Are Protests Games of Strategic Complements or Substitutes? Experimental Evidence from Hong Kong's Democracy Movement

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Abstract

The decision to protest is strategic: an individual's participation is a function of her beliefs about others' turnout. Models of protest often assume strategic complementarity; however, the challenge of collective action suggests strategic substitutability. We conduct the first field experiment directly manipulating individuals' beliefs about others' protest participation, in the context of Hong Kong's pro-democracy movement. We elicit university students' planned participation in an upcoming protest and their prior beliefs about others' participation, in an incentivized manner. One day before the protest, we randomly provide a subset of subjects with truthful information about others' protest plans, and elicit posterior beliefs about protest turnout, again in an incentivized manner. This allows us to identify the causal effects of positively and negatively updated beliefs about others' protest participation on subjects' turnout. We consistently find evidence of strategic *substitutes*. Analysis of control group subjects and survey evidence reinforce our experimental findings.

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1 Introduction

For hundreds of years, individuals have participated in protests demanding democratic political change from authoritarian rulers. In this, they have sometimes been successful (e.g., the Velvet Revolution, in 1989), and sometimes not (the Tiananmen Square protests in the same year). Anti-authoritarian protests are not only events from the past: according to the human rights NGO Freedom House, 26% of the world's population — nearly two billion people — live in states classified as "not free", and the Arab Spring provides a very recent reminder that citizens of unfree states continually rise up and demand political rights.[1] Given the prevalence of authoritarian regimes, it is unsurprising that anti-authoritarian movements continue to arise. The outcomes of these movements have the potential to shape human societies and the wealth of nations.[2]

What drives individuals' decisions to participate in protests demanding democratic rights from authoritarian regimes? In this paper we focus on the strategic element of the protest decision: how one's own participation is shaped by beliefs about the participation of others.[3] We conduct the first field experiment directly manipulating individuals' beliefs about others' protest participation, studying how these beliefs shape one's own participation in a high-stakes context: Hong Kong's ongoing democratic, anti-authoritarian movement.[4]

The strategic element of the protest decision is at the core of many models of protests. Much recent work assumes that the protest game is one of strategic complements: beliefs that others are more likely to turnout increase one's own likelihood of turnout. In a recent review article, Gehlbach et al. (2016, p. 579) go so far as to affirm "the strategic complementarity that *characterizes* mass protests" (emphasis added).[5] Yet, the protest game may not be one of strategic complements: incentives to free-ride on others' political collective action (see, e.g., Olson, 1965; Granovetter, 1978) or to send a signal of one's "type" or "identity" could generate a game of strategic substitutes.[6] While much theoretical work has been done on the strategic element of the protest decision,

[1] Data come from Freedom House's (2016) "Freedom in the World" report, available online at `https://freedomhouse.org/sites/default/files/FH_FITW_Report_2016.pdf`, last accessed August 5, 2016. By some measures, the world has become less free in recent years: Freedom House introduces its 2016 Report lamenting a "10th consecutive year of decline in global freedom." There has been an expansion of political freedom over the long run, however: Besley and Persson (2016) show that over the last two centuries, nations have become more democratic.

[2] A large literature in the social sciences has studied the growth consequences of democracy: see, e.g., Przeworski and Limongi (1993); Przeworski et al. (2000); Gerring et al. (2005); Rodrik and Wacziarg (2005); Persson and Tabellini (2006, 2008); Papaioannou and Siourounis (2008); Acemoglu and Robinson (2012); Bates et al. (2012); Meyersson (2016); Acemoglu et al. (2015). Researchers have also looked at democracy's effects on other outcomes, e.g. health: Besley and Kudamatsu (2006); Blaydes and Kayser (2011).

[3] Our work complements the existing theoretical and empirical literature on the extension of the franchise (e.g., Acemoglu and Robinson, 2000; Lizzeri and Persico, 2004; Llavador and Oxoby, 2005; Acemoglu and Robinson, 2006; Aidt and Franck, 2012, 2015), which typically considers aggregate behavior, rather than individual behavior.

[4] Cantoni et al. (2016) provide a complementary, descriptive study of the characteristics of supporters of Hong Kong's anti-authoritarian movement.

[5] See, for example, Kuran (1989, 1991, 1997); Chwe (2000); de Mesquita (2010); Edmond (2013); Barbera and Jackson (2016).

[6] Akerlof and Kranton (2000) present an economic analysis of identity; Benabou and Tirole (2011); Besley et al. (2014); Jia and Persson (2016) present models in which adherence to a group's social norms may be a game of strategic substi-

empirical evidence on the causal effect of beliefs regarding others' protest turnout on one's own turnout is extremely limited.[7]

Credibly testing for strategic complementarity or substitutability in the protest decision has been hindered by three empirical obstacles:

1. First, political movements have typically been studied *ex post* (e.g., Kuran, 1989, 1991, 1997; Opp and Gern, 1993; Lohmann, 1994). This not only generates selection issues — movements are generally studied when they've become large and successful — but also makes the prospective study of beliefs nearly impossible: belief elicitation would necessarily be retrospective and likely distorted by the realization of the political outcomes of interest.

2. Second, it is often difficult to study protesters against authoritarian regimes credibly and in real time (see Reny, 2016 for a discussion on challenges facing social scientists in China). Authoritarian settings are not friendly to research, and elicited beliefs and actions may be distorted by fear or social stigma.[8]

3. Third, it is extremely difficult to exploit variation in beliefs to identify causal effects: naturally-occurring variation is very likely to be endogenous. Experimental variation, e.g., arising from an information treatment, runs into challenges from heterogeneous priors, which imply that the same information treatment can generate positive belief updating among one subset of the sample (i.e., those whose priors are below the information provided) and negative updating among another subset.[9] This means, for example, that even an effective intervention may produce average treatment effects on beliefs or on actions that appear to be a null result. The average effect would simply reflect heterogeneous treatment effects of opposite signs. Thus, experimental interventions aimed at manipulating beliefs require carefully measured priors (and ideally posteriors as well) to determine exactly how the treatment affects particular individuals' beliefs, and through beliefs, behavior.

We overcome each of these obstacles, as follows:

1. First, Hong Kong's democracy movement (discussed in more detail below) is an ongoing, high-stakes political movement in its early stages, with uncertainty regarding the movement's ultimate success yet to be resolved. We study a movement that may grow to be

tutes.

[7] González (2016) provides the best empirical analysis of which we are aware, exploiting rich information on students' social networks to provide convincing evidence of a positive peer effect on one's own protest participation. However, his analysis is unable to identify specific mechanisms underlying the peer effect. Specifically, it is difficult using the data he has available to isolate the effects of beliefs about others' turnout *per se* from other effects, such as information transmission or social learning regarding the quality of the protest. Recent empirical work on the causes and consequences of mass political movements includes Madestam et al. (2013); Yanagizawa-Drott (2014); DellaVigna et al. (2014); Acemoglu et al. (2014); Enikolopov et al. (2016).

[8] Indeed, analyses of political behavior in real time are more common in settings that are already politically free (e.g., Gerber et al., 2011).

[9] See Coffman et al. (2015) for a theoretical analysis of the effects of information nudges.

overwhelming and successful in achieving political rights from Hong Kong's rulers in Beijing, or it might be crushed.[10] Thus, we do not select this case on the movement's outcome. Because Hong Kong's democrats traditionally protest the rule of the Chinese Communist Party each Handover Day (July 1), there exists a known protest about which we can elicit beliefs prospectively, in real time.

2. Second, Hong Kong's institutions, at least for the moment, guarantee civil rights protection (including broad protections of the right to peaceably assemble and of political speech), allowing us to credibly elicit individuals' political beliefs and behavior. An illustration of Hong Kong's uniquely suitable environment for our analysis can be found in Freedom House's (2016) "Freedom in the World" report: in it, Hong Kong had the largest gap in the world between political rights and civil liberties: the civil liberties of Greece and the political rights of Zimbabwe.[11]

3. Third, using a three-part online survey we conducted at the Hong Kong University of Science and Technology (HKUST), we are able to elicit the prior beliefs of over 1,200 university students regarding the protest turnout of their university classmates in the upcoming "July 1" protest, in an incentivized manner.[12] We are then able to provide an information treatment to a random subset and elicit posterior beliefs (again in an incentivized manner). Finally, we are able to elicit the students' own protest participation in the protest.

The goal of our experimental design is to isolate the causal effect of variation in beliefs regarding others' protest participation on one's own protest participation. To do so, we provide a random subset of individuals in our sample truthful information intended to shift beliefs regarding others' protest participation. A challenge we face is that such information must be provided *prior* to the protest itself — before we know the actual protest decisions of others.

[10]The eventual success or failure of the movement is likely to have repercussions throughout "Greater China" (and thus around the world) given rising concern in Hong Kong, mainland China, as well as in Taiwan, over the increasingly authoritarian and nationalistic policies undertaken by the Chinese Communist Party. Our work contributes to a growing empirical literature on the political economy of contemporary Greater China: for example, Lorentzen (2013) highlights the central government's tolerance of certain types of protests; King et al. (2013) study information control policies that aim at suppressing collective actions; Martinez-Bravo et al. (2014) study the introduction of village elections in mainland China; Kung and Chen (2011), Jia (2014), and Fisman and Wang (forthcoming) study the effects of incentives within the Chinese bureaucracy; and, Cantoni et al. (forthcoming) study attempts by the Chinese Communist Party to shape mainland students' political attitudes through textbooks.

[11]Of course, this immediately raises the question of the external validity of our analysis. We discuss this issue in more detail below, but for now acknowledge that our analysis captures protest decisions in a particular movement, in a particular place and time, at a particular stage of a movement's evolution. Varying any one of these dimensions may affect our findings. Still, we believe that the analytic tools applied are very generalizable, and that our results can certainly inform thinking about a broad range of protest movements around the world.

[12]The "July 1st March" is an annual protest rally that takes place in Hong Kong since the 1997 handover to the People's Republic of China. The protest became a major element of the broad democratic movement in Hong Kong since 2003, operates as a key channel for Hong Kong citizens to voice their demand for democracy, fight for universal suffrage, rights for minorities, protection of freedom of speech and a variety of other civil rights and political concerns.

To solve this problem, one week before the protest, we collect information on individuals' beliefs about others' *planned* turnout, as well as individuals' beliefs about others' future *actual* turnout at the protest. One would imagine that these would be closely related, but crucially, we are able to elicit planned protest participation prior to the protest itself. This allows us to provide truthful information regarding others' *planned* participation, plausibly affecting beliefs regarding others' *actual* protest participation.

A day before the protest, we provide a random subset of individuals in our sample truthful information about the planned participation of their classmates. We estimate the "first stage" effect of information regarding others' planned participation on individuals' (posterior) beliefs regarding others' actual participation. Next, we estimate the "reduced form" effect of of information regarding others' planned participation on individuals' own actual protest participation. Importantly, we split our analysis into two subsamples: those whose prior beliefs were below the true level of planned participation (whose beliefs regarding actual turnout, we expect, should be positively affected) and those whose prior beliefs were above the true level of planned participation (whose beliefs regarding actual turnout, we expect, should be positively affected).[13]

Our findings consistently point to our sample of Hong Kong students viewing the strategic component of their protest decision as being a game of strategic *substitutes*. Among subjects whose prior beliefs regarding others' planned participation were below the truth, the experimental provision of information regarding the true level of other subjects' planned participation has a significant and substantial, positive effect on beliefs about actual participation in the protest. Among these same subjects, information regarding the true level of others' planned participation has a significant *negative* effect on subjects' own turnout in the protest. Among subjects whose prior beliefs regarding others' planned participation were above the truth, the experimental provision of information regarding the true level of other subjects' planned participation has a significant and substantial, negative effect on beliefs about actual participation in the protest. Among these same subjects, information regarding the true level of others' planned participation has a significant *positive* effect on subjects' own turnout in the protest.

We additionally find non-experimental evidence indicating strategic substitutability in the protest decision: examining solely the naturally-occurring variation in beliefs about others' turnout among individuals in the control group, we again find that beliefs of greater turnout by others are associated with a lower likelihood of protest turnout.

We are able to address several questions about our analysis. First, using list experiments, we provide evidence that our experimental subjects are willing to truthfully report on potentially sensitive political attitudes related to their participation in the July 1 protest; this helps assuage concerns regarding our reliance on a self-reported measure of protest turnout (see Section 3.3).

Second, we can rule out a major threat to internal validity: the possibility that information

[13] In addition to providing evidence on balance between treatment and control groups in the full experimental sample, we present evidence of balance within each of these subsamples. See Section 3.

about other subjects' turnout affected not only beliefs about others' protest participation, but also beliefs about the "quality" of the political movement itself. Such a confounding "social learning" effect, however, would produce the appearance of strategic complementarity, not the strategic substitutability that we find. A similar logic suggests that our findings are not driven by experimenter demand effects (see Section 5).

Third, we explore the external validity of our findings: we replicate our findings re-weighting our sample to match the HKUST student body; we also provide evidence of a negative correlation between participation in past protest events and optimistic beliefs regarding other subjects' adherence to anti-authoritarian views (again see Section 5). While we believe our findings have some external validity, we also highlight reasons why our context — an early-stage political movement, led by a committed core of activists — may be a very different game from larger scale movements. We think this is an important limitation on the external validity of our study, but also argue that early-stage movements — which may be unsuccessful, or may eventually evolve into larger scale movements — represent an important, understudied area of research.

We next, in Section 2, provide an overview on Hong Kong's ongoing democratic, anti-authoritarian movement. Then, in Section 3, we describe our experimental design. In Section 4, we present our main findings, and in Section 5 discuss their internal and external validity. Finally, in Section 6, we offer concluding thoughts.

2 Hong Kong's democracy movement

Prior to 1997, Hong Kong was a British colony, with limited democratic political rights, but strong protections of civil liberties and respect for the rule of law.[14] In 1997, Hong Kong was returned to the People's Republic of China, to be ruled as a Special Administrative Region with its own quasi-constitution — the "Basic Law" — and a promise from China that its legal, economic, and social traditions would be respected and maintained until 2047, under a policy known as "one country, two systems." While the "Basic Law" and "one country, two systems" provide a structure for Hong Kong's political and legal institutions, there remain a great many details that have been bargained and battled over between the so-called "pan-democracy" and "pro-Beijing" camps — and, of course, with Hong Kong's rulers in Beijing.

Hong Kong's ongoing democratic movement, expressed most dramatically in the "Umbrella Revolution" of 2014, has its roots in debate regarding the method of selection of Hong Kong's Chief Executive (the head of Hong Kong's government). Article 45 of the Basic Law of Hong Kong specifies the following regarding the selection of the Chief Executive:

> The method for selecting the Chief Executive shall be specified in the light of the actual situation in the Hong Kong Special Administrative Region and in accordance with the

[14] This description of Hong Kong's anti-authoritarian movement is nearly identical to that presented in Cantoni et al. (2016).

> principle of gradual and orderly progress. The ultimate aim is the selection of the Chief Executive by universal suffrage upon nomination by a broadly representative nominating committee in accordance with democratic procedures.

While specifying an ultimate aim of universal suffrage, the details of such an election were not specified. In particular, the Basic Law does not state *when* any election employing universal suffrage should take place, nor does it specify the details of "nomination by a broadly representative nominating committee." From Hong Kong's return to China until today, the Chief Executive has been selected by an Election Committee; currently, the Committee is composed of 1,200 members.

In 2007, the Chinese government indicated a move toward universal suffrage in Hong Kong, with the Tenth National People's Congress stating: "[T]he election of the fifth Chief Executive of the Hong Kong Special Administrative Region in the year 2017 may be implemented by the method of universal suffrage." The Twelfth National People's Congress followed this in 2014 with the details of implementation:

> [T]he principle that the Chief Executive has to be a person who loves the country and loves Hong Kong must be upheld. [...]
>
> A broadly representative nominating committee shall be formed. [...] The nominating committee shall nominate two to three candidates for the office of Chief Executive in accordance with democratic procedures. Each candidate must have the endorsement of more than half of all the members of the nominating committee.[15]

The new election mode would thus have allowed the citizens of Hong Kong a choice between two or three candidates (rather than imposing a single one), previously vetted by the same nominating committee as before.

Meanwhile, members of Hong Kong's Democratic Camp organized to pressure the Chinese government to establish electoral institutions that adhered to international democratic norms, particularly regarding the nomination process for Chief Executive candidates. A group of citizens formed an organization known as "Occupy Central with Love and Peace" (OCLP), which threatened civil disobedience — an occupation of the Central District of Hong Kong — should Beijing not satisfy their demands. To provide their movement with greater legitimacy, OCLP carried out an unofficial referendum in the summer of 2014, which drew over 700,000 voters. Voters endorsed a proposal that allowed the public to nominate Chief Executive candidates, which Beijing rejected. Voters in the referendum also expressed strong support for a Hong Kong Legislative Council (LegCo) veto of any Beijing proposal that did not satisfy international democratic norms.

As noted above, the Chinese proposal offered only a very limited expansion of democratic rights; OCLP and a broad range of democratic activists were unsatisfied and organized civil dis-

[15] Source: `http://www.scmp.com/news/hong-kong/article/1582245/full-text-npc-standing-committee-decision-hong-kong-2017-election`, last accessed August 7, 2016.

obedience in response to Beijing's proposal. The Hong Kong Federation of Students and the student political organization Scholarism organized a walkout on classes in late September 2014. Hong Kong police used tear gas on students and other democratic activists amassed in Central and Admiralty on September 28, 2014, which led to increased sympathy for the democratic movement among the people of Hong Kong.

Thereafter, a much larger-scale occupation of various sites in Hong Kong was established: the so-called "Umbrella Revolution," named for the ubiquitous umbrellas carried by participants. The Umbrella Revolution persisted for months, being slowly (and generally peacefully) cleared out by police by the end of December 2014. While the movement involved large amount of local residents in Hong Kong participating,[16] and generated substantial press coverage around the world, it did not alter Chinese policy. The limited electoral reform proposal drafted by the Chinese Communist Party was sent to the Hong Kong LegCo for its approval, where it failed to reach the supermajority required for passage. Thus, in June 2015, the LegCo returned Hong Kong to the *status quo ante* of a Chief Executive appointed by the Election Committee.

Since June 2015, the democratic movement in Hong Kong has both fragmented and radicalized. While in 2014 efforts were coordinated around the demand for popular nomination of Chief Executive candidates and election via universal suffrage, Beijing's intransigence convinced significant components of the democratic movement that only a greater degree of self-rule — even independence — would ensure political rights and Hong Kong citizens' continued enjoyment of civil liberties and rule of law.

Recent encroachments on Hong Kong citizens' civil liberties, including the arrest (alleged kidnapping) of Hong Kong booksellers by the mainland Chinese government, have deepened Hong Kong citizens' fear of the Chinese Communist Party and their sense of a Hong Kong identity very much distinct from — even opposed to — that of mainland China. The result is that Hong Kong citizens and political parties are now much more loudly calling for independence or, more politically correctly, for "self determination." "Localist" violence has occasionally flared; new political parties, such as the student-led Demosistō, have formed and won seats in the 2016 LegCo election on platforms explicitly calling for self-determination.[17]

3 Experimental design

In this section, we describe: *(i)* the broad outline of the experimental design; *(ii)* the experimental sample; and *(iii)* the details of the elicitation of subjects' protest plans, beliefs, and their actual protest participation.

[16] The exact count of total turnout during the "Umbrella Revolution" is still unknown, but some estimates that there were more than 100,000 participants on the street at any given time during the months of the movement.

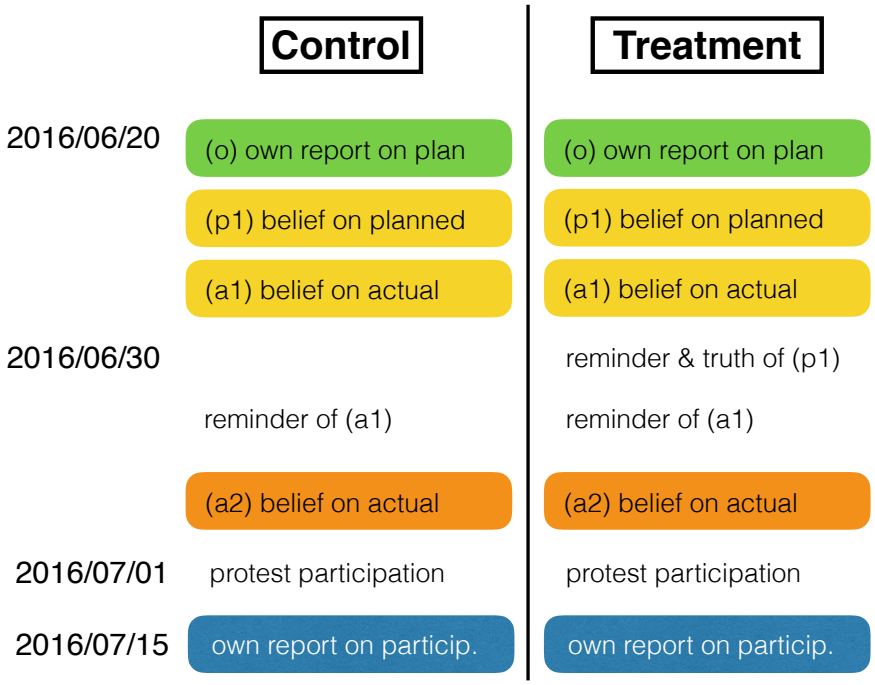
[17] Two legislators elected on a self-determination platform were recently removed from office by a ruling of the Chinese National People's Congress, foreshadowing future conflict.

3.1 Design overview

Our experiment was conducted through a three-part email survey. The goal of our experimental design is to isolate the causal effect of variation in beliefs regarding others' protest participation on one's own protest participation. To do so, we provide a random subset of individuals in our sample *truthful* information intended to shift beliefs regarding others' protest participation. A challenge we face is that such information must be provided *prior* to the protest itself — before we know the actual protest decisions of others.

To solve this problem, one week before the protest, we collect information on individuals' beliefs about others' *planned* turnout, as well as individuals' beliefs about others' future *actual* turnout at the protest. One would imagine that these would be closely related, but crucially, we are able to elicit planned protest participation prior to the protest itself. This allows us to provide truthful information regarding others' *planned* participation, plausibly affecting beliefs regarding others' *actual* protest participation. We first estimate the "first stage" effect of information regarding others' planned participation on individuals' (posterior) beliefs regarding others' actual participation. Next, we estimate the "reduced form" effect of information treatment regarding others' planned participation on individuals' own actual protest participation. Putting together the first stage and the reduced form, we can estimate the effect of a change in beliefs about others' participation on one's own using two-stage least squares.[18]

The broad outline of the design is as follows:



[18] We discuss this two-stage estimate, particularly the implied exclusion restriction, in more detail below.

1. On June 24, 2016, we elicited subjects' own planned participation in the upcoming (planned) July 1, 2016, anti-authoritarian protest (known locally as the "July 1 March"). We also elicited (in an incentivized manner) subjects' beliefs regarding other subjects' planned protest participation (i.e., elicited priors regarding *planned* participation). In the same survey, we elicited (again, in an incentivized manner) subjects' beliefs regarding other subjects' actual protest participation on July 1, 2016 (i.e., elicited priors regarding other subjects' *actual* participation). Finally, we elicited (in an incentivized manner) subjects' beliefs regarding the total protest participation among all Hong Kong citizens on July 1, 2016 (i.e., elicited priors regarding total *actual* turnout among all HK citizens).

2. On June 30, 2016, we provided a random subset of our experimental sample with information regarding the true level of *planned* protest participation. For both the information treatment group and the control group, we again elicited (in an incentivized manner) beliefs regarding other subjects' actual protest participation on July 1, 2016 (i.e., elicited posteriors regarding other subjects' *actual* participation). Comparing posteriors between the treatment and control groups provides an estimate of the "first stage" relationship. We also elicited (in an incentivized manner) subjects' beliefs regarding the total protest participation among all Hong Kong citizens on July 1, 2016 (i.e., elicited posteriors regarding total *actual* turnout among HK citizens).

3. On July 15, 2016, we elicited subjects' participation in the July 1 protest. This provides us with our outcome variable of interest and comparing participation rates between the treatment and control groups provides an estimate of the "reduced form" relationship of interest. Self-reported July 1 protest participation is also the outcome in our two-stage estimates of the effects of beliefs regarding others' protest participation on one's own.

3.2 Experimental sample

Our sample of experimental subjects is drawn from the population of students at the Hong Kong University of Science and Technology. Studying a sample of students to understand protest participation is ideal given students' historic position at the center of anti-authoritarian, democratic movements. Students are certainly at the center of Hong Kong's democratic movement: among the leading groups in the Umbrella Revolution were Scholarism, a non-partisan organization of students, and the Hong Kong Federation of Students. Since the end of the Umbrella Revolution, Scholarism was disbanded; Joshua Wong and Nathan Law, the former leaders of Scholarism and the Hong Kong Federation of Students, respectively, formed a party called Demosistō, with the explicit aim of achieving Hong Kong's political self-determination.

In Part 1 of the study, we recruited participants on June 24, 2016, sending an email to the entire undergraduate population of the Hong Kong University of Science and Technology (HKUST).[19]

[19] All experimental materials were provided in English, the primary language of instruction at HKUST. Some bilin-

We received 1,744 completed surveys, achieving a response rate of 19.1%. Among these, we focus on the 1,576 students who were either born in Hong Kong or moved there prior to high school (Hong Kong "natives").[20] Part 1 of the experiment elicited students' political preferences, beliefs, attitudes, and planned and past political protest behavior. Because protests occur every Handover Day, July 1, we asked a series of questions specifically eliciting planned participation in the upcoming July 1 protest, as well as (prior) beliefs about turnout at the protest (we discuss the specifics of this elicitation in the next subsection). We paid students for their participation, and also provided additional payments as a function of their choices in incentivized games and in incentivized belief elicitations. On average, respondents received HKD 205, approximately US$ 25, for completing this first survey. Our experimental intervention was conducted in Part 2 of the study, a very short online survey sent in an email on June 30, 2016, and completed by 1,303 Hong Kong native students.[21] Along with the experimental intervention of interest (described below), this second survey elicited (posterior) beliefs about turnout in the following day's protest. Students received a payment of HKD 25, for completing the survey. Finally, in Part 3 of the study, we elicited students' participation in the July 1 protest of 2016 in a third online survey sent via email on July 15, 2016, and completed by 1,241 Hong Kong native students.[22] Students who have completed Part 3 of the study received an additional payment of HKD 25.

In Table 1, columns 1 and 2, we present summary statistics for the 1,576 Hong Kong native students who completed Part 1 of the experiment. We then present summary statistics for the (mutually exclusive, exhaustive) subsets of students who: (a) completed *only* Part 1 of the study (273 students; see columns 3 and 4); (b) completed *only* Parts 1 and 2 (62 students; see columns 5 and 6); and, (c) completed *all* three Parts (1,241 students; see columns 7 and 8). To test for systematic attrition of our sample after the assignment of treatment, we test for statistically significant differences between the subset of students who completed only Part 1 and the subset of students who completed all three Parts of the study. In Table 1, column 9, one can see that there is very little evidence of systematic attrition post-treatment assignment in our study: two of 14 characteristics are marginally significantly significantly different (at the 10% level) across groups. The sample of students who completed all three Parts of the study is quite representative of the broader HKUST student body on the dimension of school of enrollment (i.e., students' broad academic area), but unrepresentative by gender and cohort (see the Online Appendix, Table A.1).[23] This does not threaten the internal validity of our findings, but should be kept in mind nonetheless.

gual support (i.e., materials provided in Chinese characters) is provided to clarify key terms.

[20] Cantoni et al. (2016) provide a comprehensive description of the survey conducted in Part 1 of this experiment, and a detailed analysis of students' political preferences.

[21] The full text of Part 2 of the study is reproduced in the Online Appendix A.

[22] The full text of Part 3 of the study is reproduced in the Online Appendix A.

[23] Note that all of our findings are robust to re-weighting our sample to match the composition of the HKUST student body; we discuss this further in Section 5, below.

3.3 Elicitation of plans, beliefs, and actual protest participation

Part 1: Subjects' planned participation and prior beliefs

In Part 1 of the study, on June 24, 2016, we elicited subjects' own planned participation in the upcoming July 1, 2016, anti-authoritarian protest, asking:

> Are you planning to participate in the July 1st March in 2016?
>
> 1 Yes
> 2 Not sure yet, but more likely than not
> 3 Not sure yet, but more unlikely than yes
> 4 No

We next elicited (in an incentivized manner) subjects' beliefs regarding other subjects' planned protest participation (i.e., elicited priors regarding *planned* participation). Specifically, we asked:

> Please guess what percentage of the participants from HKUST of this study plan to participate in the July 1st March in 2016 (answer either "Yes" or "Not sure yet, but more likely than not" to the above question on July 1st March in 2016).
>
> If your guess is within 2 percentage points of the percent of students who actually answer either "Yes" or "Not sure yet, but more likely than not," you will earn a bonus payment of HKD 10.

In the same survey, we elicited (again, in an incentivized manner) subjects' beliefs regarding other subjects' actual protest participation on July 1, 2016 (i.e., elicited priors regarding *actual* participation). We asked:

> Please guess what percentage of the participants from HKUST of this study will participate in the July 1st March in 2016.
>
> If your guess is within 2 percentage points of the percent of students who actually participate, you will earn a bonus payment of HKD 10.

Responses in Part 1 indicated that 16.9% of all subjects (including non-native Hong Kong students) planned to participate in the July 1 protest of 2016 (i.e., answered either "Yes" or "Not sure yet, but more likely than not" to the question regarding their plans for the upcoming July 1 protest). Among the Hong Kong native students who completed the study, on whom we focus, 17.6% planned to participate. The experimental sample's average prior belief regarding planned protest participation was quite close to the truth, at 15.8%, but there was a great deal of variation around the truth (the standard deviation was also 15.8 percentage points).

The sample's average prior belief regarding others' actual participation in the July 1 protest was slightly below beliefs about others' planned participation, at 13.9%. In Figure 1, we present

the distribution of subjects' prior beliefs regarding others' planned participation and regarding others' actual participation. One can see in the figure that these correspond quite closely, with the distribution of priors regarding actual participation shifted slightly to the left of the distribution of beliefs regarding planned participation.

Part 2: The experimental intervention and posterior beliefs

In Part 2 of the study, on June 30, 2016, we provided a random subset of our experimental sample with information regarding the true level of *planned* protest participation; we also elicited posterior beliefs regarding actual participation in the upcoming July 1 protest of 2016.

We randomly assigned two-thirds of subjects to the treatment group and one-third to the control group.[24] We present observable characteristics for the treatment and control groups and test for balance across groups in Table 2, columns 1–3. One can see that the treatment and control groups are very similar in their observable characteristics, with only one of fourteen variables (altruism) statistically significantly different between groups (at the 5% level).

As discussed above, the impact of an information shock on beliefs, and thus behavior, should differ (likely having effects of opposite sign) depending on whether the information provided was above or below individuals' prior beliefs. We will thus conduct our analysis treating individuals with priors above and below the information treatment separately. Treatment assignment should have been orthogonal to individuals' prior beliefs; to make sure, we test for balance within the "Prior beliefs above truth" and "Prior beliefs below truth" subsets of our experimental sample. One can see in Table 2, columns 4–9, that treatment and control groups are balanced on observable characteristics within each of these subsets. Of 28 tests of differences between groups, only one (altruism among individuals with prior beliefs below the truth) is statistically significantly different between treatment and control (at the 1% level). Our findings of generally balanced treatment and control groups indicate successful randomization and support an interpretation of differences between treatment and control groups as indicative of causal effects of treatment.[25] We will consider the effects of the imbalance in altruism in more detail below.

Individuals in the treatment group — but not the control group — were reminded of their responses from Part 1 regarding other subjects' planned participation in the July 1 protest of 2016, and then told the actual level of other subjects' planned participation, as follows:

[24]The decision to assign more individuals to the treatment group was made taking into account that many subjects may have ignored Part 2 of the study, and thus effectively ended up in the control condition. Under such a scenario, we could have examined protest behavior among individuals who were actually treated and among individuals who were assigned to the control condition or who did note complete the survey in Part 2 of the study. In practice, the vast majority of subjects completed all 3 Parts of the study, so the additional individuals in the treatment group were not strictly necessary.

[25]It is important to note that variation in individuals' prior beliefs was not experimentally manipulated. In the Online Appendix, Table A.3, we present predictors of both individuals' own self-reported plans to participate in the protest as well as predictors of individuals' prior beliefs regarding other subjects' planned participation.

Recall that you guessed that *[Part 1 response]*% of HKUST survey participants would plan to attend the July 1 March.

Based on last week's survey, the true percentage of survey participants who plan to attend the July 1 March is **17%**.

All subjects (both treatment and control) were reminded of their responses from Part 1 regarding actual participation in the July 1 protest of 2016, as follows:

Remember that we offered you:
1 — A HKD 10 bonus payment for accurately guessing the percentage of HKUST survey participants who would actually attend this July 1 March;
2 — An additional HKD 10 bonus payment for accurately guessing the total number of Hong Kong citizens would actually attend this July 1 March.

In last week's survey, you guessed that:
1 — *[Part 1 response]*% of HKUST survey participants would attend this July 1 March;
2 — A total of *[Part 1 response]* Hong Kong citizens would attend this July 1 March.

All subjects were then given an opportunity to update their responses from Part 1:

Perhaps since then your views have changed.

We now ask you again to provide guesses about actual attendance of the July 1 March.
Instead of your guesses in the previous survey, we will use today's guesses to determine your bonus payment.

1 How many people in total do you think will participate in the July 1st March in 2016?
If your guess is within 10% of what will be reported by the HKUPOP after the July 1st March in 2016, then you will earn a bonus payment of HKD 10.

To give you a sense, according to HKUPOP's report, among the July 1st March that took place between 2003 and 2015:
The lowest attendance in a given year is: 17,000 (in 2008);
The highest attendance in a given year is: 462,000 (in 2003).

2 Please guess what percentage of the participants from HKUST of this study will participate in the July 1st March in 2016?
If your guess is within 2 percentage points of the percent of students who actually participate, you will earn a bonus payment of HKD 10.

The experimental sample's average posterior belief regarding the percentage of other subjects

who would actually participate in the July 1 protest was 14.5%; the average posterior belief regarding total actual turnout among HK citizens was 143,856. In fact, the July 1 protest of 2016 was smaller than subjects expected: the protest was attended by 3% of experimental subjects, and only 26,000 people overall.[26]

Part 3: Measuring protest participation

In Part 3 of the study, on July 15, 2016, we elicited subjects' participation in the July 1 protest of 2016. We asked subjects:

Did you attend the July 1 2016 March?

A response of "yes" to this question is our measure of individuals' protest participation.[27]

An important concern regarding our measure of protest participation is that experimental subjects may not report on their participation truthfully. This concern is particularly relevant in the context of an anti-authoritarian movement. However, there are several reasons to believe that self-reported protest turnout is a good measure in our context. First, as noted above, Hong Kong citizens' civil liberties remain largely protected by the "one country, two systems" institutions in place: there is a highly independent judiciary in place that protects citizens' rights to freedom of speech and assembly. Second, the particular protest that we study remained peaceful and did not result in any arrests. While subjects faced a risk of government crackdown on the protest *ex ante*, there was no concern regarding legal sanctions on participants two weeks after the protest, when subjects' protest participation was elicited. Third, for fear of government sanction to produce measurement *error*, it would need to be the case that subjects were willing to take the risk of attending a (very public) protest, but unwilling to tell us in a private survey that they did so. While this is possible (they may misperceive the observability of their protest choice and fear putting their behavior on the record), it strikes us as unlikely.

As a more direct test of our experimental subjects' willingness to truthfully respond to politically-sensitive survey questions, in Part 1 of the study we elicited several key dimensions of political ideology that may be considered sensitive using "list experiments" (or, "Item Count Technique"; Raghavarao and Federer, 1979). The list experiment provides "cover" for the expression of possibly stigmatized attitudes, and allows one to estimate the prevalence of these attitudes at the

[26]The smaller than expected protest was perhaps the result of an announcement on the morning of July 1 that the arrested and returned Hong Kong bookseller, Lam Wing-kee, would not lead the protest, as had been expected, out of fear for his safety. The Hong Kong Free Press headlined an article on June 28, "Organisers expect 100,000 to attend July 1 democracy rally led by bookseller and ex-prisoners of conscience" (`https://goo.gl/kgDYr1`, last accessed December 19, 2016). The same source headlined an article on July 1, "Returned HK bookseller will not lead July 1 democracy march after 'serious threat' to safety" (`https://goo.gl/dHcR9b`, last accessed December 19, 2016).

[27]We also ask a small number of follow-up questions: we asked subjects who reported attending the protest to indicate which of 28 groups' crowds they joined at the protest (we also gave them the option of "Others"). Next, we asked subjects for their impressions of the protest in an open-ended manner, subject to a 300 word maximum. Finally, we asked subjects about the number of their friends who attended the protest.

population level. In addition, we adopt a modified version of the standard list experiment (Coffman et al., forthcoming) that appends "covered" elicitation with the traditional survey method (namely, direct question): the control group students in our list experiment setup (those who see N statements instead of $N+1$) are asked the politically sensitive questions *directly* in the form of "yes" or "no." As a result, for each political attitude, we are able to compare the experimental sample's expressed adherence to that attitude in response to a direct question with the estimated adherence to that attitude based on our list experiment. We can then test whether there exists a distortion in the expression of a particular attitude in response to a direct question (e.g., due to stigma or fear).

In Table 3, we present the fraction of our sample expressing support for Hong Kong independence; who consider themselves Hong Kongese rather than Chinese; who have a favorable view of the ruling CCP; and, who support the use of violence in pursuit of Hong Kong's political rights. In the left-hand column, we simply present the population estimate of adherence to a political attitude based on direct questions. In the right-hand column, we show the difference between the estimate based on direct questions and the estimate based on the list experiment. One can see that for three of the political attitudes, there is no significant effect of providing respondents with "cover" for expressing their views; it is comforting that attitudes from supporting independence to expressing unfavorable views toward the ruling party are all expressed without significant fear in our setting. Only for the use of violence does the list experiment show a significant difference: it seems that many students in our sample would support the use of violence in order to achieve Hong Kong's political rights, but are afraid to say so when directly asked. That expressing such an extreme (and morally ambiguous) attitude is stigmatized is not surprising; indeed, finding a significant gap between direct questions and the list experiment on this dimension suggests that subjects do value the cover provided by the list experiment when it is needed — but it is not needed in response to political questions within the range of non-violent opposition to the Chinese Communist Party.

4 Main results

4.1 The first stage: effects on posterior beliefs

We begin by presenting the effects of the information treatment on individuals' beliefs regarding actual participation in the July 1 protest — the "first stage." Our focus is on posterior beliefs regarding the percentage of other experimental subjects who would actually participate in the July 1 protest — this is the belief most directly linked to the information provided regarding subjects' planned participation. We will also present some evidence on posterior beliefs regarding total turnout among HK citizens.

The effect of the information treatment — informing the treatment group that 16.9% of ex-

perimental subjects planned to attend the protest — can be seen in the distributions of beliefs regarding subjects' *actual* participation, presented in Figure 2. One can see in the figure that prior beliefs regarding actual participation for the majority in the experimental sample were below 15%, with the median at 10%, and with a long tail. One also sees in the figure that the distributions of posterior beliefs regarding actual participation look very different comparing the treatment and control groups. The control group's distribution of posteriors looks very much like the experimental sample's distribution of priors, but shifted slightly to the right. In contrast, the treatment group's posteriors are distributed much more tightly between 10% and 20%.[28]

The compression of the distribution of beliefs among the treatment group subjects is precisely what one would expect given that the truthful information provided to them was above the prior beliefs of some (regarding planned participation) and below the prior beliefs of others. We next more closely examine the anticipated heterogeneous effects of the information treatment depending on subjects' prior beliefs, in Figure 3. In the figure, we present a binned scatter plot of the change in beliefs (posteriors minus priors) regarding other subjects' actual participation against subjects' priors regarding other subjects' *planned* participation. In the left-hand panel of the Figure 3, one can see that, as predicted, subjects in the treatment group with priors regarding planned participation below the information provided (recall that the true level of planned participation was around 17%) all updated their beliefs regarding other subjects' actual participation positively. As predicted, all subjects in the treatment group with priors regarding planned participation above the information provided updated their beliefs regarding other subjects' actual participation negatively. Subjects in the treatment group with priors more distant from the information provided updated their beliefs more than those with priors closer to the information provided. In the right-hand panel of Figure 3, one can see that individuals in the control group with lower priors tended to update their beliefs positively, and vice versa — suggestive of mean reversion — but the changes in beliefs are tiny compared to those observed in the treatment group.[29]

Observing that belief updating in the treatment group systematically differs between subjects with priors above and below the information provided, we now study the first stage effects of the treatment splitting the experimental sample into groups with priors regarding planned participation above and below the true level of planned participation of 16.9%. Recall that treatment and control groups are balanced on observable characteristics within each of these subsets (see Table 2, columns 4–9). In Figure 4, we present the prior and posterior beliefs regarding other subjects' actual participation for the treatment and control groups, split by priors regarding planned participation above and below the information treatment. One can see in the figure that there exists a strong first stage effect of the information treatment on beliefs regarding other subjects'

[28] A Kolmogorov-Smirnov test of equality of posterior distributions between the treatment and control groups strongly rejects the null ($p < 0.001$).

[29] The updating of beliefs among the control group may also result from information spilling over from the treatment group; such information spillovers would tend to bias estimated effects (in both the "first stage" and the "reduced form") toward zero.

participation. Among individuals with priors regarding other subjects' planned participation below the true level, there is a significantly greater increase in posteriors among the treatment group than among the control group. Among individuals with priors regarding other subjects' planned participation above the true level, there is a significantly greater decrease in posteriors among the treatment group than among the control group.

We next estimate regression models predicting changes in beliefs (posteriors minus priors) as a function of treatment status. In Table 4, Panel A, column 1, one can see that among individuals with prior beliefs regarding planned participation of other subjects below the truth, treatment increases beliefs regarding other subjects' actual turnout by a statistically significant 4.5 percentage points. In Table 4, Panel B, column 1, we add to the model estimated in Panel , column 1, controls for individual demographic characteristics as well as for the levels of individuals' prior beliefs regarding other subjects' planned participation.[30] One can see that (consistent with successful randomization) including these controls does not meaningfully affect the estimated treatment effect. In Table 4, Panel A, column 2, one can see that among individuals with prior beliefs regarding planned participation of other subjects above the truth, treatment differentially decreases beliefs regarding other subjects' actual turnout by a statistically significant 10.2 percentage points. In Table 4, Panel B, column 2, one can see that including controls for individuals' demographic characteristics and their prior beliefs does not qualitatively affect our point estimates.

We next pool individuals with prior beliefs regarding other subjects' planned participation both above and below the truth, but code the treatment variable as being equal to -1 for individuals with prior beliefs above the truth in order to make the treatment effect monotonic. In the pooled experimental sample we find that treatment changes beliefs "toward" the information provided by 9.8 percentage points (Table 4, Panel A, column 3). Including demographic controls and controlling for individuals' prior beliefs has very little effect (Table 4, Panel B, column 3).

One might believe that experimental subjects who update their beliefs regarding other subjects' turnout at the protest would also update their beliefs regarding the turnout of Hong Kong citizens more generally. We thus next examine the effect of the treatment on subjects' beliefs regarding protest turnout among the entire Hong Kong population. We replicate the specifications in Table 4, columns 1–3, but using as our outcome the change in beliefs (posteriors minus priors) regarding the total turnout in the July 1 protest of 2016. In Table 4, columns 4–6, one can see that the treatment causes changes in beliefs regarding total protest size that match in sign the effects on beliefs regarding other subjects' actual turnout. While the point estimates are noisy (and only statistically significant in specifications pooling individuals with priors regarding other subjects' planned turnout both above and below the truth), they indicate that the treatment shifted beliefs regarding non-student citizens' turnout in the same direction as experimental subjects' turnout.

[30] We control for priors regarding other subjects' planned participation because the sample is split on the level of this variable. Controlling for priors regarding other subjects' actual participation produces very similar estimates.

4.2 The reduced form: effects on protest turnout

We now turn to examining the effects of the information treatment on individuals' protest participation. As we did above, we split the experimental sample into two groups: first, subjects' whose prior beliefs regarding other subjects' planned turnout was below the truth; and, second, subjects' whose prior beliefs regarding other subjects' planned turnout was above the truth. In the previous section we saw that in the former group, the treatment increased beliefs regarding other subjects' turnout, while in the latter group, the treatment reduced beliefs regarding other subjects' turnout.

In Figure 5, we present turnout levels among subjects in the treatment and control groups in the two subsamples split according to priors. One can see in the figure that in the subsample whose priors were below the truth, the information treatment caused turnout to *fall*; in the subsample whose priors were above the truth, the information treatment caused turnout to *rise*. It is worth emphasizing: in both subsamples we find evidence that the protest decision is a negative function of beliefs regarding the turnout of others. The protest game in this setting is one of *strategic substitutes*.[31]

Interestingly, Figure 5 provides additional evidence consistent with the protest game being one of strategic substitutes: examining only the naturally-occurring variation in beliefs among the control group subjects, one sees that control group subjects with lower prior beliefs turnout more than control group subjects with greater priors. In Figure 6, we show a binned scatter plot of control group subjects' protest participation against their posterior beliefs regarding other subjects' protest participation. One can see that greater beliefs regarding others' turnout are associated with lower protest turnout. Thus, both natural variation and experimental variation in beliefs indicates that Hong Kong students turnout to protest more when they believe that fewer others are going to turnout.

We next examine heterogeneity in the treatment effect associated with subjects' priors in a more disaggregated manner, regressing protest participation on the interaction between a treatment group dummy variable and 5-percentage-point bins of priors regarding other subjects' planned participation (as well as lower-order terms). In Figure 7, we present the estimated coefficients on the interaction terms as well as their 95% confidence intervals. One can see in the figure that the effect of the treatment on protest turnout was greatest among individuals whose priors were furthest from the information provided — precisely those subjects whose beliefs were most affected by the treatment (recall the results in Figure 3). These findings provide reassuring evidence of consistency between the first stage effects and the reduced form. We present evidence on heterogeneity in the treatment effect associated with subjects' priors in an even less parametric manner — presenting locally-weighted regression estimates of the treatment effect across subjects' priors

[31] One may be concerned that the lack of balance on subjects' altruism may affect our findings. In the Online Appendix, Figure A.1, we present graphs analogous to Figure 5, but disaggregating between subjects with altruism above and below the median. One can see that our findings are qualitatively the same for more altruistic and less altruistic subjects.

— in Figure 8. One can again see that the treatment effects — negative for subjects with priors below the truth and positive for subjects with priors above the truth — are generally greatest among individuals whose priors were furthest from the truth.

4.3 Two-stage estimates: the effects of beliefs on turnout

Thus far we've shown that providing information regarding the true level of planned protest turnout among our experimental sample caused: (i) beliefs regarding actual turnout to change; and, (ii) subjects' own turnout to change, with beliefs and turnout moving in opposite directions. We next combine the two effects — first stage and reduced form — in a two-stage analysis that allows us to estimate the causal effect of a change in beliefs regarding actual turnout on one's own turnout. It is worth emphasizing that one should not interpret the two-stage estimates too literally: we have already shown that the information treatment affected beliefs regarding the turnout of both other experimental subjects and Hong Kong citizens more generally, so we cannot estimate the casual effect of precisely a one percentage point change in beliefs regarding other subjects' turnout.[32] With this caveat in mind, we still believe this exercise is instructive.

In Table 5, we present: (i) regression estimates of the "reduced form" effect — i.e., the effect of the treatment on subjects' own protest participation (Panel C); regression estimates of the "first stage" effect — i.e., the effect of the treatment on changes in beliefs (posteriors minus priors) regarding other subjects protest participation (Panel B); and, (iii) a two-stage estimate in which the treatment dummy variable is used as an instrument for beliefs regarding other subjects' protest participation in the first stage, and the experimentally-induced variation in beliefs is used to predict subjects' own protest turnout in the second stage (Panel A). As above, we split the sample according to whether subjects' priors regarding other subjects' planned participation was above or below the true value.

One can see in Table 5, Panels B and C, regression estimates that correspond to the results shown in Figures 4 and 5. Individuals whose prior beliefs regarding other subjects' planned participation are below the true value update their beliefs positively in the treatment condition, and are less likely to participate in the protest; individuals whose prior beliefs regarding other subjects' planned participation are above the true value update their beliefs negatively in the treatment condition, and are more likely to participate in the protest. The treatment effects in both the first stage and the reduced form are statistically significant for each subsample, and they are robust to including controls for subjects' demographic characteristics and subjects' prior beliefs regarding others' planned protest participation.

In Table 5, Panel A, we present the two-stage estimates of the effects of beliefs regarding others' protest participation on one's own. For both subsamples we find a statistically significant effect of

[32] In addition to concerns regarding precisely which beliefs may be causing a change in turnout, an even greater concern is that our treatment works through channels other than changing beliefs regarding protest turnout (e.g., social learning about the protest movement); we address this concern below.

beliefs about others' participation, and the signs of the estimates indicate that protest participation is a game of strategic substitutes: more positive beliefs regarding others' participation are associated with lower protest turnout. While individuals with priors regarding planned turnout above the true value had their beliefs moved more on average, the change in protest participation associated with variation in posterior beliefs induced by the experimental treatment has very similar effects in the two subsamples: a one percentage point increase in beliefs regarding other subjects' protest participation is associated with around a one-half percentage point decrease in one's own likelihood of attending the protest. This is a large effect: a shock producing a one-standard deviation increase in posteriors (8–16 percentage points depending on the subsample) produces an estimated 3–10 percentage point reduction in individual protest turnout, between a 0.2 and 0.4 standard deviation reduction.

5 Discussion

We first discuss the internal validity of our findings, then we discuss their external validity.

5.1 Internal validity

Our experimental design largely alleviates concerns regarding correlations between unobservable subject characteristics, treatment status, and outcomes. However, one might still wonder whether the treatment — information provided regarding the true fraction of experimental subjects planning to attend the upcoming protest — specifically affected protest participation through changing beliefs about others' participation.

One particularly important concern is that information regarding other subjects' protest plans not only affects beliefs about others' participation, but also affects beliefs about the political movement itself. However, the standard social learning logic would suggest that positive updating of beliefs regarding the number of other subjects joining a protest should lead students to update *positively* about protest "quality." This would produce the appearance of strategic *complementarity*, not the strategic substitutability that we observe.

Another concern is that our results are driven by experimenter demand effects: perhaps subjects changed their behavior to conform to their perceptions of the experimenter's objectives. However, experimenter demand effects, too, would likely produce effects mimicking strategic complementarities — when the experimenter tells a subject that a behavior is more prevalent than the subject expected, the subject seems likely to assume that the experimenter is trying to induce that behavior.

In general it is difficult to construct stories that would spuriously generate our findings: confounding factors would need to systematically produce effects of the opposite sign depending on whether subjects' priors were above or below the information provided. One possibility is that

the information treatment highlighted the gap between subjects' initial expectations and information collected by the experimenter. It is possible that (two weeks after the intervention) subjects systematically misreported their protest participation in an asymmetric manner, thus producing our findings. Beyond this story being rather convoluted, we are reassured that we find evidence of strategic substitutability in the protest game even in the absence of any experimental treatment. Simply examining naturally-occurring variation in beliefs (i.e., among our control group subjects) produces the same qualitative findings as found exploiting the experimental variation. We find evidence that the protest game is one of strategic substitutes even among individuals who received no message from the experimenter regarding other subjects' participation. This strongly suggests that our finding is not an artifact of the experimental design.

5.2 External validity

It is worth emphasizing that our findings arise from a specific sample of students engaged in a particular political movement at a particular stage in its evolution. That point conceded, it is worth exploring the external validity of our findings. A first question is whether they are likely to generalize to the broader population of HKUST. Although our experimental sample is not representative of the campus population, we can re-weight our observations to match the population on gender, cohort, and department. In the Online Appendix, Table A.2, we replicate Table 5, showing reduced form, first stage, and two-stage effects of the treatment, but weighting observations to match the HKUST population. We find that our results are essentially unchanged.

A second question is whether the July 1 protest of 2016 is a representative event within Hong Kong's anti-authoritarian movement. One might wonder whether this single, smaller than expected, event produced unusual patterns of protest participation. While we do not have experimental evidence on the effects of beliefs about others' participation on one's own from other protests, we can examine descriptive evidence on reported past protest participation available from the survey conducted in Part 1 of the study. We asked subjects about their past participation in protests associated with the anti-authoritarian movement (e.g., the Umbrella Revolution protests) and correlate past participation with beliefs regarding the political views of other subjects.[33] While only suggestive, we find that subjects who participated in more past protests hold more *pessimistic* beliefs regarding others — consistent with our experimental evidence indicating that participation in protests is not driven by a belief that there will be broad participation by others (see the Online Appendix, Figure A.2 for a graphical presentation of these findings).

A third question is, to what extent is our finding of strategic substitutes in the protest decision is likely to generalize to other political movements? While we can only speculate, we will point

[33]To be precise, we collect information on participation in the Umbrella Revolution protests; in past July 1 protests, and in "other" protests. We correlate participation in each protest with subjects' beliefs regarding others' political preferences (conditioning out subjects' own political preferences to isolate the effects of beliefs about others' preferences from one's own). Further descriptive evidence on the drivers of participation in past protests is provided in Cantoni et al. (2016).

to several characteristics of the particular setting we study that may be more likely to produce a game of strategic substitutes. The Hong Kong anti-authoritarian movement is in its early stages, remains small, and is currently driven by a small core of committed participants. Such participants may be especially likely to view participation in the movement as part of their identity (Akerlof and Kranton, 2000; Benabou and Tirole, 2011), and may view participation in a smaller protest as particularly identity-reinforcing when a protest is smaller. A radical core of participants may also view participation in a smaller than expected protest as being vital to maintain a movement within a dynamic game: participants may be playing a game of strategic substitutes today hoping to generate a game of strategic complements — and a mass movement — in the future.

6 Conclusion

We conduct the first experiment to manipulate the beliefs of potential participants in an anti-authoritarian protest, finding a broad range of evidence indicating that Hong Kong students considering participating in the July 1 protest of 2016 viewed the strategic element of their decision as a game of strategic substitutes. Experimental exposure to information regarding other subjects' planned participation affects Hong Kong university students' beliefs regarding other students' actual future participation in an anti-authoritarian protest, and affects students' own protest participation. Specifically, individuals in the treatment group with prior beliefs below the truthful information provided to them updated their beliefs positively and became *less* likely to participate in the protest; individuals with prior beliefs above the truthful information provided to them updated their beliefs negatively, and became *more* likely to participate. The negative association between beliefs regarding others' participation and one's own is also seen in the naturally-occurring variation in beliefs present among control subjects in our study.

Our findings suggest several avenues for future work. An obvious one is to replicate our analysis in other settings, or even within the same setting at a different time, at a different stage of the political movement. Another is to try to better understand the mechanisms underlying the strategic substitutability that we observe. One possible mechanism is a greater ability to signal one's identity (to oneself or others) when a protest is small, but our study is unable to pin this down. A third avenue for future work is to think about the protest game as having multiple reference groups with whom one plays. Most models focus on broad levels of turnout driving individual decision making, but one might be more concerned with one's friends' turnout than the turnout of the broader population and this game might be one of strategic complements even when the game played with the broad population is one of strategic substitutes.

Our finding of strategic substitutes seems most plausible for small-scale protests occurring in the early stages of a political movement; that protests in the advanced stages of a political movement may look quite different — perhaps being games of strategic complements — suggests the need to study the political movements as dynamic processes, rather than simply as one-shot ex-

plosive events — as interesting as the latter may be.[34] We believe that scholars of political movements and protest participation would do well to devote more attention to early-stage political movements led by a committed core of activists — these may fail; or, over time they may generate events that bring about political change and even bring down authoritarian regimes.

[34]See Barbera and Jackson (2016) for a model of protests as part of a dynamic game.

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Figures and tables

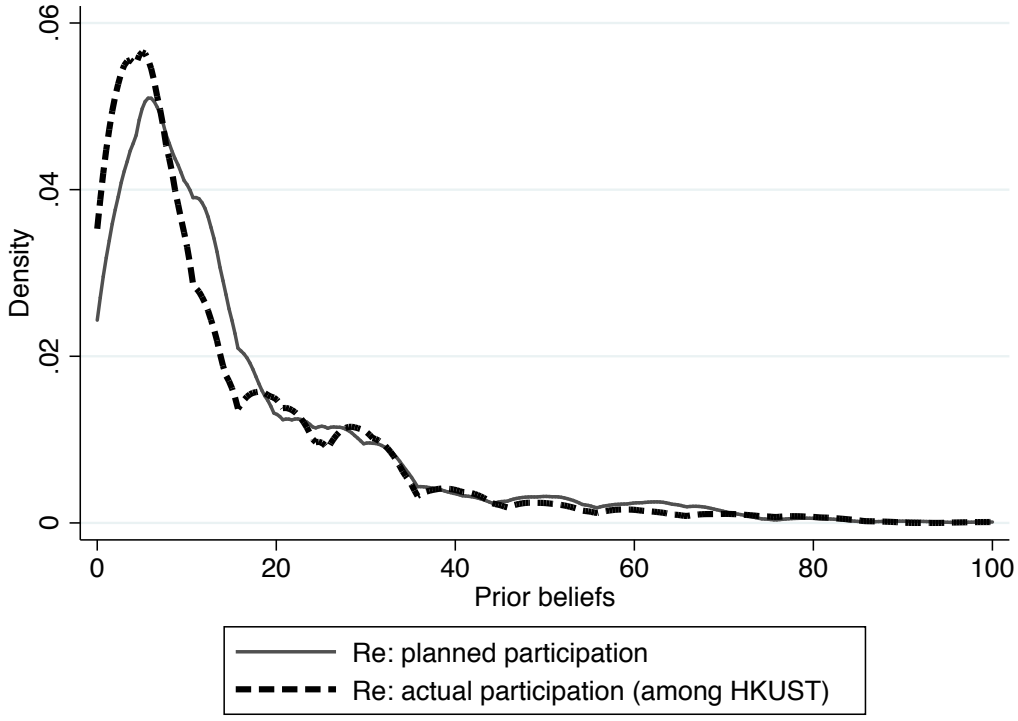

Figure 1: Distribution of prior beliefs regarding the planned protest participation and actual protest participation of HKUST survey participants.

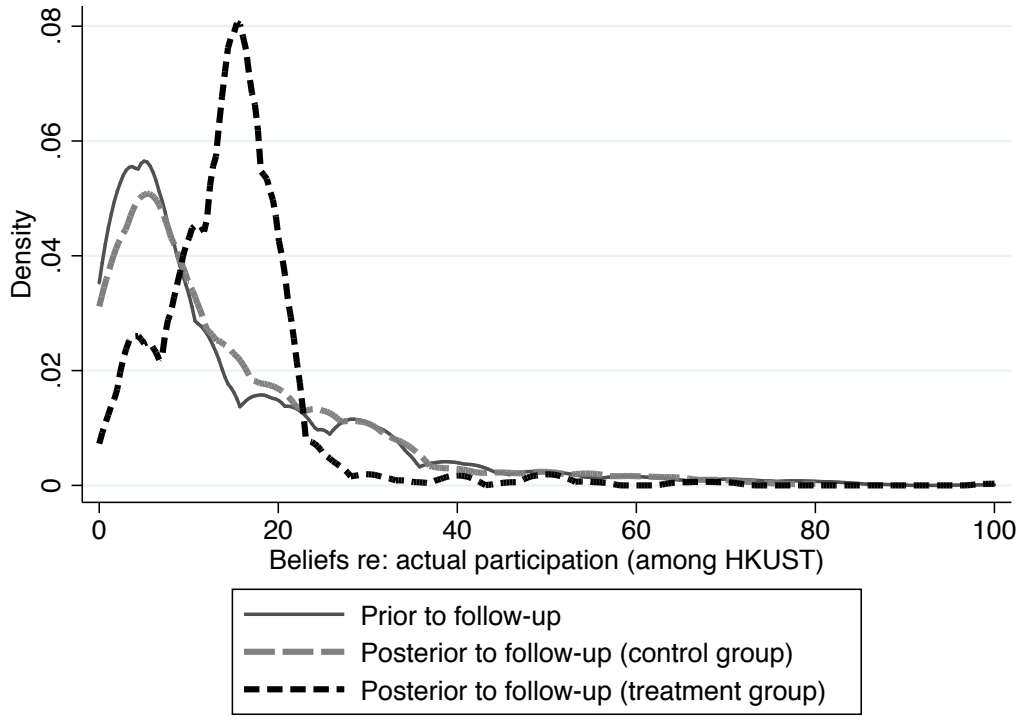

Figure 2: Distribution of prior beliefs and posterior beliefs regarding the actual protest participation of HKUST survey participants.

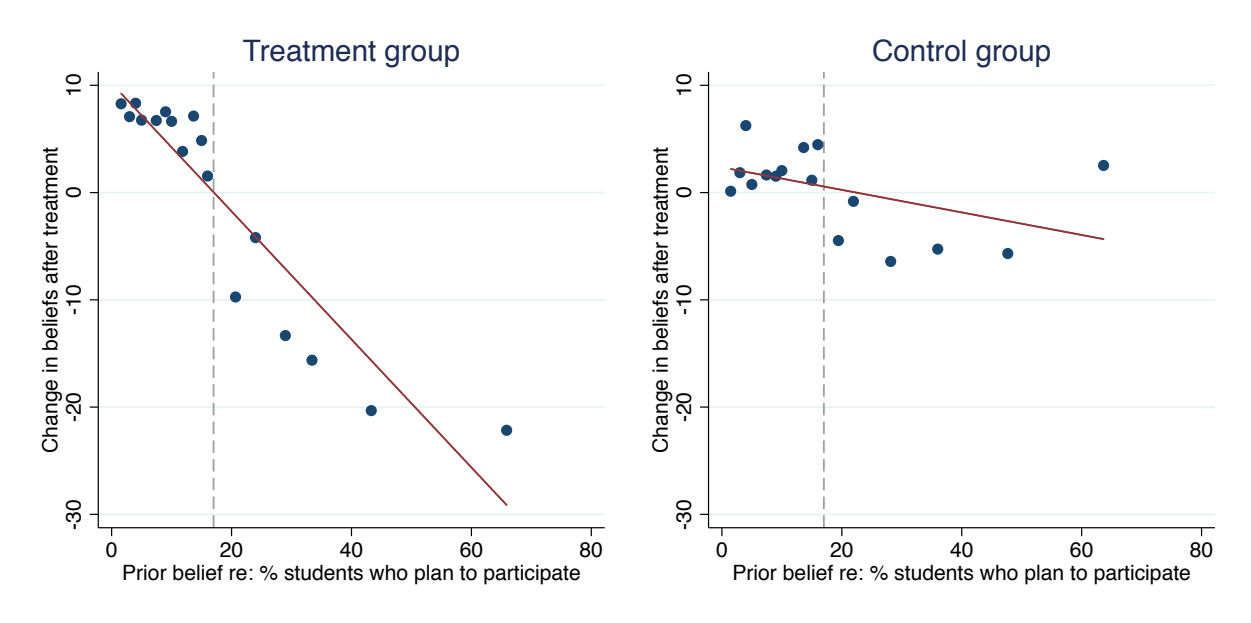

Figure 3: Changes in beliefs (posteriors minus priors) regarding the actual protest participation of HKUST survey participants, presented separately by subjects' treatment status.

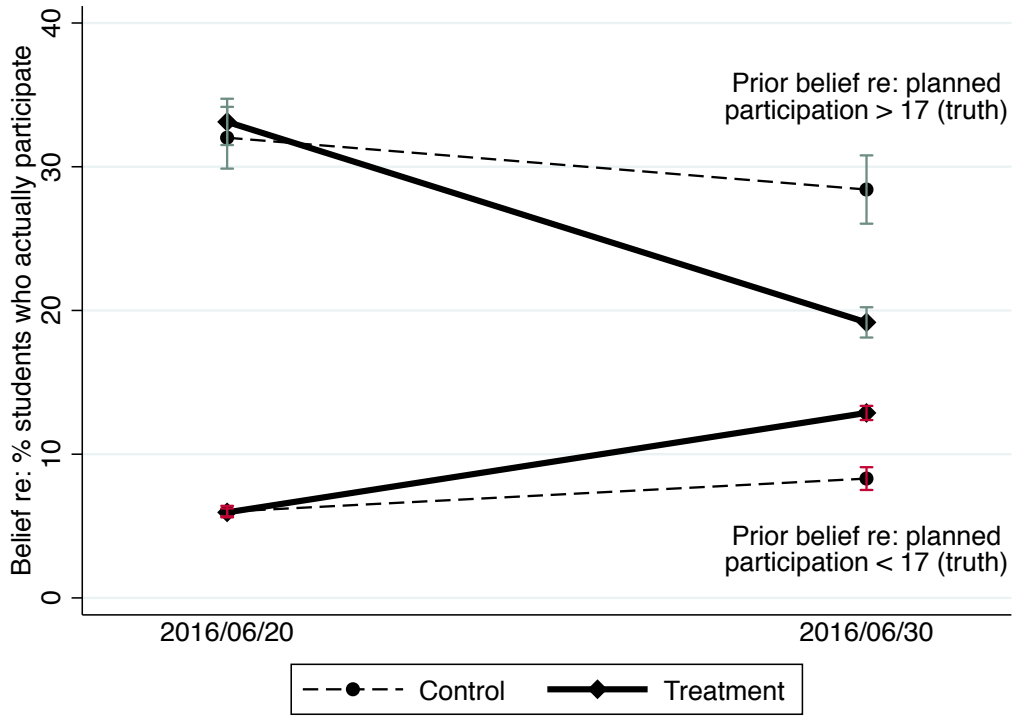

Figure 4: Treatment effect on beliefs ("first stage"). Graph shows prior and posterior beliefs regarding the actual protest participation of HKUST survey participants, split according to subjects' treatment status and according to prior beliefs. Subsamples of subjects are divided according to whether beliefs regarding the planned protest participation of HKUST survey participants were above or below the true level of 17%.

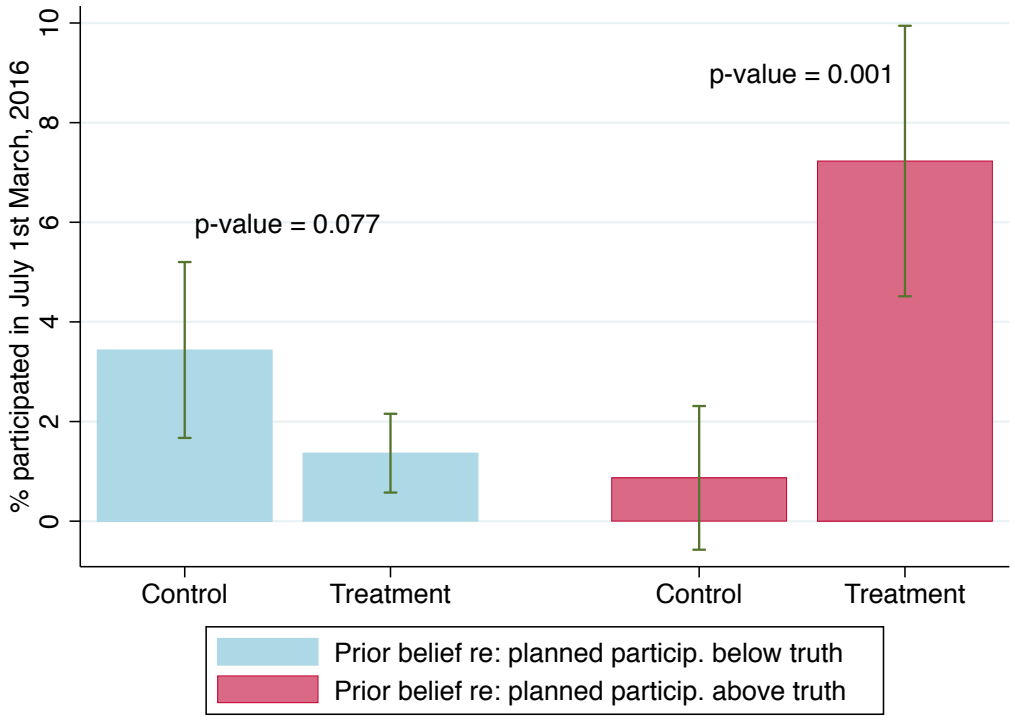

Figure 5: Treatment effect on protest participation ("reduced form"). Graph shows self-reported participation in the July 1 protest of 2016, split according to subjects' treatment status and according to prior beliefs. Subsamples of subjects are divided according to whether beliefs regarding the planned protest participation of HKUST survey participants were above or below the true level of 17%.

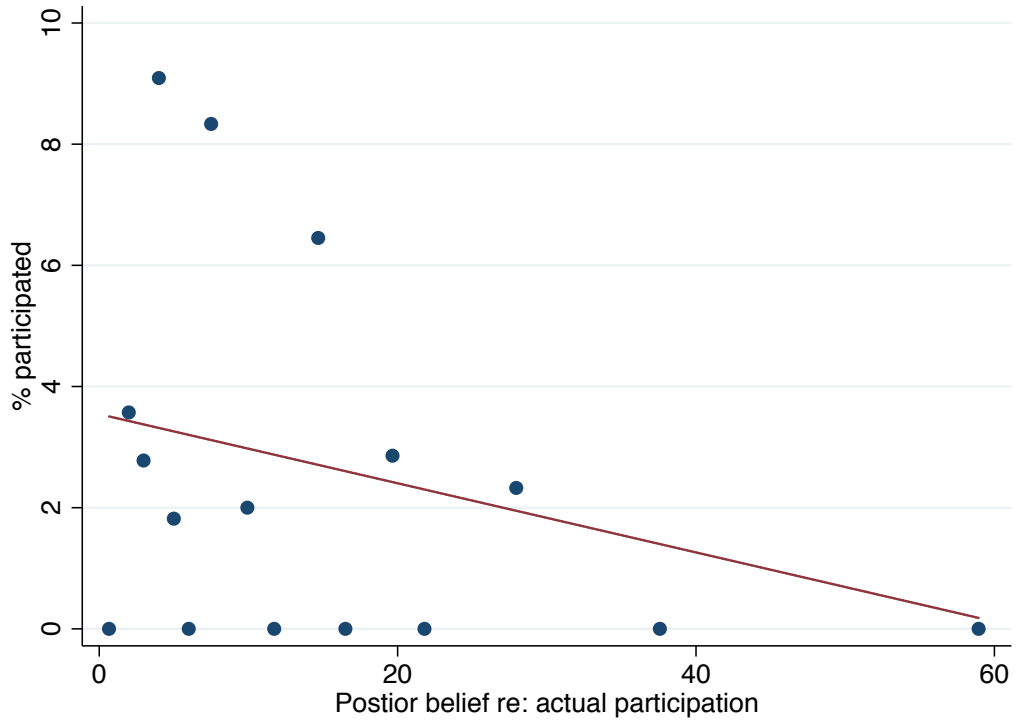

Figure 6: Binned scatter plot showing the percentage of subjects in the control group who participated in the protest against subjects' posterior beliefs regarding the actual protest participation of HKUST survey participants.

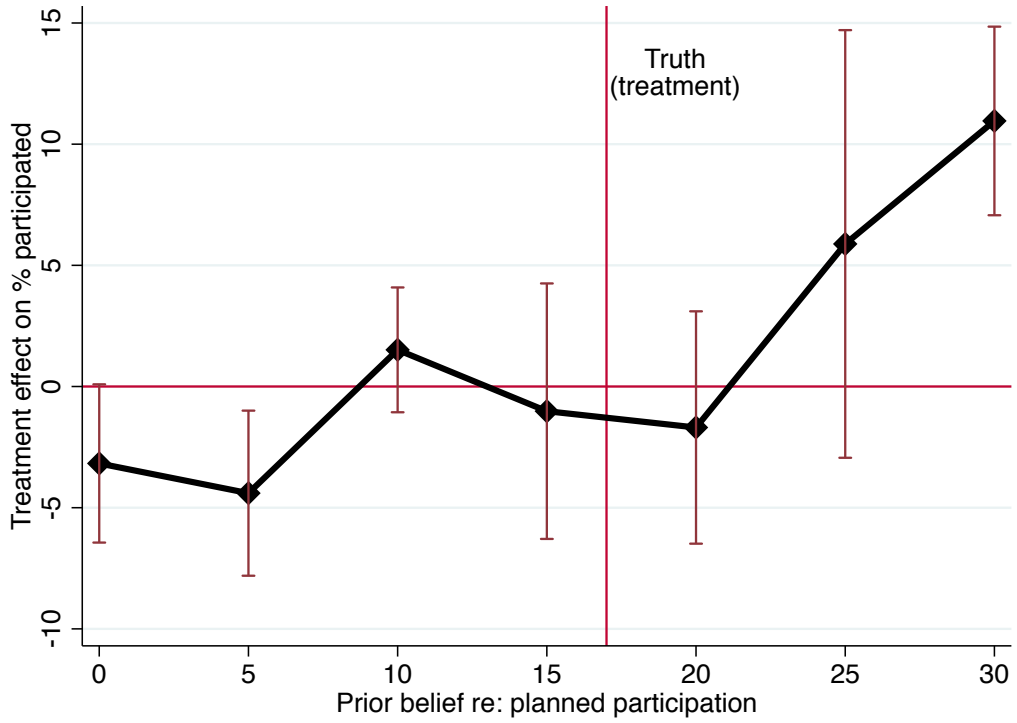

Figure 7: Treatment effect on protest participation ("reduced form"), disaggregated by prior beliefs regarding the planned participation of HKUST survey participants (bins are 5 percentage points wide).

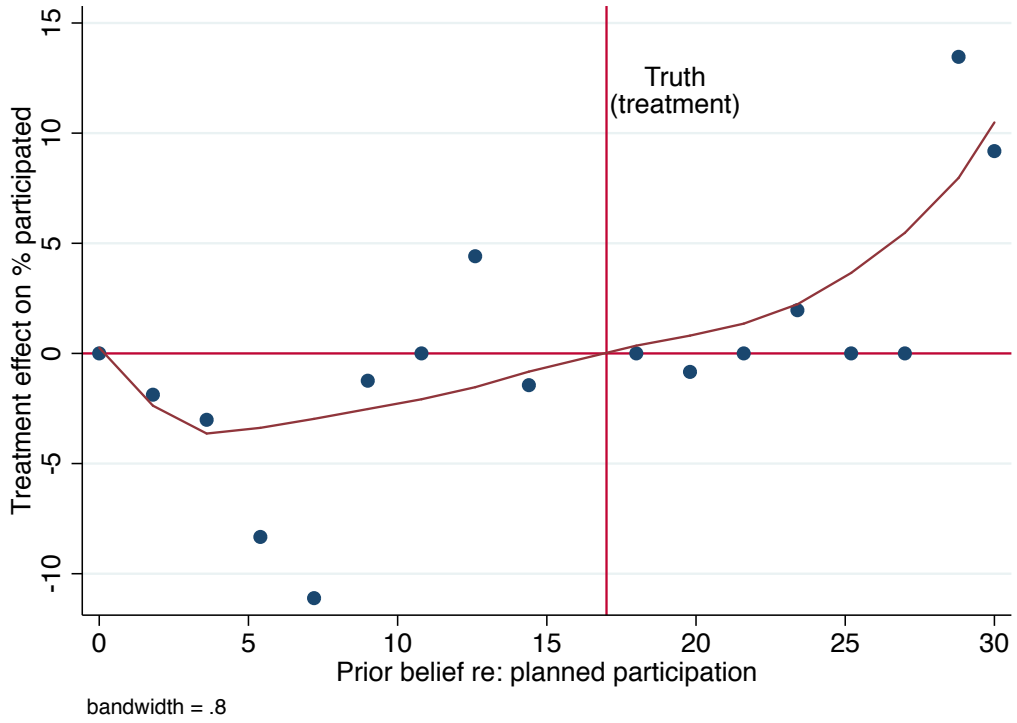

Figure 8: Non-parametric treatment effect on protest participation ("reduced form"), across prior beliefs regarding the planned participation of HKUST survey participants, smoothed using a lowess kernel at bandwidth = 0.8.

Table 1: Summary statistics

	Completed Part 1		Completed only Part 1		Completed only Parts 1 & 2		Completed Parts 1,2,3		Post-treatment attrition
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	p-value
Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Male	0.554	0.497	0.608	0.489	0.548	0.502	0.542	0.498	0.925
Birth year	1995.7	1.489	1995.8	1.554	1996.0	1.509	1995.6	1.471	0.080
Educated in English hs	0.813	0.390	0.781	0.415	0.836	0.373	0.819	0.385	0.733
HH monthly income	27247	16778	26983	16458	26278	16712	27353	16862	0.619
# apt owned in HK	0.853	0.963	0.852	1.022	0.952	0.999	0.848	0.948	0.420
Father hs above	0.286	0.452	0.256	0.437	0.322	0.471	0.290	0.454	0.593
Mother hs above	0.235	0.424	0.256	0.437	0.177	0.385	0.234	0.423	0.261
# gen. migrated to HK	2.713	0.955	2.725	0.948	2.726	0.908	2.710	0.959	0.893
Altruism (z-score)	-0.015	0.985	0.047	0.955	0.035	0.981	-0.031	0.992	0.605
Risk preferences (z-score)	-0.010	0.992	0.083	1.009	0.218	1.084	-0.042	0.982	0.062
Planned to participate in protest	17.6	38.1	17.9	38.4	16.1	37.1	17.6	38.1	0.752
Prior belief re: % others' planned particip.	16.5	16.6	19.6	19.5	17.0	15.5	15.8	15.8	0.575
Prior belief re: % others' actual particip. (HKUST)	13.8	15.4	13.8	16.3	12.9	12.7	13.9	15.3	0.554
Prior belief re: others' actual particip. (all HK)	160954	168466	171684	162499	221861	340916	155551	155879	0.125
Treatment	–	–	–	–	0.661	0.477	0.673	0.469	0.851
# of obs.	1576		273		62		1241		–

Note: Columns 1–2 show descriptive statistics for all subjects who completed at least Part 1 of the study. Columns 3–4 show descriptive statistics for subjects who completed only Part 1 of the study. Columns 5–6 show descriptive statistics for all subjects who completed Parts 1 and 2 of the study, but not Part 3. Columns 7–8 show descriptive statistics for all subjects who all three Parts of the study. Post-treatment attrition (column 9) tests for differences between columns 3 and 7 with respect to each row item, and p-value of the test is reported. "Educated in English hs" indicates whether the subjects has completed high school with English as the formal instruction language (as opposed to Chinese); "HH monthly income" is self-reported total income earned by both parents, including all other sources of income such as dividends and rents; "# apt owned in HK" indicates the number of real estate properties owned by parents/household in Hong Kong at the time of the survey; "Father hs above" and "mother hs above" indicate father and mother's highest educational attainment being above high school, respectively; "Altruism" and "risk preferences" are z-score indices constructed from all questions from the corresponding modules of the fundamental preference survey questions, weighted by the inverse covariance of the standardized outcomes, computed following Anderson (2008).

Table 2: Balance check

	All			Prior belief on planned particip. below truth			Prior belief on planned particip. above truth		
	Control mean	Treatment mean	p-value	Control mean	Treatment mean	p-value	Control mean	Treatment mean	p-value
Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Male	0.557	0.535	0.480	0.567	0.522	0.210	0.530	0.566	0.524
Birth year	1995.6	1995.6	0.969	1995.8	1995.7	0.406	1995.4	1995.6	0.160
Educated in English hs	0.827	0.816	0.650	0.812	0.814	0.951	0.865	0.822	0.310
HH monthly income	28336	26875	0.152	28191	27296	0.461	28702	25886	0.137
# apt owned in HK	0.832	0.856	0.678	0.824	0.866	0.543	0.851	0.831	0.846
Father hs above	0.288	0.291	0.918	0.289	0.290	0.965	0.287	0.293	0.904
Mother hs above	0.256	0.223	0.192	0.261	0.222	0.196	0.243	0.225	0.697
# gen. migrated to HK	2.672	2.728	0.337	2.691	2.713	0.744	2.626	2.763	0.203
Altruism (z-score)	0.059	-0.074	0.026	0.084	-0.108	0.008	-0.003	0.004	0.949
Risk preferences (z-score)	-0.025	-0.051	0.663	-0.005	-0.082	0.280	-0.076	0.024	0.346
Planned to participate in protest	16.8	17.8	0.791	13.7	14.2	0.867	24.8	26.5	0.785
Prior belief re: % others' planned particip.	15.7	15.9	0.903	7.8	7.6	0.530	35.9	35.4	0.761
Prior belief re: % others' actual particip. (HKUST)	13.5	14.1	0.508	6.0	5.9	0.750	32.3	33.3	0.583
Prior belief re: others' actual particip. (all HK)	159226	153764	0.563	144972	140686	0.691	195294	184542	0.563
# of obs.	406	835		291	586		115	249	

Note: Table tests for balance on observable characteristics (treatment versus control) for: the full sample (columns 1–3); for the subsample of subjects whose priors regarding others' planned participation was below the true value of 17% (columns 4–6); and, for the subsample of subjects whose priors regarding others' planned participation was above the true value of 17% (columns 7–9). "Educated in English hs" indicates whether the subjects has completed high school with English as the formal instruction language (as opposed to Chinese); "HH monthly income" is self-reported total income earned by both parents, including all other sources of income such as dividends and rents; "# apt owned in HK" indicates the number of real estate properties owned by parents/household in Hong Kong at the time of the survey; "Father hs above" and "mother hs above" indicate father and mother's highest educational attainment being above high school, respectively; "Altruism" and "risk preferences" are z-score indices constructed from all questions from the corresponding modules of the fundamental preference survey questions, weighted by the inverse covariance of the standardized outcomes, computed following Anderson (2008).

Table 3: Item count experiments: willingness to respond to direct questions

Attitudes:	"Yes" in direct question	Δ when veil is provided
Unfavorable view of CCP	0.923	0.020
		[0.059]
Consider self as Hong Kongese	0.879	-0.063
		[0.051]
Support for HK independence	0.465	0.054
		[0.057]
Support violence in pursuit of HK's political rights	0.217	0.169***
		[0.050]

Note: The left hand column presents the fraction of 790 Hong Kong local students who expressed the corresponding attitude in response to a direct question. The right hand column presents the difference between that fraction and the fraction estimated to support the attitude using an item count technique ("list experiment"). The 790 students asked the direct questions also represent the control group for the list experiment; the remaining 786 Hong Kong local students represent the treatment group. Assignment to "direct question" and "list experiment" conditions was random.

Table 4: Treatment effect on posterior beliefs

Sample:	Change in beliefs on % participation among HKUST students			Change in belief on total # participation among HK population		
	Prior *below* truth	Prior *above* truth	All subjects	Prior *below* truth	Prior *above* truth	All subjects
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: *without controls*						
Treatment	4.496***	-10.187***		14644.7	-5120.5	
	[0.552]	[1.611]		[7195.7]	[15009.1]	
Treatment *(direction adj.)*			9.831***			11337.7***
			[0.491]			[3656.6]
Panel B: *controls for demographic characteristics and prior beliefs*						
Treatment	4.699***	-11.687***		16991.1	-9360.7	
	[0.544]	[1.629]		[7200.0]	[25788.4]	
Treatment *(direction adj.)*			6.945***			9303.0**
			[0.542]			[4769.7]
Observations	873	361	1234	873	361	1234
DV mean (control grp.)	2.417	-3.805	0.664	-17912.3	-19518.5	-18364.9
DV std. dev. (control grp.)	7.744	13.01	9.914	102207	144307	115441
DV mean (all)	5.430	-10.80	0.681	-8098.8	-23036.2	-12468.7
DV std. dev. (all)	7.874	16.19	13.23	97847	116412	103798

Note: Table shows first stage effects: the effects of the experimental treatment on subjects' changes in beliefs regarding others' actual protest participation (posteriors minus priors). Columns 1–3, show effects on posterior beliefs regarding other experimental subjects' actual participation, while Columns 4–6 show effects on posterior beliefs regarding the total turnout at the protest by all Hong Kong citizens. Columns 1 and 4 show effects on posterior beliefs for the subsample of subjects whose priors regarding others' planned participation were below the true value of 17%; columns 2 and 5 show effects on posterior beliefs for the subsample of subjects whose priors regarding others' planned participation were above the true value of 17%. In columns 3 and 6, all subjects are pooled and treatment is coded as "-1" for subjects whose priors regarding others' planned participation was above 17%. Panel A is estimated without any controls; Panel B replicates the analysis in Panel A, but adds controls for subjects' demographic characteristics and for the levels of subjects' prior beliefs.

Table 5: Treatment effect on protest participation

Sample:	Participated in 2016 July 1st March			
	Prior belief re: planned particip. *below* truth		Prior belief re: planned particip. *above* truth	
	(1)	(2)	(3)	(4)
Panel A: *two-stage least squares*				
Change in belief	-0.468**	-0.422*	-0.626***	-0.591***
	[0.234]	[0.228]	[0.248]	[0.219]
Panel B: *1st stage on changes in belief*				
Treatment	4.496***	4.699***	-10.19***	-11.69***
	[0.546]	[0.554]	[1.760]	[1.762]
Adj. R^2	0.071	0.073	0.083	0.160
Panel C: *reduced form*				
Treatment	-2.071*	-1.959*	6.359***	6.851***
	[1.172]]	[1.219]	[1.860]	[2.036]
Observations	877	857	364	349
Control for demographics	No	Yes	No	Yes
Control for prior beliefs	No	Yes	No	Yes
1st stage DV mean (control grp.)	2.417	2.417	-3.805	-3.805
1st stage DV mean (control grp.)	7.744	7.744	13.01	13.01
1st stage DV mean (all)	5.430	5.430	-10.80	-10.80
1st stage DV mean (all)	7.874	7.874	16.19	16.19
2nd stage DV mean (control grp.)	3.436	3.436	0.870	0.870
2nd stage DV std. dev. (control grp.)	18.25	18.25	9.33	9.33
2nd stage DV mean (all)	2.052	2.052	5.220	5.220
2nd stage DV std. dev. (all)	14.19	14.19	22.27	22.27

Note: Table shows reduced form effects (Panel C); first stage effects (Panel B); and, two-stage effects (Panel A). The reduced form effects are estimated effects of the experimental treatment on subjects' own protest participation. The first stage effects are the estimated effects of the experimental treatment on subjects' changes in beliefs regarding other subjects' actual protest participation (posteriors minus priors). The two-stage estimates exploit variation in beliefs regarding other subjects' participation induced by the experimental treatment to estimate the effect of beliefs about others' protest turnout on one's own turnout. Columns 1–2 show effects on posterior beliefs regarding other experimental subjects' actual participation and on one's own protest turnout for the subsample of subjects whose priors regarding others' planned participation were below the true value of 17%. Columns 3–4 show effects on posterior beliefs regarding other experimental subjects' actual participation and on one's own protest turnout for the subsample of subjects whose priors regarding others' planned participation were above the true value of 17%. Columns 1 and 3 are estimated without any controls; columns 2 and 4 add controls for subjects' demographic characteristics and for the levels of subjects' prior beliefs.

ONLINE APPENDIX, NOT FOR PUBLICATION

Appendix A Experimental design transcript

A.1 Pre-protest module (Part 2)

Version A: Control Group

[Screen 1]
Welcome screen: thank you for participating in this follow-up survey.

[Screen 2]
Remember that we offered you:

1. A HKD 10 bonus payment for accurately guessing the percentage of HKUST survey participants who would actually attend this July 1 March (七一遊行);
2. An additional HKD 10 bonus payment for accurately guessing the total number of Hong Kong citizens would actually attend this July 1 March (七一遊行).

In last week's survey, you guessed that:

1. *[embedded individual value]* % of HKUST survey participants would attend this July 1 March;
2. A total of *[embedded individual value]* Hong Kong citizens would attend this July 1 March.

Perhaps since then your views have changed.

We now ask you again to provide guesses about actual attendance of the July 1 March.
Instead of your guesses in the previous survey, we will use today's guesses to determine your bonus payment.

1. How many people in total do you think will *participate* in the July 1st March (七一大遊行) in *2016*?
   - If your guess is within *10%* of what will be reported by the *HKUPOP* (香港大學民意研究計劃) after the July 1st March in 2016, then you will earn a bonus payment of HKD 10.
   - To give you a sense, according to HKUPOP's report, among the July 1st March that took place between 2003 and 2015:
     - The lowest attendance in a given year is: 17,000 (in 2008);
     - The highest attendance in a given year is: 462,000 (in 2003).

   [Slider bar, ranging from 0 to 1,000,000]

2. Please guess what percentage of the participants from HKUST of this study will *participate* in the July 1st March (七一大遊行) in *2016*?
   - If your guess is within 2 percentage points of the percent of students who actually participate, you will earn a bonus payment of HKD 10.

   _____ %
   [Fill in the number: between 0-100]

[Screen 3]
You have now finished the follow-up survey module.

Thank you very much for your participation. We will inform you about the total payment you have earned from last week and today's surveys – the payment will be deposited to your bank account via the *HKUST Student Information System (SIS)*.

We will also inform you about future study opportunities, and we look forward to seeing you again soon!

Feel free to contact us at jzproject@ust.hk if you have questions and/or concerns regarding this study.

Version B: Treatment Group

[Screen 1]
Welcome screen: thank you for participating in this follow-up survey.

[Screen 2]
In this follow-up survey, we wish to update you on your fellow HKUST survey participants' planned participation in this year's July 1 March (七一遊行).

Recall that you guessed that *[embedded individual value]* % of HKUST survey participants would plan to attend the July 1 March.

Based on last week's survey, the true percentage of survey participants who plan to attend the July 1 March is 17%.

Remember that we offered you:

1. A HKD 10 bonus payment for accurately guessing the percentage of HKUST survey participants who would actually attend this July 1 March (七一遊行);
2. An additional HKD 10 bonus payment for accurately guessing the total number of Hong Kong citizens would actually attend this July 1 March (七一遊行).

In last week's survey, you guessed that:

1. *[embedded individual value]* % of HKUST survey participants would attend this July 1 March;
2. A total of *[embedded individual value]* Hong Kong citizens would attend this July 1 March.

Perhaps since then your views have changed.

We now ask you again to provide guesses about actual attendance of the July 1 March.

1. How many people in total do you think will *participate* in the July 1st March (七一大遊行) in *2016*?
   - If your guess is within *10%* of what will be reported by the *HKUPOP* (香港大學民意研究計劃) after the July 1st March in 2016, then you will earn a bonus payment of HKD 10.
   - To give you a sense, according to HKUPOP's report, among the July 1st March that took place between 2003 and 2015:
     - The lowest attendance in a given year is: 17,000 (in 2008);
     - The highest attendance in a given year is: 462,000 (in 2003).

   [Slider bar, ranging from 0 to 1,000,000]

2. Please guess what percentage of the participants from HKUST of this study will *participate* in the July 1st March (七一大遊行) in *2016*?
   - If your guess is within 2 percentage points of the percent of students who actually participate, you will earn a bonus payment of HKD 10.

   _____ %
   [Fill in the number: between 0-100]

[Screen 3]
You have now finished the follow-up survey module.

Thank you very much for your participation. We will inform you about the total payment you have earned from last week and today's surveys – the payment will be deposited to your bank account via the *HKUST Student Information System (SIS)*.

We will also inform you about future study opportunities, and we look forward to seeing you again soon!

Feel free to contact us at jzproject@ust.hk if you have questions and/or concerns regarding this study.

A.2 Post-protest module (Part 3)

[Screen 1]
Welcome screen: thank you for participating in this follow-up survey.

[Screen 2]

1. Did you attend the July 1 2016 March?

   {IF "NO", skip to Q3.}

2. Which political group's crowd did you join during the March?
   (please choose all that apply)

   公民黨 Civic Party
   民主黨 Democratic Party
   人民力量 People Power
   工黨 Labour Party
   社民連 League of Social Democrats
   街工 Neighbourhood and Worker Service Centre
   新民主同盟 Neo Democrats
   青年新政 Youngspiration
   香港眾志 Demosisto
   熱血公民 Civic Passion
   本土民主前線 Hong Kong Indigenous

   科大學生會 HKUST Student Union
   科大行動 ProgressUST
   學聯 HKFS

   普羅政治學院 Proletariat Political Institute
   香港花生 HKpeanut
   D100 民間電台 D100 Radio
   職工盟 Hong Kong Confederation of Trade Unions
   雷動計劃 ThunderGo
   小麗民主教室 Siu Lai Democracy Groundwork
   土地正義聯盟 Land Justice League
   法輪功 Falun Gong
   大陸朱 Chu Siu-hung
   爭取全民退休保障聯席 Alliance for Universal Pension
   懇請政府重訂屋宇飼養犬隻條例聯盟 Give Dogs a Home
   旺角鳩鳴團 Mong Kok Shopping Revolution

良心之友 Friends of Conscience
撐傘落區 Umbrella Blossom
其他 Others

3. What was your general impression of the March (300 words or less)?

   {Open-ended}

4. Recall that in the previous survey rounds, we asked about your friends at HKUST. To the best of your knowledge, how many of the friends you named (listed below) attended?

   {Multiple round}

[Screen 3]
So far, you have earned: HKD {*inserted individual payment value*} in total from participating in our study.

The payment will be ***deposited directly to your bank account*** via the ***HKUST Student Information System (SIS)***, in approximately 5-8 weeks.

Feel free to contact us at jzproject@ust.hk if you have questions and/or concerns regarding this study.

Appendix B Appendix figures and tables

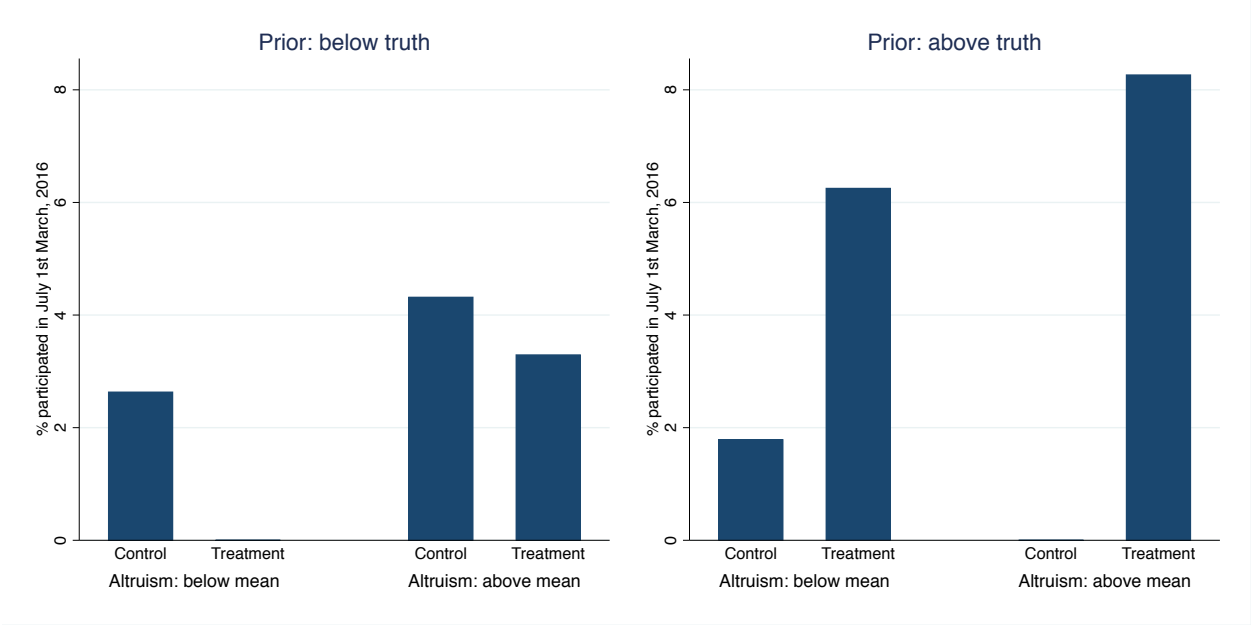

Figure A.1: Heterogeneous treatment effect on protest participation ("reduced form"), split by whether altruism (a z-score index constructed using questions from Part 1 of the study) is above or below the mean level.

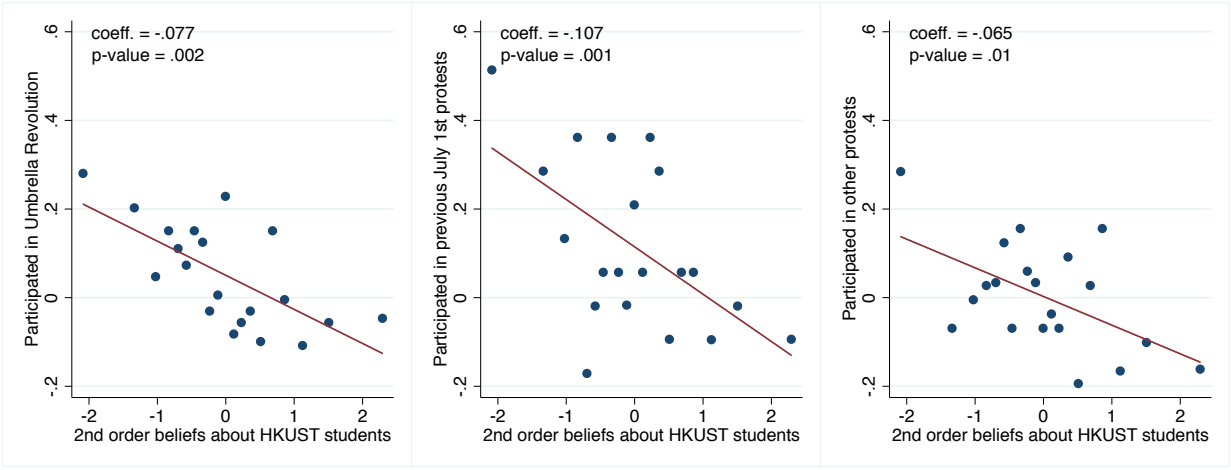

Figure A.2: Binned scatter plots predicting protest participation (standardized) using beliefs about other HKUST students (z-score indices constructed using questions from Part 1 of the study)/ Beliefs about other subjects are residuals, conditional on one's own reported attitudes on the relevant dimension.

Table A.1: Sample representativeness

	Population ratio	Sample ratio	T-test p-value
	(1)	(2)	(3)
Male	0.630	0.543	0.000
Entering cohort of 2012	0.410	0.225	0.000
Entering cohort of 2013	0.210	0.228	0.109
Entering cohort of 2014	0.203	0.246	0.000
Entering cohort of 2015	0.177	0.301	0.000
School of Engineering	0.358	0.328	0.017
School of Sciences	0.224	0.237	0.258
School of Business and Management	0.356	0.364	0.524
School of Humanities and Social Sciences	0.023	0.027	0.355
Interdisciplinary Programs	0.039	0.036	0.531

Note: The source for the population ratio is a HKUST undergraduate student profile compiled by the HKUST Student Affairs Office. The sample ratio is calculated for students who completed Parts 1, 2, and 3 of the study. Column 3 presents p-values from t-tests of whether the population proportion equals the sample proportion.

Table A.2: Robustness – re-weighting the sample

Sample:	Participated in 2016 July 1st March			
	Prior belief re: planned particip. *below* truth		Prior belief re: planned particip. *above* truth	
	(1)	(2)	(3)	(4)
Panel A: *two-stage least squares*				
Change in belief	-0.468**	-0.447**	-0.626***	-0.519**
	[0.234]	[0.225]	[0.248]	[0.233]
Panel B: *1st stage on changes in belief*				
Treatment	4.496***	4.510***	-10.19***	-10.17***
	[0.546]	[0.561]	[1.760]	[1.848]
Adj. R^2	0.071	0.068	0.083	0.075
Panel C: *reduced form*				
Treatment	-2.071*	-1.982*	6.359***	5.269***
	[1.172]]	[1.165]	[1.860]	[1.634]
Observations	877	873	364	361
Reweighted	No	Yes	No	Yes
1st stage DV mean (control grp.)	2.274	2.274	-3.626	-3.626
1st stage DV mean (control grp.)	7.995	7.995	13.22	13.22
1st stage DV mean (all)	5.319	5.319	-10.84	-10.84
1st stage DV mean (all)	8.043	8.043	16.57	16.57
2nd stage DV mean (control grp.)	3.222	3.222	0.712	0.712
2nd stage DV std. dev. (control grp.)	17.69	17.69	8.44	8.44
2nd stage DV mean (all)	1.888	1.888	4.433	4.433
2nd stage DV std. dev. (all)	13.62	13.62	20.61	20.61

Note: This table replicates the analyses presented in Table 5 in the main text, but re-weighting the observations in the experimental sample to match the HKUST student population on gender, cohort, and the school of study within the university.

Table A.3: Predictors of planned participation & prior beliefs

	Plan to participate in protest		Belief on % students planned to participate	
	beta	s.e.	beta	s.e.
	(1)	(2)	(3)	(4)
A: Anti-authoritarian attitudes				
A.1: Support for democracy	0.060***	[0.009]	-0.414	[0.453]
A.2: Support for HK independence	0.049***	[0.010]	0.240	[0.458]
A.3: HK identity (self-reported)	0.045***	[0.011]	0.557	[0.490]
A.4: Unhappiness with political status quo	0.043***	[0.010]	0.399	[0.470]
A.5: Anti-CCP views on current events	0.044***	[0.009]	-0.889**	[0.440]
A.6: Aggressive pursuit of political rights	0.057***	[0.010]	-0.271	[0.422]
B: Anti-authoritarian behaviors				
B.1: Participated in Umbrella Revolution	0.157***	[0.020]	1.282	[0.861]
B.2: Vote for pro-democracy party	0.018	[0.024]	-0.053	[1.051]
B.3: Plan to participate in July 1st protest	–	–	7.216***	[1.327]
B.4: HK identity (revealed in identity game)	0.023**	[0.010]	0.478	[0.438]
B.5: Donation to Demosisto	0.123***	[0.033]	2.720**	[1.351]
C: Economic preferences				
C.1: Risk tolerance	0.033***	[0.009]	0.408	[0.409]
C.2: Patience	-0.002	[0.009]	-0.777*	[0.460]
C.3: Altruism	0.034***	[0.009]	0.405	[0.440]
C.4: Reciprocity	0.029***	[0.011]	0.200	[0.421]
C.5: Preference for redistribution	0.006	[0.010]	0.319	[0.395]
D: Personality traits				
D.1: Big 5 - openness	0.013	[0.010]	0.711	[0.424]
D.2: Big 5 - agreeableness	0.011	[0.009]	0.578	[0.403]
D.3: Big 5 - conscientiousness	0.002	[0.010]	-0.374	[0.419]
D.4: Big 5 - neuroticism	-0.023**	[0.010]	0.139	[0.411]
D.5: Big 5 - extraversion	0.013	[0.009]	0.611	[0.391]
E: Cognitive ability				
E.1: Cognitive reflection test	-0.014	[0.009]	-0.171	[0.431]
E.2: University GPA	-0.035***	[0.010]	-0.677	[0.423]
F: Economic status				
F.1: HH economic & social status	-0.009	[0.010]	0.005	[0.411]
F.2: Own projected economic status	-0.003	[0.010]	-0.509	[0.404]
G: Background characteristics				
G.1: Gender	0.033*	[0.019]	0.761	[0.834]
G.2: Birth year	0.003	[0.007]	-0.766***	[0.297]
G.3: HK-oriented childhood env.	0.016	[0.010]	0.139	[0.439]
G.4: Non-religious	0.041*	[0.022]	-0.147	[1.001]
H: Beliefs about politics				
H.1: Beliefs about future institutions	0.006	[0.010]	-0.098	[0.419]
H.2: Beliefs about protest efficacy	0.017*	[0.010]	0.694*	[0.420]

Continued on next page

	Plan to participate in protest		Belief on % students planned to participate	
	beta	s.e.	beta	s.e.
	(1)	(2)	(3)	(4)
I: Beliefs about HKUST students				
I.1: Support for democracy	-0.027***	[0.010]	0.174	[0.448]
I.2: Support for HK independence	-0.019**	[0.010]	0.432	[0.417]
I.3: HK identity	-0.019*	[0.010]	0.061	[0.437]
I.4: Unhappiness with political status quo	-0.019*	[0.010]	0.082	[0.441]
I.5: Aggressive pursuit of political rights	-0.014	[0.010]	0.993**	[0.406]
J: Social life				
J.1: Political social network	0.059***	[0.010]	0.674	[0.430]
J.2: Sociability	-0.010	[0.010]	-0.593	[0.436]
K: Beliefs about close friends				
K.1: Support for democracy	-0.016	[0.010]	0.246	[0.456]
K.2: Support for HK independence	-0.006	[0.010]	0.132	[0.447]
K.3: HK identity	-0.017*	[0.010]	0.275	[0.471]
K.4: Unhappiness with political status quo	0.008	[0.010]	0.099	[0.466]
K.5: Aggressive pursuit of political rights	0.001	[0.010]	1.052**	[0.462]
L: Media consumption				
L.1: Frequency of news consumption	0.013	[0.009]	-0.046	[0.395]
L.2: Pro-democratic source of media	0.021**	[0.010]	-0.040	[0.476]
M: Political interest and knowledge				
M.1: Political interest	0.065***	[0.009]	-0.200	[0.415]
M.2: Political knowledge	0.007	[0.010]	-1.158***	[0.426]

Note: Table shows the predictors of planned participation and of prior beliefs regarding other survey participants' planned participation. Subjects' own plans, their priors, and the individual characteristics considered as explanatory variables were all elicited in Part 1 of the study.