

DETECTING AGGRESSIVE TAX PLANNING BY MNEs AT THE INDUSTRY LEVEL: A MICRO APPROACH

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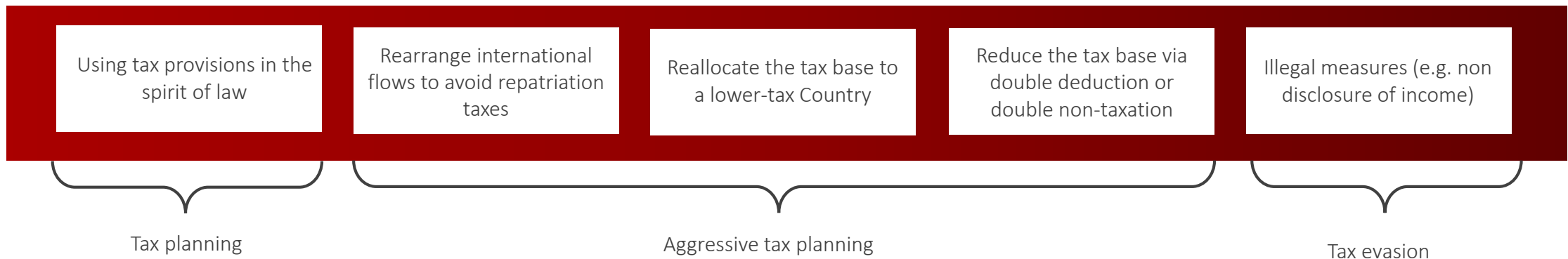
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INTRODUCTION

- **Aggressive tax planning (ATP)** by MNEs is a set of practices aimed at exploiting mismatches and loopholes in the international tax framework to reduce the overall tax burden
- According to the literature, three main channels for ATP:
 - ATP via **interest** payment (debt management)
 - ATP via **royalty** payment (R&D policies)
 - ATP via strategic **transfer pricing**
- **Boundaries** of ATP definition (from EU Commission, 2017)



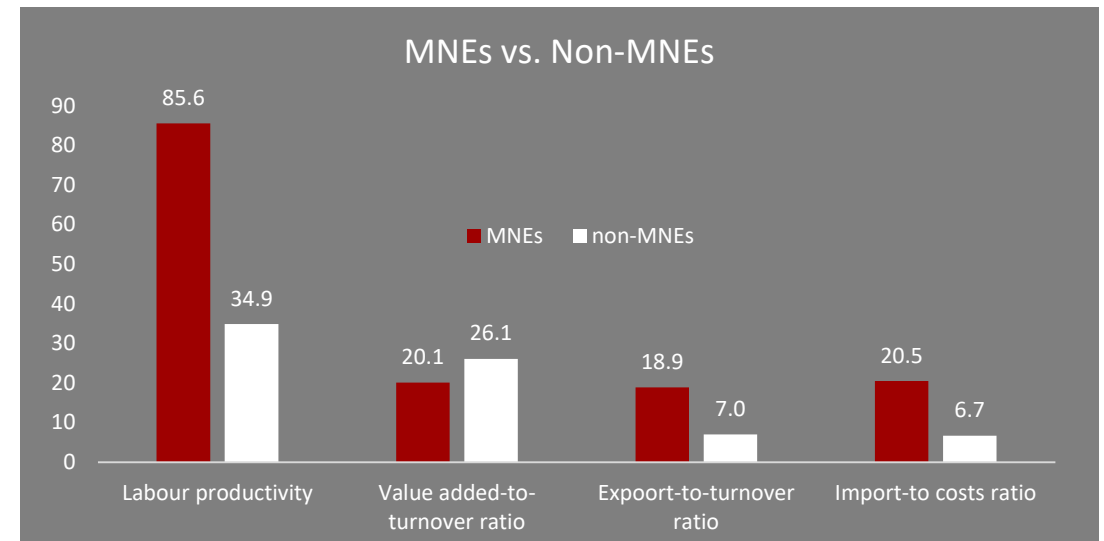
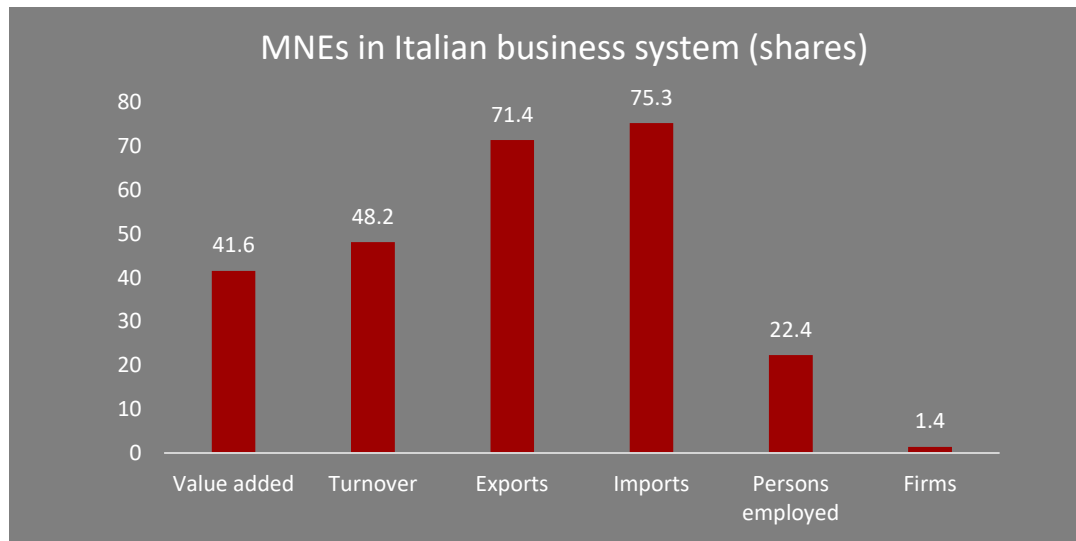
INTRODUCTION

- Measurement of ATP is relevant for several reasons:
 - Monitoring
 - Inform policies aimed at contrasting ATP
 - Assessing related IFFs
 - Adjusting GDP and GNI among countries
- **Top-down** methods (macro approach) have been generally used to measure different aspects of ATP
- **Bottom-up** methods (micro approach) have been less used because of the difficulty in gathering information at micro-level

This work proposes a bottom-up method based on the analysis of microdata relating to the whole population of Italian MNEs. The aim is correcting value added with a procedure that grounds on a double comparison: (1) between MNEs and non-MNEs and (2) among MNEs.

MNEs in Italy

- Italian business system is composed by 4.4 million firms
- About 400,000 are internationalised (imports and/or exports)
- 63,141 units are in MNEs:
 - 24,970 units are affiliates in 11,720 multinational groups with foreign headquarters in 121 countries
 - 38,171 units are headquarter in 8,125 multinational groups with foreign affiliates in 125 countries



Database

- The database for the analysis is composed of three informative sources:
 - The archive **Frame-SBS**, which includes information about the structure and economic variables for the whole population of 4.4 million of Italian firms
 - The archive **COE-TEC** (Integrated International Trade Database), which includes information about imports and exports (by product and origin/destination country) of Italian firms
 - The archive **ASIA-Groups** (Italian version of European EGR), which includes information about firms involved in domestic and foreign groups
- For each unit in the Italian business system, the final database reports comprehensive information about:
 - The economic and organizational structure
 - The characteristics of its inclusion in the network of international trade
 - If applies, the position within MNE groups

The PS-ROC procedure (overview)

- The **PS-ROC** procedure is composed of two main phases:
 1. The **identification** of tax avoiding (TA) units among MNEs
 - Italian MNEs are evaluated in order to define if they are suspected of tax avoiding behaviour
 - The selection procedure is based on an «vertical» procedure which involves the comparison between MNEs and non-MNEs (control group)
 2. The **adjustment** of value added for TA units
 - Value added of TA units is adjusted based on an «horizontal» or a «vertical» procedure according to the typology of data that are available
 - In the «vertical» procedure, the adjustment of value added is obtained exploiting the selection model (**using only the information related to Italian firms**)
 - In the «horizontal» procedure, the adjustment of value added is obtained by back-casting the distribution of value added of the given MNE group (**using also the information related to foreign firms**)

The PS-ROC procedure (identification)

- The phase of **identification** is composed of three steps:
 - For each MNE unit, a control group of domestic firms is defined using propensity score matching
 - For each pair MNE unit-control group, a comparison in terms of profit share is used to define a proxy variable, which stresses possible abnormal behaviours by MNEs
 - ROC analysis is used to define the final clustering between tax avoiding (TA) and non tax-avoiding (NTA) units starting from the proxy variable

The PS-ROC procedure (identification)

- The control group for each Italian MNE is defined using propensity score matching. This allows to define the 10 Italian domestic units that are more similar to the given Italian MNE based on the following set of characteristics:
 - Region
 - Industry (3-digits)
 - Per capita turnover
 - Persons employed
 - Share of goods and services on total costs
 - Export-to-turnover ratio
 - Import-to-cost ratio
 - Share of salaries on total costs
 - Share of services on turnover
- For each pair MNE unit-control group, a proxy variable, which can be thought of as an indicator of suspect of TA is given by the following condition:
 - **Proxy=1** if ebit-to-turnover ratio for the MNE unit is lower than the average of the control group
 - **Proxy=0** if ebit-to-turnover ratio for the MNE unit is greater or equal to the average of the control group

The PS-ROC procedure (identification)

- For MNE units, in order to refine the classification a ROC analysis is carried out using a composite indicator that takes into account a set of variables relating to the structure of costs and revenues, and the tax differential with other countries:



- These variables should correct the proxy by considering other aspects of the generation of profits
- In this context, ROC analysis allows to define a cut-off over the value of the **composite indicator**, which permits to cluster MNEs into TA and non-TA, adjusting the classification derived from the proxy variable

The PS-ROC procedure (adjustment)

- Due to the unavailability of micro data relating to foreign MNEs included in MNE groups in which Italian MNEs are involved (as affiliates or headquarter), an «vertical» method has been applied to adjust value added
- In particular, the «vertical» method exploit the information provided by the ROC analysis in the selection phase
- For each TA unit, the following condition applies:

$$\bar{S} > \alpha F_{1,i} + \beta F_{2,i}$$

where factors are:

$$F_{1,i} = \sum_j \gamma_{j,1} x_{j,i} \quad \text{and} \quad F_{2,i} = \sum_j \gamma_{j,2} x_{j,i}$$

- The procedure assigns to the indicator x_1 , which is the ebit-to-turnover ratio, the value such that, for each TA MNEs, the following condition is obtained:

$$\bar{S} = \alpha F_{1,i} + \beta F_{2,i}$$

The PS-ROC procedure (adjustment)

- This allows to define the adjustment condition as:

$$\tilde{x}_{j,i} = \frac{\bar{s} - (\alpha \sum_{-j} \gamma_{-j,1} x_{-j,1} + \beta \sum_{-j} \gamma_{-j,2} x_{-j,2})}{\alpha \gamma_{j,1} + \beta \gamma_{j,2}}$$

where:

- \bar{s} is the threshold value defined by the ROC analysis on the composite indicator
- $(\alpha \sum_{-j} \gamma_{-j,1} x_{-j,1} + \beta \sum_{-j} \gamma_{-j,2} x_{-j,2})$ represents the effect of the other variables on the value of the composite indicator
- $\alpha \gamma_{j,1} + \beta \gamma_{j,2}$ represents the weight of the ebit-to-turnover ratio on the value of the composite indicator
- $\tilde{x}_{j,i}$ is the adjusted value of the ebit-to-turnover ratio in order to bring the TA MNE on the threshold
- The amount of the adjustment is obtained as: $(\tilde{x}_{j,i} - x_{j,i}) * Turnover_i$

Preliminary results

Industry	Units	Identification (%)						Adjustment (mln euro and %)				
		TA proxy	TA proxy vs. TA ROC				TA ROC	Original EBIT	Adjusted EBIT	Correction	Incidence of correction	Incidence of TA
			YY	NY	YN	NN						
Mining and quarrying	157	75.8	63.7	0.6	12.1	23.6	64.3	137	158	20	14.8	12.9
Food and beverage	1640	64.0	47.2	7.3	16.8	28.8	54.5	10225	11990	1765	17.3	14.7
Textile	584	68.3	55.1	5.7	13.2	26.0	60.8	1824	1987	163	8.9	8.2
Wearing apparel	578	67.5	53.1	7.3	14.4	25.3	60.4	2853	3058	205	7.2	6.7
Leather	482	68.9	59.5	11.6	9.3	19.5	71.2	2887	3222	335	11.6	10.4
Wood, Paper and print	1248	64.7	48.0	6.4	16.7	28.8	54.4	3827	4246	419	11.0	9.9
Chemical and pharmaceuticals	967	58.5	46.2	6.8	12.3	34.6	53.1	13525	15166	1640	12.1	10.8
Rubber and plastic	935	69.7	56.0	3.9	13.7	26.4	59.9	4874	5725	851	17.5	14.9
Non-metallic minerals	780	67.8	55.3	4.2	12.6	27.9	59.5	3827	3998	171	4.5	4.3
Metals	2680	67.4	55.7	8.4	11.6	24.2	64.1	10055	12174	2118	21.1	17.4
Electronics	1286	70.7	61.2	6.6	9.5	22.7	67.8	10403	11217	815	7.8	7.3
Machinery	2602	62.0	52.9	4.9	9.1	33.1	57.8	17596	18342	747	4.2	4.1
Automotive	540	66.1	51.7	6.3	14.4	27.6	58.0	12968	14237	1269	9.8	8.9
Other manufacturing and repair	1901	73.3	59.2	5.4	14.2	21.3	64.6	4396	4902	506	11.5	10.3
Energy, water and waste	2433	58.2	53.1	7.4	5.1	34.4	60.5	22427	30347	7920	35.3	26.1
Construction	4653	71.7	58.9	2.3	12.8	26.0	61.2	5772	6318	546	9.5	8.6
Wholesale and retail trade	13335	69.9	51.2	6.6	18.7	23.6	57.7	33262	40473	7211	21.7	17.8
Transportation and logistics	2048	70.8	61.3	5.5	9.5	23.6	66.8	24703	26171	1468	5.9	5.6
Hotel and restaurants	2685	64.5	54.3	4.8	10.2	30.7	59.1	3814	4069	254	6.7	6.2
Telecommunications	729	72.8	63.0	2.9	9.9	24.3	65.8	20680	21182	502	2.4	2.4
Informatics	2142	80.6	73.1	5.7	7.5	13.7	78.8	11261	11945	685	6.1	5.7
Real estate	7897	56.8	40.3	3.0	16.5	40.2	43.4	3882	4274	393	10.1	9.2
Business services	6492	79.8	68.9	5.8	10.9	14.5	74.6	22028	24301	2274	10.3	9.4
Personal services	2449	74.2	63.8	4.5	10.5	21.2	68.3	5849	6418	570	9.7	8.9
Total	61243	68.4	55.0	5.4	13.5	26.1	60.4	253073	285920	32846	13.0	11.5

Conclusions and open issues

- The PS-ROC procedure is able to measure profit shifting in Italian MNEs
- In the absence of data about foreign firms involved in Italy-related MNE group, the method is based on a double «vertical» analysis (which exploit only the information about Italian firms)
- The selection phase is finalised to compare Italian MNEs with similar non-MNEs and to define a model to correct the first proxy
- The correction phase is aimed at measuring the amount of ebit (value added where salaries are fixed) which has to be imputed to TA MNEs in order to make their ebit coherent with the selection indicator
- This work suffers from a number of shortcomings, which are mainly related to the availability of data. In particular:
 - Information about foreign enterprises is completely missing (or very costly, e.g. bureau Van Dijk)
 - Some relevant variables about financial statement (debt, immaterial assets) are missing for branches or un-incorporated enterprises
- Data availability should be the main point in the international agenda if profit shifting has to be measured with bottom-up methods

Thank you.
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