Comment on Hausmann and Rodrik

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The paper by Ricardo Hausmann and Dani Rodrik constitutes a useful and enlightening application of the theoretical ideas proposed in two previous papers: "Growth Diagnostics" (Hausmann, Rodrik and Velasco, 2004; henceforth HRV) and "Economic Development as Self-Discovery " (Hausmann and Rodrik, 2003). The comments in this note will center on three aspects of the paper under discussion: the theoretical framework, the identification of binding constraints on growth in El Salvador, and the conditions necessary to implement the authors' policy proposal.

1 The theoretical framework

The authors take as their starting point the theoretical framework expressed in their equation in page 5, which is analogous to equation 4.1 of HRV. This equation expresses the growth rate as a multiplicative constraint of the savings/investment effort, the appropriability of returns, and the level of productivity. The authors suggest that an appropriate approach to thinking about how to increase growth in this setup is to identify the "most-binding" constraint, that is, the constraint that generates a higher payoff when relaxed.[1]

This thinking is put forward in the context of a more general framework, where the focus is welfare and not growth, in HRV. Let us however stick for a moment to the simpler framework of their equation on page 5, which we rewrite, following HRV, as:

$$\gamma_c = \frac{r(1-\theta)(1-\psi)(1-x)-\rho}{1-\beta}. \quad \text{(i)}$$

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[1] HRV actually show three ways to identify the most binding constraint. In Section 2.1.5, they suggest ignoring second-best interactions across markets and focusing on the largest direct efect, that is, that with the largest associated Lagrange multiplier. Their formal growth analysis in section 3, however, focuses on the total effect on balanced-growth welfare of eliminating different distortions, effectively incorporating second-best interactions in the calculation. In contrast, their applied analysis in section 4 discusses the total (direct and indirect) effect on a reduced form equation for economic growth. It is this third approach that is repeated in the paper under discussion, and the one we will follow in our note.

Here r is the rate of return (which depends on productivity), θ the level of uninternalized external effects, ψ the level of distortionary taxation, $1-x$ the expected appropriability, β a measure of constraints on borrowing and ρ the discount rate.

The way in which the authors tackle the analysis of growth strategies in this context is by first defining which distortions must be taken as given (thus making explicit the fact that their analysis is second-best) and then asking which of the remaining distortions will generate the highest marginal payoff when relaxed.

The first point that I would like to make about this framework is that it relies on the implicit assumption that we can change at most one constraint at any given moment of time. This assumption may or may not make sense, but it is not made explicit at any point in the analysis (neither in this paper nor in HRV). Therefore it is difficult to understand exactly what implicit constraint the authors are thinking about when they make it.[2]

Let me make this case in the simplest context possible. Suppose we take borrowing constraints, productivity and appropriability to be given, and we are trying to decide whether to focus on putting our efforts on reducing distortionary taxation (ψ) (by eliminating wasteful government expenditure) or reducing production externalities (θ) (by promoting the type of policies for self-discovery suggested in the text). Suppose we have two choices: we can completely eliminate one of these two distortions, or we can reduce both of them by half. What would we choose?

Let Δ_j denote the payoff from eliminating constraint $j = \{\theta, \psi\}$, and $\Delta_{\frac{1}{2}(\theta,\psi)}$ denote the payoff to reducing both of them by one-half. We can assume, without loss of generality, that $\theta \geq \psi$. Then it is straightforward to prove that $\Delta_\theta > \Delta_\psi$. The payoff from completely relaxing one constraint is thus the same as that which comes from completely relaxing θ:

$$\Delta_\theta = \frac{r(1-\psi)(1-x)\theta}{1-\beta}$$

Now let's suppose the policymaker can reduce the two constraints to half of their present value at the same time. That is, instead of concentrating on the most binding constraint and getting rid of it, the policymaker decides to target a combination of the two constraints that she can address. Her payoff now will be:

$$\Delta_{\frac{1}{2}(\theta,\psi)} = \frac{r(1-x)\left(\frac{\psi}{2} + \frac{\theta}{2} - \frac{3\theta\psi}{4}\right)}{1-\beta}$$

[2] In HRV, the strategy of focusing on the most binding constraint is presented as one in a list of potential reform strategies which also include wholesale reform, doing as much reform as best as you can, second-best reform and targeting the biggest distortions. The option of contemplating combinations of reforms that generate the highest direct payoffs is not explicitly considered.

Note that

$$\Delta_{\frac{1}{2}(\theta,\psi)} > \Delta_\theta \Leftrightarrow \theta < \frac{\psi}{1-\frac{\psi}{2}}.$$

Since $\psi < \frac{\psi}{1-\frac{\psi}{2}}$, then there is a range of parameter values for which it will be optimal to follow the strategy of relaxing both constraints instead of only one. This range can be quite large. For example, if $\psi > 2/3$, then it will always be the case that reducing both constraints by half is better than relaxing one constraint completely.

In this simple example, I have assumed that the elimination of one constraint is as feasibla as the reduction of two constraints to half their starting values. This is of course an arbitrary assumption. But the point I wish to stress is that we need to model the costs of changing policies explicitly in order to understand what possible tradeoffs there are in the adoption of alternative reform strategies. In the meantime, I would like to caution against assuming a priori that one should concentrate on only one constraint at a time.[3]

There is an alternative interpretation of the HRV framework, which the authors seem to have in mind at several points in their exposition, and which I personally find more appealing. It is that of a policymaker who does not know what the second-best solution is.[4] She might know what the first-best solution is, but that is of little use, given that some constraints cannot be relaxed. She simply knows that she faces a highly non-linear problem, where reforms that might appear to be in the direction of the first-best can have disastrous welfare consequences. In that context, the HRV framework proposes what seems to be a sensible strategy for reaching the second best: relax one constraint at a time, in a direction which will generate the greatest increase in growth at a given moment of time.

Posed this way, the HRV framework is perfectly analogous to a non-linear programming problem, in which we are trying to maximize a function with constraints, but where both the function and the constraints are so highly non-linear that we have no idea where the maximum lies. If this analogy is correct, then the field of economic policy reform has much to learn from the theory of non-linear optimization . I would like to point to two basic lessons that strike me as evident when one starts to think along these lines.

The first one parallels the point already made, in that changing one policy at a time will generally be a very inefficient way of reaching the maximum of this

[3] HRV do present a more complete framework briefly in section 3.10, where they explicitly incorporate a political constraint. But the framework is totally static, and thus tells us nothing about the number of strategies that we can change at any given moment in time. On the contrary, the solution to the problem as they pose indicates a second-best policy vector, to which it will be optimal to move to immediately, and which in general is likely to differ in more than one dimension from our starting policy vector.

[4] " *The difficulty with a second-best reform strategy is that many, if not most of these second-best interactions are very difficult to figure out and qualify ex ante.* The strategy requires having a very good sense of the behavioral consequences of policy changes across different markets and activities... In practice, most of the second-best interactions remain obscure, and tend to be revealed after the fact rather than ex ante. " (HRV, p. 7, emphasis added)

function. The majority of techniques with desirable convergence properties in non-linear optimization tend to change all parameters at every step, after identifying the direction of maximum increment that can be achieved. Restricting ourselves to changing only one parameter at a time may not only increase the time that it takes us to reach an optimum (thus generating welfare losses during the transition) but also increment the probability of not converging to the optimum.

A second lesson to be learned from the analogy is that we have to take seriously the possibility of getting stuck at a local but not global maximum. Many appealing characterizations of the development process take the form of models in which there are "poverty traps", out of which it can be difficult to get out of. Take for example Murphy, Shleifer and Vishny's (1989) classic characterization of underdevelopment in which the economy's low productivity and low levels of aggregate demand reinforce each other generating a low-level equilibrium in which the economy is not large enough to adopt more efficient technologies, and its low level of productivity generates a low level of aggregate demand. It is likely that if we look at this problem from the point of view of relaxing the most-binding constraints, we may conclude that there is not much we can do to improve this economy's situation. Given its low level of productivity, higher aggregate demand will do little except generate inflation; given its low level of aggregate demand, the introduction of more efficient technologies will generate huge losses for whoever pays the fixed cost of techniques that only make sense in large markets. In this context, the model requires that policymakers think not only about changing both policy dimensions at once, but also about the need for large changes in them.

These examples are not meant to argue that we should get rid of the HRV framework. Indeed, I think that they prove its usefulness precisely because they are not issues that we were likley to think about in this way without their framework. But, as with any useful model, its use requires not only knowing how to apply the framework, but also knowing when to think outside it.

2 The Salvadoran Economy: What are the binding constraints?

The HRV methodology leads to a one-by-one analysis of the different potentially binding constraints on economic growth. The strategy is one of inference by iterative elimination: the authors argue that the binding constraint cannot be availability of credit (as that is plentiful), human capital (as it shows low returns), appropriability (as the country has good protection of property rights and macro policies); therefore it must be that the problem is low returns to investment. Here is when the self-discovery theory kicks in: since traditional sectors are not doing very well, the problem must be that investors haven't yet discovered the new sectors that have to replace them. Discovering new sectors requires solving the informational externalities that drive HR 's self-discovery

theory; therefore El Salvador needs to create a strategy that creates incentives for entrepeneurs to discover what the country has a comparative advantage in.

Although I think the authors may well be right in pointing to the lack of incentives for gathering information on the economy's comparative advantage as an important component of Salvador's growth problems, the strategy of iterative elimination has the drawback that it makes their argument heavily dependent on the lack of relevance of other constraints. For reasons emphasized above, I don't believe that a strategy of thinking about **one** binding constraint will always be the most productive one; most likely at times several constraints will be binding, in the sense that relaxing them together, even by a small amount, would be better than concentrating on just one. In their iterative elimination, I believe the authors rush too rapidly to dismiss a number of potential constraints that may be playing an important part in El Salvador's growth problems.

In the first place there is the role of education. The authors echo Lant Pritchett's (2001) argument that expansions in the fraction of educated individuals that are unaccompanied by increases in the rate of economic growth are indicative of a small social payoff to education. As Pritchett recognizes, this result is true to the extent that the quality of education is held constant. If the quality of education is falling, then increases in the number of educated workers may not necessarily translate into a higher quality-adjusted work force, and there is no reason why they should affect the growth rate positively. Frankly, I would be surprised if the decade of political violence in El Salvador had not had a substantial effect on the capacity of its school system to deliver adequate education. Indeed, there is an interesting piece of evidence that the authors present pointing in this direction. According to the data in Table 7, the wage premia earned by the cohort of 36-40 year olds in 1992 were on average 25.6% greater than those of the cohort of 25-30 year olds. Note that this age difference also corresponds to the difference between those that were educated before the war and those that were educated during the war. The data seems to confirm that the quality of schooling fell considerably during the war. Whether it recovered or not is a question that will requires further research and time to answer. It may well be that education is a binding constraint in El Salvador, and that a high payoff can be achieved by raising educational quality.

This argument may apply more broadly to many public goods and services, whose provision may have suffered both from the war and from inadequate reconstruction efforts. In discussing whether taxes may be too high, the authors admit that "[t]ax revenue may be so low that the government lacks the resources to provide an adequate supply of public goods needed to make economic activity productive." Despite bringing forward this explanation, the authors do little to pursue it further. But it seems to me that a good case can be made that herein lies a major, if not the main, constraint to economic growth.

There are many pieces of evidence that point to a widespread collapse in the provision of public goods during the war (and inadequate recovery in the aftermath). Take infrastructure. El Salvador's war was characterized by a prolonged attempt by FMLN guerrillas to cause the regime's economic collapse by demolishing the nation's infrastructure. Existing estimates put the cumula-

tive total cost of economic sabotage by the FMLN between 1980 and 1990 at $1-1.5 billion. From 1981 until mid-1987, the FMLN destroyed or seriously damaged 83 of the country's 92 major bridges, including the Puente de Oro and the Cuscatlán (Pan American Highway), the country's two largest, which connected San Salvador to other departments (INS, 2000). In an economy traditionally reliant on a reduced number of agricultural exports, destroying roads and bridges also meant destroying the means whereby export goods are brought to markets, and may be associated with the subsequent lackluster performance of the economy's traditional export sectors.

Or take a much less tangible state output such as the rule of law. El Salvador's homicide rate, at 50.2 per 100,000, is now the second highest in the world (WHO, 2002, Table 2.1), 9.12 times that of neighboring Costa Rica and 6.9 times that of Nicaragua. In a 1999 survey, 55% of Salvadorans stated that crime would justify a coup d 'etat. (Wood, 2001) Some analysts (e.g., Kincaid, 2000) have traced the high violence rates in El Salvador to the rapid demobilization of the two armies and the lack of an effective restructuring of police forces, examples of particularly costly types of state failures.

These facts all point to the possibility that the prolonged civil war caused a severe decline in the capacity of the state to provide a broad array of public goods and services that are necessary to the safe conduction of profitable economic activity. The emphasis on sound macro policies and fiscal solvency prevalent during the post-war period may have coincided with a less than adequate channeling of resources to the rebuilding of the nation's economic and social infrastructure. Similarly to the pattern identified by Easterly and Servén (2003) for Latin America more broadly, the economy may have been saving in financial resources at the cost of sacrificing important public productive assets. The resulting lack of public and social capital will function as a binding constraint on present economic growth which will manifest itself in the low perceived rates of return on domestic investments that the authors identify.

3 Varieties of intervention

When it comes to policy design, Hausmann and Rodrik have a difficult task. The type of distortion that they identify can only be adressed by government intervention. Yet the history of government intervention aimed at creating succesful export industries in Latin America is not very encouraging. As they recognize, the problems of state capture and dynamic inconsistencies of intervention policies are pervasive. The authors have set themselves the task of convincing us that they have come up with an institutional design that is relatively protected from those sources of policy failure.

There are three key components in the authors' proposal that are meant to create these conditions. First, the strategy must be seen as a high-level goal of the government, and therefore to count with the political leadership and commitment that will force bureaucrats to take their job seriously. Second, it

must have a high degree of transparency and accountability, so that bureaucrats will not be able to obfuscate their actions from the general public. Third, there must be a set of rules (e.g., built-in sunset clauses, clear benchmarks for success/failure, incentives targeted to new activites) that will stop the initiative from serving other purposes than those for which it is designed.

Evidently, this design makes sense in theory, but is it likely to work in practice? I have my doubts. There are way too many high-profile initiatives in the region that have ended up in the dustbin of economic ideas, quickly forgotten after the political benefits to be gained from their implementation were reaped. It is difficult to believe in the power of rules, legal or otherwise, in a continent whose most recent political developments include the ouster of a President for abandonment of his post while he was sitting in the Presidential Palace. Transparency and accountability have little effect unless those to whom you are accountable actually have an incentive to make you behave differently.

Contrasting these elements with succesful cases of developmentalist strategies, one fact that is striking is that the regimes that were able to succesfully engineer these strategies did not tend to implement them through bodies whose actions were very transparent or accountable (at least in the sense of public acountability, or the "possibility of embarassment " stressed by the authors) nor that were bound by strict limits on their actions. One of the few things that the Korean, Taiwanese and Chilean states all shared was a high degree of discretionality in their capaciy to design, implement and modify policy interventions and an almost absolute protection from public criticism.

Something else that was shared by these three experiences was that they all arose as a response to a real threat of disappearance of the private sector through a takeover by extreme-left regimes. One way to see them is as instances of a particular type of Hobbesian solution in which private elites concede much of their power to the military because this is the only way that they can be saved from the greater threat of wholesale expropriation by an extremist regime. In all three societies, economic success was seen as a necessary condition for the sustainability of the regime and for the survival of the capitalists' way of life. As Robert Wade has pointed out in reference to Korea and Taiwan "whereas the governments of most other developing countries know that they can fail economically and not risk invasion, the governments and elites of these countries knew that without fast economic growth and social stability this could well happen. This led them to make an unusually close coupling of national security and economic strength." (Wade, 1992, p. 314) [5].

My reading of this evidence is that succesful developmentalist strategies will be carried out by states that are sufficiently strong and autonomous so as to impose the social goal of development over the short-run interests of the private sector, yet also sufficiently oriented towards a development strategy in which the private sector plays a central role. It is in that sense not surprising that the most succesful development experiences of the post-war era come from the three

[5] I would argue that this exact phrase could be used to describe Chile if we substitute "invasion " by "left-wing insurgency. "

societies that survived the strongest threat of the imposition of a communist regime.

Does the Salvadoran state fit this criteria? On the one hand, the fact that it arises from the prolonged civil war against a left-wing armed insurgency would seem to indicate that it does. Yet the genesis of ARENA is quite different than that of the military regimes cited above, with a much stronger role played by traditional economic families in its constitution and definition of basic goals (see Griffith and González, 2002). The evidence regarding the lack of provision of basic public goods in the post-civil war period is not encouraging, in that it does not seem to signal a state that is intent on a developmentalist goal. Perhaps recent political developments in the country and in the region will spur elites into allowing the emergence of a state that is sufficiently strong and autonomous so as to stave off the challenge of the left. In my view, only such a state is capable of seriously carrying out proposals like those put forward by Hausmann and Rodrik.

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