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Export impact on dividend policy for big Colombian exporting firms, 2006 – 2014

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ABSTRACT

EXPORT IMPACT ON DIVIDEND POLICY FOR BIG COLOMBIAN EXPORTING FIRMS, 2006 – 2014

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This paper studies the impact of exogenous export demand shocks on firms' dividend policy using firm specific real exchange rate variation as instrumental variable. IV exclusion restriction is plausibly satisfied because real exchange rate shocks were unanticipated -partly explained because of international oil price fluctuation-, and first stage statistics confirm relevance condition fulfillment. The results indicate that big private Colombian exporting firms initiated to decree effectively paid dividends as a way to mitigate the *agency cost* generated by exogeneous exports variation via higher free cash flow and higher cash flow volatility. The findings support partly the 'outcome model' within the agency cost theory and deny *signaling*.

Keywords: dividends, exports, agency cost, volatility, management.

JEL classification: F14, F10, G30, G32, G14, G35

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I. Introduction

The lack of consensus about why firms pay dividends despite extensive academic research is known as the "*dividend puzzle*".[1] In order to put this puzzle together, Allen et al. (2010)[2] suggest: "*instead of inquiring whether dividends are good or bad, perhaps we should be asking when it makes sense to pay high or low dividends*" (Allen et al., 2010, p.873), and two literature review papers (Al-Najjar & Kilincarslan, 2019; El Attar & Jabbouri, 2018) recommend to develop new perspectives and to conduct more studies for developing countries. Although more recent studies have brought new elements into the debate, like managers' career concerns (Dang et al., 2020)[3], the international trade topic is conspicuous by its absence. To the best of the author's knowledge, only two papers relate international trade and dividend payout.

From the import perspective, Booth et al. (2013) estimates the sectoral import penetration impact on the probability that firms pay dividends, finding that between 33% and 40% of the "disappearing dividends" phenomenon occurred in US[4] between 1978 and 1999 could be attributed to import competition rise. The transmission mechanism suggested is that competition from imports rise uncertainty in future performance preventing firms to pay dividends. From the export perspective, Goldman & Viswanath (2015) found that cashflow diversification through exports (due to negative correlation between local and international demand shocks) is positive correlated with higher dividend payout in India between 2000 and 2009. However, from the author's point of view, the potential endogeneity of the main independent variables in these papers (sectoral import penetration ratio and sales diversification[5]) is not addressed, hence, it is not possible to infer robust causality.

For this reason, the main novelty of this paper is to estimate exported value effect on dividend policy through instrumental variable, which allows to address exported value's endogeneity due to non-observable variables that influence exported value and dividend policy. This methodology is framed within the recommendations for future research mentioned before; the *new methodological perspective* to analyze dividend payout is implemented for Colombia,[6] a *developing country* where exogenous international demand shocks provide a *proper natural experiment* to evaluate firms' dividend policy adjustment.[7]

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[1] *"The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don't fit together"* (Black, 1976, p.5)

[2] Also, they list the dividend payout as one of the most important unresolved topics in the corporate finance literature.

[3] They suggest that managers career concerns could explain that S&P1500 firms either maintained or increased dividend payment during COVID-19 crisis.

[4] The proportion listed US firms that pay dividends decreased from 66.5% in 1978 to 20.8% in 1999. This reduction can be explained for a mix of new publicly firms with typical non-paying dividends characteristics (small size, low earnings, and high growth) and a lower paying probability of existing firms (Fama & French, 2001).

[5] *ExpIntenRel = 1-2|expintensity-0.5|* is used as a proxy variable for sales diversification.

[6] Jaramillo (2021) also explores Colombian dividend payment determinants with the same financial statement dataset used in this paper. However, Jaramillo (2021)'s main focus is not international trade (although one of the explanatory variables included in the regression is the aggregate nominal exchange rate between Colombia and USA, whose coefficient is not statistically significant).

[7] Some stylized facts allow to infer that international demand shocks are more appropriate than local demand shocks to study firm's dividend policy adjustment. For example, export share is positive and statistically correlated with cash flow volatility (see appendix B), which is an important dividend policy determinant (see section III). Also, public information (e.g. customs data) allow to measure exogeneous export demand shocks precisely.

The instrumental variable is firm specific real exchange rate weighted by export destination countries shares in total firms' exports in its first sample year, which plausibly satisfy the exclusion restriction because real exchange rate variation occurred during 2006-2014 was partly driven by oil price fluctuation and Colombian trading partners' macroeconomic conditions oscillation. This instrumental variable follows the methodology implemented by Jiang et al. (2010), which analyzes how export demand shocks associated with the Asian financial crisis affected Chinese exporters (in terms of productivity, workers, capital, among others variables) through similar firm-specific exchange rate shocks constructed with the precrisis export destination's shares.

This empirical approach permits to verify accurately the testable predictions of the *agency cost* and *signaling* dividend theories. Unfortunately, dividend theories that discuss capital gains will not be empirically address because of data limitations.[8] This paper proceeds as follows. Section II describes some basic aspects about Colombian dividend policy regulation, section III presents the theoretical framework and the potential links between exports and dividend payout, section IV shows the descriptive statistics, section V details the empirical methodology, section VI analyzes the results, and section VII concludes.

II. Colombian dividend policy regulation

In Colombia, firm's dividend payment approval follows three steps described in the Colombian Commercial Code (abbreviated as CCC from now on). First, the board of directors and/or the firms' legal representative (which usually is the manager) expose to the shareholders' assembly the project of profits to be distributed in dividends based on the previous year financial statements (Article 446, CCC). Then, the shareholders' assembly discusses the project. Subsequently, the project is approved, modified or disapproved (Article 420, CCC). In case the shareholders' assembly decides to decree dividends, the dividends must be paid within the year following the date on which are decreed (Article 156, CCC).

As a way to protect the minority shareholders, it is established a *special majority system* in which it is required the favorable vote of a plural number of shareholders representing minimum 78% of the shares or participative quotes to distribute less than 50% of profits in dividends or not distribute dividends at all (Article 155, CCC).[9] One exception to this rule applies to the firms created upon the "SAS" (*Simplified joint-stock company*) legal form, which *could* stipulate in its bylaws another majority system to approve the profit distribution in dividends (Article 38, law 1258 of 2008).

It is common for the shareholders' assembly to reach this agreement; 81.53% of the biggest private Colombian firms[10] between 2006 and 2014 did not distribute dividends or distribute less than 50% of profits in dividends (77.10% before 2008 when SAS legal form had not been created). Therefore, Colombia should not be classified as a mandatory dividend rule country because, on average, firms are not distributing in dividends the supposed 50% minimum of profits that some studies state (La Porta et al., 2000; Saens & Tigero, 2021), but as a regulatory system which aims to protect minority shareholders.

[8] Information about the quantity and the nominal value of the shares (or participative quotas) issued when firms not listed at the stock market were founded and the private transactions of these shares carried out by the shareholders is not public. Also, including stock market information would reduce the sample substantially as only 15 firms (37% from the total) with stock market capitalization produce goods. In the same way, it is not possible to assess alternative ways in which firms remunerate their shareholders, like stock repurchases, which are widely implemented in developed countries (Grullon & Ikeneberry, 2000) because of data limitations.

[9] See Document 220-074017 from the Colombian Companies Superintendence: content (ccb.org.co), and Sentence C-707/05 from the Colombian Constitutional Court: C-707-05 Corte Constitucional de Colombia.

[10] See section IV for dataset description.

III. Theoretical framework

Although numerous dividend theories have been established across several decades of corporate finance research (Al-Najjar & Kilincarslan (2019) and El Attar & Jabbouri (2018) provide an extensive literature review of each theory), the trade impact on dividend policy has not been neither defined nor theoretically modeled. This section describes the theories that can be empirically evaluated with the dataset of this paper (do not mention capital gains),[11] [12] and then, it is discussed how exports could impact dividend policy according to each theory.

In first place, *agency cost* theory establishes that firms pay dividends as a mechanism to mitigate the agency cost between managers (agent) and shareholders (principal) associated with free cash flow (FCF)[13] subject to manager discretion (Jensen, 1986; Easterbrook, 1984). Dividend payment would avoid manager overinvestment in projects with negative net present value or that do not represent shareholders' interest. Cash flow volatility could also generate agency cost: "*when cash flows are variable, it is difficult for investors to accurately attribute deviations in cash flows to the actions of corporate managers or to factors beyond management's control. Thus, the higher the expected variance in cash flows, the greater the potential agency cost, and the greater the reliance on dividend distributions*" (Bradley et al., 1998, p.556).[14] Therefore, higher FCF and higher cash flow volatility could create agency cost between manager and shareholders that would incentive firms to pay dividends.

These transmission mechanisms could operate in bigger proportion in firms with agency cost characteristics. For instance, Kulchania (2023) uses lower debt as an agency cost proxy variable based on the seminal Jensen (1986)'s paper, which suggest that debt could be a mechanism to alleviate agency cost as the capital market scrutiny could monitor efficiently that managers behave according to shareholder's aim.

Low managerial quality has been also identified as another characteristic of firms with agency issues. Bhattacharyya (2007) develops a principal-agent theoretical model in which dividend policy is a component of a screening contract offered by the principal to the agent in the presence of hidden information (unknown agent productivity) and moral hazard (unknown agent effort). The equilibrium

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[11] In the group of theories that mention capital gains, *catering* theory states that firms offer the dividend policy that investors want; firms initiate to pay dividends when investors put a higher stock price on firms that pay dividends (Baker & Wurgler, 2004). *Bird in the hand* theory follows the popular saying that one bird in the hand is better than two in the bush, which in this context means that investors prefer dividends than capital gains because dividends are less risky. Therefore, firms that pay frequent and high dividend rate would reduce investors' cash flow uncertainty and would increase firm's value. The usual criticism to this theory is that firm's risk is more determined by its investment projects than by the way it distributes profits. On the contrary, *tax preference theory* emphasizes that differential taxes between dividends and capital gains would spur investors to prefer firms with specific dividend policy due to fiscal benefits (Litzenberger & Ramaswamy, 1979).
In the same way, *tax dividend clientele hypothesis* highlights that tax heterogeneity between dividends and capital gains would create dividend clienteles because of investors looking for the highest after-tax return on their portfolios. As in most of countries dividend tax rate is higher than capital gains tax rate (Allen et al., 2000), stocks with higher dividend yields would attract investors with lower marginal tax rate. There is evidence of the validity of this theory for US (Kawano, 2014) and Sweden (Dahlquist et al. 2014).

[12] A third dividend literature group could be defined related with the impact evaluation of changes in dividend taxes regulation on firms' outcomes. For example, Chetty & Saez (2005) found a positive response of dividend payment to 2003 tax dividend cut in US. Also, Jacob (2021) found that firms with limited internal funds increased wages and TFP due to dividend tax cut in Sweden. Although these studies are not directly related with the topic of this paper, they are relevant for future research on Colombia given that different dividend tax reforms have been recently approved (law 1819 of 2016, law 1943 of 2018 and law 2277 of 2022).

[13] "*Free cash flow is cash flow in excess of that required to fund all projects that have positive net present value when discounted at the relevant cost of capital*" (Jensen, 1986, p.323).

[14] Cash flow volatility could be also classified as an independent dividend theory, in which its correlation with dividend payment is negative: "*Cash flow volatility theory suggest that more stable firms should be able to pay higher dividends. Shareholders prefer predictability in their dividends and cash flow stability means that firms will not need to cut dividends because of lower profits*" (Goldman & Viswanath, 2015, p.359)

contract motivates low-quality managers to pay more dividends and invest less (conditioned on cash availability). It is predicted a negative relation between manager quality and dividend payment.

Firms' opacity (information asymmetry between insiders and outsiders) could be an additional agency cost determinant. Morris & Roseman (2014) developed an agency cost multi-period theoretical model as a function of how opaque is the firm to its shareholders. The theoretical prediction - owners will remove free cash flow through dividends when opaqueness is high - is confirmed by an econometric estimation, which uses some variables related with the quantity of analyst that cover a firm and their forecasts accuracy as low opaque firm proxy variable for US from 1993 to 2010. In conclusion, lower debt, lower managerial quality, and higher firms' opacity could exacerbate the agency cost between managers and shareholders that would boost dividend payment.

The agency cost theoretical framework becomes quite complex when the corporate governance notion is added into the analysis, since the *agent* could be the manager and/or majority shareholder(s) and the *principal* the minority shareholder(s). In a seminal paper, La Porta et al. (2000) raises two models to describe the agency cost in this context: the "*outcome model*", in which dividends are an outcome of an effective system which allows the minority shareholder(s) to force firms to pay dividends, avoiding that managers' and/or majority shareholder(s) divert corporate assets or free cash flow to themselves, and the "*substitute model*", in which dividends are a substitute for shareholders' legal protection, and firms pay dividends to establish a reputation for moderation in expropriating shareholders allowing them to raise funds in the capital market. *Ceteris paribus*, the outcome model would predict a positive relationship between dividend payout and corporate governance quality, while the substitute model a negative one.

The Colombian studies about this aspect usually cover subsamples of firms listed in the stock market (Benavides & Mongrut, 2010; Gaitan, 2009; Lagos & Vecino, 2011; Pombo & Gutierrez, 2007; Ramirez & Usma, 2010), whereby it is not possible to extrapolate these papers' findings to the firms of this paper (see section IV). However, the *Good Business Practices Report* of the Colombian Companies Superintendence (Superintendencia de Sociedades, 2020), which cover the biggest private Colombian firms,[15] provides valuable inputs: i) on average the number of shareholders is low: 70% of the biggest private firms have 5 or less shareholders, ii) the manager is appointed by the shareholder's assembly in 61% of the firms, and iii) only 58% of these firms have board of directors.

According to La Porta et al. (2000), the majority shareholder could become a *controlling* shareholder, who can determine the manager's decisions, in this potential highly concentrated context. Nevertheless, Colombian regulation generates a counterbalance (special majority system) relative to the dividend payment (section II). It would be necessary to carry out studies about corporate governance for Colombian firms non-listed in the stock market to deepen this aspect.

In second place, *signaling* theory states that under asymmetric information between managers and the market, managers use dividends to communicate private information about current and future firms' performance. Managers increase dividend payments if they expect positive and low volatile earnings (Farre et al., 2014) and avoid cutting or making volatile payments since it could be interpreted by investors as a negative sign about firms' performance. Lintner (1956) developed the pioneering partial dividend adjustment model, which explains a payment process in which firms smooth dividend payments and converge to a target dividend payout ratio, rather than adjusting immediately to earnings, in order to signal firms' stability.

[15] Colombian Companies Superintendence did not share the micro-data information because of confidentiality reasons.

Which is the export role on firms' dividend policy? According to the agency cost theory, dividend policy could be modified if exports increase (decrease) FCF, ergo, exacerbate (calm) priorities differences between managers and shareholders, in consequence, firms pay (not pay) dividends to mitigate this agency cost. In this sense, export net effect on FCF will depend if cash flow from operating activities increases in a higher magnitude than capital expenditures and debt payment because of exports variation (assuming FCF = cash flow from operating activities – capital expenditure – debt payment[16]). Although academic literature has studied export effect on capital expenditures (Campa & Myles (2002) found that under liquidity constrains, Spanish exporters' capital investments are higher than non-exporters because of more stable cash flow associated with negative correlation of destination countries' business cycles), it would be necessary to consider export effect on the other FCF components to determine its aggregate impact.

Also, the empirical evidence about exports effect on cash flow volatility, another agency cost source, is non-conclusive; while some papers found that exporting has a negative effect on cash flow volatility (see Goldman & Viswanath (2015) for India and Campa & Myles (2002) for Spain), there is evidence in the opposite direction for sales volatility (see Vannoorenbergue (2012) for France and Riaño (2011) for Colombia). Appendix B indicates that export share is positive correlated with cash flow volatility and conditional cash flow volatility, supporting to a greater extent the second hypothesis. One potential explanation for this pattern is provided by Riaño (2011), who calibrated a dynamic model with Colombian manufacturing firms finding that, despite firm risk aversion, the correlation between demand shocks in the local and international market is not an important exporting determinant when idiosyncratic firm productivity is highly persistent.

In addition, exporting could make the managerial practices more structured (Görg & Hanley (2017) provides evidence for Germany), which could have opposing effects on dividend policy. On one hand, improving managerial quality could reduce the agency cost and the dividend payment according to the agency cost theory (Bhattacharyya, 2007). On other hand, better managers could work in firms with better corporate governance and/or implement corporate governance codes to improve it, which could rise dividend payment according to the 'outcome model'. Nonetheless, there is mixed evidence about the sign of the correlation between corporate governance and managerial quality (Acharya et al., 2018), ergo, further research about this aspect is needed.

On the other hand, *signaling* theory would predict that temporal favorable export demand shocks (generated by, for example, exchange rates or international commodities prices fluctuation) should not increase dividend payment: "*managers perceive that the volatile (unstable) dividend payment streams reflect the volatility in earnings that are not good indicators about their firms' financial performance to the market*" (Al-Najjar & Kilincarslan, 2019, p.207). Consequently, it would exist a future 'signaling cost' of stop paying dividends when favorable temporal international market conditions reverse. On the contrary, it is more likely to rise dividend payment in a smoothed way across time when a structural change in firm's exports occurs (for example, new exported product encouraged by R&D investment), since those earnings could present lower future volatility.

According to the theories that address capital gains topics, exports could also impact dividend policy. Investors' choice between firms that pay dividends or firms with higher capital gains could

[16] One limitation of the agency cost theory is that there is still no consensus about free cash flow (FCF) definition. Jensen (1986) initially described FCF as: "*Free cash flow is cash flow in excess of that required to fund all projects that have positive net present value when discounted at the relevant cost of capital*" (Jensen, 1986, p.323), but he never directly measured it. In a literature review paper about FCF definitions implemented in the academic literature, Bhandari & Adams (2017) recommend to use FCF = CFO (Cash flow from operating activities) – CAPEX (Capital expenditures) – Debt payment.

change because of trade exposure; it would be necessary to carry out studies to determine if exports impact on stock returns[17] is higher or lower than its impact on dividend payment. However, neither dividend payment[18] nor capital gains[19] were taxed in Colombia during the analyzed period (2006-2014), which would make *tax preference* (Litzenberger & Ramaswamy, 1979) and *dividend clientele* (Kawano, 2014) theories non-relevant in Colombia, independently of firms' income source (exports or local market income).

As a final remark, it is expected that this paper become a starting point that allow to theoretically model the international trade impact on firms' dividend policy.

IV. Descriptive statistics

The database is composed by the merge of two public Colombian datasets for the 2006-2014 period. The first one is customs data, which cover entire international transactions disaggregated at firm level - traded value (FOB for exports and CIF for imports)- product (Colombian external tariff subheading 10 digits) – quantity – destination or origin country, reported by the DANE.[20] The second one is financial statements (balance sheet, income statement, and cash flow) of the biggest private Colombian firms (those whose total assets or operating income value exceeds 30,000 Colombian legal minimum wages) validated by tax auditors and reported to the Colombian Companies Superintendence.[21] Both databases are public and were download in February 2021. On annual average, big private exporting firms account 41% of total exporting firms with valid firm ID's (3,434 of 8,338 firms per year) and 61% of total exported value (US$28,322 million of US$46,256 million per year). See Merchan (2023) for comparative descriptive statistics between big private exporting firms relative to big private non-exporting firms and exporting firms relative to non-exporting firms.

Initially, all big private Colombian firms (exporters and non-exporters) are included in the descriptive statistics to provide a Colombian dividend policy's general framework. Graph 1 indicates that annual average percentage of firms that decreed dividends is significantly higher for exporting (32%) than for non-exporting firms (24%), however, the tendency for both type of firms is similar: a flat slope with a rise in 2010 (the same countercyclical dividend payout pattern experienced during the recent COVID crisis in America (Dang et al., 2020) occurred post 2008 global financial crisis in Colombia, in which the percentage of firms that decreed dividends increased during low economic growth years).

[17] There is evidence for US that exchange rate movements could increase capital gains: "*stock performance of export-oriented companies tends to move against the dollar*" (Chakraborty et al., 2015, p.1059)

[18] There was not an additional tax to the profits distributed in dividends in Colombia from 1986 to 2016. See Avila-Mahecha (2019).

[19] Article 36-1 from the Colombian tax law indicated that profits from shares sales were exempted from income tax or profit tax. It was modified by article 376 of Law 1819 from 2016.

[20] National Colombian Statistics Agency (DANE, by its acronym in Spanish). Imported and exported value were deflated using Colombian Producer Price Index (2014 is the base year).

[21] The variables from this dataset were deflated using an industrial-specific annual Producer Price Index (PPI) reported by the Colombian Central Bank (2014 is the base year).

In terms of the amount decreed,[22] [23] graph 2 illustrates that annual average percentage of decreed dividends relative to assets is very similar for exporting (7.5%) than for non-exporting firms (9.1%) -restricting the sample to firms that decreed dividends-. Also, the probability that exporting firms pay those decreed dividends according to times established in law (one year after decreeing them) is very similar for exporting (76%) than for non-exporting firms (77%) (graph 3). In general, graphs 1, 2, 3 lead to conclude that exporting is positive correlated with 'dividend extensive margin' (probability that firms decree dividends) but neither with 'dividend intensive margin' (amount decreed) nor with the probability of paying dividends according to times established in law.

As the baseline econometric analysis will be performed in three years differences specification given the IV first stage results (see section VI), graph 4 shows that exporting firms are more likely to be 'continuers' (decreed dividends in t and t-3) than non-exporting firms (20% and 13% annual average, respectively). On the contrary, exporting firms are similar in the probability to initiate to decree dividends (decreed dividends in t but not in t-3) than non-exporting firms (14% and 13% annual average, respectively) (graph 5). Also, exporting firms are similar in the probability to stop decreeing dividends (did not decreed dividends in t but decreed them in t-3) than non-exporting firms (15% and 13% annual average, respectively) (graph 6). Consequently, 'stock dividend policy' (continuers) is higher for exporting than for non-exporting firms while 'flow dividend policy' (entry and exit) is similar for both type of firms.

Graph 7 shows that aggregate real exchange rate (instrumental variable) diminished (appreciated) between 2006 and 2014, indicating an aggregate Colombian competitiveness loss in the international market, which is highly correlated with oil price surge occurred during those years (Acero, 2017). Nevertheless, this trend did not occur with all principal export destination countries; bilateral real exchange rates show an appreciation with US, Ecuador and Netherlands, but depreciation with China and Venezuela (see graph 8). The opposite tendency with China and Venezuela arose because of the Colombian pesos depreciation with the yuan -contrary to the nominal revaluation trend with the other trading partners' currencies (graph 9)-, and the unprecedent high inflation rate in Venezuela.

Lastly, table 1 shows the simple average of the main variables included in the econometric analysis disaggregated by four firm types, according if firms exported and/or decreed dividends. Some interesting patterns emerge from the descriptive statistics. First, ranking firm types from the largest to the smallest in terms of total assets and TFP indicates that exporting firms that decreed dividends are the biggest, followed by exporting firms that did not decreed dividends, non-exporting firms that decreed dividends, and non-exporting firms that did not decreed dividends. This implies that firms' size and productivity are statistically correlated in higher proportion with the probability of exporting than with the probability of decreeing dividends.

Secondly, firms that decree dividends have statistically higher profit rate (operating profit/operating income), financial investment rate (financial investment/assets) and lower debt rate (debt/assets) that firms that did not decree dividends, independently if they exported or not. Basically,

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[22] The amount decreed in dividends is not directly reported in the financial statements, but it was calculated as follows: $Amount\ Decreed\ Div_t = Amount\ Paid\ Div_t + Non\ paid\ Div_t - Non\ paid\ Div_{t-1}$, where $Amount\ Paid\ Div_t$ is the amount paid in dividends in t and $Non\ paid\ Div_t$ is the amount of payable dividends in *t* (liabilities).

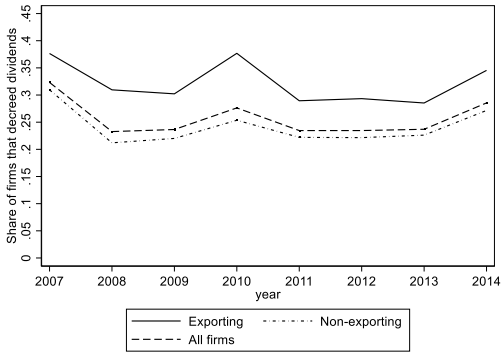
[23] It was identified and dynamically corrected some non-sense observations: i) a decrease in the amount of payable dividends (liabilities) between t and t-1 ($Non\ paid\ Div_t - Non\ paid\ Div_{t-1} < 0$) with zero amount paid in dividends $Amount\ Paid\ Div_t = 0$, and ii) decrease in the amount of payable dividends between t and t-1 larger in absolute value than the amount paid in dividends: $|Non\ paid\ Div_t - Non\ paid\ Div_{t-1}| > Amount\ Paid\ Div_t$). For those observations, it was replaced $Non\ paid\ Div_t$ so that the next equation is satisfied: $|Non\ paid\ Div_t - Non\ paid\ Div_{t-1}| = Amount\ Paid\ Div_t$.

higher profits incentive firms to decree dividends (as international evidence suggests), firms are more likely to decree dividends when have met their investment needs, and the negative correlation with debt could support the agency cost theory explained in the previous section. Third, exporting firms have lower free cash flow (FCF)[24] and lower overinvestment rate[25] that non-exporting firms (independently if they decree dividends or not), suggesting that overinvesting less and reducing FCF could be two self-selection into exporting determinants. Finally, table A1, A2, and A3 show the descriptive statistics for the same variables in two-, three-, and four-year differences specification disaggregated by the same four firm types. The next section describes the econometric methodology, which restricts the analysis to the big private Colombian exporting firms because the instrumental variable can be constructed just for exporting firms.

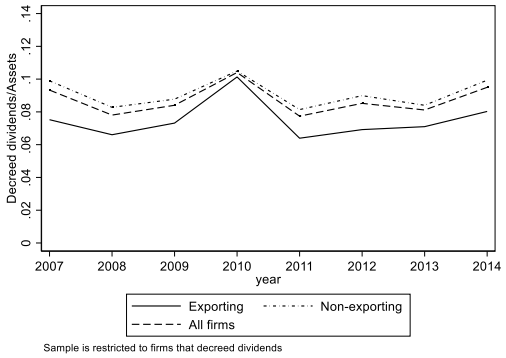
[24] Initially, free cash flow (FCF) was calculated with the recommended definition provided by Bhandari & Adams (2017): FCF = CFO (Cash flow from operating activities) – CAPEX – Debt payment. However, 43% of the observations reported negative values because CFO was negative (firms reported losses) or the capital expenditures plus debt payment magnitude was higher than CFO. Consequently, it was used an alternative FCF definition to avoid high negative values percentage: FCF = OI (Operating Income) – CAPEX – Debt payment.

[25] Overinvestment calculation follows Richardson (2006) methodology (see appendix C).

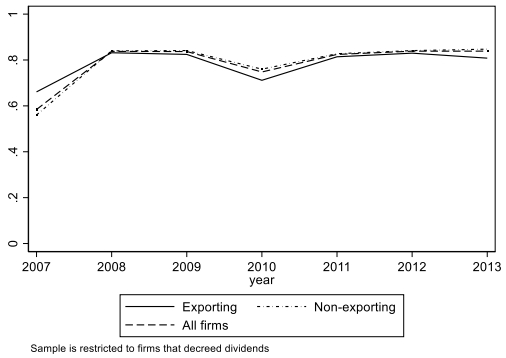
Graph 1: Share of big private Colombian firms that decreed dividends, 2007 – 2014



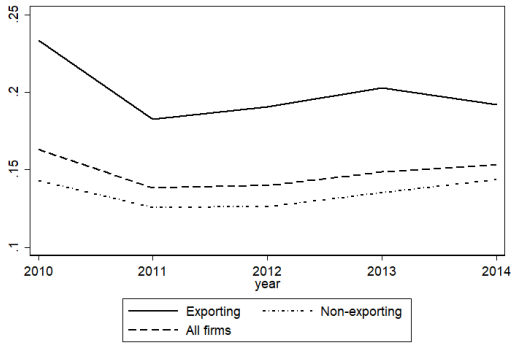
Graph 2: Average share decreed dividends relative to assets, 2007-2014



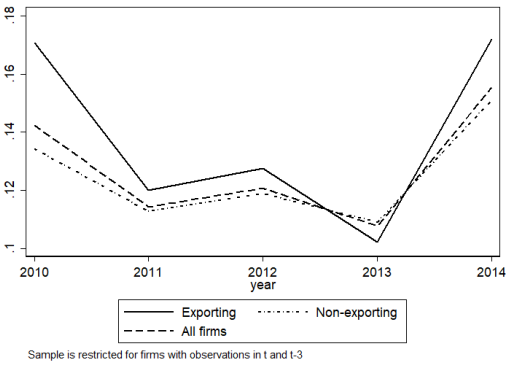
Graph 3: Share of big private Colombian firms that decreed dividends and paid them according to times established in law*, 2007 – 2013



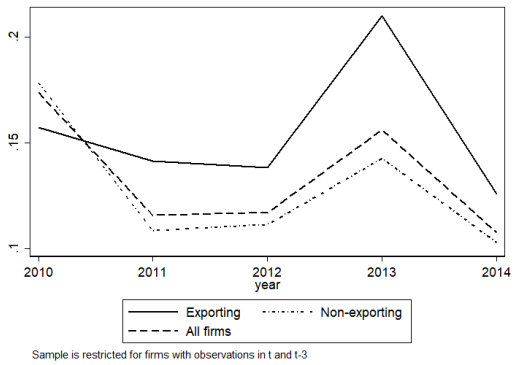
Graph 4: Share of continuers firms (decreed dividends in t and t-3), 2010-2014



Graph 5: Share of firms that initiated to decree dividends (decreed dividends in t but not in t-3), 2010-2014



Graph 6: Share of firms that stopped to decree dividends (decreed dividends in t-3 but not in t), 2010-2014



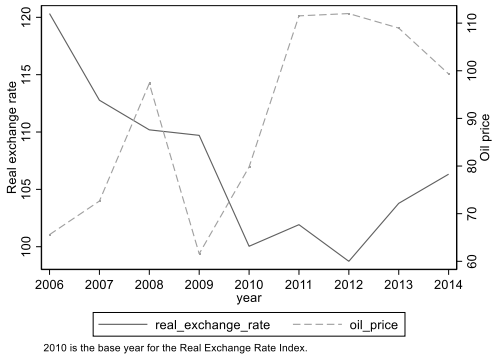
Source: Own calculations based on Colombian Companies Superintendence (biggest private Colombian firms' financial statements) and National Colombian Statistics Agency (customs data). *Decreed dividends should be paid within the next year they are decreed (Article 156, Colombian Code of Commerce).

Table 1: **Descriptive statistics – variables in levels (simple average by firm type)**

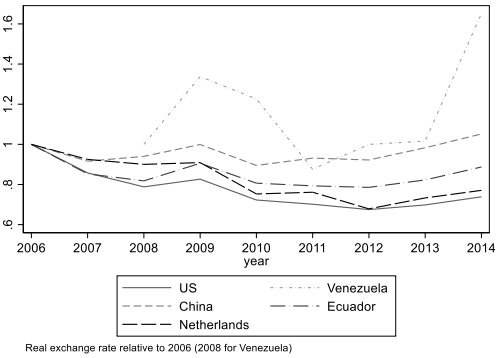
Variable	*Firm type* Non-exporting, non-decreed dividends	Non-exporting, decreed dividends	Exporting, non-decreed dividends	Exporting, decreed dividends	Pi-value (difference across groups)[1]	Number of observations
Log real exported value (COP)			19.783	19.929	0.000	21,301
Log firm specific real exchange rate[2]			5.513	5 .456	0.977	21,301
Exported value/operating income			0.200	0.128	0.000	21,301
International managerial quality[3]			0.001	0.000	0.884	15,732
Log real imported value (COP)	19.706	20.078	20.916	21.668	0.000	47,016
Log firm specific real exchange rate (imports)[4]	5.685	5.847	6.044	6.344	0.000	47,016
Imported value/sales cost	0.315	0.291	0.307	0.324	0.000	47,016
Log real decreed dividends (COP)		19.089		20.196	0.000	27,866
Decreed dividends/equity		0.251		0.185	0.007	27,866
Decreed dividends/assets		0.091		0.075	0.000	27,866
Share of big private firms that decreed dividends in t and paid them in t		0.642		0.555	0.000	27,866
Share of big private firms that decreed dividends in t and paid them in t+1		0.146		0.230	0.000	23,329
Share of big private firms that decreed dividends in t and did not pay them between t and t+1		0.212		0.217	0.020	23,329
Log real total assets (COP)	21.899	22.312	23.010	23.559	0.000	112,224
ROA (Profit before taxes/assets)	0.052	0.110	0.044	0.103	0.000	112,224
Profit rate (operating profit/operating income)	0.041	0.082	0.045	0.090	0.000	110,788
Financial investments/assets	0.021	0.029	0.016	0.028	0.000	112,224
Debt/assets	0.217	0.183	0.257	0.190	0.000	112,224
Cash flow/ assets	0.071	0.084	0.053	0.062	0.000	112,224
TFP[5]	1.815	1.856	1.879	1.924	0.000	112,224
Free Cash Flow[6] / Assets	1.643	1.668	1.246	1.271	0.000	112,224
Overinvestment[7]/assets	0.006	0.006	-0.001	-0.003	0.012	112,224

Note: Simple average by year. [1] A regression of each dependent variable on dummy variable(s) for each firm type group plus state, year, and industry fixed effects was estimated. Then, it was jointly tested that the coefficient(s) of the dummy variable(s) was(were) different than 0 through a F-test. [2] $\Delta\, Log\ real\ export\ exchange\ rate_{ft} = \Delta \ln\left(\sum_k (RER_{kt})(share\_exp_{fk,t=0})\right)$, where RER_{kt} is the real exchange rate between Colombia and destination country k, and $share\_exp_{fk,t=0}$ is the share of exported value to destination country *k* in total exports of firm f in its first sample year. [3] International managerial quality variable is obtained from Merchan (2023). [4] $\Delta\, Log\ real\ import\ exchange\ rate_{ft} = \Delta \ln\left(\sum_j (RER_{jt})(share\_imp_{fj,t=0})\right)$, where RER_{jt} is the real exchange rate between Colombia and origin country *j*, and $share\_imp_{fj,t=0}$ is the share of imported value from origin country *j* in total imports of firm f in its first sample year. [5] TFP calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2018) (table A4). [6] FCF (Free Cash Flow) = Operating Income - CAPEX (Capital expenditures) – Debt payment. [7] Overinvestment calculation follows Richardson (2006) methodology (see appendix C).

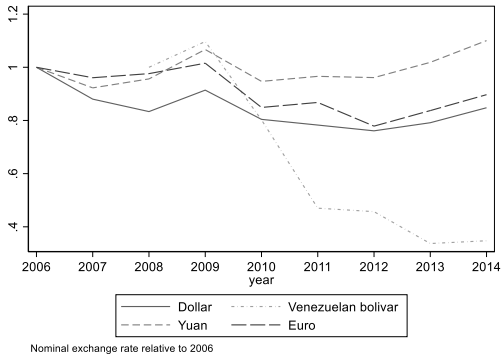
Graph 7: Real exchange rate index and oil price



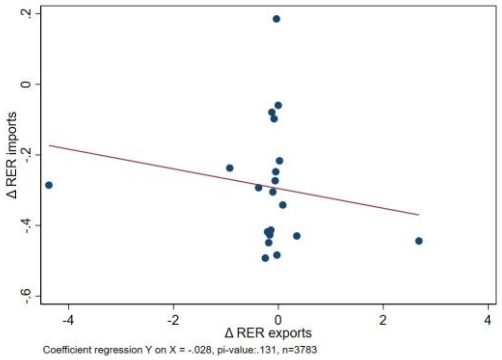
Graph 8: Bilateral real exchange rate, 2006-2014, principal trading partners (2006=1)



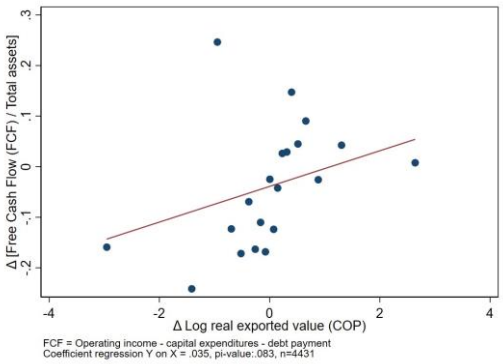
Graph 9: Bilateral nominal exchange rate, 2006-2014, principal trading partners (2006=1)



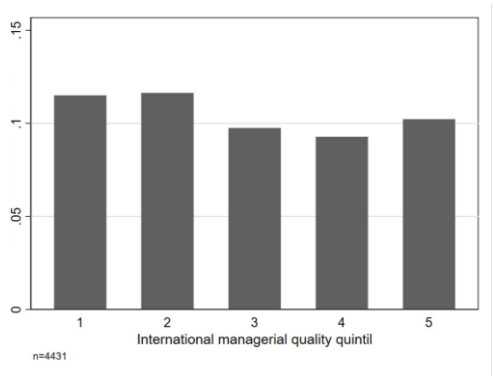
Graph 10: Binned scatter plot between firm specific real exchange from exports and imports (three-year differences)



Graph 11: Binned scatterplot between exported value and free cash flow (three-year differences)



Graph 12: Share of firms that initiated to decree (effectively paid*) dividends relative to t-3 by international managerial quality quintiles



Source: **Own calculations based on i) Colombian Companies Superintendence (biggest private Colombian firms' financial statements), ii) National Colombian Statistics Agency (customs data), iii) IMF (prices and bilateral nominal exchanges rates), iv) Colombian Central Bank (methodology to calculate real exchange rate, Banco de la Republica (2021)), v) FRED - Federal Reserve Bank of St. Louis (oil price), and vi) international managerial quality obtained from Merchan (2023). *Decreed dividends should be paid within the next year they are decreed (Article 156, Colombian Code of Commerce).**

V. Methodology

The calculation of exports effect on dividend policy through OLS could produce biased estimators since firms' exports could be correlated with unobservable dividend policy determinants like "*corporate strategy, anticipated competitive pressures, expected revenue growth, etc*" (Roberts & Whited, 2013, p.509). In fact, the omitted variable bias is particularly severe in the corporate finance literature: "*a number of factors relevant for corporate behavior are unobservable to econometricians.*" (Roberts & Whited, 2013, p.498).[26] The OLS estimates bias (upward or downward) would depend on the product of exported value-omitted variable correlation with omitted variable's impact on dividend policy. For instance, anticipate competitive pressures could be positive correlated with exported value (firms could boost exports in order to face competition) and impact negatively dividend policy (competition could rise future uncertainty discouraging firms to pay dividends), which would produce a downward OLS exported value coefficient bias.

For this reason, an instrumental variable is implemented following Jiang et al. (2010)'s methodology, which studied how export demand shocks affected Chinese exporters performance during the Asian financial crisis in 1997 using a shock index (firm specific real exchange rate variation) as instrumental variable.[27] They ran a 2SLS differentiated econometric specification including province-industry fixed effects and a vector of firms' pre-shock characteristics in order to control for initial differences. Jiang et al. (2010) also adds in the first stage a vector of the interaction of firms' pre-shock characteristics with the shock index: "*because the impact of the exchange rate shocks on changes in firms' exports may vary across firms with differing initial characteristics*" (Jiang et al., 2010, p. 825).

Equation 1 shows the first stage estimation in which *f* denotes firm, *i* industry (ISIC 3 digit), *s* state, and *t* year. The dependent variable $\Delta\, Log\ exp_{fist}$ is the change of log real exported value measured in real Colombian Pesos (COP). The instrumental variable is $\Delta \ln RER_{ft} = \Delta \ln (\sum_k (RER_{kt} + 1) * share\_exp_{fk,t=0})$, where RER_{kt} is the real exchange rate between Colombia and destination country *k*, and $share\_exp_{fk,t=0}$ is the exported value share to destination country *k* in total exports of firm *f* in its first sample year. RER_{kt} is calculated following Banco de la Republica (2021) - Colombian Central Bank methodological guide to calculate real exchange rate-, in which $RER_{kt} = (\mathrm{S}/S^*) * (P^*/\mathrm{P})$, where P^* is the external price level, P is the Colombian price level, S is the nominal exchange rate between Colombia and US, and S^* is the nominal exchange rate between country *k* and US.[28] One is added (+1) to the RER in order to include zeros for the observations in which firms exported to destination countries where they did not export the initial year (t=0). RER_{kt} growth implies real exchange depreciation, indicating that Colombian goods become relatively cheaper in the international market.

Theoretically, relevance condition is fulfilled because firms that export to countries with a higher real exchange rate depreciation are more likely to increase their exports than similar exporting firms that export to different countries, since their products become internationally cheaper encouraging external demand. For instance, two similar Colombian exporting firms in observable characteristics faced different exogeneous export demand shocks if one firm exported to US (exogeneous fall in external demand) and the other firm exported to China (exogeneous rise in external demand) (see graph 8). Nevertheless, both firms' income measured in COP are likely to absorb nominal

[26] Roberts & Whited (2013) provides a deep analysis of endogeneity issue in empirical corporate finance literature.

[27] In a similar approach, Bastos et al. (2018) calculated real exchange rate changes interacted with exports destination country dummies at the initial year to study the effect of exports destination on input prices.

[28] Consumer prices index and nominal exchanges rates were obtained from International Monetary Fund, International Financial Statistics.

exchange variation because most of these firms are not financially covered by currency risk.[29] As expected, IV first stage statistics confirm that firm specific real exchange rate impacts positively and statistically significative the exported value (see section VI).

In addition, two elements allow to infer that exclusion restriction is plausibly satisfied. First, real exchange rate variation occurred between 2006 and 2014 was unpredictable and highly correlated with international oil price increase (Acero, 2017), reducing the probability that unobservable dividend policy determinants variables are correlated with the instrumental variable. Secondly, export shares of firm specific real exchange rates are fixed at initial year, guaranteeing that the instrumental variable variation is not generated by endogenous manager decisions.

X includes a set of firm-level dividend policy determinants: log total assets, profit rate (operating profit/operating income), debt (financial debt/assets), financial investments/assets, cash flow (cash flow/assets) and TFP[30]. These variables were selected based on the most common explanatory variables included in five empirical published papers about dividend policy (Chay & Suh, 2009; DeAngelo et al., 2006; Gugler & Yurtoglu, 2003; Kulchania, 2023; Michaely & Moin, 2022).[31] As the focus of this paper is international trade, *X* also covers exported value/operating income ratio, imported value/sales cost ratio and the international managerial quality variable calculated in Merchan (2023)[32].

For ease of coefficients interpretation, X are normalized per year to have mean 0 and standard deviation 1. ∂_i are industry fixed effects, ∂_s state fixed effects, and ∂_t year fixed effects. Robust standard errors are clustered at firm level. Δ_l describes the differences operator between t and t-l which removes the firm fixed effect. Finally, equation 2 shows the second stage regression:

$$\Delta_l \, Log\ exp_{fist} = \beta_o + \beta_1 \Delta_l \ \ ln\ RER_{fist} + \Pi \Delta_l \ ln\ RER_{fist} * X_{fist-l} + \Gamma X_{fist-l} + \partial_i \ + \partial_s + \partial_t + \ \Delta_l v_{fist} \qquad (1)$$

$$\Delta_l \, Y_{fist} = \beta_o + \beta_1 \Delta_l \, \widehat{Log\ exp}_{fist} + \Gamma X_{fist-l} + \partial_i \ + \partial_s + \partial_t \ + \ \Delta_l e_{fist} \qquad (2)$$

where the main dependent variable $\Delta_l \, Y_{fst}$ is a dummy indicating if firms *initiated to decree effectively paid dividends* (the firm decreed dividends in t – effectively paid according to times established in law – but not in t-l). To the best of the author's knowledge, there is no any estimation method that fixes simultaneously the 'incidental parameter problem' of fixed effects in non-linear models (Greene, 2002; Stammann, 2021), the disadvantages of each binary choice models with endogenous variables (Dong et al., 2012) and the interpretation of interactions terms in non-linear models[33] (Drichoutis, 2011). Consequently, equation 2 is calculated through a Linear Probability Model for simplicity.

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[29] The percentage of the 5000 biggest Colombian firms that contracted exports exchange rate forwards increased from only 3% in 2006 to 6.5% in 2014 (Alfonso, 2018).

[30] TFP calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2018). See appendix table A4.

[31] Firm size (total assets or total assets growth) is included as explanatory variable in 4 of them, profitability in 3, Tobin's q in 3, debt in 2 and liquidity (cash flow over assets) in 1. As there is no firms' market value information to calculate Tobin's q, financial investment ratio relative to assets is added. TFP is also included due to a recent paper by Kulchania (2023), who fills the gap to study TFP impact on dividend policy, finding that firms with higher productivity are able to initiate, maintain, and increase dividend payouts.

[32] International managerial quality is calculated as "*the average of a regression residuals group conformed by detailed export unit value residuals for differentiated goods (multiplied by -1 for those products that compete internationally by price) and detailed export quantity residuals for homogeneous goods*" (Merchan, 2023, p.4)

[33] In order to calculate heterogeneous effects coefficients described in equation 4 and 5.

Y_{fist} also includes free cash flow (FCF) relative to assets which is one transmission mechanism through which exported value could impact dividend policy. Ideally, this transmission mechanism should be proved modeling the exports effect on FCF and then, in a second step, the FCF effect on dividends ($EXP \rightarrow \widehat{FCF} \rightarrow DIV$). Nevertheless, this methodological approach would not allow to correct exported value endogeneity, which is one of the paper's aims, whereby empirical evidence about this transmission mechanism cannot be interpreted as totally conclusive. Furthermore, Y_{fist} covers overinvestment rate relative to assets (see appendix C for its calculation details) in order to verify if dividend payment avoid manager overinvestment as the agency cost theory predicts. Third, appendix B analyzes the exported value impact on cash flow volatility with different econometric methodologies (see section III).

One potential issue of this econometric analysis is that real exchange rate effect on dividend policy via exports could be reversed via imports. This phenomenon is more likely to occur in particular firms like the ones with parent companies abroad.[34] Although stylized facts indicate that, on average, big private Colombian exporting firms tend to export to different countries where they import from (coefficient of firm specific real exchange rate from imports[35] on firm specific real exchange rate from exports is just -2.8% and non-statistically significative, see graph 10), equation 1 and 2 includes imported value/sales cost ratio as explanatory variable in order to control for this potential "reverse" effect. As a formal robustness check, equation 3 assumes imported value as endogenous variable and firm specific real exchange rate from imports as an additional instrumental variable. This econometric specification allows to verify if real exchange rate variation effect on dividend policy via exports holds when imported value is treated as endogenous[36]:

$$\Delta_l Y_{fist} = \beta_o + \beta_1 \Delta_l Log\ exp_{fist} + \beta_2 \Delta_l Log\ imp_{fist} + \Gamma X_{fist-l} + \partial_i + \partial_s + \partial_t + \Delta_l e_{fist} \qquad (3)$$

In addition, heterogeneous export effects on dividend policy disaggregated by managerial quality are calculated as shown in equation 4 in order to test the different agency cost sub- hypothesis (see section III):

$$\Delta_l Y_{fist} = \beta_o + \beta_1 \Delta_l Log\ exp_{fist} + \sum_{Q=2}^{5} \beta_Q * 1\{Quintil = Q_{IMQ,fist-l}\} * \Delta_l Log\ exp_{fist} + \Gamma X_{fist-l} + \partial_i + \partial_s + \partial_t + \Delta_l e_{fist} \qquad (4)$$

where X are the same set of explanatory variables defined previously for equation 1 and 2, and $1\{Quintil = Q_{IMQ,fist-l}\}$ is a dummy variable which takes the value of 1 if firms' international managerial quality (IMQ) belongs to quintile q in year t-l. Export shock effect on dividend policy for the first international managerial quality quintile firms is measured by $\hat{\beta}_1$, and the effect on the second, third, fourth and fifth quintile is given by $\hat{\beta}_1 + \hat{\beta}_2$, $\hat{\beta}_1 + \hat{\beta}_3$, $\hat{\beta}_1 + \hat{\beta}_4$, and $\hat{\beta}_1 + \hat{\beta}_5$, respectively. It is not strictly

[34] *"For example, Chinese firms may import intermediate inputs from parent companies overseas, assemble these inputs into finished products, and then send them back to their parent companies in the same locations. For such firms, exchange rate appreciation in a firm's overseas export locations also makes intermediate inputs more expensive. The firm's exports should rise, while the prices of intermediate inputs (in Chinese yuan) should also rise."* (Jiang et al. 2010, p.837)

[35] $\Delta\ Log\ real\ import\ exchange\ rate_{ft} = \Delta\ ln\ (\sum_j (RER_{jt})(share\_imp_{fj,t=0}))$, where RER_{jt} is the real exchange rate between Colombia and origin country j, and $share\_imp_{fj,t=0}$ is the share of imported value from origin country j in total imports of firm f in its first sample year.

[36] The estimation sample is smaller given that it is not possible to calculate real exchange rate from imports for the big private exporting firms that did not import.

required to include additional instrumental variables in order to estimate the first stage of the new endogenous variables ($1\{Quintil = Q_{Imq,fist-l}\} * \Delta_l\ Log\ exp_{fist}$) because the econometric specification would still be overidentified with the instrumental variables described in equation 1. Nonetheless, it was added four new instruments $\sum_{Q=2}^{5} \beta_Q * 1\{Quintil = Q_{IMQ,fist-l}\} * \Delta_l\ RER_{fist}$ to improve accuracy.

As a way to deep into the agency cost sub-hypothesis related with corporate governance quality, it was estimated an additional heterogeneous effect specification including a dummy variable SAS_{fis}, which indicates if firm *f* is currently legally registered as SAS. As the dividend payment rules for SAS firms could protect the minority shareholders in a smaller proportion since the *special majority system* to distribute less than 50% of profits in dividends or not distribute dividends is not mandatory (see section II), a null exported value effect on dividend policy for these firms (and positive for Non-SAS firms) could support the 'outcome model'. However, SAS dummy variable is imprecise because information about the year in which firms were legally constituted or changed from another legal form to SAS is not available[37], ergo, it is time invariant. As a way to deal with this imprecision, the estimation sample will be balanced (firms that exported all years from 2006 to 2014) in order to include comparable firms which were created under another legal form and had the possibility to transform to SAS from 2008:

$$\Delta_l\ Y_{fist} = \beta_o + \beta_1 \Delta_l\ Log\ exp_{fist} + \beta_2 SAS_{fis} * \Delta_l\ Log\ exp_{fist} + \beta_3 SAS_{fis} + \Gamma X_{fist-l} + \partial_i\ + \partial_s + \partial_t\ +\ \Delta_l e_{fist} \qquad (5)$$

in which $\hat{\beta}_1$ is the export effect on dividend policy for firms which were legally constituted as another legal form and did not transform to SAS, and $\hat{\beta}_1 + \hat{\beta}_2$ would indicate the export effect on dividend policy for firms that were legally constituted as another legal form and transformed to SAS at some point in time. It is added a new endogenous variable $SAS_{fis} * \Delta_l\ Log\ exp_{fist}$ and a new instrumental variable $SAS_{fis} * \Delta_l\ RER_{fist}$ to the IV estimation.

In terms of the export effect on amount decreed in dividends, it is implemented the methodological procedure 19.2 described in Wooldridge (2010) -which is a combination of Heckman (1979) two-step procedure and instrumental variable-, in order to verify the potential selectivity bias of the big private exporting firms that initiated to decree effectively paid dividends (sub-sample) relative to all big private exporting firms. This problem would generate incorrect standard errors in the IV results that should be corrected through bootstrapping. Equation 6 shows the selection equation (*probit*) from which the inverse mill ratio (probability density function/ standard normal cumulative distribution) is calculated and, then, it is included as one explanatory variable in the IV estimation restricting the sample to those firm-year observations in which firms initiated to decree effectively paid dividends (equation 7):

$$Initiated\ to\ decree\ efectively\ paid\ dividends\ (1 = Yes,\ 0 = No)_{\ fist} = \varphi\left(X_{fist-l}, \Delta_l H_{fist}\right) \qquad (6)$$

$$\Delta_l\ P_{fist} = \beta_o + \beta_1 \Delta_l\ Log\ exp_{fist} + \beta_2 Inverse\ Mills\ Ratio_{fist} + \Gamma X_{fist-l} + \partial_i + \partial_s + \partial_t + \Delta_l e_{fist} \qquad (7)$$

where *P* is the amount decreed in dividends relative to assets, X the same set of explanatory variables defined before, and *H* includes the instrumental variable ($\Delta_l\ Log\ real\ exchange\ rate_{fist}$) and minimum one variable that should explain selection (why firms initiated to decree effectively paid

[37] It was a widely implemented practice: around 54% of the firms transformed to "SAS" legal form at some point in time.

dividends) but not the outcome (amount decreed in dividends relative to assets).[38] These variables contribute to get precise estimates and avoid issues specifications (Sartori, 2003). Two recent dividend policy papers used the next selection variables to identify dividend payers firms: i) a dummy if the return on assets was above the first sample quartile in the previous period (Driver et al., 2020),[39] and ii) industry percentage of dividend payers (Bazil et al., 2022).[40] As the main dependent variable of this paper is defined in relation to a previous period (initiated to decree effectively paid dividends in t relative to t-l), the selection equation is calculated with the two selection variables mentioned before but differentiated in a similar way: i) a dummy variable if the return on assets was above the first sample quartile in t but not in t-l ($\Delta_l\ Quartile\ ROA > 1_{fist}$), and ii) change in the industry percentage of dividend payers between t and t-l ($\Delta_l\ percentage\ industry\ dividend\ payers_{fist}$). $\hat{\beta}_2$ statistical significance in equation 7 would determine if sample selection exists and if it is necessary to correct standard errors in the IV estimation.

VI. Results

Table 2 shows the results of the IV first stage (equation 1) estimated in two (l=2), three (l=3) and four (l=4) years differences. Firm specific real exchange rate has a positive statistically significant effect on exported value in all specifications, indicating that real exchange rate devaluation (firm's exported products become relatively cheaper in the international market) boosts exported value, as suggested by the economic theory. No rejection of Hansen's J test of overidentifying restrictions in column 2 (l=2), column 4 (l=3), and column 6 (l=4) suggests that interactions $\Delta_l\ ln\ RER_{fist} * X_{fist-l}$ are coherent instruments that identify the same parameters (Parente & Santos, 2011). In terms of the instrument's strength, all specifications except column 6 present F test joint significance larger than the 'rule of thumb' of 10 and effective F statistics -which are robust to heteroscedasticity, autocorrelation, and clustering (Montiel & Pflueger, 2013) - larger than 20% weak instrument threshold (τ). Therefore, baseline results should be calculated in two- or three-years differences.

From these options, three years differences is preferred as the baseline specification since strength F tests in the specification without interactions $\Delta_l\ ln\ RER_{fist} * X_{fist-l}$ (column 3) and Hansen's J test pi-value in the specification with interactions (column 4) are larger than the in the two-year differences specifications (column 1 and 2, respectively). Also, first stage results point a trade-off between instruments' coherency and strength: interactions $\Delta_l\ ln\ RER_{fist} * X_{fist-l}$ are coherent instruments, according to Hansen's J test pi-value, but first stage is stronger without those interactions, according to F test and effective F statistics. Consequently, second stage results are calculated with and without $\Delta_l\ ln\ RER_{fist} * X_{fist-l}$ interactions in the first stage to show robustness across specifications.

Table 3 illustrates the second stage results (equation 2) in the three-year differences estimation. The findings seem to validate the agency cost theory; firms initiated to decree effectively paid dividends in response to exogeneous exports shocks (column 1 and 2), which could be a way to mitigate the agency cost generated by FCF because of exports variation (column 3 and 4) (graph 11). As appendix B shows

[38] Year fixed effects are included. Industry and state fixed effects are excluded because some fixed effects have very low number of observations (2 and 4, respectively) which could exacerbate the incidental parameter problem. See table A10.

[39] *"Commencing dividends entails an assumption that they will be continued…initiation of dividends thus depends on some threshold criterion being exceeded… This [variable in the selection equation] is justified by the anticipated damage from having to cease dividend payments in the future, so that a threshold effect is expected."* (Driver et al., 2020, p.568)

[40] *"Proportion of dividend payers in an industry tends to have positive impact on the decision to pay dividends"* (Bazil et al., 2022, p. 304).

that export share is positive correlated with cash flow volatility and conditional cash flow volatility,[41] the set of econometric results suggest that exported value impacts dividend policy through the two agency cost transmission mechanisms explained in section III: FCF and cash flow volatility. Interestingly, dividend payment could be insufficient to avoid firms' overinvestment (exported value coefficient is not significant in column 6 but it is significant in column 5). Further research is suggested into this relevant public policy topic: *does dividend payment avoid firms' overinvestment? If yes, completely?*

These findings are robust when it is assumed that imported value is endogenous, confirming that real exchange rate variation effect on dividend policy via exports is not reversed via imports (table A5) (equation 3). Additionally, positive effect of export shocks on the probability to initiate to decree effectively paid dividends is not robust in the two-year differences specification (table A6) but in the four-year differences (table A7), suggesting that minimum three years must pass for the international market conditions fluctuation becomes relevant into the shareholders' assembly decision about dividend policy.

The '*outcome model*' sub-hypothesis within the agency cost theory is partly supported by the IV heterogeneous effects results (table 4). Positive exports impact on the probability to initiate to decree effectively paid dividends is driven by: i) the highest international managerial quality quintiles firms[42], which *could* be the firms with better corporate governance and/or the firms more likely to implement corporate governance codes[43] (equation 4), and ii) firms which did not change their legal form to SAS (equation 5), which are more likely to protect the minority shareholders because of the mandatory special majority system to distribute less than 50% of profits in dividends or not decree dividends. Further empirical research is suggested into the dynamics of the managerial quality-corporate governance-dividend policy with micro data of these three aspects.

In general, econometric results support that big private Colombian exporting firms started to decree effectively paid dividends as a mechanism to mitigate the agency cost generated by exogeneous export shocks in an effective system that protect minority shareholders (*outcome model*). This pattern follows Floyd et al. (2015)'s findings for US, in which agency cost of free cash flow explains the industrial dividend payouts.[44] On the contrary, the findings contradict signaling theory because firms adapt their dividend policy to temporary profit variation caused by international market conditions fluctuation.

A back-of-the-envelope calculation presents two limitations. First, IV coefficients are consistent but not unbiased, and secondly, econometric specification with binary dependent variable was calculated with linear probability model because of the reasons mentioned before. Since these limitations cannot be resolved, 0.0358 coefficient (column 2 in table 3) implies that 1 standard deviation change in log real exported value (1.15) accounts for around 26% of the firms which started to decree effectively paid dividends (10.3% from the estimation sample).[45] As a point of reference, the same calculation with OLS coefficient (0.0136) would indicate that 1 standard deviation change in log real exported value (1.15) accounts for around 10% of firms which started to decree effectively paid dividends (10.3% from the estimation sample).

[41] Probably, it is required a longer sample in terms of years to prove a causal effect from exports on cash flow volatility.

[42] On average, highest managerial quintile firms do not start to decree effectively paid dividends in a larger proportion (graph 12), they are just more prone to do it facing exogeneous export shocks.

[43] Detailed micro data is necessary to state conclusively.

[44] They found that agency cost theory explains industrial payouts but signaling theory the financial sector payouts.

[45] 0.26 = 0.0358*ln(1+1.15)/0.103

Finally, table A8 shows the selection equation results of the two step Heckman-instrumental variable methodology described before (equation 6). As expected, the instrumental variable (Δ_l *Log real exchange rate*$_{fist}$) and the selection variables (Δ_l *Quartile ROA* $> 1_{fist}$, Δ_l *percentage industry dividend payers*$_{fist}$) coefficients are positive and statistically significant on the probability that firms initiated to decree effectively paid dividends. Then, null statistically significance of the inverse mills' ratio coefficient in the IV estimation (equation 7) (table 5) indicates that exporting firms that initiated to decree effectively paid dividends conform a random sample from the big private exporting firms. Also, null statistically significance of the exported value coefficient indicates that exported value does not affect the amount decreed in dividends. These results confirm the patterns described in the descriptive statistics: exports impact 'dividend extensive margin' (probability to initiate to decree effectively paid dividends) but not 'dividend intensive margin' (amount decreed).

Table 2: **First stage – firm specific real exchange rate effect on exported value**

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Δ Log real exported value (COP)					
Difference (l)	Second difference		Third difference		Fourth difference	
Δ Log firm-specific real exchange rate (share destination country t=0)	0.222***	0.203***	0.226***	0.237***	0.231***	0.255***
	(0.0266)	(0.0251)	(0.0263)	(0.0308)	(0.0309)	(0.0428)
Observations	5,545	5,545	4,431	4,431	3,322	3,322
Fixed effects	State, year, industry					
X t-l *Δ RER	No	Yes	No	Yes	No	Yes
X t-l	Yes	Yes	Yes	Yes	Yes	Yes
Effective F statistic	69.82	12.28	74.33	10.59	55.75	7.11
Critical value τ = 5	*37.42*	*25.68*	*37.42*	*26.46*	*37.42*	*26.51*
Critical value τ = 10	*23.11*	*14.73*	*23.11*	*15.26*	*23.11*	*15.39*
Critical value τ = 20	*15.06*	*8.91*	*15.06*	*9.27*	*15.06*	*9.42*
F-joint significance of the instrument(s)	69.82	11.03	74.33	10.35	55.75	7.26
Under identification test p-value	0.00	0.00	0.00	0.00	0.00	0.00
Pi-value Hansen J-statistic	.	0.12	.	0.20	.	0.76

Note: Effective F statistic reports Montiel & Pflueger (2013) weak instrument test, which is robust to heteroscedasticity, autocorrelation, and clustering, with its critical values. Hansen J statistic tests under the null hypothesis that the instruments are coherent (Parente & Santos, 2011) in an overidentified model (# instruments > # endogenous variables). The null hypothesis of the under-identification test is that the model is not identified (the matrix is not full column rank). X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income, international managerial quality variable (Merchan, 2023), and imported value/sales cost. X variables are normalized to have mean 0 and standard deviation 1 (per year).

Table 3: Export effect on firms' dividend policy – third difference

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Initiate effective dividends* (the firm decreed dividends in t -effectively paid[1]- and did not decree them in t-3)		Δ_3 (Free Cash Flow[2] / assets)		Δ_3 (Overinvestment[3] / assets)	
Method	IV	IV	IV	IV	IV	IV
Δ_3 Log real exported value (COP)	0.0465***	0.0358**	0.120*	0.119*	0.00927**	0.00691
	(0.0167)	(0.0144)	(0.0717)	(0.0620)	(0.00471)	(0.00421)
Observations	4,431	4,431	4,431	4,431	4,431	4,431
Fixed effects	State, year, industry					
X_{t-3}	Yes	Yes	Yes	Yes	Yes	Yes
First stage	Column 3, table 2	Column 4, table 2	Column 3, table 2	Column 4, table 2	Column 3, table 2	Column 4, table 2
Method	OLS		OLS		OLS	
Δ_3 Log real exported value (COP)	0.0136***		0.0455**		0.000746	
	(0.00397)		(0.0216)		(0.00132)	
Observations	4,431		4,431		4,431	
Fixed effects	State, year, industry					
X_{t-3}	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. Balanced sample comprises big private Colombian exporting firms that exported all years from 2006 to 2014. [1]Effectively paid according to times established in law: one year after decreeing them (Article 156 – Colombian Code of Commerce). [2] FCF = Operating Income – Capital expenditures (CAPEX) – Debt payment. [3] Overinvestment calculation follows Richardson (2006) methodology, see appendix C. X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income , international managerial quality variable (Merchan, 2023), and imported value/sales cost. X are normalized to have mean 0 and standard deviation 1.

Table 4: **Heterogeneous export effect on firms' dividend policy – IV estimation**

	Coefficient(s)	(1) *Initiate effective dividends* (the firm decreed dividends in t -effectively paid[1]- and did not decree them in t-3)	(3) Δ_3 (Free Cash Flow[2] / assets)	(5) Δ_3 (Overinvestment[3] / assets)
Heterogeneous effect by international managerial quality quintiles - equation 4				
Q1	b1	0.0182	0.111**	0.00468
	Pi-value b1=0	0.4704	0.0136	0.5564
Q2	b1+b	0.0365	0.0539	0.0059
	Pi-value b1+b2=0	0.4330	0.4977	0.6734
Q3	b1+b3	0.0648**	-0.0641	0.0169
	Pi-value b1+b3=0	0.0316	0.2940	0.1271
Q4	b1+b4	0.0156	0.0696	-0.0045
	Pi-value b1+b4=0	0.5240	0.4295	0.7603
Q5	b1+b5	0.0564*	0.3337	0.0088
	Pi-value b1+b5=0	0.0906	0.1604	0.1818
Heterogeneous effect by legal firm type (SAS) - equation 5				
No SAS	b1	0.0348**	0.1129**	0.0071
	Pi-value b1=0	0.0433	0.0384	0.2708
SAS	b1+b2	0.0368	0.1514	0.0063
	Pi-value b1+b2=0	0.1360	0.1714	0.2806

Note*:* Robust standard errors clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. Balanced sample comprises all big private Colombian firms that exported all years from 2006 to 2014. SAS: Simplified joint-stock company. [1] Effectively paid relative to times established in law: one year after decreeing them (Article 156 – Colombian Code of Commerce). [2] FCF = Operating Income – Capital expenditures (CAPEX) – Debt payment. [3] Overinvestment calculation follows Richardson (2006) methodology, see appendix C. Equation 4 and 5 describe the IV econometric specification.

Table 5: Export effect on firms' dividend policy (amount decreed) – *heckman* correction

	(1)	(2)	(3)	(4)
Dependent variable	Δ_3 [Decreed dividends/Assets]			
Method	IV	IV	IV	IV
Δ_3 Log real exported value (COP)	0.00534	0.00872	0.00340	0.00806
	(0.0131)	(0.0109)	(0.0131)	(0.0108)
Inverse Mills Ratio			-0.00943	-0.00432
			(0.0277)	(0.0274)
Censored observations	449	449	449	449
X_{t-3}	Yes	Yes	Yes	Yes
Fixed effects	State, year, industry			
First stage				
P-value Hansen J statistic	.	0.39	.	0.39
Under identification test pi-value	0.00	0.01	0.00	0.00
F joint significance of the instrument(s)	23.04	11.42	28.41	11.58
Effective F statistic (first stage)	23.04	5.52	28.41	4.90
Critical value 20	15.06	10.16	15.06	10.00
Critical value 10	23.10	16.58	23.10	16.36
X_{t-3} *Δ_3 RER	No	Yes	No	Yes
X_{t-3}	Yes	Yes	Yes	Yes
First stage	Column 1 - Table A9	Column 2 - Table A9	Column 3 - Table A9	Column 4 - Table A9
Method	OLS		OLS	
Δ_3 Log real exported value (COP)	-0.00855**		-0.00901**	
	(0.00426)		(0.00416)	
Inverse Mills Ratio			-0.0230	
			(0.0281)	
Censored observations	449		449	
X_{t-3}	Yes		Yes	
Fixed effects	State, year, industry			

Note: Robust standard errors clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. Balanced sample comprises all big private Colombian firms that exported from 2006 to 2014 and initiated to decree effectively paid dividends. Inverse Mills Ratio is calculated based on selection equation (table A8). X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income, international managerial quality variable (Merchan, 2023), and imported value/sales cost. X are normalized to have mean 0 and standard deviation 1.

VII. Conclusion

The international trade role on dividend policy is surprisingly insufficient explored in the academic literature. This paper argues that exports could be one of the missing pieces to put together the "*dividend puzzle*" because exogenous export demand shocks allow to evaluate exporting firms' dividend policy adjustment and assess the principal dividend theories' testable predictions. For this purpose, an IV methodology is implemented in which firm specific real exchange rates weighted by destination countries' export shares at initial year is used as instrumental variable for exported value, following Jiang et al. (2010) methodology. The sample is composed by the financial statements and customs data of the biggest private Colombian exporting firms from 2006 and 2014, when an unpredictable real exchange rate fluctuation because of international oil price variation and unprecedent inflation rate in trading partners occurred. Fulfillment of relevance and exogeneity IV conditions are theoretically and empirically supported.

The results indicate that exporting firms initiated to decree effectively paid dividends as a response to exogenous export shocks. This main finding contradicts signaling theory because firms modify their dividend policy because of temporal international income variation, and could support agency cost theory because dividends could be a way to mitigate the priorities differences between manager(s) and shareholder(s) due to export shocks. Additional findings confirm the transmission mechanisms from which exports could create agency cost: i) exports increase free cash flow (FCF) and ii) export share is positive correlated with cash flow volatility and conditional cash flow volatility. Interestingly, exports do not impact the amount decreed in dividends once controlling for the selection bias possibility. In conclusion, exports impact 'dividend extensive margin' (probability to initiate to decree dividends) but not 'dividend intensive margin' (amount decreed in dividends). A back-of-the-envelope calculation indicates that exports account for a significative 26% of the firms that started to decree effectively paid dividends, supporting they hypothesis that exports was one of the missing pieces to put together the "dividend puzzle".

From a policy perspective, econometric results partly support the 'outcome model' within the agency cost theory: firms with better international managerial quality - which could have better corporate governance quality- and firms which did not transform to SAS (*Simplified Joint- stock company*) legal form – which could have better minority shareholders protection - are more likely to start to decree effectively paid dividends in response to exogeneous export shocks. Nonetheless, corporate governance micro data is required to state conclusively about the 'outcome model' validity. Also, econometric results indicate that dividend payment could be insufficient to avoid firms' overinvestment, therefore, it is suggested for future research to deep into the question: "*dividend payment avoid overinvestment? If yes, completely?*". As a final remark, it is expected that this paper become a point of reference that incentives to generate more research about international trade impact on dividend policy.

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APPENDIX A

***Table A1*: Descriptive statistics – second differences**

Variable	*Firm type* Non-exporting, non-decreed dividends	Non-exporting, decreed dividends	Exporting, non-decreed dividends	Exporting, Decreed dividends	Pi-value coefficient (diff across groups)[1]	Number of observations
Δ_2 Log real exported value (COP)			-0.02	0.07	0.01	12,987
Δ_2 Log firm specific real exchange rate[2]			-0.29	-0.22	0.17	12,987
Δ_2 Exported value/operating income			0.00	0.01	0.08	12,987
Δ_2 International managerial quality[3]			-0.01	0.02	0.15	10,336
Δ_2 Log real imported value (COP)	0.01	0.04	0.03	0.07	0.56	30,311
Δ_2 Log firm specific real exchange rate (imports)[4]	-0.29	-0.28	-0.22	-0.15	0.00	30,311
Δ_2 Imported value/sales cost	0.00	0.00	0.00	0.00	0.53	30,311
Δ_2 Log real decreed dividends (COP)		0.11		0.14	0.01	11,708
Δ_2 Decreed dividends/equity		0.02		0.02	0.11	11,708
Δ_2 Decreed dividends/assets		0.01		0.01	0.29	11,708
Share of firms that continue to decree dividends relative to t-2		0.55		0.62	0.00	20,707
Share of firms that start to decree dividends relative to t-2		0.45		0.38	0.00	20,707
Share of firms that start to decree dividends (effectively paid) relative to t-2		0.36		0.29	0.00	16,432
Share of firms that start to decree dividends (non-effectively paid) relative to t-2		0.09		0.08	0.12	16,432
Share of firms that stop to decree dividends relative to t-2	0.16		0.20		0.00	56,902
Δ_2 Log real total assets (COP)	0.12	0.13	0.11	0.12	0.72	77,621
Δ_2 ROA (Profit before taxes/assets)	-0.01	-0.01	-0.01	-0.01	0.03	77,621
Δ_2 Profit rate (Operating profit/operating income)	0.00	0.00	-0.01	-0.01	0.11	76,378
Δ_2 Total investment/assets	0.00	0.00	0.00	0.00	0.51	77,621
Δ_2 Debt/assets	0.00	0.01	0.01	0.02	0.00	77,621
Δ_2 Cash flow/ assets	0.00	0.00	0.00	0.00	0.67	77,621
Δ_2 TFP[5]	0.00	0.01	0.00	0.01	0.00	77,621
Δ_2 Free Cash Flow[6] / Assets	-0.22	-0.10	-0.10	-0.07	0.00	77,621
Δ_2 Overinvestment[7]/assets	0.00	0.00	0.00	0.00	0.08	77,621

Note: Simple average by year. [1]A regression for each dependent variable on dummy variable(s) for each firm type group plus state, year, and industry fixed effects were estimated. Then, it was jointly tested that the coefficient(s) of the dummy variable(s) of each firm type group(s) was(were) different than 0 through a F-test. [2] $\Delta\, Log\ real\ export\ exchange\ rate_{ft} = \Delta \ln\left(\sum_k (RER_{kt})(share\_exp_{fk,t=0})\right)$, where RER_{kt} is the real exchange rate between Colombia and destination country k, and $share\_exp_{fk,t=0}$ is the share of exported value to destination country k in total exports of firm f in its first sample year. [3] International managerial quality variable is obtained from Merchan (2023). [4] $\Delta\, Log\ real\ import\ exchange\ rate_{ft} = \Delta \ln\left(\sum_j (RER_{jt})(share\_imp_{fj,t=0})\right)$, where RER_{jt} is the real exchange rate between Colombia and origin country j, and $share\_imp_{fj,t=0}$ is the share of imported value from origin country j in total imports of firm f in its first sample year. [5] TFP calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2018) (table A4). [6] FCF (Free Cash Flow) = Operating Income - CAPEX (Capital expenditures) – Debt payment. [7] Overinvestment calculation follows Richardson (2006) methodology (see appendix C).

Table A2: Descriptive statistics - third differences

Variable	*Firm type* Non-exporting, non-decreed dividends	Non-exporting, decreed dividends	Exporting, non-decreed dividends	Exporting, decreed dividends	Pi-value coefficient (diff across groups)[1]	Number of observations
Δ_3 Log real exported value (COP)			-0.03	0.10	0.00	10,161
Δ_3 Log firm specific real exchange rate[2]			-0.45	-0.33	0.04	10,161
Δ_3 Exported value/operating income			0.00	0.01	0.00	10,161
Δ_3 International managerial quality[3]			-0.01	0.02	0.12	8,015
Δ_3 Log real imported value (COP)	0.03	0.09	0.10	0.16	0.01	23,411
Δ_3 Log firm specific real exchange rate (imports)[4]	-0.44	-0.36	-0.33	-0.22	0.00	23,411
Δ_3 Imported value/sales cost	0.00	0.01	0.01	0.02	0.04	23,411
Δ_3 Log real decreed dividends (COP)		0.18		0.19	0.13	8,840
Δ_3 Decreed dividends/equity		0.03		0.01	0.58	8,840
Δ_3 Decreed dividends/assets		0.01		0.00	0.79	8,840
Share of firms that continue to decree dividends relative to t-3		0.52		0.59	0.00	16,444
Share of firms that started to decree dividends relative to t-3		0.48		0.41	0.00	16,444
Share of firms that started to decree dividends (effectively paid) relative to t-3		0.38		0.30	0.00	12,587
Share of firms that started to decree dividends (non-effectively paid) relative to t-3		0.09		0.09	0.29	12,587
Share of firms that stopped to decree dividends	0.17		0.23		0.00	43,039
Δ_3 Log real total assets (COP)	0.18	0.21	0.18	0.18	0.03	59,497
Δ_3 ROA (Profit before taxes/assets)	-0.01	-0.01	-0.02	-0.01	0.00	59,497
Δ_3 Profit rate (Operating profit/operating income)	-0.01	0.00	-0.01	-0.01	0.01	58,555
Δ_3 Total investment/assets	0.00	0.00	0.00	0.00	0.72	59,497
Δ_3 Debt/assets	0.00	0.02	0.02	0.02	0.00	59,497
Δ_3 Cash flow/ assets	0.00	0.00	0.00	0.00	0.10	59,497
Δ_3 TFP[5]	0.01	0.02	0.01	0.02	0.00	59,497
Δ_3 Free Cash Flow[6] / Assets	-0.27	-0.13	-0.14	-0.04	0.00	59,497
Δ_3 Overinvestment[7]/assets	0.00	0.00	0.00	0.00	0.51	59,497

Note: Simple average by year. [1]A regression for each dependent variable on dummy variable(s) for each firm type group plus state, year, and industry fixed effects was estimated. Then, it was jointly tested that the coefficient(s) of the dummy variable(s) of each firm type group(s) was(were) different than 0 through a F-test. [2] $\Delta\, Log\ real\ export\ exchange\ rate_{ft} = \Delta \ln\left(\sum_k (RER_{kt})(share\_exp_{fk,t=0})\right)$, where RER_{kt} is the real exchange rate between Colombia and destination country k, and $share\_exp_{fk,t=0}$ is the share of exported value to destination country k in total exports of firm f in its first sample year. [3] International managerial quality variable is obtained from Merchan (2023). [4] $\Delta\, Log\ real\ import\ exchange\ rate_{ft} = \Delta \ln\left(\sum_j (RER_{jt})(share\_imp_{fj,t=0})\right)$, where RER_{jt} is the real exchange rate between Colombia and origin country j, and $share\_imp_{fj,t=0}$ is the share of imported value from origin country j in total imports of firm f in its first sample year. [5] TFP calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2018) (table A4). [6] FCF (Free Cash Flow) = Operating Income - CAPEX (Capital expenditures) – Debt payment. [7] Overinvestment calculation follows Richardson (2006) methodology (see appendix C).

***Table A3*: Descriptive statistics – fourth difference**

Variable	*Firm type* Non-exporting, non-decreed dividends	Non-exporting, decreed dividends	Exporting, non-decreed dividends	Exporting, decreed dividends	Pi-value coefficient (diff across groups)[1]	Number of observations
Δ_4 Log real exported value (COP)			-0.02	0.16	0.00	7,698
Δ_4 Log firm specific real exchange rate[2]			-0.53	-0.43	0.16	7,698
Δ_4 Exported value/operating income			0.00	0.01	0.05	7,698
Δ_4 International managerial quality[3]			-0.01	0.01	0.47	6,037
Δ_4 Log real imported value (COP)	0.09	0.18	0.20	0.25	0.00	17,716
Δ_4 Log firm specific real exchange rate (imports)[4]	-0.56	-0.44	-0.41	-0.31	0.00	17,716
Δ_4 Imported value/sales cost	0.02	0.02	0.02	0.03	0.03	17,716
Δ_4 Log real decreed dividends (COP)		0.18		0.16	0.82	6,539
Δ_4 Decreed dividends/equity		0.01		0.00	0.52	6,539
Δ_4 Decreed dividends/assets		0.00		0.00	0.67	6,539
Share of firms that continue to decree dividends		0.51		0.61	0.00	12,205
Share of firms that start to decree dividends		0.49		0.39	0.00	12,205
Share of firms that start to decree dividends (effectively paid)		0.41		0.33	0.00	8,445
Share of firms that start to decree dividends (non-effectively paid)		0.08		0.08	0.34	8,445
Share of firms that stop to decree dividends	0.19		0.26		0.00	32,449
Δ_4 Log real total assets (COP)	0.25	0.28	0.24	0.25	0.01	44,667
Δ_4 ROA (Profit before taxes/assets)	-0.02	-0.01	-0.02	-0.01	0.00	44,667
Δ_4 Profit rate (Operating profit/operating income)	0.00	0.00	-0.01	0.00	0.00	43,947
Δ_4 Total investment/assets	0.00	0.00	0.00	0.00	0.34	44,667
Δ_4 Debt/assets	0.01	0.02	0.02	0.02	0.01	44,667
Δ_4 Cash flow/ assets	0.00	0.00	0.00	0.00	0.10	44,667
Δ_4 TFP[5]	0.01	0.02	0.02	0.02	0.00	44,667
Δ_4 Free Cash Flow[6] / Assets	-0.29	-0.15	-0.14	-0.06	0.00	44,667
Δ_4 Overinvestment[7]/assets	0.01	0.01	0.00	0.01	0.11	44,667

Note: Simple average by year. [1]A regression for each dependent variable on dummy variable(s) for each firm type group plus state, year, and industry fixed effects were estimated. Then, it was tested that the coefficient(s) of the dummy variable(s) of each firm type group(s) was(were) different than 0 through a F-test. [2] $\Delta\, Log\ real\ export\ exchange\ rate_{ft} = \Delta \ln\left(\sum_k (RER_{kt})(share\_exp_{fk,t=0})\right)$, where RER_{kt} is the real exchange rate between Colombia and destination country k, and $share\_exp_{fk,t=0}$ is the share of exported value to destination country *k* in total exports of firm f in its first sample year. [3] International managerial quality variable is obtained from Merchan (2023). [4] $\Delta\, Log\ real\ import\ exchange\ rate_{ft} = \Delta \ln\left(\sum_j (RER_{jt})(share\_imp_{fj,t=0})\right)$, where RER_{jt} is the real exchange rate between Colombia and origin country *j*, and $share\_imp_{fj,t=0}$ is the share of imported value from origin country *j* in total imports of firm f in its first sample year. [5] TFP calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2018) (table A4). [6] FCF (Free Cash Flow) = Operating Income - CAPEX (Capital expenditures) – Debt payment. [7] Overinvestment calculation follows Richardson (2006) methodology (see appendix C).

***Table A4*: TFP calculation**

VARIABLES	(2) Log real operating income
Log real operating expenses	0.344***
	(0.00398)
Log real property, plant, and equipment	0.0363***
	(0.00576)
Log real sales cost	0.556***
	(0.00941)
Observations	159,872
Number of groups	29,656

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

***Source:* TFP calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018). *Free variable* is operating expenses, *state variable* is property plant and equipment, and *proxy variable* is sales cost.**

Table A5: Export and import effect on firms' dividend policy – third difference

	(1)	(2)	(3)	(4)	(5)
Dependent variable	Δ_3 Log real exported value (COP)	Δ_3 Log real imported value (COP)	*Initiate effective dividends* (the firm decreed dividends in t -effectively paid[1]- and did not decree them in t-3)	Δ_3 (Free Cash Flow[2] / assets)	Δ_3 (Overinvestment[3] / assets)
Method	First stage	First stage	IV	IV	IV
Δ_3 Log real exported value (COP)			0.0301*	0.0758*	0.00526
			(0.0157)	(0.0434)	(0.00431)
Δ_3 Log real imported value (COP)			0.0403	0.0267	0.00492
			(0.0257)	(0.102)	(0.0105)
Δ_3 Log firm-specific real exchange rate	0.226***	-0.0111			
	(0.0350)	(0.0246)			
Δ_3 Log firm-specific real exchange rate imports	0.0576*	0.217***			
	(0.0305)	(0.0414)			
Observations	3,783	3,783	3,783	3,783	3,783
X_{t-3} *Δ RER	Yes	Yes	-	-	-
X_{t-3} *Δ RER imports	Yes	Yes	-	-	-
X_{t-3}	Yes	Yes	Yes	Yes	Yes
Fixed effects			State, year, industry		
Under identification test pi-value			0.05	0.05	0.05
F test: joint significance of instruments (column 1)			7.12	7.12	7.12
F test: joint significance of instruments (column 2)			3.38	3.38	3.38
Method			OLS	OLS	OLS
Δ_3 Log real exported value (COP)			0.0133***	0.0197	-0.000182
			(0.00405)	(0.0170)	(0.00137)
Δ_3 Log real imported value (COP)			0.00795	-0.0158	0.00867***
			(0.00555)	(0.0321)	(0.00168)
Observations			3,783	3,783	3,783
X_{t-3}			Yes	Yes	Yes
Fixed effects			State, year, industry		

Note: Robust standard errors clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. Balanced sample comprises all big private Colombian firms that exported from 2006 to 2014. [1] Effectively paid relative to times established in law: one year after decreeing them (Article 156 – Colombian Code of Commerce). [2] FCF (Free Cash Flow) = Operating Income - CAPEX (Capital expenditures) – Debt payment. [3] Overinvestment calculation follows Richardson (2006) methodology, see appendix C. X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income, international managerial quality variable (Merchan, 2023), and imported value/sales cost. X are normalized to have mean 0 and standard deviation 1.

Table A6: Export effect on firms' dividend policy – second difference

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Initiate effective dividends* (the firm decreed dividends in t -effectively paid[1]- and did not decree them in t-2)		Δ_2 (Free Cash Flow[2] / assets)		Δ_2 (Overinvestment[3] / assets)	
Method	IV	IV	IV	IV	IV	IV
Δ_2 Log real exported value (COP)	0.0163	0.0101	0.0813	0.00189	0.00793*	0.00689
	(0.0165)	(0.0130)	(0.0560)	(0.0358)	(0.00468)	(0.00496)
Observations	5,545	5,545	5,545	5,545	5,545	5,545
Fixed effects	State, year, industry					
X_{t-2}	Yes	Yes	Yes	Yes	Yes	Yes
First stage	Column 1, table 2	Column 2, table 2	Column 1, table 2	Column 2, table 2	Column 1, table 2	Column 2, table 2
Method	OLS		OLS		OLS	
Δ_2 Log real exported value (COP)	0.00733*		0.0360*		0.00130	
	(0.00382)		(0.0199)		(0.00127)	
Observations	5,545		5,545		5,545	
Fixed effects	State, year, industry					
X_{t-2}	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. Balanced sample comprises all big private Colombian firms that exported from 2006 to 2014. [1] Effectively paid relative to times established in law: one year after decreeing them (Article 156 – Colombian Code of Commerce). [2] FCF = Operating Income – Capital expenditures (CAPEX) – Debt payment. [3] Overinvestment calculation follows Richardson (2006) methodology, see appendix C. X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income, international managerial quality variable (Merchan, 2023), and imported value/sales cost. X are normalized to have mean 0 and standard deviation 1.

*Table A7: E*xport effect on firms' dividend policy – fourth difference

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Initiate effective dividends* (the firm decreed dividends in t -effectively paid[1]- and did not decree them in t-4)		Δ_4 (Free Cash Flow[2] / assets)		Δ_4 (Overinvestment[3] / assets)	
Method	IV	IV	IV	IV	IV	IV
Δ_4 Log real exported value (COP)	0.0472***	0.0406***	-0.0293	0.0371	0.00737	0.00717
	(0.0177)	(0.0153)	(0.106)	(0.0916)	(0.00550)	(0.00503)
Observations	3,322	3,322	3,322	3,322	3,322	3,322
Fixed effects	State, year, industry					
X_{t-4}	Yes	Yes	Yes	Yes	Yes	Yes
First stage	Column 5, table 2	Column 6, table 2	Column 5, table 2	Column 6, table 2	Column 5, table 2	Column 6, table 2
Method	OLS		OLS		OLS	
Δ_4 Log real exported value (COP)	0.0164***		0.0584**		0.000844	
	(0.00438)		(0.0242)		(0.00157)	
Observations	3,322		3,322		3,322	
Fixed effects	State, year, industry					
X_{t-4}	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at firm level. *** p<0.01, ** p<0.05, * p<0.1. Balanced sample comprises all big private Colombian firms that exported from 2006 to 2014. [1] Effectively paid relative to times established in law: one year after decreeing them (Article 156 – Colombian Code of Commerce). [2] FCF = Operating Income – Capital expenditures (CAPEX) – Debt payment. [3] Overinvestment calculation follows Richardson (2006) methodology, see appendix C. X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income, international managerial quality variable (Merchan, 2023), and imported value/sales cost. X are normalized to have mean 0 and standard deviation 1.

Table A8: Selection equation (probit) – *heckman* estimation

VARIABLES	(1) The firm initiated to decree effectively paid dividends in t relative to t-3 (1=Yes, 0=No)
Δ_3 Quartile ROA>1	0.027*
	(0.016)
Δ_3 Percentage firms that decreed dividends in the industry	0.285***
	(0.045)
Δ_3 Log firm-specific real exchange rate	0.011***
	(0.003)
X_{t-3}	Yes
Dummy years	Yes
Observations	4,431

Note: Probit - marginal effects reported. Sample is restricted to big private exporting firms that exported all years from 2006 to 2014. X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income , international managerial quality variable (Merchan, 2023), and imported value/sales cost.

Table A9: IV first stage (sample: *heckman* estimation)

Dependent variable Difference (l)	(1)	(2)	(3)	(4)
	Δ_3 Log real exported value (COP) Third difference			
Δ_3 Log firm-specific real exchange rate (share destination country t=0)	0.229***	0.288***	0.236***	0.299***
	(0.0477)	(0.0744)	(0.0442)	(0.0761)
Inverse Mills Ratio, t			0.143	0.204
			(0.359)	(0.367)
Censored observations	449	449	449	449
Fixed effects		State, year, industry		
X_{t-3} *Δ_3 RER	No	Yes	No	Yes
X_{t-3}	Yes	Yes	Yes	Yes
Effective F statistic	23.04	5.52	28.41	4.90
Critical value 5	*37.42*	*28.51*	*37.42*	*28.20*
Critical value 10	*23.11*	*16.58*	*23.11*	*16.36*
Critical value 20	*15.06*	*10.16*	*15.06*	*10.00*
F joint significance of the instrument(s)	23.04	11.42	28.41	11.58
Under identification test p-value	0.00	0.01	0.00	0.00
Pi-value Hansen J statistic	.	0.39	.	0.39

Note: Effective F statistic reports Montiel & Pflueger (2013) weak instrument test, which is robust to heteroscedasticity, autocorrelation, and clustering, with its critical values. Hansen J statistic tests under the null hypothesis that the instruments are coherent (Parente & Santos, 2011) in an overidentified model (# instruments > # endogenous variables). The null hypothesis of the under-identification test is that the model is not identified (the matrix is not full column rank). X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2018) -see appendix A4-), exported value/operating income, international managerial quality variable (Merchan, 2023), and imported value/sales cost. X variables are normalized to have mean 0 and standard deviation 1.

Table A10. Number of observations per fixed effects

	Number of fixed effects	Number of observations per fixed effect				
		Mean	*Median*	*Standard deviation*	*Min*	*Max*
Year	4	1133.25	1135	9.9	1120	1143
State	15	302.20	62	582.9	4	2192
Industry	47	96.45	24	139.8	2	698

APPENDIX B

Exports and cash flow volatility

Ideally, export effect on cash flow volatility should be estimated including different cash flow standard deviation observations by firm calculated for different time periods without overlapping (1985-1989, 1990-1994, 1995-1999, 2000-2004, etc..). As the data of this paper covers only 9 years of observations (2006-2014), one feasible option is to calculate rolling window standard deviation. Column 1 of table B1 shows estimation of equation 2 including 4-years rolling window standard deviation of cash flow/assets as dependent variable (equivalent to l=3 in equation 2)[46]. The results indicate that there is no statistically significative export effect on cash flow volatility neither in the IV (panel A) nor in the OLS estimation (panel B). Results are robust when the dependent variable (cash flow standard deviation) is calculated 3-years rolling window (equivalent to l=2) and 5-years rolling window (equivalent to l=4). The null statistically significance of the exported value coefficient holds for other volatility measures (rolling window standard deviation of FCF/assets in column 2 and rolling window standard deviation of log operating income in column 3). Probably a sample that covers a longer period of time is required to calculate multiple standard observations per firm without rolling window in order to get a more accurate volatility measure.

Then, it is implemented a regression which includes only one observation per firm; cash flow standard deviation as dependent variable and simple average of the explanatory variables X described in equation 2 across years by firm plus industry fixed effects on the right-hand-side. The sample covers all big private exporting firms with 5 or more observations during the 2006-2014 period. The main explanatory variable is exported value/operating income, instead of log real exported value, since that is the variable used by Vannoorenberghe (2012) as export exposure when one observation per firm is included in a regression that estimates export impact on firms' volatility. Column 1 - panel C - table B1 suggest a positive correlation between export share and cash flow volatility. In the same way, column 2 and 3 illustrate a positive correlation between export share and other volatility measures (FCF/assets and operational income's standard deviation). In general, export share is positive correlated with cash flow volatility and other firms' volatility measures but causality cannot be proven.

As an alternative approach, it is replicated -as far as possible- Vannoorenberghe (2012)'s estimation, which calculates a two-step methodology in which variance of disaggregated sales growth residuals per firm is computed in the first stage, and then, included as dependent variable in the second stage. As the sample of this paper does not contain information disaggregated at firm-year-product for the local market segment, Vannoorenberghe (2012)'s methodology is replicated but at firm-year level. In first place, column 1 and 2 of table B2 show the operating income growth residuals estimation (replication of table 2 - column 2 and 4 in Vannoorenberghe (2012)). Then, column 1 in table B3 indicates that export share has a positive impact on conditional operating income volatility -including Vannoorenberghe (2012)'s explanatory variables-. Results are robust to one and two- years differences.

[46] The results are robust excluding cash flow/assets from the explanatory variables X.

Analogously to the previous estimation, the sample is restricted to exporting firms with 5 or more observations in the 2006-2014 period.

Finally, it is replicated this methodology to calculate conditional cash flow volatility (columns 3 and 4 in table B2) and conditional FCF volatility (columns 5 and 6 in table B2), indicating that export share impacts positively conditional cash flow volatility (column 2 and 3 in table B3). In conclusion, export share is positive correlated with cash flow volatility, conditional cash flow volatility and other firms' volatility measures but causality cannot be proven (probably because of data restrictions).

Table B1. Export share effect on firms' volatility

Dependent variable	(1) *SD [Cash flow/assets] in a 4-year rolling window*	(2) *SD [FCF/assets] in a 4-year rolling window*	(3) *SD [Operational income] in a 4-year rolling wind.*
	Panel A: IV – rolling window		
Method	IV	IV	IV
Δ_3 Log real exported value (COP)	-0.000582 (0.00142)	-0.0429 (0.0312)	-0.0159 (0.0109)
Observations	4,431	4,431	4,431
Fixed effects		State, year, industry	
X_{t-3}	Yes	Yes	Yes
	Panel B: OLS – rolling window		
Method	OLS	OLS	OLS
Δ_3 Log real exported value (COP)	-0.000518 (0.000410)	-0.000773 (0.00983)	0.00741* (0.00398)
Observations	4,431	4,431	4,431
Fixed effects		State, year, industry	
X_{t-3}	Yes	Yes	Yes
	Panel C: OLS – cross section		
Dependent variable	*SD [Cash flow/assets]*	*SD [FCF/assets]*	*SD [Operational income]*
Mean export share (exported value/operating income)	0.00994*** (0.00230)	0.559*** (0.151)	0.130*** (0.0255)
V^*_{avg}	Yes	Yes	Yes
Observations	2,356	2,356	2,356
R-squared	0.638	0.161	0.135
Fixed effects		Industry	

Note: SD: standard deviation. Robust standard errors clustered at firm level in panel A-B. Robust standard errors clustered at industry level in panel C. *** p<0.01, ** p<0.05, * p<0.1. X controls variables are: log total assets, profit rate, debt/assets, financial investments/assets, cash flow/assets, TFP (calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2018) -see appendix A4-), exported value/operating income, international managerial quality variable (Merchan, 2023), and imported value/sales cost. X are normalized to have mean 0 and standard deviation 1. *V is equal to vector X excluding exported value/operating income.

Table B2. Calculation of residual growth rate

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Δ3 Log real total operating income (USD)		Δ3 [CF/assets]		Δ3 [FCF/Assets]	
Δ3 Log real property, plant and equipment (USD)		0.0865***		-0.0105***		-0.150***
		(0.0155)		(0.00262)		(0.0481)
Constant	0.0898***	0.0912***	0.000344	0.00174***	-0.107***	-0.0859***
	(0.00656)	(0.00161)	(0.000815)	(0.000272)	(0.0186)	(0.00499)
Observations	10,099	9,481	10,099	9,481	10,099	9,481
R-squared	0.135	0.592	0.044	0.375	0.030	0.400
Firm fixed effects	No	Yes	No	Yes	No	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at firm level in parentheses. FCF = Operating Income – Capital expenditures (CAPEX) – Debt payment. CF: Cash flow. *** p<0.01, ** p<0.05, * p<0.1

Table B3. Export share effect on conditional operating income, cash flow, and free cash flow variance

VARIABLES	(1) Variance residuals column 2 table B2 [Δ3 Log real total operating income (USD)]	(2) Variance residuals column 4 table B2, [Δ3 CF/assets]	(3) Variance residuals - column 6 table B2, Δ3 [FCF/assets]
Mean export share (exported value/operating income)	0.324***	0.00234*	8.736
	(0.0778)	(0.00132)	(8.386)
Mean log real operating income (USD)	0.00454	0.00177***	10.67**
	(0.0373)	(0.000682)	(5.349)
Mean log real property, plant and equipment (USD)	0.00628	-0.00104***	-1.675
	(0.0174)	(0.000263)	(1.117)
Mean log real operating expenses (USD)	-0.0503*	-0.00138***	-9.363**
	(0.0268)	(0.000493)	(4.619)
Mean debt (Debt/assets)	0.102	-0.0281***	30.25**
	(0.138)	(0.00367)	(13.69)
Constant	0.635***	0.0120***	-14.68
	(0.136)	(0.00378)	(10.04)
Observations	2,382	2,382	2,382
R-squared	0.076	0.093	0.046
Industry fixed effects	Yes	Yes	Yes

Note: Robust standard errors clustered at industry level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

APPENDIX C

Overinvestment calculation

Richardson (2006) calculates overinvestment as the residual of a regression of investment expenditure on the lags of several variables (growth opportunities, leverage, cash, age, size, stock returns, expenditure investment), plus year (t) and industry (s) fixed effects with *Compustat* database for United States. As the dataset of this paper does not include information that allows to measure growth opportunities, age, and stock returns variable, the feasible regression is the following:

$$I(new)_{fst} = \beta_o + \beta_1 Debt_{fst-1} + \beta_2 Cash_{fst-1} + \beta_3 Operating\ expenses_{fst-1} + \beta_4 I(new)_{fst-1} + \partial_s + \partial_y + v_{ft} \quad (8)$$

where $I(new)_{ft}$ is investment expenditure, $Debt_{ft-1}$ is the lag of liabilities/assets share, $Cash_{ft-1}$ is the lag of cash/total assets ratio, $Operating\ expenses_{ft-1}$ is the size proxy variable, ∂_s are industry fixed effects, and ∂_y are year fixed effects. Results are shown in table C1.

Table C1. Overinvestment calculation

VARIABLES	(1) Net expenditure investment (total)/assets	(2) Net expenditure investment (fixed asset)/ assets
Net expenditure investment (total) (t-1)	-0.000105	
	(9.96e-05)	
Net expenditure investment (fixed asset) (t-1)		-6.55e-05
		(5.37e-05)
Log real operating expenses (USD) (t-1)	0.00597	0.00164***
	(0.00420)	(0.000625)
Cash flow/assets (t-1)	0.115***	0.0396**
	(0.0331)	(0.0160)
Liabilities/Assets (t-1)	-0.00109	-0.000680
	(0.00102)	(0.000547)
Observations	175,418	175,418
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
R-squared	0.001	0.002

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.