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Insights from system dynamics on the future of Latin America

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The start of the year is traditionally the time for both new initiatives, and for making predictions about the year to come. In that spirit, this article employs a methodology called “[system dynamics](#),” that I used extensively earlier in my career, to examine some of the worrisome interacting forces currently playing out in Latin America and the Caribbean, and what it could mean for the future of the region and the United States.

System Dynamics

My Latin American colleagues, with whom I used system dynamics for years in seminars and wargames, may smile with recognition as they read this article; I employed the methodology tirelessly with them, yet have rarely made use of it in my public writings about the region. System dynamics is a powerful tool for thinking about complex, interdependent systems in a very different way. Indeed, what are the physical, political, social, and commercial interactions and interchange of information and perspectives between [almost 650 million Latin Americans](#), if not a complex interdependent system?

Traditional quantitative and qualitative analyses tend to presume simple, “linear” relationships between one or more causes and effects (e.g. poverty and inequality [cause crime](#); reducing poverty and inequality will reduce crime). System dynamics focuses on how chains of such relationships play out over time through positive and negative “feedback loops” to produce often unexpected outcomes. The methodology provides insights often different from traditional analysis into how such systems (e.g. Latin America and the Caribbean) could behave over time, as well as tools for analyzing the “centers of gravity” and points of intervention for impacting

those systems. It also provides a unique, visual way to communicate that understanding to outside audiences.

This is usually the point in which the eyes of my more policy analysis/qualitatively-oriented colleagues glaze over, and they skip on to the next article about what Latin America should expect from the Biden Administration... However, if the reader would bear with me through a couple of superficially-intimidating spaghetti-like diagrams, this article will attempt to provide a new way of thinking about the region (and many other things) that the reader may find useful. In my own case, although I have previously avoided mentioning the methodology, in the 26 years I have worked with it, system dynamics has made a profound impact in my own approach to understanding virtually ever subject I write upon.

At its heart, system dynamics involves the representation and analysis of chains of causal relationships (“causal diagramming”) and time series simulation of the systems that those relationships comprise. This article focuses on the former. Causal diagramming is similar to writing or painting in that the diagrams represent the perspective and choices of the author. There is no “complete” or “perfect” diagram; good ones are credible, and communicate insight. In that spirit, this article does not seek to predict what “will” happen in Latin America, but to use causal diagramming to stimulate thinking about what “might” happen and why.

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The Dynamics of Latin America and the Caribbean in the COVID-19 Environment

Figure 1, although simple, uses causal diagramming to highlight some of the socioeconomic dynamics represented by COVID-19 in Latin America. A blue arrow connects each variable to another impacted by it. A “+” means that when the “cause” variable changes, the “affected” variable changes in the same direction. A “-” means that a change in the “cause” variable changes the “affected” variable in the opposite direction. Note that, following the lines of “causality” in the direction of the arrows, there are multiple “circuits” or “loops” within even this simple diagram. The large + and - signs indicate whether those circuits are “positive” (reinforcing) or “negative” (balancing), as explained later.

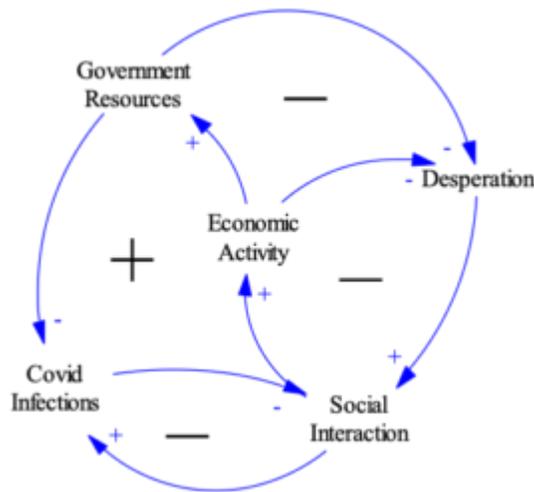


Figure 1

The diagram above shows the complex behaviors produced by linking well understood relationships. For example, an increase in “COVID-19 Infections” lead to policies and other responses which decrease “Social Interaction” (e.g. through social distancing and curfews). This is an example of a “negative” or “balancing” loop: decreased social interaction, to a degree, slows “COVID-19 Infections,” theoretically preventing the cycle from spiraling out of control.

Note, however, how the variables are connected through multiple loops. Thus, while decreasing “Social Interaction” limits “COVID-19 Infections,” it also decreases “Economic Activity” which increases “Desperation” which increases pressure for more “Social Interaction” (e.g. street vendors having to work to eat). Thus we see how the loop of socioeconomic effects undermines the operation of the first loop in limiting the spread of COVID-19.

A further examination of the diagram shows the dilemma to be even worse. As “Economic Activity” decreases, it undercuts “Government Resources” to deal with the disease (e.g. through decreased tax revenues to pay for social programs), further contributing to “Desperation,” and thus impairing the government’s ability to limit social interaction to control virus propagation. Making matters even worse, decreased “Government Resources” also undercuts the government’s ability to impede “COVID-19 Infections” (e.g. through buying and distributing PPE, doing testing and contact tracing, developing vaccines, enforcing curfews, etc.).

Because this diagram does not tell us how “big” each of these effects are relative to the others, it does not clearly indicate which dynamic will overwhelm the other, and thus “how bad” things could become. It does, however, give us insights, within a single logical structure, about why the situation turns out much better or worse in some countries than others, since subtle differences in the same basic relationship across countries can produce very different dynamics over time. In Latin American countries with large informal sectors (e.g. Peru and Bolivia), the link between decreased economic activity and desperation of those affected is stronger than countries with more formalized work sectors (e.g. Uruguay). Similarly the degree to which “Desperation” affects “Social Interaction” depends on the nature of populations and their disposition toward authority, such as certain countries refusing to take curfews seriously. The link between “COVID-19 Infections” and “Social Interactions” similarly

depends on the degree to which leaders respond to the threat with social distancing policies (recall the criticism of Presidents Bolsonaro in Brazil and AMLO in Mexico for not aggressively responding to the pandemic with lockdowns). There are also external inputs to the dynamic, such as government borrowing, by which regimes try to delay the impacts of resource limitations long enough to keep “COVID-19 Infections” and “Desperation” under control.

The Bigger Picture

Figure 2 shows a more complicated diagram adding an array of additional economic, sociopolitical, and other considerations to the representation. It includes dynamics involving crime, corruption, social mobilization, political change, and the role of China in the region. As with the simpler diagram, Figure 2 does not show what *will* happen in Latin America and the Caribbean, but highlights interacting forces which could lead to very undesirable consequences.

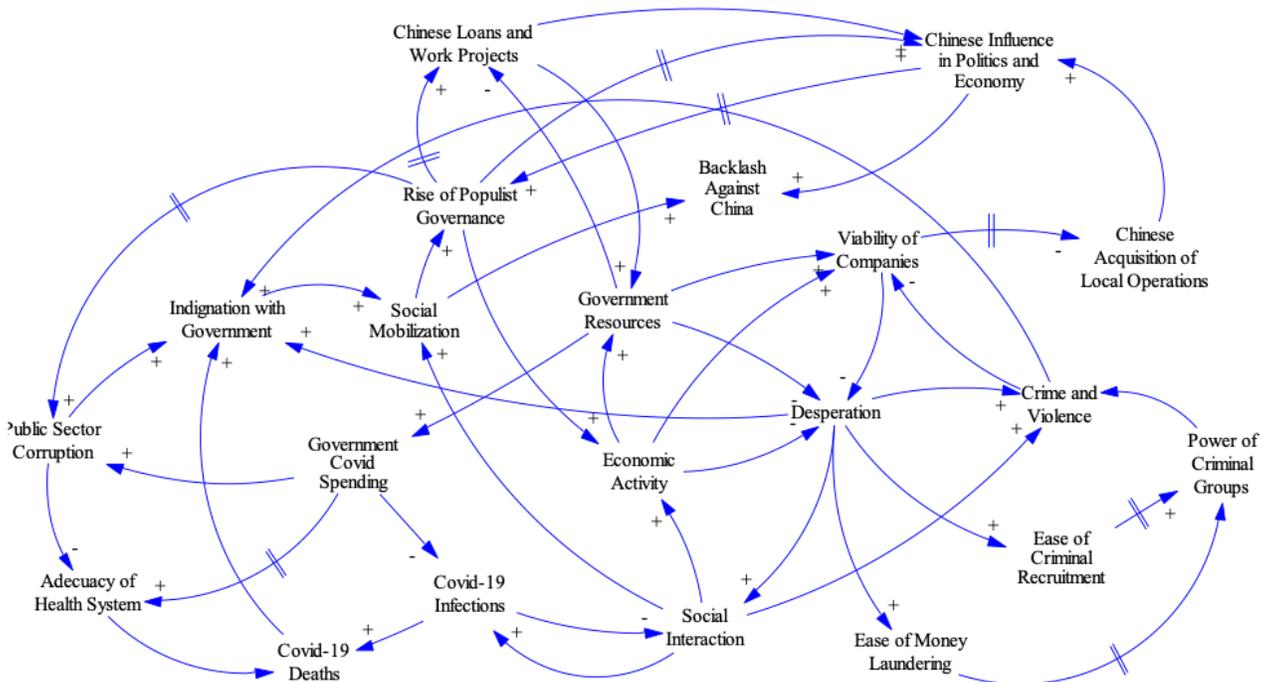


Figure 2

Beginning on the center-right side of Figure 2, increasing “Desperation” in conjunction with the return to “Social Interaction” in the region could fuel expanded “Crime and Violence.” That same increased “Desperation” could also contribute to the “Ease of Criminal Recruitment” and the “Ease of Money Laundering” from persons and businesses in delicate situations, ultimately augmenting the “Power of Criminal Groups” in the region (the double line indicates a delay between the cause and effect), further bolstering “Crime and Violence” through the expanded activities of those groups.

On the left side of Figure 2, increased “Government COVID-19 Spending” may, over time, improve the “Adequacy of the Health System,” thus reducing “COVID-19 Deaths.” Nonetheless, abuses associated with the same “Government COVID-19 Spending” also feed “Public Sector Corruption.” Such corruption, in combination with expanding “Desperation,” “Crime and Violence,” and “COVID-19 Deaths,” will tend to increase popular “Indignation with the Government,” already occurring across the region. As “Social Interaction” resumes, that heightened “Indignation with the Government” will give rise to “Social Mobilization” that will fuel political instability, and could enable the “Rise of Populist Governance” in some countries.

With respect to China, depicted in a series of variables near the top of the diagram, the impaired “Viability of Companies” in the region may facilitate “Chinese Acquisition of Local Operations” through mergers and acquisitions and other arrangements. At the same time, the shortage of Latin American “Government Resources” could facilitate a new influx of “Chinese Loans and Work Projects,” accelerated in some countries by the “Rise of Populist Governance” (e.g. Venezuela, Argentina, Bolivia, and possibly Ecuador after its February 2021 election). Such expanded Chinese presence on the ground, in turn, will increase “Chinese Influence in Politics and the Economy” in those countries, particularly where populist

governance is present. On the other hand, the greater the Chinese footprint in those countries, the more likely that the previously noted increase in “Social Mobilization” could also fuel a “Backlash Against China,” obligating China to use its new leverage in those countries to suppress criticism and work with local governments to protect Chinese personnel and operations.

Of concern, the diagram highlights multiple feedback loops which, accelerated by the pandemic, threaten to bring further hardship to the region. Note, for example, how the “Desperation,” deepened by the pandemic, operates through “Crime and Violence” and the empowerment of criminal groups to do further damage to employers (decreased “Viability of Companies”), ultimately producing more “Desperation.” Similarly, note how both the “Desperation” and “Public Sector Corruption,” fueled by graft associated with “Government COVID-19 Spending” gives rise to more “Indignation with Government” and “Social Mobilization,” ultimately increasing the risk of the “Rise of Populist Governance” in certain countries, which if it occurs, would produce even more corruption and desperation. In short, the pandemic has not only produced extreme hardship for the region in the short term, but as I have argued elsewhere, it presents a potentially grave risk for Latin America because of the mutually reinforcing destructive cycles it has accelerated.

These diagrams are but partial representations of the worrisome dynamics facing the region due to COVID-19 in the coming year and beyond. Reinforcing feedback between health, economic, and sociopolitical factors help explain why the effects of the pandemic in Latin America were far more extensive than originally anticipated, and why the prospects for the region for 2021 and beyond could be far different than even the grave and worsening situation that linear-oriented economic models and political analysts are predicting.

The way the dynamic plays out in the region in practice will depend on the balance between positive and negative feedback effects that are beyond the scope of this work. Some of the possibilities are frighteningly logical, yet counterintuitive, at the same time. On one hand, possible bad news for the region could have a silver lining; the continued spread of the virus and delays in the arrival and distribution of vaccines, could ironically sustain a level of social distancing that suppresses social mobilization, helping the region's current governments to limp along until assistance from the U.S., China, and international bodies can assist it in addressing the multiple challenges involved. Reciprocally, there are also risks embedded in the good news hoped for in 2021; a successful vaccination campaign that would permit the relaxation of curfews and social distancing could also enable new waves of crime (based on pent-up desperation), as well as snowballing social protests more intense than those seen in the fall of 2019—particularly if governments cannot address the associated takeoff in crime and grievances over the economy and corruption with sufficient rapidity.

Further analysis could identify mitigating factors, reasons for hope, and opportunities for intervention. The purpose of this article is to use the methodology to launch a critical discussion for the region by highlighting what *could* happen, as well as areas to study in detail to better assess risk, and candidate areas for intervention by both policymakers in the region, and for the incoming Biden Administration, given the strong U.S. stake in the wellbeing of the region to which we are tied by bonds of geography, commerce, and family.

Evan Ellis is Latin America Research Professor for the U.S. Army War College Strategic Studies Institute. The views expressed herein are strictly his own.

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