FUNDING RESILIENCY
JONATHAN ROSENBLOOM
2014 Idaho Law Review Symposium: Resilient Cities
Environment | Economy | Equity
Funding Resiliency Roadmap

1. Cities & the Cost of Enhancing Resiliency

2. Challenges Facing Municipal Bonding in Building Resilience
   A. High Cost / Difficult Economic Status
   B. Incompatible Goals

3. Alternative Mechanisms
   A. Increasing Capital through Collaboration
   B. Capture Risk Aversion Value
Part I

1. Cities & the Cost of Enhancing Resiliency

2. Challenges Facing Municipal Bonding in Building Resilience
   A. High Cost / Difficult Economic Status
   B. Incompatible Goals

3. Alternative Mechanisms
   A. Increasing Capital through Collaboration
   B. Capture Risk Aversion Value
## At-Risk Local Government Services

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potable water*</td>
<td>• Flood</td>
<td>Systemic and Catastrophic Risk of Damage to Local Infrastructure</td>
</tr>
<tr>
<td>Provision &amp; distribution of energy</td>
<td>• Drought</td>
<td></td>
</tr>
<tr>
<td>Fire fighting</td>
<td>• Hurricane</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>• Heat wave</td>
<td></td>
</tr>
<tr>
<td>Waste removal</td>
<td>• Snow storm</td>
<td></td>
</tr>
<tr>
<td>Emergency medical</td>
<td>• Tornado</td>
<td></td>
</tr>
<tr>
<td>Airports</td>
<td>• Wild fires</td>
<td></td>
</tr>
<tr>
<td>Policing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stormwater management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Libraries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prisons &amp; jails</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Colorado Flood 2013
DSM Water Works 2008 Flood
Water and Droughts / Fires

California (2014)

Arizona (2013)
Venice 2012
Venice 20__: The “Moses Project”
Local Infrastructure Resiliency Costs

- **Projected**
  - Venice, Gate Project: $8 billion
  - UN 2009 Report: $50-170 billion / yr
  - World Bank 2010 Report: $140-175 billion / yr
  - N.O., Inner Harbor Navigation Canal: $14 billion
  - N.O., Stormwater: $6.2 billion
  - London, Thames River: $2.3 billion
  - Red River of the North in ND & MN: $1.8 billion
  - Massachusetts, Seawalls (2006): $1 billion
  - NYC, Storm Surges: $20 billion

- **Actual**
  - Quito, Ecuador: $350 million, to date
  - St. Petersburg, Russia, Neva Bay: $6.4 billion
  - Grand Forks, ND: $171 million
2009 Estimate of Water Utilities (based on IPCC 2007 Report)

SUMMARY
Drinking Water = $325 - $692 billion
Wastewater = $123 - $252 billion

GRAND TOTAL
Drinking Water and Wastewater = $448 - $944 billion
Part II

1. Cities & the Cost of Enhancing Resiliency

2. Challenges Facing Municipal Bonding in Building Resilience
   A. High Cost / Difficult Economic Status
   B. Incompatible Goals

3. Alternative Mechanisms
   A. Increasing Capital through Collaboration
   B. Capture Risk Aversion Value
Traditional Bonding

1. Local government issues bonds & capital is forwarded to local gov.

2. Fund and monitor improvement project

3. Repay principal and coupon

Risk of performance

Local Government (issuer)

Capital Improvement

Risk of repayment

[If applicable, generation of local revenue source]
Part II

1. Cities & the Cost of Enhancing Resiliency

2. Challenges Facing Municipal Bonding in Building Resilience
   A. High Cost / Difficult Economic Status
   B. Incompatible Goals

3. Alternative Mechanisms
   A. Increasing Capital through Collaboration
   B. Capture Risk Aversion Value
Slowing of Bond Market

Average Daily Trading Volume, 2008–2012
By par amount, number of trades and number of unique securities
Local Government Bankruptcies

Stockton, Calif.
- Status: Filed for bankruptcy
- Date: 6/28/2012
- Debt or deficit amount: $26 million

Detroit, Mich.
- Status: Filed for bankruptcy
- Date: 7/18/2013
- Debt or deficit amount: Estimated $18.5 billion in long-term debt

Central Falls, R.I.
- Status: Filed for bankruptcy
- Date: 8/1/2011
- Debt or deficit amount: $21 million of outstanding debt, plus unfunded pension liabilities

Boise County, Idaho
- Status: Bankruptcy filing rejected
- Date: 9/8/2011
- Debt or Deficit Amount: $5.4 million

Vallejo, Calif.
- Status: Filed for bankruptcy
- Date: 7/3/2012
- Debt or deficit amount: $43 million

San Bernardino, Calif.
- Status: Filed for bankruptcy
- Date: 8/1/2012
- Debt or deficit amount: $46 million

Jefferson County, Ala.
- Status: Filed for bankruptcy
- Date: 11/9/2011
- Debt or deficit amount: More than $4 billion

Harrisburg, Pa.
- Status: Bankruptcy filing rejected, defaulted on payments
- Date: 3/10/2012
- Debt or deficit amount: More than $300 million

Source: www.governing.com, Reuters
Incompatible Goals: Equity in Resiliency

• “ensure[s] that the benefits of promoting resilience and reducing vulnerability are distributed fairly.”

Incompatible Goals: Adaptation in Resiliency

Municipal Bonding:

Project → Growth → Projected Local Revenues

Adaptation Funding:

Project → Risk Reduction → Value in Risk Aversion
Part III

1. Cities & the Cost of Enhancing Resiliency

2. Challenges Facing Municipal Bonding in Building Resilience
   A. High Cost / Difficult Economic Status
   B. Incompatible Goals

3. Alternative Mechanisms
   A. Increasing Capital through Collaboration
   B. Capture Risk Aversion Value
Public / Private Alternatives

- Infrastructure Trusts
- Property Assessed Clean Energy (PACE)
- Kyoto Protocol’s Clean Development Mechanism
- Green Banks
- Morris [County, New Jersey] Model
Performance-Based or Social Bonds

1. Make long-term investment
2. Fund and monitor performance-based preventative programs
3. Prevent a given social ailment that reduces demand for curative services
4. Pay to Intermediary for programs meeting set criteria for prevention
5. Repay principal and coupon
NYC’s Social Impact Bond: Sliding Scale

<table>
<thead>
<tr>
<th>Reduction in Re-Admission Rate</th>
<th>Projected Long Term City Net Savings</th>
<th>City Payments to Investors</th>
<th>Investor Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 20.0%</td>
<td>$20,500,000</td>
<td>$11,712,000</td>
<td>22.0%</td>
</tr>
<tr>
<td>≥ 16.0%</td>
<td>$11,700,000</td>
<td>$10,944,000</td>
<td>14.0%</td>
</tr>
<tr>
<td>≥ 13.0%</td>
<td>$7,200,000</td>
<td>$10,368,000</td>
<td>8.0%</td>
</tr>
<tr>
<td>≥ 12.5%</td>
<td>$6,400,000</td>
<td>$10,272,000</td>
<td>7.0%</td>
</tr>
<tr>
<td>≥ 12.0%</td>
<td>$5,600,000</td>
<td>$10,176,000</td>
<td>6.0%</td>
</tr>
<tr>
<td>≥ 11.0%</td>
<td>$1,700,000</td>
<td>$10,080,000</td>
<td>5.0%</td>
</tr>
<tr>
<td>≥ 10.0%</td>
<td>≥ $1,000,000</td>
<td>$9,600,000</td>
<td>0.0%</td>
</tr>
<tr>
<td>≥ 8.5%</td>
<td>≥ $1,000,000</td>
<td>$4,800,000</td>
<td>-50.0%</td>
</tr>
</tbody>
</table>
An once of prevention is worth a pound of cure.

-B. Franklin

1. Reallocation & Sharing of Risk
2. Capture Value of Risk Aversion
3. Additional Access to Capital
4. Allow Those Affected to Protect Investments
Questions & Comments?