EU Tax Observatory Working Paper No. 5

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September 2022

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Abstract

This paper presents a new way to tax excess profits. We propose to tax the rise in the stock market capitalization of companies that benefit from extraordinary circumstances, such as energy firms following the invasion of Ukraine in February 2022. Targeting the rise in stock market capitalization (which is easily observable) makes the tax much harder to avoid than standard excess profit taxes, and allows to capture rents irrespective of where multinational companies book their profits. We apply this proposal to energy companies that are headquartered or have sales in the European Union. We estimate that taxing the January 2022 to September 2022 valuation gains of energy firms at a rate of 33% would generate around €80 billion in revenue (0.4% of GDP) for the European Union. We discuss implementation practicalities and compare our proposals to other plans made to tax excess profits.

*The views expressed in this paper are those of the authors, and do not necessarily reflect the views of the the European Commission. We thank Emmanuel Saez for helpful discussions. We acknowledge financial support from the European Commission grant TAXUD/2021/CFP-01.

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1 Introduction

The invasion of Ukraine by Russia in February 2022 and the ensuing war have brought hardship to the global economy, and to the economy of the European Union in particular. The upsurge in energy prices has dramatically increased firms' input costs and households' energy expenditures. For some companies, however, this conflict has come as an opportunity. Many energy firms have seen their profits and stock prices rise, earning rents from the increase in oil and gas prices.

In this paper, we propose and quantify the revenues of a modern excess profit tax that would efficiently redistribute windfall profits from the war in a simple manner. We propose to tax the rise in the stock market capitalization of energy companies that are headquartered or have sales in the European Union. We estimate that a 33% tax on the January 2022 to September 2022 valuation gains of these energy firms would generate around €80 billion in revenue (0.4% of GDP) for the European Union. If fully and equally redistributed to all EU households, this one-off tax could fund a transfer of €180 per person, more than €700 for a family of four. With a 50% tax rate, the transfer would exceed €1,000 for a family of four.

Our proposal modernizes traditional excess profit taxes and adapts them to the economic realities of the 21^{st} century. Excess profit taxes have been successfully used in the past, especially in wartime.[1] But the organization of global economic activity has changed substantially since Word War II. Today, a large share of output is produced by multinational companies that can shift profits to subsidiaries in low-tax territories. Tørsløv, Wier and Zucman (2022) estimate that 36% of the profits made by firms in countries other than their headquarter's are shifted to tax havens. This shifting has dramatically increased since the 1970s (Wier and Zucman, 2022) and complicates the taxation of profits. Meanwhile, financial markets have developed. Ratios of stock market capitalization to GDP exceed 100% in many countries.[2] Even though some are still closely-held owned, the vast majority of large energy companies are publicly traded. This makes targeting market capitalization appealing.

Our proposal has two main advantages relative to standard excess profit taxes. First, because stock market capitalizations are observable and hard to manipulate, the tax we propose would be easy to enforce. Companies would not be able to avoid it by shifting profits to tax havens. Second, this tax would capture all rents earned by energy firms, including those earned from oil and gas extraction ("upstream activities"), as opposed to only rents on refining and other "downstream activities".[3] This is in contrast to the excess profit taxes currently discussed in the European Union, such as the tempo-

[1] For example, the United States introduced an excess profit tax in 1940, in force until 1950; "adjusted excess profit tax net income" was taxed at a rate of 95% (Avi-Yonah, 2020). See Hebous, Prihardini and Vernon (2022) for a review of past excess profit taxes.

[2] See World Federation of Exchange database, available at `https://data.worldbank.org/indicator/CM.MKT.LCAP.GD.ZS`.

[3] Many countries tax economic rents from fossil fuel extraction. See Baunsgaard and Vernon (2022) for a review of the fiscal instruments targeting extractive companies.

rary solidarity contribution proposed by the European Commission in September 2022, which would tax profits booked in the European Union, i.e., primarily downstream activities. For a given tax rate, the excess valuation tax we propose would generate about three times as much revenue as the solidarity contribution proposed by the European Commission: €80 billion vs. €25 billion with a tax rate of 33%, for example.

We stress that both the traditional and the modern excess profit tax we propose have strengths of their own. Both would affect different firms differently (e.g., some companies may have large excess profits but little or no rise in stock market capitalization, or vice versa). Risks of double taxation are limited, because excess profit taxes capitalize into stock prices, reducing valuation (and thus the base of the tax we propose) accordingly. For these reasons, policymakers could consider using both instruments simultaneously. In that case, a tax on the rise in market capitalization could be seen as a minimum effective excess profit tax, ensuring that firms in specific sectors pay a minimum amount of additional tax as long as their stock price rose, even if they managed to shift profits to tax havens.

Concretely, the tax we propose would work as follows. For energy companies headquartered in the European Union, 100% of the increase in market valuation since the beginning of 2022 would be subject to taxation in the European Union. For energy companies headquartered outside of the European Union, the rise in market valuation would be apportioned to the EU proportionally to the fraction of global sales made in the EU. For example, if the market valuation of a non-EU gas producer rose by €100 billion and the company makes 20% of its sales in the European Union, then €20 billion would be subject to taxation in the European Union. Thus, the tax would apply not only to EU firms, but also to companies that extract oil and gas outside of the European Union and sell to EU consumers. This is critical to effectively redistribute windfall profits and address the hardships caused by surging energy prices. Because all large firms (including those headquartered outside of the European Union) must produce country-by-country breakdowns of their sales, apportioning excess valuation based on sales is feasible.

The proposal builds on Saez and Zucman (2022), who presented a proposal for an annual tax on corporations' stock. Saez and Zucman (2022) detail the merits and practicality of such a tax. It is straightforward to administer: it could be collected by Securities and Exchange commissions in each country, which already collect fees on listed companies. It is hard to avoid, because market capitalization is readily observable. It complements existing profits tax, as companies can become very valuable even before making taxable profits (e.g., Amazon). We extend this idea to a temporary tax on the *increase* in market capitalization of energy companies. Our proposal has the same enforcement and administrative strengths as the annual tax described by Saez and Zucman (2022), while addressing the specific issues and needs arising from the war context. Because it is a one-time tax, it is even harder to avoid.

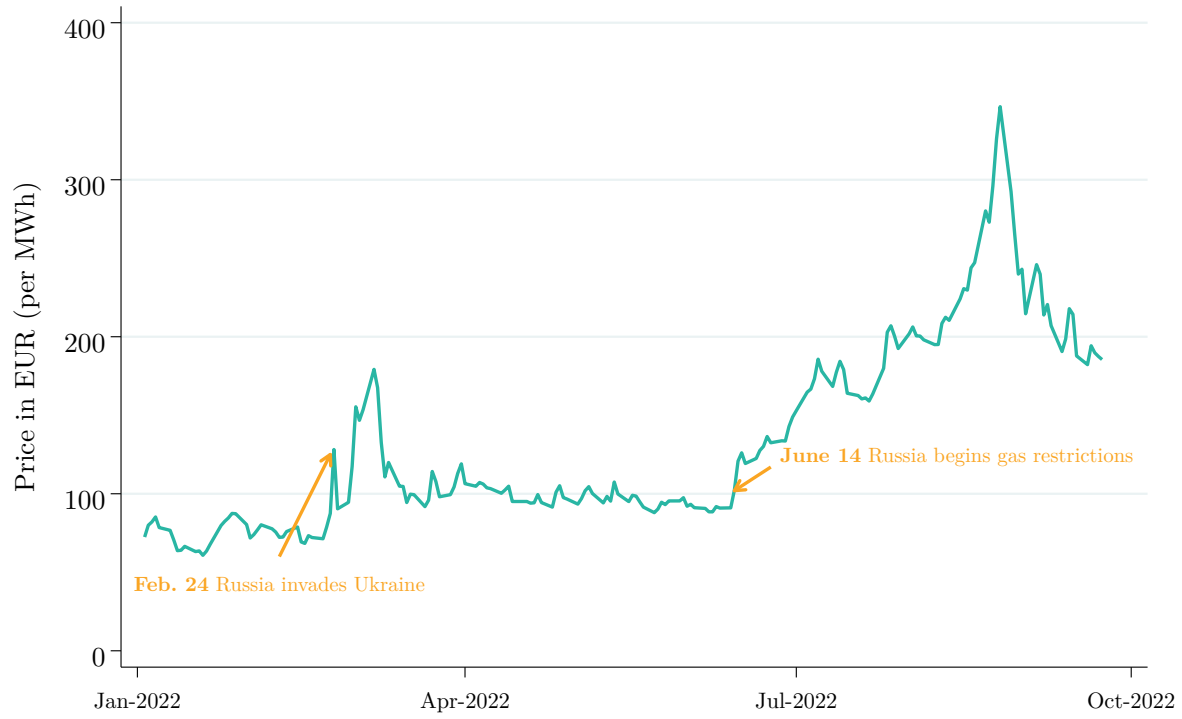
The rest of this paper proceeds as follows. Section 2 describes the context and rationale for the tax we propose. In Section 3 we discuss implementation issues. In

Section 4 we score our proposal and compare it to other excess profit tax proposals. Section 5 concludes.

2 Excess Valuation Tax: Context and Rationale

Energy prices had been increasing in Europe for over a year before the Russian invasion of Ukraine in February 2022, but the situation substantially worsened after the invasion. Oil prices rose from an average of about $70 in 2021 to a high of $120 in June 2022, before falling back to about $80 in September 2022. European gas prices first increased following the invasion of Ukraine, and then surged after Russia began restricting gas exports to the European Union in June 2022 (see Figure 1). Since many power plants are gas-fired, the lower supply induced an increase in prices which greatly benefited energy companies. Coal prices rose sharply after the invasion of Ukraine and remained at a high level in the following months.

Figure 1: Natural Gas Prices Since January 2022

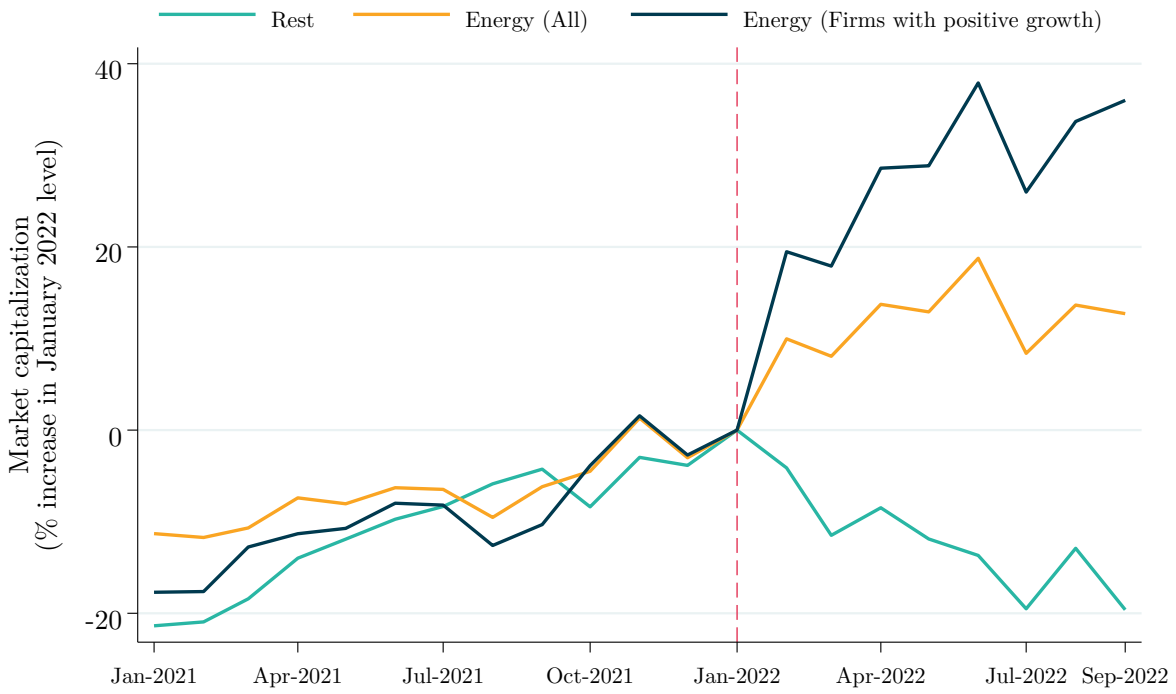


Note: This figures reproduces a figure from a *New York Times* article titled "Why Europe's Electricity Prices Are Soaring" published on August 25, 2022. It shows the evolution of the prices of benchmark European natural gas contracts using Dutch T.T.F. natural gas futures data.

The increase in energy price was reflected in a rise in the market valuation of energy companies. We illustrate this phenomenon by studying the change in the market capitalization of the companies composing the Stoxx Europe 600 index, which includes 600 European companies (including some non-EU companies) accounting for approximately

90% of the capitalization of the European stock market. While the capitalization of European companies outside the energy sector declined, on average, by around 20% between January and September 2022, the valuation of energy companies grew by close to 15%. For energy companies with stock price increases, market valuation rose 35% (see Figure 2).[4]

Figure 2: Growth in market capitalization for Stoxx Europe 600 companies



Note: This figure shows the monthly evolution of the total market capitalization of the firms composing the Stoxx Europe 600 index, between January 2021 and September 2022, expressed as a percentage change relative to January 1, 2022. *Energy (all)* includes all 36 energy companies included in the Stoxx 600, whether their market valuation rose or fell in 2020. *Energy (firms with positive growth)* includes only the 18 energy firms whose market capitalization rose in 2022. *Rest* corresponds to the 564 firms in the Stoxx 600 which are not in the energy sector. Market capitalization for each firm is converted to euro using daily exchange rate (the vast majority of Stoxx 600 companies are listed in euros).

As shown in Appendix Figure A, in absolute terms, total market capitalization for Stoxx 600 firms outside the energy sector decreased from €12.4 trillion in January 2022 to €9.9 trillion in September 2022. Meanwhile, market capitalization for Stoxx 600 energy sector firms rose from €785 billion to €894 billion.

Of course, there is heterogeneity within sectors. Some energy companies did not benefit from the current situation and saw their market capitalization fall. For example, Enel—an Italian energy company—saw its market capitalization fall by €26 billion between January and September 2022. The tax we propose would not affect firms

[4]Energy companies are not the only ones experiencing gains in market capitalization. Armament and defense companies have also seen sharp increase in their stock price since the beginning of the war, in a context of rising international military tensions. See Appendix for a discussion of defense companies.

with declines in their market capitalization. However, these firms could be affected by standard excess profit taxes (to the extent they have excess profits), highlighting the complementary between the two instruments. In total, 18 energy firms in the Stoxx 600 (accounting for 9% of the total market capitalization of the Stoxx 600 as of September) saw their market capitalization increase since January, while 18 experienced losses. In addition, as shown by Appendix Table A, 281 global energy firms outside of the Stoxx 600 had valuation gains from January to September 2022.

3 Feasibility and Implementation

We propose to tax energy companies based on the increase in their market capitalization between January 1st 2022 and December 31st 2022. For our benchmark estimates, we consider a tax rate of 33%, the same rate as the one proposed by the European Commission in September 2022 for its solidarity contribution on excess profits. For firms headquartered in the European Union, 100% of the rise in market capitalization would be taxable in the EU. For non-EU companies that have sales in the European Union and whose market capitalization rose in 2022, the market capitalization increase would be apportioned to the European Union using the fraction of the sales these companies made in the EU.

Taxation of non-resident multinationals. To illustrate how the taxation of non-EU firms would work, consider the following example. Imagine the market capitalization of a UK oil firm increased by €100 billion between January and December 2022, and that this firm made 50% of its 2022 sales in the EU. Then in our benchmark proposal this firm would pay a tax of $33\% \times €100 \times 0.5 = €16.5$ billion. This can be seen as a form of destination-based excess profit tax. A destination-based principle to tax non-resident multinationals has also been proposed by Hebous, Prihardini and Vernon (2022) in the context of standard excess profit taxes.

Who would collect the tax. The tax we propose could be collected by the European Commission and be used for EU own resources. Alternatively, the tax could be collected by the tax authority of each member state. In that case, the apportionment of the market valuation gains of non-resident multinationals would be applied at the country-level, based on the fraction of global sales made in each country. For instance, if a UK energy multinational has 5% of its sales in France, then France would tax 5% of the increase in the market capitalization of this firm. The tax authorities of the different member states have the information necessary to compute the tax owed by non-resident multinationals, because they receive country-by-country reports from all large multinationals (including a country-by-country breakdown of sales).

Double taxation issues. A potential concern is the risk of double taxation between the tax we propose and the solidarity contribution on excess profits proposed by the European Commission in September 2022 (EC, 2022). However, the risk of such double taxation is limited because standard excess profit taxes capitalize into stock prices and reduce stock market valuation. For example, if a company has to pay a standard excess profit tax of €1 billion on its 2022 profits, then everything else equal, this reduces its market capitalization—and hence the 2022 rise of its market capitalization, i.e., the base of the tax we propose—by €1 billion. There is no double tax. From that perspective, the tax we propose would complement the temporary solidarity contribution proposed by the European Commission.

Another potential double taxation problem exists if all countries applied the mechanism we describe. There would be double taxation if the increase in market capitalization was taxed both by the headquarter country and the sales countries. In that case, one has to define priority rules. A possibility would be to give priority to sales countries, i.e., to allow any tax paid to sales countries to be creditable against the tax owed in the headquarter country. The headquarter country would thus merely play the role of "tax collector of last resort," meaning it would only collect revenue to the extent that some sales countries have chosen not to collect their share of the tax.

Liquidity concerns. A potential concern with the tax we propose is that firms experiencing large gains in their share price might not have enough liquidity to pay the tax out of current profits. In practice, however, this concern is unlikely to be an issue because the tax we propose applies to listed firms only and listed firms can always issue shares to raise cash. Because liquidity issues would only affect firms that experienced a large increase in their stock price, these firms would raise funds at a high valuation, minimizing dilution for existing shareholders.

Unlisted firms. We do not propose to tax unlisted energy companies, for two main reasons. First, the vast majority of large energy firms globally are listed, including the world's largest oil producers (e.g., Saudi Aramaco, listed in 2019; PetroChina, listed in 2000) and most large European and American energy firms. Among the top 40 (non-state-owned) energy firms by turnover in the Orbis database, 37 are listed and only 3 are closely held. Second, because the tax we propose is temporary, the risk that some listed firms might try to avoid it by choosing to become private is very limited.

It is worth noting that if policymakers wanted to introduce an annual tax on corporations' stock then it would be important to include large private firms, as to limit incentives for firms to stay private or to unlist. As discussed in Saez and Zucman (2022), valuing private firms could be done by using the valuation multiples of similar listed firms, such as the price/earnings, price/sales, and price/book ratios of listed firms of the same size in the same sector.

Comparison with other excess profit taxes. The increase in oil, gas, and coal prices, and the exceptional profits involved for energy firms have led to calls for the introduction of temporary excess profit taxes globally. International organizations such as the International Monetary Fund have supported the introduction of such mechanisms. A number of countries have already introduced such taxes. Greece and Romania introduced temporary taxes on electricity generators in late 2021 and 2022. Hungary introduced a temporary tax on certain electricity generators for 2022 and 2023. In March 2022, Italy introduced a windfall profit tax of 25% on some energy companies. For a company to be taxed, the increase in profits between 1 October 2020 to 30 April 2021 and 1 October 2021 to 30 April 2022 must be at least €5 million with an increased profit margin of at least 10%. The United Kingdom also introduced an Excess Profits Levy in May 2022 which taxes company profits from production activities at 25 percent, on top of the usual 40% tax rate on oil and gas companies operating in the UK and the UK Continental Shelf. It thus increases the headline tax rate on those profits from 40% to 65%.

In her State of the Union address delivered in September 2022, the President of the European Commission Ursula von der Leyen announced a proposal for a temporary solidarity contribution on excess profits generated from activities in the oil, gas, coal and refinery sectors. The tax would be at a rate of 33% on 2022 profits above a 20% increase on the average profits of the previous three years for energy companies incorporated in the European Union (EC, 2022).

The main difference with our proposal is that the levy we describe would tax the increase in market capitalization as opposed to excess profits. This removes the need to precisely define what "excess profits" are (e.g., the reference period for the computation of "normal profits"). Because market capitalization is perfectly observable, avoidance is nearly impossible.[5] Corporations cannot avoid the tax by shifting profits to low-tax countries. Last, market capitalization captures all sources of rents, whether from downstream or upstream energy activities, and are thus more comprehensive than taxes based on profits booked in specific territories.

4 Revenue Estimation

To score our proposal, we collected data on Stoxx Europe 600 companies and on the largest energy companies in terms of market capitalization globally.[6] We identified 299 listed energy companies that experienced an increase in market valuation between

[5]Avoidance is all the more unlikely since the tax we propose is a one-time tax. If the tax was permanent, firms could try to avoid it by, e.g., becoming or staying unlisted. See Saez and Zucman (2022) for a discussion of potential tax avoidance issues.

[6]We gathered data for all Stoxx Europe 600 companies, as well as the other energy companies from this list of the 415 largest energy companies by market capitalization https://companiesmarketcap.com/energy/largest-companies-by-market-cap/. We then matched this list with a list of 194 energy firms from FinBox (https://finbox.com) with a market capitalization greater than USD 3 billion, as of September 2022. This led us to add 19 additional companies to our dataset.

January and September 2022.[7] When computing the increase in market capitalization for these firms, we neutralize the effect of exchange rate movements. Specifically, we first compute the increase in market capitalization in local currency and then convert this increase into euros using September exchange rates. As a result, firms that experienced no valuation gain in local currency pay no tax (even if the currency in which they are listed depreciated against the euro).

As of September 2022, the 299 energy companies included in our analysis had a total market capitalization of €7.4 trillion. Their capitalization had grown by €1.6 trillion since January 2022.

We apportion the gross increase in market capitalization of non-EU firms to the EU proportionally to the share of sales made by these firms in the EU. To compute this share, we use the public country-by-country reports and most recent annual report of 11 large non-US energy multinationals: BP, Chevron, ConocoPhillips, Ecopetrol, Equinor, Exxon Mobil, Occidental Petroleum, Petrobras, Saudi Aramco, Shell, and SSE. These 11 firms account for about 57% of the total increase in market capitalization of all non-EU energy multinationals. For other non-EU energy multinationals, we assume that 10% of their sales are made in the European Union, roughly the fraction observed for the 11 large firms for which we have detailed data. Because the share of sales made in the European Union varies significantly at the firm level, firm-level results for these non-EU multinationals should be interpreted with caution. Aggregate estimates are likely to be accurate, however, since our 10% assumptions (once combined with the observed values for the other energy firms in our sample) implies a share of the European Union in global energy consumption in line with available data.

We then simulate different revenue scenarios based on varying the tax rate (Table 1). A number of results are worth noting. First, the tax we propose has significant revenue potential. With a tax rate of 33%, we estimate it would generate about €80 billion in revenue, 0.4% of the GDP of the European Union. To more concretely assess the sums involved, note that there are about 447 million inhabitants in the European Union. If the revenues from the tax were fully and equally redistributed to households, each inhabitant (including children) would receive about €180, i.e., a family of four would receive slightly more than €700. Second, about 80% of the revenues would originate from multinationals incorporated outside of the European Union but with sales in the EU (e.g., Shell, Exxon Mobil, Saudi Aramco, Equinor). This highlights the importance of taxing non-EU multinationals, which derive significant rents from oil and gas exports to the EU.

Third, we can see that there is a wide range of potential revenue depending on the tax rate applied. With a rate of 20% the tax would generate about €48 billion in revenue, while with a rate of 50% the tax would generate about €120 billion, the equivalent of almost €270 euros per EU inhabitant (€1,000 euros for a family of four). It is worth

[7] 20 firms, for which we were not able to retrieve market capitalization data, were excluded from the analysis. We also exclude EDF, that was bought back by the French government in 2022.

Table 1: Revenues from a Tax on the Increase in Market Capitalization of Energy Firms

	Market Capitalization Growth (billions EUR)		Tax Revenue (billions EUR)			
	Gross	Apportioned to EU	5%	20%	33%	50%
Non EU Firms	1,568.8	192.4	9.6	38.5	63.5	96.2
EU Firms	47.6	47.6	2.4	9.5	15.7	23.8
Total	**1,617**	**240.1**	**12.0**	**48.0**	**79.2**	**120.0**

Note: This table displays the January 2022 to September 2022 market capitalization growth of EU and non-EU energy firms in our sample, and the revenue potential from taxing this increase in capitalization. *Gross* corresponds to the gross increase in market capitalization between January and September 2022, *Apportioned to EU* corresponds to this gross increase apportioned to the EU using our apportion rule described in the text, *5%*, *20%*, *33%*, and *50%* correspond to the estimated tax revenue using either a 5%, 20%, 33%, or 50% tax rate.

emphasizing that the tax only concerns energy companies that experienced a rise in their share price over the year 2022, so that even with a 50% rate the shareholders of these firms would still be significantly better off than in January 2022. One could also consider a 100% tax on the rise in capitalization, leaving shareholders no worse off than in January 1, 2022. Revenues would exceed €220 billion, i.e., about 1.2% of EU GDP.

Table 2 details the growth in capitalization (and potential tax revenues) for the largest EU and non-EU energy multinationals. We can see that market capitalization has increased massively for a number of non-EU firms (e.g., Shell, Exxon Mobil, Saudi Aramco), by more than €100 billion (an order of magnitude more than for EU energy multinationals with the largest gains). This explains why these firms would contribute significant amounts of revenues, even though only a small fraction (sometimes very small) of the increase in their valuation would be apportioned to the European Union. Appendix Table A provides similar information for the full list of companies included in our analysis.

5 Conclusion

This paper presents a proposal to tax the increase in the market valuation of companies benefiting from exceptional circumstances, such as energy companies following the invasion of Ukraine in February 2022. All energy firms headquartered in the European Union or with sales in the EU would be liable if their market capitalization rose in 2022. With a rate of 33%, this tax could raise around 0.4% of EU GDP in revenue and easily be collected and administered. This scheme would allow to tax windfall profits from the war easily and efficiently by preventing firms to manipulate their profits to avoid taxation. Because both EU and non-EU firms would be subject to the tax (to the extent they have sales in the EU, i.e., benefit from the common market), the mechanism would

Table 2: Revenue Estimates from a Tax on the Increase in Market Capitalization: Details

	Market Cap. Growth (billions EUR)	Share of sales in the EU	Tax Revenue (billions EUR) 5%	20%	33%	50%
Panel A: EU Firms						
TotalEnergies	17.6		0.9	3.5	5.8	8.8
EnBW Energie	4.7		0.2	0.9	1.5	2.3
Neste	4.5		0.2	0.9	1.5	2.3
Repsol	3.5		0.2	0.7	1.2	1.8
ČEZ Group	2.8		0.1	0.6	0.9	1.4
Others	14.5		0.7	2.9	4.8	7.3
Total	**47.6**		**2.4**	**9.5**	**15.7**	**23.8**
Panel B: Non-EU Firms						
Shell	121.1	45%	2.7	10.9	18	27.3
Saudi Aramco	269	6%	0.8	3.1	5.1	7.7
Exxon Mobil	138.3	10%	0.7	2.9	4.8	7.3
Equinor	49.7	22%	0.5	2.2	3.6	5.5
BP	23.3	30%	0.3	1.4	2.3	3.5
Others	967.4		4.5	18	29.7	45
Total	**1,569**		**9.6**	**38.5**	**63.5**	**96.2**

Note: Panel A displays the growth in market capitalization (in billion EUR) between January and September 2022, as well as the potential tax revenues (for 4 different potential tax rates) for the five EU companies with the largest growth in market capitalization. Row *Others* includes results for all other liable EU companies. Panel B displays the growth in market capitalization (in billion EUR) between January and September 2022, the share of sales they made in the EU, as well as the potential tax revenues (for 4 different potential tax rates) for the five non-EU companies with the largest growth in market capitalization. Row *Others* includes results for all other liable non-EU companies.

ensure a level playing field between EU and non-EU firms.

It is often in time of war that new and innovative tax instruments have been developed. The one we propose in this paper responds to the specifics of the current crisis and to the practical challenges of taxing multinational companies in a globalized world.

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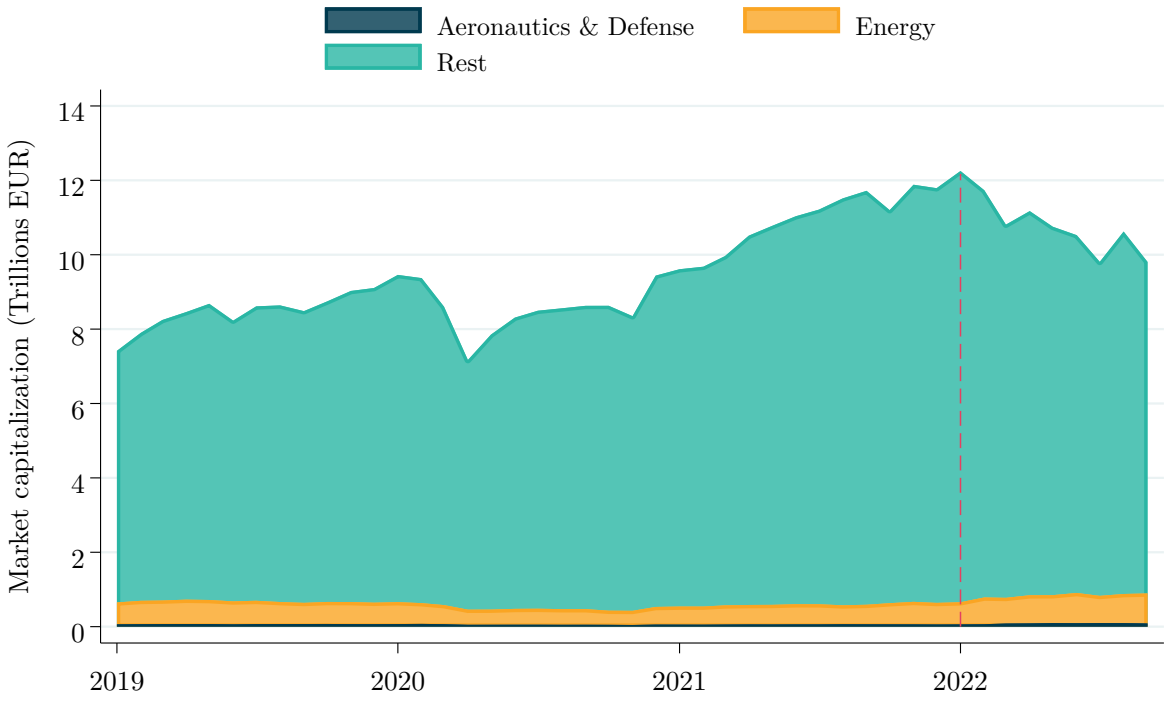
Appendix

A Defense Companies

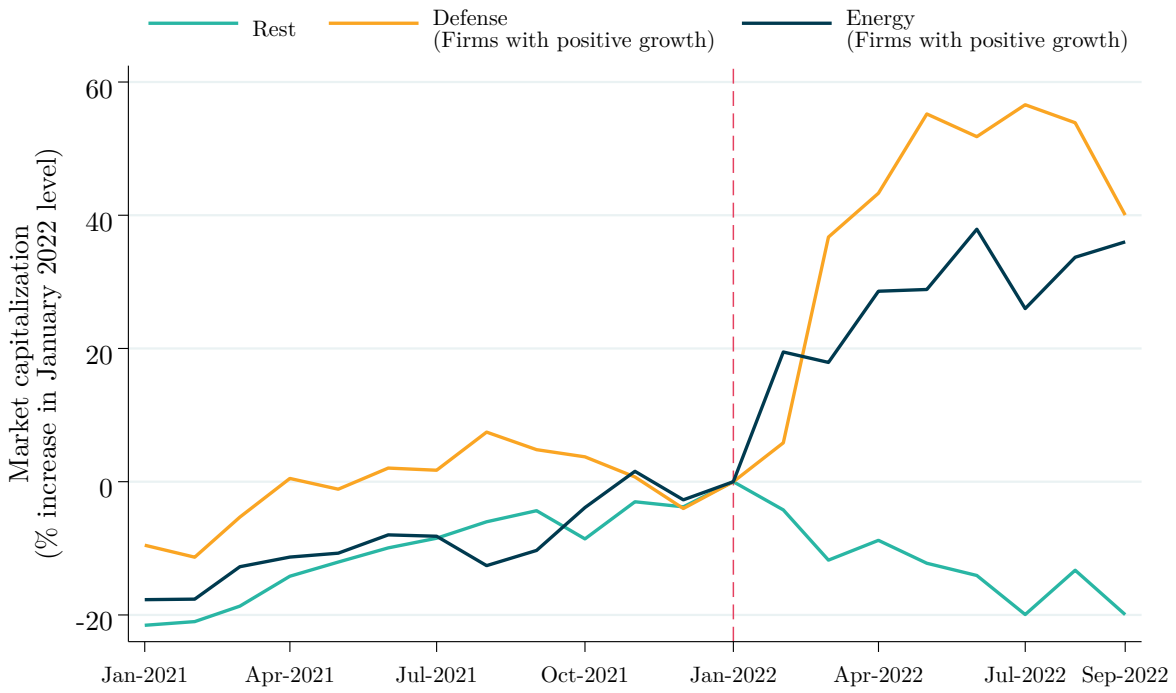
Energy companies are not the only ones benefiting from the war situation. Armament and defense companies have also seen sharp increases in their stock prices since the beginning of the war, in a context of rising international military tension. One could consider extending the excess profit tax to this sector, i.e., to socialize some of the gains that currently accrue to the private shareholders of defense companies, as has typically been done in war contexts historically. Revenues could be used, e.g., to support the defense and reconstruction of Ukraine. The revenues from such a tax would be relatively modest, however, as EU defense companies have a much lower market capitalization than EU energy firms (see Figure A).

Figure A: Evolution of total market capitalization for Stoxx Europe 600 firms per sector



Note: This figure shows the monthly evolution of total market capitalization of the firms composing the Stoxx Europe 600 index, between January 2019 and September 2022, in absolute values. *Aeronautics & Defense* and *Energy* correspond to the evolution of firms in those sectors that grew positively between January 2022 and September 2022. *Rest* corresponds to all firms in all other sectors.

Figure B: Growth in market capitalization for Stoxx Europe 600 firms per sector in January 2022 base – Energy and Defense



Note: This figure shows the monthly evolution of the total market capitalization of the firms composing the Stoxx Europe 600 index, between January 2021 and September 2022, expressed as percentage increase compared to January 1, 2022 level. *Energy (firms with positive growth)* includes only energy firms whose market capitalization rose in 2022. *Defense (firms with positive growth)* includes only defense firms whose market capitalization rose in 2022. *Rest* corresponds to all firms in all other sectors. Market capitalization for each firm is converted to euro using daily exchange rate (the vast majority of Stoxx 600 companies are listed in euros).

B Supplementary Results

We provide below a list of the 299 energy companies we identified as being headquartered in the European Union or having sales in the European Union, and that experienced increases in their market valuation between January and September 2022. Table A provides the contribution of each firm based on the apportionment rule we defined in the text.

Table A: List of Energy Firms

Firm	Country	Share sales in EU	Growth in Market Capitalization (billions EUR)
3R Petroleum	Brazil	10%	0.17
Adani Green Energy	India	10%	21.26
Adani Power	India	10%	14.65
Adani Total Gas	India	10%	26.55
Adani Transmission	India	10%	30.14
Adaro Energy	Indonesia	10%	3.1
Advantage Energy	Canada	10%	0.56
AES	USA	10%	1.27
AGL Energy	Australia	10%	0.27
Aker BP	Norway	10%	13.1
Albioma	France		0.53
Alliant Energy	USA	10%	0.04
Alpha Metallurgical Resources	USA	10%	1.48
AltaGas	Canada	10%	0.36
Altus Power	USA	10%	0.02
Ameren	USA	10%	1.09
American Electric Power	USA	10%	7.81
Amplify Energy	USA	10%	0.18
Ampol	Australia	10%	3.64
Antero Midstream	USA	10%	0.14
Antero Resources	USA	10%	6.64
Apache Corporation	USA	10%	2.91
ARC Resources	Canada	10%	2.98
Archaea Energy	USA	10%	1.16
Array Technologies	USA	10%	0.93
ATCO	Canada	10%	0.36
Baker Hughes	USA	10%	4.85
Baytex Energy	Canada	10%	1.18
Beach Energy	Australia	10%	0.32
Berry Corporation	USA	10%	0.03
Birchcliff Energy	Canada	10%	1.03
Black Stone Minerals	USA	10%	1.16
Bloom Energy	USA	10%	0.7
Boralex	Canada	10%	1
Borr Drilling	Bermuda	10%	0.71
BP	UK	29.95%	23.29
Brigham Minerals	USA	10%	0.9
Brookfield Renewable	USA	10%	0.3
Brookfield Renewable Partners	Bermuda	10%	13.87
California Resources Corporation	USA	10%	0.05
Cameco	Canada	10%	3.17
Canadian Natural Resources	Canada	10%	15.83
Capital Power	Canada	10%	1.02
Cemig	Brazil	10%	1.1
Cenovus Energy	Canada	10%	12.85
CenterPoint Energy	USA	10%	2.47
Centrais Electricas Brasileiras	Brazil	10%	10.74
Centrica	UK	10%	0.49
ČEZ Group	Czech Republic		2.81
ChampionX	USA	10%	0.31
Chandra Asri Petrochemical	Indonesia	10%	3.21
Cheniere Energy	USA	10%	5.43
Cheniere Energy, Inc.	USA	10%	14.36
Chennai Petroleum	India	10%	0.34
Chesapeake Energy	USA	10%	4.52
Chevron	USA	2%	82.16
China Coal Energy Company Limited	China	10%	6.44
China Oilfield Services	China	10%	0.39
China Shenhua Energy	China	10%	23.2
Chord Energy	USA	10%	3.43
Chubu Electric Power	Japan	10%	1.07
Civitas Resources	USA	10%	1.44
CMS Energy	USA	10%	0.64
CNOOC	China	10%	21.41
Coal India	India	10%	6.42
Colbún	Chile	10%	0.56
Comstock Resources	USA	10%	2.6
ConocoPhillips	USA	13.1%	45.38
CONSOL Energy	USA	10%	1.76
Consolidated Edison	USA	10%	4.76
Continental Resources	USA	10%	8.93
ContourGlobal	UK	10%	0.48
Coterra Energy	USA	10%	8.54

Firm	Country	Share sales in EU	Growth in Market Capitalization (billions EUR)
CPFL Energia	Brazil	10%	2.09
Crescent Point Energy	Canada	10%	1.25
Crestwood Equity Partners	USA	10%	1.23
CrossAmerica Partners	USA	10%	0.05
CSI Compressco	USA	10%	0.01
DAQO New Energy	China	10%	2.11
DCP Midstream	USA	10%	2.34
Delek Logistics Partners	USA	10%	0.83
Delek US	USA	10%	0.87
Denbury	USA	10%	0.51
Devon Energy	USA	10%	16.32
Diamondback Energy	USA	10%	4.28
Diversified Energy	USA	10%	0.06
Dominion Energy	USA	10%	4.52
Doosan Enerbility	S. Korea	10%	0.71
Dorchester Minerals	USA	10%	0.36
DT Midstream	USA	10%	0.7
DTE Energy	USA	10%	2.26
Duke Energy	USA	10%	1.69
Earthstone Energy	USA	10%	2.03
EDP Renováveis	Spain		1.93
Enbridge	Canada	10%	7.62
EnBW Energie	Germany		4.67
Encavis	Germany		0.83
Enel Américas	Chile	10%	1.17
Enel Chile	Chile	10%	0.08
ENEOS Holdings	Japan	10%	1.58
Energy Transfer Partners	USA	10%	10.14
Enerplus	Canada	10%	1.03
Eneti	Monaco	10%	0.08
ENGIE Brasil	Brazil	10%	0.43
ENI	Italy		0.02
EnLink Midstream	USA	10%	1.68
Entergy	USA	10%	1.01
Enterprise Products	USA	10%	9.42
Enviva	USA	10%	0.17
EOG Resources	USA	10%	19.34
Equatorial Energia	Brazil	10%	0.97
Equinor	Norway	21.93%	49.72
ERG	Italy		0.38
EVgo	USA	10%	1.64
Excelerate Energy	USA	10%	0.17
Exterran	USA	10%	0.07
Exxaro Resources	South Africa	10%	1.13
Exxon Mobil	USA	10.5%	138.34
Fluence Energy	USA	10%	0.14
Forum Energy Technologies	USA	10%	0.06
GAIL	India	10%	0.22
Galp Energia	Portugal		1.73
GasLog Partners	Greece		0.13
Gaztransport & Technigaz SA	France		1.69
Genesis Energy	New Zealand	10%	0.07
Genesis Energy L.P.	USA	10%	0.1
Genie Energy	USA	10%	0.11
Geopark	Chile	10%	0.1
Gibson Energy	Canada	10%	0.28
Glencore	Switzerland	10%	10.36
Global Partners LP	USA	10%	0.18
Golar LNG	Bermuda	10%	1.59
Gran Tierra Energy	Canada	10%	0.24
Gulf Island Fabrication	USA	10%	0
Hallador Energy Company	USA	10%	0.14
Halliburton	USA	10%	6.78
Hanwha Solutions	S. Korea	10%	2.17
Helix Energy Solutions	USA	10%	0.2
Helmerich & Payne	USA	10%	2.13
Hess	USA	10%	14.58
Hess Midstream	USA	10%	6.04
HF Sinclair	USA	10%	6.15
HighPeak Energy	USA	10%	1.65
Houston American Energy	USA	10%	0.03
Huaneng Power	China	10%	6.34
Hydro One	Canada	10%	1.29

Firm	Country	Share sales in EU	Growth in Market Capitalization (billions EUR)
Idemitsu Kosan	Japan	10%	1.14
Imperial Oil	Canada	10%	7.12
Indonesia Energy	Indonesia	10%	0.05
Innergex Renewable Energy	Canada	10%	0.37
Inox Wind	India	10%	0.11
Inpex	Japan	10%	4.48
Jastrzebska Spólka Weglowa	Poland		0.21
Jinko Solar	China	10%	0.84
JSW Energy	India	10%	0.99
Kalpataru Power Transmission	India	10%	0.05
KEPCO	Japan	10%	1.57
Keyera	Canada	10%	0.58
Kimbell Royalty Partners	USA	10%	0.64
Kinder Morgan	USA	10%	5.31
KLX Energy Services	USA	10%	0.06
Korea Gas	S. Korea	10%	0.02
Kosmos Energy	USA	10%	1.54
Laredo Petroleum	USA	10%	0.23
Liberty Energy	USA	10%	0.95
Magellan Midstream Partners	USA	10%	0.77
Magnolia Oil & Gas	USA	10%	3.29
Mahanagar Gas	India	10%	0
Marathon Oil	USA	10%	4.66
Marathon Petroleum	USA	10%	10.09
Martin Midstream Partners	USA	10%	0.05
Matador Resources	USA	10%	2.57
Maxeon Solar Technologies	Singapore	10%	0.25
MEG Energy	Canada	10%	1.44
Mercury NZ	New Zealand	10%	0.13
MOL Group	Hungary		1.57
Montauk Renewables	USA	10%	1.04
MPLX	USA	10%	2.77
Murphy Oil	USA	10%	2.06
Nabors Industries	Bermuda	10%	0.58
National Grid	UK	10%	0.68
Neoen	France		0.21
Neste	Finland		4.5
New Fortress Energy	USA	10%	6.59
Newpark Resources	USA	10%	0
NexGen Energy	Canada	10%	0.01
NextDecade Corp	USA	10%	0.62
NexTier Oilfield	USA	10%	1.48
Nine Energy Service	USA	10%	0.07
NiSource	USA	10%	1.16
NLC India	India	10%	0.27
Noble Corporation	UK	10%	0.82
Northern Oil and Gas	USA	10%	0.9
NOV	USA	10%	1.62
NOW Inc.	USA	10%	0.36
NuVista Energy	Canada	10%	0.64
Obsidian Energy	Canada	10%	0.4
Occidental Petroleum	USA	2%	37.16
Oil States International	USA	10%	0.01
Oneok	USA	10%	0.86
Origin Energy	Australia	10%	0.3
Ormat Technologies	USA	10%	0.73
Otter Tail	USA	10%	0.18
Ovintiv	USA	10%	4.64
Pacific Gas and Electric	USA	10%	3.65
Pampa Energía	Argentina	10%	0.5
Par Pacific Holdings	USA	10%	0.13
Paramount Resources	Canada	10%	0.55
PBF Energy	USA	10%	2.53
PBF Logistics	USA	10%	0.49
PDC EnergyPDCE	USA	10%	1.69
PEDEVCO	USA	10%	0
Pembina Pipeline	Canada	10%	3.63
Petro Rio	Brazil	10%	1.23
Petrobras	Brazil	20%	14.25
PetroChina	China	10%	15.51
Phillips 66	USA	10%	10.85
Pioneer Natural Resources	USA	10%	13.36
PKN Orlen	Poland		0.86

Firm	Country	Share sales in EU	Growth in Market Capitalization (billions EUR)
Plains All American Pipeline	USA	10%	1.63
Plains GP	USA	10%	0.97
Polenergia	Poland		0.61
PrairieSky Royalty	Canada	10%	0.8
PTT Exploration and Production	Thailand	10%	5.39
Range Resources	USA	10%	3.84
Ranger Energy Services	USA	10%	0.05
Ranger Oil	USA	10%	0.21
Reliance Infrastructure	India	10%	0.27
Reliance Power	India	10%	0.32
Renewable Energy Group	USA	10%	0.98
Repsol	Spain		3.52
RGC Resources	USA	10%	0.02
Riley Permian	USA	10%	0.09
Ring Energy	USA	10%	0.1
Romgaz	Romania		0.82
RPC	USA	10%	0.72
RWE	Germany		2.33
S-OIL	S. Korea	10%	1.06
SandRidge Energy	USA	10%	0.36
Santos	Australia	10%	1.47
Sasol	South Africa	10%	2.39
Saudi Aramco	S. Arabia	5.7%	268.96
Saudi Electricity	S. Arabia	10%	1.85
Schlumberger	USA	10%	11.89
Secure Energy Services	Canada	10%	0.07
Sempra Energy	USA	10%	10.23
Shell	UK	45.12%	121.1
Shoals Technologies	USA	10%	0.29
SilverBow Resources	USA	10%	0.52
Sinopec	China	10%	2.36
SM Energy	USA	10%	1.73
SolarEdge	Israel	10%	1.37
Solaria Energía	Spain		0.36
Southern Company	USA	10%	10.14
Southwestern Energy	USA	10%	3.51
Sprague Resources LP	USA	10%	0.17
Stabilis Solutions	USA	10%	0.02
Suburban Propane Partners	USA	10%	0.12
Summit Midstream	USA	10%	0.01
Suncor Energy	Canada	10%	8.45
Talos Energy	USA	10%	0.94
Tamarack Valley Energy	Canada	10%	0.18
Targa Resources	USA	10%	3.83
Tata Power	India	10%	0.54
TC Energy	Canada	10%	4.76
TechnipFMC	UK	10%	1.5
Tellurian	USA	10%	0.83
Thai Oil	Thailand	10%	0.54
Toho Gas	Japan	10%	0.09
Tōkyō Gas	Japan	10%	1.44
Topaz Energy	Canada	10%	0.35
TotalEnergies	France		17.6
Tourmaline Oil	Canada	10%	9.8
TransGlobe Energy	Canada	10%	0.02
Tsakos Energy Navigation	Greece		0.28
U.S. Well Services	USA	10%	0.02
United Tractors	Indonesia	10%	2.98
Unitil Corporation	USA	10%	0.11
Uranium Energy	USA	10%	0.49
Vaalco Energy	USA	10%	0.09
Valaris	UK	10%	1.66
Valero Energy	USA	10%	14.2
Vector Limited	New Zealand	10%	0.42
Vermilion Energy	Canada	10%	2.4
Vertex Energy	USA	10%	0.34
Vista Oil & Gas	Mexico	10%	0.39
Viva Energy	Australia	10%	0.26
Voltalia	France		0.03
Voltamp Transformers	India	10%	0.1
W&T Offshore	USA	10%	0.48
Weatherford International	USA	10%	0.14
Whitecap Resources	Canada	10%	0.84
Whitehaven Coal Limited	Australia	10%	2.12
Williams Companies	USA	10%	9.49
Woodside Energy	Australia	10%	19.77
Worley	Australia	10%	0.61
Yancoal	Australia	10%	2.24
YPF	Argentina	10%	1.17
Zion Oil & Gas	USA	10%	0.02

Note: This table lists the 299 energy companies we identified as being headquartered in the European Union or having sales in the European Union, and that experienced increases in their market valuation between January and September 2022. The first column indicates the headquarter country. The second column reports the observed or assumed fraction of sales made in the EU by firms with headquarters outside of the EU. For 11 non-EU companies (BP, Chevron, ConocoPhillips, Ecopetrol, Equinor, Exxon Mobil, Occidental Petroleum, Petrobras, Saudi Aramco, Shell, and SSE), this fraction is observed in either country-by-country reports or public financial statements; for the other firms we assume this fraction is equal to 10%. The last column reports the growth in market capitalization between January and September, converted to euros using September exchange rates.