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Technologies, Rules, and Progress: The Case for Charter Cities

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ABSTRACT

Non-resident fellow Paul Romer argues that the principal constraint to raising living standards in this century will come neither from scarce resources nor limited technologies. Rather it will come from our limited capacity to discover and implement new rules—new ideas about how to structure interactions among people, such as land titles, patents, and social norms. The central task of reducing global poverty is to find ways for developing countries to adopt new rules that are known to work better than the ones they have. Economists who advise leaders on policy have often overlooked why some good rules get adopted and others do not. But a better understanding of rules-that-change-rules could lead to breakthrough thinking about development policy. The special rules of China's Special Economic Zones, where new cities like Shenzhen could grow up, created small laboratories through which rules from Hong Kong spread to the mainland, helping unleash the largest and fastest reduction of poverty on record. Romer concludes that a new type of development policy would be to voluntarily charter new cities for the purpose of changing rules, using a range of new legal and political structures analogous to the ones that made Hong Kong and Shenzhen possible. The essay is adapted from a talk presented in Mexico City on October 2009, at the conference, "Challenges and Strategies for Promoting Economic Growth," organized by Banco de México.

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Technologies, Rules, and Progress

After the financial crisis of 2008–09, many observers turned pessimistic about prospects for growth. This pessimism persists in both developed and developing countries. Forecasts call for slower growth in both the short- and long-term.

Similarly pessimistic forecasts following previous instances of macroeconomic distress, turned out to be wrong. The current forecasts will be wrong as well, provided we draw the right lessons and focus our energies and creativity in the right direction.

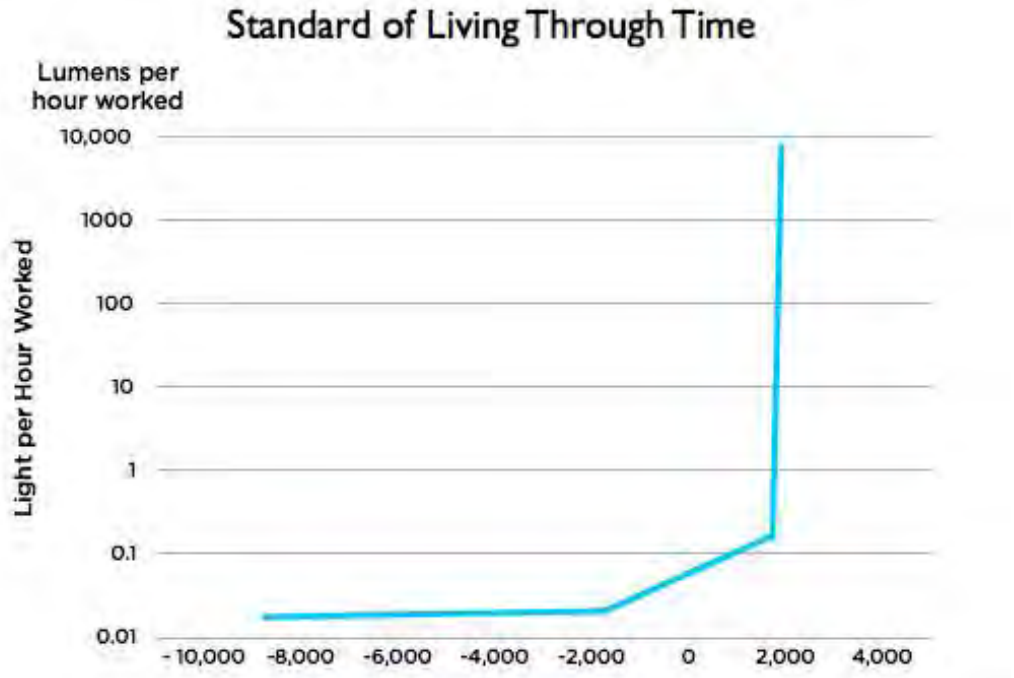
In this century, new technologies can raise living standards at the fastest rate in human history. To careful observers, this much has been clear for some time. What's new is the recognition that it will happen only if our rules keep up with our technologies and the proliferating web of human interactions that these technologies make possible. The constraint we will face will come from neither scarce resources nor limited technological opportunities; if we falter, it will be because of our limited capacity for discovering and implementing new rules.

The people who live in the poorest countries on earth are the ones who suffer most obviously from bad rules. The most pressing task is to find ways for them to adopt rules that are already known to work much better. Finding strategies that make this possible is the key to reducing global poverty. Doing so might also shed new light on the general dynamics of rules, an area in which everyone has an important stake.

Grounds for optimism

In the late 1970s, many economies seemed to be out of control. If central banks and elected officials couldn't even tame inflation, how could they promote sustained economic growth? The Club of Rome commissioned a famous report called *The Limits to Growth* that said that resource scarcity would doom us to catastrophic decline in the level of economic output. We know now that that these near-term concerns about the prospects for growth ignored powerful, long-term trends.

The best way to see this is with data collected by William Nordhaus (1997) on the price of light. The graph on the next page tracks the amount of light (in lumen-hours) the typical human can buy with one hour of work, tracked from 10,000 years ago to the present. Notice that the vertical axis uses a ratio scale; this means that the slope tells us about the rate of increase in the amount of light you can get from one hour of work.



This stunning graph shows not just how much better off we are than people were in the past, but also that the rate of improvement is increasing over time. The myopic doom and gloom of the 1970s and the pessimism we feel about the recent economic crisis are misplaced in the context of the forces the drive this broad trend.

The power of technology

We know quite a bit about what drives this process of accelerating improvement. In the late 1800s, the invention of the light bulb was a new technology that made light much more convenient and much less expensive. The light bulb involved various component technologies. Technologies are ideas about how to arrange physical objects—ideas like how to generate electricity, how to transmit electricity to homes and businesses, and how to construct the actual bulb that converts electricity to light.

One key feature about technologies, one that distinguishes them from scarce objects, is that we can share them. Because ideas are sharable, we benefit from interacting with many people. Growth speeds up when we can trade ideas with a larger number of people (Jones and Romer 2010). With more people, a new idea is more valuable and there are more potential discoverers. This is why international trade is so important. It lets us share the ideas embedded in the goods we exchange. This is also why cities are so important. They are places where millions of people can meet and share ideas. Sharing also means that developing economies that copy existing technologies will see their living standards converge with those in developed economies.

Taking advantage of exchange with more and more people requires new rules. The largely informal rules that govern village life are simply not up to the task of making sure that millions of us can live in close quarters. Nor in making sure that we can have a system of international trade that benefits everyone.

New technologies themselves also require new rules. There's a well-known parable that should be updated to say, "If you give someone a fish, you feed them for a day; if you teach someone to fish, you destroy another aquatic ecosystem." Over the same historical period when our access to light was improving dramatically, humans have done enormous harm to our seas because our rules did not keep up with our fishing technologies.

Rules: Ideas about how people interact

The fisheries example highlights the fact that sustainable growth and development relies on something more than just the power of technology. We can lump the ideas behind fishing nets and trawlers under the category of technology, but there's another category of ideas needed to ensure a sustainable catch: rules.

If technologies are ideas about how to arrange physical objects—for example, ideas about how to combine iron and carbon to make steel—rules are ideas about how to structure interactions among people. Like technologies, rules can be shared and copied. As the fishing parable suggests, progress comes not just from the discovery of new technologies, but also from the implementation of new and better rules. For example, many fisheries use rules that specify a system of tradable quotas to sustainably manage the harvest.

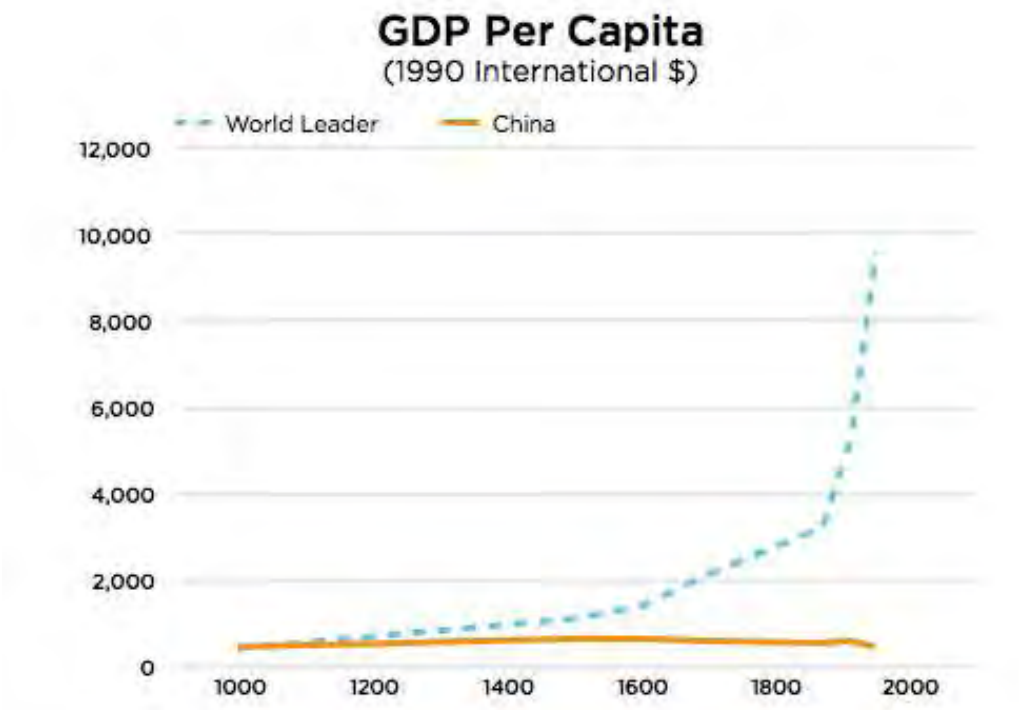
Just as we've started to think carefully about what will lead to the discovery and implementation of better technologies, we need to pay attention to the mechanisms that lead to the discovery and implementation of better rules. We need to think harder, not just about where new and better rules come from, but also about how they get implemented.

Developing countries pursue catch-up growth by copying technologies. They understand that it is wasteful to reinvent the wheel. Many governments create the appropriate conditions for foreign direct investment that will bring in technologies controlled by multinational corporations and let local workers use them. But a critical and thus far unanswered question concerns the potential for copying rules. What types of mechanisms will allow developing countries to copy the rules that work well in the rest of the world?

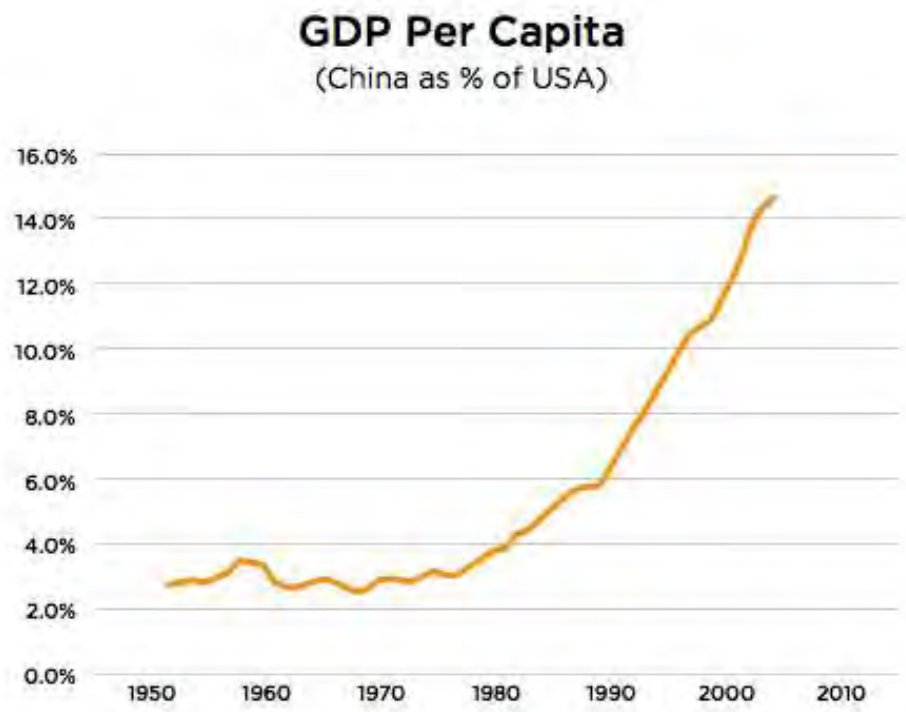
If people can copy good rules, we need to consider why it sometimes does not happen. China's economic experience illustrates both the promise of adopting better rules and the failures from shunning them.

About 1,000 years ago, China was the world leader in economic output and innovation, pioneering important technologies like steel and printing. Shortly thereafter, China began to fall dramatically behind while the world's leading countries discovered and implemented new technologies.

By the 1970s, income per capita in China was just 3 percent of that in the United States. Looking back in 100 years or so, the event that will have the most historical salience will not be the financial crisis of 2008 but the moment around 1980 when, after 1,000 years of stagnation, China started to catch up with the technological frontier. China employed mechanisms, including special economic zones, that allowed it to copy good rules from the rest of the world, especially its thriving neighbors in Hong Kong.



Source: The World Economy (http://www.theworldeconomy.org/statistics.htm)



Source: Penn World Table (http://pwt.econ.upenn.edu/php_site/pwt_index.php)

Developing new rules

What are some examples of rules? One simple rule concerns whether we drive on the left or on the right. The side we choose is not important; it only matters that we choose a side and stick to it. Another example is ownership, the idea that someone can own a piece of property such as a piece of land. Yet another rule, which came later in human history, was the notion of open science, an arrangement in which certain kinds of ideas were not subject to individual ownership. Instead, people who discovered ideas were rewarded with publication and academic prestige.

Economists who think about policy are accustomed to asking how particular rules affect wellbeing. For example, we understood that a patent can create a very important incentive—a motivator for someone like Thomas Edison to invent the light bulb. Similarly, we can say that the rules of open science can lead to something like Maxwell's laws of electricity and magnetism, which helped engineers design the transmission networks that made light in the home possible. In these cases, the rules of intellectual property rights and open science worked together to create the appropriate incentives for the development of new technologies. Unfortunately, the economists who advise leaders on policy don't worry as much about where rules come from. This limits their ability to provide good advice on how to change the rules, even when they know that new rules would be beneficial.

These policy-oriented economists could learn from economic historians, who have examined how rules develop (see for example, Greif 2006 and North et al. 2009). They point us to

examples like the human breakthrough that led to cultivation of cereal grains. For hunter-gatherers, the ownership of land was not important. Yet when humans began to cultivate cereal grains, it became increasingly important to have ownership of land to motivate the work needed to cultivate the grain. In this case, it is likely that rules about property ownership or land arose in response to the advent of new technology.

Because it's not always obvious what the best rules are, we experiment and explore to find rules that work well in a new context, just as we experiment and explore with new technologies. Consider the fishing example. If people can use only their bare hands to catch fish, then a rule of free access to fisheries works relatively well. The development of nets makes fishermen more productive—enough so that they begin to deplete fisheries under the rules of free access. Attempts to avoid depletion with rules that limited the length of a fishing season typically failed to stanch the decline and had harmful side effects because they put a premium on fishing as rapidly as possible.

Eventually, we came up with the idea to use individual tradable quotas (ITQs). An ITQ gives the owner rights to a fraction of the total allowable catch in a fishery and the ability to sell that right. The value of the ITQ is based on the productivity of the fishery. ITQs in fisheries on the verge of collapse will be worth very little. As a result, the fishermen who own the ITQs have a strong incentive to preserve the fishery, thereby increasing the value of their rights (Heal and Schlenker 2008). The ITQ solution came only after a period of trial and error and a number of collapsed fisheries.

The puzzle is that once we understand its benefits, political roadblocks still prevent more widespread use of this beneficial rule system. The fisheries example illustrates how the dynamics of rules are inherently more conservative or resistant to change than the dynamics of technology. As a result, economists need to give more thought to mechanisms that speed up the adoption and implementation of rules that are known to be good.

Some rules are embodied in values or social norms. Rules against spitting evolved over time and became increasingly important as humans lived in higher density urban areas rather than in the countryside or in hunter-gatherer bands. But the rules against spitting are typically enforced not by laws or police but by social norms about what is right or wrong. As recent Nobel recipient Elinor Ostrom pointed out, this type of social norm offers some advantages: when we share common notions of acceptable behavior, we achieve order more efficiently than active policing.

But social norms have a downside. If changed circumstances mean that the rules codified in our norms and values are no longer appropriate, it can be very difficult to adopt better rules. For example, we may have felt that it was wrong for any one person to take ownership of mother nature in hunter-gatherer societies. Norms of sharing were an appropriate way to manage risk. When grain cultivation made land ownership more efficient than common property, we had to overcome the moral sense that it was wrong to have someone own land and refuse to share the food it produces. Shifting from the norms of sharing to the norms of ownership is a difficult and contentious process (Gurven and Kaplan 2005).

Meta-rules: Rules for changing the rules

Meta-rules are rules about rules. They determine how we go about changing our rules. The kind of meta-rules that we most often think about are standard political systems that fall on a continuum between something like democracy and something like authoritarian decision-making. Democratic meta-rules require some form of voting, perhaps by referendum or a representative body, to change the rules. Under more authoritarian meta-rules, a rule change may require the approval only of an executive.

Stockholm's recent adoption of congestion pricing offers an interesting example of a subtle change in democratic meta-rules. To encourage the adoption of more efficient traffic rules there, city officials employed a meta-rule based on the ~~"tr~~y before you buy" strategy that firms use to enhance the credibility of their product claims. Instead of committing everyone to a permanent change, the officials let residents sample the new traffic rules that charged higher prices for drivers entering the city center at peak times during a seven-month trial period. Officials also increased citywide bus service to demonstrate the benefits of the charge to non-drivers. In pretrial polls, the majority of residents opposed the charge. After the trial ended, 52 percent of residents voted in favor of permanent congestion pricing (Harsman and Quigley 2009). First-hand experience with the benefits of the scheme appears to have tipped the scales in favor of a beneficial rule change that electorates worldwide have shown great reluctance to adopt.

In evaluating meta-rules, we need to be open-minded and look at a broad range of alternatives. One that is little used now, but that could be revived, involves designing entirely new systems and letting people who want to try the new system opt into it. Historically, the ability to move between countries in search of better opportunities—to vote with one's feet—was a powerful force for progress. While modern globalization offers greater mobility of capital, goods, services, and ideas, restrictions on the mobility of people keep many people from leaving bad systems of rules for better ones. Moving forward, the effort to create new places with good rules and let people opt in could offer an important supplement to familiar democratic or authoritarian mechanisms for changing the rules.

New systems with opt in

Rule change is a pervasive problem that shows up on many scales. Corporations sometimes have as much difficulty changing the rules as nations. IBM had a corporate culture, a rule set, that was well suited to selling mainframe computers to large businesses but was not the right rule set for selling personal computers or hand-held devices. Brand new organizations, such as Apple, emerged with rule sets that moved computing to the consumer level. As the new rule sets proved successful, customers, workers, and technologies gravitated toward them. It was not just Moore's Law that gave us pocket computers with internet access. New entrants—with new systems of rules that people could opt into—pushed this dramatic change as well. Faced with this competition from new entrants, IBM eventually changed as well.

Discount retailing in the United States offers another example. Before the 1960s, the rule sets used by department and variety stores dominated retailing. Discount retailing, the notion that a

store could retain elements of quality and selection found in department stores while offering goods at lower prices, began to take shape in the early 1960s. New entrants like Walmart came in with new rules required to make this model succeed. Target emerged as a special division—a skunkworks—of an existing department store, Dayton-Hudson. Target shows that new rules come not only from start-up firms but also from autonomous divisions within existing organizations. Though still accountable to Dayton-Hudson, Target had the freedom to hire independently and create its own rules for discount retailing. Target experienced tremendous success as a skunkworks, eventually growing large enough to take over the entire company.

What would this mean for the larger governance structures that people live under? Accidents of history made Hong Kong a new system for political and institutional rules in China. The British administered this small piece of Chinese territory, and many Chinese people opted into the new set of rules that prevailed there. Later, the Chinese government deliberately established the nearby city of Shenzhen, adopting market rules similar to those that prevailed in increasingly prosperous Hong Kong.

Like Target, Shenzhen grew up as a special division within an existing national organization." The city's administrators were accountable to the Chinese government, but the rules they enforced were very different from those that prevailed in other Chinese cities at the time. Notably, the rules in Shenzhen allowed foreign firms, people, and technologies to work and prosper with locals under the rules of a market-based economy. Many people chose to opt into the new rules in Shenzhen, which grew very quickly from an area with very little population to an urban area of approximately 15 million people.

The challenge for developing countries

China's special economic zones demonstrate the potential in urbanization to create entirely new places, which were sparsely populated before, that could be operated under different sets of rules. The challenge for developing countries is to do something similar to drive changes in the rules within their existing systems of governance.

There are many places along the world's coastlines that could host new cities of 10 million or so residents at a population density similar to that of Hong Kong. Suppose that leaders in a developing country pick an essentially uninhabited piece of land of this size, create a new set of rules, and allow willing participants to opt in. Changing the rules for a nation as a whole using existing political mechanisms forces leaders to persuade and sometimes coerce everyone to change what they're doing. The potential for opt-in avoids the need for coercion or for consensus, and can therefore speed up experimentation with new rules. The use of new systems of rules with opt-in could give both developed and developing countries the opportunity to do things that they wouldn't be able to do under the current political processes for changing the rules.

For example, it looks likely that current political processes will prevent the adoption of congestion pricing in most developed cities. Modifications to the democratic process like those used in Stockholm might eventually work, but they might not. After all, even after experience

with the new system, the vote to approve congestion prices in Stockholm was very close. But a new city that builds congestion pricing into its traffic rules from the start will circumvent the electoral roadblock. Many people will be willing to move to the congestion-free city even though they might not support congestion charges where they currently live.

How might a new city with new rules be administered? One option would be to follow the Chinese example of Shenzhen. The new city could be an autonomous area with new rules that are administered by a city manager with strong executive powers. The city manager might have wide discretion in the pursuit of a mandate to oversee a safe and prosperous city, but he or she would ultimately be accountable to elected leaders. Another option would be to follow the example of Hong Kong and create a partnership with one or more foreign countries. This arrangement could be like the one between the British and the Chinese, but entered into voluntarily. Because some governments in developing countries lack the credibility needed to make commitments to long-term investors in urban infrastructure, they could benefit from a partnership with a government that can make such commitments.

Modern central banks use the mechanism of a strong but accountable executive with a great deal of success. We give central bankers clear mandates on issues like price stability and growth. We also give them wide discretion in pursuit of those mandates. Elected representatives don't have a say on the rules of monetary policy, but they do get to specify the mandate and hold central bankers accountable for living up to it. In monetary policy, this system for managing monetary rules has been very effective. Since the pessimism about inflation in the late 1970s, we made enormous strides as more countries adopted rules that specified an independent central bank with a strong but accountable executive. Central bank–like governance arrangements for new, well-run cities could encourage private financing of infrastructure, rapid urbanization, and a much more rapid economic transition toward manufacturing and services.

Just as there are many more technologies to discover, there are many more prosperity-inducing rules to discover and many existing rules worth copying. The key challenge is to find meta-rules that encourage productive changes in systems of rules—the types of changes that will allow relatively poor countries to catch up with or surpass the rest of the world. The chartering of new cities is an example of a meta-rule that can help a country to quickly adopt new rules in new cities—the growth of which can drive economic progress in the rest of the country.

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