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INVESTORS' PREFERENCES FOR E-MOBILITY POLICIES: AN ANALYSIS OF EUROPEAN INVESTORS

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Abstract

Despite their potential for urgently needed emission reduction, electric vehicles account for a small fraction of the European vehicle fleet. Large scale deployment of electric vehicles requires considerable investments. While public policies are crucial for leveraging such financing, when ill-designed, they risk being ineffective or might even crowd-out investments. This study sheds light on investors' policy preferences in the e-mobility sector. Based on behavioural finance literature, I propose that various a priori beliefs and investors' country-contexts affect their evaluation of e-mobility policies. The policy preferences of European investors are examined through an adaptive conjoint analysis. The results indicate that policy preferences are dependent on investors' belief in government intervention and the effectiveness of e-mobility technology. Furthermore, the existence of a domestic car manufacturing sector and the size of electric vehicle fleets affect investors' policy evaluations. These behavioural aspects should, therefore, be incorporated into future policymaking processes.

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List of Acronyms

ACA	Adaptive Conjoint Experiment
ACBC	Adaptive Choice-Based Conjoint
BEV	Battery Electric Vehicle
CBC	Choice-Based Conjoint
Cleantech	Clean Technologies
CO_2	Carbon Dioxide
e-mobility	Electromobility
EU	European Union
EV	Electric Vehicle
ICEV	Internal Combustion Engine Vehicles

1 Introduction

Climate change is a highly discussed subject because of its devastating effects on the environment and the livelihoods of people around the world. Human activities, in particular greenhouse gas emissions, are major drivers of the increase in global average temperature. Hence, it is crucial to identify and pursue options to achieve global emissions reductions of 25% until 2030 and to reach net-zero by 2070 (International Panel on Climate Change 2018).

Over the last years, the European Union (EU) – emitting approximately 10% of the global greenhouse gases – has successfully put in place climate change mitigation efforts (European Environmental Agency 2019c; Ritchie and Roser 2019). However, not all sectors are impacted equally by these efforts. Namely, the emissions of the transportation sector increased considerably (Eurostat 2019). Given the importance of the transportation sector (25% of the total emissions) in the EU, this is an alarming development. Furthermore, since the transportation sector is growing globally, large-scale advancements are urgently needed (International Energy Agency 2019a). This study will consider the large and increasing share of the emissions of road transportation (Sims et al. 2014; European Environmental Agency 2019a), with a European focus.

Electromobility (e-mobility) offers great potential to reduce those transport emissions. However, as the technology still has several drawbacks, considerable investments are required to make use of e-mobility at large scale and therewith reduce emissions from the transportation sector. Despite recent increases in investment volumes, the European Central Bank estimates an annual investment gap of 6.2 to 14 billion US$ (de Concini 2018). To leverage these investments, public policies are crucial. Therefore, for this study, I chose a behavioural finance perspective to public policies and e-mobility investments.

Behavioural finance theory emphasises the importance of the investors as a person in any investment decision. In contrast to traditional finance theories, investment decisions are assumed to be influenced by the investors' subjective perception rather than being based merely on an objective risk and return analysis. However, in policymaking processes, investors' perspectives are seldomly incorporated (Chassot, Hampl, and Wüstenhagen 2014). As policies frequently miss their targets and potentially have adverse effects on investments in clean technologies (cleantech), it is of crucial importance to understand the processes behind investment decisions. Several studies on the energy policy sector support the urgency of including investors' policy perception (e.g. Bürer and Wüstenhagen 2009; Lüthi and Wüstenhagen 2012; Masini and Menichetti 2012). This literature incorporates several behavioural factors such as a priori beliefs in market mechanisms and technological effectiveness, which proved effective in explaining policy preferences and investment behaviour of investors. To my knowledge, no comparable research in the mobility sector has been conducted.

The study aims to fill this gap and contributes to the understanding of the investment decision-making process in the e-mobility sector. To that end, the following will analyse investors' policy preferences with consideration of behavioural aspects as well as regarding the EV market conditions in the investors' locations. Therefore, on the one hand, the analysis examines how investors' a priori beliefs vis-à-vis government intervention and technological effectiveness influence policy preferences as well as the impact of the investors' susceptibility to local opinions on car industry via lobbing. On the other hand, investors' preferences are investigated depending on the EV fleet shares in their respective countries. To this aim, a survey is distributed to European investors.[1] The core element of the survey is a conjoint experiment which allows answering the research question by capturing the investors' policy preferences in a hypothetical choice setting. This study is the first research on investors' perception of e-mobility policies. It improves the understanding of how a priori beliefs influence investors'

[1] The survey was created and distributed in collaboration with Eva Bortolotti, who studied different aspects of it.

investment decisions. As the findings contribute to improved and more effective policy design, it will shed light on how urgently needed investments in e-mobility can be encouraged through public policies.

The remainder of this paper is structured as follows: Section 2 will set the scene for e-mobility. It informs about the potential of e-mobility regarding emission reduction as well as several drawbacks of e-mobility technology. The chapter also discusses mobility investments. Section 3 focusses on policies, by, on the one hand, introducing concepts of categorisation, and, on the other hand, present common e-mobility policies currently applied in European states. Following this, section 4 elaborates on investors' policy preferences and proposes hypotheses. For this, the section will draw on parallels to the literature on the renewable energy sector. Next, section 5 is dedicated to the methodology and as a major part the adaptive conjoint analysis (ACA). Thereafter, the regarding results are presented and discussed in view of the hypotheses (section 6). The paper terminates with concluding remarks in section 7.

2 E-mobility

This study defines e-mobility as including electric vehicles (EVs) - such as full battery electric vehicles (BEVs) and plug-in hybrid electric vehicles - as well as e-bikes, e-scooters, and e-busses (inspired by de Concini 2018). However, the focus of this paper lies on EVs. This section will first discuss the advantages and shortcomings of e-mobility and, later, the mobility investments by pointing at the still considerable investment gap.

2.1 Advantages

There are four points of action regarding the reduction of transportation emissions: a) lowering the demand of transportation; b) shifting transportation from high-emitting to low-emitting modes; c) decreasing the energy intensity of the transportation technologies; d) reducing the emission intensity of the fuels (Edelenbosch et al. 2017). Reducing the transportation demand as well as the modal shift have shown to be effective in local studies and might in aggregation have an underestimated potential to reduce transportation emissions. Taking a large-scale perspective, increasing the energy efficiency of the transportation technology – i.e. increasing the distance travelled per unit of energy – and fuel switching towards low-emitting fuels seem promising. Despite being a mature technology, internal combustion engines vehicles (ICEV) are still estimated to increase efficiency considerably by up to 64% until 2050. This means that ICEV would drive over 60% longer distances with the same amount of fuel than today. Efficiency gains of battery electric vehicles (BEVs) are not expected to be this high (only up to 39%) (Ruhnau et al. 2019). However, when interpreting these efficiency gains, it's important to keep in mind that current BEV technology has an energy efficiency of 80% compared to the energy efficiency of ICEV of 20-35% (Sims et al. 2014). Accordingly, current BEV technology is much better at translating energy into motion, so much less energy is lost than in ICEVs. Furthermore, "Fuel switching towards electricity, hydrogen and biofuels goes significantly beyond historical rates of change and the scenarios would imply a clear break with historical trends" (Edelenbosch et al. 2017, 292). Due to its reliance on fertile land, biofuels are accompanied by debates regarding food security, deforestation and other negative impacts on ecosystems and societies (Zhang and Fujimori 2020). Both electricity and hydrogen technologies in BEVs and fuel cell electric vehicles, respectively, have zero tailpipe emissions and offer the possibility to reduce overall transportation emissions. The emission reduction advantages of the deployment of fuel cell electric vehicles over BEV, and vice versa, are controversially discussed (Bohnes, Gregg, and Laurent 2017; Ruhnau et al. 2019).

Additional to their vast potential for decreasing the transportation emission, the transition to e-mobility has further positive side-effects. One of these is the air pollution reduction, especially for urban areas (Creutzig 2016). Since air pollution is a major public health issue in cities around the world, increasing air quality is an important aspect of e-mobility. Similar holds for noise pollution, as EVs are much quieter than ICEV. Besides, e-mobility favours energy security improvements since electricity can be produced domestically and through various technologies. Thus, replacing imported fossil fuels through electricity reduces energy dependencies. Furthermore, battery technologies are core to a clean energy transition. Technological developments in the realm of EVs potentially favour developments of storage capacities required with increasing shares of intermittent renewables (International Energy Agency 2019b).

2.2 Drawbacks

However, e-mobility is by far not a perfect technology. Especially in the manufacturing and end-of-life phases improvements are required. On the one hand, the production of an EV and specifically their batteries require rare minerals such as lithium and cobalt. The mining processes of these minerals are usually unregulated and incorporate unhealthy working conditions. Since there are less such minerals needed for the ICEV production, ICEVs are evaluated to have lower human toxicity implications than EVs (Brennan and Barder 2016). Furthermore, despite being a zero-tailpipe emissions technology, BEVs are not climate neutral. The manufacturing phase is very emission-intensive, especially regarding battery production. Not only in the production phase but also the use-phase of an EV, the share of renewables in the local energy mix is crucial. Therefore, the positive emission effect of electrifying transportation is highly dependent on the advancements of clean energy generation. Electrification without simultaneous uptake of renewable energies would increase the total emissions (Zhang and Fujimori 2020). On the other hand, and in addition to the considerations regarding the energy mix, life-cycle analyses of BEV also highlight the need for recycling solutions in the end-of-life stage. Recycling would not only reduce EVs’ emissions but also the number of rare minerals required (Hall and Lutsey 2018).

From a consumer perspective, EVs higher purchase costs are a big barrier. Total costs of ownership (which includes purchase, use, maintenance, disposal, and in certain studies also taxes) are an interesting measure for vehicles price comparisons. Such studies reveal that despite often being advocated, the savings during the EV use phase, such as lower electricity prices than fuel prices and lower cost of maintenance, do not compensate the higher upfront cost (Breetz and Salon 2017). Various researchers studied the total cost of ownership of EVs in comparison to ICEVs and found that the relative cost competitiveness depends on local conditions (e.g. electricity prices) as well as car model characteristics such as size, and distance travelled (Lévay, Drossinos, and Thiel 2017; Brennan and Barder 2016; Wu, Inderbitzin, and Bening 2015). The study by Brennan and Barder (2016) estimates that in terms of total costs of ownership, ICEVs have an advantage of approximate 44%. However, the differences are much smaller in premium car segments (Lebeau et al. 2013; International Energy Agency 2018).

In conclusion, EVs offer a big potential to cut greenhouse gas emissions when combined with an increasing share of renewables in the electricity mix. However, as the discussion of the drawbacks and text box 1 on EV deployment in Europe show, EVs are still a niche product. Despite considerable growth rates, there are only a few countries with noteworthy market shares

Text box 1: *EV Deployment in Europe*

In 2018, there were globally 5.1 million EV in use, with 45% of them being located in China, 24% in Europe, and 22% in the United States. In 2018, there were only five countries where more than 1% of their cars were EVs: The world-wide leader is Norway, where 10% of the cars are electric, followed by Iceland (3.3%), Netherlands (1.9%), Sweden (1.6%) and China (1.1%). Therefore, EVs are still an exception among the global car fleet.

Despite this rather low numbers in terms of fleet shares, the increase in EV sales is considerable: In 2018 only, 2 million EVs were sold world-wide. This amounts to an increase in year-on-year growth of 68% from 2017 to 2018. Again, Norway is leader, where almost 50% of all newly bought cars are EVs. In terms of EV shares on newly bought vehicles, Norway is followed by Iceland (17.2%) and Sweden (7.9%). Despite this exceptionally high market shares, the European growth rate in EV sales between 2017 and 2018 (+ 31%) was below the global average.

BEVs is the preferred technology among EV buyers, with 68% of the EV sales in 2018 being BEVs. Plug-in hybrid electric vehicles are mainly purchased in Europe. Outside Europe, sales share of plug-in hybrid electric vehicles amongst EVs has decreased (International Energy Agency 2019).

for EVs. Hence, e-mobility needs major innovations in the realm of battery and vehicle production, battery composition, and recycling processes that would decrease the respective environmental impacts. Furthermore, such technological advances could reduce purchase prices and thereby remove a significant barrier to EV deployment.

2.3 Investments

It is difficult to precisely estimate e-mobility investments. A study by the European Central Bank assesses that mobility (not **e-**mobility) investments doubled between 2013 and 2018 but that these investments are allocated selectively, with few dominant companies such as Uber and Tesla. Furthermore, mobility investments are largely benefiting companies that focus on mobility services (such as car-sharing) or automation. At the same time, especially companies in the realm of green urban transport and highly energy-efficient road vehicles such as EVs face difficult access to finances. Moreover, despite a considerable car manufacturing sector, most investments occur outside of Europe and the European industry risks being left behind (de Concini 2018). According to EV Boosters, globally, approximately 17.4 billion US$ have been invested in e-mobility in 2019. Most of these investments go into EV manufacturing, followed by shared e-mobility projects and batteries (EV Boosters, n.d.). Quite different numbers are provided by a McKinsey and Company report: Average annual investments in EVs, charging, and batteries increased from 1.4 billion US$ (in 2010-2013) to 5.1 billion US$ for the years 2014 to 2019 (Holland-Letz et al. 2019). In addition to the difficulties in the allocation of current e-mobility investments, the European Central Bank estimates an annual investment gap of 6.2 to 14 billion US$ in Europe (de Concini 2018)[2]. Since it is not only hard to estimate the current investments but also difficult to quantify the required investments, this estimation has a rather wide scope. Nevertheless, the numbers show the importance of leveraging additional e-mobility investments. Part of the reason for the investment gap is that CO_2 emissions and their impacts

[2] For changes from Euro to US$ or from CHF to US$ the exchange rates of July 14th, 2020 are used.

are still externalities to trade. Therefore, market prices do not account for the environmental benefits of EVs which leads to a price disadvantage (Foxon and Pearson 2008, 156). This impacts not only consumers' perspective of EVs but also investors' and car manufacturers' motivation for investments. The car manufacturing sector tends to invest less than what would be needed because the environmental benefits of clean innovations do not profit the firm itself. Furthermore, given the environmental externalities, their current technologies might be more profitable than clean alternatives (Wesseling, Farla, and Hekkert 2015).

Public policies can internalise environmental impacts as well as offer incentives for investment in e-mobility. Therefore, public policies are essential to encourage investments and to close the investment gap. Consequently, the next paragraph will focus on public policies, introduce several categorisation schemes of policies as well as present commonly used mobility policies.

3 Policy Review

In the focus of this section lie e-mobility policies. The chapter, first, discusses various ways of categorisations of policies and, second, presents commonly used e-mobility policy instruments in the EU and Switzerland.

3.1 Policy Categorisations

Policy instruments are categorised in various ways. In environmental economics literature, authors differentiate **between command-and-control** and **market-based** policy instruments. Command-and-control instruments, also known as prescriptive regulations, regulate the performance and behaviour of e.g. factories or processes. Market-based instruments, in turn, directly address market failures while still respecting market principles. They can either influence the market prices (such as in the case of taxes) or limit the quantity of e.g. emissions (for instance, to motivate the emitters to trade emission allowances) (Keohane and Olmstead 2016). A related differentiation is expressed by Koessler and Engel (2019), as policies changing the economic playing field (i.e. market-based policies) in contrast to policies changing the legality (i.e. command-and-control). Furthermore, policies can either be **technology-neutral** or **technology-specific**. In innovation policy literature, the former describes policies that promote equally all technologies that e.g. lower emissions. The latter specifies which of these technologies are supported and establish differentiated incentive schemes (Azar and Sandén 2011). While technology-neutral support is often promoted by policymakers, most policy schemes indeed rely on technology-specific instruments (Azar and Sandén 2011). Many instruments can be designed either technology-neutral or -specific. Technology-neutral support might be cost-effective in the short-term, but hampers the chances of niche technologies to thrive, which could then increase technology costs in the long run (de Mello Santana 2016).

Other categorisations from the innovation literature arise around the functions of policies. Frequently used is the distinction between **technology-push** and **market-pull** policies. The former describes policies that aim at increasing the supply of technology, while the latter policies target the demand for new technologies (Bürer and Wüstenhagen 2009). Finally, Kivimaa and Kern (2016), established a comprehensive analysis of policy functions. Their main differentiation is between **creative** policies and **destructive** policies. Creative policies support the development and establishment of new technologies. Destructive policies destabilise the market of established legacy technology to in-directly support the emergence of new technologies. Kivimaa and Kerns analysis of the energy efficiency policies of Finland and the UK reveals that both creative, as well as destructive policies, are applied, whereby there is an imbalance in favour of creative policies. This is not surprising since legacy technologies have established support systems that make it politically difficult to adopt destructive policies. While the differentiation between these policy functions is of great use, despite the insight that destructive policies are an integral part of policy mixes, Kivimaa and Kern did not elaborate on the optimal balance between destructive and creative policies to achieve sustainability transformations. They do, however, indicate that few destructive policies in a policy mix might be enough (Kivimaa and Kern 2016).

3.2 E-mobility Policies in Europe

In Europe, the policy environment knows a wide range of policy instruments and equally many policy designs. Subsidies and taxation schemes are frequently set nationally, however, most non-financial incentives are organised locally. This creates a poorly integrated patchwork of incentives that is hard to keep track (van der Steen et al. 2015). The following overview of policies targeting emission reduction in road transportation – with a focus on passenger cars – will draw on the categorisation schemes of command-and-control vs. market-based; technology-push vs. market-pull; and creative vs. destructive policies. However, the overview will not enter the terrain of research and development policies, thus ignoring several typical technology-push policies. Beside the EU-wide emissions standards, which are discussed first, all other policy instruments incentivising e-mobility are set on a national level at most.

Emission Standards

In the EU, the integration of the transport policies is a long-time goal that goes as far back as the Treaty of Rome (Coito and Blaser 2020). In 1999, the first EU-wide average emission targets were introduced voluntarily and made mandatory in 2009 (‘Emission Standards: Europe: Cars GHG’ n.d.). Recently, the EU adjusted the fuel economy standards that apply since the beginning of 2020 and whose transition phase ends by the end of 2020. These new targets are set at 95gCO_2 /km for new passenger cars and 147g CO_2 /km for new light commercial vehicles. Furthermore, the Regulation 2019/631 sets benchmarks for the sale of zero and low emission vehicles of 15% in 2025 and 35% in 2030 for new passenger cars (The European Parliament and The Council 2019). The same average emission standards are applicable for imported new cars into Switzerland (Swiss Federal Office of Energy 2019). This command-and-control policy aims mainly at motivating technological improvements (technology-push) and can have both creative effects (by pushing for new technologies) as well as destructive effects on legacy (ICEV) technologies. This is especially the case when the emission standards reach levels too low to be achievable by combustion engines.

Fuel Taxes

Taxes on diesel and petrol are very commonly applied market-based, market-pull policies with a destructive effect on the ICEV technology. However, the EU does not share a common taxation scheme. The current taxation levels on diesel and petrol differ considerably amongst the EU-28, where most countries tax diesel lower than petrol. The highest taxes on diesel are found in the UK, Belgium, Italy, and France, while petrol is most heavily taxed in the Netherlands, Italy, Finland, and Greece. In recent years, the share of fuel taxes in the total fuel prices decreased mainly due to the increase in oil prices. The *absolute* tax level reached its minimum in 2009 (European Environmental Agency 2019b). Despite the taxes being set nationally, the European Commission promoted the adjustment of the national taxation schemes to internalise the true cost of transportation and, therefore, induce taxes according to the emissions caused by the fuels (European Commission 2011). Switzerland knows a tax on imported petroleum (including petrol and diesel) which generated 6.2% of the national revenue in 2019 (Federal Customs Administration n.d.). As of spring 2020, the federal parliament debates on whether (and on what level) to implement new taxation of transportation fuels tied to the emissions, as such a scheme currently exists only for heating fuels (Energieradar 2020).

Tax Deductions

Similar to diesel and petrol taxes, registration and circulation taxes are market-based instruments. Privileging EVs by offering deductions on such taxes are market-pull, creative policies, that are widely applied. Examples are deductions or exemptions of the value-added tax at the point of purchase (e.g. Netherlands and Portugal) as well as several taxes throughout the use-phase, e.g. circulation or similar ownership taxes (e.g. Netherlands, United Kingdom, and Austria) (European Automobile Manufacturers Association 2019). In Switzerland, vehicle taxation lies in the jurisdiction of the cantons, and most cantons offer at least some deduction (Swiss eMobility n.d.). Another tax incentive for EVs are exemptions from congestion charges applied locally by cities such as Milan and London (‘Milan: Lessons in Congestion Charging’ 2013; ‘Congestion Charge’ n.d.).

Subsidies

Subsidies on EV purchases are one-time bonuses at the point of purchase and are mostly set nationally, sometimes locally. They are a typical market-based, market-pull instrument that impact the upfront and total cost of ownership of low emission vehicles and, therefore, have creative effects on new technologies. There are big differences as to the level of support. According to a McKinsey and Company report from 2017 both national and local subsidies in Europe cover between 2% (e.g. Portugal: 380 US$) and 49% (Denmark: 22’150 US$) of the average vehicle prices (Hertzke, Müller, and Schenk 2017). Many EU countries do not offer any subsidies (European Automobile Manufacturers Association 2019). In Switzerland, there are no national subsidies on the EV purchase, and existing cantonal and local incentives reach around 5’300 US$ (Swiss eMobility n.d.). Norway, the country with the highest market share for EVs, supports the purchases with a 16’050 US$ bonus (Hertzke, Müller, and Schenk 2017).

Non-monetary Incentives

The last group of instruments are taken together to non-monetary incentives. These instruments are usually adopted on a local level and include e.g. access to bus lanes for EVs or free parking for EVs. Another important sector of such non-monetary incentives are charging networks: e.g. the provision of public chargers (Transport & Environment 2020) or the imposition of building standards that facilitate the installation of private chargers (‘Energy Performance of Buildings Directive’ 2020). Non-monetary policies can be categorised as command-and-control instruments that aim at increasing the demand for EVs (creative market-pull instruments).

As this overview shows, there is a wide range of policy instruments to influence the e-mobility sector. The effectiveness of many of these instruments have been assessed regarding the EV deployment rate choosing consumers' perspective (see text box 2). However, as e-mobility technology still requires considerable investments to overcome drawbacks and achieve large-scale deployment, investors' perspective on e-mobility policies is crucial.

Text box 2: *Mobility Policies' effect on EV deployment*

While there have been no studies on investors' perception of mobility polices, there have been numerous, sometimes contradicting studies on mobility policies influence on EV deployment shares. These studies emphasise that for effective promotion of EVs no single policy is enough, but it requires a mix of several policies (e.g. Hardman et al. 2017; Held and Gerrits 2019; Kester et al. 2018; Shafiei et al. 2018; Yong and Park 2017). Comparisons between policy instruments found that financial incentives at the point of purchase (such as subsidies or VAT exemptions) play a major role as they reduce the higher upfront cost of EVs in comparison to ICEVs (e.g. Hardman et al. 2017; Kester et al. 2018; Yong and Park 2017; Wang, Tang, and Pan 2019). Furthermore, fuel taxes are evaluated to positively affect EVs deployment by increasing relative usage costs of ICEVs over EVs (Held and Gerrits 2019; Wang, Tang, and Pan 2019).

Nevertheless, Wang et al. (2019) emphasise that financial policies cannot explain the differences between the deployment rates. Rather, they put forward the importance non-monetary incentives such as road priority and the charging network to reduce range anxiety of consumers (for the latter see also e.g. Hardman et al. 2018; Held and Gerrits 2019; Sierzchula et al. 2014; Tietge, Mock, and Campestrini 2016; Yong and Park 2017).

Furthermore, it is pointed out that the best policies are of little use, when consumers are not aware of their existence. Thus, awareness raising and information campaigns on EVs' advantages and policy instruments are essential requirements for successful policy mixes (Hardman et al. 2017; Kester et al. 2018; Tietge, Mock, and Campestrini 2016).

4 Investors' Perception and Hypotheses

This section first discusses general tendencies of policy preferences based on the assessment of investment risks and returns and the respective hypotheses. Furthermore, it will deduce sets of hypotheses on a priori beliefs and influences of the local context as well as hypotheses derived from the investors' location.

4.1 Perception of Policy Instrument, Level, and Uncertainty

For investment decisions, the assessment of the balance between risks and returns of a project is essential. Risks of investments can be rooted in the technology itself, the project team as well as in the uncertainty about market adaptation and the regulations of the market segment (Chassot, Hampl, and Wüstenhagen 2014). However, according to the behavioural finance literature, investment decisions cannot be explained by mere rational risk and return considerations but should be evaluated under inclusion of the investor itself. “Emotional processes, mental mistakes, and individual personality traits complicate investment decisions” (Kent Baker and Ricciardi 2014, 7). Investor behaviour and investment decisions are guided by heuristics and short-cuts which are based e.g. on experience, personal beliefs and personal preferences (Kent Baker and Ricciardi 2014; Subrahmanyam 2007). Therefore, it is more appropriate to speak of *perceived* risks and returns of a project. And to establish a policy environment that promotes investments into the e-mobility sector, factoring in the perception of the investors is essential.

Within the risk and return analysis, policies can either impact the perceived risks related to the investment, impact the expected return from an investment, or both. As a gold standard, policies to leverage investments should decrease the perceived investment risk and increase the expected return (Polzin et al. 2019). However, the policy itself (e.g. due to the risk of reversal) can become an investment risk. In this line, some studies on investors’ perception of policies found a trend to policy aversion, a general mistrust, where investments into regulated markets are hampered (Bürer and Wüstenhagen 2009; Chassot, Hampl, and Wüstenhagen 2014; Matthews 2018). Nevertheless, well-designed policies can reduce investment risks and stabilise returns. An example of this is a subsidy system: The price for the new technology becomes competitive with legacy alternatives and, hence, the demand for the new technology increases (Polzin et al. 2019). The positive perception of such policies is illustrated in the renewable energy sector, where feed-in tariffs are repeatedly shown to be the preferred policy instrument (Bürer and Wüstenhagen 2009; Lüthi and Wüstenhagen 2012; Masini and Menichetti 2012). Feed-in tariffs follow the same logic as subsidies at purchase (e.g. for EVs) as they compensate for higher production costs and thus augment the financial competitiveness for the new technology (Polzin et al. 2019). In contrast to other policies such as CO_2 taxes or emission standards, subsidies directly generate revenue for the projects. From the perspective of the government, however, subsidies are public expenses which makes them vulnerable to budgetary restrictions and, thus, associated with less stability (Shafiei et al. 2018; Barradale 2010).

Besides the policy instrument, investors are interested in the policy level. "There is a minimum threshold of financial support (…) below which little can be achieved" (Leete, Xu, and Wheeler 2013, 873). In line with this, the survey by Masini and Menichetti (2012) reveals Venture Capitalists' and Private Equity funds strong preference for short-term policies with a high level of support. High policy levels and strong incentives can be interpreted as strong signals that the regulator is willing to support a sector or technology. In addition to the actual incentive level, the predictability of a policy and its level is crucial. The assessment of consumers' perspective on EV policies emphasised the need of long-term policies (Hardman et al. 2017; Tietge, Mock, and Campestrini 2016; Yong and Park 2017) which was also confirmed in studies focussing on renewable energy investors (Leete, Xu, and Wheeler 2013). Nevertheless, the investors' perspective on this aspect seems less clear since policy adjustments are also perceived as chances to adjust for market developments (Nemet et al. 2014). Nevertheless, especially unexpected policy changes have a negative impact on the risk perception of investors (Lüthi and Wüstenhagen 2012; Polzin et al. 2019). Therefore, and supported by the illustrations from the renewable energy sector, I propose the following hypotheses on investors' policy preference:

Hypothesis 1: Due to their positive impact on investments' risks and returns, subsidies are positively evaluated by investors.

Hypothesis 2: Investors generally prefer high policy levels.

Hypothesis 3: Investors prefer policies with stable incentive levels.

4.2 A Priori Beliefs on Policy Perception

In line with the behavioural finance literature, a priori beliefs are expected to affect investors' investment decisions. For decision-makers, the choice of a policy instrument reveals information about the regulator, which can trigger positive or negative reactions. Koessler and Engel (2019) theorise that command-and-control instruments are perceived as indications for an authoritarian regulator; taxes and subsidies for a regulator who believes in market-forces; and a setting relying on voluntary agreements as a sign of a libertarian regulator. Investments are expected to be hampered when policy signals do not fit the investors' opinion on the role of the regulator (Koessler and Engel 2019). Moreover, it was shown that investors who express individualistic, free-market worldviews are less likely to invest in a regulated market segment and have a significantly different risk-return assessment than investors without such worldviews (Chassot, Hampl, and Wüstenhagen 2014). Followingly, investors perceive policies differently, depending on their a priori beliefs in the necessity of governmental intervention. First, command-and-control policies, as signals of an authoritarian regulator, would seem more appealing for investors who believe in the necessity of government intervention (Koessler and Engel 2019). In contrast, investors who are critical about government intervention would prefer policies more, the lesser they interfere with market-mechanisms. Amongst these investors, both command-and-control policies, as well as technology-specific policies, where the regulator bypasses the market and picks a winning technology, would be least preferred (Azar and Sandén 2011). Therefore, the regarding hypotheses read:

Hypothesis 4a: Investors with stronger beliefs in the necessity of government intervention evaluate command and control policies more positively.

Hypothesis 4b: Investors who do not believe in the necessity of government intervention prefer policies with little interference with market mechanisms.

Besides a priori beliefs vis-à-vis the interaction between the government and the market mechanisms, Masini and Menichetti promote the importance of investors' a priori belief regarding the technology. Investors' belief that the technology works and will be deployed in future – i.e. technology effectiveness – is fundamental for any investment (Masini and Menichetti 2012). Therefore, such an a priori belief is expected to also influence the policy preferences of investors. The preferences of both investors who believe in the effectiveness of e-mobility as well as sceptical investors are of interest in designing policy. The latter group is expected to favour policies that counterbalance their perceived risk. According to Polzin et al. (2019), policies affect the investment risk inter alia through offering stable prices for the technology, guaranteeing technology volumes, and/or reducing the technology variety in the sector. These functions are deduced from examples of the renewable energy sector, namely feed-in tariffs and technology standards (Polzin et al. 2019). Parallel examples from the mobility sectors could be subsidies (stabilising prices), public procurement (guaranteeing volumes), and emission performance standards (limiting technology variety). Followingly, investors' who perceive a technological risk on e-mobility, are expected to especially favour such policies.

Hypothesis 5: Investors who believe in the effectiveness of e-mobility have lower preferences for policies that counterbalance investment risks.

Furthermore, as investors' environment influences their investment decisions, investors' policy preferences are expected to differ whether they are from car-producing or non-car producing countries. The overall view on the automobile industry in the former countries might differ from the perspective of the latter countries. A study on Germany, indeed showed that car manufacturing is a quite sensitive topic, due to its intertwining with the local culture (Mögele and Rau 2020). Part of the reason is the industry's lobbyism in political processes and thus public discourse (Somerville 2011). Studies from the U.S. show, that car manufacturers attempt to influence mobility policies. More precisely, "Through political influence of public innovation policy, firms may increase their success in obtaining government subsidies or winning government tenders, or they may attempt to shape technology-forcing regulations in ways that involve low compliance cost for themselves (…)" (Wesseling, Farla, and Hekkert 2015, 89). Followingly, car-producing countries have different mobility policies than non-car producing countries: car-producing countries have policy environments focussing on supporting innovation, while non-car producing countries were found have more policies promoting the demand for e-mobility (such as purchase incentives) (Wesseling 2016).

Due to investors' susceptibility to non-rational personal beliefs assumed under a behavioural finance approach (Kent Baker and Ricciardi 2014), I expect that investors are also influenced by the car industry's interests. Car manufacturers policy preferences are expected to be reflected in the policy preferences of investors from the respective countries. Thus,

Hypothesis 6: Investors from car-producing countries evaluate policy instruments that offer financial benefits to car manufacturers more positively. At the same time, they least prefer instruments that harm the sales of ICEVs.

4.3 EV Fleet Size on Policy Preference

Besides this, investors' policy preferences might be influenced by the state of EV deployment in their respective countries. Following an evolutionary approach to policy design, policies need to be adapted to technological learning and deployment developments (Nill and Kemp 2009). In line with this approach, Grubb (2006 as cited in Bürer and Wüstenhagen 2009) promotes technology-push policies for the very early stages (before commercialisation) and market-pull policies for when a niche market is established. This sequence is also promoted by Foxon and Pearson (2008). It can thus be expected that investors' evaluation of policies varies according to the stage of deployment in their countries:

Hypothesis 7: Policy preference of investors is dependent on the fleet composition in their respective countries, where bigger niche-markets for EVs decrease the preference for technology-push policies.

5 Methodology

To analyse the stated hypotheses, an online survey was conducted among European investors. The survey included quantitative questions as well as a conjoint experiment. The design of the survey was assisted through ten semi-structured interviews lead by either Eva Bortolotti or me. Four of the interviewees were official partners of the Swiss National Science Foundation project on "Financing investments in clean technologies". The interviewees were policy experts, cleantech investors, public officials, and a CEO of an e-mobility start-up. The interviews allowed for precision in the formulation of the questions as well as certainty about the appropriateness of the facets in the conjoint experiment.

5.1 Survey

The first part of the survey was used to collect information about the respondents and the institutions they are affiliated with. This included the respondents' position in the institutions and their experience with cleantech investments. Furthermore, we asked about the type of institutions, the size of the institutions' fund, the location of the institutions' headquarters, their main countries of investment as well as whether the institutions have already invested in cleantech and e-mobility. In addition to the definition of e-mobility (see section 2), in the survey, cleantech was defined as "those technologies/products/services that aim at sustainable

Text box 3: *Question blocks on a priori beliefs*

Government Intervention:

1. “Government intervention is needed to regulate the market economy”
2. “The necessary change in technology to mitigate climate change will happen even without government intervention"
3. “Government intervention does more harm than good, let governments stay out of the way”
4. “My company’s investments are likely to be negatively impacted by climate change policies”

E-mobility Effectiveness:

1. "Due to the technical advantages of e-mobility, they will automatically be deployed on a large scale”
2. “My company sees e-mobility as an investment opportunity”
3. “I believe that the future of mobility are EVs rather than internal combustion engine vehicles”

utilization of natural resources and which provide for the production of renewable energy” with e-mobility being one of the provided examples (based on Cleantech Alps 2017, 4).

The second part of the survey aimed at assessing a set of a priori beliefs of the investors. This study focusses on the a priori beliefs on governmental regulation and the technological effectiveness of e-mobility. The question block on government intervention is composed of a set of four statements (see text box 3) to which respondents were asked to indicate the degree of agreement/disagreement on a Likert scale. The scale ranges from 1 (strongly disagree) to 5 (strongly agree) with 3 indicating indifference. High values on statement 1 indicate openness for governmental intervention, whereas loadings on statements 2-4 need to be inverted to measure openness instead of rejection of government intervention. The used statements are similar to those posed by Menichetti (2010) and Chassot et al. (2014), and statement 3 is taken unchanged from the former study. For the analysis, an additive index is built with equal weights for each of the four statements. In this study, respondents with index value below 1.8 are referred to as strong market-liberalists, and with index values between 1.81-2.6 as market-liberalists. Index values between 2.61 and 3.4 still indicate indifference. Investors loading high on this index are considered governmentalists (index values 3.41-4.2) or strong governmentalists (4.21-5). These terms should be understood as labels for better readability since the few statements are not enough for a full-fledged categorization usually indicated by liberalism or governmentalism.

Similarly, three statements were posed to measure respondents’ a priori belief on the effectiveness of e-mobility (see text box 3). Again, the 5- point Likert scale ranged from 1 (strongly disagree) to 5 (strongly agree) with 3 measuring indifference. The three statements are inspired by the work of Menichetti (2010). As before, the statements were compiled into an additive index with equal weights. High loadings indicate investors’ a priori belief that e-mobility is an effective technology, which has a future. Investors’ with index values lower than 3.4 are referred to as “e-mobility-critical”; those with index values between 3.41-4.2 as “e-mobility-confident”; and those with higher loadings refer to “e-mobility enthusiasts”.

Furthermore, the respondents were categorised regarding whether their headquarters are located in one of the top-10 car manufacturing countries in Europe. Following the 2017 data of the European Automobile Manufacturers Association, these countries are Germany, Spain, France, United Kingdom, Czech Republic, Russia, Turkey, Slovakia, Italy, and Poland (European Automobile Manufacturers Association 2018).

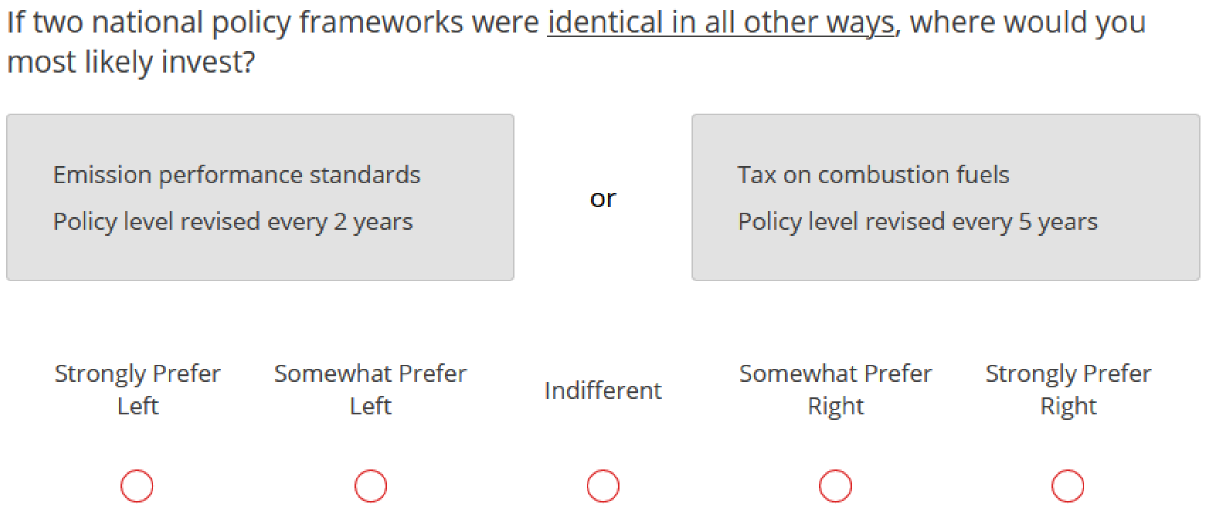
To account for EV deployment, data was collected from the European Alternative Fuel Observatory. The most recent data (2019) was used to differentiate investors with headquarters in countries with more than 50’000 EVs deployed and those from countries with smaller EV fleets. The former category includes Belgium, France, Germany, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom (European Alternative Fuel Observatory 2019).

The third part of the survey included the various question types for the assessment of the investors' policy preferences through an adaptive conjoint analysis (ACA). As a point of reference, the investors were given the opportunity to invest in an innovative battery project for EVs. The respondents were asked to assume the same project characteristics for their respective investments under different policy frameworks (thus, holding the characteristics of the project team and the existing charging infrastructure network constant). The battery project was chosen because batteries are an important part of an EV's price (Fries et al. 2017 as well as confirmed by one of the interviewees). Apart from the price, the weight and size of batteries, their range and charging time as well their material, production, and several aspects of security (such as heat generation) can still be improved. Furthermore, batteries are seen as "by far the most valuable part of an electric car" (Möller et al. 2019, 13), as they have additional potential to be used outside the vehicle sector (e.g. intermittent energy generation). To not go into technical complexities, the project was only presented superficially. This ensured that the respondents understood all explanation regardless of whether they invested in cleantech or e-mobility before. The example project thereby combined easy comprehension with a big potential for technological improvement.

5.2 Adaptive Conjoint Analysis (ACA)

Conjoint analysis is frequently used in marketing research to assess consumers' preferences for new products and their design features. The basic idea is to provide respondents with the choice between hypothetical but realistic product alternatives and thus simulate a purchase situation (Orme 2019a). Therewith, the method imitates revealed preferences in a hypothetical setting. Since the first attempts for conjoint analysis in the 1950ies, the logic of *"which product alternatives are presented to the respondent"* has been refined so that current conjoint experiments do not require presenting all possible combinations of product features. This is a major improvement to the method, making the interviews much shorter and more manageable for the respondents (Johnson 2002).

Figure 1: *Example of a choice question from the conducted ACA*



In conjoint experiments, design features (e.g. colour) are called attributes which can have various levels (e.g. green, red, and blue). ACA experiments start with two types of prior questions that assess the degree of desirability and the importance of the product features (the entire survey is in appendix A). Respondents' answers to these questions are used to individualise the choice questions they are presented with later. It is in this way that ACA is an *adaptive* conjoint analysis (Sawtooth Software 2007). This again shortens the interview while increasing the information on preferences gained per question. After stating the degree of importance and desirability of the product features, respondents are then presented with the choice questions. As shown in figure 1, these consist of two alternative products, where respondents choose which alternative they prefer, and to what degree.

These choices reveal the ranking of each attribute level per respondent. These ranking scores are called part-worth utilities and the aggregation of such part-worth utilities across the sample allows the estimation of the overall relative preference between the levels of an attribute (Orme 2019a). These aggregated utilities are expressed zero-centrically, where the direction and the size of these scores indicate the relative preferences of the respondents. Positive (negative) utilities indicate that a level is more (less) preferred relative to the other given options. Only comparisons of utilities within the same attribute are valid, comparison between utilities from different attributes are not allowed (Adrian, Wright, and Kilgore 2017). In the estimation of utilities, attributes are expected to not interact. As a “main-effect model” the utility of one attribute level does not depend on which level of another attribute it is combined with, no interactions between attributes are expected (Orme 2013).

Furthermore, the Online Market Simulator by Sawtooth Software allows estimating preference shares for products compiled by all attributes. Consumers are expected to choose the product under utility maximation, where the overall utility of a product is equal to the sum of the consumer’s part-worth utilities of each attribute level that defines the product (Orme 2019b). Hence, the market simulator allows comparing preference shares of products relative to another.

Text box 4: *ACA versus other conjoint analyses*

ACA is not the only method for conjoint analysis. Most conjoint analyses use Choice-Based Conjoint (CBC) or Adaptive Choice-Based Conjoint (ACBC) approaches. The former simulates a “shelve situation” with many product alternatives where respondents decide which product they purchase. ACBC, on the other hand, is a mix between ACA and CBC, where preferences of respondents are narrowed down in the first assessments before presenting them choices. Compared to CBC, this makes ACBC more engaging and realistic. While there is more information collected by this approach (and requirements for sample sizes are smaller), such experiments take longer than CBCs. In contrast to ACA, both methods do not generate data on the relative preferences among the rejected alternatives nor on whether the product alternative was preferred strongly or slightly. Thus, the amount of information obtained per choice is lower than with ACA (Orme 2013).

5.3 ACA on Investors’ Policy Preferences

As mentioned, ACA has been designed for market research. Applying ACA for policy preference assessment of investors implies the assumption that an investment decision is comparable to a purchase decision. Several studies have proven the appropriateness of conjoint analysis (Gamel, Menrad, and Decker 2016) and ACA (Lüthi and Wüstenhagen 2012; Menichetti 2010). As elaborated in text box 4, there are several conjoint analysis methods. The advantage of ACA over other conjoint methods is its allowance for small sample sizes due to the high information density per presented choice (Sawtooth Software 2007).

For our survey, the attributes and levels were chosen based on the literature review on policies and policy preference in section 2 and the interviews. Therefore, respondents were presented to three attributes with three levels each (figure 2). The three attributes are policy instrument, policy level, policy revision.

Figure 2: *Extract from the survey, indicating the attributes, levels, and the reading example*

In the following questions, **3 characteristics of the policy framework** will be investigated: policy instruments, policy levels and policy revisions. Each characteristic can come in 3 forms (listed in the table below).

Policy instruments:
Tax on combustion fuels
Emission performance standards for new cars
Subsidies for EV at purchase

Policy levels*:
Low policy level
Medium policy level
High policy level

Policy revisions:
Policy level revised every 2 years
Policy level revised every 5 years
Not defined when policy level will be revised

***Reading example:** If it helps you, you can think of the policy levels as follows:

- **low** policy level =	Tax of 0.065$/l diesel (i.e. 25$/tCO2);	120gCO2/km standard;	2'500$ subsidy on EV purchase
- **medium** policy level =	Tax of 0.13$/l diesel (i.e. 50$/tCO2);	95gCO2/km standard;	5'000$ subsidy on EV purchase
- **high** policy level =	Tax of 0.26$/l diesel (i.e. 100$/tCO2);	80gCO2/km standard;	10'000$ subsidy on EV purchase

The first attribute is policy instrument, which comprises a selection of the policies regarded most efficient to augment EV deployment. Based on the literature review, the selection comprised market-based (taxes on combustion fuels and subsidies on EV purchase) as well as command and control instruments (emission performance standards for new cars). Moreover, these instruments can be divided into creative (subsidies) and destructive (taxes) policies, whereby the emission standards can have both destructive and creative effects. The selection was evaluated as appropriate by the interview partners.

The second attribute is policy levels, which was kept simple by differentiating low, medium and high policy levels. Attempts to express policy levels for all three policy instruments in a common unit remained unsuccessful. A table was available for reference, giving examples for the monetary levels (bottom of figure 2). As an illustration, the medium policy level for the tax on combustion fuels is based on a CO_2 price of 50$, which is an approximate equivalent of

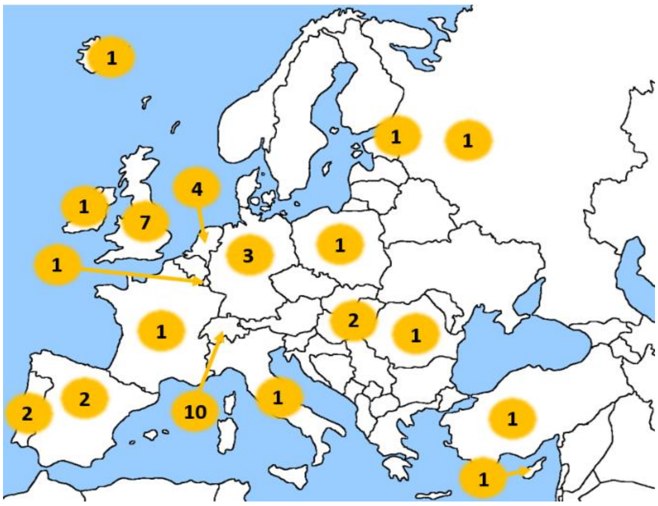
0.065$ per litre of diesel. For the emission standards, the medium level is set at the same level as the EU-wide goals of 95g CO_2 emission per kilometre driven (The European Parliament and The Council 2019). Finally, the medium policy level of subsidies is set at 5’000 US$ on the purchase of an EV, which lies in the mid-range of currently offered incentives in the EU (Hertzke, Müller, and Schenk 2017). The low policy level is based on a CO_2 price of 25 US$, less stringent standards and lower financial incentives at purchase. The high policy level is established accordingly.

The third attribute focusses on revisions of the policy level. The first level is set at a fixed policy revision after 2 years, which according to the interview with a public official seems more politically and administratively feasible than annual revisions. According to the interview with the CEO of an e-mobility start-up, technologies can be considered as outdated after approximately five years, which was thus set as the second level of policy revision. The third level implies a high degree of uncertainty since it is unclear when the policy level will be revised.

The survey was designed on Lighthouse Studio by Sawtooth Software and follows their guidance (Sawtooth Software n.d.). After being familiarised with the policy attributes and levels, the respondents were first asked to evaluate the desirability of each attribute level in comparison to the other attributes and other levels. Secondly, respondents indicated the importance of intra-attribute differences through the comparison of their least desirable level with their most desirable level for each attribute. It followed the pair questions in which the respondents chose between two policy sets on a 5-point scale, with the option for indifference (figure 1). The number of pair questions was set at 3*(N-n-1)-N, where N stands for the total number of levels and n for the total number of attributes, i.e. 3*(9-3-1)-9 = 6. This follows the recommendation by Sawtooth (Sawtooth Software n.d.).

Four of the interviewees participated in a pre-test and gave detailed and valuable feedback. Their recommendations were incorporated before the distribution of the survey to European investors. The survey was disseminated via e-mail to approximately 5’350 investors in Europe (for e-mail text see appendix B). Most of the addresses (5’023) were obtained from “Crunchbase”, an online platform aiming at connecting professionals from various sectors (‘About Crunchbase’ 2020). An overarching majority of the Crunchbase-addresses were impersonal info addresses. The rest of the respondents were addressed more personally. Their addresses were collected through internet research or personal work contacts. Furthermore, the link to the survey was published on the social media channels of the Green Growth Knowledge Platform and the Centre for International Environmental Studies of the Graduate Institute. Finally, we asked our interviewees to distribute the survey amongst their contacts. It is uncertain how many investors were reached through this last way. 87 people accessed the survey, of which 41 responded to all questions.[3]

Figure 3: *Location of respondents*



5.4 Sample

The respondents come from 18 European countries, with a cluster of 10 respondents (24%) from Switzerland (figure 3). 59% of the respondents work in a director or partner position and 32% are investment managers, business analysts or similar. 88% of the investors have experience in cleantech investments, however, most (44%) have less than five years. Almost

[3] As we expected, this is a low response rate. One interviewee, however, indicated a similar response rate with their last survey.

Table 1: *Sample description*	N	% of total N
Investor position		
Partner, Director of similar	24	59%
Investment Manager, Investment Analyst or similar	13	32%
Other	4	10%
Investor's cleantech experience		
No experience	5	12%
Less than 5 years	18	44%
Between 5 and 10 years	9	22%
More than 10 years	9	22%
Institution Type		
Venture Capital	19	46%
Private Equity Fund	5	12%
Family Office	4	10%
Bank	4	10%
Corporate Investor	2	5%
Accelerator	2	5%
Other	5	10%
Institution Fund Size		
Less than US$ 50 Million	14	34%
US$ 50 Million – US$ 200 Million	13	32%
US$ 200 million – US$ 1'500 Million	6	15%
More than US$ 1'500 Million	5	12%
Not specified	3	7%
Invest in Cleantech		
No	8	20%
Yes:	33	80%
Cleantech Fund Share		
Less than 5%	6	15%
5% - 9%	6	15%
10% - 49%	12	29%
50% - 99%	5	12%
Only invest in cleantech	4	10%
Invest in e-Mobility		
No	23	56%
Yes:	18	44%
e-Mobility Fund Share		
Less than 5%	7	17%
5% - 9%	5	12%
10% - 49%	6	15%

half of the respondents indicated that they work in a Venture Capital firm (19 respondents), which is the biggest group, followed by Family Offices (12%), Equity Funds (10%), and Banks (10%). 34% of the institutions (14 respondents) have total fund sizes of less than 50 million US$, another 32% of the institutions manage funds between 50 and 200 million US$. Furthermore, 80% of the institutions of our respondents (33 respondents) invest or have invested in cleantech. For most of these institutions (72% of the 33 cleantech investors), cleantech accounts for less than 50%, where only half of them have more than 10% of their investments in this sector (12 respondents). Four institutions only invest in cleantech (12%). 18 institutions (44%) invested in e-mobility but no institution has more than 50% of their investment in e-mobility. Six institutions allocate 10-49% of their funds to e-mobility, five between 5-9% and seven have smaller shares than 5%. There is only one respondent whose institution invests directly in ICEVs.

In sum, Venture Capitalists and investors from Switzerland are thus overrepresented in the sample. This will have to be considered in the analysis of the results. More details on the sample composition can be found in table 1.

6 Results

This section proceeds following the hypotheses formulated in section 4. It will first present and discuss the overarching trends of policy perception in the sample. Afterwards, the results regarding the a priori beliefs and EV fleet shares will be described in relation to the respective hypotheses.

6.1 General Preference Trends

The utilities per policy instrument show that the respondents prefer subsidies for EVs at purchase (+15.3) over emission performance standards (+1.8) and the tax on combustion fuels (-17.1). The sample prefers high policy levels (50.3) over medium and low policy levels (-49.7). Furthermore, the investors give low preference to undefined policy revision rules (-40.2) as the utilities for both revisions every two years and revisions every five years are remarkably higher. Within the defined revision options, investors prefer revisions every five years (+27.7). The corresponding zero-centred utilities and their standard deviations are shown in table 2. The standard deviations are considerable for all attribute levels (except medium policy level), which indicates rather big differences in preferences within the sample of investors.

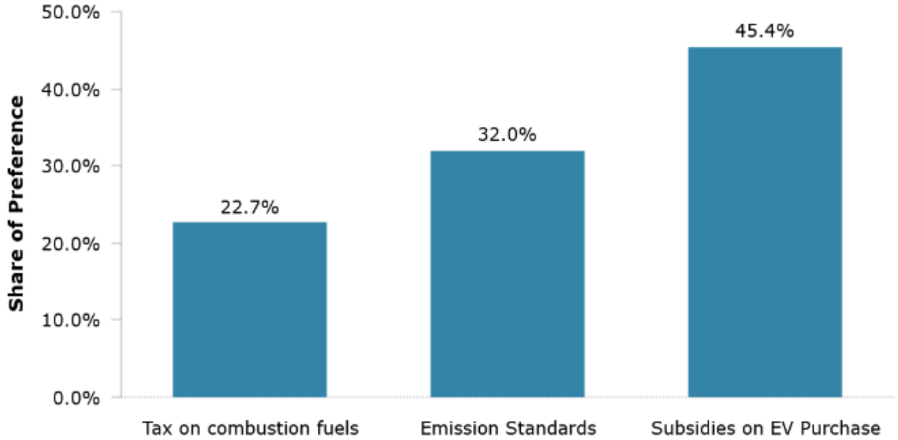
The first market simulation (figure 4) compares the preference shares between the policy instruments (thus holding policy level and revision rules constant). For its interpretation, it is important to remember that the shares of preference are not absolute, they hold only for the comparison within this experiment. Including e.g. a fourth policy setting would change the shares. This first market simulation illustrates support for **hypothesis 1**.

Table 2: *Sample utilities*

	Utilities	Standard Deviations
Policy Instruments		
Tax on combustion fuels	-17.10	41.74
Emission performance standards	1.78	40.57
Subsidies for EV at purchase	15.33	42.75
Policy Levels		
Low policy level	-49.75	16.52
Medium policy level	-0.52	3.45
High policy level	50.27	16.86
Policy Revision		
Revision every 2 years	12.52	37.26
Revision every 5 years	27.71	29.50
Revision not defined	-40.23	35.53

The preference share for subsidies for EVs at purchase lies at 45.4%, which is double the preference share of the tax on combustion fuels and 13.4 percentage points higher than the share for emission standards. The results indicate that investors favour policies that have a direct impact on the risk and return expectations of a project: As discussed further above, the introduction of subsidies on EVs influences both parts of the risk and return balance positively, and the battery project receives direct financial support. In contrast, taxes on combustion fuels

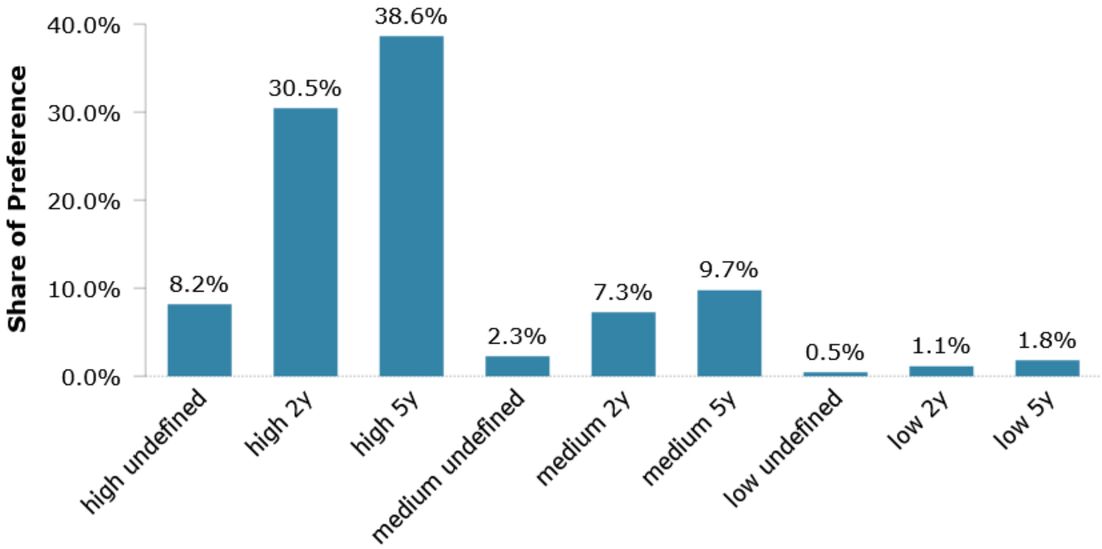
Figure 4: *Preference shares by policy instruments*



might have some minor impacts on the perceived risk of a project. In the case of the battery project presented to the respondents, the existence of a tax on combustion fuels can be interpreted as a sign that policymakers care about emissions from vehicles. Neither does such a tax directly impact the expected returns, as a tax does not promote EVs directly. The higher preference share for emission standards, on the other hand, can be explained by their positive effect on the investment risk, as they reduce the variety of allowed technologies.

Furthermore, **hypotheses 2 and 3** are confirmed by the respondents' utilities on policy levels and revision rules, which is illustrated by the market simulation in figure 5. Investors prefer higher policy levels over lower policy levels, and they are sensible for policy revisions. The clear preference pattern of the respondents regarding policy levels is also supported by the relatively small standard deviations (especially the standard deviation on the medium policy level of 3.45) compared to other attributes[4]. No matter what the policy level is, the preference share increases with policy certainty, i.e. fixed policy revision rules. Such revision rules decrease the risk that incentives are unexpectedly changed but allow for adjustment to technological and market developments. Revising policy levels after five years seems a good

Figure 5: *Preference shares by policy levels and revision rules*

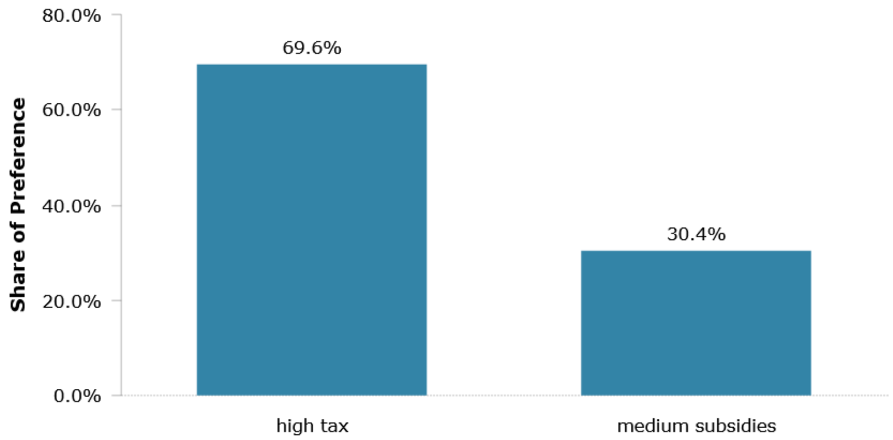


[4] The preference for high policy levels over medium and low policy levels is very accentuated and is not different in any of the following analyses (e.g. on a priori beliefs). Furthermore, the standard deviations of the policy level utilities are continuously relatively small. Therefore, the utilities and preference shares on the policy levels will not be discussed anymore yet be shown in the respective tables.

balance between the need for market adjustment and the preference for policy stability. It is furthermore confirming the assumption expressed by the interviewed CEO of an e-mobility start-up. However, it is also obvious that the policy level is more important to investors than the revision rules, as the preference shares on medium and low policy levels are much lower irrespective of the applied revision rule (exemption medium policy level with revision every 5 years). This is an interesting result which can be interpreted in at least two ways: On the one hand, this could mean that investors are not very sensitive towards policy risk. In regards to numerous studies that emphasise policy risk (e.g. Bürer and Wüstenhagen 2009; Holburn 2012; Lüthi and Wüstenhagen 2012; Nemet et al. 2014), this would be a very surprising result. On the other hand, it could be an indicator that investors do not see a long-term need for policy support in the e-mobility sector. Considering that there is policy support at the time of their investment, they could be confident that policy incentives are not needed for a long time before the investment gets self-supporting. However, the results of the survey do not allow to verify nor contest these assumptions.

From a policymaker perspective and keeping in mind that subsidies require government expenses, it could also be interesting that despite the clear differences in preference shares, sub-optimal instruments can be compensated by policy levels or revision rules. For example, a high policy level for the (least preferred) tax on combustion fuels reaches a more than double as high

Figure 6: *Preference shares comparing a high tax on combustion fuels with a medium subsidy on EVs at purchase*



preference share than the preferred instrument (subsidies) with a medium policy level (e.g. figure 6). However, this needs to be interpreted with care since sensibility for the policy level or the uncertainty regarding revisions might be instrument dependent. Previous research shows that not all policy instruments are associated with the same stability and thus policy risk (Barradale 2010). For example, subsidies are more prone to reversal than taxes. The evaluation of revision rules could thus be highly dependent on what policy instrument it is combined with. Yet, the ACA does not assume interaction between the attributes, and does, thus, not account for such sensibilities.

6.2 A Priori Belief in Government Intervention

Respondents' belief in the necessity of government intervention is measured with an additive index composed of four statements (see section 5.1). Respondents tend towards the upper end of the scale, which indicates high levels of agreement with government intervention. 44% of the respondents are categorised as governmentalists and an additional 20% of the respondents as strong governmentalists. Ten respondents (24%) are indifferent and five respondents (12%) are labelled as market-liberalists. The trend towards governmentalism holds for investors from Eastern (71% governmentalists), Northern (40%), and Western Europe (42%)[5]. While no investor from Eastern Europe identified as strong governmentalist, between 20% and 30% of the other three categories did so. Investors from Southern Europe identify predominantly as indifferent (60%). On the other side of the spectre, market-liberalists are mainly from Western Europe, with only 20% (one respondent) being from Northern Europe. The utilities of the policy instruments (table 3) show that with increasing support for government intervention, the utility for subsidies at EV purchase rises. The utility of market-liberalists for subsidies lies at -0.2. For

[5] Since the countries are only represented through few respondents, they are categorised according to the United Nations M49 into four categories (United Nations Statistics Division 2020). For more information on the allocation of countries to these categories and respective shares, please refer to appendix C.

the indifferent investors, the utility lies at 11.8 and increases until 21.0 for strong governmentalists. The tax on combustion fuels is the policy instrument most preferred by market-liberal investors (12.9). For all other groups of investors, this policy instrument has the lowest utilities (-19.7 to -24.9). The utilities of the emission performance standards lie between -12.7 (for the market-liberalists) and 9.3 (for the indifferent group), whereby (strong) governmentalists have utilities for the emission standards of 0.6 (4.0).

The utilities for the revision rules follow partially the pattern from the sample overview: The revision rule that implies high policy uncertainty ("Not defined when policy level will be revised") has the lowest utilities (e.g. -52.7 for the indifferent group). However, it is evaluated more attractive by market-liberalists (-12.9). This group indicates comparable utility for a policy revision every 2 years (-8.9). Yet, all groups have the strongest preference for revisions every 5 years (21.7 for market-liberalists; 31.5 for governmentalists).

In general, these findings support the underlying behavioural finance assumption that investors' a priori beliefs influence their evaluation of policies and that investors' perspective is therefore crucial to well-designing a policy setting to leverage investments. Regarding the formulated

Table 3: *Government Intervention Utilities*

	Policy Instruments		Policy Levels		Policy Revision	
	Tax on combustion fuels		**Low policy level**		**Revision every 2 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Market-liberalists	12.94	49.14	-54.73	25.45	-8.87	40.88
Indifferent	-21.12	38.53	-49.21	18.38	25.98	29.19
Governmentalists	-19.74	45.70	-45.89	12.31	6.86	40.32
Strong governmentalists	-24.92	29.02	-56.00	16.90	21.83	34.15
	Emission performance standards		**Medium policy level**		**Revision every 5 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Market-liberalists	-12.74	32.17	-1.13	3.21	21.73	37.03
Indifferent	9.34	49.68	0.55	4.81	26.76	28.70
Governmentalists	0.63	40.83	-0.77	2.96	31.52	31.99
Strong governmentalists	3.97	36.75	-0.92	2.97	24.04	23.78
	Subsidies for EV at purchase		**High policy level**		**Revision not defined**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Market-liberalists	-0.20	52.54	55.85	24.53	-12.86	57.43
Indifferent	11.78	41.48	48.66	20.42	-52.74	27.91
Governmentalists	19.11	42.05	46.66	12.36	-38.38	34.36
Strong governmentalists	20.95	45.77	56.92	16.25	-45.87	25.63

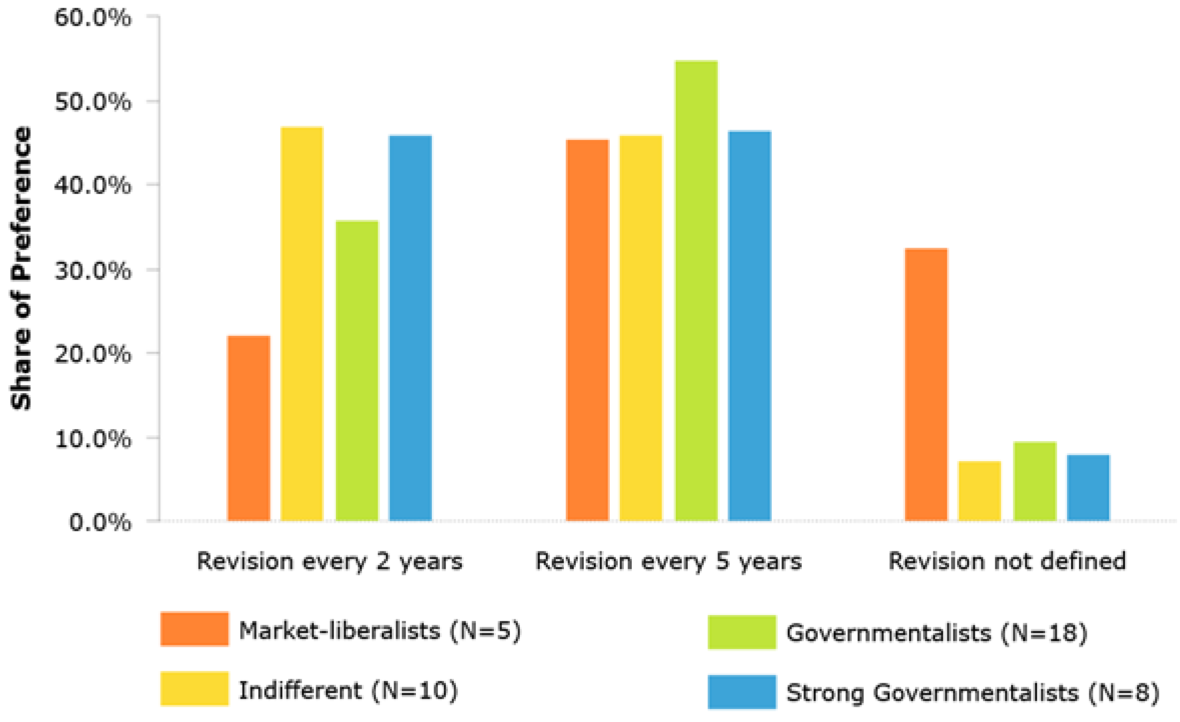
Figure 7: *Preference shares on policy instruments by level of a priori belief in government interventions*

hypotheses, two market simulations are performed. The first simulation (figure 7) compares the three policy instruments while keeping the policy level and the revision rules constant. The share of both governmentalist and strong governmentalist investors that would prefer the emission standard setting (about 33%) is bigger than the one for market-liberalist investors (19.4%). This finding is in line with **hypothesis 4a**, which stated that command-and-control policies are evaluated more positively by investors who believe in government interventions' necessity. The perceived need for government intervention does seem to increase acceptance for such an authoritarian policy, which in turn is less positively evaluated by investors who do not believe in the necessity for government intervention. However, the general preference pattern for subsidies overrules this finding. Despite the relatively high preference share of emission standards, subsidies remain the most preferred policy instrument by governmentalists. Given the choice amongst the three instruments, 51.9% of the strong governmentalist and 46.4% of the governmentalist investors would invest under the subsidies setting, which are the largest shares of preference over all groups and instruments.

Market-liberalists show a preference pattern much in line with **hypothesis 4b**. They do most prefer the tax on combustion fuels (with a preference share of 45%). Within the given options, the tax is least distortive to the market-mechanisms. Subsidies – the other market-based instrument – is preferred by 35.5% of the market-liberalist investors. The subsidies specifically support EVs and therewith are picking a winning technology. It is therefore in line with hypothesis 4b that amongst market-liberalists, subsidies have lower preference shares than the tax on combustion fuels. Investors who do not believe in the necessity of governmental intervention, regard market-mechanisms as appropriate for dealing with mitigation needs. Therefore, they wish policies to interfere as least as possible with market-mechanisms.

The second market simulation varies in revision rules and keeps policy instruments and policy levels constant. Interestingly, it shows that the preference shares between defined revision and undefined revision settings do not change as much for market-liberalist investors as they do for governmentalist investors. Thus, market-liberalists are not as sensitive towards revision uncertainty as governmentalist investors (figure 8). The smaller differences between the

Figure 8: *Preference shares of revision rules by a priori belief in government interventions*



preferences for revision rules of the market-liberalists seems to contradict with the finding by Chassot et al. (2014) that investors with free-market worldviews are more sensitive towards policy risk and more likely to retain from investing in a regulated market. This finding could be indicative of a variation in experiment design. In contrast to the study by Chassot et al. (2014), this survey did not give the respondents the choice to not invest nor a “no policy” setting. The design forced the investors to choose between regulations. Therefore, they could not express their policy aversion. Furthermore, there are only five market-liberalists in the sample and their preference share for the uncertain revision rule has a bigger standard error than the other groups and attribute levels. Hence, the result might also be the consequence of the small sample size and skewedness towards governmentalists.

6.3 A Priori Belief in E-mobility Effectiveness

Investors’ belief in the maturity of e-mobility is measured by an additive index composed of three variables (see section 5.1). Regarding this index, the sample is skewed towards higher values, with 32% e-mobility sceptics, 41% of the respondents being e-mobility confident, and 27% being e-mobility-enthusiasts.

Regarding the location of the respondents, there are interesting differences. While 71% of the investors from Eastern Europe and each 40% of the investors from Northern and Southern Europe fall into the category of e-mobility enthusiasts, no respondent from Western Europe does so (even though this is the biggest group). Instead, the investors from Western Europe are e-mobility-confident (58%) or -sceptical (42%). Of the investors from Eastern, Northern, and Southern Europe 14%, 20%, and 40% are e-mobility sceptics, respectively.

Furthermore, respondents from institutions who have already invested in cleantech, are less enthusiastic about e-mobility than investors without previous cleantech investments (24% in contrast to 38%). Similarly, the share of respondents who have invested in cleantech that are e-mobility-sceptical is bigger (33%) than that of those without cleantech experience (25%).

However, experience with e-mobility investments tends to make investors more positive regarding the effectiveness of e-mobility: a large share (61%) of the investors with e-mobility experience are e-mobility-confident, and 17% are e-mobility-enthusiastic. Moreover, investors from car-manufacturing countries seem more enthusiastic about e-mobility effectiveness, with 35% of them identifying as e-mobility enthusiasts, compared to 21% of the investors from non-car-producing countries[6].

There are considerable differences between the a priori belief in e-mobility effectiveness regarding their utilities for the policy instruments (table 4). The more positively investors evaluate e-mobility, the lower utilities they have for the tax on combustion fuels: -2.9 for e-mobility-sceptical investors and -31.8 for e-mobility enthusiasts. E-mobility-confident investors have the highest utility for emission performance standards (17.8 compared to -15.6 for e-mobility sceptics). Furthermore, subsidies are evaluated positively by e-mobility-sceptical investors (18.5), have the highest utility among e-mobility enthusiasts (34.1) but, interestingly, not a very high utility for e-mobility-confident investors (0.7).

Table 4: *E-mobility Utilities*

	Policy Instruments		**Policy Levels**		**Policy Revision**	
	Tax on combustion fuels		**Low policy level**		**Revision every 2 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
E-mobility-sceptical	-2.88	50.15	-50.67	14.44	1.10	38.01
E-mobility-confident	-18.51	35.46	-49.80	19.32	10.03	37.09
E-mobility-enthusiast	-31.74	37.93	-48.58	15.54	29.86	33.27
	Emission performance standards		**Medium policy level**		**Revision every 5 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
E-mobility-sceptical	-15.64	33.85	-0.19	3.34	33.15	29.92
E-mobility-confident	17.79	46.53	-1.31	3.36	29.68	26.59
E-mobility-enthusiast	-2.39	29.94	0.32	3.76	18.23	33.64
	Subsidies for EV at purchase		**High policy level**		**Revision not defined**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
E-mobility-sceptical	18.52	39.60	50.86	13.31	-34.25	40.54
E-mobility-confident	0.72	45.95	51.11	19.35	-39.71	39.03
E-mobility-enthusiast	34.13	35.83	48.26	17.87	-48.10	22.91

[6] For more info on the shares according to location, previous investments, and manufacturing countries, please refer to appendix D.

The more investors believe in the effectiveness of e-mobility, the higher utilities they have for the revision every 2 years, the lower their utilities for revisions every 5 years, and the lower utilities they have for undefined revision rules. Thus, e-mobility-sceptical investors have the highest utilities for the revision every five years (33.1) and e-mobility-enthusiasts for revisions every two years (29.9). All groups have the lowest utilities for undefined revision rules (between -34.3 and -48.1).

The market simulation to illustrate these results is shown in figure 9. **Hypothesis 5** is about investors' preferences for policies that counterbalance investments risks, in this survey namely, subsidies and emission performance standards. It was hypothesised that e-mobility-confident and -enthusiastic investors would prefer these instruments less strongly than e-mobility-sceptics. However, specifically regarding these instruments e-mobility enthusiasts' and e-mobility sceptics' preferences are rather similar, while e-mobility-confident investors have remarkably different preference shares. The only clear pattern that goes along with the increasing degree of a priori belief in the effectiveness of e-mobility is with the tax on combustion fuels. However, this instrument has no particular effect neither on investment risks nor returns. Consequently, hypothesis 5 is not supported by the findings as the differences in preference shares are poorly explained by such risk and return considerations. Nevertheless, a priori beliefs in e-mobility effectiveness seem to impact the policy preferences of investors and should be studied further. An attempt to explain that e-mobility-confident investors have such different preferences than -enthusiasts, could be that the former group perceived e-mobility as an interesting option. At the same time, this group would, however, still like to give other low-emission technologies (such as fuel cell electric vehicles) equal opportunity. In contrast, e-mobility enthusiasts are convinced by EVs and would rather see this technology be promoted specifically. This could explain why e-mobility-confident investors have higher preference shares for the technology-neutral emission performance standards and relatively lower shares for subsidies on EVs at purchase. It would also be supported by the preference shares regarding the tax on combustion fuels – another technology-neutral policy. The explanation would, however, not clarify why e-mobility-sceptical investors have comparable preference shares for standards and subsidies as have e-mobility enthusiasts. In contrast to the above findings, e-mobility-sceptic investors would be expected to have comparable (high) preference shares for emission performance standards as e-mobility-confident investors have.

Figure 9: *Preference shares of policy instruments by a priori belief in e-mobility effectiveness*

6.4 Car-manufacturing Countries

There are 17 investors (41%) from the top 10 European car manufacturing countries and 24 investors (59%) from other countries. The car-producing countries represented in the sample are Germany (3 respondents), Spain (2), France (1), United Kingdom (7), Russia (1), Turkey (1), Italy (1), and Poland (1).

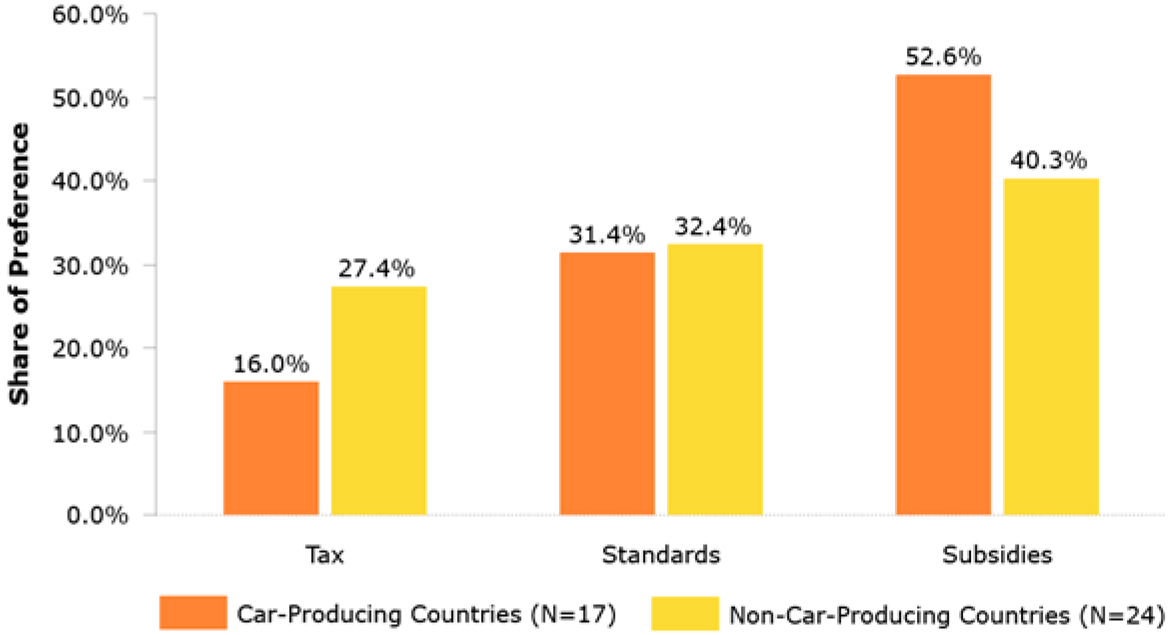
Within the attribute on policy instruments, investors from non-manufacturing countries have much more balanced instrument utilities. They do prefer subsidies (7.6) over standards (0.6) and the tax (-8.2). Thus, the differences between the utilities of investors from non-car-producing countries are rather small. While showing the same preference pattern, investors from manufacturing countries show utility scores of 26.3 for subsidies, 3.4 for emission performance standards, and -29.7 for the tax on combustion fuels (table 5).

As expected in **hypothesis 6**, investors' evaluations of policy instruments are influenced by whether they are from one of the major car manufacturing countries or not. As the market simulation in figure 10 shows, investors from a manufacturing country are more inclined toward subsidies. Moreover, investors from non-producing countries show higher preference shares for the tax on fuels (27.4%) than the investors from manufacturing countries (16%). The experiment cannot differentiate whether the divergence in preference shares can be attributed to the mere existence of a big car industry or to the powerful lobby of car manufacturers – which in turn could have influenced the investors' policy perception. Nevertheless, the results might be related to two characteristics of the policy instruments. First, subsidies are revenue for the car manufacturers. This is also confirmed by studies comparing prices of ICEVs and EVs which find that EV purchase prices are adjusted to existing subsidies, i.e. the price reduction through subsidies is compensated by higher sale prices (Lévay, Drossinos, and Thiel 2017). Therefore, car manufacturers' support for subsidies through their lobbying activities is not surprising. Secondly, a tax on combustion fuels disadvantages legacy technologies, as it raises the use-

Table 5: *Utilities by Car-manufacturing*

	Policy Instruments		Policy Levels		Policy Revision	
	Tax on combustion fuels		**Low policy level**		**Revision every 2 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Car-producing	-29.69	39.61	-44.12	12.42	9.91	46.3
Non-Car-producing	-8.19	41.70	-53.74	18.09	14.38	30.24
	Emission performance standards		**Medium policy level**		**Revision every 5 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Car-producing	3.41	41.98	1.08	2.90	24.30	33.17
Non-Car-producing	0.62	40.42	-0.12	3.80	30.12	27.08
	Subsidies for EV at purchase		**High policy level**		**Revision not defined**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Car-producing	26.28	38.02	45.20	12.68	-34.20	44.78
Non-Car-producing	7.57	44.95	53.86	18.71	-44.50	27.47

Figure 10: *Preference shares on policy instruments by differentiation between car-manufacturing and non-car-manufacturing countries*



costs of ICEVs. As car manufacturers still rely much on this legacy technology, the automobile lobby would not support such taxes. Interestingly, emission standards, which can have both creative as well as destructive effects are evaluated very much alike by both groups.

6.5 EV Fleet Size

61% of the respondents (25) are from a country with already more than 50'000 EVs on the streets. Investors from France (1), Germany (3), the Netherlands (4), Switzerland (10), and the United Kingdom (7) fall into this category. Furthermore, there are 15 (37%) investors from countries with fewer EVs. The missing investor is from Russia, which is not considered in the data from the European Alternative Fuel Observatory (2019).

Regarding policy instruments, investors from countries with big EV fleets display very balanced utilities per instrument, ranging from -8.8 for the tax over 3.7 for the subsidies to 5.2 for the emission standard. In contrast, the utilities of investors from countries with small EV fleets are much more pronounced. They rate subsidies (31.8) over emission standards (-3.7) and the tax (-28.1).

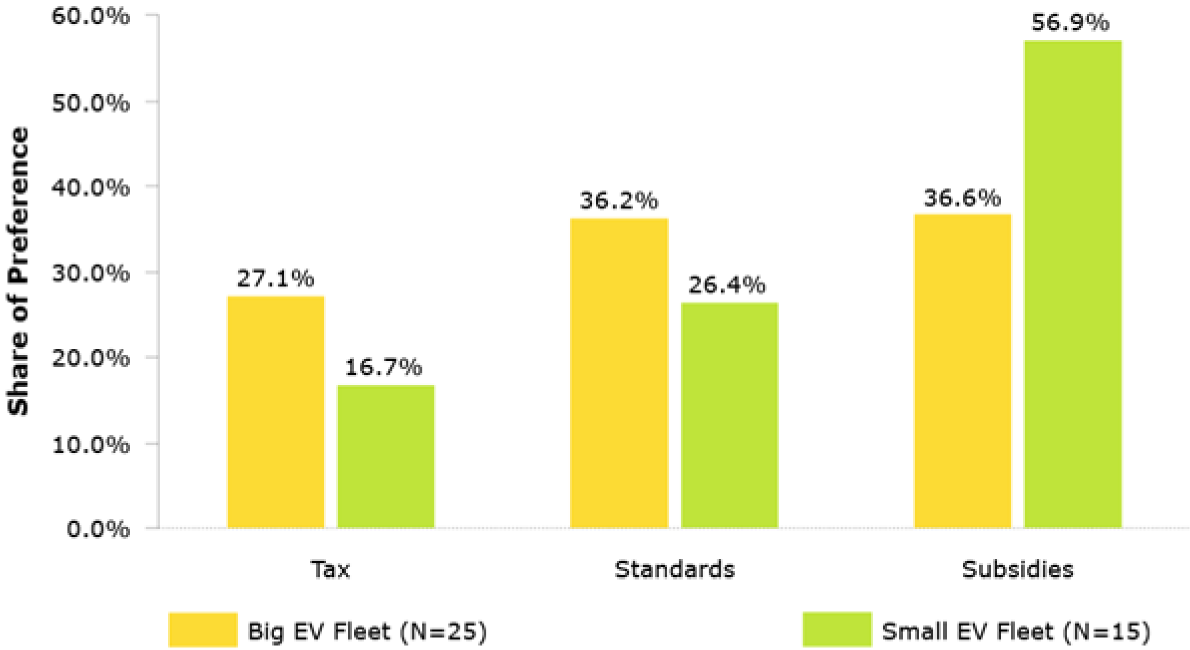
Considering the utilities of the revision rules, the preference of investors from countries with big EV fleets is again less pronounced. The groups do agree in their lowest preference for undefined revisions (-29.6 versus -56.7, respectively) and their highest preference for revisions every five years. The corresponding utilities lie at 22.7 for investors from countries with big EV fleets and 37.4 for the contrast group (see table 6).

The results of the market simulation, shown in figure 11, contradict **hypothesis 7**. Investors from countries with big EV fleets have relatively high preference shares for the emission standards. While subsidies still have the biggest preference share (36.6%), these investors almost equally prefer the emission standards (36.2%). This is in remarkable contrast to the investors from countries with small EV fleets, whose preference share for subsidies of 56.9% is much bigger than the share for the other policies (26.4% for emission standards). Nevertheless, both groups show the smallest preference share for the tax on combustion fuels. According to Grubb (2006) and Foxon and Pearson (2008), technology-push policies are of most use during the phase before the establishment of a niche market. As soon as a niche-market exists market-pull instruments (such as the subsidies or the CO_2 tax) should be adopted. In contrast, investors from countries with bigger EV fleets show a higher preference for the technology-push policy (emission standards) than investors from countries with still small EV fleets. Another way to approach these results is that the former group demonstrates lower

Table 6: *Utilities by EV Market*

	Policy Instruments		**Policy Levels**		**Policy Revision**	
	Tax on combustion fuels		**Low policy level**		**Revision every 2 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Big EV Fleet	-8.83	42.39	-53.16	17.76	6.91	39.43
Small EV Fleet	-28.15	39.03	-44.87	13.49	19.27	32.97
	Emission performance standards		**Medium policy level**		**Revision every 5 years**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Big EV Fleet	5.17	44.64	-0.59	3.53	22.72	27.00
Small EV Fleet	-3.7	35.13	-0.59	3.47	37.44	32.53
	Subsidies for EV at purchase		**High policy level**		**Revision not defined**	
	Utilities	Std. Dev.	Utilities	Std. Dev.	Utilities	Std. Dev.
Big EV Fleet	3.66	45.97	53.75	17.58	-29.63	40.24
Small EV Fleet	31.84	30.42	45.46	18.84	-56.71	17.78

Figure 11: *Preference shares on policy instruments by size of EV fleet*



support for subsidies instead of higher support for emission standards. Subsidies are the only technology-specific instrument included in the experiment. Investors from countries with bigger EV fleets could thus refrain from technology-specific in favour of technology-neutral instruments. This could reflect their belief that EVs reached competitivity and do not require further targeted support. In the same line, investors from countries with bigger EV fleets exhibit higher support for policies that internalise the environmental advantage of EVs over ICEVs by disadvantaging the legacy technology, i.e. the tax on combustion fuels.

7 Conclusion

Despite considerable efforts to cut emissions, greenhouse gas emissions from the transportation sector are increasing. In combination with the expansion of renewable energy production, e-mobility offers considerable emission reduction potential. Furthermore, the transition to e-mobility has welcome side-effects such as cleaner air in urban areas, reduced noise pollution, and increased energy independence. However, such environmental benefits are still externalities to trade and EVs are more expensive than ICEVs. Furthermore, especially in the production and the end-of-life phase, EVs cause pollution and have other social and environmental drawbacks (e.g. requirement for rare materials) which require developments. Thus, further improvements and achieving large-scale deployment of EVs, require considerable investments in the e-mobility sector. Well-designed public policies can leverage such investments as well as internalise environmental costs of ICEVs. Therefore, a detailed understanding of investors' perception and evaluation of mobility policies is required.

Drawing on behavioural finance literature and illustrations from the renewable energy sector, I have examined how investors' a priori beliefs on government intervention, on the technological effectiveness of e-mobility as well as the influence of domestic car-manufacturing industry affect investors' policy preferences. Furthermore, policy preferences are analysed while controlling for the EV fleet sizes.

The assessment revealed that investors' a priori belief in the necessity of government intervention as well as their belief in the effectiveness of e-mobility technology impact how they assess policies. Furthermore, it was shown that investors from countries with big car-manufacturing industries show more accentuated policy preferences and preferences which are in line with the manufacturers' policy interests. Finally, investors evaluate policies differently, depending on the size of the EV fleets in their countries. While not all hypothesised effects were proven correct, the findings generally support the behavioural finance assumption that investors' a priori beliefs influence their policy preferences.

The paper contributes to the e-mobility policy and behavioural finance literature and provides implications for future policymaking. First, so far e-mobility policies were analysed regarding their effects on consumers. Since investments are crucial for the development of the e-mobility sector, an extension of investors' perception of these policies promotes the understanding of the sector. Secondly, investors' policy preferences have so far only been studied in the renewable energy sector. This paper, therefore, contributes to validate and extend previous findings to a sector that still requires a fast and decisive transition. Finally, my results appear relevant to policymakers. As ill-designed policies risk crowding-out cleantech investments, it is crucial to include investor's perception into policymaking. One implication of the results might be, therefore, that the policymaking process should take into consideration what group of investors the policy should speak to. Such considerations should include the investors' perceptions of e.g. the ideal role of the government and the promoted technology.

Like most research, this study is not without limitations. As the sample size is rather small, it is hard to generalise the findings. Generalisable results would have required a more appropriate representation of European countries as well as investor types. The current sample is skewed towards investors from Switzerland and Venture Capitalists. A second limitation pertains the chosen methodology and survey design. The policy settings were described by three attributes. This is a compromise to keep the survey in a manageable length. However, other attributes such as the duration of policy support could have been important for investors' assessment of a policy setting. Furthermore, the ACA design forced investors to choose between regulations. Yet, outside the experiment, the respondents could reject investing in regulated markets or under the given policies. In a similar line, one respondent reported that he would never invest in a battery project. The choice of example project might, therefore, have impacted the investors' policy evaluations. Another important limitation is regarding attribute interaction. ACA regards each attribute independently. However, especially the evaluation of revision rules could be highly dependent on what policy instrument it is combined with. Further studies should emphasise an appropriate representation of investors and address these methodological shortcomings.

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APPENDIX A

Start

Survey on Cleantech Investments and Public Policies

You have been invited to participate in this survey because of your professional experience in investment management.

In the following, you will be asked about the main policy factors that influence investments in clean technologies and, in particular, in **e-mobility projects**. However, no specific investment experience in cleantech or e-mobility is required to complete the survey.

This survey is part of the Research Project 'Financing Investments in Clean Technologies' funded by the **Swiss National Science Foundation (SNF)**. The project is expected to produce **concrete policy recommendations** to steer financing towards cleantech investments in Switzerland and Europe.

By entering your email address at the end of the survey you automatically take part in the drawing of one annual subscription to the Bloomberg Businessweek. Also, all participants who provide their addresses will receive a **free copy of the final report**.

All the answers will be treated confidentially, and only aggregate results will be made available in our final report.

The survey will take **10 minutes** of your time.

For more information on the research project, please contact cleantech@graduateinstitute.ch.

Thank you very much for the time you'll be investing!

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RspndCTExperience

How many years of experience in cleantech investments do you have?

RspndCTExperience=1 ○ No experience

RspndCTExperience=2 ○ Less than 5 years

RspndCTExperience=3 ○ Between 5 and 10 years

RspndCTExperience=4 ○ More than 10 years

RspndPosition

Which of the following best describes your position in your institution?

RspndPosition=1 ○ Partner, Director or similar

RspndPosition=2 ○ Investment Manager, Investment Analyst or similar

RspndPosition=3 ○ RspndPosition_3_other Other (please specify) [ ]

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InstType

Which of the following categories best describes your institution?

InstType=1 ○ Private Equity Fund

InstType=2 ○ Venture Capital

InstType=3 ○ Corporate Investor

InstType=4 ○ Public Pension Fund

InstType=5 ○ Private Pension Fund

InstType=6 ○ Mutual Fund / Hedge Fund

InstType=7 ○ Bank

InstType=8 ○ Foundation (Charity)

InstType=9 ○ Family Office

InstType=10 ○ InstType_10_other Other (please specify) [ ]

InstSizeWords

What's the approximate total size of assets managed by your institution (in million US$)?
e.g. "approx. $250 million"

[ ]

InstLocationOp

Please indicate in which country the headquarter of your institution is located.

[ ]

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InstCTyn

Has your institution already invested in *clean technologies* (cleantech)?

NOTE: We define cleantech as those technologies/products/services that aim at sustainable utilization of natural resources and which provide for the production of renewable energy. This includes:
- ***renewable energy production and distribution*** *(e.g. smartgrids, hydropower, energy storage)*
- ***energy efficiency, resource efficency*** *(e.g. water, waste, advanced materials)*
- ***transportation*** *(e.g. e-mobility)*
- ***agritech*** *(e.g. agronomy and sustainable food production)*
- *or other products (e.g. hybrid technologies, prevention of natural disasters).*

InstCTyn=1 ◯ yes

InstCTyn=2 ◯ no

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InstCTEuroTop1

Please indicate the European countries where you invest most in terms of **cleantech**?

first

Please select country ▼

InstCTEuroTop2

second

Please select country ▼

InstCTEuroTop3

third

Please select country ▼

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InstCTpp

What percentage of your total portfolio (or of your portfolio companies) is dedicated to cleantech?

- InstCTpp=1 Less than 5%
- InstCTpp=2 From 5% to 9%
- InstCTpp=3 From 10% to 49%
- InstCTpp=4 From 50% to 99%
- InstCTpp=5 I only invest in clean technologies

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InstMtype

What **mobility** technologies have you invested in?

- [ ] InstMtype_1 — I do not invest in mobility technlogies
- [ ] InstMtype_2 — Internal combustion motors & components
- [ ] InstMtype_3 — Hybrid motors & components
- [ ] InstMtype_4 — Electric motors & components
- [ ] InstMtype_5 — Automated road transport technologies & services
- [ ] InstMtype_6 — Batteries
- [ ] InstMtype_7 — Fuel cells & alternative fuels (e.g. biogas)
- [ ] InstMtype_8 — Mobility-sharing platforms/softwares
- [ ] InstMtype_9 — Charging infrastructures
- [ ] InstMtype_10 — InstMtype_10_other Other (please specify) ______

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InstEMpp

What percentage of your total portfolio is in ***e**-mobility* projects?

NOTE: We define e-mobility as including all electric urban means of transportation. This includes Electric Vehicles (EV) - such as full battery electric vehilces (BEVs) and plug-in hybrid electric vehicles (PHEVs) - as well as e-bikes, e-scooters, and e-busses.

- InstEMpp=1 ○ Less than 5%
- InstEMpp=2 ○ From 5% to 9%
- InstEMpp=3 ○ From 10% to 49%
- InstEMpp=4 ○ from 50% to 99%
- InstEMpp=5 ○ I only invest in e-mobility projects

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InstEMEuroTop1

Please indicate the European countries where you invest most in terms of **e-mobility**?

first

Please select country ▼

InstEMEuroTop2

second

Please select country ▼

InstEMEuroTop3

third

Please select country ▼

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0% 100%

ApBeliefsMarket

Please state to what extent you agree with the following statements:

	I strongly disagree	I disagree	I am indifferent	I agree	I strongly agree
"Government intervention is needed to regulate the market economy"	ApBeliefsMarket_r1=1 ◯	ApBeliefsMarket_r1=2 ◯	ApBeliefsMarket_r1=3 ◯	ApBeliefsMarket_r1=4 ◯	ApBeliefsMarket_r1=5 ◯
"The necessary change in technology to mitigate climate change will happen even without government intervention"	ApBeliefsMarket_r2=1 ◯	ApBeliefsMarket_r2=2 ◯	ApBeliefsMarket_r2=3 ◯	ApBeliefsMarket_r2=4 ◯	ApBeliefsMarket_r2=5 ◯
"Government intervention does more harm than good, let governments stay out of the way"	ApBeliefsMarket_r3=1 ◯	ApBeliefsMarket_r3=2 ◯	ApBeliefsMarket_r3=3 ◯	ApBeliefsMarket_r3=4 ◯	ApBeliefsMarket_r3=5 ◯
"My company's investments are likely to be negatively impacted by climate change policies"	ApBeliefsMarket_r4=1 ◯	ApBeliefsMarket_r4=2 ◯	ApBeliefsMarket_r4=3 ◯	ApBeliefsMarket_r4=4 ◯	ApBeliefsMarket_r4=5 ◯

ApBeliefsEMobility

Please state to what extent you agree with the following statements:

	I strongly disagree	I disagree	I am indifferent	I agree	I strongly agree
"Due to the technical advantages of e-mobility, they will automatically be deployed on a large scale"	ApBeliefsEMobility_r1=1 ◯	ApBeliefsEMobility_r1=2 ◯	ApBeliefsEMobility_r1=3 ◯	ApBeliefsEMobility_r1=4 ◯	ApBeliefsEMobility_r ◯
"My company sees e-mobility as an investment opportunity"	ApBeliefsEMobility_r2=1 ◯	ApBeliefsEMobility_r2=2 ◯	ApBeliefsEMobility_r2=3 ◯	ApBeliefsEMobility_r2=4 ◯	ApBeliefsEMobility_r ◯
"I believe that the future of mobility are EVs rather than internal combustion engine vehicles"	ApBeliefsEMobility_r3=1 ◯	ApBeliefsEMobility_r3=2 ◯	ApBeliefsEMobility_r3=3 ◯	ApBeliefsEMobility_r3=4 ◯	ApBeliefsEMobility_r ◯

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ApBeliefsCC

Please state to what extent you agree with the following statements:

	I strongly disagree	I disagree	I am indifferent	I agree	I strongly agree
"Human activities are an important cause of climate change"	ApBeliefsCC_r1=1 ○	ApBeliefsCC_r1=2 ○	ApBeliefsCC_r1=3 ○	ApBeliefsCC_r1=4 ○	ApBeliefsCC_r1=5 ○
"In our investment decision, my company also considers recent scientific information on the effects of climate change"	ApBeliefsCC_r2=1 ○	ApBeliefsCC_r2=2 ○	ApBeliefsCC_r2=3 ○	ApBeliefsCC_r2=4 ○	ApBeliefsCC_r2=5 ○
"The issue of climate change is exaggerated by the media and politicians"	ApBeliefsCC_r3=1 ○	ApBeliefsCC_r3=2 ○	ApBeliefsCC_r3=3 ○	ApBeliefsCC_r3=4 ○	ApBeliefsCC_r3=5 ○
"Investing in climate change mitigation technologies constitutes more risk than benefits for my company"	ApBeliefsCC_r4=1 ○	ApBeliefsCC_r4=2 ○	ApBeliefsCC_r4=3 ○	ApBeliefsCC_r4=4 ○	ApBeliefsCC_r4=5 ○

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ApBeliefCorona

Given the current health crisis, this survey will also explore the impact of the COVID-19 outbreak.

Again, please state to what extent you agree with the following statements:

	I strongly disagree	I disagree	I am indifferent	I agree	I strongly agree
"I expect that the COVID 19 crisis will have a lasting impact on my investment behaviour"	ApBeliefCorona_r1=1 ◯	ApBeliefCorona_r1=2 ◯	ApBeliefCorona_r1=3 ◯	ApBeliefCorona_r1=4 ◯	ApBeliefCorona_r1=5 ◯
"The COVID-19 crisis is likely to shift the political support from clean technologies to other areas	ApBeliefCorona_r2=1 ◯	ApBeliefCorona_r2=2 ◯	ApBeliefCorona_r2=3 ◯	ApBeliefCorona_r2=4 ◯	ApBeliefCorona_r2=5 ◯
"My current investments in clean technologies are at risk due to the COVID-19 crisis"	ApBeliefCorona_r3=1 ◯	ApBeliefCorona_r3=2 ◯	ApBeliefCorona_r3=3 ◯	ApBeliefCorona_r3=4 ◯	ApBeliefCorona_r3=5 ◯
"COVID-19 economic stimulus programmes can be an opportunity to promote cleantech policies and build a greener economy"	ApBeliefCorona_r4=1 ◯	ApBeliefCorona_r4=2 ◯	ApBeliefCorona_r4=3 ◯	ApBeliefCorona_r4=4 ◯	ApBeliefCorona_r4=5 ◯

CoronaOpen

How do you think the COVID-19 crisis will affect your investments in clean technologies and specifically e-mobility?

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Intro1

Now please assume that you have the opportunity to invest in an **innovative battery project for electric vehicles (EVs).** Consider the possibility that the investment could be in different European countries with **different policy frameworks.**

Everything else remains constant. E.g. the technology of the batteries, the characteristics of the project team, and the charging infrastructure network are always the same.

Since technological details and the investment type are irrelevant (e.g. equity or debt), please refer to the most common for your company.

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Intro2

In the following questions, **3 characteristics of the policy framework** will be investigated: policy instruments, policy levels and policy revisions. Each characteristic can come in 3 forms (listed in the table below).

Policy instruments:	Policy levels*:	Policy revisions:
Tax on combustion fuels	Low policy level	Policy level revised every 2 years
Emission performance standards for new cars	Medium policy level	Policy level revised every 5 years
Subsidies for EV at purchase	High policy level	Not defined when policy level will be revised

***Reading example:** If it helps you, you can think of the policy levels as follows:
- **low** policy level = Tax of 0.065$/l diesel (i.e. 25$/tCO2); 120gCO2/km standard; 2'500$ subsidy on EV purchase
- **medium** policy level = Tax of 0.13$/l diesel (i.e. 50$/tCO2); 95gCO2/km standard; 5'000$ subsidy on EV purchase
- **high** policy level = Tax of 0.26$/l diesel (i.e. 100$/tCO2); 80gCO2/km standard; 10'000$ subsidy on EV purchase

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ACAtry759_Rating1

How desirable are the following policy instruments to be part of a policy setting regarding your investment in the battery project?

	Not Desirable	Somewhat Desirable	Desirable	Very Desirable	Extremely Desiral
Tax on combustion fuels	ACAtry759_Rating1_1=1 ○	ACAtry759_Rating1_1=2 ○	ACAtry759_Rating1_1=3 ○	ACAtry759_Rating1_1=4 ○	ACAtry759_Rating1_ ○
Subsidies for EV at purchase	ACAtry759_Rating1_3=1 ○	ACAtry759_Rating1_3=2 ○	ACAtry759_Rating1_3=3 ○	ACAtry759_Rating1_3=4 ○	ACAtry759_Rating1_ ○
Emission performance standards	ACAtry759_Rating1_2=1 ○	ACAtry759_Rating1_2=2 ○	ACAtry759_Rating1_2=3 ○	ACAtry759_Rating1_2=4 ○	ACAtry759_Rating1_ ○

ACAtry759_Rating3

How desirable are the following policy revisions to be part of a policy setting regarding your investment in the battery project?

	Not Desirable	Somewhat Desirable	Desirable	Very Desirable	Extremely Desirable
Policy level revised every 2 years	ACAtry759_Rating3_1=1 ○	ACAtry759_Rating3_1=2 ○	ACAtry759_Rating3_1=3 ○	ACAtry759_Rating3_1=4 ○	ACAtry759_Rating3_1=5 ○
Not defined when policy level will be revised	ACAtry759_Rating3_3=1 ○	ACAtry759_Rating3_3=2 ○	ACAtry759_Rating3_3=3 ○	ACAtry759_Rating3_3=4 ○	ACAtry759_Rating3_3=5 ○
Policy level revised every 5 years	ACAtry759_Rating3_2=1 ○	ACAtry759_Rating3_2=2 ○	ACAtry759_Rating3_2=3 ○	ACAtry759_Rating3_2=4 ○	ACAtry759_Rating3_2=5 ○

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Intro3

In the following questions you will be asked to weight the 3 caracteristics (policy instruments, policy levels, and policy revisions) by stating the importance of the difference between your most preferred and least preferred choice.

ACAtry759_Importance1

If two national policy frameworks were identical in all other ways, how important would the following difference be for your decision to invest in this country?

	Not Important	Somewhat Important	Important	Very Important	Extremely Imp
Tax on combustion fuels ---*instead of*--- Subsidies for EV at purchase	ACAtry759_Importance1=1 ◯	ACAtry759_Importance1=2 ◯	ACAtry759_Importance1=3 ◯	ACAtry759_Importance1=4 ◯	ACAtry759_Import ◯

ACAtry759_Importance2

If two national policy frameworks were identical in all other ways, how important would the following difference be for your decision to invest in this country?

	Not Important	Somewhat Important	Important	Very Important	Extremely Importan
High policy level ---*instead of*--- Low policy level	ACAtry759_Importance2=1 ◯	ACAtry759_Importance2=2 ◯	ACAtry759_Importance2=3 ◯	ACAtry759_Importance2=4 ◯	ACAtry759_Importance2 ◯

ACAtry759_Importance3

If two national policy frameworks were identical in all other ways, how important would the following difference be for your decision to invest in this country?

	Not Important	Somewhat Important	Important	Very Important	Extremely Importan
Policy level revised every 2 years ---*instead of*--- Not defined when policy level will be revised	ACAtry759_Importance3=1 ◯	ACAtry759_Importance3=2 ◯	ACAtry759_Importance3=3 ◯	ACAtry759_Importance3=4 ◯	ACAtry759_Importance3 ◯

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Intro4

In this last part, you will be asked to indicate your preferences in **six trade-off choices**.

Please keep in mind that **the technology of the batteries, the characteristics of the project team, the charging infrastructure network remain always constant**. The only differences are the ones explicitly shown in the choice.

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National Research Programme

ACAtry759_Pair1

If two national policy frameworks were identical in all other ways, where would you most likely invest?

High policy level Not defined when policy level will be revised	or	Medium policy level Policy level revised every 2 years

Strongly Prefer Left	Somewhat Prefer Left	Indifferent	Somewhat Prefer Right	Strongly Prefer Right
ACAtry759_Pair1=1	ACAtry759_Pair1=2	ACAtry759_Pair1=3	ACAtry759_Pair1=4	ACAtry759_Pair1=5
○	○	○	○	○

Policy level example: If it helps you, you can think of the policy levels as follows:
- **low** policy level = Tax of 0.065$/l diesel (i.e. 25$/tCO2); 120gCO2/km standard; 2'500$ subsidy on EV purchase
- **medium** policy level = Tax of 0.13$/l diesel (i.e. 50$/tCO2); 95gCO2/km standard; 5'000$ subsidy on EV purchase
- **high** policy level = Tax of 0.26$/l diesel (i.e. 100$/tCO2); 80gCO2/km standard; 10'000$ subsidy on EV purchase

ACAtry759_Pair2

If two national policy frameworks were identical in all other ways, where would you most likely invest?

Emission performance standards Policy level revised every 5 years	or	Subsidies for EV at purchase Not defined when policy level will be revised

Strongly Prefer Left	Somewhat Prefer Left	Indifferent	Somewhat Prefer Right	Strongly Prefer Right
ACAtry759_Pair2=1	ACAtry759_Pair2=2	ACAtry759_Pair2=3	ACAtry759_Pair2=4	ACAtry759_Pair2=5
○	○	○	○	○

Policy level example: If it helps you, you can think of the policy levels as follows:
- **low** policy level = Tax of 0.065$/l diesel (i.e. 25$/tCO2); 120gCO2/km standard; 2'500$ subsidy on EV purchase
- **medium** policy level = Tax of 0.13$/l diesel (i.e. 50$/tCO2); 95gCO2/km standard; 5'000$ subsidy on EV purchase
- **high** policy level = Tax of 0.26$/l diesel (i.e. 100$/tCO2); 80gCO2/km standard; 10'000$ subsidy on EV purchase

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ACAtry759_Pair3

If two national policy frameworks were identical in all other ways, where would you most likely invest?

Emission performance standards Medium policy level	or	Tax on combustion fuels Low policy level

Strongly Prefer Left	Somewhat Prefer Left	Indifferent	Somewhat Prefer Right	Strongly Prefer Right
ACAtry759_Pair3=1	ACAtry759_Pair3=2	ACAtry759_Pair3=3	ACAtry759_Pair3=4	ACAtry759_Pair3=5
○	○	○	○	○

Policy level example: If it helps you, you can think of the policy levels as follows:
- **low** policy level = Tax of 0.065$/l diesel (i.e. 25$/tCO2); 120gCO2/km standard; 2'500$ subsidy on EV purchase
- **medium** policy level = Tax of 0.13$/l diesel (i.e. 50$/tCO2); 95gCO2/km standard; 5'000$ subsidy on EV purchase
- **high** policy level = Tax of 0.26$/l diesel (i.e. 100$/tCO2); 80gCO2/km standard; 10'000$ subsidy on EV purchase

ACAtry759_Pair4

If two national policy frameworks were identical in all other ways, where would you most likely invest?

Tax on combustion fuels Policy level revised every 2 years	or	Subsidies for EV at purchase Policy level revised every 5 years

Strongly Prefer Left	Somewhat Prefer Left	Indifferent	Somewhat Prefer Right	Strongly Prefer Right
ACAtry759_Pair4=1	ACAtry759_Pair4=2	ACAtry759_Pair4=3	ACAtry759_Pair4=4	ACAtry759_Pair4=5
○	○	○	○	○

Policy level example: If it helps you, you can think of the policy levels as follows:
- **low** policy level = Tax of 0.065$/l diesel (i.e. 25$/tCO2); 120gCO2/km standard; 2'500$ subsidy on EV purchase
- **medium** policy level = Tax of 0.13$/l diesel (i.e. 50$/tCO2); 95gCO2/km standard; 5'000$ subsidy on EV purchase
- **high** policy level = Tax of 0.26$/l diesel (i.e. 100$/tCO2); 80gCO2/km standard; 10'000$ subsidy on EV purchase

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ACAtry759_Pair5

If two national policy frameworks were identical in all other ways, where would you most likely invest?

Subsidies for EV at purchase High policy level	or	Tax on combustion fuels Low policy level

Strongly Prefer Left	Somewhat Prefer Left	Indifferent	Somewhat Prefer Right	Strongly Prefer Right
ACAtry759_Pair5=1	ACAtry759_Pair5=2	ACAtry759_Pair5=3	ACAtry759_Pair5=4	ACAtry759_Pair5=5
○	○	○	○	○

Policy level example: If it helps you, you can think of the policy levels as follows:
- **low** policy level = Tax of 0.065$/l diesel (i.e. 25$/tCO2); 120gCO2/km standard; 2'500$ subsidy on EV purchase
- **medium** policy level = Tax of 0.13$/l diesel (i.e. 50$/tCO2); 95gCO2/km standard; 5'000$ subsidy on EV purchase
- **high** policy level = Tax of 0.26$/l diesel (i.e. 100$/tCO2); 80gCO2/km standard; 10'000$ subsidy on EV purchase

ACAtry759_Pair6

If two national policy frameworks were identical in all other ways, where would you most likely invest?

Low policy level Policy level revised every 2 years	or	Medium policy level Policy level revised every 5 years

Strongly Prefer Left	Somewhat Prefer Left	Indifferent	Somewhat Prefer Right	Strongly Prefer Right
ACAtry759_Pair6=1	ACAtry759_Pair6=2	ACAtry759_Pair6=3	ACAtry759_Pair6=4	ACAtry759_Pair6=5
○	○	○	○	○

Policy level example: If it helps you, you can think of the policy levels as follows:
- **low** policy level = Tax of 0.065$/l diesel (i.e. 25$/tCO2); 120gCO2/km standard; 2'500$ subsidy on EV purchase
- **medium** policy level = Tax of 0.13$/l diesel (i.e. 50$/tCO2); 95gCO2/km standard; 5'000$ subsidy on EV purchase
- **high** policy level = Tax of 0.26$/l diesel (i.e. 100$/tCO2); 80gCO2/km standard; 10'000$ subsidy on EV purchase

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Interview

Would you be available for a 15-20 minutes follow-up interview via phone or Skype?

Interview=1 yes

Interview=2 no

Contact

If you would like to participate in the drawing of the Bloomberg Businessweek subscription and receive a copy of the reports, please write your contact below. The results of the research project are expected to be available after July 2020. We will use this contact in case you agreed to have a follow-up interview.

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ThankYou

Thank you for filling in this survey!

0% 100%

APPENDIX B

Subject: Participation in Research Project ‘Financing Investments in Clean Technologies’

Dear Sir or Madam, / Dear [Name],

We would like to invite you to participate in this survey on investments into clean technologies, and in particular in e-mobility projects. We approach you because of your professional experience in investment management, however, no specific experience in cleantech or e-mobility is required to complete the survey.

This survey is part of the Research Project 'Financing Investments in Clean Technologies' funded by the **Swiss National Science Foundation (SNF)**. The project is expected to produce concrete policy recommendations to steer financing towards cleantech investments in Switzerland and Europe. Due to the current health crisis, the survey will also investigate the impact of COVID-19 on your investment decisions.

PLEASE ACCESS THE SURVEY HERE!
Or copy and paste this link into your browser:
https://cleantechinvestments.sawtoothsoftware.com/login.html
We suggest using a laptop or computer for an optimal display.

By entering your email address at the end of the survey you automatically take part in the drawing of one annual subscription to the Bloomberg Businessweek. Also, all participants who provide their addresses will receive a **free copy of the final report**.

For more information on the research project, please contact cleantech@graduateinstitute.ch.

Thank you very much for the time you'll be investing!

Best regards,

Joëlle Noailly
Head of Research, CIES, Graduate Institute Geneva

graduateinstitute.ch/cies

APPENDIX C

UN M49 category	Eastern Europe	Northern Europe	Southern Europe	Western Europe
Countries represented in the sample	Cyprus Hungary Poland Romania Russia Turkey	Estonia Iceland Ireland United Kingdom	Italy Portugal Spain	France Germany Luxembourg Netherlands Switzerland
Total number of respondents	7	10	5	19

Key
frequency *row percentage* *column percentage*

	Government_Ind_Cat_8				
Location_Cat	Market-li	Indiffere	Governmen	Strong go	Total
Eastern Europe	0 0.00 0.00	2 28.57 20.00	5 71.43 27.78	0 0.00 0.00	7 100.00 17.07
Northern Europe	1 10.00 20.00	2 20.00 20.00	4 40.00 22.22	3 30.00 37.50	10 100.00 24.39
Southern Europe	0 0.00 0.00	3 60.00 30.00	1 20.00 5.56	1 20.00 12.50	5 100.00 12.20
Western Europe	4 21.05 80.00	3 15.79 30.00	8 42.11 44.44	4 21.05 50.00	19 100.00 46.34
Total	5 12.20 100.00	10 24.39 100.00	18 43.90 100.00	8 19.51 100.00	41 100.00 100.00

APPENDIX D

Key
frequency
row percentage
column percentage

Location_Cat	EmobilityEffectiveness sceptical	confident	enthusias	Total
Eastern Europe	1	1	5	7
	14.29	14.29	71.43	100.00
	7.69	5.88	45.45	17.07
Northern Europe	2	4	4	10
	20.00	40.00	40.00	100.00
	15.38	23.53	36.36	24.39
Southern Europe	2	1	2	5
	40.00	20.00	40.00	100.00
	15.38	5.88	18.18	12.20
Western Europe	8	11	0	19
	42.11	57.89	0.00	100.00
	61.54	64.71	0.00	46.34
Total	13	17	11	41
	31.71	41.46	26.83	100.00
	100.00	100.00	100.00	100.00

Cleantech Y/N	EmobilityEffectiveness sceptical	confident	enthusias	Total
yes	11	14	8	33
	33.33	42.42	24.24	100.00
	84.62	82.35	72.73	80.49
no	2	3	3	8
	25.00	37.50	37.50	100.00
	15.38	17.65	27.27	19.51
Total	13	17	11	41
	31.71	41.46	26.83	100.00
	100.00	100.00	100.00	100.00

Emob Y/N	EmobilityEffectiveness sceptical	confident	enthusias	Total
no	9	6	8	23
	39.13	26.09	34.78	100.00
	69.23	35.29	72.73	56.10
yes	4	11	3	18
	22.22	61.11	16.67	100.00
	30.77	64.71	27.27	43.90
Total	13	17	11	41
	31.71	41.46	26.83	100.00
	100.00	100.00	100.00	100.00

locprodc	EmobilityEffectiveness sceptical	confident	enthusias	Total
Car-manufacturing	5	6	6	17
	29.41	35.29	35.29	100.00
	38.46	35.29	54.55	41.46
non-car-manufacturing	8	11	5	24
	33.33	45.83	20.83	100.00
	61.54	64.71	45.45	58.54
Total	13	17	11	41
	31.71	41.46	26.83	100.00
	100.00	100.00	100.00	100.00