Financing Sewers in 19th Century: A Prequel for African Cities?

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I. Why Examine Sewer Financing in the 19th Century’s Largest Cities?

- A complicated innovation that transformed the way cities work, one that links finance to expenditures in interesting ways; and...

- Interesting period, wonderful historical work – Melosi, Szreter, Pinkney, Evans, and Hamlin.
19th Century Sewers as Interesting Innovations

- Use of the steam engine, filtration, and steel made cities able to support industrialization, without them density was deadly;

- But, investments in city-wide systems cost more than the annual budget, they were extremely long-lived, and did not yield remuneration – i.e., sewers were a disruptive technology.
Why 19th Century’s Experience as a Prequel?

• Might be relevant to African Cities today since few in SSA urban population have sewers, and conditions are not improving; and

• There is a policy question based on interpretations of history about how it should done -- Self-Financing or Not?
The Point of the Presentation

• Examine the experience of the largest cities in a Second Generation Fiscal Federalism (SGFF) context;

• Use that context to answer the question: How did these cities finance their sewers? And then,

• Suggest what the experience might imply for financing sewers in SSA.
Second Generation Fiscal Federalism: What is It?

• SGFF starts from an Nth best world, with policy-makers having individual rather than social welfare incentives and constraints;

• It does not focus on the reforms needed to achieve a Pareto Optimum as does First Generation Fiscal Federalism;

• The SGFF view has been fruitful in explaining the evolution of U.S. Infrastructure finance with descriptions of, for instance, why “Taxless Finance,” was used and abused in 19th century.
The Point of the Presentation

• First: briefly describe how Berlin, Chicago, London, New York, and Paris financed their sewers, Hamburg as well;

• Then, show some of the effects these investments had on health and city institutions; and

• Finally, answer the Historical Question on self-financing with a sense of what it might imply for SSA Cities.
II. SGFF Suggests 19th Century Sewer Finance...

Took Three Forms:

1. **Top-Down Finance**, with distinct Bonapartist and Social Darwinist models – London and Paris;

2. **Cajoled Finance**: Political Machines and Financial Tricks – Chicago and New York; and

Types of Finance:
1. Top-Down Finance in London

- In London, financing a response to what is known as “The Big Stink.” Thames was so foul that Parliament couldn’t function
Central Government was main financier and decision-maker.

Policy followed a market-oriented approach: relied upon but constrained local government so that central government could function.

Types of Finance:
1. Top-Down Finance in London
Types of Finance:  
1. Top-Down Finance in Paris

Again, the Central Government Drove Events.

- But, in Paris, Haussmann carried out Emperor Napoleon III’s designs including four-fold sewer expansion;

- Sewers expanded as rapidly as his famous boulevards.
Paris’ Sewer as Spectacle...
Types of Finance:
1. Top-Down Finance in Paris

- In Paris, Haussmann carried out Emperor Napoleon III’s designs including four-fold sewer expansion.
  - Sewers expanded as rapidly as his famous boulevards;
  - Eventually Haussmann resigns under financial cloud related to unbudgeted contingent liabilities.
Financing was Cajoled from state and central government, or through illegal financial manipulations; and

• **Chicago** waited until state and then federal financing was available to drain Lake Michigan into the Mississippi in massive public works projects;
... and Flushed the City by Reversing Chicago River Flow
Had to Raise Chicago Four Feet to Build the Sewers...
• In **New York**, Boss Tweed used the support of five banks to finance sewers to properties he owned. The banks failed; he was imprisoned;

• NYC saved from prolific debt issuance because prolonged recession halved interest rates and it refinanced.

Boss Tweed exposed for his corruption by cartoonist and editor Thomas Nast
U.S. Interest Rates

200+ YEARS OF U.S. INTEREST RATES
AVERAGE = 5.18%
Types of Finance:
3. Windfall Finance in Berlin and Hamburg

• Force Majeure events were necessary – war and city-wide fire – but not sufficient. Windfalls following the events were necessary;

• Berlin’s emergence as great city was paid for by French reparations from the Franco-Prussian War – 22 % of French GDP.
Windfall Finance: Berlin’s Funding

Force majeure events were necessary – war, and city-wide fire – but not sufficient.

Windfalls following the events were necessary;
Windfall Finance: Hamburg’s Fire Insurance Funding

• Hamburg’s reconstruction paid by an Insurance from one of the first fire insurance policies – premia paid for more than 100 years – and which caused the industry to be restructured.
III. Effects of Investments on the Cities

Fundamentally Changed Cities:

• From Dickens’ London to the Prince of Wales celebrating the opening a beautiful Victorian system;
London’s New System: An Architectural Beauty
III. Effects of Investments on Cities

Changed Urban Institutions:

• In England the Sanitarians, with central government assistance, spread the investments to other more deadly cities;

• Paris, and other French cities continued Haussmann’s centrally-supported work after his fall;

• Berlin, sewers helped it become an industrial powerhouse and central grants spread sewers more rapidly;

• New York and Chicago, with external help, sewers shaped the cities of today.
Will Places, like Kibera, Remain Like mid-19th century Paris?
Will the SSA Cities Remain the Large Urban Villages They were 100 Years Ago?
III. Effects of Investments on Cities

• Cities underwent an Institutional Transformation.

• Decision-making changed from being done on a piecemeal, individual basis to one with large-scale planning of involved interlocking problems.

• How did it affect health?
Effects of the Sewer Investments on Health: Consider Hamburg, the Outlier

Figure 1b: Typhoid and diarrhea deaths per 1000 population

- Black line: Chicago (typhoid)
- Orange line: Hamburg (diarrhea)
- Green line: Berlin (typhoid)

Note: Lowess smoothing; bwidth 0.2
Effects of the Sewer Investments on Health: Consider Paris

Figure 1a: Deaths per 1000 population

- New York City
- London
- Paris

Note: Lowess smoothing; bwidth 0.2
The Health Experience

While the investments didn’t always work as well as might be expected:

• Hamburg didn’t serve the poor – result was Europe’s last Cholera epidemic;

• Haussmann wanted sewers for drainage not waste – result was a belated “Big Stink” in Paris in 1880s.
A Summing Up on the Effects:  
Sewers Provided Extraordinary Gains

• Nevertheless, Health gains, particularly after water treatment undertaken;

• Hundreds of thousands of lives saved; and

• Institutional Change. Cities became places with engineers, urban and financial planners, with larger budgets and property tax systems.
IV. The Historical Question: Self-financed or not?

In no case was it just self-financing. Szreter had it right when he said:

...the history of mortality decline shows that committed local government, ... can have quite considerable potential and scope as an agency to promote health improvements and general social change, if led by appropriate exhortatory but flexible central administration.”
In no case self-financed

But the experience suggests that more than just the historical record as a basis for policy is involved.

• Large externalities stemming from lack of effective sanitation; and

• Even where subsidies were given it was not enough. Needed to proscribe the externality generating process as well.
V. Is the Early Experience a Prequel for African Cities?

In most respects no, enormous differences:

• Income and governance levels are lower today and technology is very different;
Some Context on Differences in 19th Century Versus SSA Today: Income Differences

- Per Capita Income at time of Initial Investment
  - Berlin: $2379
  - Chicago: 1967
  - Hamburg: 1272
  - London: 4201
  - New York: 2812
  - Paris: 3558
  - SSA: 1040
Do the 19\textsuperscript{th} century cities serve as a Prequel for African Cities?

In most respects no, enormous differences:

• Income and governance levels are lower today; and

• Demands are different: Disease vectors are distinct, as are the industrial demanders for water.
While lack of access to sanitation is more deadly today in SSA, local political support for such large investments is much lower:

- The health treat is different.
  -- Disease vectors are localized in slums today;
  -- Versus 19th century, cholera terrorized all.

- Private Industrialists were important demander of water services, which made old systems increasingly obsolete. Present in SSA?
Do the 19\textsuperscript{th} century cities serve as a Prequel for African Cities?

In most respects no, enormous differences:

- There less the water availability in SSA’s much bigger cities; and
- Finally, the fiscal, financial and accountability circumstances are much more austere in SSA.

- But, in some ways they do serve as a prequel....
Prequel-like Conditions:

- Health Concerns. Even though infant mortality is much lower in African Cities today it remains high;
19th Century Cities as a Prequel for African Cities: Heath Concerns

- Infant mortality rate (IMR) today much lower than in 19th century;

- IMR decline in SSA has followed, but lagged, the enormous gains from medical innovations in the 20th century; BUT

- IMR remains 20 times higher than Europe and is much higher in slums.
19th Century Cities as a Prequel for African Cities?

Prequel-like Conditions:

• Health Concerns. Even though infant mortality is much lower in African Cities today it remains high; and

• Urban growth rates. Coping with the demographics requires greater local government responsiveness because...
19th Century Cities a Prequel: Rapid Urbanization combined with Deteriorating Conditions

• Only 40 percent of SSA urban population now have with access to improved sanitation; no gains since 1990;

• Most SSA urban population live in slums; and

• Urban population in SSA forecast to double over the next 25 years, adding 400 million people;
19th Century Cities as a Prequel for African Cities?

Prequel-like Conditions:

• Health Concerns. Even though infant mortality is much lower in African Cities today than in 19th Century, it is still many times more than the level of developed countries;

• Urban growth rates. Coping with the demographics requires greater local government responsiveness; and

• Fiscal and Financial Challenges. Today, these conditions, like those in the 19th century, are of unprecedented scale.
VI. Main Policy Implication

• Recognize that lack of sanitation in SSA is a problem that cannot be dealt with by current urban institutional structures;

• Determine the priority of this function within the scope of alternative urban investments. Many, for instance, argue that land reform is a greater priority, or the provision of electricity. They may well be, but...

• Other reforms may take a generation to realize, what happens to health in the meantime?
Urban reforms, including sewers, may take a generation to realize, what happens to health in the meantime?

• What other expedient policies exist to address the “next generation” problem?

• Almost certainly not the sewer systems, but, as was the case in the 19th century, a very messy institutional problem is looming.