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The political economy

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POLITICAL ECONOMY

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This presentation touches 4 points: what is political economic analysis; why is it important today; how it is constrained in a single system model; how exogenous factors and impinging or competing systems can be considered.

INTRODUCTION

I am not a modeller and not here to tell you how to model. I am a political economist.
One of the ones who need to use your results to make decisions.
I want to talk about how your work fits or could fit with mine.

DEFINITION

Economics originated as political economy

Political economy is the study of what influences human behavior with respect to the distribution and use of resources, money and labor in a society

-It's about what is needed for economic development , about trying to build a society
-Study of opportunities and alternatives, choices and their consequences
-Incentives and how to use them

HISTORY

Started at the time of the Industrial Revolution as descriptive - coal pricing, transport (Jevons) and Adam Smith (Wealth of Nations AND Theory of Moral Principles- study of economic activity as embedded in a society

Political economic analysis is not new: for electricity in Berlin, Bavaria (Oskar van Miller); in England, contrast between London County Council and Charles Merz (Newcastle). Focus on socio-economic whole.

Political economic analysis is only descriptive, not prescriptive. It looks at a situation or problem, proposal or policy to see what are the considerations, choices, and consequences of those choices, within a broad and inclusive framework..

Who does this now? Government offices and politicians, NGOs, planners, careful investors, World Bank, project managers , **Environmental Impact Statements**

TODAY'S DILEMMA

Political decision making and investment strategies require a broad view of things, looking at perhaps peripheral or divergent interests in order to assure effective policies, compromises and investments

Making a broad political economic analysis is more complex today

-population and economic growth greater than before

-better communications make more information available

-computers make possible (and therefore require) the handling of more complex statistics, data and mathematical relationships than ever before

ON THE OTHER HAND, sheer size and complexity of any one system tends to foster a need and a tendency to keep a narrow focus: can result in tunnel vision

Specialisation and tunnel vision analysis ignores some important features of how the world works, and competing demand for resources can be ignored.

BUT as population, economic growth and demand for resources grows, the systems start to impinge on each other.

THE PROBLEM FOR SYSTEM ANALYSIS

Thinking outside your own frame of reference
Technical specialisation vs the broader picture – how to reconcile

Most of my work in one way or another deals with economic development questions, and political compromises.

I need to deal in real world decisions, and if I am to use your analysis, which I must, I need from you an understanding and explanation of to know how well your model represents the reality I am dealing with.

Everyone has charts or graphs in their presentation. Her is my graphic of a political economic analysis.

THINK ABOUT THIS:

The elephant is a whole being
But remember the famous fable about the blind men and the elephant:

One touched the side and decided an elephant is like a wall
One touched the tusk and decided an elephant is like a spear
The one who touched the trunk thought the elephant was like a snake
The one who touched a leg thought the elephant was like a tree
The one who touched the ear thought the elephant was like a palm fan
And the one who touched the tail thought the elephant was like a rope

Each was right insofar as his scope of analysis went, but they were all wrong when it came to understanding the whole.

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With this background we can explore the important questions

WHY is political economic analysis important or useful

HOW can one get there

WHAT IS THE BENEFIT of making the effort

WHY GO THROUGH THE TROUBLE OF LEARNING MORE?

If you don't want to be isolated in an increasingly integrated world, learn something about the world around you, the synergies and impingements on your own corner of the planet, and use this knowledge.

Is it really important?: Just one issue of Economist (May 14) has 5 articles about resource use environmental worries that will require political economic analysis as they are debated and resolutions considered: new water technology; land claims, population growth, and natural gas/water pollution problems.

If you want your analysis to be used and useful, explore the questions decision makers need to answer. Inform and explore choices; when you exclude elements, be able to explain why and what the consequences are; otherwise, modeling is academic exercise for your own amusement.

Different ministries will look at the same problem from a very different perspective. The Ministry of Industry will look at environmental compliance in terms of least cost options for compliance, while the Minister of Environment will look at how far he can push the standards. The Minister of Energy will look at system reliability from an operational point of view, while the Minister of Defense will look at it strategically.

What if your minister or boss wants to build an elephant?
And all you can talk about is a specific kind of leg …?
This seminar is about making your analysis consonant with the larger idea of a whole elephant.

TODAY I WANT TO TALK ONLY ABOUT HOW YOU CAN IMPROVE POLITICAL ECONOMIC AWARENESS IN MODELING YOUR OWN SYSTEM

NEXT SESSION WE CAN TALK ABOUT SETTING UP POLITICAL ECONOMIC COHERENCE BETWEEN SYSTEM MODELS

LIMITS IN YOUR OWN SYSTEM ANALYSIS

In doing your own analysis, you focus. This does not excuse you from thinking critically about every input.

Why, why not, what if should be your constant queries. In your analysis often you can tell me what, but you don't tell me WHY. How can I use your analysis if I can't explain the differences and the whys?
Iour

Critical thinking and common sense go a long way to helping broaden your thinking. A bit of research also is needed.

> You may know parts of your own system very well, maybe not. Do you know how and why it operates the way it does? Do you know about the incentives and regulations that can affect system expansion? What about competition from other systems, economics, demography, politics of all sorts, and human whims, and how they affect your system.

If you don't have some ideas about these things, you run the risk of accepting uncritically whatever input you get, whether or not it makes sense.

How objective is your model?

> -All models are political to some extent.
> -You take a position on the elephant – what it is and how it should be – by choosing assumptions and boundaries for the analysis .

Boundaries, definitions and assumptions set the stage already for the outcome. They limit and implicitly skew the analysis. Do you understand the consequences of your choices?

Most important, What are you leaving out?

Consider the following:

Boundaries:

Different time horizons:

The time horizon automatically determines the technologies that will be available for consideration, and the players in the market. (5 vs 20 year; irrigation vs annual crop decisions, CCGT vs. nuclear)

Territorial boundaries

Solutions optimal at the corporate level are not necessarily optimal socially or environmentally, nor at a multiregional or national level, or for a multinational cooperative system. (See the IAEA of energy options for the Baltic countries; pollution of the Rhine; upstream farmers and estuary pollution, countries building power plant to export power to neighbors, who are doing the same, or who don't need the power.)

Technology choices

Serious analysis cannot ignore *new* technologies or applications or impinging systems and interrelationships.

Limits other than time driven: personal preferences, impinging technologies, slow penetration (static or long term nature of most infrastructure investments,fear of stranded assets or loss of vested interests, FOAK-related reservations).

Think about the political and economic consequences of these exclusions: you might preclude whole industries from developing. (hydropower and aluminum)

Definitions

Definitions are probably the most important and often most taken for granted.
Can't model the undefined.

For example, there is no internationally agreed definition of nuclear waste. Materials considered as waste in some countries are considered resources in others; levels of radioactivity defining various levels of waste will also differ, and the generation of nuclear waste by sources

outside the nuclear industry is not considered nuclear waste at all. No model of worldwide nuclear waste management therefore exists.

Non-negotiable to be crystal clear about every definition in your model.

For example: **How do you define supply? Do you assume that all resources extant are available and available only for you and your purposes? And on what terms and conditions?**

How do you define "available" supply? Extent or volume vs actual unrestricted availability? What about constraints due to ownership (Alaska native claims; Gen Delgado); law, regulation, commercial contracts (t or p, national content /US pipe) .

-construction of the Alaskan oil pipeline was delayed until State and Alaska Native land claims to North Slope lands could be resolved and appropriate compensation negotiated.

-a general in Latin America who owned land upstream that controlled access to a water supply being modeled. The model was useless for planning until the general and his erratic behavior were incorporated into the model as part of various supply options.

-even in countries with a land registry system, there may be no enforceable property rights, so availability of resources can change at the whim of whoever can exercise sufficient power to control them

-contractual terms often define supply availability in complex ways that are not susceptible to least cost analysis. Some of these are more evident and transparent than others.

-Take or pay contracts can result in more costly supplies being taken before cheaper ones IPPs, ENRON,US gas).

-National interests and concerns about national content can dictate construction and trade agreements that are not least cost. The US, for example, insists that US-Canada pipelines be 498" in diameter rather than a far more efficient 54", because no US steel manufacturer is capable of producing

54” pipe. Similarly, transport of all goods between US ports much be done in US ships, even though the rates charged for this shipping far exceeds international prices.

-Water supply is not homogenous. Most irrigation water is consumed (i.e., not available for subsequent use) , whereas the majority of freshwater withdrawals for cooling thermal power plants are returned to rivers, lakes or the ocean after use. (Nuclear Technology Review, 2009, fn. 51 and 52, p. 126.) The two cannot be treated similarly if water resource availability is at issue. Water people ay know this, but energy modelers may not.

-Coal mining often affects aquifers, leading to water depletion or acid drainage; oil and gas production result, along with mining, in serious surface subsidence. What does this do to economic development and land use?

In countries where mineral rights and surface ownership are separate, do mineral rights supersede the surface rights of an established farm? Or do surface rights prevail?

What about by-products and side lines (e.g., non-energy uses of energy resources.

Do you factor in supply/availability constraints (maintenance and distance factors) in developing countries or with imported technology (solar power, dam maintenance, nuclear medicine)

Do you check how contradictory/inconsistent regulations affect supply and demand, even if you like the policies?

A good illustration of this problem is the introduction of a maximum requirement for wind power on a utility system. This reduces CO_2 emissions, but at a serious cost. Since a high level of concern for system reliability requires back up for intermittent power, raising the

share of wind on the system also raises the need for back up plants, usually fossil plants built or used for ready reserve power. Where preference is given to wind power, these plants are idle a large part of the time, incurring high costs and earning no revenue; where wind is not given preference, the substantial subsidies paid to wind power go to waste.

A popular proposed solution is to adjust consumer demand to fit supply using smart grids, so that the system runs always close to capacity. This, however, requires an unprecedented degree of consumer participation and a high investment in new infrastructure that is not designed for consumer interests but the interest of investors in wind. Moreover, the closer to the margin the system runs, the greater the threat to reliability and the greater the danger of outages. As the drive to reduce CO_2 gains momentum, this will require more attention in the future. But remember when you model policy changes, you need to model the whole policy and not just a couple of elements, or trace it through only one level of the system. You need to think about whether this is a goal worth optimizing, or one that can be optimized without major unintended consequences or cost.

Data and Statistics

Do you ever ask if the numbers make sense? Are they complete?

Are the statistics harmonious and comparable? (old or from different years, from different sources, based on different definitions or presented in different units. different currency values (IAEA experience)

Given the time lag between data collection, model construction and applied analysis, are the more important variables, statistics and assumptions are still valid.

Does your data all come from one source?

If yes, how reliable.

If no, how compatible?

When you gather statistics, do you ever ask “why” or “why not” or “what if this were different”? Do you check if important things are missing?

Do you check statistics are meaningful? (% without absolute reference)

Assumptions

Is there a logical consistency in the story you are telling?
Are your data appropriate to your analysis?

Are your assumptions realistic? Simplifying assumptions affect results. Are these assumptions valid for you?

For example, most general energy models project demand and then assume that supply will grow to meet anticipated demand. Moreover, these models generally forecast the supply of several fuel and energy sources and then select one as the residual, assuming that this resource will take up all the slack. The problem is that everyone is someone’s residual, but all have supply gap.

Analytical goals

Are you exploring the right thing? System contraction vs expansion

Most models are geared to expansion planning based on growing demand for services, growing population and economic growth. BUT one should not ignore the *possibility of the need for system contraction*. This is not unreasonable and in fact has happened several times in the history of the electricity industry (AC-DC, IPPs, economic downturns.

The ability to plan for change has made the difference between being able to implement gradual and economically viable solutions (through technical changes and conversion in the AC-DC transition) vs economic disaster (imposing IPP preferences requiring regulatory and financial bailouts).

Are you asking the right questions?

Optimizing the right thing? Besides least cost: employment, environmental protection, social justice, competition outside you own system for markets or resources; consumer preferences other than least cost.

Are you explaining the WHY of your results – this is so important

MAKING YOUR MODEL USEFUL

Decision makers balance competing socio-economic needs and conditions.

- optimisation inevitably means compromise. Least cost solution may not be popular or politically acceptable, or not relevant to the needs of the system players
- optimising one group's goals diminishes satisfaction of others.

Do you explain: When the model optimized your goals, what did it do to mine?

First, you could ask and be able to show what the internal consequences of optimization have been. Decision makers and policy makers constantly need to balance and satisfy a multitude of competing social and economic needs and conditions, where the optimisation of one group's goals is sure to contradict or detract from the satisfaction of others. What are the effects on the other parties and other interests when you optimise a single selected factor.

Does your analysis explain the consequences of the choices you made in the model? Ministers from competing agencies need to see how their interests are affected before signing on to the proposal. If decision makers are to implement your results, can they use your analysis to explain to the affected and interested parties exactly what the compromises, cost and benefits will be.

Even though you are not responsible for implementation, you might consider at the level of common sense the implementability of proposed choices. Your least cost solution may not be popular or politically acceptable, or not relevant to the needs of the system players (complexity or market resistance or national politics). Identifying external constraints may alter the proposed solutions derived from the model; it can also be a valuable service the analyst provides to the decision maker.

1. Within your own model, explore the consequences and benefits of different compromises internal to your system, the effects of trade-offs and optimization on all parties and interests

EXPLAIN these consequences in your analysis.

Facilitates negotiation; explaining the compromises can help implementation; easier to sell recommendations

Multicriteria decision analysis can be very helpful for this.

2. Change some of your boundaries and assumptions. Run the model assuming that one or more of your initial basic assumptions is wrong.

3. While you cannot model the world, a broader set of exogenous variables might be incorporated into your analysis and even into the model as constraints.

NOTHING TURNS OUT THE WAY YOU EXPECT – SO MODEL SOME SURPRISES

4.Sensitivity analysis is not enough….

Most sensitivity analyses look at relatively minor adjustments in a set of variables. This is fine, but it misses two things.

First, sensitivity analysis generally does not consider drastic, improbable or undesirable events. You can't just assume incremental changes. You need to always be asking "what if?"

Second, assuming a low and a high demand tells you very little about how the system works, nor does it trace through the consequences of changes in the economy or in social goals. **Sensitivity analysis will tell you "how much" but it does not tell you "why". I always want to know why.**

4. You can't just assume incremental changes. Make some extreme "what if" case scenarios. They often come true. (loss of resource availability (oil trade, coal strikes, weather related (1994-5 SE US freeze), inflation (double digit), price hikes, demand or technology (Austria phones) shifts

Sensitivity analysis is fine, but more *extreme considerations of key variables* are much more useful, especially for long term analysis. Consider inflation. An assumption of 5% or 7% inflation is not unusual,

but no one wants to consider double digit inflation. Yet this happened in the US in the late 70s and early 80s, wreaking havoc with capital intensive facilities planned and under construction. Thermal generating and hydro projects were cancelled or stopped midstream, and half the nuclear plants planned were dropped, all at enormous financial cost. Yet in the early 70s policy makers declined to acknowledge the question as being bad for business.

Think about a 20 year drought.. or the more rapid dissemination of a radical new technology

Give credible consideration to improbable or more extreme events. Pick an apparently sensitive element and make extreme policy changes; see what happens. Then choose some seemingly insignificant ones and make drastic changes; see what happens.

This takes a bit of serious thinking and some common sense, but in the end it is cheap insurance. It makes your analysis and results more valid over time and under changing circumstances.

What if something drastic happens and your minister asks "how serious is this?" "what will the effects be?", and "what can be done?" – what can you say?

The last thing you want to have to say to him is "Gee, I never even thought about that…I have no idea"

It is much better to be prepared even if only psychologically for bad outcomes. Having a Plan B is even better. I cannot emphasise enough the importance of having a Plan B – my own feeling is I can do anything and it will be fine so long as I have a plan B. My investor friends call it an exit strategy, and they never embark on any investment unless they know what the exit strategy will be.

BROADEN YOUR THINKING

Even with all of the above, your model is incomplete and subordinate as a world view. The world will not work to accommodate your system model. It helps if you understand where you fit into the larger picture. How big is the elephant that will use your leg?

Political economic analysis requires you to look beyond your own system, to be aware of and acknowledge if not incorporate other considerations and changes on exogenous systems, almost always expressed as constraints or changes in the supply, demand and price on your own system.

So how do you do broaden your thinking?

First, remember the engineer and the economist, and the can-opener: assume for ROW a broader scope, factual relationships and statistics.

If the US Bureau of Reclamation could do it so can you. The US government had comprehensive plans in the 19th century for water management in the West, allocating water rights and organizing massive shifts of water to the arid Southwest. USG first built hydro dams for irrigation with power generation seen only as an auxiliary activity engaged in only to pay for a more optimal irrigation system. This changed with the advent of WWI, when defense activities became the factor to be maximized. And after WWII operation of these same dams was used to optimize power generation and especially overall regional development of the West, including recreation and rural electrification.

Second, **for your own education**, play around with incorporating the competing demands of other systems in your model; then try optimizing your goals

-Try optimizing someone else's goals using your model

-Run scenarios that incorporate supply, demand or policy choices from impinging or competing systems. Don't be afraid to make extreme case scenarios reflecting external changes – they often come true

Third, broaden your research and use teamwork

Fourth – use CLEWS. Discussion of mechanics in session on integrated analysis.

BENEFITS OF POLITICAL ECONOMIC ANALYSIS

Makes your work relevant for analytical discussion and political debates
More informed decision making
More politically effective and acceptable policy choices
May pre-empt uninformed and unfortunate investments