

# Entrepreneurial Security: A Free-Market Model for National Economic Security

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## ABSTRACT

*The Department of Homeland Security (DHS) indicates that the majority of the nation's critical infrastructure is owned by the private sector. However, from a policy standpoint, the potential role the entrepreneur and the free-market system might play in critical infrastructure and key resource (CIKR) risk management may not be fully appreciated. Recognizing an environment of budgetary uncertainty for future homeland security expenditures, this article suggests the principals of a free-market system may be beneficial to national CIKR risk management. Furthermore, the concept of "entrepreneurial security" is introduced as a potential free-market based paradigm for national CIKR risk management.*

## INTRODUCTION

Is the Department of Homeland Security (DHS), specifically the Office of Infrastructure Protection (OIP), considering a sustainable national critical infrastructure and key resource (CIKR) risk management model for a contracting budgetary environment? According to the Congressional Budget Office (CBO), homeland security funding has fallen from a peak of \$76 billion in 2009, to \$68 billion in 2012.<sup>1</sup> With the nation's budgetary picture uncertain, future homeland security funding could conceivably be reduced even further.

The basic assumption here is that in a contracting budgetary environment, the current DHS national CIKR risk management approach will likely be financially unsustainable. Given this assumption, what policy options are available for a national CIKR risk management model that is operationally functional in a fiscally austere environment? This article, in an economic context, suggests that the most financially

sustainable and adaptive national CIKR risk management model will be based on the principles of a free-market system. As a possible alternative, the concept of "entrepreneurial security" is introduced as a sustainable and adaptable free-market based paradigm for national CIKR risk management.<sup>2</sup>

The Homeland Security Act of 2002 designated DHS as the center-of-gravity for the nation's CIKR risk management. The current *National Infrastructure Protection Plan (NIPP)* states that

The act assigns DHS the responsibility for developing a comprehensive national plan for securing CIKR and for recommending the 'measures necessary to protect the key resources and critical infrastructure of the United States in coordination with other agencies of the Federal Government and in cooperation with State and local government agencies and authorities, the private sector, and other entities.<sup>3</sup>

Although DHS may be responsible for coordinating the nation's CIKR risk management activities, coordination activities and resource allocations for national CIKR risk management are fundamentally an economic problem.

## COMPLEX ADAPTIVE SYSTEM

For all intents and purposes, protecting infrastructure is synonymous with protecting economic activity. Put another way, CIKR are economic components created to support human activity.<sup>4</sup> Infrastructure was not developed for creating human activity; rather, human activity is the reason for creating infrastructure. Unfortunately, the majority of DHS CIKR policy literature describing the nature of how a free-market economic system functions is anemic.<sup>5</sup>

Very little policy guidance has been dedicated to expressing the characteristics of a free-market economic system, let alone

defining it. This is peculiar, since DHS openly acknowledges that the majority of the nation's infrastructure is privately owned.<sup>6</sup> As a result, the current DHS national CIKR risk management model has not emphasized the importance of understanding economic fundamentals. Without proper economic understanding, the national CIKR risk management approach may therefore not correspond with the attributes of a free-market system.

As the definition of a free-market can be interpreted as an idealized type of economic system, a more scientific model will be used to articulate the *function* of a free-market system. As a means for providing deeper CIKR insight, the function of a free-market system will be analyzed through the construct of a complex adaptive system.<sup>7</sup>

In her book *What is Complexity*, Melanie Mitchell defines a complex adaptive system as “a system [in] which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated information processing, and adaptation via learning or evolution.”<sup>8</sup> In other words, it is “a system that exhibits nontrivial emergent and self-organizing behaviors.”<sup>9</sup> Eric D. Beinhocker, in his book *The Origin of Wealth*, suggests that the free-market is an open disequilibrium complex adaptive economic system, where disparate economic actors’ have the ability to freely and subjectively process and/or share information with each other and randomly adapt their behavior.<sup>10</sup> “In such systems the micro-level interactions of the parts or particles lead to the emergence of macro-level patterns of behavior.”<sup>11</sup>

Essentially, “the economy is not a closed equilibrium system; it is an open disequilibrium system and, more specifically, a complex adaptive system.”<sup>12</sup> In describing the features of a more non-market oriented system, Beinhocker suggests:

If an economy were a closed equilibrium system, its defining characteristic would be a trend toward less order, complexity, and structure over time, as entropy sends any closed equilibrium system inevitably toward featureless stasis. Closed equilibrium systems do not spontaneously self-organize; they do not generate patterns, structures, and complexity; and

above all, they do not create novelty over time.<sup>13</sup>

In 1776, a seemingly clairvoyant Adam Smith described an idealized economic process where individual economic activities not only benefit the self-interests of the individual, but also unwittingly benefit the holistic interests of society. Smith suggests that an economic actor who produces goods of the greatest value “intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it the worse for the society that it was no part of it.”<sup>14</sup> The imagery of Smith’s “invisible hand” to describe economic order is, in many ways, analogous to the function of a complex adaptive economic system.

Order, in a free-market system (i.e. complex adaptive economic system) materializes through lower level interactive and adaptive individual relationships, where unpredictable and spontaneous collective order emerges. The free-market’s economic order is an emergent, dynamic, bottom-up, and self-organizing process that no one controls. Essentially, order emerges within a complex adaptive economic system even though it is decentralized and leaderless.

So, what does a complex adaptive system have to do with CIKR? Consider a complex adaptive system a schematic for how individual economic actors *behave* within an open disequilibrium system (i.e., free-market system). That being said, CIKR, in many ways is nothing more than the physical representation of an economic actor’s business decision. Later in this article the underlying principle surrounding an economic actor’s business decision will be explained in greater detail.

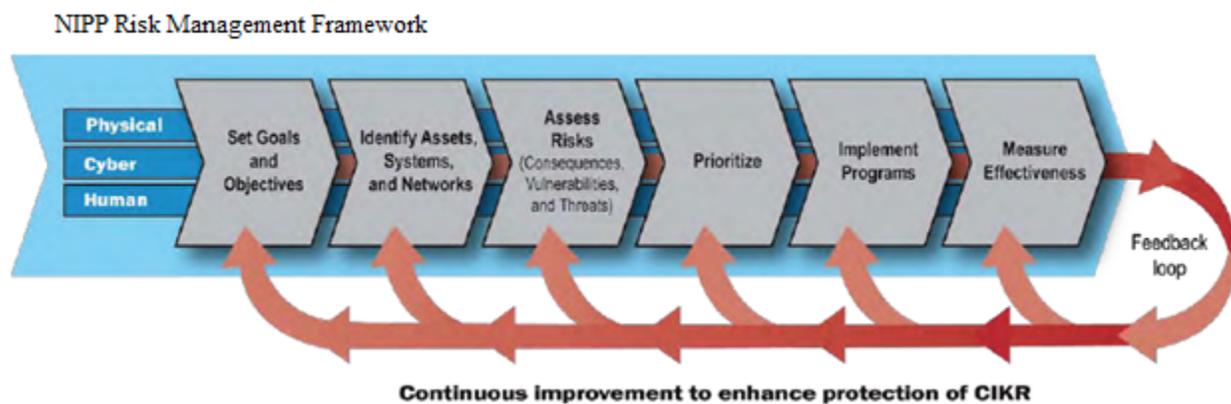
## RISK AND RISK MANAGEMENT

The current NIPP emphasizes both risk and risk management. However, “the cornerstone of the NIPP is its risk management framework.”<sup>15</sup> From a risk standpoint, DHS uses a formula where risk is a “function of consequence, vulnerability, and threat.”<sup>16</sup> In other words,  $R = (C, V, T)$ . Additionally, and within its own lexicon, DHS defines risk management as the “process of identifying,

analyzing, assessing, and communicating risk and accepting, avoiding, transferring or controlling it to an acceptable level considering associated costs and benefits of any actions taken.”<sup>17</sup>

Below is the NIPP idealized graphic for approaching CIKR risk management. From an applicability standpoint, it seems the risk

management framework could be the most beneficial on the micro level (i.e. individual business/firm). The challenge lies in applying the risk management framework on a macro level (i.e. nationally). CIKR risk management, from both the micro and macro levels, will be discussed later in the article.



**Figure 1.** CIKR Risk Management

What makes national CIKR risk management complex is that (1) The US economy is an open disequilibrium complex adaptive economic system and (2) DHS is attempting to comprehend the consequence, vulnerability, and threat (i.e., risk) across *all* eighteen CIKR economic sectors assets, systems, and functions. Furthermore, DHS is then attempting to coordinate the nation’s collective CIKR risk management activities (i.e., economic behaviors/decisions) among the multitudes of CIKR stakeholders.

That being said, the problem of DHS coordinating the nation’s CIKR risk management, and perhaps with homeland security in general, is that the problem is “wicked.”<sup>18</sup> Wicked problems, in a nutshell, are extremely complex problems that intensify the challenges for any planner/planning body to effectively address. If a planning solution to a wicked problem is said to exist, it may not be desirable.<sup>19</sup>

In expressing how the current DHS national CIKR risk management model might function on a macro level, Horst Rittel and Melvin Webber provide a more illustrative narrative. In an idealized context, the current national CIKR risk management approach could be described as:

An on-going, cybernetic process of governance, incorporating systematic procedures for continuously searching out goals; identifying problems; forecasting uncontrollable contextual changes; inventing alternative strategies, tactics, and time sequenced actions; stimulating alternative and plausible action sets and their consequences; evaluating alternatively forecasted outcomes; statistically monitoring those conditions of the publics and of systems that are judged to be germane; feeding back information to the simulation and decision channels so that errors can be corrected--all in a simultaneously functioning governing process.<sup>20</sup>

Essentially, for the current national CIKR risk management model to be operationally functional, DHS would need *to collect and process* the complete, simultaneous, and uninterrupted flow of real-time consequence, vulnerability, and threat (CVT) information across the entire economy's CIKR assets, systems, and functions. In other words, DHS would need to permanently have its finger on the economy's pulse. Not doing so could potentially render the current DHS approach to coordinating the nation's CIKR risk management activities less nimble and less responsive. Furthermore, assuming DHS could collect and analyze such a magnitude of data, DHS would also need the full cooperation from the entire spectrum of public and private CIKR stakeholders in coordinating and synchronizing the nation's collective CIKR risk management efforts. One approach may be for national CIKR risk management to be coordinated in an asynchronous manner, as discussed later in this article with regards to entrepreneurial security.<sup>21</sup>

Not only is the current DHS national CIKR risk management model capital intensive, assuming the economic dependencies/interdependencies become more complex overtime, additional financial resources will likely be required for further coordination and planning. As the "new normal" for the homeland security enterprise gravitates toward deteriorating budgets and financial uncertainty, contemplating potentially financially sustainable alternatives for national CIKR risk management seems prudent.

## ENTREPRENEURIAL SECURITY

*"Capitalism without failure is like religion without sin. It doesn't work."*<sup>22</sup>

-Alan H. Meltzer

In order to successfully and sustainably coordinate the nation's CIKR risk management posture, both partnerships and information sharing are required; in fact, they are paramount. However, the concern here is not with coordinating the nation's CIKR risk management activities per se. The primary, in fact crucial, concern here relates

to the nation's CIKR risk management *coordinator*.

As mentioned earlier, a complex adaptive system is the scientific construct used to describe the functional nature of the free-market system. In offering an alternative national CIKR risk management model, this section provides the economic theory underpinning the concept of entrepreneurial security. To accomplish this task, entrepreneurial security uses the economic contributions associated with the Austrian school of economics to describe how national CIKR risk management might emerge within a free-market. Additionally, the Austrian approach to economics is used because it may be the most closely aligned with what Beinhocker refers to as complexity economics.<sup>23</sup>

Infrastructure, as stated earlier, is the physical representation of an economic actor's business decision. That being said, what might be the impetus behind an economic actor's business decision? Nobel Laureate Milton Friedman asserts that the primary, indeed only, purpose of business is to seek profit.<sup>24</sup> First and foremost, the nation's CIKR exists because economic actors *chose* to take the risk to build (i.e., produce) infrastructure to maximize their profits.<sup>25</sup> Alternatively, separate economic actors *choose* to use (i.e. consume) infrastructure to maximize their profits.<sup>26</sup> The common denominator for both types of economic actors is choice and profit. Nevertheless, how is this article defining an entrepreneur and what role will that entrepreneur have in national CIKR risk management?

## THE ENTREPRENEUR

The entrepreneur, as economist Jack High suggests, is one who "shoulders uncertainty, coordinates plans, and introduces new goods and production processes."<sup>27</sup> Furthermore, "Crucial to all of these activities is the pursuit of monetary profit. Profit provides the incentive to exercise the alertness, judgment, creativity, and will to formulate and carry out plans that capture monetary profit."<sup>28</sup> Entrepreneurs are economic actors; not only are they producers, they are also consumers.

In an Austrian context, Dan Mahoney suggests there is a duality that may apply to private property due to the fact that both consumers and producers are property owners.<sup>29</sup> As such, consumers influence what is produced when choosing how to employ their property to make purchases. Alternatively, producers determine what is consumed by directing their property in the means of production.<sup>30</sup> The important point here is that producers and consumers are both coordinating their diverse and self-interested activities through an economic transaction (i.e. purchases).

Again, DHS defines risk management as the “process of identifying, analyzing, assessing, and communicating risk and accepting, avoiding, transferring or controlling it to an acceptable level considering associated costs and benefits of any actions taken.”<sup>31</sup> Accepting the premise that infrastructures are economic components created to support only those economic transactions which are profitable (i.e. human activity), it seems producers and consumers may be the most qualified to manage their CIKR risk; especially if the objective is to consider the costs and benefits of risk management activities.

The skeptic, however, may offer the following rebuttal. Perhaps entrepreneurs (i.e., those functioning at the micro level) can manage *their* individual CIKR (i.e. business) risk, but on the national (i.e., macro) level, CIKR are intertwined into highly complex and interdependent systems. Therefore, if each entrepreneur is only concerned with his or her individual self-interest how does that translate into a nationally coordinated CIKR risk management model? Moreover, how are individual entrepreneurs going to comprehend the consequence, vulnerability, and threat (CVT) to the nation’s entire CIKR? One potential answer is through the price system.

## PRICE SYSTEM

To reiterate, this article seeks to provide a national CIKR risk management model that is both adaptable and financially sustainable in a fiscally austere environment. That said, the price system might be an existing free-

market mechanism that is capable of sharing all-hazard CVT information in a manner beneficial to national CIKR risk management.<sup>32</sup>

Peter Boettke explains, “Prices summarize the terms of exchange on the market.” He describes the price system as a mechanism that “...signals to market participants the relevant information, helping them realize mutual gains from exchange.”<sup>33</sup> In a risk management context, price fluctuations communicate warning signals that are equitably sent across the entire economy. Nobel Laureate Friedrich Hayek claims that through competitive price fluctuation, the price system enables entrepreneurs to adjust their activities vis-à-vis their fellow economic actors.<sup>34</sup> From an Austrian information-sharing standpoint, prices have the potential to transmit cautionary signals. These cautionary price signals help facilitate and/or compel entrepreneurs to make more informed economic decisions.

For instance, every economic actor need not know whether global turmoil might be responsible for increased energy costs to adjust energy consumption activities. For adaptation to occur, the only thing that matters is that consumers and producers know the price of energy has changed.<sup>35</sup> For example, price fluctuations could be seen as the economy’s version of a fever.<sup>36</sup> Where prices are free to fluctuate competitively, price fluctuations could be seen as cautionary signals, thereby, indicating to a consumer/producer that alternative and/or substitute solutions may be beneficial – regardless of the individual’s knowledge of foreign affairs.

In homeland security jargon, competitive prices could be considered unclassified “actionable intelligence.” As they relate to all-hazard CVT, price fluctuations would influence an economic actor’s business decision. As economic activities (i.e. human behavior) shift with price fluctuations, so too will the criticality, composition, and configuration of CIKR to support those activities.

Through a competitive price system, individual economic actors are pressured and/or compelled to communicate and coordinate with each other the necessary risk management activities for maximizing profit. As competitive prices communicate the CVT

to an individual economic actor, consensual economic transactions coordinate individual risk management activities (i.e. through new business relationships) vis-à-vis other economic actors. However, although individuals may have the ability to manage individual risk, how does this translate into national risk management? One potential answer is through emergence.

### EMERGENT SECURITY

Although the price system may facilitate communication and coordination between individual economic actors, several questions remain. First, how will individual economic actors know which risk management activities are the correct ones? Second, how does individual risk management evolve into national risk management?

As it relates to the first question, economist Israel Kirzner provides a potential economic framework for discovering appropriate risk management solutions. Kirzner suggests that profit opportunities emerge through prior entrepreneurial error, which in turn stimulates subsequent entrepreneurial discovery.<sup>37</sup> In a risk management context, it is the natural alertness of the entrepreneur that observes the diversity of economic activities and, through such observations, discovers possible opportunities and/or the possible danger of disaster.<sup>38</sup>

In many ways, CIKR risk management discoveries can include a diversity of activities. For example, CIKR risk management could lead to new business models. Distributed energies, such as solar/wind/geothermal for example, could be seen as alternatives to the dependence on the electric grid. The point here is that the most adaptable and financially sustainable CIKR risk management solutions will emerge through entrepreneurial discovery.

The energy sector's electric grid illustrates the differences between the current approach to national CIKR risk management and an entrepreneurial approach. Showcased in the DHS *Energy Sector Specific Plan* (SSP), The American Recovery and Reinvestment Act of 2009 allocates \$4.5 billion for "energy reliability, sustainability, and resilience."<sup>39</sup>

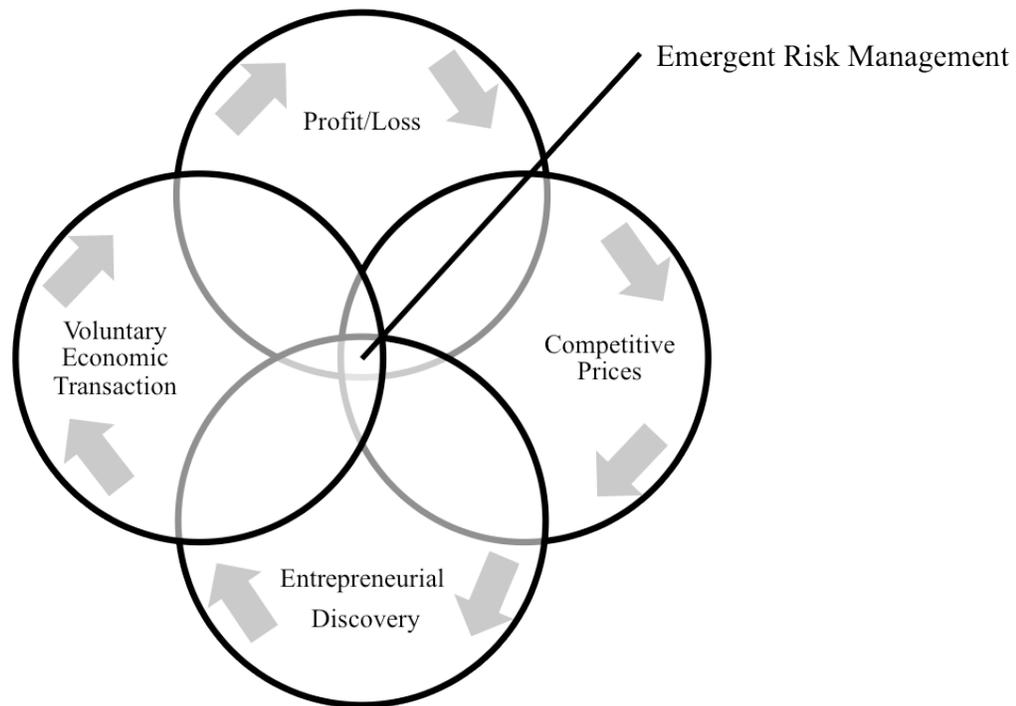
Utilizing the Public-Private Partnership model,<sup>40</sup> DHS would likely leverage the Energy Sector's Coordinating Councils as the principal coordinating mechanism to invest in "a nationwide plan to modernize the electric grid, enhance security of US energy infrastructure, and ensure reliable electricity delivery to meet growing demand."<sup>41</sup>

However, this approach to managing the risk to the energy sector has the potential to distort the true price of energy, ergo, the true risk to the energy sector. As a result of such external financial intervention, moral hazard is potentially introduced and economic actors might not alter their energy related risk management behavior because the price system failed to communicate any cautionary signals. Although the policy may be well meaning, the resulting energy sector risk management model may be equivalent to up-armorizing the Humvee. In a CIKR risk management context, we will accessorize the existing energy model (i.e., the electrical grid) and proclaim we have just increased its security performance.

Within a complex adaptive economic system, if the true competitive price (i.e., risk) of energy is freely communicated through the price system – to the entire spectrum of energy producers and consumers – entrepreneurs (i.e., economic actors) would have an increased opportunity to discover the most adaptive and sustainable energy related risk management approaches.

Uniting a freely fluctuating price system with individual free choice, successful energy sector related risk management activities have the potential to be voluntarily *communicated and coordinated* through the economic transactions between energy producers and energy consumers. The absence of an economic transaction between an energy producer and energy consumer would suggest that a voluntary partnership is not profitable (i.e., too risky). In many ways, the most adaptive and sustainable energy sector risk management approaches may still be waiting to be discovered and these approaches may and/or may not embrace the electrical grid.

The diagram below is a visual representation of how economic security might emerge within an entrepreneurial security model.



**Figure 2.** Entrepreneurial Security

The free-market is a heterogeneous and dynamic complex adaptive economic system, where activities within the system are spontaneous, adaptive, decentralized, leaderless, and self-organizing. As it relates to the second question, in an entrepreneurial security model, national (i.e., macro) CIKR risk management percolates from the bottom-up (i.e., micro). Within the crucible of entrepreneurial friction, the most adaptive and financially sustainable national CIKR risk management solutions have the potential to spontaneously emerge.

The entrepreneurial approach to national CIKR risk management is, in a sense, Darwinian. The most sustainable, cost effective, and dynamic national CIKR risk management solutions have the potential to emerge through variation, selection, and replication.<sup>42</sup> This has been demonstrated by multitudes of individual entrepreneurs observing and interacting with each other.

### MEASURING SUCCESS

One of the challenging aspects of national CIKR risk management is how to measure success. For entrepreneurial security, successful CIKR risk management will occur at the price intersection where both a consumer and producer conduct a voluntary and consensual economic transaction.<sup>43</sup> In an openly competitive environment where prices are free to fluctuate, a voluntary economic transaction between a consumer and a producer would signal a profitable CIKR risk management activity. For entrepreneurial security, profit will not only be the catalyst for change – it will also be the arbiter of success.

Within an asymmetric threat environment, multitudes of diverse entrepreneurs will communicate, adapt and self-organize through the price system in order to manage risk and maximize their profit. In a decentralized and dynamic manner, a sustainable and national CIKR risk

management model will emerge from the bottom up. To revisit Smith's invisible hand from an entrepreneurial security standpoint, the economic actor "intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention."<sup>44</sup> As entrepreneurs individually manage risk and maximize profit using free market characteristics, they promote a more secure nation – an end that was no part of their intention.

### NATURAL SECURITY

The human immune system offers a corollary for describing the type of national CIKR risk management being recommended. In order to build immunity against harmful pathogens, a short-term sickness may sometimes facilitate the long-term defensive solution. For example, if antibiotics are the default remedy for the flu, the defenses of the immune system will deteriorate incrementally. Indeed, a potential danger of externally stimulating the immune system to avoid short-term illness is that such stimulation may render the immune system less adaptable and effective against injurious pathogens in the long-term.

However, if the body is allowed to naturally fight the flu in the short-term, a sustainably stronger and more resilient immune system will emerge. The immune system, from a "natural security" standpoint, is a complex adaptive security system. In terms of coordinating defensive activities, biologist Luis P. Villarreal suggests our immune systems do not "depend on a central authority, such as our brain, to initiate a response."<sup>45</sup> In fact, "our immune systems do this automatically, against old or new threats, with no central authority."<sup>46</sup>

To be clear, this article is not advocating a national CIKR risk management model that only reacts when there is a homeland security event. Furthermore, law enforcement and the military, respectively, will play critical homeland security and homeland defense roles. However, in an economic context, we should be soberly cautious in institutionalizing national economic security policies that may inadvertently possess

characteristics similar to immunosuppression.

### NEGATIVE EXTERNALITIES

One might argue that the market, from a risk management standpoint, cannot compensate for what economists call a negative externality (such as a terrorist attack). From a homeland security standpoint, Peter Orszag suggests:

The presence of a negative externality means that private markets will undertake less investment in security than would be socially desirable: Individuals or firms deciding how best to protect themselves against terrorism are unlikely to take the external costs of an attack fully into account, and therefore will generally provide an inefficiently low level of security against terrorism on their own. Without government involvement, private markets will thus typically under-invest in anti-terrorism measures.<sup>47</sup>

However, a negative externality is still a market variable. Additionally, there is evidence to suggest that economic actors take into consideration homeland security related concerns.

Research by James Hayes and Charles Ebinger indicate that businesses, in fact, do "consider security spending to be part of the 'investment' that a company must make to be successful and well-run firms will make that investment."<sup>48</sup> Additionally, businesses will "take into account the threat of terrorism on the financial well being and reputation of the firm and that inability to perceive risk is not to blame for the failure of firms to spend money on terrorism protection."<sup>49</sup> Significantly, Hayes and Ebinger indicate where a connection between government intervention and security spending exists, such a "relationship suggests that "crowding out" by government spending replaces private investment rather than supplements it."<sup>50</sup>

## CONCLUSION

Application of the entrepreneurial security model – although it is based in economic theory – addresses a number of CIKR risk management needs.

- **Sharing Information:** A competitive price system is a mechanism through which a diversity of all-hazard risk (i.e., CVT) information is shared across *all* CIKR sectors in a universal format that *all* CIKR stakeholders understand and have open access to.
- **Creating Partnerships:** The price system helps compel CIKR stakeholders across all CIKR sectors to voluntarily communicate and coordinate their risk management activities vis-à-vis each other (i.e., seek out their self-interest).
- **Adaptation:** In seeking out their individual self-interests (i.e., profit activity) and through voluntary interactions, CIKR stakeholders will have the potential to discover the most adaptive and financially sustainable risk management solutions.
- **Measuring Success:** The most appropriate CIKR risk management solutions will be realized when CIKR stakeholders (i.e., consumers and producers) make a consensual economic transaction.

For national CIKR risk management to be enduring within a complex adaptive economic system – which is to say financially sustainable and adaptive over the long run – two key elements need to be present: (1) prices must be realized through dynamic free-market competition, and (2) individual economic actors must be free to choose the most profitable risk management solutions vis-à-vis one another. As it relates to national CIKR risk management, an entrepreneurial security model would suggest transitioning from the current public-private partnership

model to a model that emphasizes and strengthens partnerships between consumers and producers.

If government financially intervenes in national CIKR risk management the true risk picture could be distorted. Furthermore, if the economic actor is also limited in their choices to address their risk, an open disequilibrium economic system could be in danger of inadvertently gravitating toward a closed equilibrium economic system. As it pertains to managing the risk of a complex adaptive economic system, the influence of freedom of choice and competitive prices are areas worthy of further research.

Again, the free market is a heterogeneous and dynamic complex adaptive economic system, where activities within the system are spontaneous, adaptive, decentralized, leaderless, and self-organizing. In attempting to effectively manage the risk to the components of a complex adaptive economic system, in a manner that is both adaptive and financially sustainable, the concept of entrepreneurial security could be beneficial.

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<sup>1</sup> Congressional Budget Office, *The Proposed Homeland Security Budget for 2013* (September 27, 2012), <http://www.cbo.gov/publication/43520>.

<sup>2</sup> Although entrepreneurial security has evolved, the original concept was presented at a conference in 2010. “Entrepreneurial Security: Transitioning from Security Consumption to Security Production,” *Fourth Annual Homeland Defense and Security Education Summit*, Washington, DC, February 2010.

<sup>3</sup> DHS, National Infrastructure Protection Plan (NIPP), 2, [http://www.dhs.gov/xlibrary/assets/NIPP\\_Plan.pdf](http://www.dhs.gov/xlibrary/assets/NIPP_Plan.pdf).

<sup>4</sup> Human action is a defining cornerstone for understanding how an economy functions within the Austrian School of Economics. Deborah L. Walker, “Austrian Economics,” *The Concise Encyclopedia of Economics* (The Library of Economics and Liberty, n.d.), <http://www.econlib.org/library/Enc/AustrianEconomics.html#abouttheauthor>.

<sup>5</sup> The specific CIKR policy documents below do not address the nature of a free-market system in enough detail necessary for constructing an appropriate CIKR model for protecting a free-market economy. US Department of Justice, *Presidential Decision Directive 63 – Protecting the Nations Critical Infrastructures*, <http://www.justice.gov/criminal/cybercrime/factsheet.htm>; *Homeland Security Act of 2002*; *Homeland Security Presidential Directive (HSPD) – 7*, <http://www.dhs.gov/key-dhs-laws>; *Implementing Recommendations of the 9/11 Commission Act of 2007*, <http://www.dhs.gov/key-dhs-laws>.

<sup>6</sup> Department of Homeland Security (DHS), *Critical Infrastructure Sector Partnerships*, <http://www.dhs.gov/critical-infrastructure-sector-partnerships> (accessed on December 11, 2012).

<sup>7</sup> For the purpose of the article, the free-market system is synonymous with a complex adaptive system/complex adaptive economic system. The idea to look at CIKR as a complex adaptive system came from an article written by Christopher Bellavita, “Changing Homeland Security: Shape Patterns, Not Programs,” *Homeland Security Affairs* II, no. 3 (October 2006) <http://www.hsaj.org/?article=2.3.5>.

<sup>8</sup> Melanie Mitchell, *Complexity: A Guided Tour* (Oxford: Oxford University Press, 2009), 13.

<sup>9</sup> Ibid.

<sup>10</sup> Eric D. Beinhocker, *The Origin of Wealth: The Radical Remaking of Economics and What it Means for Business and Society* (Boston: Harvard Business School Press, 2006).

<sup>11</sup> Ibid., 18.

<sup>12</sup> Ibid., 70.

<sup>13</sup> Ibid.

<sup>14</sup> Adam Smith, *Wealth of Nations* (Amherst: Prometheus Books, 1991), 351.

<sup>15</sup> See, *The National Infrastructure Protection Plan (NIPP)*, 27.

<sup>16</sup> Ibid., 32.

<sup>17</sup> Department of Homeland Security. *DHS Risk Lexicon* (2010), 30. <http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf>.

<sup>18</sup> Bellavita, “Changing Homeland Security: Shape Patterns, Not Programs.”

<sup>19</sup> Horst W. J. Rittel and Melvin M. Webber, “Dilemmas in a General Theory of Planning,” *Policy Sciences* 4, no. 2 (1973): 159. <http://www.jstor.org/stable/4531523>.

<sup>20</sup> Ibid.

<sup>21</sup> The idea of an asynchronous approach to infrastructure protection emerged through the author’s conversations with Jeff Maxfield regarding the online learning environment. See R. Jeffery Maxfield. “Online Education for Nontraditional Adult Students: Perceptions and Attitudes of Emergency Services Workers in Asynchronous Learning Environments.” (EdD diss., Utah State University, 2008), <http://digitalcommons.usu.edu/etd/114/>.

<sup>22</sup> Statement of Allan H. Meltzer, Congressional Oversight Panel, March 4, 2011, <http://www.gpo.gov/fdsys/pkg/CHRG-112shrg65276/html/CHRG-112shrg65276.htm>.

<sup>23</sup> See, Beinhocker, *The Origin of Wealth*, 19.

<sup>24</sup> Milton Friedman, *Capitalism and Freedom* (Chicago: University of Chicago Press, 1962), 15.

<sup>25</sup> For the purpose of this article, profit is synonymous with self-interest.

<sup>26</sup> For more information regarding the benefits of economic choice, see Milton Friedman and Rose Friedman, *Free to Choose: A Personal Statement* (Orlando: Harcourt, 1990).

<sup>27</sup> Jack High, "Entrepreneurship and Economic Growth: The Theory of Emergent Economic Growth," *Quarterly Journal of Austrian Economics* 12, no. 3 (Fall 2009): 5. The 2009 National Infrastructure Protection Plan (NIPP) mentions the entrepreneur once, within the context of the SAFETY ACT. Although the SAFETY ACT is an important aspect of CEKR risk management, this article suggests that there is a broader role for the entrepreneur as it relates to national CIKR risk management. See, US Department of Homeland Security. *The National Infrastructure Protection Plan* (2009), 89. [http://www.dhs.gov/xlibrary/assets/NIPP\\_Plan.pdf](http://www.dhs.gov/xlibrary/assets/NIPP_Plan.pdf).

<sup>28</sup> Ibid.

<sup>29</sup> Dan Mahoney, "Ownership, Scarcity, and Economic Decision Making," *Quarterly Journal of Austrian Economics* 5, no. 1 (Spring 2002): 43.

<sup>30</sup> Ibid.

<sup>31</sup> See, *Department of Homeland Security. DHS Risk Lexicon* (2010), 30. <http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf>.

<sup>32</sup> Using the price system as a tool for observing potential market impacts is different than the controversy surrounding the Policy Analysis Market (PAM), or what has been referred to as the "terrorism futures market." The price system, as used here, is seen as already existing mechanism economic actors can use to communicate and coordinate risk management activities. For more information regarding PAM, see Robin Hanson's "The Policy Analysis Market (and FutureMAP) Archive" (n.d.), <http://hanson.gmu.edu/policyanalysismarket.html>.

<sup>33</sup> Peter Boettke, "Austrian School of Economics," *The Concise Encyclopedia of Economics* (The Library of Economics and Liberty, n.d.) <http://www.econlib.org/library/Enc/AustrianSchoolofEconomics.html>.

<sup>34</sup> F.A. Hayek, *The Road to Serfdom* (Chicago: University of Chicago Press, 1944), 56.

<sup>35</sup> Hayek uses the example of tin. F.A. Hayek, *Individualism and Economic Order* (Chicago: University of Chicago Press, 1948), 85. Also, see Friedman and Friedman, *Free to Choose: A Personal Statement*, 15.

<sup>36</sup> See Beinhocker, *The Origin of Wealth*, 18.

<sup>37</sup> Israel M. Kirzner. "Entrepreneurial Discovery and the Competitive Market Process: An Austrian Approach." *Journal of Economic Literature* 35, no. 1 (March 1997): 72.

<sup>38</sup> Ibid.

<sup>39</sup> Department of Homeland Security (DHS), *Energy Sector-Specific Plan: An Annex to the National Infrastructure Protection Plan* (2010), 72, <http://www.dhs.gov/xlibrary/assets/nipp-ssp-energy-2010.pdf>.

<sup>40</sup> As it applies to national CIKR risk management, "The Department of Homeland Security has established the Critical Infrastructure Partnership Advisory Council (CIPAC) to facilitate effective coordination between federal infrastructure protection programs with the infrastructure protection activities of the private sector and of state, local, territorial and tribal governments." See, Department of Homeland Security (DHS), *Critical Infrastructure Partnership Advisory Council (CIPAC)*, <http://www.dhs.gov/critical-infrastructure-partnership-advisory-council>.

<sup>41</sup> See, *Energy Sector-Specific Plan: An Annex to the National Infrastructure Protection Plan*, 72.

<sup>42</sup> Raphael Sagarin, "Natural Security for a Variable and Risk-filled World," *Homeland Security Affairs* VI, no. 3 (September 2010) <http://www.hsaj.org/?article=6.3.4>.

<sup>43</sup> See, Friedman and Friedman, *Free to Choose: A Personal Statement*, 51.

<sup>44</sup> See, Smith, *Wealth of Nations*

<sup>45</sup> Luis P. Villarreal, "From Biology to Belief," in Raphael Sagarin and Taylor Terence, eds., *Natural Security: A Darwinian Approach to a Dangerous World* (Berkeley, CA: University of California Press, 2008), 44.

<sup>46</sup> Ibid.

<sup>47</sup> Peter R. Orszag, *Critical Infrastructure Protection and the Private Sector: The Crucial Role of Incentives*, testimony before the House Select Committee on Homeland Security (2003), [http://www.9-11commission.gov/hearings/hearing5/witness\\_orszag.htm](http://www.9-11commission.gov/hearings/hearing5/witness_orszag.htm).

<sup>48</sup> James K. Hayes and Charles K. Ebinger, "The Private Sector and the Role of Risk and Responsibility in Securing the Nation's Infrastructure," *Journal of Homeland Security and Emergency Management* 8, no. 1 (2011): 12, <http://www.bepress.com/jhsem/vol8/iss1/13>.

<sup>49</sup> Ibid.

<sup>50</sup> Ibid., 18.



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