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An Economic Analysis of Security Policies

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Abstract: This paper analyses public policy choices in the security economy from an economic perspective. It discusses the role of public goods for national and global security and identifies the importance of the first- and second-order indirect effects of insecurity on economic activity, which include the behavioural responses of agents and the government to security measures, akin to such effects in insurance economics. Furthermore, key public policy trade-offs are outlined, in particular between security and efficiency, globalisation, equity and freedom. The analysis identifies suitable policy options for raising security in the national and international contexts and in view of these trade-offs. A suitable balance between market and non-market instruments in achieving security should be aimed for to minimise the adverse effects of aiming for higher security. In addition, the public good nature of security implies that international coordination of security policies is important, despite this process being itself fraught with enforcement problems.

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1. INTRODUCTION

The world seems to have become less secure since September 11, 2001. A variety of risks are appearing, are being noticed or are being feared more than before the deadly terror attacks of New York and Washington. These risks include the new global terrorism, large scale electrical black outs, wars in the Middle East, an increase in computer viruses, worms and spam, attacks by snipers, e-commerce fraud, anthrax attacks, petrol strikes, and international financial instability. This paper analyses public policy choices in such insecure world. The analysis is based on broad definitions of risk (both private and social risks), security (both national and global) and security policies (both public and private measures).

The three objectives of the paper are to apply economic concepts suitable for the analysis of public policy choices in the security economy, to identify key policy trade-offs in designing security policies, and to discuss suitable policy instruments for attaining security while minimising these trade-offs, both nationally and internationally.

The paper will demonstrate how national and global public goods are involved in providing security, how security measures can have strong economic effects themselves (in addition to the effects of the insecurity itself), that these effects are composed of both first- and second-order effects, and that there exist a number of important trade-offs for policy makers in deciding what level of security should be attained and which means should be adopted in attaining them. These trade-offs include the balancing acts between security and efficiency of production and trade, between security and freedom and between security and equity.

The paper is structured as follows. Section 2 defines and characterizes the security economy, discusses security as national and global public goods, introduces the distinction between direct, first-order indirect and second-order indirect effects of security polices, and provides an overview over the empirical scale of these indirect effects. Section 3 discusses the trade-offs between security, on the one hand, and non-security spending, efficiency, globalisation, equity and freedom, on the other hand. Section 4 derives policy implications, including in the areas of competition, regulation and coordination policies, for both national and international policies. Section 5 concludes.

2. THE SECURITY ECONOMY

Characterising the security economy

"Risk" can have several economic meanings. First, risk describes the possibility of a harmful event occurring or being induced. Examples may include the likelihood of a cheque bouncing or of a cheque fraudster being detected. Such events may cause substantial damage. Second, risk refers to the variation, variance or volatility of economic indicators such as exchange rates or future investment returns. These movements may induce costs to some economic actors. Third, risk can be defined as an indicator being close to a threshold. Again, there may be some cost or loss involved in being close to a threshold. This is akin to the concept of vulnerability. The cost of a variation then depends on the distance to a given threshold.

In this paper, insecurity is defined as an aggregate and unquantifiable form of risk. There are different sources of such risks and hence insecurity in the economy. These are related to the forces of nature, globalisation, technological, social, and political developments on the one hand and economic or market forces on the other hand. These risks differ in their probabilities of occurring, the scale of damages they can induce and in the degree of covariance and hence insurability, as argued below.

The security economy will be defined for the purpose of this paper as those activities affected by, preventing, dealing with and mitigating insecurity in the economy. Such broad definition includes private and public activities in both legal and illegal areas of the economy. Narrower versions of this definition (such as a focus on state spending for homeland security or private spending for anti-crime devices) may be adopted by other authors for different purposes.

Security as a public good

National security, like a lighthouse, is a prototypical public good. National security is non-rival in consumption; each citizen enjoys the full amount of national security produced, without restricting the consumption of other citizens. Furthermore, it is impossible to exclude citizens from the provision of national security. Hence, the level of national security provided by the private sector would be suboptimal from society's point of view. This is one justification for the public provision or the public regulation of security in a closed economy.

In the international context, global - rather than national - security is also a public good (Sandler 2005). Instances of global insecurity include nuclear wars between the superpowers, dramatic climate change induced by greenhouse gas emissions or transnational terrorism. The

nature of the global public good is that individual countries fail to internalise the foreign costs and benefits of their actions and inactions concerning the underlying global risk.

National defensive measures aimed at diverting the local harmful consequences of global risks may be over-supplied from a social planning perspective. For example, increasing national precautions against transnational terrorism may reduce such attacks within the country but increase the number of attacks against nationals of that country living abroad or against other countries. This is what appears to have happened with the pattern of transnational terrorist attacks since 9/11, with less protected countries bearing an increasing share of transnational terrorist attacks (Sandler 2005).

National pro-active measures aimed at reducing global risks entail foreign positive externalities; pro-active measures are thus under-provided. For example, unilaterally cutting greenhouse gas emissions reduces global warming but only has negligible positive effects for the pro-active country itself. In the context of transnational terrorism, Sandler (2005) identifies the irony that by focussing the attacks of 9/11 against the United States, the US government was led to exert additional pressure on other states to intensify their anti-terrorist policies. Hence transnational terrorists to some extent are creating conditions which lead to their own activities becoming more difficult to implement in the future. As argued by Frey and Luechinger (2004), such pro-active policies may also involve positive actions, such as bribing terrorists financially or politically to become peaceful. However, such actions will be under-provided by national governments with the existence of global threats to security.

While the existence of *national* public goods justifies regulation, *global* public goods provide the rationale for internationally coordinating these regulatory schemes. This is especially true if the global collective good security is considered to be a weakest-link public good (Hirshleifer 1983). The prototypical weakest-link public good is a dyke that prevents the rising sea level to flood an island. Each inhabitant can construct a section of the island's dyke as protection from floods. However, the actual protection equals the height of the lowest section of the dyke. The same concept holds in principle for the general case of international security issues. Even if country A spent a lot on security s (that is it achieves a high s_A*) it may be negatively affected by another country B with a lower s_B*. Through international air transport, country B may export insecurity unwittingly, for example by transporting suitcases with bombs enclosed onboard a plane travelling towards country A - as happened in the

Lockerbie bombing. The weakest-link nature of many security-related collective good problems strongly shapes the policy recommendations discussed in section 4.

Direct economic effects of insecurity

Insecurity imposes costs on people who are risk averse. Standard economic theory demonstrates that economic agents, if they are risk-averse, would prefer a world of less insecurity and are willing to pay a premium to reduce risks. Yet the costs of insecurity are composed of three effects. First, the direct costs resulting from the underlying risky *event* itself. Second, the indirect first-order costs induced by the *agent's* reaction to the threat. And finally, the indirect second-order costs that are caused by the *policy* responses to the event and to the agents' reactions.

Direct effects of insecurity include losses in property rights, output, utility, health or lives resulting from events such as theft, fraud, computer viruses, power cuts or terrorism. The first-order negative effects contain the responses by the directly affected parties, such as precautionary information technology measures taken by a company targeted by computer viruses. The second-order indirect effects include the costs of the measures implemented by government in response to actual or perceived risks. These may include economic policies or more general political reactions to insecurity.

A recent empirical study by Siems and Chen (2004) investigating the response of capital markets to cataclysmic events concludes that the indirect effects of insecurity may well outweigh the direct effects in terms of economic relevance. The authors also find that American capital markets have improved their response times to various cataclysmic events in the last fifty years. It appears that earlier events had not been more dramatic than recent events. Instead, the economy had not been able to deal with crises in an adequate way in earlier years. The authors explain this inter alia with improvements in the efficiency of the banking and financial sectors, providing the necessary post-crisis liquidity to promote market stability. In addition, fast and well-coordinated responses by the monetary authorities helped stabilise the American financial system. The study emphasises that it is not only the nature and the direct effects of a disastrous incident that determines its consequences but also the reactions by agents and policy makers, that is the indirect effects.

First-order indirect effects: agent's reaction

One important first-order indirect effect of insecurity is a rise in private sector security spending. Such spending may express an underlying desire to protect production or to enhance a firm's products. As such, security spending may be voluntary or in response to market forces. Security spending could also be obligatory as a result of new security legislation. This distinction has an impact on the competitiveness of firms.

In the first case, firms decide to spend money on security in the short term to minimise long-term costs (for example by spending on building security to avoid or deter fire, thieves or terrorists attacks). Such spending is akin to insurance spending and reflects a firm's information, perception and preferences. Firms can be said to self-insure against certain risks. It is likely that some firms have higher costs than others, for instance as a result of their location in high-risk zones.

In the second case, firms respond to market forces for enhanced security measures, for example because employees require employers to have such security measures (for example protecting expatriate staff on high-risk postings) or because more security has to be embedded into a firm's products (for example alarm systems in cars). In these cases, costs rise but potentially revenues rise as well or are prevented from falling. Such measures may involve many firms in a market although some firms may opt to provide lower security and hence lower quality products thus occupying a different niche of the market. An intermediate level of cost differentiation may thus obtain.

In the third case, firms are legally obliged to implement certain security measures (for instance foreign airlines serving the US). In this case, the extra security spending acts akin to an environmental regulation aimed at increasing social welfare. Such regulation typically raises costs but not private, firm-level benefits.[1] Within-sector productivity will fall as a result of such enforced spending. In parallel, new sectors may emerge to service the new security needs as can be observed in the environmental service sector. For a closed economy, this then implies that costs are borne uniformly by all firms in a given sector. Internationally, this may not hold and raises important trade policy issues.

[1] The distributional long-term effects of such regulation will be addressed in section 3.

This third case also contrasts with a new tax imposed on a sector. Taxes also reduce productivity and may affect certain firms uniformly. However, taxes have the important implication of raising tax revenue, which can then be used to achieve some other social good or to compensate some other actor. Also, in the case of taxation, the taxable sector and the sector at risk may differ while in the case of state security spending the two are necessarily the same. Hence in the latter case, threatened sectors may be doubly affected by the new insecurity, both through the security risk and the security legalisation. Depending on the circumstances, this suggests the policy recommendation to diverge security measures and their financing to reduce the burden of new security measures.

Indirect first-order effects concerning the behaviour of agents in response to the existence of risky events can also be analysed using standard insurance theory. Insurance can be used by risk-averse agents to overcome the negative effects of risk. By a large set of such agents forming an insurance, they can spread risks and thus improve welfare. Even if the nature of the risk allows pooling, moral hazard and adverse selection may affect the insurance market.

In the case of moral hazard, insured agents take higher risks than non-insured agents. For example, the existence of an obligatory terror re-insurance (or even re-re-insurance) may encourage insurers (or re-insurers) to accept more risky customers. This implies that insurance (or risk-sharing mechanisms such as regulation more generally) can actually increase risk levels compared to the absence of insurance (or regulation).

In the case of adverse selection, high risk agents take up insurance but insurance companies cannot identify the nature of these individuals due to asymmetric information. For example, the recipients of credible terror threats are more likely to buy terror insurance thus leaving the insurance company with a risky and potentially uninsurable pool of clients. This implies that insurance (or risk sharing arrangements more generally) may break down entirely if asymmetric information is very prevalent.

Furthermore, the insurance market is affected by first-order indirect effects on the supply side (Kunreuther et al. 2003). Standard war or terror risks cannot be insured at prices which are acceptable to customers as their occurrence is too strongly correlated across contracts for insurance companies to be able to pool its risks effectively.

In order to illustrate how severely the economy can be influenced by first-order indirect effects of insecurity, it is useful to consider some possible instances of such reactions. The

costs of insecurity include changes in demand for tourism services or in the supply of foreign direct investment (Sandler and Enders 2004). Greater insecurity (for example due to terrorist attacks) may lead to the re-design of supply chains which in turn reduces the benefits from just-in-time production processes. Alternatively, firms may prefer to source their inputs from local suppliers if these are less affected by certain insecurities. Such local suppliers may be more reliable but also more expensive. In the long term, such cost pressures may induce a variety of changes, such as increases in inventories, investments in new technologies or changes in the balance of horizontal or vertical integration (Hodges and McFarlane 2003).

Other indirect effects of higher insecurity include higher transaction costs of conducting business, including higher transport costs and higher transport insurance rates (Lenain et al. 2002). This will reduce trade flows, the transport and tourism sectors, both domestically and internationally (Nitsch and Schumacher 2004, Walkenhorst and Dihel 2002). The decline in trade could reduce the spread of economic activity and boost geographic clustering. But the more clustered an economy is, the more valuable the clustered target is for terrorists, for instance, thus further raising insecurity (Frey and Luechinger 2004).

Generally, if insecurity thrives on openness, then firms and households will scale back on openness. For example, less online trade may be conducted in the presence of online fraud and less international outsourcing may be undertaken in the presence of regular riots, roadblocks or strikes abroad. Change in relative prices as a result of insecurity will lead to a suboptimal re-allocation of resources. Therefore, the insecure economy will have lower GDP growth than would obtain otherwise (Lenain et al. 2002).

Higher levels of risk also undermine investor confidence, reducing their willingness to commit to new projects. Over time, higher risk premiums increase required rates of returns on investments, reducing equity prices and biasing investment decisions against high-risk, high-return, long-term investments towards low-risk, low-return, short-term investments. The cumulative effect of such portfolio adjustments is to change the composition of portfolio, to reduce overall investment and to retard further economic growth. However, markets will also induce positive feedback effects causing structural shifts. These will occur in favour of products and services which have embedded security as an important characteristic.

It is worth noting that reactions to insecurity may not always be justified, even if they are voluntary, because the degree of insecurity is also a matter of perception. Actual risks are extremely hard to assess. There is strong evidence that people, and by extension policy

makers, are poor judges of objective levels of risks. On the one hand, especially when strong emotions such as fear are involved, people tend to focus on the worst-case scenarios rather than on the probability of the outcome occurring. As a result agents over-estimate minor risks or neglect significant risks (Sunstein 2003). In addition, the public representation of insecurity is very skewed (Kunreuther 2002). Airline crashes, for example, receive more column inches in newspapers than fatal car accidents, although the former cause fewer casualties than the latter. For both reasons it is likely that the private sector and policy makers over-provide security measures and legislation, so that the costs of security may easily exceed its benefits.

On the other hand, Kunreuther and Heal (2003) point out that, on the demand side, people tend to under-estimate the risks of natural disasters or terrorist attacks when it comes to making insurance decisions. This "it-will-not-happen-in-my-backyard" mentality represents another obstacle for developing an insurance market for disastrous events.

Finally, the events of 9/11 may have revealed to the general public which state of insecurity they actually face. This view is supported by evidence that the likelihood of terrorist attacks has not increased after 9/11 but that agents assess this risk more realistically (Sandler 2003). This interpretation also implies that structural changes in the economy (for example increasing the share of security-related spending or reductions in demand for airline travel) may not be inefficient but rather are the result of an adjustment process towards a new market equilibrium.

Second-order indirect effects: policy reaction

Government regulation can cause insecurity in two ways. First, there may be an element of regulatory insecurity where an increasing density of regulation, though aimed at raising social welfare, increases uncertainty for firms operating in an environment of raising legal obligations. Second, certain types of regulation may trigger illegal responses raising insecurity. For example, the period of prohibition in the United States from 1920 to 1933 represents an instance where a policy reaction induced a significant but perverse behavioural response, including illegal brewing, smuggling and organised crime.

The degree of government security regulation is quite large in many economic sectors. For example, inspections and other security regulations create delays at borders, increase shipping times and reduce border permeability thus reducing trade flows. Such regulation thus enhances the direct effects of insecurity on trade. In addition, standard government

regulations in the fields of national defence, fighting crime and civil rights will impose further costs on businesses (Hobijn 2002, Lenain et al. 2002, World Bank 2003). Security regulations imply shifting economic resources between actors, including between sellers and buyers and between private and public agents. The existence of such a burden will reduce the efficiency of the market and hence growth.

In the insurance market, second-order indirect effects exist as well. For example, the market for terror re-re-insurance has been organised quite differently in various OECD economies (Kunreuther et al. 2003, Wolgast and Ruprecht 2003). While in the United States the government required insurance firms to offer terror insurance, in Germany for instance the government helped subsidise a monopolist public-private partnership re-re-insurer to cover potential terror risks. The US scheme has suffered from insurance firms offering the obligatory terror insurance but doing so at premiums that are unattractive to most firms. Thus the insurers fulfil their legal obligations without incurring risky and potentially unprofitable terror risks. Therefore, this may represent an instance where public intervention and even subsidies are necessary for maintaining some market forces, rather than using regulation (or the lack thereof as was common in most OECD economies before 9/11) to stifle the market for terror insurance.

Another second-order indirect effect of insecurity is the increase in public security spending which may have a retarding impact on long-term growth through two channels: First, high budgets for defence and homeland security may crowd out more growth-enhancing investments. Second, there is some evidence that public security spending may also crowd out the more efficient private sector attempts to increase security. These point will be addressed in more detail in section 3.

Estimates of the scale of indirect effects

It is difficult empirically to measure the costs of the indirect effects but economic theory can provide some important insights (Sandler and Enders 2004). In assessing the economic effects of security spending, Hobijn (2003) claims that neither private nor public spending on security will have a major impact on the economy. Private security spending in the United States in his view will reduce labour productivity by 1.12 % and multifactor productivity by 0.65 %, which in turn results in only small reductions of American GDP. In addition, he predicts that security-related research and development (R&D) will not significantly crowd out productivity enhancing R&D. In regard to public security spending, he calculates that

homeland security spending will reduce output only by 0.6 % over a five-year period. Judging by the much larger scale of military spending in the 1980s, he believes that to be negligible and to have no effect on the US budget deficit.

However, one should interpret Hobijn's optimistic results with a degree of caution. The analysis contains some important assumptions such that private expenditures for security will only double in the future. Hobijn may also under-estimate the future public spending by the Bush administration, especially when adding homeland and national security spending in the light of the Iraq war and occupation.

Nordhaus (2002) in particular contradicts Hobijn's line of argument. He cautions not to depend too strongly on governmental estimates of future security budgets.[2] Nordhaus finds that the costs of wars, for example, are always grossly under-estimated, which is perfectly rational from the point of view of the warring government.

Another analysis partly backing Hobijn's view is a simulation of the combined growth effects of increased private expenditures for security (up 0.5 % of GDP) and increased military spending (up 1 % of GDP) financed through borrowing (Lenain et al. 2002). This study suggests that real GDP would be reduced by about 0.7 % after five years. The effect is small but permanent and derives from the consequences of undermining fiscal consolidation. The post-cold war peace dividend is not threatened by this increase in security-related spending.

Moving from the effects of security spending to the effects of security measures, it has been estimated that a one-day delay at the border controls costs 0.5% of the value of the delayed good (Hummels 2001). Another calculation suggests rising trading costs of 1 % to 3 % ad valorem after September 11 (Leonard 2001). Based on such values, it has been estimated that an increase in US inventories of 10 % and an increase in US commercial insurance premiums of 20 % would cost 0.1 % and 0.3 % of GDP per year, respectively (Raby 2003). Another study calculates an elasticity of trade flows (in volume terms) with respect to transport costs (ad valorem) to be lying in the range of –2 to –3.5 (Limao and Venables 2001).

[2] Security budgets may even be poorly measured ex post, as argued by Brauer (2004) for the case of the United States.

In international trade, the total global welfare losses resulting from such security-related increases in transaction costs after 9/11 have been estimated using a computable general equilibrium model to be relatively low with about 75 billion USD per year (Walkenhorst and Dihel 2002). Yet that study also suggests that some regions and sectors are hit particularly hard, as goods with a low ratio of value to weight (such as agricultural products, textiles, non metallic minerals and machinery) are vulnerable to an increase in transaction costs. The regions most affected by 9/11 in absolute terms according to Walkenhorst and Dihel are Western Europe, North America and Northern Asia. However, they calculate that Southern Asia, North Africa and the Middle East suffer the most damage in relation to the size of their economies, not least due to the higher import dependence. That means that developing countries may be particularly affected by the first- and second-order effects of 9/11.

A different methodological approach involves directly estimating the effect of the existence of insecurity on growth or international trade. One such study finds that international trade flows are significantly reduced by the existence of terrorism in a trading partner's country (Nitsch and Schumacher 2004). In the short-term, this effect is estimated to reduce international trade by 4 % if the number of terrorist incidents in one country is doubled.

It is open to empirical analysis if and how soon the negative effects of insecurity will wear off in the long-term. Increases in efficiency may be obtained by better regulation and implementation (Hobijn 2003, Lenain et al. 2002, Walkenhorst and Dihel 2002, Raby 2003, World Bank 2003). Regulation may be more targeted, thus reducing unnecessary security measures. Markets may respond to existing security measures, finding new ways to communicate, to produce and to deliver goods. Security measures may deter or identify criminals thus reducing the exposure to risks and hence making the measures superfluous in the long-term. This *may* be true. It is, however, not clear if these developments will actually occur. A key policy focus should thus be the monitoring of security spending, the security situation, the security policies and their effects on the economy to adjust measures over time as appropriate.

Overall, security spending and security measures do have strong effects. It is less clear that these effects significantly restrict growth, trade and other economic activities. However, security policies appear to have a differential impact, depending on the nature of the economy. In the long-term, there operate strong forces which will alleviate the negative economic effects of security policies.

3. ECONOMIC TRADE-OFFS

Security spending versus other spending

The first trade-off refers to the different types of expenditure by both the private sector and governments. Such butter versus guns decisions include the trade-offs between different types of public and private sector expenditure between security-related versus other goods and services.

While the character of *public* spending on military services may be consumptive, a similar argument may hold for the case of *private* spending on security. Since output is not positively affected by this spending (especially when spending concerns hiring more guard labour) productivity falls. In addition productive investments are likely to be crowded out and hence growth is retarded. Therefore both public and private spending on security may have both expansionary and dampening effects on growth, with the net effect being ambiguous a priori and empirically (Lenain et al. 2002).

Security versus efficiency

The second trade-off concerns efficiency. An economy is efficient when it maximises production from a given set of resources and technologies. Aiming for security entails both costs and benefits. Such costs may cause frictions in production thus preventing the economy from functioning efficiently.

This could refer to the equilibrium position on the production possibility frontier (PPF) where the marginal rate of substitution between the good security and the alternative good equals the price ratio between these two goods. If an exogenous shock requires a higher provision of security then this may lead to a reallocation of production from the alternative good to the production of security. The new equilibrium may be efficient if at that point the price ratio also equals the marginal rate of substitution between these two goods. An inefficient level of security production would obtain if production of either or both goods was within the PPF, if the marginal rate of substitution did note equal the price ratio, or if a tax levied to finance security created an excess burden.

Another source of friction may prevent a new equilibrium from establishing itself in response to technological change, which could potentially extend the PPF outwards. The nature of the security markets, of the new technological developments and of government regulation then

determines if efficiency obtains. Government policy should thus be geared towards maintaining markets and incentives which make this feasible.

Efficiency can be visualised as minimal levels of transaction costs, for example when crossing borders or generally in trade. Here there appears to be an obvious trade-off between security and efficiency as more border controls increase security but also reduce the speed and ease with which goods and people are moved. In the long run, however, this trade-off may disappear, as argued above. Security driven improvements may even facilitate trade in the long run. Additional investments in secure facilities and modern technologies can reduce transaction costs. Security cost pressures could potentially induce reforms in trade-related institutions and infrastructure with beneficial effects on trade and growth. Better trade facilitation due to deregulation of trade-related sectors, harmonisation of customs services and coordination across countries would increase trade among 75 countries by 377 billion USD (World Bank 2003).

Security versus globalisation and technological change

The third trade-off may occur between security on the one hand and globalisation and technological change on the other hand. It is not clear ex ante whether globalisation is compounding or extenuating the problems associated with the security economy.[3]

More generally, one can identify a race between two effects of globalisation. On the one hand, the same forces which can bring some countries and sectors such prosperity are highly vulnerable to security threats. It is both the openness and the interdependence that enable various risks to destabilise the international economy (Stevens 2003). On the other hand, coordination, integration and harmonisation associated with globalisation reduce the scope for insecurity and make the tracking of the sources of insecurity easier.

In addition, globalisation is a process which provides on-going flows of benefits while many forms of insecurity cause one-off, shock-like costs (unlike the fight against insecurity which may cause ongoing costs, too). In an integrated, globalised world economy, building

[3] One example of the former effect is that transnational terrorism, itself made possible by globalisation, also implies that terrorists have to hit increasingly large targets to make an impact on global current affairs (Sandler 2005). In other words, there exists a race for nastiness among transnational terrorists.

coalitions to fight insecurity by providing public goods may hence be much easier than in a world economy dominated by import-substituting nation states.

Accordingly, Siems and Chen conclude that the globalised world has become more stable in face of threats (2004). Especially the policy response to 9/11 showed how effectively cooperation can be indeed conducted. The international integration made it both necessary and possible for authorities all over the world to share relevant information and to reconcile policies in order to absorb such tremendous shock.

Globalisation and technological change induce structural change in open economies. Especially the security economy may witness an accelerated structural change (World Bank 2003). This may be obtained through technological advances induced by investments in security infrastructure, for example through the automation, surveillance and informational exchange in harbours, airports and border crossings. Globalisation may thus serve as the very means that makes the trade-off between security and efficiency diminish in the long run.

One important policy challenge is the integration of technical security protocols into international organisations, agreements and technical standards (such as the European Union, the World Trade Organisation and the International Organization for Standardization (ISO)). Transparency and harmonisation should be sought to reduce transaction costs. In addition, security concerns should not permit the establishment of non-tariff trade barriers. Another policy implication addresses the role of economic winners and losers from structural change induced by new security regulations. This will be discussed further below.

At the same time, countries falling behind the evolving international security standards are unable to reap the benefits of globalisation if their territory is not seen to be safe or reputable any more (for example by not guaranteeing security, providing smart technologies and protecting supply chains). Those economies will face higher risk premiums and the cost of protecting assets will rise, reducing foreign direct investments.

Competition concerning both the supply of security between countries and the nature of the provision of security within countries could evolve. Some countries may specialise in utilizing their comparative advantage in producing secure or insecure goods (such as the respective examples of the United States and Taliban-led Afghanistan in the case of terrorism or Switzerland and some small island states in the case of more or less prudent banking facilities).

In addition, countries may choose different models of providing a given standard of security within an international organisation. NATO, for example, has contained in its history both democracies and dictatorships as well as armies of recruits and professional armies. For companies, there is geographic choice in their production decisions, both in regard to the desired level of security and the nature in which this level is achieved. As a result each country *A* would than obtain its (individually) optimal level of security s_A*, a circumstance which may well conflict with the weakest-link nature of international security.

Security versus equity

A politically and socially sensitive trade-off concerns the distributional costs of increased security. Analytically, it is not clear ex ante which groups should gain or lose most from higher security. Many security services are provided by the low skilled (such as guards) but many technology-intensive products will be developed by the highly skilled. If international trade is reduced by higher security-related transaction costs, then this may damage employment in those sectors or countries most affected by such measures. Public sector employment may rise if public security spending focuses on judicial, police, customs and military personnel. However, some of their services can also be subcontracted to private providers, which is an important policy option when considering the efficient provision of security.

Governments could consider compensating the losers of security measures within their countries. Internationally, this may be particularly important if losers of the security economy (say groups or entire countries losing from reduced trade in developing countries) may themselves be the source of future insecurity. Hence the compensation of losers (and perhaps the taxation of the winners) is strongly related to the causes and the nature of the insecurity. One option may be the accelerated and unilateral reduction of trade barriers for developing countries particularly damaged by the war against terrorism.

Another equity issue is related to the access to security services and products. Lower income groups may, as a result of market forces or due to administrative processes, be excluded from secure products or services. One can also think of social clustering since the poor may only be able to afford property in less safe environments or regions. Policy makers may wish to consider how they can grant egalitarian access to the security economy.

Another equity concern has already been mentioned in section 2. While it is clear that both market-induced and compulsory investments in security measures raise costs for firms, it is less clear ex ante whether the producer or the consumer bear a larger share of the costs. Using tax-incidence analysis, one can demonstrate that the short-term burden is distributed according to the price elasticities of demand and supply. In the long-term, however, the supply elasticity is apt to be perfectly elastic in a globalised world, thus allowing most of the costs to be shifted onto the consumers.

Security versus freedom and privacy

The fifth trade-off concerns the balance of civil rights, privacy and individual freedom versus the possible need to curtail these rights in the pursuit of more security. Internet, computing, mobile and wireless technologies are highly vulnerable to security attacks. At the same time, these technologies can be used to monitor movements, usage and profiles of individuals or goods – by consumers, regulators and potential perpetrators of crimes. For example, a positive correlation between democracy and the levels of terrorist activities has been observed in various studies (Sandler 2005). This effect may result from terrorists preferring to act in countries where their attacks will be reported widely.[4]

This topic raises a number of interesting and relevant points which, albeit, are not all or not exclusively the domain of economic analysis. First, there is a clear trade-off between economic freedom and economic growth, at least in the extreme. The empirical estimation of this trade-off may lead to ambiguous results but analytically it should be clear that a high level of regulation and restriction hampers productivity growth and utility maximisation (Paldam and Würtz 2003).

Second, the evolution of the network economy and the evolution of the security economy are closely related. The opportunity to process and link data of low marginal value is growing dramatically. With it rises both the vulnerability of interconnected and interdependent data systems and the opportunities for tracing criminals. Protecting these systems, using their opportunities and maintaining civil liberties requires a fine balancing act. The greater demand

[4] Such negative consequence of press freedom may only be overcome if freedom of press (or democracy) was a truly universal phenomenon.

for security-induced surveillance and the technological advances in this field facilitate the potential abuse of data mining, social sorting and losses in privacy (Lyon 2003).

In fact, many economic sectors require increasingly complex information chains in production. The monitoring of the origins of food, of industrial chemicals (especially in the European Union), and of dangerous waste products increasingly require source-to-use chains of information. The use of smart tags can thus be expected to rise dramatically as will the use of positioning- and navigation-systems in combination with mobile technologies (Hodges and McFarlane 2003). These technological and legal developments demonstrate the rising challenges for the security economy and its policy makers. Resolving civil rights and technological security issues should occur in parallel to the implementation of such information chains. Forcing the resolution of security concerns may actually accelerate the development of source-to-use information systems.

In addition, social preferences about the relative value of judicial type I and type II errors may evolve in the security economy. This may be particularly true for very rare but extreme events where the importance of balancing type I errors (where the innocent goes to jail) and type II errors (where the guilty walks free) may be reversed (Kunreuther 2002). Many societies, when protecting their own citizens from extreme attack, prefer to punish the innocent than to let the guilty escape with committing atrocities. The opportunity cost of inaction weighs particularly heavily in the security economy. This may hence lead to an otherwise excessive level of security regulation and spending. However, there is no obvious, technocratic optimality in assessing the trade-off between security and freedom. In democracies, the voters have to decide what their preferences are in this respect.

4. POLICY IMPLICATIONS

National policy instruments

Policies aimed at reducing our exposure to risks can be defensive (for example by installing anti-virus software) or pro-active (for example by identifying, arresting and punishing hackers before, as or after they strike). Some of the defensive policies may not be security policies in a narrow sense. Yet it is a useful to remember that reducing economic insecurity involves many more policy fields than law-and-order or economic policies.

In addition to defensive and pro-active policies, other policies may aim to reduce the costs of insecurity. This may serve the purpose of reducing the impact of insecurity but also of making

deliberate acts of insecurity less attractive to the perpetrators. Frey and Luechinger (2004), for example, suggest that raising the marginal costs of terrorists to undertake terrorist attacks by adopting deterrence policies may not be the best response to such threats. Instead, terrorism may be fended off more effectively by abating the expected benefits of terrorist acts for the prospective terrorists. Such a policy could be based on strengthening decentralized decision-making since a strike against authority would then have only little effects on the stability of the polity and the economy.

The analysis of security policies should also differentiate between different policy instruments. Information and institutions are one group of policies to achieve deterrence and punishment. Since the probability of malevolence tends to be over-estimated by individuals, information should be used to make risks more transparent. One set of policy instruments includes regulation, supervision and coordination while another involves the provision of financial incentives and disincentives, for example through fiscal policy. For instance, in addition to the under-provision of security, a market economy may also under-invest in security-related R&D. As R&D generates spillovers for society, the social rate of return is typically higher than the private rate, and hence private investment in R&D typically falls short of the socially desirable level. Hence, even if security was a private good, there would be a case for state subsidies for security-related R&D.

The public debate about the fight of terrorism since 9/11, for instance, has focussed quite strongly on security spending and the adjustment of civil rights while neglecting some other instruments, such as international coordination, political signals or even, at times, deliberate des-interest. Most importantly, the public debate often failed to ask how market forces may help solve some of the problems that society faces, instead focussing strongly on government intervention, regulation and spending.

International policy coordination

As argued above, dealing with global public goods requires international coordination. There are many incidents in the global security economy where uncooperative behaviour falls short of the socially optimal outcome. The aforementioned under-supply of pro-active policies and the over-supply of defensive measures may serve as examples. In the first case, nations are stuck in a prisoner's dilemma with a Nash equilibrium of mutual inaction. The second case resembles the well-known tragedy of the commons (Sandler 2005).

It is the weakest-link public good nature that emphasises the need for international cooperation and intervention. Whenever the overall level of protection is set by the least contributor, competition fails to achieve the efficient level of security both in the private and the public spheres.

Kunreuther and Heal (2003) give an example from the private sector by noting that airline A will only install an additional baggage screening system at its check-in counters if other airlines (including airline B) adopt similar systems. This is because the hazard may not only arise from passengers who check in directly with airline A, but also from passengers who check in bags with airline B and then arrange for their luggage to be transferred, with necessarily being checked again by airline A. The security of airline A is hence determined by the weakest link in the chain of airlines.

Only a coordinated approach can break this suboptimal equilibrium by guaranteeing the participation of every airline. International organisations like the International Air Transport Association (IATA) can stipulate rules and regulations for their members. A key policy issue are the sanctions that are implemented locally within member states, which apply in the case of national deviant behaviour.

A public-sector example is provided by Sandler (2005). He makes the point that even a nation which heavily invests in securing its domestic targets is still vulnerable as it is linked with other less secure countries through trade, travel and migration. It is again the weakest-link character of other countries that cannot (or choose not to) increase domestic and border security which causes the problem This shortcoming must be overcome by international institutions such as the OECD, NATO, the UN, and ISO by setting minimum standards in the areas of defence, politics and economics.

However, this coordinating task is challenging. International cooperation tends to be myopic due to political (in particular democratic electoral) processes and due to a preference by governments to be autonomous in defence matters. This contrasts with the long-term planning horizons of terrorists (who rarely have credible outside options).

In addition, weakest-link countries (which often are developing countries) often do not have the capacity to conform to international standards. As a consequence, the international community must support these states through either cash transfers or in-kind transfers, which itself poses a collective action problem. Governments face a standard free-rider situation

where every government "sits on its hands" expecting others to provide the transfers. Furthermore, there is a moral-hazard problem associated with cash-transfers, since the recipient may divert the money for concerns other than enhancing its security (Sandler 2005).

Despite these obstacles, international security policies should also contain a strong commitment to international development as one of the pillars of global security policy. This view corresponds to the so-called "Solana strategy", the European security strategy proposed by the European Commission (2003). In addition, compensatory or complementary liberalising policies are important to provide a strong stimulus of world economic growth and to generate the economic surplus to assist vulnerable groups in the global security economy. This applies especially in the area of transport costs and world trade, where additional trade access could be provided to countries at risk from loosing out in the security economy (Leibfritz 2003, World Bank 2003).

5. CONCLUSIONS

The paper finds that in addition to its striking direct effects, insecurity can have important indirect effects via agents' behavioural and governments' policy responses. Policy insecurity, the burden and incidence of security regulation, and unintended responses to policies may raise aggregate insecurity further. The emergence of new risks induces structural changes in the economy, both across sectors and across countries. Markets may be inhibited due to insecurity but they can also help to pool risks and to alleviate the costs of remaining risks. Regulation can also help support the emergence of markets otherwise threatened by insecurity. Non-markets instruments may be useful for enabling access to the security economy and for coordinating technical standards. There is hence a potential for the emergence of "secure growth", akin to the emergence of "green growth".

Given the public good nature of global security and the resulting externality effects, policy responses to insecurity rely heavily on international coordination efforts, which may be fragile if the public good is of the weakest-link type. Given the diversity of the actors involved and the difficulty in monitoring and enforcing cooperative behaviour, policy coordination at the international level is desirable but hard to achieve. Multilateral institutions should play a vital role in this coordination game.

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