

# Argomenti di discussione

(Discussion topics)

## THE ANATOMY OF VAT EFFICIENCY: EVIDENCE FROM ITALY 2009-2014

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# The anatomy of VAT efficiency: evidence from Italy 2009-2014

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## Abstract

The C-efficiency indicator measures the level of inefficiency in VAT design and administration as the product of two gaps, a policy and a compliance gap. While the former explicitly takes into account the presence of different VAT rates, the compliance gap does not. In this paper we present a methodology to disaggregate the compliance gap and overall VAT inefficiency between VAT rates. We also apply our methodology to disaggregate the VAT compliance gap in Spain.

## Sommario

L'indicatore *C-efficiency* misura il livello di inefficienza nel disegno e nell'amministrazione dell'IVA. È ottenuto come il prodotto di due indicatori, il *policy gap* e il *compliance gap*. Il primo considera esplicitamente l'esistenza di varie aliquote IVA nel sistema tributario mentre il *compliance gap* non ne tiene conto. In questo articolo si presenta una metodologia per disaggregare il *compliance gap* e l'efficienza complessiva dell'IVA tra le aliquote IVA. La nostra metodologia viene impiegata anche per disaggregare il VAT gap spagnolo.

**JEL classification:** H21, H26

**Keywords:** VAT gap, Policy gap, Compliance Gap, Disaggregation of VAT gap between rates

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## 1. Introduction<sup>1</sup>

The Value Added Tax (VAT) is currently used by 96 countries<sup>2</sup> in the world. The US remains the only OECD member state which does not have a VAT. In Europe, VAT contributes to 17.5% of tax revenues ([Eurostat, 2016](#)).

Despite its policy relevance, VAT is far less studied in the economic literature than income taxes. Some notable exceptions are Keen (2013), Bird and Gendron (2007) Ebrill et. At (2001) and Alm and El-Ganainy (2013).

This literature has developed a measure of the efficiency in the design and administration of VAT, known as C-efficiency, where inefficiency is measured as the product of two gaps, a policy and a compliance gap. To understand the policy gap, note that most countries apply a *standard* rate and one (or more) *reduced* rate(s), with the latter usually applied to large consumption or merit goods (food, transport, culture). The policy gap measures the fraction of VAT revenues which is lost due to the application of these reduced rates and of exemptions.

On the contrary, the compliance gap measures the fraction of VAT revenues which is lost mainly due to evasion<sup>3</sup>. VAT evasion is related to evasion of income taxes – because undeclared sales reduce the income tax base of the seller - and to the consumers' willingness to pay – since it is the final consumer who bears the burden of VAT.

Thus, the policy gap has more to do with the *design* of the VAT and the compliance gap with its *administration*, although the two are clearly intertwined. For example, the level of VAT rates has to do with the design of the tax and has an impact on the policy gap but, at the same time, it does influence the gain from VAT non-compliance (Agha and Haughton, 1996) or, more in general, “a policy change will generally affect both policy and compliance gaps” (Keen, 2013. P. 436)

The C-efficiency indicator is calculated by the European Commission (Reckon 2009; CASE 2017) without distinguishing between different rates. However, countries often change VAT rates selectively. Spain raised its standard rate from 16% to 21% and its reduced rate from 7% to 10% between 2010 and 2012. Similarly, from 2014, France has raised standard and reduced rate, respectively, from 19.6% to 20% and from 7% to 10%. Other countries have chosen to raise only standard rates: Portugal has increased by 2 percentage points its standard rate from 20% over the 2010-2011; UK has increased standard rate in 2009 and 2011, reaching 20%. Italy increased its standard VAT rate twice, from 20% to 21% in September 2011 and from 21% to 22% in October 2013. Some administrative measures have also been undertaken during the same period to reduce VAT evasion.

There are two main reasons behind these changes. First, it is believed that increasing VAT rates is less distortive than increasing income tax rates or social contributions. Second, an increase in VAT rates used to finance a reduction in the labour cost enhance the competitiveness of national products and acts as a substitute for currency devaluations, because domestic VAT rates are applied on imports but not on exports.

The impact on the efficiency of the design and administration of VAT, however, is far less clear. In general, when only standard rates are increased one should expect the policy gap to increase, but the impact on the compliance gap is unclear. Given that only some VAT rates are changed, to understand these impacts a methodology to disaggregate both of the gaps between rates is needed.

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<sup>1</sup> The authors wish to thank Rubén Víctor Fernández from Spain Tax agency for having provided us Spain data.

<sup>2</sup> Four countries of the Gulf Cooperation Council, Bahrain, Kuwait, Oman and Qatar, are going to implement VAT since January 2019.

<sup>3</sup> Compliance gap includes also missing payments and errors, see D'Agosto et al. (2016).

This paper does this for the first time in the literature by using national accounts and tax declarations for VAT paid in Italy in the period between 2009 and 2014.

As a result, we are able to disaggregate C-efficiency between the super-reduced, the reduced and the standard rate. We apply our methodology to Spain and show that there it yields quite different results.

## 2. The C-efficiency indicator and its disaggregation

The VAT compliance gap (CG) is simply the difference between the amount of VAT that should be paid according to the law (the theoretical tax liability) and that actually received by government (the actual revenue), expressed as a proportion of the former. Formally

$$CG = \frac{VTTL-AR}{VTTL} = 1 - \frac{AR}{VTTL} \quad [2.1]$$

where VTTL is the theoretical VAT liability and AR is the actual VAT revenue.

The VAT policy gap (PG) is the difference between VAT which would be paid if there was no VAT evasion and all transactions were taxed at the standard rate, i.e. the notional ideal revenue<sup>4</sup>, and VAT that would be paid if there was no VAT evasion but taxing every transaction at the rate set in the law, i.e. the theoretical tax liability. This difference is then expressed as a fraction of the former. Formally

$$PG = \frac{NIR-VTTL}{NIR} = 1 - \frac{VTTL}{NIR} \quad [2.2]$$

where NIR is the notional ideal revenue. Note that since PG is measured assuming no evasion, the measure of PG is independent on that of CG. VAT efficiency is usually measured as

$$C - efficiency = (1 - CG) \times (1 - PG) \quad [2.3]$$

The independence property implies that the impact on efficiency of any policy change should be measured by taking into account its impact on both gaps.

As argued by Keen (Keen, 2013, p. 431) “the welfare significance of C-efficiency is tenuous at best”. In particular, PG is clearly built assuming the reference point of the optimality of uniform taxation, an idea which is theoretically debatable although usually accepted by practitioners. On the other hand CG is justified by the belief that evasion reduces welfare, which in turn reflects the assumption that private and public compliance costs are of a sufficiently small size. Despite its limitations, *C-efficiency* is widely used to compare the efficiency of VAT in various countries.

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<sup>4</sup> The term “transactions” is a general one which may encompass all types of final consumption (as suggested by Keen, 2013) or exclude from final consumption the share which is VAT-exempt by its nature. The term may also include intermediate consumption and investments when it is actually taxed. See Section 3 on this.

To gain further insights, we consider the application of  $n$  VAT rates,  $i=1\dots$ . We can write

$$VTTL = \sum_i^n VTTL_i = \sum_i^n t_i VTB_i \quad [2.4]$$

where  $VTB_i$  is the theoretical VAT base for transactions taxed at rate  $i$  and

$$VTB = \sum_i^n VTB_i \quad [2.5]$$

where  $VTB$  is aggregate theoretical vat base. Since we can also write

$$AR = \sum_i^n AR_i \quad [2.6]$$

then we can also write

$$CG = \sum_i^n CG_i^w = \sum_i^n CG_i x (VTTL_i / VTTL)_i$$

$$CG_i = \left(1 - \frac{AR_i}{VTTL_i}\right) \quad [2.7]$$

i.e that the compliance gap is a weighted sum of single compliance gaps, where the weights are the ratios between  $i$ -th and the theoretical VAT liability. Note that both the knowledge of  $VTB_i$  and that of  $AR_i$  are required to calculate this share.

Now consider  $m=n-1$  are reduced rates and denote with  $j=1,\dots,m$  each reduced rate and with  $t_s$  the standard rate. We also have

$$NIR = \sum_i^n NIR_i = t_s \sum_i^n VTB_i \quad [2.8]$$

Define as  $VTB_j$  the theoretical  $i$ -th and  $j$ -th base so that

$$\sum_j^m (t_s - t_j) VTB_j / NIR \quad [2.9]$$

is the amount of the policy gap attributable to the  $j$ -th reduced rate. Note that the knowledge of  $VTB_j$  and of VAT rates is sufficient to estimate [2.9].

### 3. C-efficiency in Italy

In comparison with the rest of Europe (Case 2017, Table 3.1) the Italian efficiency in design and administration of VAT performs quite poorly.

**Table 3.1:** Selected results for Policy gap in European Countries from CASE 2017

Country	Policy Gap (1)	Rate gap (1a)	Exemption gap (1b)
Bulgaria	27.95	2.27	25.68
Germany	44.33	7.07	37.26
Estonia	36.07	2.56	33.51
Spain	59.53	14.59	44.93
France	52.63	11.66	40.97
<b>Italy</b>	<b>53.90</b>	<b>15.47</b>	<b>38.43</b>
Latvia	38.52	3.15	35.37
Lithuania	28.27	4.01	24.26
Hungary	42.10	4.61	37.49
Poland	48.75	15.45	33.31
Slovenia	46.81	11.68	35.14
Slovakia	36.65	1.47	35.19
<b>EU-28</b>	<b>44.04</b>	<b>9.50</b>	<b>34.54</b>

The highest policy gap is displayed by Spain (59,5%), while the lowest are those of Eastern European Countries (39,2%). Among the large European countries, France has got values similar to Italy, whilst Germany has much lower values. The structure of VAT rates is similar –as virtually all major countries have standard and reduced rates- but values differ largely among countries.

These estimates are obtained measuring VTB as the sum of final consumption of Households, General Government and non-profits including the investments by these sectors and widening the idea of VAT as a pure consumption tax applied in the approach adopted by Keen (2013) (see Section 4 for more details). Consequently, the policy gap estimated by Case (2017) and by Keen (2013) is actually composed of two gaps, the exemption gap and the rate gap.

On the contrary, and as we shall explain more in details in Section 4 (see in particular equation 4.1) and comments below), here we take a more legally-compelling notion of theoretical VAT base because we exclude from it consumption which is VAT-exempt, therefore we do not consider the exemption gap, but we include intermediate consumption by business sectors (see Section 4 for more details) other than their investments. It turns out that that our estimates of the policy gap are larger than the Rate gap (table 3.1, column 1a) provided by Case (2017). In particular, our estimate of the policy gap for Italy ranges between 27% and 28%, approximately, while that of the compliance gap is slightly higher (see Table 3.2 below).

**Table 3.2:** C-efficiency estimates for Italy 2009-2014

Years	Compliance gap (a)	Policy Gap (b)	C-efficiency (c)=(1-a)x(1-b)
2009	29,3%	26.7%	51.8%
2010	28,4%	26.8%	52.4%
2011	29,7%	26.8%	51.5%
2012	29,9%	27.3%	51.0%
2013	29,8%	27.7%	50.8%
2014	29,9%	28.1%	50.4%



In general, we note that the C-efficiency in Italy has further decreased by 1.4 percentage points between 2009 and 2014. This reduction in efficiency has been driven by a sharp increase in the policy gap –by 1.4 percentage points in absolute terms i.e. by 5.2 percentage points in relative terms – and a smaller one in the compliance gap– by 0.6 percentage points in absolute terms i.e. by 2.2 percentage points in relative terms.

However, a closer look reveals more. In particular, one should note that the increasing trend in the compliance gap starts in 2011 whilst, on the contrary, this gap decreased markedly in 2010. From this perspective, the increase in the compliance gap has been more intense than that of the policy gap: between 2011 and 2014 the compliance gap has increased by 1.5 percentage points in absolute terms i.e. by 5.5 percentage points in relative terms.

When trying to interpret these results, we should consider that a variety of factors may have influenced the observed trends. In particular, the economic context and the business cycle –and, for these years, the Great Recession-, the change in consumer behaviors and the changes in legislation.

Starting from the latter, in the period observed, there were three major changes in the VAT legislation in Italy:

- i) in 2010 the possibility to use VAT credits to offset VAT and other tax or social contributions liabilities was limited, based on the idea that a consistent part of these credits originated from tax evasion and or tax frauds (such as the infamous carousel fraud, see Harrison and Krelove, 2010);
- ii) in September 2011 the standard VAT rate was increased from 20 to 21%;
- iii) in October 2013 the standard VAT rate was further increased from 21 to 22%.

On the contrary, the super-reduced rate and the reduced rate were kept constant at, respectively, 4% and 10%.

From Table 3.2 the following hypotheses can be formulated. First, the increase in the standard rate has driven a rise the policy gap in 2012 and 2014. Second, the 2010 reform has been effective in reducing the compliance gap. Third, the increases of the standard rate have widened the compliance gap, and the consequent loss in efficiency has more than offset the previous gain due to 2010 reform.

To verify these hypotheses, the following questions arise.

First, if the observed increase in the policy gap has been determined exclusively by the change in the standard rate or whether it has been also determined by a change in the composition of the VTB. In the former case one should observe that the share of the policy gap due to the application of the 4% rate has increased more, while in the latter case this should not necessarily happen.

The second question is whether the observed decrease in the compliance gap in 2010 was actually due to the reform of VAT credits. In such a case one would expect to observe a reduction of all disaggregated compliance gaps because the reform was applied to all business sectors and to all transactions, independently on the rate.

The third and last question is if the increase in the compliance gap after 2011 is related to the change in the standard rate or not. In the former case, only the compliance gap concerning transactions taxed at the standard rate should be concerned.

All of these questions require to look at the policy and compliance gaps disaggregated between rates. In Italy, as in many other European countries, the reduced and super-reduced rates are mostly used for food and for other merit goods (see Table 3.3 below).

**Table 3.3:** Share of bases subject at different VAT rates for different categories of commodities consumed by households in Italy (year 2014)

Commodity group	Share at the super reduced rate	Share at the reduced rate	Share at the standard rate	Weighted average tax rate	Share over total
Food and non-alcoholic beverages	44%	49%	7%	8,1%	21%
Alcoholic beverages			100%	22,0%	4%
Clothing			100%	22,0%	8%
Water, electricity and fuels		64%	36%	14,3%	10%
Items for the house			100%	22,0%	7%
Health goods	13%	56%	31%	13,0%	2%
Transports		11%	89%	20,7%	15%
Communication		11%	89%	20,7%	3%
Culture	20%	13%	67%	16,8%	9%
Hotels and restaurants	5%	95%		9,7%	14%
Other	3%		97%	21,4%	8%
<b>All</b>	<b>12%</b>	<b>34%</b>	<b>54%</b>	<b>15,7%</b>	<b>100%</b>

We now proceed by disaggregating the two gaps.

#### 4. The disaggregation of the policy gap

In the literature various approaches are used to estimate the theoretical VAT liability, or VTTL. Most of them are based on a top-down comparison between national accounts and tax data. In turn, this comparison can be implemented either from the demand or from the supply side. Here we follow the former, since VAT is usually interpreted as a consumption tax<sup>5</sup>

Denote with  $AD_{ic}$  the component of the aggregate demand which is taxed at a rate  $i$ . Note that this implies the availability of aggregate demand at a very detailed level, so that different rates can be appropriately selected.  $VTB_i$  is then calculated as

$$VTB_i = \sum_c AD_{ic}(1 - \alpha_{ic}) \quad [4.1]$$

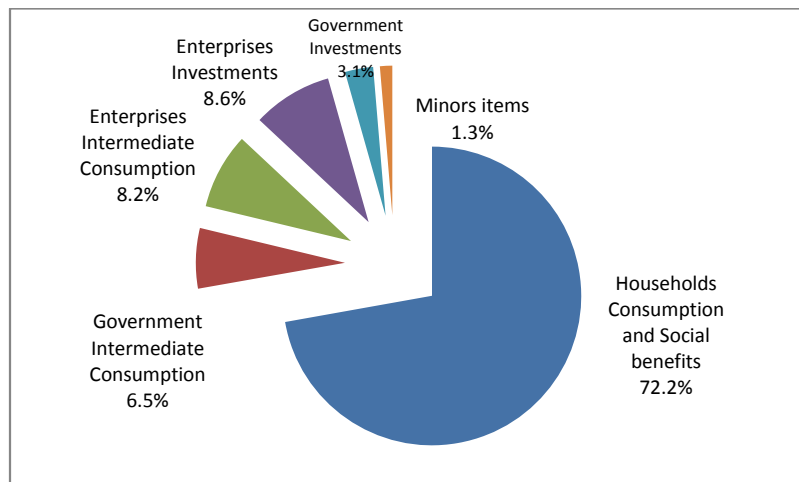
where  $\alpha_{ic}$  is the share of  $AD_{ic}$  which, according to the law, should *not* be taxed. There are two main reasons why this happens. First,  $\alpha_{ic} = 1$  when the transaction is VAT-exempt so that no VAT is applied. For example, within the EU all financial services as well as health services are VAT exempt. Also, exports do not pay any VAT. Second,  $\alpha_{ic} = 1$  when the transaction is subject to VAT but the amount paid is deductible from the VAT base of the buyer, so that this deduction cancels out with the VAT remitted by the seller. In principle, this rule should apply to all intermediate consumption and to all investments.

If these rules were strictly applied, VAT would be a pure consumption tax, whose macroeconomic tax base would coincide with the sum of household consumption and of consumption by non-profit

<sup>5</sup> See also IMF (2017), HMR&C (2017) and Ministry of Economics and Finance (2018).

institutions and by general government. However, rules are quite different from this ideal notion as Figure 4.1, referring to the period 2009- 2014, shows.

**Figure 4.1:** Composition of the theoretical VAT base (Average 2009- 2014)



Enterprises intermediate consumption and investments account<sup>6</sup>, respectively, for 55,2% and 7.2% of the macroeconomic demand<sup>7</sup>; however their theoretical VAT base account for, respectively, the 4,4% and the 4,9% of the corresponding National Accounts Aggregates and it implies that the average value of  $\alpha$  is close but lower than unity

There are two main reasons why intermediate consumption and investments are actually included in the theoretical VAT base. First, VAT on these goods cannot be fully deducted when buyers are also suppliers of VAT-exempt goods and services (*subjective non-deductibility*). Second, some purchases or investments are presumptively considered as being not entirely inherent to the economic activity and therefore the VAT paid is not entirely deductible. This happens especially for purchases of goods such as buildings, cars, personal computers which are used by self-employers both in their economic activity and for their personal or family life. In these cases, the law prescribes that the cost and the VAT are only partially (usually for 50%) deductible from, respectively, the income and the VAT taxbase (*objective non-deductibility*).<sup>8</sup>

The following step is the disaggregation of the theoretical VAT base between different rates. This is done following the legal classification of transactions submitted to VAT as contained in three Tables added to the VAT legal text (Presidential Decree 633/1972). In turn, this requires to use detailed information about single items. The resulting disaggregation of the theoretical VAT base is reported in Table 4.1.

<sup>6</sup> Government intermediate consumption and investments account respectively, for 2.8%% and 1.4% of the macroeconomic demand and account for, respectively, the 6.5% and the 3,1% of the theoretical VAT base.

<sup>7</sup> Macroeconomic demand includes Household Consumption, Government benefits, General Government Investments, General Government Intermediate Consumption, Market enterprises Intermediate Consumption, Market enterprises Investments.

<sup>8</sup> To calculate the share of subjective and objective *theoretical* non deductibility, first, the *actual* non deductibility is observed from VAT declarations (see Section 4) and, second, it is assumed that the propensity to evade exempted sales is the same as the propensity to evade taxable sales. Recall that, according to EU legislation, an exempted sale is not taxed but, correspondingly, the supplier has no right to deduct the VAT paid on purchases of inputs used to produce the exempt good.

**Table 4.1:** Disaggregation of VTB in Italy (in millions of euros)

Year	VTB 4%	VTB 10%	VTB 20%	VTB 21%	VTB 22%	VTB
2009	110.527	294.531	476.916			881.974
2010	113.075	300.839	484.480			898.394
2011	113.168	300.849	358.592	136.369		908.977
2012	109.441	291.837		483.404		884.682
2013	103.157	292.651		350.784	115.220	861.812
2014	102.132	288.668			465.738	856.538

Two main things should be noticed. First, the total theoretical VAT base, VTB, shrinks over the period, as a net result of a slight increase between 2009 and 2011 and a sharp decrease after 2011. Figure 4.2 below shows that this trend bears some similarity but it is not identical to that displayed by final consumption expenditure of household as recorded by Eurostat.

**Figure 4.2:** Comparison between VTB and final consumption expenditure of households (2009=100)

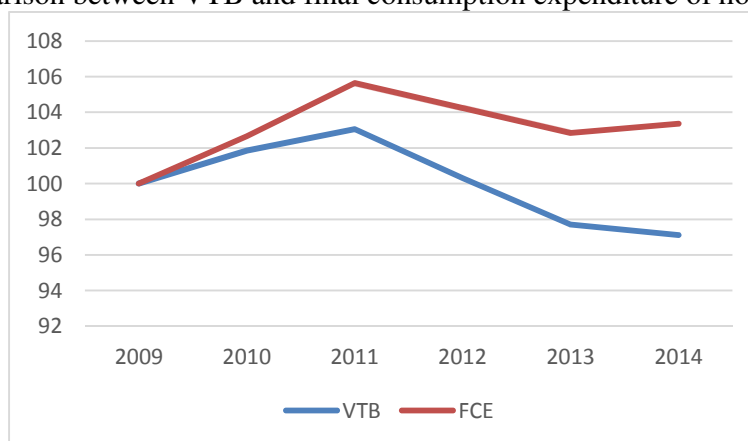


Figure 4.2 suggests that most but not all the trend in aggregate VTB is associated with the business cycle and the (lagged) impact of the Great Recession, which hit Italy hard in 2009 and again in 2011.

Second, although all of the bases have followed the same trend (i.e. increasing between 2009 and 2011 and decreasing after 2011), the rate of change has not been homogeneous across them. In particular, the VTB taxed at the super-reduced rate of 4% has decreased relatively more than the other two, i.e. by 7.6 percentage points with respect to 2009 and by 9.8 percentage points with respect to 2011. Given that the super-reduced rate is applied to food and some merit goods (see Table 2), this seems to suggest that the consumption of food and of merit goods after the crisis has been reduced more than other goods, which, in turn, is probably associated to the distributional characteristics of various goods<sup>9</sup>. On the contrary, the VTB taxed at the reduced 10% rate has decreased by relatively less than others, i.e. by 2 percentage points with respect to 2009 and by 4 percentage points with respect to 2011.

As a result, when the policy gap is disaggregated the share which increases more is that at 10%, whilst that at 4% stays almost constant (see Table 4.2 below).

<sup>9</sup> This reduction has been documented and shown to be particularly acute among low-income families, see for example [http://www.censis.it/7?shadow\\_comunicato\\_stampa=121078](http://www.censis.it/7?shadow_comunicato_stampa=121078).

**Table 4.2:** Disaggregation of the policy gap in Italy

Year	Policy gap	4%	10%
2009	26.7%	10.0%	16.7%
2010	26.8%	10.1%	16.7%
2011	26.8%	10.0%	16.8%
2012	27.3%	10.0%	17.3%
2013	27.7%	9.7%	18.0%
2014	28.1%	9.8%	18.4%

The two rate changes of 2011 and 2013 generate an increase in the 10% -rate policy gap. The latter increases by 1.7 percentage point between 2009 and 2014, of which 1.6 after 2011. Thus, the overall increase in the policy gap is entirely explained by the increase in the 10%-rate policy gap. To put it alternatively, this increase is lower than that which had been observed if the composition of VTB would have not changed in the period observed. For example, if this composition was the same as that of 2009 the policy gap would have been equal to 28.4% at the end of 2014.

## 5. The disaggregation of the compliance gap

VAT revenues are collected by VAT operators who act as withholding agents. After collection, every VAT operator issues a VAT declaration, and then he/she actually remits the VAT. The aggregate actual revenue, AR, can therefore be observed directly from the VAT remittance forms. In Italy, however, these forms (known as F24) do not distinguish between different VAT rates.

Define as VRB as the total *reported* VAT base. This is calculated as

$$VRB = \tau AR \quad [5.1]$$

where  $\tau$  is the average rate observed from tax declarations. Note that, since a VAT operator may omit the remittance of (part of) the due VAT, VRB is an underestimate of the actual VAT base. Clearly we have

$$VRB = \sum_i VRB_i \quad [5.2]$$

where  $VRB_i$  is the reported VAT base for transactions taxed at rate  $i$ .

Conceptually, a reported VAT base is a difference between reported taxable operations and reported *deductible* costs.

Thus, to estimate the ARs it is necessary to accomplish the following steps:

- i) estimate, for each rate, the total amount of VAT taxable operations reported by taxpayers;
- ii) subtract from the previous amount the total of deductible costs reported by taxpayers;
- iii) multiply these differences, which are proxies of VAT taxable base for each rate, by the appropriate rate.

While reported taxable operations are distinguished by rates in the VAT declarations, reported *deductible* costs are not. In tax declarations, only total costs are reported by VAT rates, so that deductible costs differ from total costs because of subjective and objective non-deductibility cases

mentioned before. Here it is assumed that these cases have the same impact across tax rates, so that, for each taxpayer, the distribution of deductible costs among different rates is assumed to be the same as the distribution of total costs among different rates.

The implied distribution of the actual revenues across different rates is reported in Table 5.1.

**Table 5.1:** Disaggregation of AR in Italy

Year	AR 4%	AR 10%	AR standard	Overall
2009	3.881	21.190	65.989	91.060
2010	4.094	22.110	68.074	94.278
2011	4.112	21.959	68.868	94.939
2012	3.916	21.938	68.826	94.680
2013	3.771	21.984	67.291	93.045
2014	3.583	22.790	68.574	94.946

Using results in Tables 4.1 and 5.1 we can disaggregate the compliance gap between weighted compliance gaps as described in [2.7]. We report the results in Table 5.2 below.

**Table 5.2:** Disaggregation of the compliance gap in Italy (in % points)

	4% rate			10% rate			Standard rate		
	$CG_i$	$Vi/V$	$CG_i^w$	$CG_i$	$Vi/V$	$CG_i^w$	$CG_i$	$Vi/V$	$CG_i^w$
	(a)	(b)	(a*b)	(a)	(b)	(a*b)	(a)	(b)	(a*b)
2009	11.8	3.4	0.4	27.8	22.8	6.3	30.5	73.8	22.5
2010	9.5	3.4	0.3	26.5	22.9	6.1	29.8	73.7	22.0
2011	9.2	3.4	0.3	27.1	22.3	6.0	31.4	74.4	23.4
2012	10.6	3.2	0.3	24.9	21.6	5.4	32.2	75.2	24.2
2013	8.7	3.1	0.3	24.9	22.1	5.5	32.1	74.7	24.0
2014	12.4	3.0	0.4	21.1	21.3	4.5	33.1	75.6	25.0

See equation [2.7] for symbols; V stands for VTTL

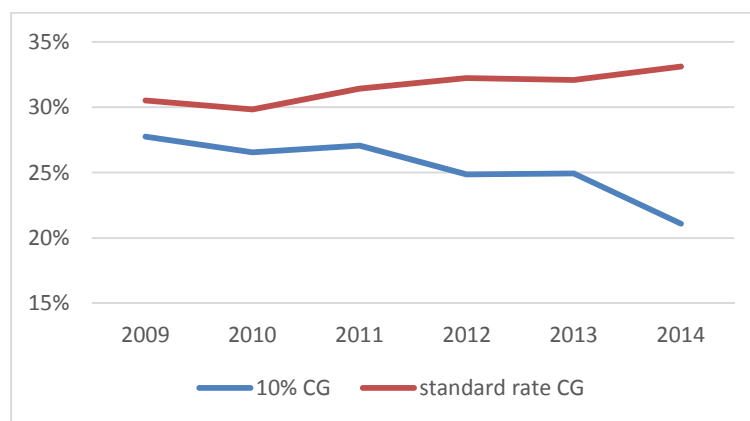
In general, the propensity to evade is higher for transactions taxed at the standard and at the reduced rate. This has probably to do both with the rate *level* – an higher level creates more incentives for both the seller and the buyer to evade – and with some *structural features* of the businesses involved. In particular, food is sold by larger shops which tend to have a lower propensity to evade, think about chains of nation-wide and international supermarkets and shopping malls.

We focus on the values of the 10%-rate and the standard rate compliance gaps to address our two last questions, because the 4% -rate compliance gap accounts for less than 0.5 percentage points.

First, the hypothesis that the 2010 reform<sup>10</sup> was effective in reducing evasion seems confirmed, because both CGs decrease in that year. They also both bounce back upwards in 2011, as if the impact of the reform was partly absorbed by tax evaders, but there is a clear difference between the two trends (see also Figure 5.1 below). The 10%-rate CG increases in 2011 to a value of 27.1% - which is still smaller than the 2009 value and, from 2011 onwards, it decreases steadily. On the contrary, the standard rate CG increases in 2011 to a higher value -31.4%- and then increases further in following years.

This reasoning leads us to address the last question. The increase observed in overall compliance gap after 2011 is entirely explained by the rise in the standard rate compliance gap, so the increase in the value of the rate seems a plausible explanation. Note, in particular, the increases in the value of the standard rate CG in 2012 and again in 2014, i.e. the two years following the adoption of a new and higher standard rate.

**Figure 5.1:** comparison between 10% and standard rate compliance gaps



## 6. The disaggregation of VAT efficiency

We can use previous results to disaggregate the C-efficiency indicator by rates. In particular, it is interesting to distinguish between the share of inefficiency which can be attributed exclusively to the standard rate and the share of inefficiency that can be attributed exclusively to all non-standard rates. We define the observed inefficiency as the difference between the maximum degree of efficiency, 1, and the observed value of the C-efficiency indicator. Given [2.3] total inefficiency index,  $I$ , is equal to

$$I = 1 - C - \text{efficiency} = CG + PG - CG \times PG \quad [6.1]$$

so that

$$I + CG \times PG = I_s + I_r; \quad [6.2]$$

$$I_s = CG_s^w; \quad I_r = (CG - CG_s^w) + PG$$

<sup>10</sup> Note that a reform reducing the limit of VAT credit to offset often involves Vat operators whose Vat rates on sales are lower than Vat rates on purchases (for instance, restaurant).

where  $CG_s^w$  is weighted compliance gap for the standard rate. Here we are retaining the assumption that the inefficiency measured by the policy gap can be attributed to reduced rates, or, to state it alternatively, that the standard rate is the “reference value” for uniform taxation. We can then express the shares of “gross inefficiency”  $I+CGPG$  which can be attributed to the standard and to the reduced rates, respectively.

**Table 6.1:** Disaggregation of VAT “gross inefficiency” in Italy

Year	Standard rate inefficiency share	Non-standard rates inefficiency share
2009	40.3%	59.7%
2010	39.8%	60.2%
2011	41.4%	58.6%
2012	42.3%	57.7%
2013	41.7%	58.3%
2014	43.2%	56.8%

Even by attributing, somewhat arbitrarily, the policy gap entirely to the application of non-standard rates the share of gross inefficiency due to the evasion of transactions taxed at the standard rate has increased steadily from 2011 onwards.

This clearly reflects the pattern observed before for Italy, where transactions taxed at the standard rate are also more evaded. Adopting the same approach for other countries will likely yield different results. Consider, for example, Spain which has a rate structure similar to Italy, a super reduced at 4%, a reduced at 10% and a standard rate, currently at 21%. Over the period 2009-2012, Spain changed also twice their vat rates involving both reduced and standard rates: in 2010, reduced went from 7% to 8% while standard from 16% to 18%. Again, in 2012, reduced increased at 10% while the standard at 21%.

As we noted above, the PG in Spain reaches very high values, while, on the contrary the CG is lower than the Italian one. More precisely, taking advantage of a unique dataset provided to us by the Spain Minister of finance, we estimate the CG to be equal to 22.8% on average in the years between 2009-2012 (with yearly values ranging from 21.3 and 25%). The disaggregation of CG between rates in Spain yields the results displayed in Table 6.2.

**Table 6.2:** Disaggregation of the compliance gap in Spain

Years	4%-rate CG	Reduced rate CG	Standard rate CG
2009	42.1%	35.6%	15.5%
2010	51.0%	37.0%	13.0%
2011	37.6%	36.6%	19.9%
2012	48.1%	33.6%	16.2%

These results suggest that the larger part of the VAT “gross inefficiency” in Spain is attributable to reduced rates rather than to standard rates.



## **7. Concluding remarks**

A recent paper by Keen and Slemrod (2017) argues, although with reference mainly to direct taxes, that tax administration and tax rates are not separate issues and it provides a unified theoretical framework from which both optimal tax rates and optimal enforcement levels are easily derived. Our paper provides additional evidence that this is a fruitful approach because, in practice, when tax rates are changed, administrative changes are called for to preserve or enhance the efficiency in tax collection.

In this paper, by disaggregating policy and compliance gaps by rates, we show that the two increases in standard rates in Italy have augmented the standard rate compliance gap as well as the intermediate rate policy gap. After these changes, the share of the VAT inefficiency which can be attributed to the application of the standard rate has increased, and this peculiar result is due to the fact that the propensity to evade is higher for transactions taxed at the standard rate.

The evidence presented in this paper clearly shows that increasing tax rates, and particularly the standard one, would further decrease the efficiency in VAT design and administration by surely amplifying the policy gap and, most probably, by increasing even more the already high compliance gap. Therefore, these changes in tax rates, if enacted, should be accompanied with an increased efficiency in the administrative procedure to tackle possible advantages that fraudulent taxpayers may arise from applying VAT rates on their transactions. An example consists in a more intense use of computer-based automatic cross-checks of VAT debts and VAT credits between customer and supplier to reduce the propensity to evade B2B transactions as well as a reduction of incentives to evade VAT in B2C transactions.

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