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Money laundering through the strategic management of accounting transactions

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ABSTRACT

We develop new transaction management (TRM) proxies, to find empirical evidence of the strategic management of accounting transactions, aiming to carry out money laundering activities, within a sample of 355 firms controlled by Italian Mafias.

Our results reveal that, using a cluster analysis, Mafia-controlled firms can be classified into two different groups corresponding to real firms and shell firms, based on specific assumptions on their distinctive peculiarities. Importantly, our regression estimations provide evidence of different TRM practices of these firms, which may be linked to specific money laundering activities. Finally, the seizure of Mafia-controlled firms and their assignment to legal administrators only have a significant impact on TRM within Mafia-controlled shell firms, whereas the null impact on TRM, within Mafia-controlled real firms, casts doubt on the ability of legal administrators to completely deter money laundering.

This study proposes new TRM proxies, based on the nature of the expenditure transaction, which could be used by authorities as accounting red flags of money laundering activities. Furthermore, this study may support critical arguments against the orthodox view of the anti-money laundering role of accounting and the suitability of traditional TRM proxies to depict practices within firms sharing common traits with Mafia-controlled firms. Indeed, these firms may engage in TRM for illicit and/or opportunistic purposes, when the external scrutiny is weak, their financial statements are irrelevant for trading with stakeholders, because of competitive advantages or dominant market positions, and they can count on colluded actors as counterparties of money laundering transactions.

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Abbreviations: TRM, transaction management; MCFs, Mafia-controlled firms; MCRFs, Mafia-controlled real firms; MCSFs, Mafia-controlled shell firms; NMCFS, non-Mafia-controlled firms; CFO, cash flow from operations; VAT, value-added tax; ANBSC, National Agency for the Management and Assignment of Seized and Confiscated Assets.

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1. Introduction

This paper intends to determine whether the strategic management of accounting transactions, aiming to carry out money laundering activities within firms in specific contexts, leave some detectable traces in the financial accounting information, which can act as red flags of illicit practices. In this regard, [Neu, Everett, Rahaman, and Martinez \(2013\)](#) argue that it is the strategic use of accounting transactions that simultaneously supports the realization of criminal business activities and consolidates criminal networks among public servants, businessmen, and politicians. More specifically, we examine transaction management (TRM) within a sample of 355 firms, defined as Mafia-controlled firms (MCFs), given that they are controlled, directly or indirectly (through figureheads and strawmen), by a Mafia clan affiliated with an Italian Mafia organization such as: Cosa Nostra, 'Ndrangheta, Camorra, or Sacra Corona Unita ([Champeyrache, 2014](#)). In this regard, the firms in our sample are defined as MCFs because they have been seized by judicial authorities, following the accusation of Mafia-type association against their owners, based on the article 416-bis of the Italian criminal law. Importantly, this article prescribes the seizure and confiscation of all the assets, including firms and company shares, of the charged person, which consist of the proceeds of the crime or their investment. Seized MCFs are managed by legal administrators appointed by judicial authorities with the purpose of continuing the business activities and keeping the level of employment in full respect of the law. Therefore, this study analyses MCFs not only before the intervention of judicial authorities, when Mafiosi owners hold full control, but also after their seizure and assignment to legal administrators. Indeed, an additional purpose of this paper is to determine whether there is a significant change in TRM practices of MCFs following their seizure.

Despite the difficulties in producing accurate estimates, recent studies ([Calderoni, 2014b](#); [Savona & Riccardi, 2015](#)) reveal that the annual illegal proceeds of Mafia organizations in Italy amount to approximately 10.7 billion Euros. In addition, about 9% of the total investment of Mafia organizations in the legal economy between 2007 and 2013 consists of firms ([Transcrime, 2013](#)). These figures provide evidence of the significant presence of MCFs in Italy. However, prior research suggests that Italian Mafias also operate in other European countries such as Spain, Germany and Netherlands ([Forgione, 2009](#); [Roth, 2010](#); [Transcrime, 2013](#)). Furthermore, money laundering transactions involving firms are widespread in Europe ([Eurostat., 2013](#)) and in most of the other world countries, as evidenced by the Panama Papers ([ICIJ, 2016](#)).

With the purpose of distinguishing Mafia-controlled real firms (MCRFs), that engage in real business activities as well as serving as a cover for criminal transactions, from Mafia-controlled shell firms (MCSFs), that only act as a vehicle for money laundering without having significant assets or operations, we carry out a cluster analysis on the pre-seizure MCFs sample, by using clustering variables that may clearly identify the two groups, based on specific assumptions. The two resulting clusters differ, consistently with our predictions, and are assumed to correspond to MCRFs and MCSFs, respectively. Subsequently, our results, based on TRM proxies, provide evidence of the different TRM practices of these firms, which may be linked to specific money laundering activities. Finally, the seizure of MCFs and the consequent intervention of legal administrators only have a significant impact on the TRM practices of MCSFs, whereas the insignificant change in the TRM proxies for MCRFs casts doubt on the ability of legal administrators to completely deter money laundering.

TRM can be situated within the academic literature on earnings management through real activities manipulation. In this regard, prior research examines earnings management within firms engaging in financial statement fraud and other socially irresponsible practices ([Chaney, Faccio, & Parsley, 2011](#); [Gargouri, Shabou, & Francoeur, 2010](#); [Jones, Krishnan, & Melendrez, 2008](#); [Perols & Lougee, 2011](#)), which may reflect some aspects of MCFs. In particular, [Ravenda, Argilés-Bosch, and Valencia-Silva \(2015\)](#) develop a logistic regression model to classify MCFs from non-Mafia-controlled firms (NMCFs) using several financial variables. However, unlike our study, in [Ravenda et al.'s \(2015\)](#) paper empirical findings are not ascribed to definite money laundering strategies and do not specifically address TRM practices (no specific hypotheses are developed). Furthermore, the results do not consider the heterogeneity within MCFs, based on the distinction between real firms and shell firms, and they may be driven by uncontrolled factors. Finally, the effect of the seizure is not analysed, the MCFs sample is significantly smaller (198 firms), and the earnings management models are those used in previous studies, which raise concerns about their low explanatory power and consequent ability to detect fraudulent practices ([Dechow, Ge, & Schrand, 2010](#); [Jones et al., 2008](#)). Moreover, in a subsequent study, [Ravenda, Valencia-Silva, Argilés-Bosch, and Garcia-Blandon \(2018\)](#) show how MCFs manipulate specific accruals to disguise illicit practices and smooth earnings, without considering external transactions and without separating shell firms from real firms. In addition, accruals may only provide mechanical and indirect accounting signals of money laundering through year-end adjustments, whereas our examined transactions, involving cash and/or resources transfers, may be the tool to practically launder dirty money. Finally, other studies ([Bivona, 2012](#); [Fabrizi, Malaspina, & Parbonetti, 2017](#); [Transcrime, 2013](#)) carry out descriptive analyses of samples or cases of seized MCFs, including sometimes financial data, attempting to build a taxonomy and examining management issues after their seizure. Also in this case, they do not empirically address TRM aimed at money laundering.

Hence, to the best of our knowledge, our paper is the first which provides empirical evidence about the strategic management of accounting transactions as a means of carrying out specific money laundering activities within MCFs. Importantly, the results of this paper may be applied to any criminal organization which engages in money laundering by strategically managing accounting transactions. Indeed, previous research shows the analogies among accounting strategies put in place by distinct criminal organizations to establish criminal networks and achieve their illicit purposes ([Neu, Everett, & Rahaman, 2015](#); [Sargiacomo, Ianni, D'Andreamatteo, & Servalli, 2015](#)). Specifically, this study shows that, unlike listed companies, unlisted MCFs may have incentives to strategically manage accounting transactions for illicit or opportunistic

purposes, when their financial statements are irrelevant for trading with stakeholders, because of specific competitive advantages or dominant market positions. Furthermore, our paper develops alternative TRM proxies which, by informing on the nature of the managed expenditure transactions, provide further insights to the conclusions arising from the proxies adopted in prior studies. Specifically, our study may help practitioners and regulators to identify accounting red flags, which could enhance the performance of risk assessment models aiming to uncover money laundering-related activities within firms. Finally, the outcomes of our research may question the orthodox view on the anti-money laundering role of accounting and support a more radical perspective asserting that, to be effective in the global fight against corruption and money laundering, accounting should promote more transparency and accountability towards the victims of criminal practices and the society in general (Everett, Neu, & Rahaman, 2007).

The remainder of the paper proceeds as follows: the next section describes the context of MCFs; the third section defines the theoretical framework and develops the hypotheses; the fourth section describes the methodology; the fifth section presents the results and their discussion; the final section includes concluding remarks.

2. The context of Mafia-controlled firms

Previous studies (Fantò, 1999; Gambetta & Sugden, 1995) suggest that MCFs differ from lawful NMCFs in three basic aspects: the owners are directly or indirectly related to a Mafia organization; funding may mainly arise from illegal activities; criminal methods are often used to support business activities. Therefore, legal and illegal activities are closely interconnected within MCFs, since the former mostly serve to launder proceeds stemming from the latter (Fantò, 1999). However, Mafia organizations infiltrate the legal economy by taking over legitimate businesses not only to enhance and launder their illegally earned profits, but also to consolidate their power and gain social consensus by generating job opportunities for the local population (Fantò, 1999; Riccardi, 2014). Fantò (1999) asserts that the usage of criminal methods (e.g. intimidation and corruption), embedded in the *modus operandi* of MCFs while carrying out business, allows MCFs to benefit from competitive advantages over NMCFs. In particular, MCFs discourage competitors by gaining business opportunities (e.g. awards of public contracts) and achieving better contractual conditions with business counterparties (e.g. suppliers, employees, customers) through the employment of illegal means (Arlacchi, 2010).

A full comprehension of the features of MCFs cannot disregard the socio-economic and political context in which they operate. In this regard, a model defined as fraud triangle may theoretically explain the influence of the context on the MCFs *modus operandi*. Based on this model, the illegality within an organization is determined by the simultaneous presence and interaction of incentive or pressure to carry out the illicit practice, opportunity to commit the fraud (e.g. internal controls are weak or non-existent), and personal attitude fostering the rationalization or self-justification of the fraud (Cohen & Zarowin, 2010; Morales, Gendron, & Guénin-Paracini, 2014). All these elements could be identified within the context of MCFs. Indeed, the aforementioned incentives of Mafiosi owners to infiltrate the legal economy through MCFs are supported by the protection opportunity granted by the Mafia organization and its networks. Furthermore, employees may be pressured to rationalize and self-justify illegal behaviors (Cohen, Ding, Lesage, & Stolowy, 2010), in order to safeguard their job in a depressed economic environment with high unemployment such as that of Southern Italy.

In this respect, Mafiosi owners hold an economic power arising from the control of scarce resources which fosters illicit activities within MCFs (Lukes, 2005; Palmer, 2012). In this line, Champeyrache (2014) theoretically explains the *modus operandi* of MCFs by referring to the artificial scarcity construct. More specifically, Mafiosi owners through MCFs employ criminal methods to control and restrict to non-Mafiosi entrepreneurs the access to economic resources in their territories. This practice decreases the resource supply relative to their demand, makes resources artificially scarce and allows MCFs to gain a monopolistic power, which enhances their social status, mystification, and legitimacy. Indeed, these restrictions on access to resources create an incentive for non-Mafiosi individuals to abide mafia rules, in order to gain access to resources and be included in the upper strata (Champeyrache, 2014). In particular, MCFs monopolize strategic sectors (e.g. raw materials and public contracts) and artificially inflate prices of the controlled resources by creating entry barriers for the non-Mafiosi entrepreneurs that are then prevented from freely developing new business activities (Arlacchi, 2010). This monopolistic scenario dominated by MCFs is confirmed by previous research showing that sectors more extensively infiltrated by Mafia organizations present the characteristics of: high labour and cash intensiveness, low technology, prevalence of small and medium-sized businesses competing on local markets (e.g. construction), weak foreign competition, and strong public regulation allowing Mafia organizations to exert influence on public officials and politicians and gain preferential treatment in obtaining public resources (Riccardi, 2014; Sciarrone & Storti, 2014).

On the other hand, the institutional context also supports the development of MCFs and their illicit *modus operandi* with a relatively low risk of detection. Indeed, as well as pursuing the profit, Mafia organizations seek political control of the territories where they operate (Mattina, 2011). In particular, they infiltrate the state and local authorities by influencing electoral results and interfering in the market for votes (Buonanno, Prarolo, & Vanin, 2016). Hence, Mafia activities find fertile ground in contexts characterized by weak public governance and enforcement of regulations aiming to protect property rights and public resources from misappropriation (Della Porta & Vannucci, 2011; Gambetta & Sugden, 1995; Venkatesh, 1997). Furthermore, public institutions and regulators, deeply infiltrated by Mafia organizations and contaminated with illegality, may lack the “arm’s length” social distance which is needed for an effective and independent scrutiny and assessment (Gabbioneta, Greenwood, Mazzola, & Minoja, 2013). In this regard, prior research finds that in certain situations government

auditors or inspectors, subjugated to political powers, may refrain from reporting on illicit practices involving politicians of their circle (Neu et al., 2015; Radcliffe, 2008).

Finally, based on some institutional theories, regulators tend to relax their scrutiny on firms which gain legitimacy of ethical and socially responsible organizations by explicitly meeting social expectations and providing benefits to the society, even if they do so only symbolically (Bromley & Powell, 2012; Gabbioneta et al., 2013). Specifically, MCFs enhance their social acceptance by offering job opportunities, which represent scarce sources of income in the weak Southern Italian economy (Calderoni, 2014a; Gambetta & Reuter, 1995). Therefore, authorities may refrain from effective intervention, strict enforcement of rules, and thorough investigation of alleged illegal activities related to MCFs, because of the social support from a part of local inhabitants which may grant MCFs a kind of protection or immunity.

3. Theoretical Framework, related research and hypothesis development

3.1. Transaction management in prior research

Previous research finds that, in order to achieve their objectives, managers adopt different techniques to opportunistically manage reported earnings, including both the execution of specific transactions (D. A. Cohen, Dey, & Lys, 2008; Roychowdhury, 2006; Zang, 2012), which commonly affect expenses and CFO, and the manipulation of accruals, which does not impact CFO. In this paper, we mainly focus on TRM proxies that we expect to exhibit significant differences for MCFs, as an evidence of fraudulent and opportunistic practices. Previous studies define TRM in the context of real activities manipulation as actions that change the timing or structuring of an operation, investment, and/or financing transaction, without a sound economic justification, in order to influence the output of the accounting system (Cohen & Zarowin, 2010; Roychowdhury, 2006). Specifically, prior research documents that managers of listed companies provide price discounts or more lenient credit terms to temporarily boost sales. Furthermore, they overproduce to lower the cost of goods sold, and reduce discretionary expenditures such as selling, general and administrative (SG&A) and R&D, in order to improve reported margins (D. A. Cohen & Zarowin, 2010; Roychowdhury, 2006; Zang, 2012). Hence, sales manipulation and overproduction cause abnormally high production costs relative to sales, and reduction of discretionary expenditures causes abnormally low discretionary expenditures relative to sales. As Roychowdhury (2006) suggests, the effect of these manipulation methods on CFO is multidirectional and consequently ambiguous.

It should be noted that we use the term TRM, rather than earnings management through real activities manipulation, for several reasons. First, it is more difficult for MCFs to infer the direction of the related impact on earnings. Indeed, due to their supposed illicit purposes, we assume for MCFs a higher probability of fraudulent manipulations, which may be reflected in abnormal and inconsistent cost patterns. Second, the reference to “real activities” may be misleading for MCFs, as abnormal costs may be due to fictitious transactions. Finally, we mostly examine costs rather than revenues, given that abnormal costs are estimated relative to revenues. It is noteworthy that we talk about costs rather than expenses, given that we focus on the resource acquisition transactions in the current year, irrespective of whether they are expensed or inventoried.

We expect MCFs to manage transactions differently and for different purposes from listed firms mostly considered in previous studies on TRM. Therefore, TRM proxies used in previous research (D. A. Cohen & Zarowin, 2010; Duellman, Ahmed, & Abdel-Meguid, 2013; Roychowdhury, 2006; Zang, 2012) such as abnormal CFO, abnormal production costs and abnormal discretionary expenses may not be able to accurately portrait the TRM patterns within MCFs or at least their outcomes should lead to different conclusions. In particular, we do not expect MCFs to resort to overproduction as a tool to increase earnings as assumed by Roychowdhury (2006). Indeed, overproduction may have undesirable effects for MCFs such as: increasing reported earnings and taxable income and reducing current CFO. Furthermore, MCFs benefit from competitive advantages granted by criminal methods and may not need to provide price discounts to temporarily boost sales. Finally, because of the particularities of MCFs and the sectors in which they mostly operate, we expect discretionary expenses related to R&D and SG&A to represent a relative small percentage of total reported operating expenses. Hence, in our study we classify costs by nature rather than by function, in accordance with the legal structure of the income statement in Italy, and we adopt as proxies for TRM: abnormal personnel costs, abnormal material costs including both raw materials and merchandise, abnormal service costs as well as the previously used abnormal CFO.

3.2. Hypotheses on transaction management within MCFs

Prior studies suggest that TRM within listed companies is mainly carried out to inflate earnings rather than underreporting them (Cohen & Zarowin, 2010; Cohen et al., 2008; Roychowdhury, 2006). Conversely, we analyse unlisted firms whose TRM purposes may not be consistent with those of listed firms. Specifically, prior research finds tax avoidance to be a main motivation for earnings management in unlisted firms, particularly in countries with strong tax alignment, such as Italy (Coppens & Peek, 2005; Gavana, Guggiola, & Marenzi, 2013; Marques, Rodrigues, & Craig, 2011). However, Coppens and Peek (2005) find that unlisted firms, whose outcome of negotiations with stakeholders greatly depends on the quality of their accounting information, are less likely to downward manage earnings for tax avoidance. Indeed, this practice may result in negative consequences at the firm level such as unfavorable terms of trades with stakeholders, larger costs of debt/equity, higher probability of lawsuits and being investigated by tax authorities (Coppens & Peek, 2005; Ibrahim &

Xu, 2011). Nonetheless, unlike unlisted NMFs, the availability of black money deriving from illicit practices attenuates or eliminates the MCFs need for bank funding and the associated incentive to show positive financial results as well as an acceptable earnings quality. Furthermore, favorable trades with the other stakeholders (e.g. suppliers, customers, employees, etc.) are guaranteed by the adoption of criminal methods granting competitive advantages and dominant market positions (Arlacchi, 2010; Champeyrache, 2014). Finally, the Mafia infiltrated in the political institutions may provide protection against investigations and inspections of tax authorities (Buonanno et al., 2016; Gambetta & Sugden, 1995). In this regard, previous research finds that a lower monitoring intensity also due to political connections is associated with more intensive earnings management (Chaney et al., 2011; Duellman et al., 2013). Therefore, MCFs may avoid the trade-offs in financial and tax reporting decisions which are typical of unlisted firms.

These reduced constraints to downward manage earnings through transactions for income tax avoidance purposes may lead MCFs to downward manipulate revenues or upward manipulate material costs (e.g. through forged invoices). In both cases, these practices may result in abnormally high material costs with respect to sales, as measured by the related TRM proxy we adopt in this paper. Importantly, higher material costs relative to sales can also allow MCFs to fraudulently increase the input value-added tax (VAT) credit on their purchases relative to the output VAT debit on their sales. This may finally result in a VAT refund claim of the taxpayer to tax authorities, whether credits exceed debits (Hybka, 2014; Keen & Smith, 2006). These tax benefits achievable through TRM may further enhance the competitive advantages of MCFs, which may be able to reduce selling prices or bid for public sector contracts with lower prices than competitors (Caneppele, Calderoni, & Martocchia, 2009; Martocchia, Tenti, & Calderoni, 2014; Sargiacomo et al., 2015; Savona, 2015). Hence, these lower selling prices may further boost abnormal material costs relative to sales.

It is noteworthy that tax avoidance is strictly related to money laundering, a *raison d'être* for MCFs. Indeed, on the one hand, proceeds from tax evasion should definitely be laundered in a later stage and, on the other hand, money laundering is an opportunity for tax avoidance (Mihu, 2012; Subashi, 2013; Zdanowicz, 2009). More specifically, money laundering is the process of transforming the proceeds of crime (e.g. “dirty money”) into apparently legitimate assets through a series of transactions, aiming to disguise the illegal source of proceeds, and bring them back into the legal circuit of the economy (Irwin, Choo, & Liu, 2012; Schneider & Windischbauer, 2008; Walker & Unger, 2009). This definition is also consistent with that of European Union law.¹ Money laundering is needed given that most of all illegal transactions are carried out by cash that needs to be turned into usable assets (Chong & Lopez-De-Silanes, 2015; Schneider & Windischbauer, 2008). Methods of money laundering have become increasingly complex and ingenious. However, three basic phases are traditionally identified: placement, layering and integration (He, 2010; Irwin et al., 2012). Placement is the first stage process of introducing the cash generated from crime into the financial system or the retail economy, by avoiding regulatory controls. Layering is the second stage process of distancing the funds from their illegal source and ownership through a complex web of financial transactions. Integration is the last stage process consisting in converting the illegal funds into apparently legitimate business earnings. Some of these steps may be omitted, depending on the circumstances (Levi & Van Duyn, 2005).

MCFs may be involved in all the aforementioned money laundering stages. For example, the creation or acquisition of a business by the Mafia, using proceeds coming from illicit activities, can be categorized within the integration stage. On the other hand, Martocchia et al. (2014) describe various cases of MCFs involved in public procurement which engage in the so-called trade-based money laundering (Ferwerda et al., 2013; Zdanowicz, 2009). Previous studies situate this form of money laundering among the most used layering technique (He, 2010; Irwin et al., 2012). In this regard, in its definition of trade-based money laundering, The Financial Action Task Force. (2006) highlights the use of trade transactions, in order to disguise and legitimize the proceeds of criminal activities. This is practically carried out through forged invoices related to fictitious trade transactions or whose price, quantity or quality of goods and services are misreported (Rezaee, 2005). It is noteworthy that trade-based money laundering is closely connected to the aforementioned tax avoidance practices, given that the manipulation of trade transactions directly affects income tax and VAT. In particular, previous studies document that MCFs first win public sector contracts by employing criminal methods such as corruption and influence-peddling (Caneppele et al., 2009; Grossi & Pianezzi, 2016; Savona, 2010). In a second stage, MCFs record fake or inflated invoices for materials not actually employed or not satisfying the required quality standards, in order to transfer cash to colluded shell or front companies² which ultimately kick the money back to the Mafia members and/or corrupt politicians and public officials (Martocchia et al., 2014). Sometimes these fake invoices are recorded in parallel to undeclared purchases of materials, carried out by MCFs at lower prices using black money, which is in this way laundered (Caneppele et al., 2009; Riccardi, 2014). Further research on corruption in public procurement (Della Porta & Vannucci, 2007; Grossi & Pianezzi, 2016; Neu et al., 2015; Piga, 2011), whose control represents a relevant business for the Mafia (Savona, 2015), documents the successful bidder's practice of inflating costs, as a way of increasing the ultimate public contract price according to the contract terms. Importantly, all these fraudulent schemes are likely to result in higher abnormal material costs, which also entail the aforementioned benefits in terms of income tax and VAT.

Another money laundering scheme is based on the usage of cash intensive businesses to introduce illicit cash into the banking system (placement) (Gilmour & Ridley, 2015). Specifically, in this scheme a business, typically expected to carry out most of its sales through anonymous cash transactions (e.g. restaurants, hotels, retail stores, convenience stores, etc.),

¹ Article 1 of Directive 2005/60/EC of the European Parliament and of the Council of 26 October 2005 on the prevention of the use of the financial system for the purpose of money laundering and terrorist financing.

² The difference between shell company and front company is that the former is fictitious because it has no real operating activities, whereas the latter has real businesses as well as serving as a cover for the criminal transactions (He, 2010).

falsifies its customer receipts and invoices to disguise illicit cash as legitimately derived from sales and subsequently deposit it into the banking system alongside legitimate cash. In this regard, [Gilmour and Ridley \(2015\)](#) show that cash-intensive businesses in UK are extremely vulnerable to money laundering, despite the large-scale anti-money laundering efforts focused on combating money laundering across a broad range of sectors. Previous studies document the preference of MCFs for cash-intensive sectors that are particularly suitable for the placement stage of money laundering ([Riccardi, 2014](#); [Savona, 2015](#)). In particular, this money laundering technique is more likely to be successfully carried out by long-established MCFs which have succeeded in building trusty and stable relationships with banks as well as gaining a social legitimacy ([Gilmour & Ridley, 2015](#); [Levi & Reuter, 2006](#)). We can expect fictitious sales supported by fake receipts to be accompanied and disguised by fictitious purchases supported by fake supplier invoices, as a layering strategy following the placement of dirty money into the banking system. Importantly, money laundering through cash intensive businesses is also likely to result in higher abnormal material costs related to sales, which may allow avoiding income tax and VAT as well as transferring out black money and reducing the risk of its seizure which may conclude investigations of judicial authorities.

It is noteworthy that all the money laundering scenarios described above mostly assume MCFs that engage in real business activities (Mafia-controlled real firms (MCRFs)) and take advantage of these activities to launder dirty money and increase profits. Overall, the previous considerations can consistently lead us to the following first hypothesis:

Hypothesis 1. *Pre-seizure MCRFs exhibit abnormally high material costs.*

Another money laundering technique, included in the placement stage and commonly adopted by MCRFs, according to previous studies ([Caneppele et al., 2009](#); [Martocchia et al., 2014](#)), consists in paying undeclared black salaries to employees using dirty money. Indeed, as well as representing a way to launder money, the employment of undeclared work allows to evade the labour tax, consisting of social security contributions, computed on gross salaries of all employees, that the employing firms are legally required to withhold and pay to the social security system ([Arezzo, 2014](#)). Furthermore, undeclared work permits to circumvent various labour market regulations (e.g. maximum working hours, work permit, minimum wages, safety regulations, trade union rights, etc.), commonly established to protect the employees against exploitation, and specific administrative obligations ([Feld & Schneider, 2010](#)). In this regard, [Arlacchi \(2010\)](#) identifies the “labour cost compression” deriving from the aforementioned illicit labour practices as a competitive advantage of MCRFs over NMCs. Therefore, we may expect abnormally low personnel costs within MCRFs which can also offset abnormally high material costs, predicted by hypothesis 1, avoiding excessively implausibly low margins which may arouse authorities’ suspicions ([Keen & Smith, 2006](#)). On the other hand, some of the employees may be fictitious, whereas in reality they may be members of the Mafia organizations masking and laundering, in the form of salaries, proceeds arising from illicit activities, without being actually involved in the business operations ([Transcrime, 2013](#)). In this scenario, MCRFs may exhibit an abnormally high number of employees and consequently abnormally high personnel costs, relative to NMCs. Furthermore, as abnormal personnel costs are measured relative to sales, underreporting of sales or the MCRFs practice of bidding for public sector contracts abnormally low prices, that are not economically viable for the other competitors not counting on the financial resources and criminal competitive advantages of MCRFs, may also result in abnormally high personnel costs ([Caneppele et al., 2009](#); [Martocchia et al., 2014](#); [Sargiacomo et al., 2015](#); [Savona, 2015](#)). In this regard, previous studies document the MCRFs stratagem of compensating the initial abnormally low price of awarded public contracts with subsequent contract variations during their execution, which imply extra costs and the initial budget overrun for the contracting public authority ([Grossi & Pianezzi, 2016](#); [Martocchia et al., 2014](#)). Furthermore, MCRFs involved in public contracts, whose presence may be relevant in our sample, should show the fulfilment of all the labour regulations, including the payment of social contributions, to be able to compete in a public tender, according to the Italian public contract law (Legislative Decree No 163/2006). This closer scrutiny from public authorities may discourage MCRFs bidding for public contracts from engaging in illegal practices aiming to compress labour costs.

Because of the previous conflicting arguments, we address this issue empirically and we formulate the following second null hypothesis, without any directional prediction:

Hypothesis 2. *Pre-seizure MCRFs do not exhibit abnormal personnel costs relative to NMCs.*

Services costs may also be manipulated similarly to material costs and for the same reasons. Furthermore, previous studies find that expense decreasing TRM, as a departure from optimal operational decisions, is negatively associated with firms’ future performance ([Cohen & Zarowin, 2010](#); [Roychowdhury, 2006](#); [Zhao, Chen, Zhang, & Davis, 2012](#)). Therefore, some managers may avoid engaging in expense decreasing TRM, which may negatively affect future profitability of their firms, especially in contexts of strong competition ([Zang, 2012](#)). Nonetheless, MCRFs may be more reluctant to hire external services (e.g. consultancy, marketing, maintenance, security, etc.) than NMCs, due to their competitive advantages and market power, granted by the illegality ([Arlacchi, 2010](#); [Fantò, 1999](#)), which may outweigh the costs of suboptimal operational decisions arising from TRM. Furthermore, according to the Italian GAAP³ applicable to all Italian unlisted companies, service costs

³ Italian GAAP are regulated in the Italian Civil Code (articles 2423–2429), in accordance with 2013/34/UE Directive, and in the set of pronouncements issued by the OIC (Italian Accounting Standard Setter).

reported in the income statement should include some additional employee benefits (e.g. training, canteen, ticket restaurants, travel allowances, etc.), whose low relevance for MCRFs can be assumed based on the aforementioned labour cost compression practices (Arlacchi, 2010). Therefore, service costs may appear abnormally lower relative to NMCFs. Furthermore, the availability of financial resources coming from illicit activities, which may need to be quickly invested and laundered, may encourage buying long-lived assets rather than renting them. Finally, MCRFs may avoid upward managing service costs, given that their abnormally high value may arouse more suspicion and be more difficult to justify than that of material costs, because of the immateriality of services and their less direct relation to manufacturing or merchandising activities. However, the underreporting of revenues discussed in the development of hypothesis 2 may lead to opposite or null results. Hence, we formulate our third hypothesis in the null version:

Hypothesis 3. Pre-seizure MCRFs do not exhibit abnormal service costs relative to NMCFs.

The cumulative effect of these expenditure manipulations on reported CFO and earnings may be multidirectional and ambiguous. For example, we could suppose that abnormally high material costs are completely or partially offset by abnormally low personnel or service costs. Therefore, we formulate the following null hypothesis by addressing this issue empirically:

Hypothesis 4. Pre-seizure MCRFs do not exhibit abnormal CFO relative to NMCFs.

However, some MCFs may simply be shell firms (Mafia-controlled shell firms (MCSFs)), with insignificant or no real business operations or assets, whose unique logical purpose consists in serving as technical vehicles to commit frauds, such as money laundering through fictitious transactions and false invoices (Jancsics, 2016; Singh, 2010). In most cases, shell firms are used to facilitate the allocation of local-government resources into private hands (Jancsics, 2016; Sargiacomo et al., 2015; Savona, 2010). It is noteworthy that MCSFs may also have some minimum activities and some employees to provide the illusion of a legitimate business (Jancsics, 2016; Vona, 2017). Importantly, it is the lack of accurate information on their ownership structure that allows the hidden real owners to perpetrate their illicit activities by maintaining their anonymity and control over the shell firms through figureheads or straw men (Jancsics, 2016; Ruehsen & Spector, 2015).

Previous studies find that specific attributes are commonly associated with shell companies (Singh, 2010). More specifically, MCSFs may report abnormally high revenues relative to assets. Indeed, fake sale invoices may be issued with the only purpose to place black money or to justify the transfer of cash from other colluded firms, aiming to eliminate the trail of flow of funds, before kicking the money back to the Mafia affiliates and/or corrupt politicians and public officials. At the same time, MCSFs may exhibit abnormally high service costs through fictitious incoming invoices, which can be a vehicle to siphon off and cash in the incoming proceeds. Conversely, material and personnel costs relative to sales may appear abnormally low because of the abnormally high asset turnover, previously envisaged, and the absence of significant real business operations requiring such resources. Specifically, the directors of these firms may be low-paid “dummy directors” with low qualifications appointed merely to fulfil the legal obligation. In addition, MCSFs may exhibit an abnormally fast growth because of the artificial injection of resources. MCSFs may also appear on average more indebted and less capitalized (lower equity) than real firms, given that their investment in assets may mainly be funded through payment receipts from fictitious sales and financing in the form of loans, advance payments for future delivery of goods or services, credit purchases from other colluded firms (Singh, 2010). In this regard, short-term operating liabilities may prevail over long-term financial debts, given that the latter either imply a relationship with a financial institution, that is usually avoided and not needed by MCSFs, or may raise more suspicion, if related to long-term financial transactions with other firms without any guarantee or continuous business relations. Finally, relative to real firms, MCSFs may be smaller (lower total assets) and less capital-intensive, because of the absence of a real business structure (Floros & Sapp, 2011), and they may have a shorter life given that, once achieved their illicit purposes, the Mafiosi owners may decide to immediately liquidate their shell firms to avoid detection from authorities.

Based on the previous considerations on MCSFs and similarly to MCRFs, we formulate the following three additional hypotheses:

Hypothesis 5. Pre-seizure MCSFs exhibit abnormally low material and personnel costs.

Hypothesis 6. Pre-seizure MCSFs exhibit abnormally high service costs.

Hypothesis 7. Pre-seizure MCSFs do not exhibit abnormal CFO relative to NMCFs.

According to ANBSC (2012) statistics, following their seizure, most of the MCRFs experience financial difficulties which often lead them to bankruptcy and subsequent liquidation. The main reasons for the financial failure may lie in the loss of the business opportunities granted by the Mafia methods and networks, the rise in the operating expenses because of the regularization of illicit practices (e.g. undeclared work, tax and social contribution evasion) and the hiring of external

services and consultants to support the legal administrators in turning the business around, and the shortage of funding, given that the illegal sources of liquidity may be discontinued and banks may not be willing to provide the necessary funding, once aware of the judicial seizure (Bivona, 2012). Furthermore, previous studies (Dalla Chiesa, 2017; La Rosa & Paternostro, 2015; Transcrime, 2013) document that the ousted Mafiosi tend to disrupt the work of the legal administrators, by intimidating them and/or by boycotting the seized MCRFs through their networks with both private (e.g. customers, suppliers, banks) and public (public officials, politicians) stakeholders, within the Mafia-controlled territory. Other difficulties for the continuation of the seized MCRFs may come from the dismissal of valuable employees linked to the Mafiosi owners or the voluntary resignation of other qualified employees and, more importantly, from the negative impact on the reputation and credibility of the firms, which may undermine their relationship with customers, suppliers and other stakeholders (Bivona, 2012; La Rosa & Paternostro, 2015). Finally, the lack of collaboration of the employees, loyal to the previous owners, and the possible hostility and distrust towards the seizure process on the part of the social fabric, in which the company operates and the Mafia organization holds the consensus, may further hinder the successful continuation of seized MCRFs (Dalla Chiesa, 2017). It is noteworthy that the main duty of legal administrators, appointed by the judge among experts included in an official national register, consists in re-establishing the legality within seized MCFs, by adopting sound and socially responsible management practices and cutting off transactions with all Mafia-colluded counterparties, as well as guaranteeing the preservation and development of the business. In this regard, legal administrators, after performing a required due diligence on the seized MCFs, may decide to immediately start the liquidation process for MCFs without real business operations and whose unique *raison d'être* lies in money laundering. On the other hand, based on the analysis of 104 assignment decrees of definitively confiscated MCRFs, published on the website of ANBSC, La Rosa and Paternostro (2015) detect an excessively conservative approach of the legal administrators in the management of the seized MCRFs and their inadequate entrepreneurial orientation and preparation (most of the administrators are lawyers rather than experienced business managers), which may negatively affect the chances of survival of these firms in the mid- and long-term. Indeed, the existence of legal bureaucratic constraints that may hinder their decision power, the lack of incentives and the temporary nature of their role, accompanied by uncertainty over the relatively long duration of the judicial procedure, may discourage legal administrators from engaging in a riskier business management that could foster the performance and development of the firms (Bivona, 2012).

In summary, following the seizure, the fertile context for fraud may be reversed, money laundering transactions may be discontinued, and practices of seized MCFs may become more aligned to those of NMCFs. Therefore, the final hypothesis of our study is:

Hypothesis 8. *The seizure of MCFs has a significant impact on their TRM practices.*

4. Methodology

4.1. Estimation models of transaction management proxies

In order to calculate our TRM proxies we first estimate, cross-sectionally for each industry-year, normal material costs (including both raw materials and merchandise), normal personnel costs and normal service costs starting from the model adopted by prior studies (Cohen et al., 2008; Roychowdhury, 2006) for normal production costs:

$$\frac{COST_t}{\ln(TA_{t-1})} = \beta_0 + \beta_1 \frac{1}{\ln(TA_{t-1})} + \beta_2 \frac{S_t}{\ln(TA_{t-1})} + \beta_3 \frac{\Delta S_t}{\ln(TA_{t-1})} + \beta_4 \frac{\Delta I_t}{\ln(TA_{t-1})} + \varepsilon_t \quad (1)$$

where in year t (or $t - 1$), $COST_t$ is material costs (MTR) or personnel costs (PRS) or service costs (SRV); $\ln(TA_{t-1})$ is natural logarithm of total assets; S_t is net sales; ΔS_t is change in net sales relative to previous year; ΔI_t is change in inventory relative to previous year. We use for the estimations financial accounting data of 299,053 unlisted firms, which are active and available in AIDA database for the period 2007–2016. The abnormal levels of material costs ($AbMTR$), personnel costs ($AbPRS$) and service costs ($AbSRV$) are measured as the estimated residuals from the Eq. (1). It is noteworthy that, compared to Roychowdhury's (2006) model, we add change in inventory in our Eq. (1) model, to consider other inventory adjustments, unrelated to changes in net sales (e.g. overproduction), which may affect the cost of transactions. Indeed, we aim to exclude these inventory adjustments from the possible causes of the residual abnormal costs. Moreover, we assume for simplicity that firms do not deviate from the target inventory as defined by Dechow et al. (2010). Hence, unlike Roychowdhury's (2006) model, we remove the coefficient ΔS_{t-1} , without significantly affecting the explanatory power (adjusted R^2) of the estimations. Finally, we deflate all variables by natural logarithm of lagged total assets, rather than by simply lagged total assets like previous studies (Cohen et al., 2008; Roychowdhury, 2006), to address the nonlinearity of the model.⁴

Finally, following Roychowdhury (2006), we compute abnormal CFO ($AbCFO$) as the residuals from Eq. (2), whose parameters are estimated in the same way as for Eq. (1):

⁴ An untabulated analysis of residuals indicates that deflating by natural logarithm of lagged total assets effectively addresses the nonlinearity and significantly improves the explanatory power of the model.

$$\frac{CFO_t}{\ln(TA_{t-1})} = \beta_0 + \beta_1 \frac{1}{\ln(TA_{t-1})} + \beta_2 \frac{S_t}{\ln(TA_{t-1})} + \beta_3 \frac{\Delta S_t}{\ln(TA_{t-1})} + \varepsilon_t \quad (2)$$

As CFO is not explicitly reported in the financial statements of Italian unlisted firms, it is indirectly derived as:

$$CFO = \text{Earnings before tax} - \text{Total accruals} \quad (3)$$

Following Dechow et al. (2010), total accruals (ACCR), are computed as:

$$ACCR_t = \Delta CA_t - \Delta CL_t - \Delta CASH_t + \Delta STD_t - DEP_t \quad (4)$$

where ΔCA is change in current assets; ΔCL is change in current liabilities; $\Delta CASH$ is change in cash and cash equivalents; ΔSTD is change in debt included in current liabilities; DEP is depreciation and amortization expenses.

4.2. Independent variables and difference in differences regression model

In order to test our hypotheses, we employ the independent dichotomous variables: *MafiaRF*, which takes value of 1 for MCRFs and 0 otherwise; *MafiaSF*, which takes value of 1 for MCSFs and 0 otherwise; *MafiaRF_CONF*,⁵ which takes value of 1 for MCRFs in the post-seizure years and 0 otherwise; *MafiaSF_CONF*,⁶ which takes value of 1 for MCSFs in the post-seizure years and 0 otherwise. Furthermore, we consider other control variables, defined in the Appendix A, which previous studies find to be associated with different earnings management practices (Duellman et al., 2013; Roychowdhury, 2006; Zhao et al., 2012). Importantly, we also include variable *RETA* (revenues divided by total assets, standardized by industry-year), whose abnormally high positive or low negative values may provide evidence of revenue management (Perols & Lougee, 2011), which may be closely intertwined with cost TRM within specific money laundering scenarios.

Because of previous inconsistent evidence and the peculiarities of our sample and TRM proxies we do not make any sign prediction for the control variables. Finally, to contrast our hypotheses, we estimate the following difference in differences regression model for our TRM proxies:

$$\begin{aligned} TRM_PROXY_t = & \beta_0 + \beta_1 MafiaRF_t + \beta_2 MafiaSF_t + \beta_3 MafiaRF_CONF_t + \beta_4 MafiaSF_CONF_t + \beta_5 RETA_t + \beta_6 NI_t \\ & + \beta_7 SIZE_{t-1} + \beta_8 LEVLONG_{t-1} + \beta_9 LEVSHORT_{t-1} + \beta_{10} INVAR_{t-1} + \beta_{11} GROW_t + \beta_{12} ROA_{t-1} + \beta_{13} ETR_t \\ & + \beta_{14} DAC_t + \beta_{15} AGE_t + \beta_{16} LOSS_t + \beta_{17} SUSP_t + \sum \theta_i IND_{it} + \sum \alpha_i YEAR_{it} + \varepsilon_t \end{aligned} \quad (5)$$

Where the variables are defined in the Appendix A.

4.3. Data and sample selection

MCFs sample consists of 355 firms seized from the Italian Mafias. Out of them, 54 definitively confiscated firms are obtained from the National Agency for the Management and Assignment of Seized and Confiscated Assets (ANBSC),⁷ whereas 301 firms seized in first instance are found on the AIDA⁸ database (2 0 1) and on online newspapers⁹ (1 0 0). For the 355 MCFs we extract from AIDA available financial statements for the years prior to the seizure year and the years following the seizure year within the period of 2007–2016. It should be noted that our sample of MCFs is restricted to firms seized within the time frame 2007–2016, given that at the time of the analysis our access to the AIDA database is limited to these last 10 years. Furthermore, because of the particularities of our study, compared to the previous Ravenda et al.'s (2015) paper, our sample also includes the years following the seizure as well as being significantly larger (355 versus 198) and more updated.

In our regression estimations, we include MCF-years (1599), before and after the seizure, and active unlisted NMCF-years (2,436,342) available on AIDA for the period 2007–2016 in the same MCFs industries.¹⁰ We initially rule out the matched sample procedure, which may lead to misanalysis, as suggested by Cram, Karan, and Stuart (2009). However, in our base regres-

⁵ Variable *MafiaRF_CONF* is built by interacting the variable *MafiaRF* with the dichotomous variable *CONF_RF*, which takes value of 1 for MCRFs in the post-seizure years and is excluded from the model because perfectly collinear with the interaction variable *MafiaRF_CONF*.

⁶ Variable *MafiaSF_CONF* is built by interacting the variable *MafiaSF* with the dichotomous variable *CONF_SF*, which takes value of 1 for MCSFs in the post-seizure years and is excluded from the model because perfectly collinear with the interaction variable *MafiaSF_CONF*.

⁷ ANBSC is the Italian public agency responsible for the administration and assignment of assets and businesses definitively confiscated to Mafia organizations.

⁸ AIDA is a database managed by Italian Bureau Van Dijk, which includes financial statements and other relevant details, including the seized status, of 1 million Italian companies with a turnover above € 500,000.

⁹ The online newspapers are: repubblica.it; ilcentro.it; livesicilia.it; strill.it; metropolisweb.it; corrieredelmezzogiorno.corriere.it; lametino.it; larivieraonline.com; cn24tv.it; inquietonotizie.it; ilsole24ore.com; castelvetranoselinunte.it; strettoweb.com; romagnoggi.it; corrierece.it; gds.it; tp24.it; lagazzettadelmezzogiorno.it; h24notizie.com; liberoquotidiano.it; gazzettadelsud.it; ilfattoquotidiano.it; corrieredellacalabria.it; campanianotizie.com; corrieredelveneto.corriere.it; ciavula.it; ildispaccio.it; ilcorrieredellacitta.com; adnkronos.com; urbanpost.it; quotidianodelsud.it; ilcirotano.it; lasiciliaweb.it; meridionews.it.

¹⁰ We performed additional estimations on restricted samples, by only including MCF-years up to 2, 3 or 4 years before and after the seizure and by excluding the seizure year, and we obtained results qualitatively consistent with the main analysis.

Table 1
Industry distribution of MCFs and AIDA unlisted firms for the period 2007–2016.

NACE code	Industry description	AIDA firms		MCFs	
		Freq.	Percent	Freq.	Percent
01	Crop and animal production, hunting and related service activities	5686	1.90	3	0.85
08	Other mining and quarrying	1071	0.36	7	1.97
10	Manufacture of food products	5344	1.79	7	1.97
11	Manufacture of beverages	885	0.30	1	0.28
20	Manufacture of chemicals and chemical products	2211	0.74	1	0.28
23	Manufacture of other non-metallic mineral products	3798	1.27	12	3.38
24	Manufacture of basic metals	1267	0.42	1	0.28
25	Manufacture of fabricated metal products, except machinery and equipment	13,811	4.62	3	0.85
31	Manufacture of furniture	2734	0.91	1	0.28
32	Other manufacturing	2408	0.81	1	0.28
33	Repair and installation of machinery and equipment	2291	0.77	2	0.56
35	Electricity, gas, steam and air conditioning supply	1445	0.48	4	1.13
36	Water collection, treatment and supply	292	0.10	1	0.28
38	Waste collection, treatment and disposal activities; materials recovery	1841	0.62	4	1.13
41	Construction of buildings	34,562	11.56	91	25.63
42	Civil engineering	1949	0.65	32	9.01
43	Specialized construction activities	13,554	4.53	18	5.07
45	Wholesale and retail trade and repair of motor vehicles and motorcycles	8648	2.89	6	1.69
46	Wholesale trade, except of motor vehicles and motorcycles	39,288	13.14	31	8.73
47	Retail trade, except of motor vehicles and motorcycles	21,806	7.29	24	6.76
49	Land transport and transport via pipelines	6297	2.11	22	6.20
50	Water transport	262	0.09	1	0.28
51	Air transport	64	0.02	1	0.28
52	Warehousing and support activities for transportation	4790	1.60	5	1.41
55	Accommodation	6048	2.02	3	0.85
56	Food and beverage service activities	8074	2.70	6	1.69
58	Publishing activities	1645	0.55	1	0.28
62	Computer programming, consultancy and related activities	6406	2.14	1	0.28
63	Information service activities	5485	1.83	4	1.13
64	Financial service activities, except insurance and pension funding	1822	0.61	1	0.28
68	Real estate activities	50,275	16.81	21	5.92
69	Legal and accounting activities	2270	0.76	1	0.28
70	Activities of head offices; management consultancy activities	7596	2.54	5	1.41
71	Architectural and engineering activities; technical testing and analysis	5103	1.71	1	0.28
74	Other professional, scientific and technical activities	3381	1.13	1	0.28
81	Services to buildings and landscape activities	2738	0.92	3	0.85
82	Office administrative, office support and other business support activities	5384	1.80	4	1.13
85	Education	2435	0.81	2	0.56
86	Human health activities	4216	1.41	9	2.54
87	Residential care activities	1227	0.41	3	0.85
88	Social work activities without accommodation	2508	0.84	1	0.28
90	Creative, arts and entertainment activities	1009	0.34	1	0.28
92	Gambling and betting activities	243	0.08	4	1.13
93	Sports activities and amusement and recreation activities	3063	1.02	1	0.28
96	Other personal service activities	1821	0.61	3	0.85
Total		299,053	100.00	355	100.00

Source: AIDA database, 2017.

sion model we control, among others, for year, size, and two-digit industry NACE code¹¹. Furthermore, estimations using propensity score matching are carried out as additional analyses.

Table 1 summarizes the industry distribution of MCFs and AIDA sample of active unlisted firms for the period 2007–2016 in the same MCFs industries.

Pearson Chi-squared test of independence suggests that the percentage distribution of MCFs in the various two-digit NACE codes significantly differs from that of AIDA NMCFs ($\chi^2(44) = 6500$; $p < 0.01$). More precisely, MCFs are particularly more numerous in industries like: Construction of Buildings (25.63% of MCFs versus 11.56% of AIDA NMCFs), Civil Engineering (9.01% versus 0.65%), and Land Transport and Transport via Pipelines (6.20% versus 2.11%). On the other hand, MCFs are proportionally fewer in: Real Estate Activities (5.92% versus 16.81%), Wholesale Trade, Except of Motor Vehicles and Motorcycles (8.73% versus 13.14%), and Manufacture of Fabricated Metal Products, Except Machinery and Equipment (0.85% versus 4.62%). It is noteworthy that, in our sample, Construction (NACE codes 41–43) is the industry with the highest presence of MCFs. This outcome is consistent with the structure of MCFs samples examined in previous studies (Fabrizi et al., 2017;

¹¹ NACE (for the French term: *nomenclature statistique des activités économiques dans la Communauté européenne*) is the industry standard classification system used in the European Union. The current version is revision 2 and was established by Regulation (EC) No 1893/2006.

Ravenda et al., 2015, 2018; Transcrime, 2013). Indeed, Construction is a sector in which Mafia organizations traditionally find significant business opportunities because of the high concentration of public contracts (Caneppele et al., 2009; Savona, 2010). In addition, Construction holds most of the characteristics which facilitate infiltration and money laundering, such as: high labour intensity, high cash intensiveness, low technology and wide use of subcontracting, among others (Riccardi, 2014; Sciarrone & Storti, 2014).

5. Results and discussions

5.1. Estimation of normal costs and CFO

Table 2 reports the regression results of Eqs. (1) and (2) models used to estimate normal values of material costs (including both raw materials and merchandise), personnel costs, service costs, and CFO. The residuals of these estimations represent our TRM proxies. Results are presented following the Fama and MacBeth (1973) procedure. Specifically, the reported coefficients and R^2 are mean values of cross-sectional estimations across 405 industry-years. Hence, the significance levels of the coefficients are calculated using the standard errors of the coefficients across industry-years. In addition, to mitigate the influence of outliers, all variables of Eqs. (1) and (2) are winsorized at the top and bottom 1 percent of their distributions, before executing the estimations.

It is noteworthy that all the estimated regressions are significant at the 0.01 level according to the F tests. Furthermore, the explanatory power of the models are satisfactory compared to the earnings management models adopted in prior studies¹² (Dechow et al., 2010; Roychowdhury, 2006). Indeed, the average adjusted R^2 s across industry-years is 61% for material costs, 64% for personnel costs, 74% for service costs, and 28% for CFO.

5.2. Cluster analysis to separate MCSFs from MCRFs

We lack specific information on the activities carried out by MCFs and cannot directly distinguish MCSFs from MCRFs. Hence, to separate MCSFs from MCRFs, we carry out a cluster analysis on the sample of pre-seizure MCF-years. The specific characteristics of MCRFs and their differences from MCSFs, assumed in the development of the hypotheses on MCSFs, can guide us to select the most appropriate clustering variables which may lead to the clear identification of the two groups. We implement the Ward's (1963) minimum-variance hierarchical clustering method using an agglomerative (bottom-up) approach. At each generation of clusters, samples are merged into larger clusters to minimize the within-cluster sum of squares or to maximize the between-cluster sum of squares. Our results are robust to other well-known basic metrics such as single-linkage, complete-linkage, and average-linkage. Fig. 1 shows the top 10 branches of the Dendrogram for the clustering analysis performed on MCFs sample using TRM proxies (*AbMTR*, *AbPRS*, *AbSRV*) as well as variables *RETA*, *CAPINT*, *GROW*, *ROA*, *LEVLONG*, *LEVSHORT* and *AGE*, defined in the Appendix A, which may be able to distinguish MCSFs from MCRFs, based on our previous assumptions. The cumulative length of the vertical segments of the Dendrogram can be viewed as the distance between two clusters.

According to this representation, two very different clusters emerge. This partition is also confirmed by the Calinski-Harabasz pseudo-F stopping-rule index, whose value (173.65) is maximum for two clusters.

Table 3 presents the variable means and medians for each cluster and the results of *t*-test and Wilcoxon test, performed to compare the variables across the two clusters.

Importantly, the resulting 2 clusters differ significantly by most of the examined variables. Furthermore, based on the results of the statistical tests, we can infer that cluster 1 MCF-years may mostly consist of MCRFs, whereas cluster 2 MCF-years may mostly consist of MCSFs. Indeed, cluster 1 is the largest and represents 83.63% of the pre-seizure MCFs sample, whereas cluster 2 only represents 16.37% of the sample. Regarding TRM proxies, cluster 1 shows, on the one hand, significantly higher abnormal material costs (*AbMTR*) and abnormal personnel costs (*AbPRS*) than cluster 2. On the other hand, abnormal service costs (*AbSRV*) and abnormal revenues to assets (*RETA*) are significantly lower for cluster 1. These differences may be due to the absence or limited presence of real business operations, resources and structure within cluster 2 MCFs, which is typical of the shell firms, whose unique purpose is money laundering through fictitious business transactions. Furthermore, relative to cluster 2 MCFs, cluster 1 MCFs are significantly larger (*SIZE*), older (*AGE*), more long-term indebted (*LEVLONG*), less short-term indebted (*LEVSHORT*), less profitable (*ROA*) and they exhibit significantly lower asset growth (*GROW*), income volatility (ΔNI), and discretionary accrual management (*DAC*). Once again, these differences may be justified by the shell firm nature of cluster 2 MCFs and are consistent with the expected characteristics of MCSFs, discussed in development of the hypotheses on MCSFs (see Section 3.2). Importantly, compared to previous studies which examine firms controlled by Italian organized crime (Bivona, 2012; Fabrizi et al., 2017; La Rosa & Paternostro, 2015; Ravenda et al., 2015, 2018; Transcrime, 2013), this is the first attempt to use a cluster analysis to empirically separate MCSFs from MCRFs.

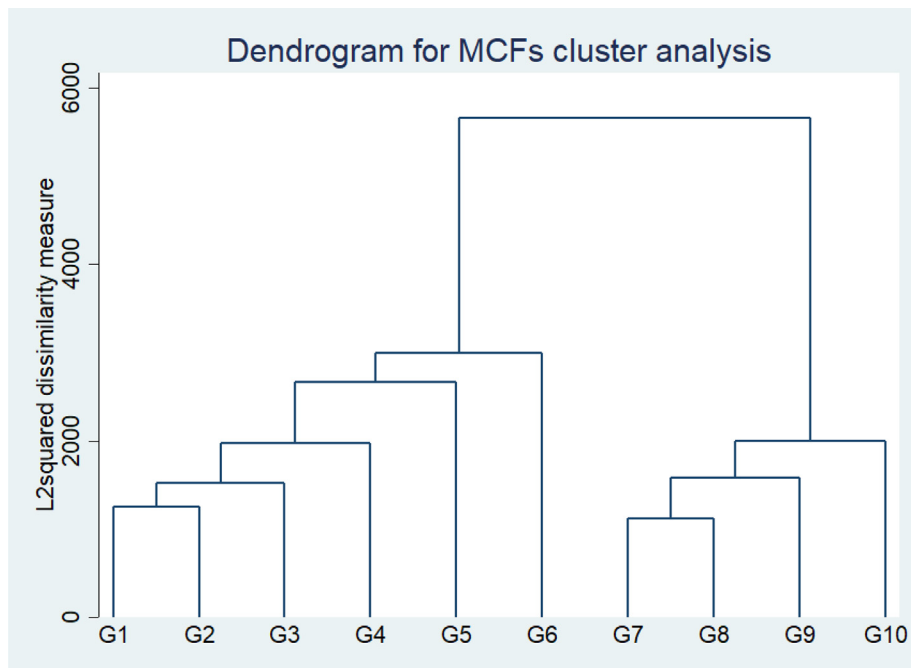
¹² In Roychowdhury's (2006) study the average adjusted R^2 s of earnings management models across industry-years is 45% for CFO, 89% for production costs, 38% for discretionary expenses and 28% for accruals.

Table 2

Regression estimations of normal and abnormal costs and cash flows.

Variables	$MTR_t/\ln(TA_{t-1})$		$PRS_t/\ln(TA_{t-1})$		$SRV_t/\ln(TA_{t-1})$		$CFO_t/\ln(TA_{t-1})$	
	Coef. t-stat	p-val.	Coef. t-stat	p-val.	Coef. t-stat	p-val.	Coef. t-stat	p-val.
$I/\ln(TA_{t-1})$	238.764 9.290	0.000	-442.493 -27.530	0.000	-332.027 -19.520	0.000	-193.940 -14.710	0.000
$S_t/\ln(TA_{t-1})$	0.330 33.580	0.000	0.127 69.730	0.000	0.233 82.150	0.000	0.062 59.800	0.000
$\Delta S_t/\ln(TA_{t-1})$	-0.017 -1.540	0.125	-0.034 -8.440	0.000	-0.007 -1.140	0.254	0.042 11.300	0.000
$\Delta I_t/\ln(TA_{t-1})$	0.565 8.730	0.000	0.102 2.540	0.012	0.186 6.360	0.000		
Intercept	-46.671 -9.360	0.000	92.485 28.370	0.000	70.662 20.520	0.000	35.630 14.730	0.000
Mean obs.	2,436,342		2,436,371		2,436,356		2,436,121	
Mean R ²	0.609		0.639		0.743		0.275	
F	298		1,304		1,692		1,620	

Notes: The p -values are two-tailed. The coefficients and R^2 are the mean values of coefficients and R^2 of cross-sectional estimations across 405 industry-years. The t -statistics in parentheses are calculated using the standard error of the related mean coefficient across industry-years. $\ln(TA)$ is the natural logarithm of total assets; MTR is material costs; PRS is personnel costs; SRV is service costs; CFO is cash flow from operations; S is net sales; ΔS is change in net sales relative to previous year; ΔI is change in inventory relative to previous year.

**Fig. 1.** Top 10 branches of Dendrogram from the Ward clustering method on pre-seizure MCFs sample.

5.3. Descriptive statistics and univariate analysis

Table 4 shows descriptive statistics for the variables included in our regression estimations by comparing pre-seizure MCRF-years both to NMCF-years and to post-seizure MCRF-years. All continuous variables are standardized by industry-year as well as being winsorized at the top and bottom 1 percent of their distributions to avoid the influence of outliers.

As regards the dependent variables, the means of $AbMTR$ and $AbPRS$ are positive and significantly ($p < 0.01$) higher for pre-seizure MCRFs relative to NMCFs, providing a first support for hypothesis 1 and a first rejection for the null hypothesis 2, respectively. In addition, contrary to hypothesis 8, in post-seizure MCRFs there is no significant change in the means of $AbMTR$ and $AbPRS$ relative to the pre-seizure period, thus suggesting an insignificant impact of the seizure on the corresponding TRM practices of MCRFs. On the other hand, there is no significant difference in the means of $AbSRV$ and $AbCFO$ between pre-seizure MCRFs and NMCFs, failing to reject the null hypotheses 3 and 4, respectively. Furthermore, no significant change in the means of $AbSRV$ and $AbCFO$ emerges in MCRFs because of the seizure, in contrast with the hypothesis 8.

Table 3
Variable comparisons between the two pre-seizure MCF clusters.

Variables	Cluster 1 (MCRFs)		Cluster 2 (MCSFs)		Cluster 1 versus Cluster 2	
	Mean	Median	Mean	Median	t-test	Wilcoxon test
<i>AbMTR</i>	0.2152	0.0308	−0.8517	−0.1933	***	***
<i>AbPRS</i>	0.1529	−0.0854	−0.5118	−0.1371	***	**
<i>AbSRV</i>	−0.0521	−0.1316	0.5003	0.1326	***	***
<i>AbCFO</i>	0.0087	−0.0343	−0.0487	0.0339		
<i>RETA</i>	−0.1127	−0.3149	2.5774	2.3412	***	***
<i>CAPINT</i>	0.0169	−0.3105	−0.0160	−0.4316		
Δ NI	0.1353	−0.3687	1.2375	0.0690	***	***
SIZE	0.3371	0.3412	−0.0099	−0.0900	***	***
LEVLONG	−0.0426	−0.5375	−0.3500	−0.6237	***	***
LEVSHORT	0.3730	0.4222	0.8355	0.9978	***	***
INVAR	0.0492	0.1948	0.0042	0.2023		
GROW	−0.0166	−0.1055	3.0697	3.1889	***	***
ROA	−0.1893	−0.1275	0.3000	−0.0013	***	***
ETR	−0.1496	−0.2376	−0.2268	−0.4075		
DAC	0.0529	0.0599	−0.3908	−0.4195	***	***
AGE	−0.5803	−0.8342	−1.0795	−1.1112	***	***
N. Obs.	889		174			
% in sample	83.63%		16.37%			

Notes: *, ** and *** denote significance levels at 10%, 5% and 1%, respectively, based on a two-tailed Wilcoxon rank-sum test and a two-tailed t-test for the differences in medians and means of continuous variables, respectively. Variables are defined in the [Appendix A](#).

Table 4
Descriptive statistics and variable comparison among MCRFs and NMCFs.

	MCRFs_PRE		MCRFs_POST		NMCFs		MCRFs_PRE versus NMCFs		MCRFs_POST versus MCRFs_PRE	
	Mean	Median	Mean	Median	Mean	Median	t-test	Wilcoxon test	t-test	Wilcoxon test
<i>Dependent variables</i>										
<i>AbMTR</i>	0.215	0.031	0.199	0.024	0.000	−0.024	***	***		
<i>AbPRS</i>	0.153	−0.085	0.040	−0.128	0.000	−0.088	***	*		**
<i>AbSRV</i>	−0.052	−0.132	−0.098	−0.174	0.000	−0.082				**
<i>AbCFO</i>	0.009	−0.034	−0.025	−0.031	0.000	−0.009		***		
<i>Control variables</i>										
<i>RETA</i>	−0.113	−0.315	−0.347	−0.565	0.000	−0.270	***	***	***	***
Δ NI	0.135	−0.369	0.474	−0.180	0.000	−0.350	***		***	***
SIZE	0.337	0.341	0.366	0.429	0.000	−0.037	***	***		
LEVLONG	−0.043	−0.538	0.208	−0.430	0.000	−0.490	***	***	***	***
LEVSHORT	0.373	0.422	0.443	0.516	0.000	−0.075	***	***		
INVAR	0.049	0.195	−0.027	0.278	0.000	0.062		*		
GROW	−0.017	−0.106	−0.101	−0.133	0.000	−0.137				*
ROA	−0.189	−0.127	−0.421	−0.179	0.000	−0.087	***	***	***	***
ETR	−0.150	−0.238	0.201	0.535	0.000	−0.042	***	***	***	***
DAC	0.053	0.060	0.011	0.057	0.000	0.031				
AGE	−0.580	−0.834	−0.557	−0.801	0.001	−0.280	***	***		**
%LOSS	16.54%		16.81%		13.12%		***			
%SUSP	16.20%		8.97%		12.37%		***		***	
Number obs.	889		450		2,436,342					

Notes: The sample full period spans 2007–2016. *, ** and *** denote significance levels at 10%, 5% and 1%, respectively, based on a two-tailed Wilcoxon test and a two-tailed t-test for the differences in medians and means of continuous variables, respectively. Pearson chi-squared test of independence for categorical variables: %LOSS is percentage of firms with two or more consecutive years of negative income; %SUSP is percentage of firms just beating/meeting the zero earnings before tax benchmark. MCRFs_PRE = pre-seizure MCRF-years; MCRFs_POST = post-seizure MCRF-years. The rest of the variables are defined in the [Appendix A](#).

Turning to control variables, it is noteworthy that pre-seizure MCRFs are significantly ($p < 0.01$) less profitable (ROA) than NMCFs and profitability further drops following the seizure. Specifically, an overinvestment of financial resources stemming from illegal activities, a poor management, and an income-decreasing earnings management for tax avoidance may cause pre-seizure MCRFs to be less profitable. In this regard, the significantly ($p < 0.01$) lower effective tax rate (ETR) for MCRFs confirms their tendency to engage in tax avoidance. On the other hand, following the seizure, profitability of MCRFs may

be negatively affected by the costs incurred by legal administrators for the re-establishment of the legality and the vanishing of all competitive advantages linked the employment of criminal methods (Arlacchi, 2010; Fantò, 1999). Interestingly, significantly ($p < 0.01$) lower abnormal revenues to assets (*RETA*) for pre-seizure MCRFs, relative to NMCFs, may be due to the underreporting of revenues or the charge of lower selling prices than competitors, linked to the previously discussed competitive advantages of MCRFs. Conversely, the significant decrease of *RETA* for MCRFs following their seizure may be due to the loss of the business opportunities granted by the criminal networks. Finally, it is noteworthy the significantly higher short-term indebtedness (*LEVSHORT*) for pre-seizure MCRFs, relative to NMCFs, that may be due to lenient payment terms allowed by intimidated suppliers or be linked to trade-based money laundering practices (Ferwerda et al., 2013; Martocchia et al., 2014).

Table 5 presents the same information as Table 4 for MCSFs.

As regards the dependent variables, the means of *AbMTR* and *AbPRS* are negative and significantly ($p < 0.01$) lower for pre-seizure MCSFs relative to NMCFs, providing a first support for hypothesis 5. Moreover, the mean of *AbMTR* significantly ($p < 0.05$) increases in post-seizure MCSFs, consistent with hypothesis 8, whereas the mean of *AbPRS* is not significantly affected by the seizure of MCSFs. On the other hand, the mean of *AbSRV* is significantly ($p < 0.01$) higher for pre-seizure MCSFs relative to NMCFs, consistent with hypothesis 6. However, contrary to hypothesis 8, the seizure of MCSFs has no significant impact on *AbSRV*. Finally, no significant difference in *AbCFO* emerges between pre-seizure MCSFs and NMCFs and the seizure has no significant impact on it, failing to reject the null hypothesis 7.

As far control variables are concerned, the main differences from MCRFs analysis lie in the variables *RETA*, *GROW* and *ROA*. More specifically, significantly ($p < 0.01$) higher abnormal revenues to assets (*RETA*) for pre-seizure MCRFs, relative to NMCFs, is consistent with our assumption on the money laundering practice of recording fictitious sales without real business structure, typical of shell firms. The significant ($p < 0.01$) decrease in *RETA*, following the seizure, may provide evidence of the effective intervention of legal administrators in deterring this money laundering practice. Furthermore, it is noteworthy the significantly ($p < 0.01$) higher growth rate (*GROW*) for pre-seizure MCSFs, relative to NMCFs, presumably financed with dirty money, which significantly ($p < 0.01$) decreases after the seizure. Unlike MCRFs, pre-seizure MCSFs exhibit a significantly ($p < 0.01$) higher profitability than NMCFs, due to their artificial capacity of earning profits with limited assets that entails money laundering. Finally, it is not surprising that pre-seizure MCSFs are significantly ($p < 0.01$) younger (*AGE*) than NMCFs, given that the Mafiosi owners may decide to prematurely liquidate them, once they have achieved their illicit purposes or in order protect their assets from possible legal actions of judicial authorities.

Finally, it is worth mentioning that untabulated Pearson correlations between the variables of our base regression model in Eq. (5) mostly show low (below 0.39) correlations between control variables, by excluding that collinearity may lead to biased estimations.

Table 5
Descriptive statistics and variable comparison among MCSFs and NMCFs.

	MCSFs_PRE		MCSFs_POST		NMCFs		MCSFs_PRE versus NMCFs		MCSFs_POST versus MCSFs_PRE	
	Mean	Median	Mean	Median	Mean	Median	t-test	Wilcoxon test	t-test	Wilcoxon test
<i>Dependent variables</i>										
<i>AbMTR</i>	-0.852	-0.193	-0.179	-0.065	0.000	-0.024	***	***	**	**
<i>AbPRS</i>	-0.512	-0.137	-0.301	-0.156	0.000	-0.088	***	*		
<i>AbSRV</i>	0.500	0.133	0.129	0.029	0.000	-0.082	***	***		
<i>AbCFO</i>	-0.049	0.034	0.061	0.014	0.000	-0.009				
<i>Control variables</i>										
<i>RETA</i>	2.577	2.341	0.363	0.161	0.000	-0.270	***	***	***	***
Δ NI	1.237	0.069	0.215	-0.281	0.000	-0.350	***	***	***	
SIZE	-0.010	-0.090	-0.206	-0.117	0.000	-0.037				
LEVLONG	-0.350	-0.624	-0.169	-0.528	0.000	-0.490	***	***		**
LEVSHORT	0.836	0.998	0.780	0.916	0.000	-0.075	***	***		
INVAR	0.004	0.202	0.368	0.580	0.000	0.062			**	
GROW	3.070	3.189	-0.066	-0.055	0.000	-0.137	***	***	***	***
ROA	0.300	-0.001	0.062	0.269	0.000	-0.087	***	***		
ETR	-0.227	-0.408	0.165	0.449	0.000	-0.042	***	***	***	***
DAC	-0.391	-0.419	0.005	0.077	0.000	0.031	***	***		
AGE	-1.079	-1.111	-1.185	-1.194	0.001	-0.280	***	***	**	**
%LOSS	4.02%		5.81%		13.12%		***			
%SUSP	13.79%		2.33%		12.37%				***	
Number obs.	174		86		2,436,342					

Notes: The sample full period spans 2007–2016. *, ** and *** denote significance levels at 10%, 5% and 1%, respectively, based on a two-tailed Wilcoxon test and a two-tailed t-test for the differences in medians and means of continuous variables, respectively. Pearson chi-squared test of independence for categorical variables: %LOSS is percentage of firms with two or more consecutive years of negative income; %SUSP is percentage of firms just beating/meeting the zero earnings before tax benchmark. MCSFs_PRE = pre-seizure MCSF-years; MCSFs_POST = post-seizure MCSF-years. The rest of the variables are defined in the Appendix A.

5.4. Regression results and discussion

In order to test our hypotheses, we estimate our model in Eq. (5) through a linear regression with panel-corrected standard errors to consider heteroscedasticity and contemporaneous correlation across panels. Table 6 presents the results for our estimations.

First, it is noteworthy that all the estimated regressions are significant at the 0.01 level according to the Chi-square tests. As regards the variables relevant for our hypotheses, the coefficient on *MafiaRF* is positive and significant ($p < 0.01$) both in *AbMTR* and *AbPRS* regression, whereas it is negative and significant ($p < 0.05$) in *AbSRV* regression. These results provide support for hypothesis 1 and reject the null hypotheses 2 and 3, indicating that pre-seizure MCRFs exhibit abnormally high material and personnel costs and abnormally low service costs, respectively. Furthermore, the coefficient on *MafiaRF* is not significant at conventional levels in *AbCFO* regression, failing to reject the null hypothesis 4. Hence, TRM performed by MCRFs before seizure has a null effect on their CFO relative to sales. On the other hand, the coefficient on *MafiaRF_CONF* is not significant at conventional levels in any regression, failing to support hypothesis 8 and thus showing an insignificant impact of the seizure of MCRFs on their TRM practices.

Turning to MCSFs, the coefficient on *MafiaSF* is negative and significant ($p < 0.01$) both in *AbMTR* and *AbPRS* regression, consistent with hypothesis 5, whereas it is positive and significant ($p < 0.01$) in *AbSRV* regression, providing support for hypothesis 6. In addition, it is negative and significant ($p < 0.05$) in *AbCFO* regression, showing that TRM performed by MCSFs leads to an abnormally low CFO. This result is consistent with the assumption that the main purpose of MCSFs is money laundering through cash transfers, rather than generating a positive CFO through real operations to support the development of the business. Finally, coefficient on *MafiaSF_CONF* is positive and significant in regression *AbMTR* ($p < 0.01$), *AbPRS* ($p < 0.05$) and *AbCFO* ($p < 0.1$), whereas it is not significant at conventional levels in *AbSRV* regression. These results provide evidence that the seizure of MCSFs has a significant impact on their TRM practices, showed by abnormal material and personnel costs, presumably for the interruption of the fictitious business transactions linked to money laundering. More precisely, after losing the full control of their MCSFs, Mafiosi owners may be induced to discontinue the incoming black money flow through fake sale invoices, which may be particularly significant within MCSFs. The consequent sharp drop in revenues relative to assets, following the seizure (see variable *RETA* in Table 5), may be the reason for the significant increase in abnormal material and personnel costs, which are computed with respect to sales.

As regards the control variables, it should be noted that all their coefficients are mostly significant at the 0.01 level, although their sign sometimes differs across the regressions. This provides evidence of a different TRM strategy associated with each type of cost.

In summary, our results provide evidence of TRM activities within MCFs before seizure. However, they cast some doubts on the effectiveness of the legal administration in reinstating the legality within MCRFs after seizure. In this regard, legal

Table 6
Multiple regressions of transaction management proxies.

	<i>AbMTR</i>			<i>AbPRS</i>			<i>AbSRV</i>			<i>AbCFO</i>		
	Coef.	z-stat	p-val.	Coef.	z-stat	p-val.	Coef.	z-stat	p-val.	Coef.	z-stat	p-val.
<i>Variables of interest:</i>												
<i>MafiaRF</i>	0.225	4.17	0.000	0.194	4.29	0.000	-0.125	-2.47	0.014	0.040	0.95	0.344
<i>MafiaSF</i>	-1.016	-7.05	0.000	-0.585	-3.97	0.000	0.448	2.99	0.003	-0.182	-2.05	0.041
<i>MafiaRF_CONF</i>	-0.005	-0.06	0.954	-0.112	-1.58	0.114	-0.025	-0.31	0.756	-0.046	-0.67	0.502
<i>MafiaSF_CONF</i>	0.794	4.16	0.000	0.387	2.05	0.040	-0.331	-1.55	0.122	0.293	1.79	0.073
<i>Control variables:</i>												
<i>RETA</i>	0.114	94.06	0.000	0.038	36.21	0.000	0.012	10.50	0.000	-0.074	-109.62	0.000
Δ NI	-0.044	-70.86	0.000	0.043	65.21	0.000	0.039	63.53	0.000	0.017	23.97	0.000
<i>SIZE</i>	-0.019	-14.73	0.000	0.047	37.45	0.000	0.055	41.39	0.000	0.033	27.00	0.000
<i>LEVLONG</i>	0.035	58.46	0.000	-0.077	-126.18	0.000	-0.024	-40.18	0.000	-0.006	-9.88	0.000
<i>LEVSHORT</i>	0.028	39.34	0.000	-0.065	-91.29	0.000	0.037	50.89	0.000	-0.059	-86.36	0.000
<i>INVAR</i>	0.038	58.63	0.000	0.007	11.36	0.000	0.020	31.39	0.000	-0.055	-90.95	0.000
<i>GROW</i>	-0.019	-25.56	0.000	0.010	15.18	0.000	0.019	25.26	0.000	0.033	52.45	0.000
<i>ROA</i>	-0.052	-76.90	0.000	-0.045	-62.66	0.000	-0.001	-1.53	0.126	0.061	84.45	0.000
<i>ETR</i>	-0.050	-76.65	0.000	0.088	134.77	0.000	0.009	14.20	0.000	-0.071	-117.65	0.000
<i>DAC</i>	0.012	19.31	0.000	-0.017	-27.76	0.000	-0.031	-48.62	0.000	-0.488	-772.61	0.000
<i>AGE</i>	0.014	17.47	0.000	0.057	69.94	0.000	-0.003	-4.25	0.000	0.006	7.79	0.000
<i>LOSS</i>	0.012	6.62	0.000	0.018	9.75	0.000	0.058	30.15	0.000	-0.200	-110.13	0.000
<i>SUSP</i>	0.103	49.49	0.000	-0.173	-88.49	0.000	0.003	1.50	0.135	-0.050	-28.68	0.000
<i>IND dummies</i>	Yes			Yes			Yes			Yes		
<i>YEAR dummies</i>	Yes			Yes			Yes			Yes		
<i>Intercept</i>	-0.036	-7.56	0.000	0.053	10.60	0.000	-0.013	-2.56	0.010	0.055	12.89	0.000
Number of obs.	2,437,941			2,437,941			2,437,941			2,437,941		
R-squared	0.020			0.027			0.009			0.279		
Wald χ^2	36,983			67,562			18,360			737,549		

Notes: The p -values are two-tailed. All test statistics and significance levels are calculated based on panel-corrected standard errors to consider heteroscedasticity and contemporaneous correlation across panels. Variables are defined in the Appendix A.

administrators may fail to completely deter money laundering practices within MCRFs and the persistence of abnormally high material costs in the post-seizure period may be linked to a strategy of the ousted Mafiosi owners, aiming to drain resources of MCRFs and partially recover them. Colluded MCRFs employees and suppliers may support this strategy of the Mafiosi owners, that may exercise their influence through their networks with private and public stakeholders, within the controlled territory (Dalla Chiesa, 2017; La Rosa & Paternostro, 2015). This supposed scenario, if confirmed, may further explain the financial difficulties of MCRFs after seizure, which often lead them to bankruptcy and subsequent liquidation (ANBSC, 2012; Bivona, 2012; La Rosa & Paternostro, 2015). It is noteworthy that these results apparently contradict previous (Ravenda et al., 2018) study, which documents a significant effect of the intervention of legal administrators on some opportunistic practices of MCFs, as evidenced by abnormal specific accruals. However, this previous study does not address TRM practices and does not separate MCRFs from MCSFs. Hence, its results may not be properly comparable with ours. Finally, the insights into the practices of MCFs, offered by our TRM proxies, may suggest that the traditional TRM measures used in previous research, which do not inform on the nature of the specific transactions, and their common interpretation in terms of earnings management may not be suitable for depicting the behavior of unlisted firms involved in illicit practices and whose incentives, *modus operandi* and context are different from those the listed firms.

5.5. Additional analyses

5.5.1. Propensity score matching

To test the robustness of our results, we address the concern on a possible selection bias both in the firms that Mafia organizations decide to take over or start up and in the MCFs that are seized by judicial authorities and finally included in our sample. Indeed, the factors influencing the decisions above may also determine TRM decisions. Therefore, following previous research (e.g., Tucker, 2010), we carry out a propensity score matching, based on the observables variables included in the base regression model, in order to identify a control group of NMCFs and account for the possible endogeneity. We then estimate the propensity of a firm to be included within MCFs using a logit regression, where the dependent variable is an indicator variable, taking value of 1 for MCFs and 0 for NMCFs, and the independent variables are those significantly different between MCFs and NMCFs and associated with our TRM proxies, namely *RETA*, ΔNI , *SIZE*, *LEVLONG*, *LEVSHORT*, *INVAR*, *GROW*, *ROA*, *ETR*, *DAC*, *AGE*, *IND* and *YEAR*. The predicted probabilities from the logit regression are the propensity scores. Subsequently, we match each MCF-year to one NMCF-year¹³ by nearest propensity score, without replacement, using a Caliper distance of 0.03, where Caliper refers to the difference in the predicted probabilities between the treatment observation and the control observation (Dehejia & Wahba, 2002). We then re-estimate the Eq. (5) base regression model based on the propensity score matched sample. Interestingly, the untabulated estimation results, based on the propensity score matching, are mostly consistent with those of previous estimations, leading to similar conclusions in terms of the support or rejection of the hypotheses of the study. Hence, the documented robustness of our results to different estimation methods and matching procedures can relieve concerns that our findings are driven by uncontrolled factors or selection bias.

5.5.2. Estimations excluding construction industry

To find out whether the results of our estimations are mostly driven by the construction industry (NACE code 41), which is the most representative, for including 25.63% of MCFs, we repeat our estimations by excluding this industry. Interestingly, the untabulated estimation results within the restricted sample show that the only relevant difference from the estimations within the full sample lies in the coefficient on *MafiaRF* in *AbPRS* regression. Indeed, it is not significant at conventional levels rather than being significantly positive, if the construction industry is excluded. Considering that construction industry is typical for public contracts awarding, whose control is a primary business of the Mafia organizations (Caneppele et al., 2009; Savona, 2010), we can provide further support for the arguments, presented in the development of hypothesis 2, stating that abnormally high personnel costs (computed with respect to sales), within pre-seizure MCRFs, may be due to their practice of bidding for public sector contracts abnormally low prices, which are not economically viable for the other competitors. Furthermore, the closer scrutiny from public authorities, in relation to the fulfillment of all labour regulations, on firms competing in public tenders, may discourage MCRFs bidding for public contracts from engaging in illegal practices to compress personnel costs. Finally, the practice of employing Mafia members as fictitious employees to pay them black money in the form of salaries may be more common within MCRFs in the construction industry, for being more labour intensive.

6. Conclusions

In this study, we hypothesize that specific TRM patterns may provide evidence of money laundering practices within a sample of 355 firms controlled by Italian Mafias. Our results reveal that, using a cluster analysis, MCFs can be classified into two distinct groups which may correspond to MCRFs and MCSFs, based on specific assumptions on the peculiarities of the shell firms compared to the real firms. Furthermore, our regression estimations show that pre-seizure MCRFs engage more in

¹³ We carried out additional estimations by matching each MCF-year to two and three NMCF-years, respectively, and we obtained results similar to the main one-to-one matching estimations.

TRM by exhibiting abnormally high raw material/merchandise costs and personnel costs, and abnormally low service costs with a null cumulative effect on reported cash flow from operations (CFO) relative to sales. Conversely, pre-seizure MCSFs exhibit abnormally low material/merchandise costs and personnel costs, and abnormally high service costs with a negative cumulative effect on CFO relative to sales. In addition, the seizure of MCFs and the intervention of legal administrators have no significant impact on TRM proxies within MCRFs, by casting doubt on the ability of legal administrators to completely deter money laundering practices. On the other hand, abnormal material/merchandise costs and personnel costs significantly increase within post-seizure MCSFs, presumably for the interruption of the fictitious business transactions linked to money laundering. More importantly, we provide plausible explanations of the specific money laundering practices that may be evidenced by these TRM patterns within both MCRFs and MCSFs.

The results of this paper provide further empirical support to previous qualitative research (Compin, 2008; Neu et al., 2013) describing the role of accounting in facilitating criminal practices (e.g. corruption, money laundering, corporate fraud). More specifically, this study addresses the need to shed light on the links between accounting and criminal activities (Neu et al., 2013). Indeed, we provide support for the insight that the strategic use accounting transactions can support money laundering and the organization of networks among politicians, bureaucrats and business actors, through the transfer of financial resources masked as normally recorded business transactions. However, this apparent normality in the legal form of the fictitious transactions, needed to bring dirty money back into the legal economic circuit, does not correspond to a normality in their magnitude, measured with respect to other variables (e.g. sales and/or total assets) through specific models, which also consider the expected values for the same industry and period. Hence, altering the normal magnitude of the accounting transactions seems to be a requirement to achieve the illicit purpose or at least a common denominator within specific criminal contexts. For example, recording abnormally high material costs with respect to sales may be necessary, not only to transfer the cash to be laundered, but also to achieve additional tax benefits which may complement the illegal circuit. In this respect, we unveil some flaws in the attempts of money launderers to maintain a semblance of rationality and economic credibility of accounting, while using it to carry out and mask the financial crime (Compin, 2008). These flaws may arise from the inability to achieve a trade-off between rationality of financial information, whose defect may not be immediately evident without more sophisticated data processing, and pursuit of opportunistic purposes. Hence, the efforts to detect money laundering practices within firms should be primarily addressed to develop methods capable of highlighting any abnormality and inconsistency in the magnitude of accounting transactions, which should be assessed by considering the peculiarities of the industry, market conditions, business and institutional context. Furthermore, as evidenced by our identification of two MCFs clusters, to draw valid conclusions, these methods should not neglect the heterogeneity of the firms involved in money laundering based, among others, on the distinction between real firms and shell firms and their consequent different involvement in each money laundering stage. In this regard, our study suggests that warning indicators able to highlight an abnormally high efficiency of some firms, compared to their peers, may be useful for public authorities to unveil money laundering activities within firms. Specifically, the generation of unusually high value added, in the form of revenue (output) from business activities, with relatively low input resources (i.e., capital assets and labour) may be typical of shell firms like MCSFs, as evidenced by our analysis. Furthermore, this abnormally high efficiency may automatically result in an abnormally fast asset growth. A capital structure characterized by high short-term indebtedness, undercapitalization (low equity) and low capital intensity, relative to the local industry standards, may also signal the absence of real business operations within shell firms. Additional money laundering warning indicators suggested by our study, also valid for firms with real business activities, are based on the analysis by nature and magnitude of the common expenditure transactions. Specifically, the abnormal and inconsistent margins of raw material/merchandise, personnel and service costs, computed on the related sales and assessed against the concurrent business patterns and trends, typical of the local socio-economic context, may provide evidence of the opportunistic usage of the underlying business transactions to carry out transfers of illicit resources.

In addition, our study suggests that the anti-corruption role of accounting is significantly weakened in favor of the facilitating role (Neu et al., 2013), when the external scrutiny from regulators is weak, its relevance in determining the terms of trades with stakeholders is relatively low, and the involvement of colluded entities allows the monetary flow through abnormal trade transactions (Ferwerda et al., 2013; Mitchell, Sikka, & Willmott, 1998; Zdanowicz, 2009). Hence, the function of accounting and the way it is used greatly depend on the socio-economic and institutional context. This is particularly true for MCFs, whose criminal methods and strong networks within the controlled territory increase their leeway to strategically use accounting transactions for their illicit purposes. In this respect, the outcomes of our study offer arguments to challenge the orthodox view which suggests that accounting only needs to “do more” rather than “do differently” in the global fight against corruption or money laundering (Everett et al., 2007). Specifically, according to this view, the solutions that accounting can offer, to address corruption and money laundering, may arise from an improvement of the accounting procedures and regulations, an enhancement of powers, resources and methods of the supreme audit institutions, a privatization of government services fostering market competition and efficiency, and a greater involvement of members of civil society through more information on government activity and compliance with principles of legality and sound management (Everett et al., 2007; Murphy & Albu, 2018; Okike, 2004).

Conversely, our study supports prior research showing that the implementation of internal control procedures including accounting and auditing reports, primarily focused on the economic performance, may produce modest results against corrupt practices in a social environment characterized by apparently legitimate networks of colluded entities that, under a cloak of secrecy and pressure for high profits, support the flow of illicit resources disguised by creative accounting transac-

tions (Compin, 2008; Sikka & Lehman, 2015). In this regard, a more radical perspective on the accounting role suggests that any effective initiative to address the problem should also consider the peculiarities of the socio-economic and political context, the needs of the victims of criminal practices, and the *modus operandi* of the key actors that, as in the case of MCFs, may include members of civil society and business community (i.e., the supply-side of corruption (Sikka & Lehman, 2015)), as well as representatives of public institutions (Everett et al., 2007). Therefore, accounting should promote a different type of accountability more focused on improving the quality and type of information demanded by all stakeholders, including the non-primary users of accounting that are victims of crime, and less concerned about the international harmonization of accounting procedures and standards (Johnston, 2015). Specifically, more mandatory disclosure on the sources of funding and supply, anti-competitive practices, entrenched legislative and regulatory privileges, public contracts and concessions awarding criteria, related party transactions, and terms of trade with suppliers and customers may weaken the monopolistic market power of MCFs, encourage business competitors, give more bargaining power to their customers and suppliers and reduce opportunities for money laundering (Johnston, 2015). Furthermore, more specific mandatory disclosure on employee conditions and compliance with labour regulations may enhance transparency and accountability towards employees (Parsa, Roper, Muller-Camen, & Szigetvari, 2018; Williams & Adams, 2013), by particularly discouraging labour exploitation practices, especially against weaker social categories (i.e., immigrants and women), as means of money laundering. Finally, the enhancement of the environmental reporting and disclosures on compliance with environmental regulations may help in the fight against the so-called Eco-Mafias, engaged in money laundering through the profitable business of the environmental crimes at substantial social, economic and environmental expense for communities, their livelihoods and habitats (Contrafatto, 2014; Walters, 2013).

In summary, more transparency in the generation and flow of resources within the business networks, achieved through specific mandatory reporting requirements and their independent examination, may contribute to the deterrence of criminal infiltrations responsible for money laundering through shell companies and fictitious accounting transactions (Neu et al., 2013). In addition, the presence of strong and functional civil society organizations (e.g., NGOs, trade unions, free media and other supportive mechanisms), preferably supported and protected by public institutions, may contribute to monitoring the business practices and safeguarding the stakeholders that are victims of crime (Parsa et al., 2018). In this regard, a relevant example can certainly be the anti-Mafia civil organization *Addiopizzo* in Sicily that fights against the payment of the protection money (*pizzo*), which Mafia organizations impose on the local entrepreneurs by extortion. Among other initiatives aiming to create an anti-Mafia business network, *Addiopizzo* has created a process to certify and disclose information on the entrepreneurs that resist paying the *pizzo* and collaborating with the Mafia (Vaccaro & Palazzo, 2015). Last but not least, the strengthening of the aforementioned radical view and its effectiveness may require the implementation of training systems for accountants and auditors that recognize the importance of critical and reflexive thinking on the different role of accounting for the public interest and the actual information needs of victims of crime (Everett et al., 2007).

Finally, as a further contribution, our paper may give rise to critical arguments against the traditional TRM proxies, used in previous research, and the way they are interpreted, which may be ill-suited for explaining the behavior of unlisted firms, especially if involved in specific illicit activities.

These findings, however, are subject to some limitations. First, the empirical evidence is limited to the patterns showed by our TRM proxies, whereas the underlying practices are assumed based on previous studies. Regarding the methodology, we cannot rule out the presence of a bias in the selection of our MCFs sample, considering that we only include MCFs detected and seized by judicial authorities which, because of their specific characteristics, are included in the AIDA database. Finally, other reasons than money laundering may lead to abnormal values of our TRM measures and their correct interpretation should necessarily consider the specific incentives and context of the examined firms.

We propose several opportunities for future research. First, a further study could exploit data collected through a series of interviews to a restricted sample of MCFs, belonging to different industries, or, in alternative, to their legal administrators (perhaps more approachable) with the purpose of confirming and broadening the insights of our study, using a more qualitative approach. Second, our proxies could be tested on other types of firm that are expected to engage in TRM, to gain further insight into their measurement ability. Third, future studies could examine the directional effect on earnings of TRM in unlisted firms which, especially in certain circumstances, might be different from that in listed firms. Fourth, additional information could be collected on MCFs, to identify further subgroups based on their *modus operandi* and the related costs and revenue manipulation patterns. Lastly, the results of this study could be corroborated in other countries, where organized crime and money laundering practices are widespread.

Appendix A. Variable definitions

TRM_PROXY: *AbMTR*, *AbPRS*, *AbSRV* or *AbCFO*:

AbMTR: abnormal material costs computed as the residuals from Eq. (1);

AbPRS: abnormal personnel costs computed as the residuals from Eq. (1);

AbSRV: abnormal service costs computed as the residuals from Eq. (1);

AbCFO: abnormal CFO computed as the residuals from Eq. (2).

MafiaRF: indicator variable taking value of 1 for MCRFs and 0 otherwise.

MafiaSF: indicator variable taking value of 1 for MCSFs and 0 otherwise.

MafiaRF_CONF: indicator variable taking value of 1 for MCRFs in the post-seizure years and 0 otherwise.

MafiaSF_CONF: indicator variable taking value of 1 for MCSFs in the post-seizure years and 0 otherwise.

RETA: revenues divided by total assets, standardized by industry-year.

ΔNI: absolute value of change in net income relative to previous year divided by lagged total assets, standardized by industry-year.

SIZE: natural logarithm of total assets, standardized by industry-year.

LEVLONG: long-term liabilities divided by total assets, standardized by industry-year.

LEVSHORT: short-term liabilities divided by total assets, standardized by industry-year.

INVAR: total inventories and receivables divided by total assets, standardized by industry-year.

GROW: change in total assets relative to previous year divided by lagged total assets, standardized by industry-year.

ROA: income before tax divided by total assets, standardized by industry-year.

ETR: current tax expense divided by income before tax, standardized by industry-year.

DAC: discretionary accruals computed as the residuals from the performance adjusted modified Jones model (Kothari, Leone, & Wasley, 2005).

AGE: firm's age in years, standardized by industry-year.

LOSS: indicator variable taking a value of 1 if the firm had two or more consecutive years of negative income including the current and 0 otherwise.

SUSP: indicator variable taking a value of 1 for firm-years with earnings before tax over lagged assets greater than or equal to zero but less than 0.01 and 0 otherwise.

IND: indicator variables for two-digit industry NACE codes.

YEAR: indicator variables for fiscal years.

CAPINT: net tangible and intangible fixed assets divided by total assets, standardized by industry-year.

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