

A Moral Analysis of Effective Prediction Markets on Terrorism

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Abstract

Predicting terrorist attacks with prediction markets has been accused of being immoral. While some of these concerns are about the likely effectiveness of prediction markets on terrorism (PMsoT), this paper discusses the three main reasons why even *effective* prediction markets on terrorism might be considered immoral. We argue that these three reasons establish only that PMsoT cause offense and/or fleeting mild harm, and that, even taken together, they do not constitute serious harm. The moral issues considered are that PMsoT: 1) create character-affecting perverse incentives, 2) desensitise society to tragic events, and 3) disrespect important ideals. In addition to arguing against the force of these three potential moral problems, it is also argued that societies and governments already endorse intelligence-gathering methods that are clearly more immoral than PMsoT in the relevant respects. We also argue that some circumstances require governments to cause non-serious harm to some people in order to protect and promote the rights and welfare of its citizens. We conclude that a government's obligation to protect and promote the rights and welfare of its citizens outweighs the non-serious harm that could be caused by effective PMsoT. As a result, we recommend that the likelihood of PMsoT being effective is investigated more closely.

Keywords: prediction markets, terrorism, ethics, prediction markets on terrorism, Policy Analysis Market

1. Introduction

Major terrorist attacks can have devastating effects on infrastructure, economies, and, most importantly, human life. Modern developments in communications and weapons technologies have supported access by non-state actors to destructive weapons (Shubik, 1997), enabling major terrorist attacks, such as 9/11, the 2002 Bali bombings, and the 2005 London Underground bombings. More recently, the Boston Marathon bombing has acted as a reminder of the continuing threat posed by terrorism. Regardless of the scale, in most cases of terrorism, intelligence agencies fail to identify key information that was available prior to the attack and could have aided in preventing it (Negroponte & Wittenstein, 2010). What more can governments—who already spend billions on national security—do to help prevent terrorist attacks?

One option available to governments is to set up prediction markets on terrorist attacks. Prediction markets (PMs) are marketplaces in which traders can trade shares in predictions of real-world outcomes, such as political, economic, or social events (Weijers, 2013). For example, a prediction market may allow a trader to buy or sell shares in the prediction that ‘A Republican candidate will win the 2016 US presidential election.’ The PM will then pay out a set amount, say \$1, for each share held by a trader if that prediction is realised, and \$0 for each share held in an outcome which is not realised. The share price represents an aggregate of investor’s perceived likelihood of the prediction being realised, such that if the share price was 55c in a prediction that paid \$1 per realised prediction, the aggregate perceived likelihood of the prediction being realised would be 55%.

In the wake of 9/11, the Defense Advanced Research Projects Agency proposed such a solution in the form of the Policy Analysis Market (PAM) (Hanson, 2007). PAM was intended to operate as a public market in which traders could invest real money on

political and economic variables, such as US GDP, as well as specific events, such as assassinations and military attacks.ⁱ DARPA's interest in prediction markets followed the success of the Iowa Electronic Markets, which were launched in 1988 and had been more accurate than traditional forecasting methods, such as polls, in predicting the outcomes of national elections (Berg, Nelson, & Rietz, 2008). However, the reliability of prediction markets as an anti-terrorism intelligence-gathering tool remains unknown. Building up to the trial of PAM, Senators Byron Dorgan and Ron Wyden heard about the project and publicly decried it as "horribly offensive" and a "federal betting parlour on atrocities and terrorism" (Wyden & Dorgan, 2003, no page). As a result, the program was shut down two days later. The comments made by Dorgan and Wyden brought PAM to the attention of politicians and the media, and the repugnance expressed by these groups about PAM has been widely identified as the main justification for the withdrawal of PAM's funding.ⁱⁱ

Why was this kind of market, and these sorts of transactions, thought to be so repugnant? Much of the initial reaction consisted of claims that the program *just was* "morally wrong," "disgusting," "offensive," "grotesque," "very sick," and "morally reprehensible."ⁱⁱⁱ However, some justifications were given. Robin Hanson (2006)—an economist involved in the development of PAM—has identified three main concerns: first, that PAM would rely on citizens who, due to their lack of training, would be unable to competently undertake or supplement the work of trained intelligence officials; second, that terrorists could mislead intelligence agencies through the market; and third, that terrorists would be able to profit from the market.

The first concern is an important one. Public spending decisions should not be taken lightly, and \$1m had been allocated specifically for PAM – a project which would rely on untrained, ordinary civilians to predict terrorist attacks. In addressing this

concern, it is important to note the research that points towards potential for PAM to be effective at intelligence-gathering. While it may seem counterintuitive that a group of non-experts could make a better prediction than an individual expert or a group of experts, the benefits of collective intelligence and the accuracy of prediction markets have been well-documented.^{iv} For example, Wolfers and Zitzewitz (2004, p. 1) note that PMs have out-performed “moderately sophisticated benchmarks” in several domains, including domestic politics, the success of forthcoming movies, and sales of consumer goods. They also report on how a prediction market on whether Saddam Hussein would be ousted as leader of Iraq was a comparably effective predictor (compared to expert opinions and oil prices) of whether the United states would go to war with Iraq. Several authors have argued that PMs success in these areas makes it seem likely that prediction markets on terrorism (PMsoT) could also be successful (e.g., Hanson, 2006; Looney, 2004; Surowiecki, 2004; Yeh, 2006). Furthermore, PAM was only ever intended to supplement traditional intelligence gathering services, rather than replace them (Hanson, 2006). If PAM proved to be an effective method of collecting intelligence, it is likely that this entirely new method of intelligence gathering would reap greater rewards than investing the same funds into existing programs (which would be like adding one more drop of water to a paddling pool).

The latter two concerns identified by Hanson definitely represent serious moral problems; however, how problematic they are hinges primarily on pragmatic concerns that could be eliminated by market design. Hanson (2006) argued that the right combination of strong market mechanisms and limitations could circumvent these concerns and that *effective* PMsoT would: elicit useful information that extant intelligence-gathering methods might not (or elicit the same information more quickly), be immune to manipulation, and enable the thwarting and possible capture of terrorists

(Pennock, 2004). The potential for PMsoT to effectively predict terrorist attacks is disputed (e.g., Richey, 2005; Stiglitz, 2003), but given that the effectiveness of PMsoT has never been tested due to certain moral concerns, we will focus on these moral concerns (outlined below), while refraining from taking a position on the potential effectiveness of PMsoT.

Beyond the concerns identified by Hanson, there are several other potential moral issues raised by PMsoT that must be considered. These potential moral issues, as articulated by politicians, journalists, and other commentators are that PMsoT will: 1) create character-affecting perverse incentives,^v 2) desensitise society to tragic events,^{vi} and 3) disrespect important ideals.^{vii} Unlike the concerns reported by Hanson, these potential moral issues would still apply to *effective* PMsoT. Since the perceived immorality of PMsoT is a tangible political barrier to them being tested, and since PMsoT must be seen as both morally acceptable and likely to be effective before they can be implemented, this paper assesses three potential reasons why *effective* PMsoT may be immoral. If it can be shown that even effective PMsoT are morally objectionable, then no further thought should be given to whether PMsoT would be effective. However, if these three potential moral issues are shown to be unproblematic, there should be further investigation of the effectiveness of PMsoT to see if a trial is warranted.

The rest of the paper includes the following discussions and arguments. First, we establish a view of the responsibilities of governments and draw distinctions between some kinds of harm and offense. In particular, we argue that some circumstances permit governments to cause non-serious harm to some people in order to protect and promote the rights and welfare of its citizens. (Section 2). Then, we discuss the three main potential reasons why even *effective* prediction markets on terrorism might be considered immoral. We argue that these reasons establish only that PMsoT are

offensive to some people and/or cause fleeting mild harm to some people, and so they do not amount to serious harm (Section 3). In addition to arguing against the force of these three potential moral problems, we also argue that societies and governments already endorse intelligence-gathering methods that are more immoral than PMsoT in relevant respects (Section 4). Finally, we conclude that a government's obligation to protect and promote the rights and welfare of its citizens outweighs the non-serious harm that could be caused by PMsoT. As a result, we recommend that the likelihood of PMsoT being effective is investigated more closely.

2. The responsibilities of governments

It is widely acknowledged that governments have a moral duty to protect and promote the rights and welfare of their citizens (Freeman, 2001; Mill, 1861; Nussbaum, 1988). Furthermore, even governments that would spurn this duty are less able to do so since international law is becoming increasingly "humanised". While the extent of the humanisation of international law is debated, it is broadly accepted that the formal legal recognition of human rights by international authorities has had an impact on sovereignty, and that sovereignty should be to some extent grounded in, and limited by, a government's willingness and ability to protect and promote the human rights and welfare of its citizens (Peters, 2009). Classical social contract theories have attempted to account for the trade-offs made between governments and citizens, including the restrictions and protections that citizens expect to be placed on their freedoms in order to improve the welfare of citizens generally (Cudd, 2012). Indeed, a government's obligation to protect and promote the rights and welfare of its citizens may require it to offend or even harm some individuals. For instance, many nations have recently taken steps to legalise civil unions and/or marriage between same-sex couples. Many people

are deeply offended by these legislative changes (Overby, Raymond, & Taydas, 2011), but it can be argued that the gains in terms of the promotion of the rights of same-sex couples far outweigh the resulting offense. The permissibility of these legislative changes might even hold if the number of people offended is greater than the number of people who would consider taking advantage of the new legislation. The reason for this (discussed in more detail below) is that a violation of rights seems more harmful than causing offense. Similarly, if an individual with a highly infectious disease refused to be quarantined, a state may forcibly quarantine her in order to protect the welfare of others. The quarantining of an individual can be seen to harm that individual—it may prevent them from pursuing their own interests, and the isolation may have negative psychological consequences on her. However, it is widely agreed that the relatively minor imposition on one person is justified by the significant public health benefits for the rest of society (Bryan, Call, & Elliott, 2007; Fidler, Gostin, & Markel, 2007; Upshur, 2003).

Indeed, governments regularly cause harm and offense, and justify it with reference to ‘the greater good’ that is expected to result. Of course, there are many reasons why governments should consider *not* taking certain actions even if they would maximise overall welfare. One such reason is that, in many cases, it would be unjust to cause serious harm to a small group of people, even though it might benefit the majority in a way that creates an overall net gain in welfare (Smart & Williams, 1973). For example, framing a lonesome stranger for a murder he did not commit so as to prevent rioting seems unjust even if it would bring about the greatest good overall (Rachels, 1999). We will not attempt to resolve the problem of exactly what governments can and cannot do in the name of the ‘greater good’. However, we do claim the following:

It is morally permissible for governments to enact policies which offend some people and/or cause non-serious harm if such policies are very likely to have the all-things-considered effect of significantly protecting and promoting its citizens' rights and welfare.

Implicit in this statement are distinctions between offense, non-serious harm and serious harm. We understand offense to be annoyance or resentment brought about by a presumed insult or lack of regard for something important. We understand harm to be a violation of rights, setting back of welfare, or both. We understand serious harm to be an *egregious* violation of rights or a *severe* or *enduring* setback to welfare, and we understand non-serious harm as all harms that do not meet the above threshold (i.e., negligible violations of rights and setbacks in welfare that are both slight and short-lived). Given these definitions, extreme offense might qualify as harm because the negative experiences involved will qualify as a setback to welfare (on most plausible accounts of what makes someone better and worse off). However, since offending someone is unlikely to be an egregious violation of their rights or to set back their welfare in a severe or enduring way, offense will usually constitute a non-serious harm.

There might be good reason to view offense as less morally important than harm (as we have done here). Consider that a large part of offense is feeling that something important has not been shown the respect it deserves. Since this kind of offense relies on particular beliefs about what is important, and those beliefs are highly contingent on the specific environmental factors an individual is exposed to, it follows that this kind of offense is variable across and within cultures, and even within individuals through time. For example, an ardent sports fan might be offended by someone spitting on the emblem of his team, only to later become disgruntled with his team's repeated poor

performance and spit on the emblem himself. Also consider someone who was not offended by homosexual acts at all before adopting thoroughgoing religious beliefs, which included anti-homosexual edicts, and becoming offended at the sight of any kind of same-sex affection. In contrast to the contingencies of offense, serious harm is much less dependent on any individual's or culture's beliefs about what is important. Indeed, our notion of serious harm is rooted more in the fundamental aspects of what it is for a person's life to go worse for them than it would have otherwise. For example, being unable to play sport because of a serious physical injury or being unable to marry because of who you are attracted to, seem to constitute serious setbacks to welfare regardless of what the relevant people believe. Given this difference between offense and harm, it seems appropriate to assign more moral weight to harm than offense.

Given the above definitions, our sufficiency claim that it is morally permissible for governments to enact policies that, all things considered, promote the rights and welfare of their citizens even though such policies might offend some people and/or cause non-serious harm sets a hard-to-satisfy criterion. And, because the criterion is only a sufficiency criterion and is hard to satisfy, it should be relatively uncontroversial. For example, this measure of moral permissibility could not be used to sanction the ethically-questionable, but potentially terrorism-thwarting telephone and email communication monitoring by the United States' National Security Agency, since it causes serious harm by egregiously violating the right to privacy of its citizens. But nor could it be used to sanction the much more morally acceptable policy of enforced quarantine mentioned above, since it egregiously curtails the right to free movement of the quarantined individual. Indeed, only relatively innocuous policies would be deemed morally permissible on our criterion. For example, our criterion could be used to sanction diverting some of the conservation budget to the defense budget in response to

an increased threat of terrorism (which might offend pacifists, but seems likely to increase overall welfare).

In the next section, we argue that the three main reasons for considering effective PMsoT to be immoral fail to justify the claim that PMsoT cause serious harm. The success of this argument combined with our claim about the moral permissibility of government actions presented here will mean that the implementation of PMsoT is morally permissible if they are very likely to have the all-things-considered effect of significantly protecting and promoting its citizens' rights and welfare.

3. Potential moral issues: Why effective PMsoT might be immoral

Character-affecting perverse incentives

The first potential moral issue is that PMs on tragic events will most likely encourage some traders to hope that the associated tragic events actually occur so that they can reap the financial (or other) rewards. This might have the effect of encouraging these traders to develop callous, selfish, and possibly even cruel characteristics.

Imagine Hal, who is averagely callous and selfish, but not in any way cruel, who buys \$100 of shares in the prediction that there will be a weapons of mass destruction (WMD) attack before the end of December 2013. Since Hal purchased 100 shares at \$1 each, and the payout on the contract if the event occurs is \$10 per share, Hal stands to receive \$1,000 if there is a WMD attack.^{viii} Every morning when Hal wakes up, he checks his email account and his PM investments. It's quite plausible that as Hal logs in to his PM account, a part of him unreflectively hopes that he has won \$1,000 (selfishness). Then Hal notices this glimmer of selfish hope and tells himself that a lot of innocent people would have to die for him to collect his \$1,000. But, his mind soon pushes away that fact and the glimmer of hope returns (callousness). Finally, just as his PM portfolio

page is about to finish loading, some small part of Hal hopes that a country he doesn't much like was the target of the WMD so that he can collect his \$1,000 and not feel so bad about it (cruelness). Hal certainly hasn't become a sadist, but his character has become slightly worse for his entertaining of these cruel thoughts. Not every trader will be encouraged to entertain cruel, callous, or even selfish thoughts by PMsoT, but it seems very likely that some will. Therefore, although there is no empirical evidence available on this issue, it seems likely that PMsoT provide character-affecting perverse incentives that will encourage some people to become slightly crueller, and thereby, slightly worse people.

But is it likely that these character-affecting perverse incentives will result in serious harm? No violation of rights seems egregious or even noticeable. And, the setbacks to welfare (encouraging some traders to become slightly crueller) seem to be neither severe nor enduring. To cause a severe setback to welfare, PMsoT would have to make a very large number of people slightly crueller or a small number of people much crueller. But, neither of these outcomes seems likely.

Considering that relatively tiny amounts of people currently bet on all prediction markets,^{ix} it is not reasonable to expect that a very large number of people will bet on PMs specifically on terrorist attacks. Furthermore, using the reasoning that supports PMsoT being cruelty-inducing, most PMsoT traders should end up less cruel than when they started trading. If betting that there will be terrorist attacks makes a trader crueller, then betting against a terrorist attack occurring should probably make them less cruel for similar reasons. Now consider that in effective PMsoT (which use only relatively specific predictions so as to enable useful intelligence to be gathered) most traders will bet against there being deadly terrorist attacks in particular locations most of the time because they are unlikely events. Therefore, on balance, PMsoT are likely to

create a situation where traders spend more time hoping that there has *not* been a terrorist attack than they do hoping that there has been one. As a result of this, it is very unlikely that any induced cruelty will be enduring.

In sum, PMsoT are likely to create slight character-affecting perverse incentives, but these perverse incentives will be offset within individual traders as well as across all traders by the more common incentive to hope that there will not be a terrorist attack. Therefore, this potential moral issue with PMsoT results in only fleeting mild harm, which is not sufficient to rule out the moral permissibility of PMsoT on our criterion.

Desensitising society to tragic events

The second potential moral issue is that PMs on tragic events, such as terrorist attacks, are likely to desensitise everyone who is systematically exposed to them (and especially traders) by making the events the subject of a game. This could result in a society that is more callous about tragedies, thereby also discouraging pro-social behaviour towards victims of tragedy. The link between desensitisation and decreased pro-social behaviour is under-studied, but is intuitively plausible and has received some empirical support (Bushman & Anderson, 2009).

Imagine living in a society in which many people bet on predictions about terrorist attacks and that the current prices of these predictions are often the subject of news items in the mainstream media (as predictions covering the 2012 United States election were; see, e.g., Zajac, 2012). There might be idle water-cooler chat about how the price on WMD attack predictions is so low that someone ‘could make a killing’, especially considering that ‘Country X has it coming.’ News reports about the thousands of potential traders who think that Country X might be attacked, and interviews with PM managers, could replace investigative journalism, such as interviews with security

and intelligence experts and political leaders. The constant associations of gambling and the twin motivations of profit and entertainment with terrorism could cause news-watchers, and especially PMsoT traders, to become desensitised to the tragic aspects of terrorism as they come to view terrorist attacks more as the subject of a game than as devastating events. And, as a consequence of this desensitisation, people may be less willing to help their fellow citizens in the event of a successful terrorist attack.

This situation is somewhat analogous to the fictional depiction of battles for survival as popular entertainment in movies such as *Bladerunner*, *Battle Royale*, and *The Hunger Games*. The gory deaths in these fictional games are no longer tragic to the spectators; rather, they have become a major aspect of the entertainment. While the decline of tragic events into entertaining games depicted in these movies might seem unrealistic, many of our contemporaries find entertainment in watching rooster fights, dog fights, *Ultimate Fighting*, and people suffering major injuries (often to the groin) in 'funniest home video' television shows.

But would PMsoT come to be viewed as entertainment? An unfortunate choice of words on the PAM website indicated that both profit and entertainment were going to be used to entice people to trade on PAM: "A PAM trader... can attempt to profit... and may be able to make money... through PAM... [which] should prove as engaging as it is informative."^x There is no empirical evidence on these issues, but it seems plausible that some people would see trading on PMsoT at least partially as a form of entertainment, and that some people will be at least slightly desensitised to terrorism by the constant association of terrorism with a so-called 'game played for profit and entertainment'.

So, PMsoT seem likely to slightly desensitise some people to terrorism, and this may result in less pro-social behaviour in the event of successful terrorist attacks. But would these possible effects constitute serious harm according to our definition? It

seems that the resulting harm is unlikely to be serious because there is no obvious violation of rights involved and any resultant setback in welfare would not be severe or prolonged.

If treating killing like a game was severely desensitising, then we might expect military drone pilots (who kill people remotely using computer-game-like terminals) to become more numb in the face of killing than front-line combat troops. However, there is no evidence of this. Similarly, there are no reports of any kind of desensitisation to any tragic events because of existing PMs. Of course, a lack of evidence is not conclusive evidence for a lack of severe desensitisation. However, the lack of evidence for severe desensitisation does make it reasonable to assume that PMsoT is not likely to lead to any severe desensitisation (and resulting lack of pro-social behaviour) in PMsoT traders.

But might not the general public be slightly desensitised for a prolonged period of time if PMsoT became a regular feature in the news media? Given the horrific reality, heavy news media coverage, and fairly regular occurrence of real terrorist attacks, prolonged desensitisation in anyone seems unlikely. It is clear that the 9/11 attacks had a huge negative impact on many people, leaving many psychological scars. It is also apparent that the more recent smaller attacks, such as the Boston Marathon bombing in 2013, re-open these old wounds. If these claims are reasonable, then it seems that the magnitude of successful real-world terrorist attacks has a sensitising effect that would counteract any widespread desensitisation caused by news media coverage of PMsoT. Indeed, the mass destruction and the intentional killing of innocents is so horrific and incongruous with playing a game that every new successful terrorist attack will obliterate any built-up desensitisation to terrorism caused by trading on PMsoT or by such trading being publicised in news media. Therefore, any desensitisation to

terrorism caused by the implementation of PMsoT on traders or the general public seems unlikely to be severe or prolonged.

In sum, it is possible that PMsoT will induce desensitisation to terrorism in traders and the wider public, which may also result in setbacks to the welfare of citizens through reduced pro-social behaviour in the event of a successful terrorist attack. However, the harsh reality of successful terrorist attacks makes any severe or prolonged desensitisation (and possibly resulting decreases in pro-social behaviour) unlikely. Therefore, this potential moral issue with PMsoT results in only non-serious harm, which is not sufficient to rule out the moral permissibility of PMsoT on our criterion.

Disrespecting important ideals

The third potential moral concern is that PMs on tragic events disrespect important ideals, such as the ideals of life, peace and freedom, by making a game out of tragic assaults on these ideals (e.g., by making a game out of an attack on innocent civilians with weapons of mass destruction). This reason for why PMsoT might be immoral is distinct from the desensitisation reason discussed above in that it does not refer directly to the desensitising impact that the PMs will have on the psychology of individuals. Instead, this reason for the immorality of PMsoT refers to the disrespect that the existence of PMsoT shows for important ideals, such as life, peace, and freedom. It could be argued that the only harm in disrespecting important ideals is that it offends the people who believe in the importance of the ideals. Also note that if no one was offended by an ideal being disrespected, then no practical moral issue seems to exist. If no one was offended by an attack on an ideal, then it is probably the case that either no one thinks the ideal is important or no one thinks the attack is a serious one.

Furthermore, governments should focus on preventing harm to their citizens rather than preventing harm to ideals. For these reasons, we focus on the offense caused by disrespecting the ideals and not the potential intrinsic immorality of desensitising these ideals.

Citizens of the United States (at least) are likely to see the ideals of life, peace, and freedom as important. Lazar and Lazar (2004) have argued that George W. Bush, Bill Clinton, and George Bush Senior all purposefully endorsed the ideals of life, peace, and freedom, and the United States' role as the international protector of these ideals. Particularly in the rhetoric of George W. Bush and Bill Clinton, Lazar and Lazar (2004) find that terrorists are regularly depicted as the evil enemies or attackers of these morally virtuous ideals. For example, Clinton (1998) claimed that "the bin Laden network of terrorist groups was planning to mount further attacks on America and other freedom-loving people" (no page) and Bush (2001) reported that terrorists "have attacked America because we are freedom's home and defender" (no page) and that "we have come to know truths that we will never question: evil is real, and it must be opposed" (2002, no page). Bush, Clinton, and other Western leaders' regular associations of terrorism with evil and threats to the ideals of life, peace, and freedom are likely to have had the effect of creating a public perception in Western countries of terrorist attacks as thoroughly evil events that, in the words of Bush (2002), "must be opposed" (no page).

Given that terrorism was, and very likely still is, seen as evil and repugnant because of its assaults on the ideals of life, peace, and freedom, it makes sense that any involvement with terrorism other than decrying it or trying to prevent it would be widely seen as repugnantly disrespectful of these sacred ideals. Furthermore, because of the way that PAM was portrayed in the media—as encouraging betting on

predictions about terrorist attacks for fun—it was not perceived as decrying or trying to prevent terrorism. Indeed, the widespread perception that PAM encouraged traders to effectively endorse terrorism by betting on it could lead one to think that all PMsoT might be immoral because of how their very existence disrespects the important ideals of life, peace, and freedom by endorsing the activities of the evil attackers of those ideals.

The perception of PAM as endorsing, rather than decrying or trying to prevent, terrorism is unfortunate because the main reason for including predictions on terrorist attacks in PAM would have been to try and prevent them. The only reason any government would have for implementing PMsoT is to add a further tool to their existing intelligence-gathering tool box in the hope that it will allow them to prevent future terrorist attacks. And, governments plausibly want to prevent future terrorist attacks out of respect for the ideals of life, peace, and freedom. Therefore, PMsoT that have the aim of preventing terrorism should be interpreted as showing respect for the ideals of life, peace, and freedom.

But, many people may still be offended by PMsoT even if they have been established with the best intentions. Some people might believe that encouraging traders to bet on and profit from terrorist attacks (or perhaps just those traders who choose to bet on there being a successful terrorist attack) disrespect the ideals of life, peace, and freedom. Indeed, such people might be legitimately offended by PMsoT in this way. The important issue for our purposes is whether this offense constitutes serious harm.

If PMsoT proved themselves to be ineffective, then it is quite possible that annoyance at them became intense and prolonged in a way that caused serious harm to the most offended people. However, any initial offense is likely to be steadily eroded by

effective PMsoT as more terrorist attacks are thwarted and PMsoT are named as a contributing factor in the successful intelligence-gathering efforts. After all, it would be difficult to be more than slightly annoyed at something for disrespecting the ideals of life, peace, and freedom if it also helped to prevent terrorist attacks. Therefore, it seems very unlikely that any offense caused by effective PMsoT would be intense or prolonged enough to constitute serious harm.

In sum, PMsoT might be perceived as disrespecting the ideals of life, peace, and freedom, but effective PMsoT seem to actually respect these important ideals by helping to prevent terrorist attacks. Furthermore, given that effective PMsoT are very likely to help thwart terrorist attacks, any offense caused by them is likely to be quickly mitigated to such an extent that it could not plausibly be considered to amount to serious harm. Therefore, this potential moral issue with PMsoT results in only non-serious harm, which is not sufficient to rule out the moral permissibility of PMsoT on our criterion.

Effective PMsoT are morally permissible

Earlier we argued that the following was a plausible sufficiency criterion for the moral permissibility of a government action: It is morally permissible for governments to enact policies which offend some people and/or cause non-serious harm if such policies are very likely to have the all-things-considered effect of significantly protecting and promoting its citizens' rights and welfare. In order to focus on the moral issues in this paper, we have assumed that PMsoT are effective. If PMsoT are effective, then it is highly plausible that they would have the effect of significantly protecting and promoting its citizens' rights and welfare by thwarting terrorist attacks. Furthermore, we argued in this section that the three features of PMsoT that have caused the most

moral concern (that PMsoT create character-affecting perverse incentives, desensitise society to tragic events, and disrespect important ideals) are likely to produce only offense or fleeting mild harms. For each potential reason to consider PMsoT immoral we discussed in this section, there was a counteracting force that made it unlikely that any net harm would result over a long period of time. These counteracting forces make it unlikely that, even when the harm from these different aspects of PMsoT are aggregated, any serious harm results.

Given that all of these consequences of PMsoT are non-serious harms, and that they seem unlikely to add up to serious harm when aggregated, effective PMsoT are morally permissible according to our criterion. Furthermore, other morally laudable aspects of intelligence-gathering PMsoT become evident when they are considered alongside other methods of anti-terrorism intelligence-gathering, as discussed in the next section.

4. PMs as anti-terrorism intelligence-gathering tools

PAM was designed as an intelligence-gathering tool (Hanson 2006), and it is important that discussions about it and other intelligence-gathering PMsoT place it in this context. Indeed, assessing all PMsoT merely as entities that would have provided a place for traders to be entertained and make a profit conflates intelligence-gathering PMs with for-profit PMs. This is an important mistake because both the underlying motives for the PMs and their likely effects on terrorism—which are both very important for their moral assessment—are vastly different. For example, it is very unlikely that a for-profit PM would create a set of predictions on terrorism that would be effective as an anti-terrorism intelligence-gathering tool because the predictions they incorporated would be selected based on potential popularity and not with the purpose of creating a set of

predictions that makes it possible to thwart potential attacks. The now-defunct Intrade is a case in point. Intrade only had a very small number of predictions related to terrorism, and they were all very broad in scope. Intrade's prediction that there will be a WMD attack anywhere in the world in 2013 exemplifies the lack of precision that would not enable useful information to be gathered.

In line with our earlier claim that governments may cause offence and/or non-serious harm if doing so will enable them to implement policies which, overall, advance the rights and welfare of its citizens, this section will consider whether it is reasonable for a government to decry the use of PMsoT as a method of predicting and preventing terrorist attacks, given the potential offence and harm that PMsoT may cause compared to other intelligence-gathering techniques, and the potential offence and harm caused by terrorism.

The goal of intelligence-gathering is to generate and aggregate useful and novel information which will assist governments and intelligence agencies to protect their own citizens.^{xi} Intelligence-gathering may involve breaches of privacy and the interception of communications (Schmid, 2001), lying and espionage (Miller, 2012), prolonged detainment of innocent people, interrogation, torture and abuse (RTE News, 2011; Ulbrick, 2005). It is worth noting that the same United States' administration that withdrew funding for PAM, on the grounds that it was immoral, also sanctioned stress and duress techniques, extraordinary rendition, and enhanced interrogation techniques, including waterboarding and stress positions.^{xii} While governments have decried the use of torture following the scandals that emerged in the 2000s, a 2009 survey found that 55% of Americans still believed the harsh interrogation techniques used by the Bush administration were justified (Jones, 2009). So, even some clearly offensive and serious-harm-causing activities are permitted and endorsed by governments and

citizens if they are thought to help prevent terrorist attacks. But what degree of offence and harm can we expect intelligence-gathering PMsoT to cause and prevent compared to other intelligence-gathering techniques?

PMsoT are, in many respects, less morally problematic than several other forms of intelligence gathering, including by: being less physically and psychologically damaging, only rewarding bad people if they provide good information, and having less chance of putting intelligence agents at risk.

First, while there is no research on the psychological effects of participating in PMsoT, it seems very plausible that the impact would be minimal (as discussed above), and certainly less severe than the physical and psychological impacts of intelligence-gathering by torture. Although PMsoT are more likely than torture to affect a larger group of people, it is important to remember that torture affects not just those individuals who are subjected to it, but also their families and friends, and even those with the job of inflicting the torture. Considering our sufficiency criterion, the intense physical and psychological impacts of intelligence-gathering by torture constitute not just offense, but also serious harm to those individuals who are directly involved. In comparison, effective PMsoT are likely to cause very limited offense and only non-serious harm. So, given that terrorist attacks can cause serious setbacks to welfare, PMsoT meet the sufficiency criterion in that they cause limited offense and harm, and prevent a much greater degree of serious harm.

Second, Joseph Stiglitz (2003) has suggested that PMsoT might be morally objectionable because they enable terrorists, and people who know what terrorists are planning, to make money from their insider-knowledge about terrorist attacks. Stiglitz would prefer that, instead of profiting from PMsoT, people with this insider-knowledge of terrorist attacks are investigated. First of all, on our definition, effective intelligence-

gathering PMsoT would be tapping in to new information sources, so they could not have been investigated (at least not in as timely a manner) without PMsoT. This leaves us with the possibilities of rewarding traders that might not be paragons of moral virtue in return for the new and useful information they provide *or* foregoing the new and useful information. It should be noted that relatively meagre rewards, such as could be expected from correct predictions in PMsoT, are routinely paid to informants by local police forces as well as international security and intelligence agencies because, in Hanson's words, "[p]aying people to tell us about bad things [is] intrinsic to the intelligence[-gathering] process" (c.f. Shachtman, 2003, no page). But, the most important point here is that, while many informants can lie to intelligence officials and still continue to be paid, traders in PMsoT generally only get paid if they provide useful information (if their prediction is correct).^{xiii} So the possibility that PMsoT will reward morally imperfect people seems less morally problematic than the rewarding of informants that occurs in local and international intelligence-gathering.

In determining whether PMsoT meet our criterion, it must be considered that some individuals may be offended by a government providing a financial reward to anyone with useful information about a terrorist attack. However, PMsoT are unlikely to cause any severe or enduring harm by doing this. A government which sought to implement PMsoT in order to prevent the serious harms inflicted by terrorist attacks would be justified in causing minor offense to some individuals because the all-things-considered consequences of the PMsoT are likely to be the protection and promotion of the rights and welfare of citizens. Furthermore, since PMsoT seem to reward possible wrongdoers in return for information in a less morally problematic way than paying informants does, then considerations of consistency suggest that the widespread acceptance of paying informants should mean that PMsoT are also accepted.

Third, PMsoT do not expose governments or their agents to the physical, psychological, or legal ramifications of espionage and related intelligence-gathering techniques. Such techniques are often illegal or life-threateningly dangerous in the places where intelligence agents are sent. Note that we are not suggesting PMsoT should replace all in-person intelligence-gathering, but just that some of the extant forms of intelligence-gathering can be considered more harmful for putting intelligence agents at great risk when PMsoT might be able to extract the same information without putting anyone in harm's way. Since a policy of espionage might well cause severe harm to some people, our sufficiency claim about what is morally permissible for governments could not be used to justify this kind of policy, even if it resulted in an all-things-considered protection and promotion of the rights and welfare of their citizens.

In sum, the relatively minor offense and non-serious harm caused by PMsoT, in conjunction with their potential to contribute to the protection and promotion of citizens' rights and welfare, qualifies the implementation of PMsoT as a decision that would be justified under the sufficiency criterion outlined in Section 2. Many governments currently permit the use of in-person intelligence-gathering techniques that are more morally questionable than effective PMsoT, presumably because the relevant people involved recognise the potentially significant harms caused by terrorism and the need to protect innocent citizens from these harms whenever possible. It is beyond the scope of this paper to argue for the morality or immorality of these other techniques. Rather, they have been discussed to show that, in the context of intelligence-gathering, effective PMsoT would be a relatively morally superior technique in several ways. Furthermore, anyone who accepts the moral permissibility of these in-person techniques also has a strong reason to accept the moral permissibility of effective PMsoT.

It is possible that effective intelligence-gathering PMsoT may cause serious harm in a way that we have not considered here and that would not apply to torture, bribing informants, and espionage. Nevertheless, PMsoT currently seem at least morally equivalent to these other intelligence-gathering methods, and are morally permissible according to our criterion. Therefore, unless further reasons for why effective PMsoT will cause serious harm or offense are discovered (we are not aware of any), it would be morally permissible for any government that seeks to protect and promote the rights and welfare of its citizens to fund effective PMsoT.

Conclusion

First we argued that it is morally permissible for governments to enact policies which offend some people and/or cause non-serious harm if such policies are very likely to have the all-things-considered effect of significantly protecting and promoting its citizens' rights and welfare. With this criterion for moral permissibility in mind, we then assessed the three main reasons why effective PMsoT might be considered immoral. We argued that these three problems (that PMsoT create character-affecting perverse incentives, desensitise society to tragic events, and disrespect important ideals) are likely to only result in offense or fleeting mild harms. Since these consequences did not amount to serious harm (even when aggregated), we concluded that establishing effective PMsoT was morally permissible for governments.

We then compared PMsoT to other anti-terrorist intelligence-gathering methods (torture, bribing informants, and espionage) and found that these methods caused more offense and harm than effective PMsoT in relevant respects and, in some cases, would not be considered morally permissible on our criterion because they cause serious harm. In particular, PMsoT were argued to be morally better than torture, bribing

informants, and espionage because they would (respectively): be less physically and psychologically damaging, only reward bad people if they provide good information, and have less chance of putting intelligence agents at risk. Assuming the claim that governments are justified in enacting policies which cause minor harm or offense if those policies also serve the overriding greater good of protecting and promoting citizens' rights and welfare, PMsoT are not just a morally permissible form of intelligence gathering, but, relative to many others, also a morally preferable method.

Our assumption that carefully constructed PMsoT would be effective should not be taken lightly because it bears directly on several claimed moral issues with PMsoT not discussed here, and indirectly on those that were. Nevertheless, detaching the moral analysis from the question of effectiveness is important because the best way to establish effectiveness is through relatively expensive real-world trials. And, there would be no point spending taxpayers' money on such trials if even effective PMsoT would not be morally permissible. Given our conclusions about the moral permissibility of effective PMsoT and the relative moral strengths of PMsoT compared to other anti-terrorism intelligence-gathering methods, we recommend that the likelihood of PMsoT being effective is further investigated to see if a real-world trial is worth pursuing.^{xiv}

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<http://www.bloomberg.com/news/2012-11-06/obama-re-election-chances-2-to-1-in-intrade-bets.html>

ⁱ Reported by Wyden and Dorgan at a press conference. Retrieved August 26, 2013, from <http://hanson.gmu.edu/PAM/govt/senator-wyden-dorgan-pressconf-7-28-03.txt>. Hanson (2006) disputes that some of these predictions would have been included, but this does not affect the discussion here. It was perceived by politicians and the media that these predictions would be included, and their disgust was a reaction to this.

ⁱⁱ For examples of this view, see Wyden and Dorgan (2003) and *BBC News*, "Pentagon axes online terror bets," July 29, 2003. Retrieved March 26, 2013, from <http://news.bbc.co.uk/2/hi/americas/3106559.stm>.

ⁱⁱⁱ The "just wrong" comment was made by Senator Thomas Daschle in Congress (Congressional Record Vol. 149, No. 114, July 29, 2003: S10082-S10083). The "morally wrong" and "grotesque" comments were made by Senator Ron Wyden at the above mentioned press conference. The "disgusting... offensive" comment was made by Senator Byron Dorgan at another press conference (transcript retrieved March 18, 2013, from <http://hanson.gmu.edu/PAM/govt/Senator-Wyden-Dorgan-pressconf-7-29-03.txt>). The "very sick" comment was made by Senator Barbara Boxer (Courson & Turnham, 2003, no page). The "morally reprehensible" comment was made by the editors in "Pentagon drowns in its own 'dead pool'". *The Virginian Pilot*, July 31, 2003, B10. See Meirowitz and Tucker (2004) for more detail on the reactions to PAM.

^{iv} For reviews, see Surowiecki (2004) and Wolfers and Zitzewitz (2004). For measures of accuracy, see Berg, Nelson, and Rietz (2008). For a comparison with the Delphi method, see Green, Armstrong, and Graefe (2007).

^v For example: "[PMsoT] will most likely encourage some traders to hope that the tragic event occurs so that they can reap the financial (or other) rewards." (Weijers 2013, no page).

^{vi} For example: "[PMsoT] are also likely to desensitise everyone systematically exposed to them" (Weijers, 2013, no page).

^{vii} For example, Senator Hillary Clinton's comment that PAM is "...a market in death and destruction, and not in keeping with our values" (Biever & Carrington, 2003, no page).

^{viii} Note that this is a real prediction available from Intrade. As at 11 March 2013, the price is \$1.14 per share, indicating that the market predicts there is an 11.4% chance that there will be a WMD attack before the end of December 2013. Retrieved March 11, 2013, from <http://www.intrade.com/v4/markets/contract/?contractId=745538> (but note that Intrade halted operations on March 11, 2013 "due to circumstances recently discovered... [that] may

include financial irregularities”). Retrieved March 11, 2013, from <http://www.intrade.com/v4/home/>.

^{ix} For example, iPredict, the New Zealand prediction market, has about 40 traders online during peak times, which is less than 1 in every 100,000 New Zealanders or less than 0.001% of New Zealand’s population. (Figure gathered via author’s observation).

^x These quotes are from a cached mirror of the original PAM website (which was taken down when the program was cancelled). Retrieved March 20, 2013, from http://www.ratical.org/ratville/CAH/linkscopy/PAM/pam_concept.htm.

^{xi} See the CIA website for more details. Retrieved March 25, 2013, from <https://www.cia.gov/about-cia/todays-cia/what-we-do/index.html>.

^{xii} Stress and duress techniques and enhanced interrogation techniques—which include stripping detainees, sleep deprivation, exposure to bright lights and loud noise, forcing detainees into uncomfortable positions for extended periods of time, and water boarding—are illegal under international law, but were sanctioned by the Bush administration (MacAskill, 2009; Reynolds, 2005; Roth, 2004).

^{xiii} With the exception of traders who buy low and sell high during price fluctuations—but this method of trading is unlikely to produce high returns because, although PMs on terrorist attacks do fluctuate, they tend to fluctuate over a relatively small range of prices.

^{xiv} Many thanks to Nick Agar for helpful comments on an earlier draft of this paper.