

Economic Resilience: No Big Ideas Needed!

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“Resilience is a bastardized term ...
everyone talks about it, but no one knows what it is ...
much like porn; I will know it when I see it.”
- *Unknown*

Resilience is one of the most bastardized terms when it comes to planning and management jargon.¹ We all want resilience, yet it means drastically different things to many people. To some, resilience is the ability to respond to shocks and abrasions in the environment, while others think of resilience as the ability to continuously innovate and stay ahead of the curve so as not to become obsolete. Local communities are the subject of this paper and the space of resilience application. 100 Resilient Cities, funded through the Rockefeller Foundation, defines resilience as, “The capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.”² Definitions of resilience are plentiful in the scholarly literatures and the practitioner musings.^{3,4,5} Definitions are as varied as the background of the authors that have proposed them; we are not going to debate definitions in this piece.⁶ Instead, we will take several basic tenets as our starting points (akin to basic assumptions):

1. Resilience is *most often* desirable in order to ensure that organizations and systems have the ability to respond to shocks and changes in their environments and to be able to continue—or even improve—operations under ties of stress.⁷
2. Organizations and systems are complex entities. Complexity manifests itself in many different forms: from interdependence among components, to non-linear and emergent dynamics, and with an absence of centralized, top-down, control. That complexity within organizations makes it difficult to forecast the future. The unpredictability of complex systems requires systems to be dependent on feedback and self-organizing.⁸
3. Systems are highly interdependent and affect one another. Shocks can have cascading impacts across an entire ecosystem. Therefore, an open systems approach is necessary. Open systems have characteristics of redundancy and independency while still working towards a common overall goal. Open systems generally reject bureaucracy and closed decision-making and encourage participation and collaboration across sectors.
4. Systems have the opportunity to be resistant or resilient. Whereas a resilient system can function in a variety of possible states and is capable of withstanding and surviving large shocks, resistant systems operate within a narrow band of possible states, are designed to resist shocks, and can only handle small shocks.⁹

¹ Kevin C. Desouza, Trevor Flanery, Jaimy Alex, and Eric Park. *Getting Serious About Resilience in Planning*. (July 31, 2012). Planetizen.com. <http://www.planetizen.com/node/57827>; Kevin C. Desouza and Trevor Flanery. Designing, Planning, and Managing Resilient Cities: A Conceptual Framework, *Cities*, 35 (December), 2013, 89-99.

² The Rockefeller Foundation, 100 Resilient Cities. *What is Resilience?* <http://www.100resilientcities.org/resilience>

³ Stewart Pickett, Mary Cadenasso, and Morgan Grove. *Resilient cities: Meaning, metaphor, and models for integrating the ecological, socio-economic, and planning realms*. *Landscape and Urban Planning*, 69(4), (2004), 369–384.

⁴ Lawrence Vale, *Interrogating urban resilience*, In Haas (Ed.), *Sustainable urbanism and beyond* (2011). New York: Rizzoli

⁵ Crawford Stanley Holling. *Panarchy: Understanding transformations in human and natural systems*. (2002). Washington, DC: Island Press.

⁶ Jamais Cascio. *The Next Big Thing Foreign Policy*, (172), (2009) 92.

⁷ The current regime in power in North Korea is resilient; most would agree that in this case resilience is undesirable.

⁸ Sturle Hauge Simonsen. *Complex Adaptive Systems*. (2007) <http://www.stockholmresilience.org/21/research/what-is-resilience/research-background/research-framework/complex-adaptive-systems.html>

⁹ Joseph Fiksel, *Designing Resilient, Sustainable Systems*. (Environmental Science & Technology, 2003). 37.

5. Systems can experience sudden shocks, but can also go through gradual decline (slow-burn). When we think of resilience we must account for both of these facets of time horizon for impacts and understand that how a system responds both to abrupt changes in the long-term **and** short-run determines its resilience.¹⁰
6. Ensuring resilience is not free; there is an economic calculus that needs to be kept in mind. Estimating risk, and the cost and benefits of risk management, is inherently complex.¹¹ Systems determine an acceptable level of vulnerability and exposure to risk in exchange for the amount of risk reduction they are willing to pay for in terms of prevention and preparation. Quantifying future potential risks is difficult.

Steady decline with bursts of change

Ecologist C. S. Holling noted that all systems exhibit comparable patterns of *decreasing* resilience which are interrupted by periods of crisis, transformation, and renewal.¹² Periods of crisis, transformation, and renewal impact the consistency and shifts in resilience. The periods of upheaval are extremely important today with the growth in population across the world and the dispersion of the global population. It has been estimated that three-fourths of the world's population will live in cities by 2050.¹³ Urbanization, coupled with the effects of globalization and technological change, means that if one city experiences crisis, it is likely that residents in another city will feel the impacts. For instance, international prices for food increased sharply between 2005 and 2008. Wheat and rice prices were hit the hardest during this time. The food crisis stemmed from a number of reasons but the most prominent were poor wheat harvests in the U.S. and Europe and a drought in Australia. International prices for cereal skyrocketed and at least 30 cities internationally experienced food riots.¹⁴ When the shortage was evident, other large grain producers like India and Thailand had no buffer crops and limited exports which put more pressure on prices. Other kinds of international issues such as fuel prices, climate patterns, the U.S. subprime mortgage crisis, individual diet changes, and global poverty reduction all played a role in exacerbating the food crisis.¹⁵ A large driver of the international food crisis was the economic components. Issues with taxing, policies, trading, and investing all played a significant role in the development and the continuation of the crisis.

Economic vulnerability and economic resilience play a strong role in cities' resilience. Economic vulnerability is an entities proneness to exogenous shocks coming from economic features such as economic openness, export concentration, and dependence on strategic imports. Economic resilience is the ability of an organization, whether it is a business or a city or even a country, to withstand the

¹⁰ Else Grete Broderstad and Einar Eythórsson, *Resilient Communities? Collapse and Recovery of a Social-ecological System in Arctic Norway*. (Ecology and Society, 2014). 19(3): 1.

¹¹ Richard Mechler and The Risk to Resilience Study Team, *From Risk to Resilience #1: The Cost-benefit Analysis Methodology* (Risk to Resilience Working Paper No. 1). M. Moench, E. Caspari, & A. Pokhrel (Eds.). (Kathmandu, Nepal: Institute for Social and Environmental Transition-Boulder, Institute for Social and Environmental Transition-Nepal, & Provention Consortium, 2008). I-S-E-T.org. <http://i-s-e-t.org/resources/working-papers/risk-to-resilience.html>

¹² Crawford Stanley Holling, *Understanding the Complexity of Economic, Ecological, and Social Systems*. (Ecosystems, 2001). 4: 390–405.

¹³ United Nations, *World Urbanization Prospects: The 2011 Revision*. (2011).

http://esa.un.org/unup/pdf/WUP2011_Highlights.pdf

¹⁴ Afsar Jafri, *Food Crisis Exposes Failings of India's Economic Reforms*. Focus on the Global South. Focusweb.org.

<http://focusweb.org/node/1369>

¹⁵ Ashish Shenoy, *The Integration of the Indian Wheat Sector into the Global Market*. Thesis. (Stanford, 2008). Stanford.edu.

https://economics.stanford.edu/files/Honors_Theses/Theses_2008/Shenoy.%20A.%202008.pdf

impacts of financial and economic shocks and to bounce back quickly, or to avoid shocks through proactive planning and interventions.

The Ideally Resilient City

In an ideal world, a city would be economically resilient, if it exhibits the following:

1. Be able to **sense changes** in its economic environment such as being able to look at how its economic base and industries are changing and morphing and how they align with broader trends in overall global economy.
2. Be able to **make proactive interventions** to ensure that it can deal with changing economics – i.e. revitalizing its revenue sources, attracting new businesses (to address the fact that we might see a decline or closure of businesses and this helps to keep jobs, etc.) – this is especially true for situations where we see a slow burn (e.g. think of the rustbelt or Detroit region).
3. In the case that a city has to deal with an unpredictable or sudden financial shock, the city should **have the requisite slack resources and authority to move resources** where needed to address immediate needs, without major disruptions to their overall operations and the quality of life of the residents.
4. The city should be **able to recover from crises in a cost-effective and timely manner** and when they do bounce back, they need to do so in a manner that ensures that they have learned from the experience and are economically stronger and better prepared for the next change.

Absorb and Advance

For economic resilience, key is the ability of the policy and institutional framework to absorb the initial impact of shocks and reduce an output gap. For cities dealing with persistent problems, a policy and institutional framework, or lack thereof, can either be extremely helpful or troublesome.

For instance, the City of Scranton, Pennsylvania has been experiencing financial hardship since the 1950s, and even with state interventions, they still have not been able to recover. They lost their main industry and they have experienced an eroding tax base, an aging population, and rising retiree and personnel costs. In addition to this, Scranton also defaulted on a parking authority bond which placed them in a precarious position with lenders and banks. In 1992, Scranton entered into Pennsylvania's Act 47¹⁶ program, which provides loan and grant money to financially distressed governments as well as financial planning and oversight. However, Scranton failed to improve under the program due to a variety of issues between Scranton and the State of Pennsylvania such as Scranton's leadership's lack of follow-through of early recovery plans and financial sanctions that followed. Today, Scranton is still flailing. Exogenous factors such as the recession and endogenous factors such as poor investments, outstanding payments to debtors, the loss of credit access, and divisive leadership have led Scranton to the brink of bankruptcy.¹⁷ While Pennsylvania's intervention wasn't enough to help Scranton, other states have put in place plans for cities in various stages of distress to help lessen financial ruin.

¹⁶ Eric Holmberg, *What Pittsburghers Need to Know About the Act 47 Plan*. (June 14, 2014). <http://newpittsburghcourieronline.com/2014/06/14/what-pittsburghers-need-to-know-about-the-act-47-plan/>

¹⁷ Josh Barro, *Scranton: When Your City Needs to Go Bankrupt*. (July 19, 2012). [Bloomberg.com. http://www.bloomberg.com/news/2012-07-19/scranton-when-your-city-needs-to-go-bankrupt.html](http://www.bloomberg.com/news/2012-07-19/scranton-when-your-city-needs-to-go-bankrupt.html)

The most aggressive U.S. state involved in local government debt oversight is North Carolina. Their program actually stems from the Great Depression when over 400 local governments and public authorities in the state defaulted on their debt.^{18,19} The Local Government Commission (LGC) was developed to sign off on all local debt issuance and, today, still monitors local property tax intake and will not permit localities to issue debt if fund balances drop below a certain point. North Carolina officials claim that LGC oversight is the main reason the state's municipalities have strong credit ratings today.²⁰ Other states such as Tennessee, New York, and Pennsylvania (albeit after the poor performance of their Act 47 program) have similar, less aggressive programs. Most U.S. states do not have such frameworks developed and therefore catch local financial problems when it is too late.²¹

Cities such as Scranton are not unlike other cities internationally that are failing, albeit in unique ways, and are extremely vulnerable and exposed to risk. True to the notion that resilience is an elusive concept that is difficult to utilize in its totality, we assert that economic resilience is so difficult to pinpoint and establish because issues such as location, industry mix, financials, economic development data, risk, exposure, vulnerability, and rigidity are all varied components of resilience.

In most cases, it is easier to know when a city is *not* economically resilient. This can be seen when a city is

1. going bankrupt, or is already bankrupt
2. failing to attract new sources of revenue and is seeing its existing revenue sources diminish
3. failing to attract new business and provide a platform for entrepreneurship and seeing an exodus of the creative class
4. unable to maintain its existing infrastructure and we see a decline in the provision of public services
5. unable to design partnerships with the private sector due to weak financial positions
6. unable to complete an appraisal of the environmental risks
7. limited in its ability to innovate

In this paper, we will explore the many facets of economic resilience, drivers of economic resilience, investing in resilience, and the risks of resilience planning. Additionally, we will offer domestic and international examples of cities that have experience with resilience planning, either through risk reduction or after-the-fact resilience planning. Finally, we will conclude with a discussion on the realities of economic resilience.

¹⁸ North Carolina State Treasurer. *About the Local Government Commission*. Nctreasurer.com. <https://www.nctreasurer.com/slq/Pages/Local-Government-Commission.aspx>

¹⁹ Edward Alden. *Policy Initiative Spotlight: North Carolina's Local Government Commission*. (North Carolina, June 15, 2012). CFR.org. <http://blogs.cfr.org/renewing-america/2012/06/15/policy-initiative-spotlight-north-carolinas-local-government-commission/>

²⁰ Stephan Fehr, *North Carolina Agency Is Local Government Lifeline*. (North Carolina, June, 2012). PEWtrusts.org. <http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2012/06/06/north-carolina-agency-is-local-government-lifeline>

²¹ Liz Farmer. *Bankrupt Cities? What About Distressed Cities?* March 2014. Governing.com. <http://www.governing.com/finance101/gov-bankrupt-cities-overshadow-distressed.html>

Economic Resilience: Many Facets

Economic resilience is the ability to maintain output in the aftermath of shocks and can be measured, at the least, by these actions: the extent to which shocks are mitigated and the speed in which economies can revert back to normal following the shock.²² Economic resilience is extremely important to cities. Cities have important roles that contribute to the national and global economy that cannot and should not be ignored. Cities own and/or operate assets and services such as airports, ports, main highways, farms, plants, and industries that have an impact on the wider economy.

At a simple level, economic resilience used to be thought of in terms of single employers, large 'company town' entities that could devastate a local community if they contracted or left. Now we think of whole industries, think automotive to southeast Michigan and the entire Great Lakes/Ontario. Economic resiliency has gotten more complicated and multi-faceted with the connected global economy.

Shocks at the local level can escalate up to the national and global level and vice versa. For instance, a study by Miguel and colleagues found a significant relationship between national GDP growth and incidence of civil wars in areas of sub-Saharan Africa.²³ Conversely, national shocks such as the 2007/2008 recession had large effects on local economies. Cities experienced local businesses closing and laying off employees and lower tax revenue because businesses were doing poorly and fewer federal tax dollars were available to fund day-to-day operations. The 'Great Recession' caused city services such as libraries, pools, snow plowing, and community development to receive cuts. At the height of recession, cities in the U.S. such as Philadelphia proposed cutting their Office of Housing and Community Development budget by 40%, their Streets Department by 28%, their Free Library system by 20% and a host of other reductions across other departments.

Economics of Disaster and Infrastructure Management

A clear dimension of economic resilience is the ability of a city to respond to damages to its infrastructure due to gradual decay or sudden impacts (e.g. due to natural disasters). Ideally, cities must plan for their infrastructure on a continuous basis and make timely improvements rather than waiting for a major disaster to strike and needing to find funding to support their needs all at once. Long-term investment and preparation is easier said than done but it is necessary. Cities that don't plan or poorly plan for the acute disasters can be equated to homeowners who live in a flood plain with no insurance or people that live in tornado-prone areas but do not have access to an underground storm shelter. Cities must know their assets and make genuine strides to protect them, to minimize impacts when they occur, to pre-plan the recovery. If not, disasters and shocks have lingering effects for years.

For instance, the City of New Orleans is located on the lower portion of the Mississippi River where flooding from the river and hurricanes have been commonplace since the city was established. In a little under 300 years, the New Orleans area has experienced at least 27 major floods, one major flood every eleven years, about the time it takes to progress from first grade to high school graduation. In its history, local and federal agencies worked to protect New Orleans from extreme flooding by erecting protective levees which kept the City moderately safe until Hurricane Katrina in August 2005. Hurricane Katrina flooded approximately 80% of the city, caused a forced and extended evacuation, an extensive

²² Lukas Vogel and Romain Duval, *Economic Resilience to Shocks*. (OECD Journal: Economic Studies 2008). 1-38.

²³ Edward Miguel, Shanker Satyanath and Ernest Sergenti. *Economic Shocks and Civil Conflict: An Instrumental Variables Approach*. (Journal of Political Economy, 2004). 112- 4. http://eml.berkeley.edu/~emiguel/pdfs/miguel_conflict.pdf

relocation of residents, disrupted municipal services for months, left city buildings and residences damaged, loss of life, destruction of key economic drivers such as oil platforms, refineries, and sugar farms, and exposed the ineptness of the local and federal governments' disaster management.

Post-Hurricane Katrina, it was estimated in 2008 that the total economic loss from the hurricane was as high as \$250 billion due largely to disrupted oil and gas production effects on national GDP, damage to Louisiana's sugar industry (valued at \$500 million annually), chemical plants, and the entertainment industry.²⁴ Three years after Hurricane Katrina, the U.S. Gulf Coast was struck again by Hurricane Gustav. Gustav was far less forceful in physical ferocity than Katrina but it had a similar impact due to other economic factors. During 2008, the U.S. was entering a recession and was suffering a housing crisis, credit crunch, and unemployment. It was estimated that Gustav cost the insurance industry \$6 to \$10 billion in insured losses; a fraction of the \$41 billion insured losses that occurred after Hurricane Katrina. However, due to the strength and resilience of the overall national economy during Hurricane Katrina, the losses were large but not extremely devastating. Three years later in 2008, the weaker Gustav storm was extremely costly to an already weakened economy. The greatest negative economic effect of Gustav was on energy; prices for crude oil, gas, and natural gas prices rose significantly.²⁵

Other poorly laid foundation in coordination, emergency management, enforcement, and regulations have a strong effect on economic resilience. Regulatory frameworks tend to not evolve with risk patterns and can have spillover effects when disaster strikes. For instance, in 2012 when Hurricane Sandy hit New York, many property owners were not insured due to a regulation that only required property owners to purchase insurance if their property was inside the Federal Emergency Management Agency's (FEMA) 100 year return floodplain projects.²⁶

Enforcement is another large issue. When regulations are set, some governments are not enforcing them adequately. For instance, according to the Organization for Economic Co-operation and Development (OECD), 60% of new buildings constructed in Mexico since 2011 were built illegally, many could be assumed to not be in compliance with state building codes.²⁷ Coordination gaps in emergency management also affect the economic resilience of a city. The past decade is rife with instances of poor emergency coordination that exacerbated disasters. Emergency management largely counts on the local government and responders to have a plan in place to handle crisis. Absent a crisis plan or adequate resources or training to carry out the plan, cities experience chaos that lengthens the disasters which happened during Hurricane Katrina in the U.S., the Earthquake in Chile, terrorists' attacks in Norway, and the Great East Japan Earthquake in Japan (whose facilities were destroyed during the disaster so they had no capacity to respond).

The financial burden that disaster planning and mitigation places on cities can be exorbitant. After the financial crisis of 2007/2008, all countries in the OECD experienced slowed economic activity and tax revenue all while public demand for services remained consistent or increased. Gross debt²⁸ has

²⁴ *UNT Experts Can Discuss Tropical Storm Gustav and Hurricane Katrina's 3rd Anniversary*. (University of North Texas, August 28, 2008). UNT.edu. <http://news.unt.edu/news-releases/unt-experts-can-discuss-tropical-storm-gustav-and-hurricane-katrin-as-3rd-anniversary>

²⁵ *Comparing the Impacts of the 2005 and 2008 Hurricanes on U.S. Energy Infrastructure*. (Infrastructure Security and Energy Restoration Office of Electricity Delivery and Energy Reliability U.S. Department of Energy, February 2009). DOE.gov. <http://www.oe.netl.doe.gov/docs/HurricaneComp0508r2.pdf>

²⁶ City of New York. *A Stronger More Resilient New York*. (Mayor of New York, New York City, 2013).

²⁷ OECD, *OECD Reviews of Risk Management Policies: Mexico 2013, Review of the Mexican Civil Protection System*. (OECD Publishing, Paris 2013).

²⁸ Gross debt entails the general government financial liabilities as a percent of nominal GSP; weighted averages

increased from an average of 80% in 2004 to an estimated 112% across OECD countries in 2013. In this reality, justifying investments into disaster planning and uncertain shocks when there are definite day-to-day expenses is difficult and sometimes does not make much practical and political sense for authorities. The challenges in risk mitigation extend beyond financial measures.²⁹ In 2010, a volcanic ash cloud formed over Iceland. Authorities didn't know how much ash would be dangerous to airplane engines flying in and out of the affected area so they grounded all flights; which was correct as a precautionary measure, but, extremely expensive for all involved. It has been estimated by the European Union transportation commissioner that the episode cost airlines £2.15 billion in supporting stranded customers, bringing stranded customers home, and loss of revenue of people who chose not to rebook their missed flights.^{30,31} Almost every country with an international airport experienced some type of disruption due to the grounded flights in Iceland, airline kerosene demand fell by 1.2 million barrels a day, compared with 4.3 million barrels consumed on a normal day, and PricewaterhouseCoopers estimated that each week of disruption destroyed around 0.025%-0.05% of annual British GDP. Cascades of impact in an emergency are real.

Cities looking for resilience must weigh the cost and benefits of resilience planning. The effects of disasters are undeniable; OECD's *Boosting Resilience through Innovative Risk Governance* report estimated in 2014 that earthquakes, social unrest, industrial accidents, terror attacks, pandemics, and other disruptive events cost both advanced and emerging nation around \$1.5 trillion in damages and economic losses.³² However, the uncertainty of shocks occurring and the reality of what it takes to make significant investments into resilience, especially when there are other investments to be made into projects with more immediate gains, makes disaster planning somewhat unappealing.

Economics and Industries

A city's economy consists of industries that are connected with each other and the city through the exchange of products, transactions, and employment. Economic growth depends largely on economic complexity, which considers the industrial composition of an area. The more ubiquitous and diverse the network of industries in a given region, the greater is the likelihood that it will be economically resilient.

Yicheol Han and Stephan Goetz hypothesized that in addition to economic growth, economic complexity affects resilience by having more diverse economic activities, sources of growth, and flexible responses to shocks.³³ They go on to note that developed countries who have more complex economies tend to have redundant economic systems that guard against failure of any one industry because there are alternative routes to connect or reconnect industries without massive losses occurring. In smaller economies where there are only one or two industries present, a disaster from one

²⁹ OECD, *OECD Economic Outlook No. 93*. (Statistical Annex, OECD Publishing, Paris, 2013).

³⁰ Graeme Wearden. *Volcanic Ash Cloud Costs Thomas Cook £70m*. (May, 2010). The Guardian.com. <http://www.theguardian.com/business/2010/may/13/thomascookgroup-iceland-volcano>

³¹ Adam Gabbatt. *Volcanic Ash Cloud Cost European Business Up to €2.5bn, says EU*. (April, 2010). The Guardian.com. <http://www.theguardian.com/world/2010/apr/27/iceland-volcano-cost-business-europe>

³² OECD, *OECD Boosting Resilience through Innovative Risk Governance*. (OECD Publishing, 2014). Keepeek.com. http://www.keepeek.com/Digital-Asset-Management/oecd/governance/boosting-resilience-through-innovative-risk-management_9789264209114-en

³³ Yicheol Han and Stephan J. Goetz, *Predicting the Economic Resilience of US Counties from Industry Input-Output Accounts*. (April 5, 2013). NARDep.info.

http://www.nardep.info/uploads/Predicting_the_Economic_Resilience_of_US_Counties_by_Han_and_Goetz_SRSA_2013B.pdf

industry spreads quickly to the others rendering a crisis for the entire local economy since no options exist to counteract the disaster.

However, even cities with economic complexity are not safe from disaster. In addition to economic complexity to provide back-up, cities, regions, and countries must lay the foundation for these back-ups to be effective. For instance, after the Great East Japan Earthquake (GEJE), nearly 700 businesses went bankrupt. Most of the businesses were outside of the earthquake-affected areas but had connections to other businesses and supply chains within the affected area. According to the World Bank, only 40% of the large companies and 12% of the medium-sized businesses had a business continuity plan in place.³⁴ In the United Kingdom after the 2007 floods, businesses experienced 8.75 days of interruption with a survey revealing that 90% of the affected businesses were underinsured and 41% had no business continuity insurance.³⁵

Cities with a high industrial concentration tend to be vulnerable to risk. With high industrial concentration, cities have a reliance on a few types of services or products. For instance, during the mid-1990s to 2000s, Silicon Valley- a city synonymous with innovations in technology- found itself flush with cash. At that time, venture capitalists were pumping money in to Silicon Valley. Between 1995 and 2000, approximately \$65 billion, or nearly one-third of the nation's venture capital investments, were invested in Silicon Valley which created significant growth in new start-ups and employment in the technology-based industry. The growth of Silicon Valley prompted a surge on stock purchases and created a 'dot-com bubble,' however, in 2000, the bubble burst and the industry collapsed. Following the dot-com bust, many businesses had to lay off employees or close entirely.³⁶

The same is true for other highly concentrated industrial towns. The City of Pittsburgh, Pennsylvania was steel capital of the world in the latter half of the 1800s due to its unique natural resources, a new process to make steel³⁷, the high demand for railroads, and a large financier of steel, Andrew Carnegie.³⁸ However, the steel industry collapsed as a number of factors such as depleting resources, rising material costs, labor relationships, and an outdated manufacturing base began to slow the industry. Following the 1981/1982 recession, Pittsburgh began to implode and had major negative effects on railroads, mines, and other businesses in the region; similar to the effect the automobile industry had on the City of Detroit. For both cities to bounce back from collapse, they had to reshape themselves into something new and not rely solely on the one industry.³⁹

Economics and Wealth Concentration

The U.S. city of Newark, New Jersey was unable to change itself before it was too late. Newark, in the late-nineteenth century, was a center of industrial production that actually rivaled New York; in particular, they had a large leather industry and one of the largest ports of the United States. However,

³⁴ World Bank Institute, *Learning from Megadisasters: Set of 32 Knowledge Notes*. (World Bank Institute, The World Bank, Washington D.C. 2008). Worldbank.org. <http://wbi.worldbank.org/wbi/megadisasters>

³⁵ Michael Pitt, *Learning Lessons from the 2007 Floods*, The Pitt Review. (UK Cabinet Office, London, 2008).

³⁶ Amar Mann and Tian Luo, *Crash and reboot: Silicon Valley high-tech employment and wages, 2000-08*, www.bls.gov. <http://www.bls.gov/opub/mlr/2010/01/art3full.pdf>

³⁷ The Bessemer steel-making process consisted of air blown through molten iron in a five-to-seven-ton, egg-shaped Bessemer converter.

³⁸ William S. Dietrich II, *A very brief history of Pittsburgh*, Pittsburghquarterly.com. Fall 2008.

<http://www.pittsburghquarterly.com/index.php/Region/a-very-brief-history-of-pittsburgh.html>

³⁹ David Streitfeld, *For Pittsburgh, There's Life After Steel*, New York Times. January 2009.

http://www.nytimes.com/2009/01/08/business/economy/08collapse.html?pagewanted=all&_r=0

Newark began a gradual decline in industrial production in post-war twentieth century due to the migration of the middle-class to suburbs. Unable to keep up with New York, who experienced similar middle-class migration but was able to annex neighboring suburbs to maintain tax revenue, Newark failed at annexing neighboring suburbs and lost tax revenue and much of its industries. Other progressive shocks were experienced by Newark such as racial tensions between blacks escaping segregation and poverty in the south and whites; decreasing number of jobs; and the tipping point, which came in 1967, in the form of riots that left significant property damage and 27 people dead.⁴⁰ The riots also became a symbol of the decline of Newark and made it less attractive to businesses and tax-paying individuals who might move to that area.⁴¹

Another aspect of gradual decline in cities is socio-economic gaps. With rapid urbanization comes the deepening of socio-economic inequalities and urban poverty. Marginalized and poor populations in cities may lack access to land, political voice, legal recourse, and a sense of safety, much less basic infrastructure and services.⁴² Cities cannot be economically resilient if there are huge socio-economic gaps in the form of income inequality and disenfranchised populations. Common practices in cities serve inequality and the furthering of social stratification. Marcus Collier and colleagues assert that for resilience to be developed, solutions must address existing socio-economic, cultural, and historic urban development challenges.⁴³ Addressing all three challenges is a complex problem for planners and practitioners. Quite often, cities focus one or two issues that have been deemed a major challenge for the city. However, this type of strategy responds to the initial issue but does not respond to the other, more complex aspects of resilience that must be improved on.⁴⁴

For instance, many new housing developments are built to specific price ranges, thus creating income homogeneity within neighborhoods. This helps create neighborhoods that are gentrified or ghettoized and furthers a restructuring of the city that reinforces segregation amongst race and class.⁴⁵ In 2005, a violent riot erupted in Paris where cars and public buildings were burned after North African youths were electrocuted when jumping a fence surrounding a transformer as they were allegedly running from police. The social unrest was blamed on the French government's failure to integrate immigrants into the country's broader society. The immigrants experienced heavy unemployment and were housed in government-subsidized apartments on the outskirts of industrial cities. In effect, the immigrant populations were poor, discriminated against, and isolated with a lack of quality job opportunities.^{46,47}

⁴⁰ Julia Vitullo-Martin, *Facing its Past, Newark Gets Ready for its Future*. July 2007. Manhattan-institute.org. http://www.manhattan-institute.org/email/crd_newsletter07-07.html

⁴¹ Tahl Kaminer, *The Decline of the Industrial City: The Limits of Neoliberal Urban Regeneration*. (Amsterdam/Delft, The 4th International Conference of the International Forum on Urbanism (IFoU), 2009). IFoU.org. [http://newurbanquestion.ifou.org/proceedings/2 The New Urban Economy/A011_Kaminer_Tahl_The Decline of The Industrial City.pdf](http://newurbanquestion.ifou.org/proceedings/2%20The%20New%20Urban%20Economy/A011_Kaminer_Tahl_The%20Decline%20of%20The%20Industrial%20City.pdf)

⁴² Anna Brown, *How Urban Resilience Can Make Cities and Nations Safer from Disasters*. (Rockefeller Foundation, July 2014). Rockefellerfoundation.org. <http://www.rockefellerfoundation.org/blog/how-urban-resilience-can-make-cities>

⁴³ Marcus J. Collier, Zorica Nedovic-Budic, Jeroen Aerts, Stuart Connop, Dermot Foley, Karen Foley, Darryl Newport, Siobhán McQuaid, Aleksander Slaev, and Peter Verburg, *Transitioning to Resilience and Sustainability in Urban Communities*. (Cities, 2013). 32: S21-S28.

⁴⁴ Derek Antrobus, *Smart Green Cities: From Modernization to Resilience?* (Urban Research and Practice, 2011). 4-2: 207–214.

⁴⁵ Michael Batty, Joana Barros, and Sinesio Alves Junior. (2004). *Cities: Continuity, Transformation, and Emergence*. CASA Working Paper Series, Number 72. (Centre for Advanced Spatial Analysis (CASA), University College, London, 2004).

⁴⁶ *Ghettos shackle French Muslims*. (BBC News, October, 2005). BBC.co.uk. <http://news.bbc.co.uk/2/hi/europe/4375910.stm>

⁴⁷ Craig Smith, *Chirac Appeals for Calm as Violent Protests Shake Paris's Suburbs*. (New York Times, November 3, 2005). NYTimes.com. http://www.nytimes.com/2005/11/03/international/europe/03paris.html?_r=0

It is no secret that a lack of opportunities and sheer poverty are taxing on the individuals experiencing it but, also, on society. In a study by Mani and colleagues, the researchers found that poverty significantly impedes cognitive functions.⁴⁸ That is, being poor does not only affect an individual's financial status; it also affects other cognitive functions due to the sheer load of cognitive stress of constantly being concerned about finances. This means that those in poverty have a difficult time with committing to productive behaviors such as being attentive parents, acquiring preventative health care, arriving on time and keeping appointments, being productive, and effectively managing their finances—all counterproductive behaviors that further poverty and lessen resilience.

This has significant impact on cities when considering how to manage and elevate their poorest residents to increase their social standing to increase resilience. It has been established that disasters affects the poor the most.⁴⁹ For instance, it was reported that a massive earthquake in Turkey in 1999 had such a devastating impact because building codes were repeatedly violated. Had those codes been honored and enforced, authorities projected that buildings could have withstood the earthquake. Along with the failure to enforce building, attention was placed on the poor individuals living in those areas. Due to poverty, poor individuals moved (by necessity) into what they knew was cheap housing which ultimately led to the furthering of their impoverished state, and even their death.⁵⁰

In addition to poverty and social unrest, socio-economic inequality also plays a large role on provision of services and taxes, and on spatial issues. Megacities such as Mumbai, Tokyo, Delhi, Mexico City, New York, Shanghai, Sao Paulo, Lagos and Mexico City are experiencing all of the effects of mass urbanization. Many of these cities have long had slums that lack the basic amenities and infrastructure present to handle the huge population growth. Although there is growing recognition on the informal economy, little to no formal public investments have been made into slum areas, and now the cities must deal with the economic impact of mass migration and how to manage resilience within these confines.

For instance, city authorities in Mumbai have made a concerted effort to assess the amount of risk the city bears and has created initiatives to mitigate those risks. Mumbai is India's largest city and it is the sixth largest metropolis in the world. It contributes 33% of India's tax collection and is a large financial center for the country with large a pharmaceutical and film production industry and is home to many multi-national corporations. Due to its insular location, extreme population, and structural density, India is at risk of hydrological and climatological disasters (floods, tornadoes, sea erosion), geological disasters (earthquake and landslides), chemical and industrial disasters (gas leaks), accidental disasters (fires, oil spills, major building collapses, air, road, and rail accidents), and epidemics (malaria, swine flu, gastroenteritis). To reach an acceptable level of risk, Mumbai authorities have begun projects such as large drainage systems in densely populated areas, rehabilitation of old drains, installation of pumping stations, portable dewatering pumps, widening of rivers, automatic weather stations, flow gauges, tornado shelters, and new state of the art emergency operation center in all wards to mitigate risk.

⁴⁸ Anandi Mani, Sendhil Mullainathan, Eldar Shafir, and Jiaying Zhao, *Poverty Impedes Cognitive Function*, Science 341 (6149), (2003), 976-980.

⁴⁹ UNDRO, *The Protection of Human Settlements from Natural Disasters*, Geneva, Feb. 24, 1976.

⁵⁰ Mary B. Anderson, *The Impacts of Natural Disasters on the Poor: A Background Note*, World Bank, 2001.

<http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/Background/anderson.pdf>

Economics and Gradual Decline

Cities often deal with issues of gradual decline or a slow-burn. Take, for instance, the North East England city of Hartlepool in Britain's rustbelt: a small city that is largely maritime industry-based. In 2008, Hartlepool was crippled by the recession having experienced failing local businesses, a local unemployment rate almost twice the national average, and high housing prices. Hartlepool declined as did many small, one-industry towns. Conversely, the British city of London moved out of recession swiftly due to deindustrialization and diversifying and developing a strong service-sector economy.⁵¹

Cities such as Hartlepool are experiencing a less discussed aspect of resilience: increasing resiliency when the city is in a gradual decline or a slow-burn. A gradual decline is a city's decrease in resilience and increased exposure to vulnerabilities and risk. Oftentimes, shocks are viewed as sudden changes in cities, but these shocks are often not abrupt, rather marking their tipping point. In fact, resilience usually declines by progressively smaller shocks, eventually plunging the system into crisis or chaos. According to the Commonwealth Scientific and Industrial Research Organization (CSIRO), we live in yesterday's cities.⁵² The urban patterns present today are remnants of past urban policy and decision-making that needs to be modified. Cities' gradual declines are the infrastructure decisions of the past existing in contradiction against the directions of today.

In order to lessen those contradictions, cities must act swiftly to turn themselves into cities of the future. The City of Turin, Italy exhibited resilience after moving away from past glory and settling into new opportunities. Turin was once a large automobile manufacturing city: one could compare it with Detroit. In 1982, carmaker Fiat abandoned its automobile factory in Turin. This had a domino effect on Turin and in the course of a decade, over 100,000 jobs were lost and their industrial sector continued to decline. In the 1990s, the old factory and nearby spaces were redesigned into a commercial district that would host a shopping mall, multiplex, hotels, art gallery, meeting rooms, helipad, and restaurants.⁵³ The repurposing of 60% of Turin's land has allowed for a growing tourism sector with more investments made into the city.⁵⁴

Economics and Taxation Policies

When cities are searching for economic resilience, another important driver of resilience is the characteristics of the economy. City tax structure is an important determinant for resilience for a number of significant reasons. First, tax systems can support competitive markets by directing attention to the long-term needs of the community such as entrepreneurial risk taking or resilience planning. Second, a tax system that can enhance growth is important because it makes taxes not just about funding current projects but also the future. Lastly, consistent, growth-focused taxation is a stronger

⁵¹ *The Urban Ghosts*. (The Economist October 12, 2013). Economist.com. <http://www.economist.com/news/britain/21587799-these-days-worst-urban-decay-found-not-big-cities-small-ones-urban-ghosts>

⁵² Commonwealth Scientific and Industrial Research Organization (CSIRO), *A Research Prospectus for Urban Resilience, A Resilience Alliance Initiative for Transitioning Urban Systems Towards Sustainable Futures*. (Australia, Arizona State University, February, 2007). Citiesforpeople.ca. http://www.citiesforpeople.ca/wp-content/uploads/2014/02/urbanresilience_researchprospectusv7feb07.pdf

⁵³ Stephan Faris, *What Torino Can Teach Cleveland*. (Torino, December, 2010). TIME.com. http://content.time.com/time/specials/packages/article/0,28804,2026474_2026675_2034641,00.html

⁵⁴ Kevin Desouza, Trevor Flanery, Jaimy Alex, and Eric Park, *Getting Serious About Resilience in Planning*. (July 31, 2012). Planetizen.com. <http://www.planetizen.com/node/57827>

practice for creating resilience because it maintains consistency even through crisis and prevents the locality from over-taxing citizens after a disaster occurs.⁵⁵

However, the world is rife with examples of cities, states, and countries that have failing tax systems that continue to keep their organization in a state of vulnerability and risk. Shocks affect the level of tax collection as well as the stability and predictability of revenue. In some cases, tax revenues aren't enough to keep a city afloat and growing. This is the case with many fragile states that rely heavily on one source of domestic revenue: non-renewable natural resources. Limited or inequitable taxing systems keep cities and states from growing a robust economy and also stifle the voices of the people. Cities must meet the challenge of growing a tax system that fosters resilience and sustainability.

Nordic countries Denmark, Finland, Iceland, Norway, and Sweden have had a successful form of government and tax policies that are aimed at promoting social mobility and stabilizing the economy. Although differences exist across the countries, the Nordic countries' economic system utilizes extensive benefit levels, income redistribution, and the liberal use of expansionary fiscal policy.⁵⁶ Nordic countries are mainly funded through taxation and are a more individualistic society that provides extensive welfare provisions and chooses not to intervene in market issues.⁵⁷ This is opposite to the U.S. who provides moderate welfare provisions to citizens but intervenes drastically to protect big business from failing through bailouts.

While both models have merit, for economic resilience to be built, governments must take a proactive approach to reducing instability in their tax systems by improving the workings of their markets, enhancing governance, and promoting social development. While we don't advocate for more or less taxation, we argue that finding an adequate tax system that is stable depends on governance decisions that uses policy as a way to improve stability in the present and in perpetuity. Policy decisions can change the course of economies in a number of valuable ways. For instance, policy decisions such as subsidies or affordable healthcare coverage can buffer families from market changes.⁵⁸ Such decisions towards social development help close inequality gaps so more citizens are able contribute to the economy through taxes.

Economics and Global Conflict

Conflict erodes resilience. The impacts of global conflict chip away at economic growth, public health systems, social development, and the degradation of physical infrastructure. According to the World Bank, after ending a civil war, the average country takes 14 years to return to its pre-war economic growth trajectory.⁵⁹ Issues such as population displacement, public health systems, as well as regional

⁵⁵ Barry Sterland, *A Unified Response to International Taxation Challenges*, www.g20.org, May 2014.

https://www.g20.org/news/transcripts/australian_finance_deputy_barry_sterland_g20_tax_symposium_opening_remarks_tokyo

⁵⁶ Unknown, *The secret of their success*, www.economist.com, February 2013. <http://www.economist.com/news/special-report/21570835-nordic-countries-are-probably-best-governed-world-secret-their>

⁵⁷ Unknown, *The Nordic countries: The next supermodel*, www.economist.com, February 2013.

<http://www.economist.com/news/leaders/21571136-politicians-both-right-and-left-could-learn-nordic-countries-next-supermodel>

⁵⁸ Miles Corak, *Tax policy for equality and social mobility*, Submission to the House of Commons, Standing on Finance. April 2013.

http://www.parl.gc.ca/Content/HOC/Committee/411/FINA/WebDoc/WD6079428/411_FINA_IIC_Briefs%5CCorakMilesE.pdf

⁵⁹ Unknown. *Ending extreme poverty in fragile contexts: Getting to Zero: A USAID discussion series*. January 2014.

http://pdf.usaid.gov/pdf_docs/pnaec864.pdf

spillover increases economic vulnerability due to instability and stresses on infrastructure and communities.

Economic disruptions due to the closing of businesses and long costs of conflicts in terms of aid and rebuilding are largely inconsistent, riddled with corruption, and not focused on long-term improvements but short-term fixes for immediate problems. Common economic shocks can include changes in commodity demand or domestic market price bubbles, market disruption, and dramatic cost fluctuations. For instance, Rigobon and Sack found that between January 2003 and March 2003, when the Iraq war was imminent, they found that the U.S. economy experienced lower Treasury yields, lower equity prices, higher oil futures prices, and a fall in the dollar. It should be noted that these variances in the economy happened with the perception of risk of a war.⁶⁰

When conflicts actually do occur, rebuilding cities is no easy feat and is very expensive. Also, when conflicts occur, it is not just the city, region, or state that works to rebuild—many humanitarian agencies step in to assist. Assistance from humanitarian organizations is extremely helpful, especially directly after the conflict has ended. But, in some conflict cases, humanitarian assistance lacks a sustainable model that will help the city or region stabilize and grow into the future. In other cases, humanitarian aid is working to stabilize city. For instance, in the Democratic Republic of Congo after the end to a long and damaging era of conflict, the World Bank committed \$1 billion to the region to re-launch economic activity, improve living conditions, and give new opportunities for the disenfranchised populations.⁶¹

In other cases, leaders of conflict-affected areas are finding new ways to rebuild while doing so sustainably. For instance, in Sudan, violent military action and famine plagued the country, and subsequently, oil revenues decreased, causing many to look to farming and livestock production to help boost the Sudanese economy. In Sudan, issues such as drought, circuitous migratory routes due to conflict, and the stigma of using antiquated practices were all strong challenges facing the Sudanese people. To support the economy in the long-term, researchers found an expansive local system of natural resource governance that utilized the land in multiple ways throughout the year, thus providing a plausible model for improving the economy by using what they have.⁶²

Additionally, institutions are key to the resilience of economies. Without them, market economies suffer from a lack of rules that they fundamentally rely on. Conflict has the common effect of reducing the influence of institutions, such as the government, on its citizens. When this happens, economies become criminalized. Ungoverned cities serve as a safe haven for criminal activity and that activity proliferates throughout the city and spreads. The consequences of an ungoverned or loosely governed city can be extremely damaging for other cities. For instance, the Mexican Drug War going on between rival drug cartels in Mexico has spilled over into the United States. Authorities in the U.S. reported higher than normal kidnappings, murders, and drug trafficking that have been attributed to the Mexican

⁶⁰ Roberto Rigobon and Brian Sack, *The Effects of War Risk on U.S. Financial Markets*, Journal of Banking and Finance, 29(7), (2005) 1769-89. <http://www.federalreserve.gov/pubs/feds/2003/200318/200318pap.pdf>

⁶¹ Unknown, *World Bank Announces US\$1 Billion Pledge to Africa's Great Lakes Region, Targeting Energy, Roads, Agriculture, Cross-Border Trade, Health, and Jobs*, May 2013. <http://www.worldbank.org/en/news/press-release/2013/05/22/world-bank-announces-us-1-billion-pledge-to-africa-great-lakes-region-targeting-energy-roads-agriculture-cross-border-trade-health-jobs>

⁶² Unknown. Risk and Resilience: Sudan's Livelihoods Challenge, www.wilsoncenter.org, November 2013. <http://www.wilsoncenter.org/event/risk-and-resilience-sudan%E2%80%99s-livelihoods-challenge>.

Drug War.⁶³

(Big) Ideas for Building Economically Resilient Regions

In June 2013, 45 U.S. mayors met to discuss and sign the National League of Cities' 'Resilient Communities for America Agreement,'—a pledge to take cost-effective actions to prepare and protect their communities from vulnerabilities and risk.⁶⁴ City leaders are now fully aware of the vulnerabilities that put their cities and the national and the global economy at risk. Cities are looking for ways to invest in their resilience, and practitioner organizations are getting involved to help out. The Rockefeller Foundation – 100 Resilient Cities organization offers a few ways for cities to enhance their resilience⁶⁵:

1. *Create redundancy and self-regulating mechanisms that allows the system to fail safely.* This requires a system that can isolate threats so they don't cascade across the organization.
2. *Encourage everyone to invest in the resilience of the community.* Taking an active role in supporting the infrastructure of the community in which a system operates is paramount.
3. *Engage in cross-organizational collaborations.* Partnerships with the private sector, public sector, and other cities all aid in the development of more economic resilient cities.

However, utilizing these prescriptions is easier said than done. A key challenge of resilience is the variability and uniqueness of cities. Although there are constants about resilience such as economic complexity and risk exposure, the differences in historical, social, cultural, spatial, resource, and regional attributes all contribute to the level of economic exposure present. For instance, take idea #1—*create redundancy and self-regulating mechanisms that allows the system to fail safely.* Redundancy is widely regarded as expensive, but worthwhile because it creates alternative solutions and extra capacities. However, many cities are performing with minimal room in their operations due to years of budget cuts and operation streamlining. In many cases, citizens will have to fund improvements through local taxes or the locality must bear the financial burden. Cities that are already stretched too thin are likely to opt for a less expensive option and to confront more immediate needs.

Idea #2—*encourage everyone to invest in the resilience of the community*—speaks to the importance of not placing the responsibility of resilience solely on the locality. When a city experiences a shock, surrounding systems experience those shocks as well. For instance, in 2013, summer floods in central Europe submerged high-speed rail lines which kept employees from reaching their jobs at the Volkswagen plant in Zwickau, Germany, thus causing the plant to temporarily shut down automobile production.

Partnerships, especially public-private partnerships, can be critical to the success of cities, especially if the city is located in a country like the U.S. where most of the infrastructure is owned and operated by the private sector. However, getting non-government entities involved in resilience planning is purely selective. Often, the private organization will decide how little or how much they would like to participate

⁶³ Alicia Caldwell, *Mexican Drug Violence Spills Over Into US*, www.huffingtonpost.com, February 2009. http://www.huffingtonpost.com/2009/02/09/mexican-drug-violence-spi_n_165422.html

⁶⁴ National League of Cities, *45 Top Mayors Commit to Creating More Resilient Cities in Response to Extreme Weather, Launch National Campaign*. (Washington D.C., June 17 2013). NLC.org. <http://www.nlc.org/media-center/news-search/45-top-mayors-commit-to-creating-more-resilient-cities-in-response-to-extreme-weather-launch-national-campaign>

⁶⁵ Judith Rodin. *Is Your Organization Resilient?* (June, 2014). Rockefellerfoundation.com. <http://www.rockefellerfoundation.org/blog/your-organization-resilient>

based on how they would benefit. Their cost-benefit analysis would probably be more critical and would not consider the issues public agencies would consider as the two's mission are not congruent—the private sector seeks to gain a profit while the public sector seeks to administer and deliver services to the public. Therefore, gaining participation and outlining the terms of participation can be an arduous task.

In idea #3—*engage in cross-organizational collaborations*—partnerships with the private sector, public sector, and other cities all aid in the development of more economic resilient cities. For instance, the cities of El Paso, Texas and Ciudad Juarez, Mexico share a border and similar population characteristics. Together, both cities have developed an international partnership to address increasing the resilience of their shared, limited water supply.^{66,67} However, collaboration across organizations is not simple. As mentioned previously, there is high variability amongst cities and what works well for one city may not work well for the other. For cross-organizational collaborations to work, in theory, information shared should be rich enough to help organizations with decision-making. But if that information is unique and grounded in the specifics of the other organization, then decision-making is not aided.⁶⁸

Conclusion

The risks of resilience planning are largely upfront and the upfront rewards tend to be low. Cities seeking to put in place resilience planning often struggle with deciding for themselves an optimal level of risk. A zero-risk level is not feasible therefore cities must take into consideration past disruptive events to decide on an acceptable risk level. Cities can utilize a variety of decision-support tools such as cost-benefit analyses, cost-effectiveness analyses, multi-criteria analyses, or models such as ALARP (as low as reasonably practicable) to narrow down an acceptable level of risk. Establishing an acceptable level of risk allows for authorities to develop resilience measures that are reasonable and feasible. For instance, following two catastrophic snow avalanches in Iceland, authorities set acceptable risk levels for avalanches and landslides and implemented them into national law.⁶⁹

Building economically resilient cities and regions will require us to be creative and innovative. Consider one example in New York. The Metropolitan Transit Authority (MTA) issued \$125 million catastrophe bonds, or cat bonds, to cover some of the costs related to a rainstorm or hurricane.⁷⁰ Cat bonds only pay if a pre-determined condition arises such as water or winds reaching a certain level. After Hurricane Sandy, MTA suffered \$4.8 billion in damages.⁷¹ When Hurricane Sandy struck, the rail stations and tunnels experienced a large tidal surge. As a result, it became extremely difficult for MTA to obtain

⁶⁶ 100 Resilient Cities, *El Paso's Resilience Challenge*. (Rockefeller Foundation, 2014). 100resilientcities.org. http://www.100resilientcities.org/cities/entry/el-pasos-resilience-challenge?utm_source=RF%2520Blog&utm_medium=Cross-Post&utm_content=8%2520Takeaways%2520From%25208%2520Cities&utm_campaign=RF%2520Blog

⁶⁷ 100 Resilient Cities, *Mexico City's Resilience Challenge*. (Rockefeller Foundation, 2014). 100resilientcities.org. http://www.100resilientcities.org/cities/entry/mexico-citys-resilience-challenge?utm_source=RF%20Blog&utm_medium=Cross-Post&utm_content=8%20Takeaways%20From%208%20Cities&utm_campaign=RF%20Blog

⁶⁸ Susanna Nilsson, Björn J.E. Johansson, and Arne Jönsson, *Cross-Organizational Collaboration Supported by Augmented Reality*. IEEE Transactions on Visualization and Computer Graphics, October, 2011, 17-10.

⁶⁹ Bell, R., Glade, T., and Danschield, M., 'Challenges in defining acceptable risk levels' in Ammann W. et al., *RISK21, Coping with Risk due to National Hazards in the 21st Century*. (Tarlton & Francis Group, London 2006).

⁷⁰ Katy Burne and Ted Mann. MTA Sells Storm Bond, (Wall Street Journal, July, 2013). WSJ.com. <http://online.wsj.com/news/articles/SB10001424127887323681904578640401075075198>

⁷¹ Charles Mead, *MTA Obtains \$200 Million of Protection With Catastrophe Bonds*. (July, 2013). Bloomberg.com. <http://www.bloomberg.com/news/2013-07-31/mta-obtains-200-million-of-protection-with-catastrophe-bonds.html>

insurance. Now, with the cat bonds in place, MTA is in a better position to rebound from another large-scale storm such as Sandy.

A ‘silver bullet’ does not exist for designing economically resilient cities. Cities are faced with significant challenges with resilience requiring attention to many more details than the average city leader has time to consider. To ensure economic resilience, we must move beyond dialogue and debates of the merits of economic resilience to a mode of experimenting with various models to secure economic resilience of various components of a city or community. Experimentation requires us to accept that most of the time we will not attain our desired outcomes. This should not be viewed as a failure of experimentation, but as an opportunity to learn from the experience and improve successive experiments.

Economic resilience, like most other forms of resilience, will not be attained through top-down planning approaches alone. Everyone has a responsibility when it comes to economic resilience. Residents have to plan for economic resilience as they consider how to be financial sustainable and manage their assets. Communities need to come together to plan for resilience as well. Public-private partnerships have a role to ensure that businesses can hedge against risks and collaborate in times of distress. Public-public partnerships and region-wide collaborations also have a pivotal role to play. Region-wide pooling of resources and collaborative frameworks can protect against cascading dependencies and can lower the burden on investments needed for economic resilience.

In our opinion, to design cities and communities that are economically resilient we do not need *big* ideas. Ideas do exist, and many of them are *big* (see above for the case of the ideas put forth by the Rockefeller Foundation). **What we need is persistence of action and clarity of execution.** To achieve persistence and clarity, we need to think beyond short-term election cycles or public opinion polls. We need to stay focused and keep the long-view in mind. Our cities and communities have deep legacies and transforming them from their current state to one where they are economically resilient is going to take time, and unfortunately, a very long time. It is our hope that by throwing attention on economic fragility, each of you can take time to reflect on the ‘small’ ideas that you can implement today (and tomorrow) to make your cities and communities ‘incrementally’ more resilient than they are today.

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