declared by the non-congruous positions will show the whole VAT revenue increase obtained in Portugal. The congruous will raise by the result obtained in Portugal divided by six while the declared amount of non-congruous will be divided by three.

4.3.1. Common Methodology

All the three scenarios will use the rules present in this section and further details regarding the difference in the methodology for the scenarios will be provided in the next sections.

Due to the unavailability of data brokedown by sector, the estimation of VAT raise will be of 22,08% to all the sectors, which is correspondent to the result that the Portuguese government

reached in VAT collection for Group 1 activities during the 2013 to 2015 period. The sector percentage of VAT redistribution used is the same applied in Portugal, which is 15%.

The implementation cost data was not available, and therefore, it was not considered. We can use as a reference, even not reflecting what actually happened in Portugal, the amounts of the '*Nota Fiscal Paulista'* implementation, which were of about € 13,5 million plus the marketing costs of € 18,4 million, as shown in the second chapter.

The VAT declaration statistics was used to estimate of the VAT aliquot (4, 10 or 22 percent) proportion for each sector. As the activities available in these statistics are divided by macro segments and, consequently, the breakdown is not the same as the '*studi di settore*', the sectors aliquot proportion were extracted from the correspondent macro segment.

Four different program adoption rates, share of invoices issued with a fiscal code (NIF), were simulated, that the were used to understand the possible different outcomes of the program direct cost. The adoption rates used are 18,76% (Portugal adoption rate at 2015), 35%, 50% and 75%. It's important to notice that this value was used solely for the direct cost of the reimburses, and it does not affect the VAT (IVA) collection, which varies according to the result obtained in Portugal up to December 2015. A peak adoption rate (21,8% at December 2017) was not used in Portugal because it was too close to 2015's value.

The lottery cost used was obtained from the relation of Portugal's Total VAT collected in 2016 (€ 15,8 bi) and the prize awards amount distributed by the lottery in the same year (€ 2,19 mi). The value obtained was 0,014% and if we apply the same schematic to Italy, using the VAT collected in 2016 (€ 129,6 bi), we obtain €17,96 mi which corresponds to the amount that should be distributed through lottery awards. The impact of the lottery in the VAT collection was not estimated due to lack of data, only the cost was used.

4.3.2. Scenario 1 – Portugal Scenario (Optimistic)

As previously explained, this scenario is based on the fact that the total VAT collection grew by 22,08%. If the same is applied in Italy, we have the results present in this first scenario, where there is no differentiation between the congruous and non-congruous VAT revenue.

The formulas for this scenario are the following:

$$VAT_{t=0} = D * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$VAT_{t=1} = VAT_{t=0} * (1 + SG)$$

$$PDC = VAT_{t=1} * AR * SR + L$$

$$\Delta VAT_{net} = VAT_{t=1} - VAT_{t=0} - PDC$$

Where:

- $\boldsymbol{VAT_{t=0}}$ ***and*** $\boldsymbol{VAT_{t=1}}$**:** VAT collection prior (t=0) and during (t=1) the program;
- $\boldsymbol{D}$**:** Total declared amount by positions in the 'studi di settore' (Congruous + Non-congruous);
- $\boldsymbol{VAT_4, VAT_{10}}$ ***and*** $\boldsymbol{VAT_{22}}$: Proportions of each VAT aliquot obtained from the VAT declaration statistics macro segments;
- $\boldsymbol{SG}$: Sector VAT growth = 22,08%;
- $\boldsymbol{PDC}$: Program Direct Cost;
- $\boldsymbol{AR}$: Adoption rate, varying from 18,76% up to 75%;
- $\boldsymbol{SR}$: Sector redistribution = 15%;
- $\boldsymbol{L}$: Lottery Cost (€ 17,96 bi);
- $\Delta\boldsymbol{VAT_{net}}$: VAT Net revenue variation.

4.3.3. Scenario 2 – Intermediate scenario

The second scenario shows a differentiation between the congruous and non-congruous VAT revenues, where the first has its increase factor divided by three and the latter uses the whole 22,08% value. Therefore, this second scenario was created based in the belief that the majority (2/3) of the congruous position declare the real amount owed while the non-congruous does not, and consequently, has a higher potential VAT to be recovered.

The formulae for this scenario are the following:

$$CVAT_{t=0} = D_c * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$NCVAT_{t=0} = D_{nc} * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$CVAT_{t=1} = CVAT_{t=0} * (1 + SG/3)$$

$$NCVAT_{t=1} = NCVAT_{t=0} * (1 + SG)$$

$$PDC = (CVAT_{t=1} + NCVAT_{t=1}) * AR * SR + L$$

$$\Delta VAT_{net} = (CVAT_{t=1} + NCVAT_{t=1}) - (CVAT_{t=0} + NCVAT_{t=0}) - PDC$$

Where:

- $\boldsymbol{CVAT_{t=0}}$ **and** $\boldsymbol{CVAT_{t=1}}$**:** VAT collection for congruous positions prior (t=0) and during (t=1) the program;
- $\boldsymbol{NCVAT_{t=0}}$ **and** $\boldsymbol{NCVAT_{t=1}}$**:** VAT collection for non-congruous positions prior (t=0) and during (t=1) the program;
- $\boldsymbol{D_c}$ **and** $\boldsymbol{D_{nc}}$: Declared amount by positions in the 'studi di settore' for congruous and non-congruous positions respectively;

4.3.4. Scenario 3 – Pessimistic scenario

The scenario number three considers that the congruous and non-congruous will have an increase factor divided by six and three, respectively. The difference between the reference amount and the actually declared will be the only one which has the potential to rise such as the Portuguese program. The reference amount is the amount that the positions should have declared to be classified as congruous. This scenario is used to simulate that the congruous and non-congruous declared amounts have a reduced VAT to be recovered, while the only potential area remains between the reference value and the declared amount of the non-congruous.

The formulae for this scenario are the following:

$$CVAT_{t=0} = D_c * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$NCVAT_{t=0} = D_{nc} * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$PVAT_{t=0} = (R_{nc} - D_{nc}) * (VAT_4 * 0{,}04 + VAT_{10} * 0{,}1 + VAT_{22} * 0{,}22)$$

$$CVAT_{t=1} = CVAT_{t=0} * (1 + SG/6)$$

$$NCVAT_{t=1} = NCVAT_{t=0} * (1 + SG/3)$$

$$PVAT_{t=1} = PVAT_{t=0} * (1 + SG)$$

$$PDC = (CVAT_{t=1} + NCVAT_{t=1} + PVAT_{t=1}) * AR * SR + L$$

$$\Delta VAT_{net} = (CVAT_{t=1} + NCVAT_{t=1} + PVAT_{t=1}) - (CVAT_{t=0} + NCVAT_{t=0}) - PDC$$

Where:

- $\boldsymbol{PVAT_{t=0}}$ **and** $\boldsymbol{PVAT_{t=1}}$**:** Potential VAT collection for difference between the reference and actually declared amounts prior (t=0) and during (t=1) the program;
- $\boldsymbol{R_{nc}}$**:** Reference '*studi di settore*' amount used for non-congruous positions;

4.3.5 Group 1 - Other Potential taxes results

The taxes considered in this section are the IRPEF, IRES and IRAP, which were briefly explained in the section 1.4.2. The scenarios simulated are those explained in the previous sections. The recovery estimation methodology used for these taxes is based in the proportion of VAT recovered from the non-declared VAT gap, which is calculated using the following formula:

$$VATr_{\%} = VAT_{t=1}/VAT_{nd(t=0)}$$

Where:

- $\boldsymbol{VATr_{\%}}$**:** Proportion of VAT recovered from the group 1 non-declared VAT gap;
- $\boldsymbol{VAT_{t=1}}$**:** Gross VAT collected after program;
- $\boldsymbol{VAT_{nd}}$**:** Non-declared VAT amount prior to the program (t=0);

The estimation of the IRPEF which could be recovered using the program uses the following formulas:

$$IRPEFA_{ndbi(t=0)} = IRPEFA_{nd(t=0)} * IRPEFA_{bi(\%)}$$

$$IRPEFA_{rec} = IRPEFA_{ndbi(t=0)} * VATr_{\%}$$

Where:

- $\boldsymbol{IRPEFA_{ndbi(t=0)}}$**:** Non-declared Autonomous IRPEF from business income;
- $\boldsymbol{IRPEFA_{nd(t=0)}}$**:** Non-declared Autonomous IRPEF prior to program (t=0);
- $\boldsymbol{IRPEFA_{bi(\%)}}$**:** Non-declared Autonomous IRPEF business income share (66,3%);
- $\boldsymbol{IRPEFA_{rec}}$**:** Non-declared Autonomous IRPEF non-declared amount recovered;

As we can notice, the whole amount of the IRPEF non-declared was not used. Only the business income, professional or by participation in partnerships or similar share was considered, since it reflects the sectors that can be beneficiated by the program. This share is available at the table 11 and is equivalent to 66,3% of the total autonomous IRPEF gap.

Since the IRES and IRAP are taxes derived from the business income, such a share does not exist. The amounts that could not be beneficiated from the program were already excluded from the gap amount as explained in the section 1.4.2.1 and 1.4.2.2. Therefore, the formulas used for these two taxes are simpler and are shown below:

$$IRES_{rec} = IRES_{nd(t=0)} * VATr_{\%}$$

$$IRAP_{rec} = IRAP_{nd(t=0)} * VATr_{\%}$$

Where:

- $\boldsymbol{IRES_{rec}}$**:** Non-declared IRES amount recovered;
- $\boldsymbol{IRES_{nd(t=0)}}$**:** Non-declared IRES amount prior to the program (t=0);
- $\boldsymbol{IRAP_{rec}}$**:** Non-declared IRAP amount recovered;
- $\boldsymbol{IRAP_{nd(t=0)}}$**:** Non-declared IRAP amount prior to the program (t=0)

4.3.6 Whole Scenario - VAT and Other taxes

As seen in the sections 1.3 and in the third chapter of this thesis, the results obtained in Portugal affected much more sectors than only those belonging to the Group 1. Therefore, an additional analysis was made to consider the impact which could be generated among the IRPEF, IRES and IRAP gaps.

The methodology used to obtain the potential revenue increase is very simple, the reduction in the VAT gap between 2012 and 2014 (from 2012's 13,6% to the 2014's 7,8%, a reduction of 42,4%) estimated by INE and presented in the section 1.3.2.1., was extended to VAT, IRPEF, IRES and IRAP, and therefore their non-declared amounts were reduced by 42,4%, which is the same proportional variation observed in the Portugal's VAT Gap.

Obviously, this contraction cannot be associated solely with the e-invoice program, but it certainly has an important share of contribution. Also, a better analysis could be made if official estimates of the Portuguese equivalent IRPEF, IRES and IRAP tax gaps were available, but they were not available when this thesis was written.

The formulas used in this simulation can be found below:

$$VATGAP_{2012(\%)} = VATGAP_{2012\ (€)} - TVAT_{2012(€)}$$

$$VATGAP_{2014(\%)} = VATGAP_{2014\ (€)} - TVAT_{2014(€)}$$

$$\Delta VAT_{\%} = 1 - (VATGAP_{2014(\%)} * 1/VATGAP_{2012(\%)}))$$

$$Tax_{gap(t=1)} = Tax_{gap(t=0)} - (Tax_{gap(t=0)} * \Delta VAT_{\%})$$

$$Tax_{rec(t=1)} = Tax_{gap(t=1)} - Tax_{gap(t=0)}$$

Where:

- $\boldsymbol{VATGAP_{2012(\%)}\ and\ VATGAP_{2014(\%)}}$**:** Proportional VAT Gap for 2012 and 2014;
- $\boldsymbol{VATGAP_{2012}}$ (€) $\boldsymbol{and\ VATGAP_{2014}}$ (€)**:** VAT Gap amounts for 2012 and 2014;
- $\boldsymbol{TVAT_{2012(€)}\ and\ TVAT_{2014(€)}}$**:** Theoretical VAT for 2012 ad 2014;
- $\boldsymbol{\Delta VAT_{\%}}$**:** Proportional VAT GAP reduction between 2012-2014;

- $\boldsymbol{Tax_{gap(t=0)}}$ $\boldsymbol{and}$ $\boldsymbol{Tax_{gap(t=1)}}$: Non-declared amounts prior (t=0) and after the program (t=1);
- $\boldsymbol{Tax_{rec(t=1)}}$: Amount of tax recovered from the non-declared tax base after the program (t=1);

These formulas were used for all the involved taxes, which were the VAT, IRPEF, IRES and IRAP.

5. Results

This chapter presents the results obtained with this study, using the methodology explained in the fourth chapter. The outcomes presented here were divided into two main sections, one explaining the results which could be obtained if a program similar to 'Nota Fiscal Paulista' was applied in Italy, and another one, using the Portuguese e-invoice as a reference.

Using these programs, the government can reveal amounts which were part of the shadow economy, and therefore, increase not only the VAT collection, but also the revenue of other taxes, such as the IRPEF, IRES and IRAP. Although, neither the official results published of '*Nota Fiscal Paulista'* nor those for *'e-fatura'* show the additional revenue collected from these related taxes, an estimate will be provided here using the non-declared VAT reduction as reference.

The potential taxes are the IRPEF, IRES and IRAP, which have a high under-declaration rate and represented 49,16% of the total tax revenue in 2015. The non-declared gap amount for these taxes, already not considering the employees IRPEF and considering only 66,3% of the autonomous IRPEF as shown in section 1.4.2.1, was estimated at € 33,7 billion, which is equivalent to 2,08% of the 2015's Italian GDP.

At the end of each section of this chapter, an analysis will be provided to answer if a possible VAT rate increase in Italy can be avoided or at least partially sterilized, in the near future, using the reference programs that have already been applied into these two different countries.

5.1. 'Nota Fiscal Paulista'

The simulation based on the Sao Paulo's '*Nota Fiscal Paulista*', which had its methodology explained in the section 4.2, shows the possible outcomes expected for the second full year of the reimburse program and first full year of the lottery introduction in Italy. These dates were used in order to synchronize with the results data available for the Brazilian program.

In addition to the direct VAT collection effects, an analysis of the potential impact in tax evasion reduction for other interested taxes will be provided.

5.1.1 'Nota Fiscal Paulista' – Direct VAT effect

This first section considers exclusively the effects on VAT revenue and evasion, and the results are summarized in the table 19:

Table 19: *VAT Net Revenue variation for selected scenarios – Brazilian results*

	Scenario 1 - Brazil mirrored results - Optimistic		Scenario 2 - Intermediate		Scenario 3 - Pessimistic	
	VAT Net Revenue Variation (VNRV)	Net Variation (%)	VAT Net Revenue Variation (VNRV)	Net Variation (%)	VAT Net Revenue Variation (VNRV)	Net Variation (%)
Adoption rate = 25,85% (Brazil adoption @ December 2009)	€ 11.259.463.831	20,1%	€ 4.842.021.567	8,6%	€ 2.800.266.017	5,0%
Adoption rate= 35,77% (Brazil adoption peak @ October 2015)	€ 10.054.864.882	17,9%	€ 3.748.890.557	6,7%	€ 1.740.935.826	3,1%
Adoption rate = 50%	€ 8.326.896.833	14,9%	€ 2.180.820.570	3,9%	€ 221.352.294	0,4%
Adoption rate = 75%	€ 5.291.113.192	9,4%	-€ 574.045.887	-1,0%	-€ 2.448.330.649	-4,4%

Source: from author

The VAT Net Revenue variation and the Net variation (%) columns already discount the tax amounts redistributed through the direct reimburses and the lottery. The Net variation (%) compares the VAT revenue before and after the program for the selected sectors.

None of the scenarios simulated could reach € 19,5 billion, which is the amount that the Italian government expects increasing the VAT rate, but if we consider exactly the same results obtained with the '*Nota Fiscal Paulista*' in Sao Paulo ICMS, we would reach a € 11,26 Net VAT revenue increase, which could allow a sterilization for the VAT increase during the next years.

The table 20 shows the impact of the program in the tax gap. As expected, the first scenario shows the highest tax recovery, with a gross VAT revenue increase of € 14,6 billion which is equivalent to 55,1% of the non-declared VAT prior to the program application. Still using the first scenario results, the total VAT Gap has decreased to €20,3 billion or 15,4% of the potential VAT. The second and third scenarios presented improvements in the non-declared VAT as well, with a recovery of 29,1% and 21,1% respectively.

The adoption rate was fixed at 25,85%, which was the adoption rate at second full year of the '*Nota Fiscal Paulista*' operation. If higher adoption rates were used, the costs would be higher, and consequently, the net VAT revenue variation results would be lower according to the values shown in table 19.

Table 20: *Impact of program in the VAT gap – Brazilian results*

	2015 Before Program		2015 - Scenario 1		2015 - Scenario 2		2015 - Scenario 3	
	Amount (€ bi)	% of Potential VAT	Amount (€ bi)	% of Potential VAT	Amount (€ bi)	% of Potential VAT	Amount (€ bi)	% of Potential VAT
Theorical revenue (Potential VAT)	131,6		131,6		131,6		131,6	
Gross VAT revenue increase			14,6	11,1%	7,7	5,8%	5,6	4,2%
VAT Redistribution Cost @ 25,85% adoption			3,3	2,5%	2,8	2,2%	2,8	2,1%
Net VAT revenue increase			11,3	8,6%	4,8	3,7%	2,8	2,1%
Non-declared VAT	26,4	20,1%	11,8	9,0%	18,7	14,2%	20,8	15,8%
Declared but not paid	8,4	6,4%	8,4	6,4%	8,4	6,4%	8,4	6,4%
Total VAT Gap	34,8	26,4%	20,2	15,4%	27,1	20,6%	29,2	22,2%
Effective VAT received	96,9		111,4	84,6%	104,5	79,4%	102,4	77,8%

Source: from author

The amount of effective VAT received prior to the program is different from the amount showed in table 1 since the value used here in table 20 is already net of to the adjustments due to reimbursements and compensations, which do not have no relation to the studied program.

To achieve the effective VAT received which was shown in the table 20, an assumption of the non-variability of the 'declared but not paid' amount was made. This option has been taken since the results data that government published considered that the actual tax collection raised by the amounts shown in the section 2.4, therefore, the amount which previously belonged to the non-declared VAT has been received.

5.1.2 'Nota Fiscal Paulista' – VAT and Other taxes

The results shown in the previous section are related to the direct VAT effect only, which were the results published by the Brazilian government. If the taxpayers' data gathered with the program was used to cross check with other potential taxes presented in the section 1.4.2, the additional revenue, generated to the government due to the under-declaration reduction, could be even higher.

The table 23 summarizes the results that can be recovered divided by tax and scenario, the methodology used was explained in the section 4.2.2.

Table 21: *Non-declared taxes recovery – Brazilian program*

	Non-declared gap prior to Program	Scenario 1 (Brazil mirrored - Optimistic)		Scenario 2 (Intermediate)		Scenario 3 (Pessimistic)	
		Gap amount after program	Recovered amount	Gap amount after program	Recovered amount	Gap amount after program	Recovered amount
Non-declared VAT recovery (GVRI/NDVbp)		55,1%		29,1%		21,1%	
IRPEF (€ bi)	19,82	8,90	10,92	14,05	5,77	15,65	4,17
IRES (€ bi)	8,92	4,00	4,92	6,32	2,60	7,04	1,88
IRAP (€ bi)	4,96	2,23	2,73	3,52	1,45	3,92	1,04
Total IRPEF + IRES + IRAP (€ bi)	**33,70**	**15,13**	**18,58**	**23,88**	**9,82**	**26,60**	**7,10**
Total IRPEF + IRES + IRAP + VAT (gross) (€ bi)	**60,10**	**26,97**	**33,13**	**42,59**	**17,51**	**47,44**	**12,66**
Total IRPEF + IRES + IRAP + VAT (net) (€ bi)	**60,10**	**26,97**	**29,83**	**42,59**	**14,66**	**47,44**	**9,90**

Source: from author

As we can notice, the amount coming from these three taxes which could be recovered for the first scenario is €18,58 billion, reducing the non-declared gap of these three taxes from €33,7 billion to €15,13, while the second and third scenarios recovered amounts were lower, since the non-declared VAT recovery obtained for these scenarios were much below the results obtained mirroring the Brazilian program results.

If we add the VAT amounts obtained in the section 5.1.1, the recovered amount, before discount the reimbursement costs of the program, is € 33,13 billion, discounting the program costs, or in other words, the additional revenue generated to the government is of € 29,83 billion, which represents 31,48% of the 2015's tax gap for all the main Italian taxes and accounts for 1,84% of the 2015's GDP. This revenue increase would allow the tax burden to be reduced to 41,46%, maintaining the same 2015's tax revenue, which could mean a 4,25% reduction in the taxes paid by the Italians due to the increased compliance.

5.2 E-Invoice for group 1 activities

The simulation based on the Portuguese '*e-fatura*', or in English e-invoice, which had its methodology explained in the section 4.3, shows the annual possible outcomes expected after three full years of the reimburse program for selected sectors and one and half year of the lottery introduction in Italy. These dates were used in order to obtain outcomes from a similar period compared to the simulation based in '*Nota Fiscal Paulista*' and due to data availability restrictions.

In addition to the direct VAT collection effects, an analysis of the potential impact in tax evasion reduction for other interested taxes, briefly explained in the section 1.4.x, will be provided.

5.2.1 E-Invoice for group 1 activities – Direct VAT results

This first section considers exclusively the effects on VAT revenue and evasion, and the results are summarized in the table 22:

Table 22: *VAT Net Revenue variation for selected scenarios – Portuguese results*

	Scenario 1 - Portugal mirrored results - Optimistic		Scenario 2 - Intermediate		Scenario 3 - Pessimistic	
	VAT Net Revenue Variation (VNRV)	Net Variation (%)	VAT Net Revenue Variation (VNRV)	Net Variation (%)	VAT Net Revenue Variation (VNRV)	Net Variation (%)
Adoption rate = 18,76% (Portugal adoption @ 2015)	€ 1.816.817.664	18,5%	€ 882.517.727	9,0%	€ 730.766.902	7,4%
Adoption rate= 35%	€ 1.524.165.829	15,5%	€ 613.284.437	6,2%	€ 465.337.298	4,7%
Adoption rate = 50%	€ 1.253.859.332	12,7%	€ 364.608.368	3,7%	€ 220.174.486	2,2%
Adoption rate = 75%	€ 803.348.503	8,2%	-€ 49.851.746	-0,5%	-€ 188.430.201	-1,9%

Source: from author

The results obtained with this simulation are much less impactful, in terms of the additional revenue generated, than those obtained with the program based in '*Nota Fiscal Paulista*'. The main reason is due to the reduced sectors involved in the simulation, which were equivalent to those of the group 1, as explained in the section 4.1.2. If we consider the proportional variation, the results are similar.

Clearly, none of the scenarios simulated could reach € 19,5 billion, which is the amount that the Italian government expects increasing the VAT rate, but if we consider exactly the same

results obtained with these group 1 activities, we would reach a potential 18,5% gap reduction, which could allow a sterilization for the VAT increase during the next years.

The VAT Net Revenue variation and the Net variation (%) columns already discount the tax amounts redistributed through the direct reimburses and the lottery. The Net variation (%) compares the VAT revenue before and after the program for the selected sectors.

The results shown already discounts the tax amounts redistributed through the direct reimburses and the lottery. It's important to remember from the methodology, that although the lottery were included, its impact in the VAT collection couldn't be estimated since the data available for the lottery results, in terms of VAT revenue, was too aggregated, and therefore it was not possible to provide an acceptable estimate with the data available.

As we can see in the table 23, none of the three simulated scenarios could show a strong reduction in the Italian VAT Gap, the best was achieved using the scenario 1 (results obtained in Portugal mirrored to the Italy) which reached a reduction of 6,2% in the total VAT Gap. This limited contraction of the VAT Gap happened due to the limited representativeness of these 10 sectors, if compared to whole VAT evasion scenario.

Table 23: *Impact of program in the VAT gap – Portuguese results*

	2015 Before Program		2015 - Scenario 1		2015 - Scenario 2		2015 - Scenario 3	
	Amount (€ bi)	% of Potential VAT	Amount (€ bi)	% of Potential VAT	Amount (€ bi)	% of Potential VAT	Amount (€ bi)	% of Potential VAT
Theorical revenue (Potential VAT)	131,6		131,6		131,6		131,6	
Gross VAT revenue increase			2,2	1,7%	1,2	0,9%	1,1	0,8%
VAT Redistribution Cost @ 18,76% adoption			0,4	0,3%	0,3	0,2%	0,3	0,2%
Net VAT revenue increase			1,8	1,4%	0,9	0,7%	0,7	0,6%
Non-declared VAT	26,4	20,1%	24,2	18,4%	25,2	19,1%	25,3	19,3%
Declared but not paid	8,4	6,4%	8,4	6,4%	8,4	6,4%	8,4	6,4%
Total VAT Gap	34,8	26,4%	32,6	24,8%	33,6	25,5%	33,7	25,6%
Effective VAT received	96,9	73,6%	99,0	75,2%	98,0	74,5%	97,9	74,4%

Source: from author

The amount of effective VAT received prior to the program is different from the amount showed in table 1 since the value used here in table 23 is already net of to the adjustments due to reimbursements and compensations, which do not have no relation to the studied program.

To achieve the effective VAT received which was shown in the table 23, an assumption of the non-variability of the 'declared but not paid' amount was made. This option has been taken since the results data that government published considered that the actual tax collection raised

by the amounts shown in the section 3.3, therefore, the amount which previously belonged to the non-declared VAT has been received.

5.2.2 E-Invoice for group 1 activities – Other taxes

The results shown in the previous section are related to the direct VAT effect only, which were the results published by the Portuguese government for the group 1 activities. If the taxpayers' data gathered with the program was used to cross check with other potential taxes presented in the section 1.4.2, the additional revenue, generated to the government due to the under-declaration reduction, could be even higher.

The table 24 summarizes the results that can be recovered divided by tax and scenario, the methodology used was explained in the section 4.3.5.

Table 24: *Non-declared taxes recovery – Portuguese program*

	Non-declared gap prior to Program	Scenario 1 (Brazil mirrored - Optimistic)		Scenario 2 (Intermediate)		Scenario 3 (Pessimistic)	
		Non-declared Gap amount after program	Recovered amount	Non-declared Gap amount after program	Recovered amount	Non-declared Gap amount after program	Recovered amount
Non-declared VAT recovery (GVRI/NDVbp)		8,2%		4,6%		4,0%	
IRPEF (€ bi)	19,82	18,19	1,63	18,91	0,91	19,03	0,79
IRES (€ bi)	8,92	8,19	0,73	8,51	0,41	8,56	0,36
IRAP (€ bi)	4,96	4,55	0,41	4,73	0,23	4,76	0,20
Total IRPEF + IRES + IRAP (€ bi)	**33,70**	**30,93**	**2,77**	**32,15**	**1,55**	**32,35**	**1,35**
Total IRPEF + IRES + IRAP + VAT (gross) (€ bi)	**60,10**	**55,15**	**4,95**	**57,34**	**2,76**	**57,70**	**2,40**
Total IRPEF + IRES + IRAP + VAT (net) (€ bi)	**60,10**	**55,15**	**4,59**	**57,34**	**2,43**	**57,70**	**2,08**

Source: from author

As we can notice, the amount coming from these three taxes which could be recovered for the first scenario is €2,77 billion, reducing the non-declared gap of these three taxes from €33,7 billion to €30,93, while the second and third scenarios recovered amounts were lower, since the non-declared VAT recovery obtained for these scenarios were much below the results obtained mirroring the Portuguese program results.

If we add the VAT amounts obtained in the section 5.2.1, the recovered amount, before discount the reimbursement costs of the program, is € 4,95 billion, discounting the program costs, or in other words, the additional revenue generated to the government is of € 4,59 billion, which represents 4,53% of the 2015's tax gap for all the main Italian taxes and accounts for 0,26% of the 2015's GDP.

5.2.3 E-Invoice results applied to VAT and Other taxes

Although the results obtained in the previous section may seem not so encouraging to combat the VAT Gap in Italy, the strategy used by the Portuguese government is much more complex than the simple combat of the evasion in these group 1 activities. When the group 2 invoice NIF requirement rule was introduced in 2015, the government aimed to expand the necessity of taxpayers to provide the NIF in their invoices, and consequently, make the attitude of providing the NIF a habit of the everyday life of the citizens, since most of commercial activities visited in an average day would generate benefits, being them from group 1, 2 or even for those which did not belong to these groups generated benefits through the '*Fatura da sorte*' lottery coupons.

This strategy worked well as it is possible to observe in the charts 19 and 20 present in the section 3.2. The year of 2015 registered an almost double-digit growth of total invoices issued, and the issuers increased by 7,7%, which is a remarkable achievement. Even prior to 2015, the program was already collecting good results, but it wasn't fully implemented yet.

According to INE VAT Gap estimate available in the section 1.5.2.1, the VAT Gap had a contraction of approximately 42,4% for the 2012-2014 period. The table 25 presented below simulates the taxes scenario in which the VAT, IRPEF, IRES and IRAP gap reduced in the same proportion:

Table 25: *E-invoice results extended to VAT, IRPEF, IRES and IRAP*

	Non-declared gap prior to Program	VAT GAP reduction results extended	
		Non-declared Gap amount after program	Recovered amount
Non-declared VAT recovery (GVRI/NDVbp)		42,4%	
IRPEF (€ bi)	19,82	11,41	8,41
IRES (€ bi)	8,92	5,14	3,78
IRAP (€ bi)	4,96	2,86	2,10
Total IRPEF + IRES + IRAP (€ bi)	**33,70**	**19,41**	**14,30**
VAT (€ bi)	**26,40**	15,20	11,20
Total IRPEF + IRES + IRAP + VAT (gross) (€ bi)	**60,10**	**34,61**	**25,49**
Total IRPEF + IRES + IRAP + VAT (net) (€ bi)	**60,10**	**34,61**	**25,14**

Source: from author

Considering only the non-declared VAT, the government would have had an additional VAT revenue of €11,2 billion in 2015, and if we consider all the taxes, already discounting the reimburse and lottery expenses, the additional revenue would be € 25,14 billion, that corresponds to a 26,53% reduction in the 2015's total tax gap and 1,55% of the GDP. Considering that the Italian tax burden was of 43,3% in 2015 as shown in the figure 8, this

revenue increase would allow the tax burden to be reduced to 41,75%, maintaining the same 2015's tax revenue, which could mean a 3,6% reduction in the taxes paid by the Italians due to the increased compliance.

This value would be enough to reach € 19,5 billion, which is the amount that the Italian government expects of additional VAT revenue increasing the tax rate.

Conclusion

This study aimed at assessing the possible results which could be obtained through the application of a tax compliance program, such as the Brazilian '*Nota fiscal paulista*' and the Portuguese '*e-fatura*'.

As analyzed in this report and discussed in the previous section, there is a great potential in the Italian taxes scenarios for the application of a tax reimbursement program, as soon as the electronic invoice obligation for B2B and B2C transactions come into force.

Almost all the scenarios studied were positive, those which the additional revenue generated was not enough to cover the program expenses, presented adoption rates much higher than those registered in the Portuguese and Brazilian programs.

The initial question of this study was if the VAT increases expected in Italy for the next years could be avoided using a similar tax reimburse program, or in other words, an additional tax revenue of €19,5 billion could be recovered from the non-declared gap.

The results obtained, using the methodology explained in this study, suggests that if the data gathered by the program is not extended to other taxes than VAT, the additional revenue generated through evasion reduction, would not be enough to avoid the aliquots increase. Although, the additional VAT revenue generated for both programs, accounted for, at least, 60% of the extra income generated through the aliquots increase.

If the data is extended to the check the tax bases of the IRPEF, IRES and IRAP, we could reach €29,83 billion mirroring the Brazilian results, which means a 31,48% tax gap reduction and 1,84% of 2015's GDP. Mirroring the Portuguese results, the obtained additional revenue would be €25,14 billion, that is equivalent to 26,53% of the total 2015's tax gap and 1,55% of the Italian GDP for the same year. In 2015, the total tax gap in Italy, not considering the IRPEF employees data, was of € 90,4 billion and equivalent to 5,6% of the GDP.

If these results were reached, the 2015's Italian tax burden could be reduced from 43,3% to 41,46% using the Brazilian results, and using those obtained for the Portuguese program, the tax burden would be reduced to 41,75%. This means that the taxes could be reduced by 4,25% and 3,58%.

The program which mirrored the '*Nota Fiscal Paulista*' results presented slightly better outcomes than those which mirrored the '*e-fatura*'. This probably happened because São Paulo presented a higher proportional non-declared VAT before the program than Portugal, and also, the Brazilian program has a higher range of business activities affected. In the other hand, Portugal has many more factors in common, such as the European Union, fiscal scenario, HDI, GDP per capita, etc. with Italy than with Brazil, and therefore, less modifications would be needed to adapt the Portuguese program to Italy.

One question which could not be answered in this thesis, was if Italy will show similar results as those observed in Portugal and Brazil, since many qualitative and quantitative factors must be taken into account, such as culture, tax morale, services received in return of the taxes paid, etc. Future analyses should focus in better understanding this aspect in order to obtain more accurate values.

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