GLOBAL INSIGHTS
Special Edition

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FALLING THROUGH THE CRACKS

HOW OVERLAPPING RESPONSIBILITIES AMONG MANY AGENCIES CONTRIBUTES TO THE POOR LIVING CONDITIONS OF GARMENT WORKERS IN GURGAON, INDIA

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EDITED BY DARIAN WOODS

India's new government in Delhi has promised to create more jobs and tackle urban chaos. Yet a stone's throw away from where decisions are made is an example of how the government creates chaos. Here, multiple agencies' overlapping jurisdictions create a situation in which even those with secure jobs cannot find decent housing or access basic urban services.

If you travel in an auto rickshaw along the Old Gurgaon-Delhi road, past the glitzy edifices of the IT and financial sector corporations—the largest sources of tax revenue for the state of Haryana—for which Gurgaon is famous, you will see an imaginary border. On one side, less than two kilometers away from these towers, is Udyog Vihar, site of numerous garment factories that sell to multinational brands, such as GAP and JCPenny. On the other is Kapashera, a slum settlement in the state of Delhi. Yet the ubiquitous six-seat auto rickshaws that do brisk business on this road are not permitted to go beyond the Gurgaon-Delhi border. If you want to visit Kapashera, you must leave the auto rickshaw and walk a half kilometer across the border. This seemingly innocuous fact symbolizes many of the jurisdiction conflicts that affect the lives of people in this slum, many of whom are garment workers with

Image 2. The Kapashera slum is divided into several compounds with rows of tiny ten-by-ten-foot one-room units. Each compound contains thirty to one hundred rooms.

Photo credit: gurgaonworkersnews.

Image 1. A Gurgaon rickshaw driver. To visit Kapashera, you must leave the auto rickshaw behind.

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permanent jobs.

The slum is divided into several compounds with rows of tiny ten-by-ten-foot one-room units. Each compound contains thirty to one hundred rooms. Most of the workers who live there are married men who cannot afford to bring their families with them, unless their wives also find work. In these compounds, there is only a handful of shared toilets, which means that each toilet must be shared by approximately twenty people. Water is available through illegal connections that draw from an already parched earth. Polythene bags and other waste choke the canal that cuts across the area, so essentially water trickles into a filthy, stagnant garbage dump.

Sanjay is a garment worker who migrated from Uttar Pradesh, a village in Gorakhpur district, 14 years ago to work in Mumbai. Now in Gurgaon, he has lived in the Kapashera slum for the past three years. In Hindi, he tells me "If we had an identity proof, we could try to get a gas connection. But without one, we cannot do anything. Politicians come once or twice and make some noise but it doesn't help." Sanjay cannot get a proof of residence from the landowner because the colony is illegal.

Sanjay is barely able to survive here. Yet, like the other workers who come from the villages in the states of Uttar Pradesh, Bihar, Jharkhand, and West Bengal, he stays here because the

agriculture crisis makes village life untenable. The only way these workers can imagine any sort of future is by migrating to the boomtowns of India.

DRIVEN TO THE MARGINS

But why is the colony located in Delhi rather than in Gurgaon, where these workers are employed? The answer lies in the development trajectory that Gurgaon has followed.

In a recent report, The Hindu, an Indian newspaper, alleged that developers received inside information about land use regulation changes in Gurgaon's Master Plan, which may have helped builders make purchases that led to massive profits. Gurgaon's development plans created explosive growth in the IT industry and established incentives for builders to develop housing for the professional class. Together these policies put private housing out of reach for the garment factory workers.

There is almost no vacant land available for migrant workers to build temporary settlements. A Haryana government scheme mandates that fifteen percent of each community's housing stock must be turned over to the Haryana Housing Board, and these units are supposed to be developed and made available to "Economically Weaker Sections." However, there are reports that such flats are rarely occupied by those for whom they are meant; even if they were, the units would be insufficient to meet the massive need for affordable housing for migrant workers. Such housing colonies are also some distance from the factories, adding transportation costs that workers cannot cover with their meager salaries. While towns like Rohtak, Faridabad, and Manesar have developed Industrial Model Townships, there is no such plan for Gurgaon.

The lack of affordable housing in Gurgaon, coupled with the high cost of living, leaves these workers with no other option but to live in the Kapashera slum settlement. In a recent survey conducted by the Society for Labor and Development, migrant workers in Kapashera reported having an average monthly salary of Rs. 6720 per month. However, even for a tiny flat, the cheapest rental housing available in Gurgaon costs around Rs. 6000 for a month. The same survey reported that these workers spend, on average, Rs. 7350 per month. In other words, many migrants end up spending all they earn and have nothing left to send home to their families in the villages. Some even fall into debt.

Because the garment factories and the workers' dwellings, where they are not legal residents, are located in separate jurisdictions, neither authorities in Gurgaon nor in Delhi will take responsibility for their predicament. The State ignores Sanjay's basic needs even though he is a productive member of a working class and creates value for society.

MULTIPLE AGENCIES, NO AGENT

Such a situation highlights the poor governance structures in India, especially those that govern urban hubs, such as the National Capital Region (NCR). The Haryana Urban Development Authority (HUDA), responsible for planned urban development in Haryana, and the Town and Country Planning department of the Haryana state government are the two agencies with the greatest authority over land use and development in Gurgaon. There are numerous allegations that their decisions principally benefit politically connected builders rather than enable construction of affordable housing. Meanwhile, the local body that is theoretically most responsive to the needs of the local population has little say in this matter.

Urban slums like Kapashera are manifestations of many knotty issues, all so intertwined that it is difficult to make a single policy recommendation to 'solve' the problem. However, it is quite clear that in the case of Kapashera, and many other such slums in India, the agencies responsible for urban services do not have clearly defined responsibilities. The Seventy Fourth amendment to the Indian Constitution empowers the local urban government—the Municipal Corporation of Gurgaon (MCG) in this case—to make most major decisions that affect local issues, such as land use changes. Yet, this policy has not been implemented in Gurgaon even though the charter of the MCG mentions land use changes as one of its functions. Currently, the State Chief Minister, through the Town and Country Planning Department, is making land use decisions. If the MCG had more authority, voters in the area would hold them accountable and perhaps the housing and public services would be better. The garment workers might have housing in Gurgaon rather than having to cross state boundaries into Delhi.

My recommendation is the same recommendation that could be made for many issues all over rural and urban India: provide more power to the local government. Yet this has not happened because devolving power to local bodies reduces the state and central governments' power to dispense patronage. That is a much larger problem, the solution to which is not as easily found.

The plight of garment workers, such as Sanjay, highlights how anachronistic governance structures cannot handle issues that migration into urban centers brings into sharp relief. The case of Kapashera is particularly complex because it is situated in the second largest urban agglomeration in the world and spans four states. Fixing governance is perhaps the most important of the many solutions needed to ensure that economic growth in massive Indian megapolises is truly inclusive.

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RENEGADE REGIMES:

HOW CAN THE UNITED STATES EFFECTIVELY ENGAGE WITH RENEGADE REGIMES TO SECURE LASTING SUCCESS OF POLICY OBJECTIVES?

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FOREIGN POLICY

American foreign policy increasingly focuses on managing the threat of "renegade" states such as Iran and North Korea that have made anti-Western sentiment central to their regimes. I hypothesize that the United States' coercive tactics have been ineffective and costly, and that coercion perversely encourages rather than disincentivizes renegade behavior. I propose that the defiant behavior of the leaders of renegade states is wholly rational, and contend that if the United States wishes to more effectively pursue its foreign policy goals with states like Iran and North Korea, it would do better to apply conscientious, positive engagement tactics that could help break the negative feedback loop that current policies have sustained.

EFFECTIVE ENGAGEMENT WITH RENEGADE REGIMES

This article explores how the United States can peacefully and productively engage with states that have made anti-Western sentiment central to their foreign policy. "Renegade regimes" are governments that repeatedly flout standards of good international citizenship as defined by the United States and allied nations. The Bush administration's 2002 National Security Strategy offers a strongly worded description of these regimes that is characteristic of the way such issues are often framed in U.S-centric policy discussions. Renegade regimes were said to "display no regard for international law, threaten their neighbors, and callously violate international treaties to which they are party."

For the purposes of this article, I will instead use the definition of renegade behavior proposed by Miroslav Nincic. Nincic defines this behavior as "a flouting of key norms of conduct espoused by the global community." By defining "renegade" status as a refusal to adhere to specific expectations, I aim to objectively discuss the challenges these regimes pose for U.S. policy-makers.

Traditional power politics relies on a stronger state's ability to coerce a weaker state into complying with its demands. Yet leaders of these "weaker" states have tenaciously resisted the policy changes urged by the United States, posing unique challenges for American foreign policy. I argue the policies currently in place regarding renegade regimes are ineffective and haphazard at best. I seek to address the failures of previous policies, explain why America's traditional approaches have

failed, and define policy alternatives that might lead renegade regimes to become more receptive to cooperating with the United States.

Drawing on literature from international relations and political psychology, I suggest that coercive tactics, which have formed the bulk of American policies toward renegade regimes, have pushed these states further away from the international community and perversely encouraged renegade behavior. The unique attributes of renegade regimes make them especially resistant to coercive pressure from the international community. A greater emphasis on positive inducements could more effectively address the incentives driving renegade behavior and could increase the weight of coercive strategies when they are employed. Sustained diplomatic engagement could help break down the walls that have insulated these regimes from the international community and encourage their leaders to develop greater respect for international community norms over time.

INCENTIVES FOR RENEGADE BEHAVIOR

A number of recent case studies demonstrating the unique incentive structures and surprising resilience of renegade regimes highlight the importance of crafting more effective U.S. national security policy. Some of the most notable examples include the Islamic Republic of Iran, the Democratic People's Republic of Korea (DPRK, or North Korea), and Venezuela.

Iran has enriched uranium for many years despite its Non-

Proliferation Treaty obligations and strict international sanctions. It has also publicly and financially supported Hamas and Hezbollah to the point that in 2006 the U.S. State Department classified Iran as the world's most active state sponsor of terrorism. Iran and North Korea have also engaged in repressive practices at home and cooperated with one another in counteracting American policy agendas in their wider regions, despite increasing repercussions for these actions.

Venezuela, under late President Hugo Chavez, pursued a deepening friendship with Iran in the face of tightened international sanctions on Iran's nuclear program. Venezuela also supports the Revolutionary Armed Forces of Colombia (FARC), an organization the United States considers a terrorist operation. These cases demonstrate the importance of formulating successful policy to counteract renegade behavior in the international system.

Leaders of renegade governments build their legitimacy through nationalism and resistance to foreign powers. These leaders face unique domestic legitimacy constraints that alter their incentive structures and influence their responses to external pressures. When bargaining with nations like the United States, whose positions are more likely to be supported by an array of international allies, leaders of renegade regimes choose independence over positive engagement. They are willing to risk negative repercussions if positive engagement might suggest a domestic loss of political fortitude. Bargaining between certain world powers and the renegade regimes discussed here can therefore produce an outcome not preferred by any party due to domestic constraints on both sides. Knowledge of renegade governments' constraints may help alter current bargaining strategies to produce a more desirable outcome for all players.

The key to renegade regimes' resilience has been their focus on building state legitimacy through outspoken defiance of the United States and the international community. North Korea conducted nuclear tests in 2006 and 2009, transferred nuclear technology to other countries, and sustained long-term international censure and sanctions in spite of its fragile economy and severe domestic privations. Outside military threats, coupled with the desire to establish domestic legitimacy based on a revolutionary history, have encouraged Pyongyang's nuclear deterrence as well as its refusal to accept ultimatums from the United States. Andrew Ward, a diplomat stationed in South Korea, explained following a nuclear negotiation breakdown in 2002 that "everything North Korea does, whether making peace or making threats, has a single goal: to sustain the regime." Pyongyang's revolutionary legacy, its juche ideology of self-reliance, and the patronage of powerful elites have allowed for and incentivized continued resistance to demands from the United States for normalization.

Like North Korea, Iran has sustained strict economic sanctions and international censure since its formation in 1979. Initially promising nuclear negotiations, begun in 2012 through the multilateral Joint Plan, have stagnated, despite strict international and comprehensive sanctions aimed at incentivizing regime compliance with nuclear non-proliferation responsibilities. Iran continues to build its domestic legitimacy on its image as a revolutionary power besieged by external threats. Considering this, President Rouhani's reputation as a diplomat and negotiator is both valuable and potentially hazardous. Although he was elected to power on a platform of negotiation with the West, the country's powerful and influential elites remain wary of negotiations that might appear to weaken Iranian claims of independence and national pride. In an article for the Washington Post, Rouhani states: "sadly, unilateralism often continues to overshadow constructive approaches. Security is pursued at the expense of the insecurity of others, with disastrous consequences… In Iraq, ten years after the American-led invasion, dozens still lose their lives to violence every day. Afghanistan endures similar endemic bloodshed." In this statement, Rouhani simultaneously warns his supporters of the dangers of American negotiation sabotage, while painting Iran as a levelheaded and peace-loving nation.

INCENTIVES FOR RENEGADE BEHAVIOR

Building on the discussion of renegade regimes' incentives, in this section I outline why coercion alone is likely to fail as a foreign relations tactic. I will then build on this critique of negative pressures in the following sections to explain how a greater focus on positive engagement strategies can better encourage norm-compliance among states that consistently reject the norms embraced by the United States.

North Korea and Iran continue to ignore international pressure despite their comparatively weak military capabilities and economies, because caving to international pressure poses grave domestic consequences. Condemnation and threats from Western powers serve to justify for a domestic audience the regime's claims of external threat, hardening even those who are critical toward the regime against external pressures.

Anti-American and anti-Western rhetoric is an important component of renegade governments' foreign policies, and has even served to unite some states in rejecting standards and responsibilities urged on them by other nations. Venezuela refused to comply with nuclear sanctions against Iran under President Hugo Chavez, and Iran and North Korea have furthered their trade relations despite international pressure on both states to end their nuclear programs. Through the same logic as 'the enemy of my enemy is my friend,' cooperation built on defiance has allowed certain states to circumvent negative pressures from the United States.

The ability of certain states to resist outside threats stems in part from a history of economic protectionism. North Korea

enjoys very little international trade, relying instead on domestic repression and information insulation to sustain its failing economy and continue its nuclear proliferation activities. The nuclear program is embedded in a larger war-economy that complements the nationalist foundations of regime legitimacy and acts as the primary deterrent to foreign threat. Focusing the weak and disenfranchised public on the perpetual threat of American forces on its border and using patronage to fund its critical power base, the regime has managed to sustain power despite appalling domestic conditions.

Iran, conversely, is heavily dependent on foreign trade in order to procure the oil rents that fund patronage. Oil income, however, is uniquely resistant to sanctions. Oil and natural gas face high international demand and OPEC price regulations, allowing Iran to find alternative buyers for its entire export stock so long as buyers are willing to flout international sanctions. Iranian primacy in the oil market makes it difficult for the United States to encourage it allies to support a complete ban. Only sanctions that also involve Europe, Russia, and China could induce economic pain for Iran, but such comprehensive and multilateral agreements themselves pose diplomatic challenges. Even American and European joint sanctions would generate insufficient damage

Leaders of renegade governments recognize that U.S. military might is constrained by political considerations, and consequently, do not always take military threats seriously. Even when the military threat is credible, yielding may carry impossible political costs for leaders who base their regime's legitimacy on outspoken defiance of foreign powers. As a result, military pressures can be particularly ineffective, even when placed on states with relatively weak military power.

Even when the United States follows through on its coercive threats, there is no guarantee that removing military targets will actually bring about the desired policy objectives. The recent cases of Iraq and Afghanistan demonstrate that a preponderance of military might does not necessarily lead to policy success. As Frederick Kagan explains, it is a mistake to believe in the "'vision of war' that see[s] the enemy as a target set and believe[s] that when all or most targets have been hit, he will inevitably surrender and American goals will be achieved." Military engagement may be particularly counterproductive when used in response to action that stems from anti-American sentiment, since doing so can compromise regional security or trigger unpredictable responses from extremist factions.

Despite the United States' military, economic, and alliance capital, U.S. leaders have been unable to pressure, threaten, or compel leaders of renegade governments to significantly change, even when the United States has enlisted the help of a vast global network of powerful partners. As Nincic explains, "shrugging off decades of threats and sanctions [Iran and North Korea] became more, not less, of a problem." Positive

engagement could lead to better results, particularly for longer-term policy goals such as lasting respect for nonproliferation treaty obligations and international human rights. Policies that encourage states to engage in more productive communication with the United States and provide their leaders with incentives for cooperation could potentially lead to increased support of America's foreign policy agenda.

THE PROMISE OF POSITIVE INCENTIVES

I propose that emphasizing positive incentives could prove more effective at achieving policy objectives than the more coercive strategies that have traditionally been employed by the United States. In this section I outline three theories from political psychology and international relations theory that have particular application to creating incentives for positive behavior in renegade regimes: 1) the importance of threat perception, 2) political psychology of loss aversion and attribution theory, and 3) the possibility of norm transference over time.

Threat perception plays a critical role in bargaining. Given that regime tenure is of paramount importance to the leaders of renegade states, outside calls for regime replacement reduce their willingness to comply with a negotiated settlement that might reduce their state's deterrence capabilities, such as nonproliferation of weapons of mass destruction (WMD). However undesirable it may seem to some, a non-intervention guarantee—the promise to not use military force—may be necessary in order to ultimately convince renegade states to disarm.

Libya under Muammar Qaddafi in the early 2000s presents an interesting example. Years of sanctions and threats failed to bring an end to Libya's WMD program. However, when confronted by a powerful American military after the overthrow of the Iraqi government, Qaddafi chose to relinquish Libya's nuclear and ballistic missile programs in exchange for a lifting of American sanctions and a non-intervention guarantee. The key to the success of this foreign policy agreement was the offer of the non-intervention agreement, concurrent with domestic pressures on Qaddafi. The increased international economic interaction marginally improved the economic situation of Libyans, reduced the threat of WMD proliferation, and fostered international dependencies upon which future negotiations drew.

It would be naive to expect positive engagement to immediately bear fruit. Leaders of renegade regimes have a long history of mistrust of the United States, which makes them wary of initial offers of productive exchange. A more graduated reduction of tension strategy—GRIT, as proposed by Charles Osgood in 1962—involves repeated offers of cooperation, even when the target rebuffs initial proposals. Repeated offers—even unrequited—can demonstrate the sender's sincerity and eventually persuade a skeptical target.

Protracted interaction with renegade regimes—through international organizations or direct partnerships—would encourage a culture of cooperation. Cooperation in one area of interest can lead to 'functional spill-over' into other areas. This creates an upward spiral in successful cooperation and communication, with each new area of positive interaction leading to greater trust and increasing the likelihood of success in future collaborations. This culture creates room for discourse that leads to greater understanding between nations. According to attribution theory, an offending state will be more receptive to messages from a cooperative partner than a traditional enemy. A leader is more likely to view criticism from a partner as a justifiable result of his own actions. This suggests that if American diplomatic interaction centered on mutually beneficial political or economic deals, renegades would be less callous to critique and more likely to consider constructive changes.

Similarly, a history of successful positive engagement will make negative pressures more effective when they do become necessary. Ongoing cooperation would create greater economic and political linkages with which to apply pressure if needed. According to prospect theory, the state will place a greater value on goods it already possesses than on equally valuable goods that it may possess in the future. Many leaders evaluate utility with respect to the status quo, and tend to be risk-averse with respect to gains (i.e., unwilling to sacrifice much to secure a gain) but risk-acceptant with respect to losses (i.e., willing to take on more risk to protect against a loss). This implies that successful cooperation is more likely to occur when states are driven by protecting against losses from non-cooperation than when enticed with potential—but unrealized—gains from future cooperation. For non-cooperation to trigger losses, however, the parties must have some existing relationship. In cases such as North Korea and Iran, leaders have adjusted their status quo to accommodate long-standing sanctions. The United States has very weak capacity to unilaterally threaten loss of any kind.

Traditional inducements, such as those outlined above follow the exchange model of positive engagement. This model "offers an adversary some concessions intended to produce a desired counterconcession [where] the objective is a trade involving policy changes on the target side." The exchange model relies on short-term payoffs and immediately measurable policy concessions. A more comprehensive and ambitious positive engagement strategy is the catalytic model, which aims "to change the other side's basic motivations so that bribes and punishments become less necessary. The purpose…is a thorough overhaul of relations by altering the other side's policy priorities." In contrast with the short-term focus of the exchange model, the catalytic model is a long-term strategy.

The catalytic model pursues social norm convergence, ideally shifting the target nation's "logic of appropriateness" to one deemed more acceptable by the other side. Continuous interaction creates opportunity for renegade regimes to gradually internalize the social norms of the country or countries with which it is now engaging productively. When targeted regimes internalize new norms, many of the policy objectives that the United States seeks, such as respect for human rights, nuclear non-proliferation, and democratic processes, become the target's objectives as well. Social norms dictate states' decisions, and are conditioned by the environment in which they operate. Transference of new social norms, such as respect for human rights and international law, can re-condition a state's behaviors.

These existing theories help explain the promise of positive incentives in relations with renegade regimes. Reducing the perception that the United States is a threat can create conditions favorable to future effective cooperation. Trust established through initial limited engagements is transferable to other areas of cooperation. Once relations with the United States provide tangible benefits to political stability and even national economic welfare, coercive strategies may become more effective due to loss-aversion, as the leaders of renegade regimes seek to avoid losing benefits on which they rely. Additionally, attribution theory explains that condemnations will have greater weight if normalized relations render targeted nations less callous to American censure. Lastly, long-term diplomatic exposure to the social norms of a newly friendly country can prompt transfer of these norms from one nation to another. Positive engagement spirals generate further potential areas of cooperation. Positive engagement is also self-reinforcing, making it increasingly effective over time as each party gains trust in the other.

ENDS OR MEANS: ASSESSING THE POLICY AIMS OF TARGETS

For positive incentives to be successful, they must take into account the goals of political leaders' policies. A renegade regime's policies may be considered unacceptable with respect to either the ends sought or the means employed. Means are the processes by which a state attempts to pursue some larger objective; means are the tactics and not the goal themselves. If the desired end result is acceptable but the means that the state employs are cause for concern, it may be possible to help the state achieve those ends via more accepted means. This may require easing barriers to more accepted methods of pursuing the same goal, or penalizing unaccepted means. The first method involves positive incentives while the latter involves negative pressures. Both work toward the same goal of making the accepted means less costly than their undesirable counterpart.

I propose means may be easier to alter than ends, particularly if the proposed alternative makes the end goal more attainable. For example, Iran claims it is enriching uranium for peaceful,

domestic energy purposes so that it may reserve its oil and natural gas supplies for export. If this is the case, then the end itself—non-militarized, domestic nuclear power—is not necessarily problematic for the United States. Rather, the United States takes issue with Iran's secrecy and non-compliance with the International Atomic Energy Agency's (IAEA) surveillance over enrichment activities. If the end Iran seeks is truly peaceful nuclear energy, American policy objectives could be met by ensuring Iran pursues this goal in a manner that complies with IAEA regulations.

If the ultimate goal itself is unacceptable, the United States should instead convince the Iran to pursue a different end entirely. If the unacceptable end is simply a stepping-stone on the road to a larger goal that is tolerable, it may be framed as an unacceptable means and treated as described above. If the undesirable end truly is the ultimate goal, however, Iran may not respond to tactics that might have been adequate in addressing means. Ultimate goals are of greater consequence to the regime. Changing the ends could therefore involve proposing acceptable alternatives to the end, or penalizing the pursuit of the intolerable end.

In such a situation, the United States may propose an even more valuable goal as an alternative. This use of positive incentives may prove effective, assuming the United States understands the appeal of the unacceptable end and can propose alternatives that satisfy the same underlying needs. Easing the path to such alternatives while still accounting for the driving interests of the regime could achieve longer-lasting results than negative pressures, which prevent a policy choice only while the pressures are enforced. Should the regime decide to change its actual aim, it must effectively abandon a policy objective, risk loss of face domestically and internationally, and forgo all previous economic investment in that goal. For positive incentives to work, the incentives to change must be sufficiently strong, and the alternatives sufficiently desirable, to make up for these losses.

For example, should it become clear that Iran is not solely seeking peaceful nuclear capacity, but instead intends to weaponize in violation of non-proliferation requirements, then the United States would find the end—nuclear weapons— unacceptable. In this case, a change in means, like allowing full IAEA inspections, would be insufficient. Offering assistance toward nuclear power in exchange for compliance with IAEA inspections would not address American security concerns. The issue then becomes determining whether weaponization alone is Iran's ultimate goal or if it functions as a means to a greater end, such as regime legitimacy or nuclear deterrence capacity. If weaponization is actually a means to a larger end, then it becomes a question of means again. Is the end acceptable, and if so, how can the United States effectively incentivize changing the means while preserving the end? However, if nuclear weaponization is the ultimate goal, then the question becomes whether the United States can positively

entice Iran to change this objective. The United States would have to consider several questions: What would constitute an acceptable, alternative objective? How can the United States sufficiently ease Iran's path to preferable alternatives, so that Iran chooses to forgo nuclear weapons capacity in favor of ends more in line with U.S. interests?

If positive incentives are insufficient or unavailable, it may become necessary to make the end so difficult to attain, or the resulting costs of attaining it so high, that it is no longer desirable. This last tactic does not easily lend itself to positive engagement. However, as I suggested in the previous discussion of loss aversion and attribution theories, a history of positive engagement may still render renegade regimes more susceptible to negative pressure if such pressure is necessary. In such cases where the ultimate goal is so valuable the regime would forgo all possible acceptable alternatives, the regime will be more susceptible to negative pressures and threats from countries with which it typically receives positive incentives. Effective engagement with renegade regimes depends on an understanding of the strengths and weaknesses of positive versus negative incentives in order to determine when such tactics will be effective at promoting American foreign policy goals.

POLICY CONCLUSIONS

Despite initial scholarly work on foreign engagement strategies in general, there is still little consensus on strategies for addressing renegade regimes in particular. I propose that positive incentives, particularly when pursued over the long-term, should play a larger role in achieving U.S. foreign policy goals.

Literature examining the domestic incentives faced by the leaders of renegade regimes, and their historic responses to foreign threats, indicates that policy grounded in positive inducements—and employing coercive measures only when truly necessary—may prove effective. Positive inducements could include promise or implementation of new trade or aid opportunities, resumption of diplomatic ties or exchange of ambassadors, and investment in the target state's national banks. For example, the United States could consider Iranian offers of cooperation to confront ISIS in Iraq and Syria. Tehran has likely made such offers primarily to address its own security needs, but American recognition of cooperation attempts could help strengthen the position of the moderate government and create a forum for dialogue beyond the issue of ISIS. Similarly, limited economic concessions aimed at strengthening the more moderate public in Iran could reflect positively on the policies of moderate leadership in comparison with past hard-liners like President Ahmadinejad. If Rouhani and his moderate policies are seen as helping to increase regime stability, he is likely to garner greater political freedoms from the hardline leadership that will allow him to

pursue more engagement policies with the West.

The major tools of diplomacy, sanctions, and threat of or use of force assume that a state will choose to accept carrots over sticks, and increased international support over exclusion. If a regime is either incapable of or unwilling to engage in global markets in a meaningful way, they are unlikely to be constrained by traditional incentives. Further research should look at a more complete picture of available foreign policy tools. Research that explores the relevant academic theories discussed here and uses quantitative methods to examine statistical correlations of engagement tactics with policy successes could help policy makers craft more successful national security strategy.

After graduating with honors from Bucknell University in 2008, Ariel Farrar-Wellman began work in policy analysis at the American Enterprise Institute's Foreign and Defense Policy Department. While at AEI, she helped launch the IranTracker and its parent Critical Threats Project websites, designed to track and analyze emerging national security issues to help inform policy makers. Ariel is now pursuing her Ph.D. in Political Science from the University of California, Davis

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Policy in Practice
Cultivating Employment Growth in a New Middle Easy City

RICH CAPLAN

EDITED BY BEN CHRISTOPHER, CATHERINE MERESAK, LANA ZAMAN, SUZANNE MERKELSON

Since attending my first City Council meeting in Berkeley for a political science class assignment, I have been fascinated with the decision making process at the local government level and its influence on cities and the daily lives of residents. A Master's Degree in Public Policy led me to twelve rewarding years serving two cities—Simi Valley, California and Vail, Colorado. As relatively new municipalities, these cities were less bound by traditional methods of providing services and more open to innovation. After these two experiences, I became a consultant to city governments across California, the Rocky Mountain West, and the Midwest, focusing on municipal finance and economic development, two areas that influence and enhance a city's quality of life.

In 2010, I joined Parsons Engineering, a Pasadena-based international engineering firm, which provided me an opportunity to practice and apply my skills to another new city undergoing major expansion—this time in Saudi Arabia. As the contract management advisor to the Royal Commission at Yanbu since the city's founding in 1979, Parsons was adding strategic and economic planning to their portfolio of management services. Yanbu fit my criteria as a new city with significant financial resources to address municipal services and emulate best global practices.

One of my first major assignments was to assist Yanbu in its first-ever Economic Plan, a strategic plan through 2030 to diversify the city's economy while preparing to triple its municipal boundaries. My role included securing and managing an international consulting firm, SRI International, a company that also had experience advising other government agencies in the Middle East. I was the link between the consulting team and the city's technical and steering committees. After the Economic Plan was completed, the city and Royal Commission at Yanbu leaders adopted the plan in 2013. The following is a description and analysis of that project.

Many international analysts assert that economics stimulated the Arab Spring as much as politics. In the early months of 2011, large numbers of unemployed youth joined the protests, seeking meaningful futures and better employment opportunities. This may be worrisome news for Saudi Arabia, which has one of the youngest populations in the region. In Saudi Arabia, 67 percent of citizens are under 30 years of age—compared to just 39 percent in the United States. The sheer size of Saudi Arabia's young population has prompted the government to pursue many public policies to accelerate

Image 1. Investors tour the Yanbu waterfront.

Photo Courtesy of Rich Caplan

and expand job creation.

Within that context, Saudi Arabia considers the rapid construction of Yanbu one of its major development achievements.
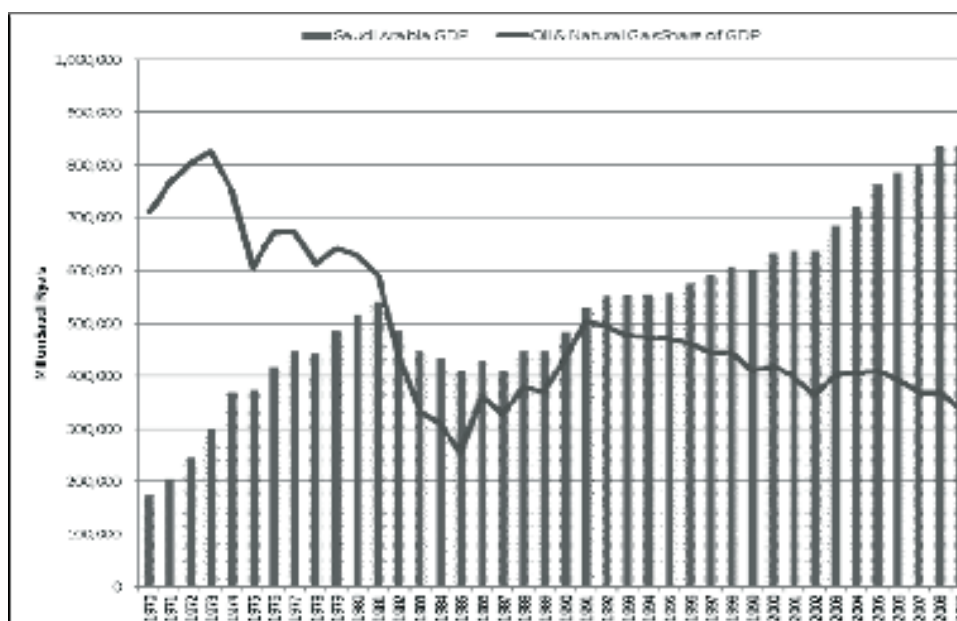
Established in 100 BC as a stopping point for merchant caravans crossing the Red Sea on the trade route from Asia to the Mediterranean, the west coast city of Yanbu was little more than a small fishing port until just forty years ago. In 1975, however, the Saudi government sought to develop Yanbu as a model industrial city. The new city was initially developed with petrochemical facilities and a refinery at its economic center.

Since then, this once isolated fishing village has been transformed into an industrial-oriented city with a 2013 population of 117,609, including an expat community of over 17,000. The residential area contains twenty recreation centers and is also home to Yanbu University and Yanbu Industrial College.

Yanbu is now an important petroleum-shipping terminal and is home to three oil refineries, a plastics facility, and several petrochemical plants. Three major oil pipelines lead across nearly 800 miles of desert from the oilfields in the east to terminate in Yanbu, with its large Red Sea port protected on both sides by wide coral reefs.

In order to accelerate the pace of employment growth, the City introduced its Economic Plan in 2013. This plan recommended forty-three special industrial and community projects and actions to guide growth through 2030, while also outlining strategies that motivate other levels of government and private sector actors to work cooperatively with the City in the pursuit of shared employment goals. To complement this Plan, a Royal Decree issued the same year expanded the borders of the city by 162 square miles, a geographic area more than three times the size of San Francisco. Today, the city is home to a range of manufacturing and support-industries and contributes approximately 3 percent to national GDP. [1] [2]

Beyond its employment goals, the Plan addresses a number of other issues of concern for the future development of Yanbu and Saudi Arabia as a whole. In the context of a changing global economy, Yanbu must develop a strategy for economic growth that is not so dependent on fossil fuels. Against this backdrop, Yanbu has significant location-based advantages, such as open land for development and immediate access to regional markets via the Red Sea's major global shipping artery.

In addition, Yanbu is governed by a professional Saudi staff and supported by international expats embedded at the Royal Commission. Yanbu and Saudi Arabia lack democratic institutions, and as a result, accountability and transparency may not be prioritized as they are in many western countries. Nevertheless, there is reason to believe that high-ranking local public officials are committed to improving the city and helping residents. Some of the primary commitments include decreasing unemployment, bolstering the private sector, and improving economic stability.

YANBU WITHIN A NATIONAL CONTEXT

Saudi Arabia's economy and society are different today than they were when Yanbu was designated as a model industrial city in 1975. According to the nation's Central Department of Statistics & Information, Saudi Arabia's economy has grown on average by about 4 percent per year over the last decade.[3] Meanwhile, Saudi Arabia's population has grown significantly,

FIGURE 1: OIL & NATURAL GAS SHARE OF SAUDI ARABIA'S GDP 1970–2010 (IN 1999 PRICES). SOURCE: SRI INTERNATIONAL

to around 27 million over the last 30 years. It is expected to peak at about 45 million in 2060.[4]

In order to prepare its young population for the changing needs of its growing economy, Saudi Arabia has made large investments in higher education, increasing the participation rate of the college-age population from just over 5 percent in 1990 to more than 35 percent in 2010, according to the Ministry of Higher Education. At the same time, the nation's economy made progress in diversifying away from its heavy dependence on oil exports and petroleum products. As economic diversification has occurred, oil and natural gas exports have declined from more than 50 percent of the Gross Domestic Product (GDP) in the 1970s to under 30 percent today. (See Figure 1 – "Oil & Natural Gas Share of Saudi Arabia's GDP 1970 – 2010.")

Saudi Arabia may face future economic challenges if it does not further reduce its economic dependence on oil exports. If oil exports decline in the future, it would eventually reduce the nation's ability to earn large export revenues. Oil exports are currently declining due to a combination of factors, including:

• Rapidly growing domestic demand for fuel and oil, which Saudi Arabia uses to generate power. This growth in demand is driven by rapid population growth and the highest per capita energy consumption rates in the world, due in part to low energy prices;

• Little government and public attention to developing alternative energy sources;

• Decline in international demand in Europe and North America, as a result of increased oil production in the United States from shale oil; and

• International energy efficiency practices that reduces global dependency on fossil fuels.[5]

These international trends are particularly relevant in Yanbu, where the most prominent industries, petrochemicals and refining, serve as the job engines driving the city's economy. As such, Yanbu may be vulnerable to these shifts in the global petrochemicals industry.

For these reasons, economic diversification is a key element of the Yanbu Economic Plan. Diversification would help Saudi Arabia develop a more sustainable economy that is better insulated from fluctuations in world oil prices.

NATIONAL DEVELOPMENT GOALS & INITIATIVES IN SAUDI ARABIA

Yanbu's development takes place within the context of a rapidly changing economic global landscape in Saudi Arabia. It is also influenced by the development goals of the national government. The overarching framework for Yanbu's Economic Plan is Saudi Arabia's current Ninth Development Plan,7 the country's current five-year developmental strategy. This national plan has six main goals:

1. Improve standards of living and quality of life for Saudis;
2. Balance development among the regions of Saudi Arabia;
3. Diversify the economic base;
4. Move toward a knowledge-based economy;
5. Enhance competitive capacities; and
6. Develop human resources.

The Yanbu Economic Plan's particular emphasis on

FIGURE 2: YANBU EMPLOYMENT GROWTH PATH (NON-GOVERNMENT EMPLOYMENT). SOURCE: RC-YANBU; SRI INTERNATIONAL.

diversifying Saudi Arabia's economy will help Yanbu contribute to the progress on all six of these national goals.

DEFINING A NEW VISION AND NEW FUTURE FOR YANBU

Yanbu's Economic Plan seeks to establish a city capable of meeting the twenty-first century challenges facing Saudi Arabia, and build on the city's strengths and opportunities.

This new vision describes a city that will be a principal logistics gateway to Saudi Arabia, distinguished from rival locations by virtue of its competitive industries and its attractive environment to business, residents, and tourists who will be drawn to the new hotels now under development along the city's scenic waterfront.

The goal for Yanbu, and indeed any city in the world, is to build a sustainable economy. The Economic Plan aims to shift Yanbu's growth trajectory away from a resource-based economy and toward a more diversified and competitive economy. Figure 2 ("Yanbu Employment Growth Path") depicts the employment growth path that Yanbu plans to achieve as it realizes its vision.

This forecast is based on:

1. An analysis of historic local and national growth trends in key industries, especially the transportation, automobile, mineral, and petrochemical industries;

2. A situational analysis of Yanbu's position vis-à-vis the region, country, and the world, especially relying on successful global competitors; and

3. Industry employment data and trends that correspond to Yanbu's Economic Vision 2030.

As noted, current employment in Yanbu is heavily concentrated in refining and petrochemicals. These industries are energy-intensive. Light industries such as plastics, food packaging and equipment manufacturing, on the other hand, are frequently driven by small businesses. In developed countries such as the United States, small businesses, which on average are less energy intensive, contribute up to 50 percent of the GDP. In Saudi Arabia, small businesses contribute only about 25 pecent of GDP, according to the Saudi Arabia Ministry of Economy and Planning.
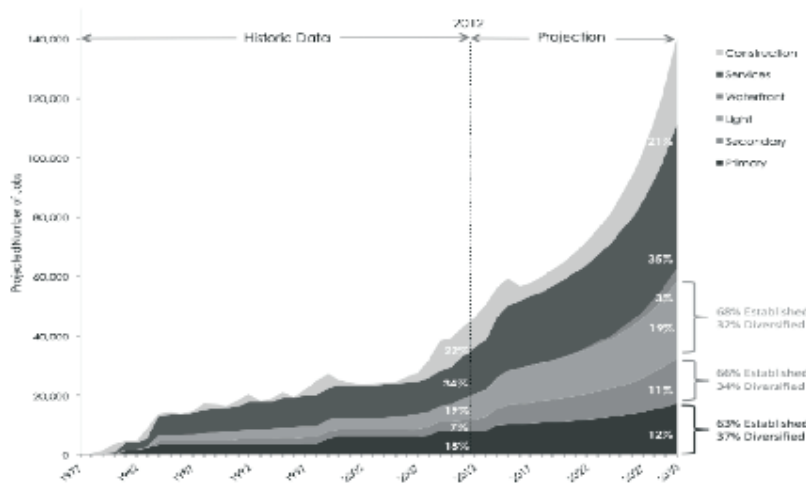
A THREE-PART STRATEGY FOR YANBU

Preparation of the strategy incorporated a comprehensive review of global best practices in competitor cities. From this analysis, the Economic Plan was streamed

BOX 1: CITY COMPETITORS CASE STUDY FINDINGS

Case studies provide city planners and managers with benchmarks and insights to guide their planning efforts. Many cities and states undertake case study analyses to make best use of their particular assets and resources. SRI International conducted case studies for eight municipalities around the world as part of the preparation of the Yanbu Economic Plan.

The case studies identified effective, innovative practices that Yanbu might adopt. The cities evaluated were: Bintulu, Malaysia; the Port Arthur/Beaumont area, Texas; Haldia, India; Singapore; Ras Laffan, Qatar; Rotterdam, Netherlands; Sohar, Oman; and Ulsan, South Korea. We analyzed these cities because they have a demonstrated record of success in areas relevant to Yanbu's economic vision. In addition, as coastal cities with well-trafficked ports, these cities share many characteristics with Yanbu. Namely, they have access to inexpensive energy, land, or labor, they dedicate a high proportion of their land for industrial use, and they host companies in similar industrial sectors.

Findings from these case studies can serve as a guide for Yanbu's future economic development. They suggest that the city should pursue the following strategies:

- Build on the Industrial Base - Use a command-and-control approach to place state-sponsored and state-owned companies into underdeveloped areas to stimulate cluster growth.

- Address Energy Supply - Develop new domestic energy resources, such as solar.

- Develop a Shipping Cluster - Build local logistics services and shipyard facilities to attract global shipping companies.

- Work with Foreign Partners - Contract with international experts to create development plans, manage infrastructure, and develop educational institutions.

- Develop a Joint Venture Program.

- Accelerate the Attraction of Foreign Investment and Recognition - Make use of expositions, international recruiting trips, and marketing offices in foreign countries.

- Improve Local Quality of Life - Devote significant attention to attractive residential housing choices and increasing social and recreational amentities for workers.

into three plan strategic components, focusing on industry, community, and municipal leadership.

A. INDUSTRY STRATEGY

Future growth of the city will require diversification into non-industrial sectors by building initially on emerging light industrial sectors, such as the automotive and the minerals industries.

- **Establish an Automotive Industry** - Demand for new cars and trucks are booming throughout the Middle East. Saudi Arabia imported 760,000 vehicles and this number is growing at a rate of 4 percent annually.[6] Despite this growing demand for vehicles, regional auto manufacturing is minimal. Saudi officials at the Ministry of Commerce have planned to establish up to four auto or truck plants. Four plants could produce over 100,000 vehicles per year thereby reducing imports by approximately 15 percent. Each of the plants could produce up to 2,000 direct jobs. These plants will also support secondary jobs such as tires

and auto parts suppliers that support the vehicle manufacturer. Mercedes Benz is currently planning to build a facility to produce 9,000 trucks per year in Yanbu.

- **Create a Hub for the Emerging Minerals Industry** - Surrounded by metals deposits in the Arabian Shield, Yanbu is well positioned to provide inputs for manufacturing metal products. Development of the minerals industry is focused on three metals found in the region: iron ore, zinc, and copper. Facilities related to each mineral have the potential to generate approximately 2,000 jobs for the processing and handling of the mineral. Metal processing is energy-intensive, so the inexpensive energy available in Yanbu is attractive to metal producers.

- **Develop a Multimodal Logistics Hub** - A logistics hub is a transportation conduit through which land, sea, and air traffic can flow, Yanbu's

FIGURE 3: YANBU EMPLOYMENT BY SECTOR 2011- 2020

Employment Sector	Major Employers	2011	Est. 2015	Est. 2020	2011-2020
Heavy Industries	Auto plants, minerals processing	11,535	16,740	19,080	+7,545
Light Industries	Auto & truck parts, packaging & construction materials	7,198	11,390	13,705	+6,507
Tourism Sector	Waterfront hotels & restaurants	0	155	1,470	+1,470
Services Sector	Retail stores, health & education	14,498	21,895	25,745	+11,247
Total Employment		33,231	50,180	59,000	+25,769

Source: Royal Commission at +Yanbu, SRI International.

proposed multi-modal logistics hub will include a special economic zone. A special economic zone will offer a streamlined import and exporting process and offer reduced tariffs on certain goods and materials. Adjacent to the city's seaport, this specially administered entity will function as a Free Trade Zone stimulating increased import and export activity.

B. COMMUNITY STRATEGY

Since Yanbu was established, advances in business logistics and communications have made geographically-dispersed operations and production sites possible. Any global company's research and development division, corporate offices, and manufacturing facilities can be in multiple locations around the world that optimize each function. For manufacturing in today's competitive environment, investors seek not only strong industrial attributes in a location, but also an environment that can attract and retain skilled workers and their families. [8]

Therefore, the Yanbu Economic Plan also aims to improve the quality of life of residents' with several recommendations. These include the development an IMAX Theater adjacent to the city's waterfront district to draw and entertain residents and attract more visitors, a new sports stadium to house a professional football team, and a track to accommodate automobile racing.

C. MUNICIPAL LEADERSHIP STRATEGY

Beyond the basic necessities of industrial and community development, the Yanbu Economic Plan recommends new mechanisms to demonstrate the city's role as an effective and innovative administrator.

One of these mechanisms is to set up a municipal holding company. A municipal holding company is a semi-independent non-profit corporation owned and managed by a municipality. Such a company enables a municipality to engage in business ventures that are often beyond the traditional functions of a city government. Like certain California redevelopment agencies and special districts in the United States, such entities provide more financial and legal flexibility than a municipality to invest and/or partner with the private sector. They also can generate added revenues to a city beyond normal revenue sources. One of the most successful in the world is the Dubai Holding Company that generates income from building and owning business parks, IT systems, hotels, and other real estate related investments. [9]

ECONOMIC PLAN IMPLICATIONS

The Royal Commission at Yanbu adopted the Economic Plan, effective January 1, 2014. The strategy expects to generate more than 25,000 new jobs in the next five to seven years across all sectors of the city's economy.

Despite this optimism, there can be serious consequences if the Economic Plan is not carefully implemented. In the years to come, city officials must be careful to balance growth with the following municipal goals:

1. **Maintain Air Quality** – Air emissions from new industries must be properly monitored to maintain the city's standards. Failure to maintain air emission standards will be viewed as a failing to achieve global best practices, and will result in negative impacts on residents' health.

2. **Support Energy Efficiency** – Despite the availability and abundance of low cost energy, energy use in Saudi Arabia has risen at record rates. This has infringed on the amount of petroleum the nation is able to export, the nation's primary

source of revenues that fund cities and national budgets. Development of alternative energy sources, especially solar, are mandated in the Plan.

3. **Achieve a Reasonable Rate of Return** – The current practice of the national government to subsidize and/or contribute to the capital costs of industrial development results in discounting the real costs of goods and services. While this practice serves to incentivize investors, it is not sustainable as a business practice or as public policy.

4. **Maintain Water Quality** – Treated water and effluent standards must be stringently enforced to maintain the high quality of Red Sea marine life and the natural beauty that are the foundation of the city's emerging tourism industry. Deterioration of the coral reefs off the city's shoreline would be detrimental to both the environment and to building the city's tourism attractiveness.

CONCLUSION: ADOPTION AND MONITORING

ToThe city is currently implementing fifteen of the Economic Plan's forty-three specific projects recommended in the initial phase. The city has also set up a monitoring system to provide bi-annual reports to city leadership and the Royal Commission. Yanbu witnessed a record amount of new investment applications for city owned land in 2014.10

With the Economic Plan in place, the small city of Yanbu, Saudi Arabia hopes to add more than 90,000 jobs by the year 2030. Its role in providing a model to other cities in Saudi Arabia and across the Middle East is a testimony to the city's leaders and the benefit of good planning. The Economic Plan is the city's most important strategy in its brief history. Achieving this ambitious employment objective will provide new and meaningful employment to the young generation while contributing to the political stability in Saudi Arabia and the Middle East.

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Prior to working in Saudi Arabia, Caplan served for 12 years in top city management positions in two new cities in California and Colorado. He has also been a consultant on economic development and public finance issues to cities, counties and non-profit organizations throughout the west and Midwest. Research, analysis and recommendations of the Yanbu Economic Plan were prepared, in part, by SRI International.

Water Conflicts between Israel and Palestine:
A Conversation with Itay Fischhendler

INTERVIEW BY KATE GLASSMAN, ANN HOLLINGSHEAD, AND FELIX OWUSU

Itay Fischhendler is a political geographer and faculty member in the Geography Department at Hebrew University. He primarily studies issues related to natural resources governance, which is conflict resolution around natural resources. Specifically, Fischhendler follows and analyzes negotiations over energy and water in the transboundary context.

In October 2014, Dr. Fischhendler gave a talk at Berkeley Law, where he is affiliated with the Berkeley Institute for Jewish Law and Israel Studies, about the Israeli-Palestinian water conflict. During this talk, Dr. Fischhendler discussed the Mountain Aquifer, a transboundary water basin located beneath the Israeli-Palestinian border. Both Israelis and Palestinians rely heavily on the Mountain Aquifer for agriculture, sanitation, and drinking water. As a result, the Mountain Aquifer is a significant source of conflict. PolicyMatters Journal sat down with Dr. Fischhendler this November to discuss this delicate situation. Below is a portion of that discussion.

PolicyMatters Journal (PMJ): *Why is water a source of conflict generally?*

Itay Fischhendler: In short, it depends on the audience. There are three elements. The first is the fact that indeed there is physical scarcity. Given increasing demand due to population growth, the growing standard of living, and a diminishing supply of water due to climate variability, there is physical scarcity. But that is just the beginning. Physical scarcity does not automatically lead to conflict. That is a wrong assumption quite often made by natural scientists, but anyone who does policy knows that it is an oversimplification to assume that scarcity leads to conflicts. Scarcity occurs all around the world, but conflicts occur in particular places. But scarcity is the first element, and the one that is most easily measured.

There are two other, more complicated and more interesting, reasons why water is a source of conflict. The second is social scarcity. There is a distinction between first order scarcity and second order scarcity. First order scarcity means actual, physical scarcity of water or energy, say. Second order scarcity means that a place does not have the social capacity to overcome first order scarcity. For example, a country may not have the institutions in place to mitigate the problem, increase supply, or decrease demand. Social scarcity is second order scarcity.

In the case of water, in many places, there is poor water governance. These issues become more problematic in the transboundary context. Worldwide, there are about 280

transboundary basins, and political and physical boundaries rarely coincide. The majority of transboundary basins do not have institutions to negotiate.

The third reason that water is a source of conflicts is because water is not a commodity. Water has symbolic meaning. It is associated with issues of sovereignty, national pride, and national identity. This means that nations need to negotiate water differently than they would with an economic commodity. Embedded in these negotiations are emotions, issues of sovereignty, and political and security considerations. Together these go way beyond the economic calculus. This may be why people call water the "wicked resource."

Quite often, we come across very severe conflicts, but we do know that water conflicts rarely escalate into water wars. So, there is domestic and international friction, but in most cases, it is not cause for going to war. The cases in which it does trigger war or a more brutal aggressive conflict do often happen to be in the Middle East. But the Middle East is not unique in the sense that scarcity happens in other basins and there are poor institutions in other places. The only difference is that in the Middle East, there is a very severe context of conflict and unstable regimes.

PMJ: *You mentioned that the Middle East is unique in its particular history of conflict and set of unstable regimes. What other factors make the water conflict in the Middle East unique? Is it because all three elements that you mentioned converge in the Middle East??*

CONVERSATION

IF: Yes, I think all of these issues converge in the Middle East. Have you ever used GIS [Geographic Information System]? You put one layer on the other, right? So, think of this conflict in terms of its layers. You put the physical elements down first by identifying the places in the world that experience physical scarcity. Then, you put the social element on top of that by identifying the basins with poor governance. Those places with physical and social scarcity may be more likely to have conflict. So, taking those places, you can then identify the ones where water is a national symbol. With all of these layers, you can identify the locations most likely to experience conflict.

A potential fourth layer in this discussion is power asymmetry. This is not necessarily unique to the Middle East, but in the Israeli-Palestinian conflict particularly, there is drastic power asymmetry between the riparians of the basin. In this context, a riparian is a nation sharing a basin. Israel and Palestine, and Israel and Jordan are not equal in power. This also applies to the Nile; Egypt is by far more powerful than the other African riparians. So there is striking power asymmetry in the Middle East. And if a nation has a power advantage, it is likely that that nation will use that power at some stage to their benefit, which makes negotiation very complicated.

This asymmetry is not necessarily unique to the Middle East. There is also striking power asymmetry between the United States and Canada and of course between the United States and Mexico. We also see asymmetry between the nations along the Danube and the Rhine in Europe.

PMJ: *Can you talk a bit more about power asymmetry as it relates specifically to the Israeli-Palestinian water conflict? What are the demands on both sides? And how does the power asymmetry between these nations look with respect to water?*

IF: Let's differentiate between some of the elements of this asymmetry. First, there is general power asymmetry. Israel's GDP is dozens of times higher than the Palestinian GDP. It's an established state that receives international support. It has enormous social capacity to find alternatives and solutions. It's a developed state. It has its own problems, but it is also part of the OECD.

The second element of this asymmetry is geographical. In water issues, geography really matters, particularly in terms of who is upstream, who is downstream, who controls the headwater, and who controls water extraction. In the Israeli-Palestinian case, the better places to extract water are on the Israeli side. For example, the natural outlet of the Mountain Aquifer is on the Israeli side. It is cheaper and more convenient to extract water downstream, which is also on the Israeli side. So, that is another layer of asymmetry. A third element of asymmetry is related to economic and technological advancement. This means that Israel has more alternatives, like desalination. Israel also has more robust institutions to advance or to initiate demand management. Israel can go for full-cost recovery for water provision and Israelis are able to pay the full cost for desalination. The situation with the Palestinians is totally the opposite. In some places, over 10 percent of Palestinians' income goes toward paying for water provision, which is extremely high. Palestinians are also highly dependent on agriculture. About 20 percent of Palestinian GDP comes from agriculture, which means that they need water for their livelihood. In Israel, by contrast, agriculture contributes less that 2 percent to the GDP. If agriculture in Israel were to decline, it would not substantially affect the Israeli economy.

PMJ: *Can you talk about how those asymmetries play out in the water negotiations that occur between Israel and Palestine?*

IF: The institutions that were set to negotiate water came from the Peace Accord, which put institutions in place in 1993 and 1995 to negotiate water; they established

"Even when the language is physics, Israelis and Palestinians do not speak the same language. There's an Israeli physics and there is a Palestinian physics."

a Joint Water Committee. Similar agreements exist between the United States and Mexico, the United States and Canada, and over many other basins. The Joint Water Committee deals with new issues, reallocates water, and approves new water infrastructure.

As a result of the power asymmetry between the two sides, however, the jurisdiction of the Joint Water Committee is narrowly defined. Jurisdiction really matters. For example, take the Mountain Aquifer, where you might expect that the Joint Water Committee would have jurisdiction over the entire boundary of the aquifer. However, because of the nature of the asymmetry, the Committee only has jurisdiction over the West Bank and a large portion of the aquifer is outside the Committee's jurisdiction. This means that Israelis can extract water from the Mountain Aquifer without the agreement of the Palestinians. The Palestinians, by contrast, need the consent of the Israelis before they can extract water from the Mountain Aquifer. So, again, the initial power structure, which resulted in the narrowly defined jurisdiction of that committee, is critical to this conflict.

I do not mean to give the wrong impression. There are five channels of negotiation between the Israelis and the Palestinians: refugees, borders, right of return, Jerusalem, and water. The only channel of negotiation that is still basically functional is water. So, water is a fantastic case. Despite all the disagreements, conflicts, and asymmetries, the Joint Water Committee has managed to meet and quite often come to agreements.

In fact, the Joint Water Committee has approved hundreds of initiatives and permits and water infrastructures in the West Bank for the benefit of both the Israeli settlers who live on the West Bank and for the Palestinians.

PMJ: *Could you speak a bit more about the power distribution of the Joint Water Committee? Would you say that it caters more to Israeli*

"There is no blueprint, ideal model, or legal solution to this problem."

demands?

IF: I'm careful because such rhetoric does exist and Palestinians and many scholars often use it. My take is that the Joint Water Committee is an imperfect structure. It is a structure that could have done better, but it also could have done much worse. Palestinians are definitely in a better position given the fact that there is a Joint Water Committee. But if I were Palestinian, I would strive to level the playing field. I think even the Israelis acknowledge the asymmetries in provision and agree access should be changed.

The question is how do you do it? What is the proper balance? What are the water resources that should be used for changing the inequality in access? Should it be fresh water, or demand management, or supply-oriented solutions, like desalination?

PMJ: *This is clearly a hugely emotional issue. In a recent talk you gave regarding this conflict, you mentioned that there are Palestinian estimates of the amount of pollution in the Mountain Aquifer and Israeli estimates, and that these estimates differ. Do you think it's possible to look at this problem objectively?*

IF: Even physical elements become political in this conflict because it is such an emotional issue. It took a long time for hydrologists and geologists involved in the conflict to realize that even they cannot agree on the numbers and figures. The physical element cannot be detached from the emotional, psychological, and political element in this case. It's not like you can delegate authority to geologists and hydrologists and assume that they speak the same language and can come to an agreement. Even when the language is physics, Israelis and Palestinians do not speak the same language. There's an Israeli physics and there is a Palestinian physics.

PMJ: *We have talked a lot about sources of water conflict. It sounds like the real determining factor is that water is not being distributed in a way that allows everyone to have their needs met. Do you think physical scarcity is actually the problem? Is there enough water for everyone, or does the power asymmetry play a greater role in leading to this conflict?*

IF: No doubt, there is not enough water for everyone. There is physical scarcity, and the situation would be ten times worse if Israel had not pursued desalination. Now, about half of the Israeli provision comes from desalination, which is awfully expensive. If there were no scarcity, Israel would not spend billions of dollars a year on desalination. Over the last five years, the price of water in Israel has increased by 40 percent, which is another indicator of physical scarcity.

This does not mean that the scarcity should be equally divided. For example, the Israelis can afford desalination and the Palestinians cannot. The cost sharing of scarcity is a moral, political, and policy question. It's not a mathematical question. Equal division is only one way to divide water in times of scarcity. There is a range of options for dividing scarcity, and given the asymmetry, conflicting needs, and disputes over water rights, dividing the scarcity is very contentious. That is what these two sides have been negotiating for years.

PMJ: *It's fascinating what you said about how equal division is only one way to divide scarcity. What might a different allocation framework look like?*

IF: We can identify a range of options for dividing the scarcity. Let me begin by saying that while it is not my intention to represent any particular group, it is easier for me to represent the Israeli voice. I believe that the Palestinians would say that, given the asymmetries in GDP and in alternatives (for example, the fact that Israel can afford desalination and they cannot), the deficiencies and the shortage should be divided differently to accommodate affirmative action or fair compensation. That's one option.

Another option is based on historical uses. This is not an unusual approach. We see examples of "first come, first served" in many places. For example the west coast of the United States has a similar allocation system based on entitlement. There is a prioritized system of senior rights and junior rights, so such a system is not far-fetched in this context.

PMJ: *California's system of junior and senior water rights is almost 200 years old. If we designed a system today, we would probably not use that framework. It may not the best way to allocate water.*

IF: Definitely.

PMJ: *We may also get rid of that system if there were people in one state paying 10 percent of their income for water while others paid much less.*

IF: I hesitate to take a normative approach here, because this is not a matter of fairness or a matter of an ideal structure. It's a matter of negotiation. One perspective is a normative approach, while another perspective is an "historical uses" approach, and yet another approach could advocate dividing the water by needs. There are a half dozen ways to allocate the shortage. All of them are equally important and legitimate, even according to international water law.

PMJ: *If you were in the position to craft an approach for dividing the scarcity of water, what might you suggest?*

IF: You are thinking like a lawyer. Lawyers say, "Assuming I am the king of the world and I had the capacity to design an ideal water treaty or institution, I would use this model." But this is the wrong approach. This is not physics, where we can apply universal rules to any case.

At the same time, however, it is not as if we cannot learn from one case to the next. Scholars have been working on water treaty design for about fifteen years and there are some repeated patterns. For example, most successful treaties have a conflict resolution mechanism. There are more than a dozen ways to address conflict in treaty design, but we know that given climate variability and political uncertainty it makes sense to include a mechanism to deal with conflicts. A treaty should also be flexible because the climate will vary and political and economic conditions will change over time. The treaty needs to be able to accommodate uncertainty. Again, there are dozens of ways of approaching it.

PMJ: *Some people say that water, not oil, will be the main source of conflict in the Middle East in the future. Do you think that's generally true or an oversimplification?*

IF: Can I be blunt? I think that's crap! I think that argument comes from academics trying to raise funds or politicians trying to get support. I think oil and water are much less complicated issues than the political instability of many Middle Eastern countries. Granted, water and oil issues are steeped in layers of complexity, like the scarcity dimensions I mentioned before, but those issues are by far less complicated than the other standing issues in the Middle East. I think there is a media distortion of the truth behind water and energy negotiations for all sorts of reasons, mainly because it resonates with people.

PMJ: *You've touched on the common misconceptions of this conflict a few times, particularly the idea that this conflict can be resolved simply through legal means. What are some other common misconceptions about this conflict?*

IF: One misconception, and this might be stating the obvious, is that this conflict is not black and white. Each side comes with legitimate demands and constraints.

Another misconception is the tendency to see the conflict through a lens of physical scarcity. Physical scarcity happens all over the world. It is a given in the system. It's the baseline. More important to conflict is social scarcity and the emotions attached to water.

Another misconception is the fact that we should expect symmetry. I cannot think of any dimension in life in which there is perfect symmetry. We were not born symmetrical, physically or socially. We should negotiate while acknowledging that's how it is. That doesn't mean that we should embrace symmetries. There is a tendency to respond to asymmetry by trying to level the playing field, but in this context it's just not that simple. The simple fact is this: there is no blueprint, ideal model, or legal solution to this problem.

Power Production in India:

Challenges and Consequences of Hydroelectric Power Plants in Himachal Pradesh

RAVI AGARWAL

EDITED BY SASHA FELDSTEIN, CATHERINE MERESAK, AND WYATT DONELLY-LANDOLT

The magnificent, yet fragile, landscape of Himachal Pradesh in northern India's Himalayan region is defined by a steep topography and abundant rivers and streams. These streams are not only beautiful and a lifeline for nearby inhabitants, but they also make Himachal Pradesh a viable location for the construction of hydroelectric power plants. While authorities tout the region's energy production potential, locals are concerned that these projects will have considerable negative impacts on the region's economy and ecology. In this paper, I analyze the challenges and consequences of developing new hydropower projects in Himachal Pradesh. I also address the relative potential of current strategies to mitigate negative impacts. I conclude with a variety of policy recommendations. I suggest the Indian government create new policies to improve environmental impact assessments, increase accountability of project developers, and continue to develop other sustainable technologies.

INTRODUCTION

The magnificent, yet fragile, landscape of Himachal Pradesh in northern India's Himalayan region is defined by a steep topography and abundant rivers and streams.[1] These streams are not only beautiful and a lifeline for the region's inhabitants, but they also make Himachal Pradesh a viable location for the construction of hydroelectric power plants. While authorities tout the region's energy production potential, locals are concerned that these projects will have considerable negative impacts on the region's economy and ecology. For example, other mega hydropower projects in India—such as those in Bhakra Nangal, Sardar Sarovar, and Narmada—led to submergence of land, displacement of residents, and various other negative ecological impacts.

Himachal Pradesh is one poignant example of India's complex relationship with energy development. India's policymakers understand that a strong and sustainable energy sector is important for their country's development and prosperity. However, like many other developing countries, India struggles to define this path sustainably. Rapidly increasing energy demand and growing concerns over the economic, social, and environmental consequences of energy development pose various challenges that shape energy governance in the country.

As a result, it is important that we analyze the relevant short and long-term consequences of hydropower projects. For example, policymakers should be able to answer questions including: Who will receive this development? How much will it cost? Development for whom? At what cost? Who will pay?

It is still a matter of debate whether these projects are ultimately beneficial or detrimental to the environment or surrounding human populations. The government of India has tried to address these concerns and has worked on various alternatives, but there is room for improvement. This paper aims to guide and inform this discussion.

The remainder of this paper is organized as follows. In the following section, I give an overview of energy sector policy in India with a focus on policies related to hydropower projects. In the next section, I discuss the challenges and concerns of traditional hydroelectric power plants and run-of-river projects, which intend to mitigate some of the impacts of these traditional designs. To illustrate some of the unintended consequences of these projects and the flaws of the policy process that defines these projects, I focus on a hydroelectric project proposed in the Himachal Pradesh. I conclude with several policy recommendations, which may be helpful in resolving these challenges in both Himachal Pradesh and other similar projects across India.

ENERGY SECTOR IN INDIA AT A GLANCE

Energy Policy Framework

The government of India has a major stake in its energy sector through state-owned enterprises and market regulation. India's energy policy framework revolves broadly around three objectives. These are:

- **Energy Access:** Providing energy access to the entire population.

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• ENERGY SECURITY: Encompasses three critical dimensions: (a) Meeting India's large energy demand to sustain an annual economic growth rate of 8 to 9 percent through 2032; (b) Meeting lifeline energy needs of all citizens to address social development, health, and safety of the energy poor; and (c) Ensuring sustainability in energy supply and use.

• CLIMATE CHANGE: Reducing carbon emissions and preventing environmental degradation. According to the 2008 National Action Plan on Climate Change, India aims to reduce its GDP-adjusted carbon emissions by 20 to 25 percent below 2005 levels by 2020.[2]

These objectives will often conflict. When these conflicts arise, India may find difficulties deciding how to maintain a balanced approach in the face of competing objectives.

KEY ENERGY POLICIES

In order to understand the issues described later in the paper, key energy policies of India and the motivations behind them are relevant. These policies are the Integrated Energy Policy, the National Action Plan on Climate Change, and a series of five-year plans. Together these policies shape the energy sector in India. In this section I also describe India's policy framework related to hydropower energy.

In 2008, India established the Integrated Energy Policy (IEP), the first comprehensive energy policy to oversee all energy sectors in India. While India's energy economy was originally government-controlled, the IEP emphasizes a transition to a market-based energy economy through transparent and targeted subsidies and proper energy pricing. The IEP also addresses issues related to climate change and increasing environmental degradation, but also states that India will contain its carbon emissions only if industrialized nations compensate India for any additional costs.[3]

To complement the IEP, India set up the National Action Plan on Climate Change (NAPCC) in 2008 to advance its economic and environmental objectives simultaneously. The NAPCC emphasizes that developed countries should affirm their responsibility for accumulated greenhouse gas emissions and fulfill their commitments under the United Nations Framework Convention on Climate Change. The UN Framework allows developing countries to transfer new and additional financial resources and climate friendly technologies to support both adaptation and mitigation.

In addition to the IEP and NAPCC, India has a series of five-year plans, which are centralized and integrated national economic programs. They have a direct impact on energy sector development in India as they lay out energy demand projections and key relevant issues.

India also has some specific national policies related to hydropower. In 2008 the Government of India, looking to reduce its dependence on thermal energy—which requires fossil fuels to generate electricity—introduced a policy that encourages the development of hydroelectric power projects. Before 2008, the power sector was highly regulated in India. The 2008 Hydropower Policy changed this, allowing power corporations to sell 40 percent of their generated power "to anybody at any price."[4] In addition to relaxing these regulations, the policy also increased the government's compensation to those displaced by a project. For example, it mandates that power corporations give 100 units of free electricity per month to families affected by the project for ten years. These families are free to consume this power or sell it.

India's 2008 Hydropower Policy also introduced penalties for project delays. If a developer does not complete a hydroelectric project within four years of its financial closure, power corporations are only allowed to sell 35 percent of their power instead of 40 percent, thereby reducing their revenue. For a further delay of six months, that number is reduced to 30 percent, and so on. This creates a strong disincentive against delaying construction. To some extent this policy is a success. Together, these clauses induce private investment in hydropower development, improve rehabilitation and resettlement, and improve financial viability.

Finally, before completing any major hydroelectric project, corporations must complete an Environmental Impact Assessment (EIA) to "identify and evaluate the potential impacts (beneficial and adverse) of development and projects on the environmental system."[5] As in other countries, policymakers in India can use EIAs to guide the decision-making process and to understand the environmental implications—including social, cultural and aesthetic concerns—of a potential project.

As I will discuss in greater detail below, there are flaws in India's EIA process. First, small hydro projects, such as those that produce less than 25 MW, do not require an EIA, although these projects often have environmental implications. Second, EIAs for projects greater than 25 MW capacity are often inaccurate,[6] and India does not have an effective procedure in place to ensure that EIA's accuracy. Third, many EIAs are project-specific and therefore do not measure cumulative effects of several projects. For example, EIAs will not capture the cumulative effects of multiple projects developed in succession along the same river or in the same region.

CHALLENGES AND CONCERNS RELATED TO HYDROPOWER

Hydroelectric power plants (HEPs) can have substantial socio-economic and livelihood impacts on their surrounding populations. There are already several examples of negative impacts of HEP projects in India. Construction activity

related to Stage I of Kashang HEP has hampered local apple crops considerably.[7] Another project in the Sainj Valley is expected to adversely impact not only traditional crops, like maize and wheat, but also negatively affect off-season vegetable and apple cultivation in the region.[8] Yet another project on the snow and glacier-fed Tarela Brook has resulted in the shutdown of more than fifty water mills and water-powered wool carding machines. These projects have all had substantial negative impacts on the local livelihood.

In addition to these challenges, the construction of large hydropower projects affects the geological stability of the region. Certain types of HEP projects require tunneling for pipelines, which lead to soil erosion and loosening of earth that can exacerbate the already high risk of earthquakes and landslides. Construction also generates rock and debris during tunneling, known as muck, which when dumped downhill, destroys forests in the valley. In other similar projects, the reckless dumping of muck has resulted in loss of pedestrian paths and access to forest and plots. Dumping of muck can also affect the natural course of rivers and streams. The operation of dam reservoirs used in large HEP projects often result in the late release of water during high-intensity rainfall events, which can cause floods downstream of the dams.

RUN OF RIVER PROJECTS

One proposed solution to the environmental, socio-economic, and geological challenges posed by hydroelectric problems is a run-of-river design. Run-of-river (ROR) projects are dramatically different in design and appearance from conventional hydroelectric projects. Traditional hydro dams store large quantities of water in reservoirs, which means operators must flood large tracts of land to build them. In contrast, most ROR projects do not require a large impoundment of water. Instead a smaller, upstream dam collects water at higher level on the stream and passes the water down to the turbine station located at a lower level through pipelines. The turbines use the water flow in the pipeline to produce electricity. This water is then discharged back into the stream. Figure 1 illustrates this method.

There are significant advantages to the ROR design. Since there is no need for large reservoirs, smaller-scale ROR projects do not lead to substantial flooding of the upper part of the river. As a result, people living at or near the river do not need to relocate, and the project will not destroy nearby natural habitat and productive farmlands nearby.[9]

There are also disadvantages associated with ROR design, however. First, downstream of the dams, the river receives quantities of water in four to six hours that it would normally receive in twenty-four hours, essentially creating a daily flood and drought situation in the river. This has implications for the safety of people living downstream of the dam, as well as for the area's ecology and biodiversity. Second, diverting

large quantities of river water reduces river flows, affecting water velocity and depth, and minimizing habitat quality for fish and aquatic organisms. Third, ROR projects are also often constructed in a cascading manner on the same river or stream. As a result, the project repeatedly diverts water from the riverbed, rendering the river dry for significant stretches. Finally, cascade dams do not leave any stretch of the river flowing free.

HIMACHAL PRADESH AND HYDROPOWER

The state of Himachal Pradesh is in the Himalayan region in northern India. Its steep topography, rivers, and streams define its magnificent yet fragile landscape.[10] These streams are lifelines for the region's inhabitants. They fulfill residents'

Fig 1 - Run-of-river project illustration
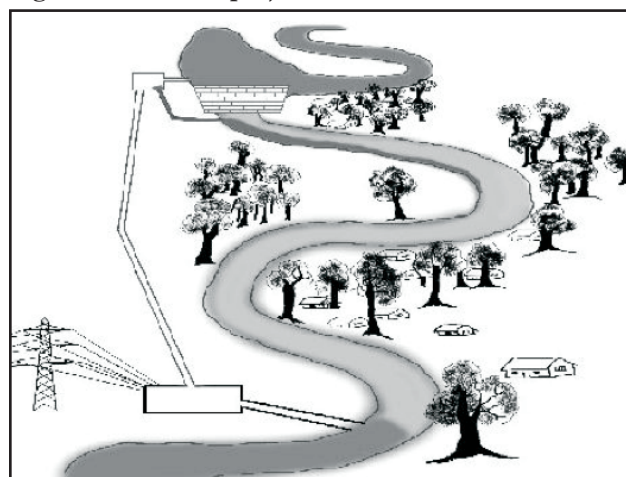
daily needs for irrigation and drinking water and support local industries, such as flour mills.

These features also make Himachal Pradesh a viable location for construction of HEPs. In fact, the river basins in Himachal Pradesh account for approximately 15 percent of India's total hydropower potential. The state government of Himachal Pradesh has identified hydropower as a promising source of revenue and its hydropower generation potential as 23,000 MW. Himachal Pradesh's present generation is about 8,418 MW. After decades of comparatively modest hydropower expansion, state authorities plan to more than double the installed capacity by 2017 "to develop Himachal Pradesh as the 'Hydropower State' of the country."[11] Specifically, the state directed the Himachal Pradesh Power Corporation (HPPC), the state's power generating utility, to harness 1,111 MW of hydropower by 2017 and another 2,400 MW by 2022.

Many of the environmental concerns related to hydropower described above are of particular relevance to Himachal Pradesh, which is ecologically fragile and vulnerable. Most of the region is in Seismic Zone IV, a high-risk zone for earthquakes. In this context, tunneling, dumping of muck, and dam reservoirs may pose particularly acute risks for the

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region.

DHAULASIDH HYDROELECTRIC POWER PLANT

In light of the potential negative consequences related to hydropower, the Himachal Pradesh government is promoting hydropower plants that use a run-of-river design, rather than depend on a mega-reservoir dam. According to current designs, a total of five HEP are to be constructed on 72 km along the Pabbar River in Himachal Pradesh. The total length of tunnels required for these projects is 68 km. Once constructed, the river would virtually disappear. A private construction contractor, Satluj Jal Vidyut Nigam Limited (SJVNL) has also proposed constructing a 66 MW Dhaulasidh ROR Project along the Beas River in the Hamirpur District of Himachal Pradesh. The Beas River, which spans about 285 miles, has substantial hydropower potential.

This project will have significant impacts on the local communities. As I describe in greater detail below, these impacts include: (1) reduced land for agriculture; (2) reduced access to water, (3) an unclear compensation structure; (4) adverse impacts for the regions ecology, including an endangered fish species; and (5) safety risks for the surrounding population. In summary, the project will affect about 713 households directly, and result in the partial or full loss of grazing lands for 43 villages, the loss of cremation ground, water sources, and common places. Below I describe the five negative impacts of the project listed above.

First, the project requires large amount of land for a small capacity plant and is expected to have significant negative impact on local agriculture. While other ROR projects typically use less than one hectare (ha.) per MW, the Dhaulasidh project uses approximately five ha. per MW in order to meet their target production (see Table 1). According to the assessment given by a local nonprofit, Him Dhara:[12]

> "Out of the 252.2 ha. of private land that will be acquired, 10.2% of the land, or 25.7 ha., is said to be cultivable. However, according to Social Impact Assessment (SIA) report, 48.88 ha. of cultivated and 81.88 ha. of cultivable land (lands which people used to cultivate before now left fallow) of farmers will be acquired. This comes to a total of 130.76 ha. of agriculture land which is huge, looking at the small fraction of geographical area under agriculture in a mountain state like Himachal Pradesh."

Second, the project would reduce functionality of the area's many narrow "kools," which are narrow canals that locals constructed and maintain to irrigate fields, run mills, and make water accessible. Whenever the kools require repair, the community uses readily available local resources to do so. The state government has built alternative cement kools, with a goal to mitigate the project's impact, but these new canals would not provide enough water to meet residents' needs

and would require expertise and specific resources to repair.[13] This structure would create an unnecessary dependence on the central government as the locals are unable to repair the cemented kools on their own, causing delay and additional expenses as someone external has to come and fix them. The project will also affect accessibility to the nearby village.

Table 1 - HEPs and land area required to produce 1 MW

HEP	TOTAL LAND REQUIRED (HA)	CAPACITY (MW)	AREA (HA.)/ MW
MIYAR	69.94	120	0.58
RAMPUR	80.97	412	0.20
MALANA-II	34.9	100	0.35
LAMBADUG	9.80	25	0.39
DHAULASIDH	330	66	5.00

The Him Dhara report illustrates this point with the example of the Bulli village near the Beas River right bank.[14] As a result of dam construction, the waters of the Beas will submerge lands of this village from three sides, sparing one side which is the entry into the village, which connects it to the left bank. They report that this has received no attention in the EIA report.

Third, the project has an unclear compensation and rehabilitation program. Many of the region's residents depend on various water activities for their livelihoods, such as fishing and running water mills for making flour. This project will negatively impact these livelihoods. SJVNL did not clearly describe its compensation plan to the villagers even after the land acquisition proceedings reached an advanced stage. The project's Detailed Project Report mentioned a compensation rate of Rs 8000 per kanal, or about $1,560 per acre. This rate is almost 50-100 times less than the rate that the affected villagers expected.[15] As a result of this misunderstanding, many villagers did not oppose the plan in its early stages.

Fourth, the project will have adverse impacts on the region's ecology, including on the Beas River's fish species. According to the EIA report, the Beas River contains twenty fish species in the project area. Of these species, two are endangered and three are vulnerable. The EIA claims that these fish will acclimate to the changed habitat; however, past experience with these dams indicates that this is unlikely to occur. For example, with the dam construction in Pandoh reservoir in Himachal Pradesh, the population of Snow Trout in the Beas River reduced significantly after the project's completion.[16]

Finally, the project could pose safety risks for the area's residents. Although no residential area is located within one kilometer of this reservoir, the EIA mentions that the project poses an increased risk of waterborne diseases, and the water level may rise in certain villages. Also, the region comes in

Seismic Zone IV, which means it is prone to earthquakes. On July 13, 2013 for example, there was an earthquake in Kangra that registered 4.5 on the Richter Scale. Construction of dams may increase the impact of such natural disasters.

Despite these sizeable concerns, the project will go ahead. According to a local nonprofit, while project proponents had no Rehabilitation and Resettlement Plan—which is required by law—and had not announced the land rates for acquiring private land, the project got all of the required clearances including Environmental and Forest clearances. SJVNL has also floated tenders for construction, which initiates the construction process.[17]

PAST REFORM EFFORTS: SHUKLA COMMITTEE REPORT

In December 2009, the Himachal Pradesh High Court took note of media reports stating that, since 1990, Himachal has lost about 1,000,000 trees during the execution of 150 hydroelectric projects. In response, the High Court appointed Chief Secretary of Forests, Avay Shukla, to monitor environmental compliance of hydroelectric projects in Himachal.

Shukla inspected eleven hydro projects of over 100 MW capacity each and summarized his findings in a report. The report stated that the individual EIAs of these projects do not address the larger concerns associated with the cumulative impacts of each of these projects together. For example, where environmental impacts are concerned, the cumulative damage along the river basin is bigger than the sum of its parts. The report also made the following observations:

- Valleys like Ravi, Beas, and Sutlej have been saturated with hydro power projects and there should be a complete moratorium on projects until relevant authorities conduct river basin impact studies and develop appropriate policy.

- The government did not sufficiently understand the effects of large-scale felling of trees, dumping of muck, and diversion of waters over the entire river basin before allotting these projects.

- Most of the projects studied do not follow the criteria for minimum discharge of 15 percent. This failure is not one of compliance, but of the design of the projects itself.

- To limit the rapidly changing water level because of the processes of the dam there should be free flowing river for a minimum distance of 5 kilometers between the tail race channel[1] of the upstream project and the full reservoir level (including back-water impact) of the downstream project.

- No project should come more than 7,500 feet above mean sea level, which as a result limits

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1 The tail race channel is the path through which water is pumped out of the plant after power generation.

the height at which the project or the dam can be constructed.

POLICY RECOMMENDATIONS

So far I have presented the socio-economic and environmental issues in the current implementation of hydropower projects, such as those proposed in Himachal Pradesh. These include impacts during construction, loss of livelihood and common resources, impact on endangered species, and long-term cumulative impacts. The following recommendations are potential solutions to address the challenges listed above.

REFORM THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Loopholes in the EIA process allow policymakers to ignore a variety of environmental impacts. For example, EIAs are based on individual projects and do not make a cumulative assessment of the net impact on the river given it is already loaded with ROR projects. This leads to individual projects receiving clearance even though together they will have a huge impact on the environment.

To make the process more complete, the government should adopt a basin-level planning and impact assessment strategy under which river basin studies can be conducted. The plans made on the basis of these studies would decide where the project should be sited, whether it should produce energy continuously or base its production on local demand, and whether the project should be ROR or storage based. The percentage discharge in the stream should also be decided based on these plans and in consultation with the local community.

Moreover through the EIA process, and the environment ministry should mandate monitoring for HEPs with capacity 1 MW to 25 MW also as they can have serious ecological and socio-economic impacts in a fragile region like Himachal Pradesh. The assessment should also consider a rehabilitation package and the government should not give clearance to projects before they disseminate these packages.

INCREASE ACCOUNTABILITY OF PROJECT PROPONENTS

The government needs to pay more attention to the ways they can hold project proponents accountable. Project proponents often engage in questionable activities, including: not advertising the mandatory public hearing within the stipulated timeframe or in local language, not responding to or disallowing questions regarding dam designs, rehabilitation plans, displacing local populations, and not responding to queries of government agencies. These malpractices not only eventually hinder the development process, but also force affected communities to turn to judicial interventions. This can harm the project and increase its cost.

One way to ensure accountability is to set up a monitoring committee that draws 50 percent of its members from the local community and representatives from public and

environmental interest groups. The committee would be set up for every project or multiple projects in a particular region. It would be responsible for ensuring compliance of regulations, monitoring the assessments and blacklisting the proponents identified for malpractices.

Compare Hydroelectric Power to Other Sustainable Technologies
The cumulative costs of small and large hydropower projects should be compared with other renewable sources such as solar, biomass, micro hydro and wind power projects. One way to do it is through Levelized Cost of Energy (LCOE). LCOE is the price at which electricity must be generated from a specific source to break even over the lifetime of the project. The REN21 report states that the LCOE per kWh for Bio Gasifier is $0.08 to $0.12, $.05 to $0.40 for Micro Hydro, and $0.15 to $0.35 for Wind power. For small and large HEPs, the LCOE varies between $0.02 and $0.12 per kWh. The capital costs for bio-gasifiers is around $1 to $2 per watt, $1,175 to $3,500 per kW for Micro Hydro, and $2,500 to $10,000 per kW for Wind power. For small and large HEPs, capital costs varies between $2,000 and $4,000 per kW for projects with capacity greater than 300 MW and less than $2,000 for projects with capacity less than 300 MW.[18] So, with comparable LCOE and capital costs, the bio-gasifiers and micro-hydro power projects could be viable alternatives. More comparisons like these need to be done to inform energy policy.

CONCLUSION

This paper identifies the main shortcomings in implementation of the current hydropower policy in India and the resulting socio-economic and environmental consequences. These consequences, though unintended, have a sizeable impact on the local economy and ecology. Ensuring accountability through holistic impact assessment, along with investment in alternative sources of energy, can help resolve the issues and help put India on a more inclusive development path.

Ravi Agarwal is interested in making sustainable alternatives to growth and development more inclusive, economically feasible, and implementation-friendly. He is currently pursuing a Master in Public Policy Degree at the University of California, Berkeley with a focus on sustainable development.

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Vulnerability to Poverty in Chile:
An Empirical Approach Using Cross-Sectional Data

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GLOBAL DEVELOPMENT

This article analyzes the structure of the vulnerability to poverty in Santiago, Chile during the 1990s. For that purpose, I use a "vulnerability as expected poverty" (VEP) approach, developed by Chaudhuri (2002), which allows me to assess vulnerability to poverty at the household level using cross-sectional data. In short, I define vulnerability as the risk or probability that a household could fall or remain in poverty in the future, considering its surrounding conditions. Using the Chilean National Socio-Economic Survey (CASEN, 1996), I show that there is an unequal distribution of the risk of being poor in Santiago. While only 12.39 percent of the population in Santiago was below the poverty line, 36 percent of the households were facing a significant risk of falling into poverty. I validate these results with the available Panel Data (CASEN) 1996-2001-2006. Finally, I propose a scheme that identifies the beneficiary group as all vulnerable households. Thus, instead of considering only those households that are below the poverty line in a specific moment in time,

INTRODUCTION

Over the last few decades, an increasing number of scholars and policy makers have been working to better understand poverty. While previous work focused on individuals and families directly in poverty, many now try to understand which members of the population may be vulnerable to poverty. In this paper, I use recent advances in the literature and data from Chile to analyze vulnerability to poverty, which I define as the risk of falling below the poverty line.

For this analysis, I focus on Santiago, Chile at the end of the 1990s, when the country experienced both strong economic growth and a dramatic reduction in poverty. During those years, most analyses of poverty highlighted the fact that the percentage of the population in poverty was decreasing every year. However, after the first longitudinal data became available, researchers found that while many people exited poverty in those years, a considerable number of people also fell into poverty. In other words, a significant part of the population permanently faced the risk of becoming poor. This article analyzes the distribution of poverty risk and assesses the differences between those who are vulnerable and the observed poor.

First, I introduce the concept of vulnerability to poverty specific to the context of Chile in the 1990s. I then measure and empirically analyze this concept. In the next chapter, I explain the method to estimate vulnerability at the household level using cross-sectional data, which has an important advantage in terms of data availability. The results describe how the risk

of being poor is distributed among the population in Santiago in 1996, and the characterization of the vulnerable population and their differences with the poor in terms of observable characteristics. Finally, I analyze policy implications of this measurement that may lead to better targeting of social programs.

Vulnerablility to Poverty in Chile in the 1990s

Vulnerability to poverty presents a new paradigm that focuses more on the assessment of the capabilities and opportunities of the population rather than on their observed income or consumption. According to Chaudhuri et al (2002), the distinguishing factor between poverty and vulnerability to poverty is risk: "the fact that the level of future well-being is uncertain. The uncertainty that households face about the future stems from multiple sources of risk." Thus, he states that "vulnerability is a forward looking or ex-ante measure of households' well-being; [while] poverty is an ex-post measure of a household`s well-being (or lack thereof)."

I have divided this section in three parts. First, as a theoretical approach, I adapt the concept developed by Katzman and Wormald (2002) and Moser (1998) to describe vulnerability to poverty. Next, I analyze the main assumptions of the VEP approach that I used to estimate vulnerability at the household level. Finally, I highlight some interesting facts about the Chilean context in the 1990s, the period I choose to analyze.

Vulnerablility to Poverty

According to Chaudhuri (2003), vulnerability "depends on the

complex dynamic inter-linkages between the macroeconomic, institutional, sociopolitical and physical environment in which households operate; the resources, human, physical and financial it commands and its behavioral responses." Moser (1998) proposes a similar definition in her asset-vulnerability approach and Katzman and Wormald later adapted to the Chilean case. The following figure summarizes that idea.

Figure 1. Social Vulnerability Framework[2]
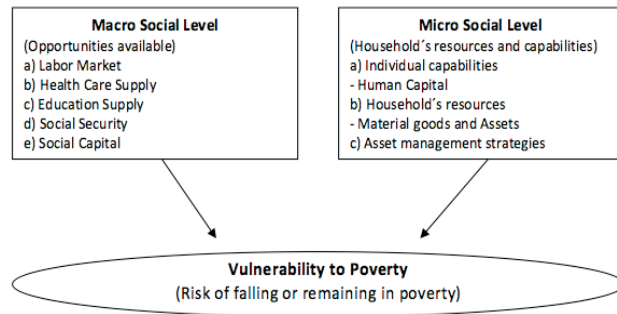
The Katzman asset-vulnerability approach considers individuals living in poverty to be active agents for overcoming poverty. Katzman & Wormald (2002) offer an extension of the model that more broadly emphasizes the structural vulnerability factors.

Chilean Context in the 1990s

During the 1990s, Chile significantly reduced poverty on three common measures—the percentage of the population that is below the poverty line (see Figure 2), the level of poverty, and the degree of inequality of those living in poverty.[3] There is extensive evidence[4] that shows the relationship between this huge poverty reduction and the accelerated economic growth in the 1990s. However, the tremendous success in absolute poverty reduction was lessened when nationally representative panel data was later released, which made the evolution of poverty visible. Figure 3 highlights these two main features of Chilean poverty dynamics.

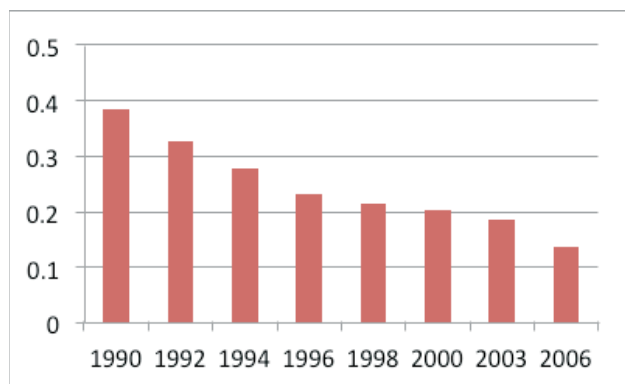**Figure 2. Poverty evolution in Chile in the 1990s (Poverty Rate P0). National Level[5]**

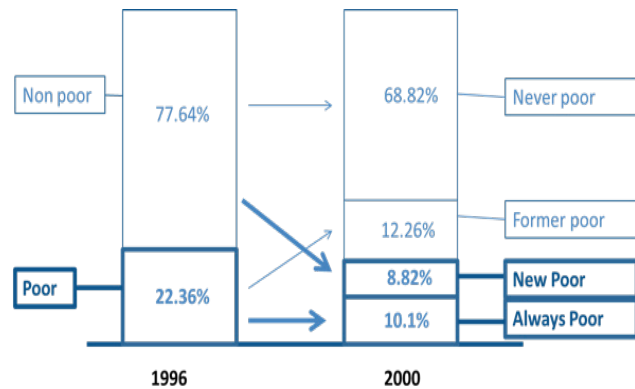**Figure 3: Poverty Transitions 1996-2001[6]**

Figure 3 shows that although the poverty rate decreased from 22.36 percent to 18.92 percent, there was a lot of movement across the poverty line. More than 50 percent of the people who were poor in the first year (12.26 percent) exited poverty in 2001. On the other hand, a significant percentage of the non-poor (8.82 percent) fell into poverty in the same timeframe. Given that I only have data for two years, the observed 32 percent of families who were in poverty in some year represents a conservative estimate. Besides the movement across the poverty line, an important point related to vulnerability is the original position in the income scale of those people who fell into poverty. This measure gives a sense of the degree of vulnerability of the population. Contreras et al. (2004) illustrates this in the following table.

Table 1: Original Decile (1996) of per capita (autonomous) income of those who fell into poverty in 2001[7]

Per Capita Income Decile in 1996	Fell into Poverty in 2001
1	-
2	4.2[8]
3	22.24
4	25.85
5	14.09
6	15.69
7	7.77
8	3.8
9	2.03
10	4.33
Total	**100**

Contreras et al. (2004) show that there was a high proportion of people, who, even though they originally ranked as high as the sixth income decile, fell into poverty in the second period. In other words, Chile had a high proportion of people

who were vulnerable to falling into poverty, regardless of their originally-observed poverty status. Therefore, a more accurate description of the Chilean poverty evolution should take into account the vulnerability that is evident from observing households' movements across the poverty line.

EMPIRICAL APPROACH

The main challenge in assessing vulnerability to poverty is that we cannot directly observe it. Unlike poverty status, which is easy to measure, vulnerability is a more complex phenomenon. For this paper, I define vulnerability as the probability that a household will have a future income (y) below the poverty line (z). This is easily estimated if we assume that differences in terms of vulnerability are due to observable household characteristics (X_H). In that sense the general specification[9] of vulnerability (v), for a household (H), at time (t) is formally defined as:

$$(1)\ v_{Ht} = Pr\{y_{H,t+1} < z\ |X_H,\ \beta_t,\ \alpha_t,\ \epsilon_{Ht}\}$$

In this model, a household's vulnerability is related to additional random (stochastic) properties for the inter-temporal income variation. Therefore, we need an estimation of the expected income and its variation over time. Ideally, we can use longitudinal panel data[10] to estimate both parameters for each household, but that kind of data is rarely available in many developing countries. Chaudhuri (2003) proposes a specific method to estimate vulnerability to poverty at the household level using only one cross-sectional database, which is available for developing countries. The method includes three steps:

First, I assume that a household's income is a stochastic process determined by:

$$(2)\ \ln(y_H) = \beta X_H + \epsilon_H$$

Where y_H is the household total per capita income and X_H represents several household characteristics. The first term in the right side of the equation, βX_H, refers to the systematic estimation of log-income, whereas ϵ_H is a mean zero error term that captures shocks that affect income at the household level. ϵ_H contributes to different income levels for households that are equivalent in terms of observational variables (X_H). The model assumes that idiosyncratic shocks to income are identically and independently distributed over time for each household (inter-temporal variation is random). However, that assumption does not imply that ϵ_H are identically distributed across households (as is typical in OLS regression under the homoscedasticity assumption).

The second step is to find an estimation of the household variability of income, σ_H. Chaudhuri (2003) assumes a parametric estimation based on observable household characteristics[11].

$$(3)\ \ \sigma_H = X_H\,\theta$$

Therefore, for both the log-income and income variation we have the following parametric equations:

$$(4)\ E[\ln(y_H)\ |\ X_H] = X_H\hat{\beta}$$
$$(5)\ Var[\ln(y_H)\ |\ X_H] = \sigma^2_{e,H} = X_H\hat{\theta}$$

Chaudhuri (2003) assumes that the income distributes log-normally, so the household's vulnerability to poverty can be estimated as the probability that, given some observed characteristics, a household will have a future income below the poverty threshold (z).

$$(6)\ \widehat{v_H} = Prob[\ln(y) < \ln(z)\ |\ Xh] = \phi\left(\frac{\ln(z) - X_H\hat{\beta}}{\sqrt{X_H\hat{\theta}}}\right)$$

In (6) ϕ is the cumulative density of the standard normal function that gives a number between 0 and 1 for each household (0 represents the lowest probability of being below the poverty line in the future while 1 represents the highest probability). Figure 4 shows this relationship, but for simplicity, I only show one explanatory variable.

Figure 4: Log-Income volatility in cross-sectional data over a particular attribute X
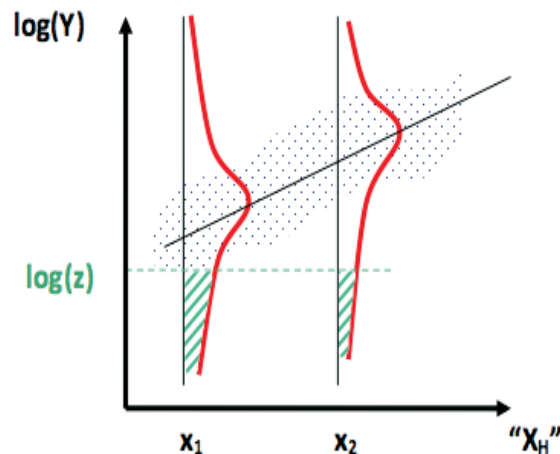
Using cross-sectional data, we can estimate more than a point that belongs to the OLS line (as is usually done in regression analysis); here we also estimate the distribution of

holds that face a probability higher than 50 percent of being poor. The goal of this classification is to identify those who have an equal chance of being in or out of poverty. A more moderate definition of vulnerability focuses on households with a higher than average probability of being poor (in this case, those with a probability higher than 12.39 percent). The idea is to focus on those households that exhibit the main risk of being poor among the population. Table 2 shows a classification of the population considering both poverty and vulnerability measures.

Table 2. Group Comparison using Vulnerability Classification and Poverty Rate[15]

Groups	V mean	v >0.5 (Ext.Vuln)	Pov.R <v <0.5 (Mod.Vuln)	v<Pov.Ratio (Non Vulnerable)	Total
Non-Poor	0.091	3.83%	19.96%	63.82%	87.61%
Poor	0.3328	3.43%	6.66%	2.30%	12.39%
Total	0.1209	7.26%	26.62%	66.12%	100.00%

The description of the population is richer when considering the risk of becoming poor. Among those who are currently below the poverty line, we can further distinguish those with higher vulnerability (3.83 percent or 10.09 percent depending on the cutoff point that we use to identify vulnerability. We can call them chronically poor). That segment of the population with their current, low income level, has a higher probability of remaining in poverty in the future. We can then think about the suitable policies for this group. A second group is composed of those who, aside from being below the poverty line, have a low probability of remaining in poverty in the future (8.96 percent or 2.3 percent, again depending on the cutoff point that we use to identify vulnerability: we can call them transient poor). Finally, another social policy group of interest arises: those who, despite having a current level of income above the poverty line, present a high probability of being below the poverty line in the future (3.83 percent or 23.79 percent; we can call this group the vulnerable non-poor). These interest groups together represent almost 37 percent of the population. Among other facts that can be highlighted, we can mention that among the extremely vulnerable (over 50 percent chance of being poor) there are more people above than below the actual 1996 poverty line.

A more general analysis of the distribution of the risk of being poor among the population requires relaxing the threshold definition of vulnerability. An attempt to do that is shown in the Figure 5:

Figure 5: Aggregate incidence of vulnerability to poverty under different vulnerability thresholds
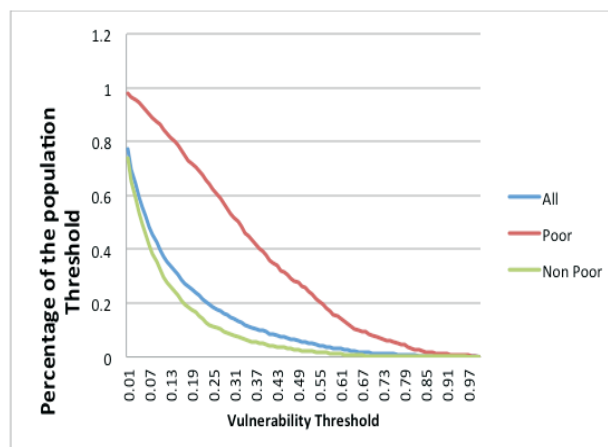
The figure above shows the percentage of each group (all population, poor, and non-poor) that would be classified as vulnerable for different thresholds. For example, if we consider vulnerable those households that face a risk of being poor higher than 50 percent (highly vulnerable), that would lead us to identify as vulnerable almost 20 percent of the poor, around 5 percent of the non-poor, and around 7 percent of the entire population. From the chart, it is clear that the observed poor have the highest risk of being poor at all vulnerability cutoffs.

CHARACTERIZATION OF THE VULNERABLE POPULATION

As previously mentioned, there is a strong correlation between poverty and vulnerability since the latter is defined as the probability of being poor. In this section, I compare the vulnerable group to the poor (see Table 3).

Table 3: Group average on characteristics related to income[16]

	Poor	Vulnerable	Non Poor	Non Vulnerable
% Population	12.39%	33.88%	87.61%	66.12%
Log Per Cap Income	9.980767	10.80037	11.68021	11.81553
Predicted Log PC Inc	10.71828	10.80516	11.5841	11.81109

Table 3 compares the predicted and actual income (in log scale) for different groups. The table shows that the poor and vulnerable are very different groups in terms of observed income. However, considering the size of each group—poor at 12.30 percent vs. vulnerable at 33.88 percent—there is a surprising similarity in terms of predicted income for both groups. In purely statistical terms, these results indicate that income is explained by many unobserved factors, both random and systematic. However, these results also have policy implications because they indicate that there are important unobservable household characteristics that explain income variation. Therefore, income should not be

income for each educational level. That distribution should not necessarily be the same for each level of $X_H{}^{12}$, and we can calculate the part of that distribution that has an income below the poverty line (z). The shaded area represents the probability of having an income below the poverty line for a household possessing such characteristics, regardless of the actual income that it shows. We can extrapolate the bivariate case for a multivariate one. The main concern of this method is the assumption that cross-sectional income variation can serve as a proxy for household income variation over time.

For this analysis, I tested several model specifications for the method described above. The more general one is the following:

$$(7) \quad v_i = f(Charact_H, Assets_H, Transfers_H, Context_H)$$

"Charact" represents several variables related to the household composition (the head of household's age and the proportion of children to adults); "Assets" is a set of variables related to household assets (Head of household's schooling; home ownership; water access); "Transfers" is a dummy variable that shows whether the household receives a government transfer; "Context" is a set of variables that characterizes the neighborhood of the household (average schooling and unemployment rate). Using this model, the main findings are shown in the following section.

There are three main issues when applying this method to other samples. First, and most importantly, this model assumes that income variation across households is a proxy for variation in household income over time. This model makes this assumption because panel data (i.e., observations of the same individual over time) is rarely available,[13] particularly for developing countries. Thus, using the cross-sectional income variance as a proxy for the inter-temporal variation is a reasonable strategy to identify households at a high risk of falling into poverty. Additionally, because I estimate the distribution, not just the average, at many levels of the explanatory variables, the data available needs to be for a large sample. For this study, I use CASEN, which is the largest socioeconomic data available in Chile, so sample size should not be a problem.

Second, given that I am not controlling for macro structural changes, this model only offers a good estimation for stationary periods. The estimation is based on shocks that may affect a household in a specific period of time, but it does not offer any specification for aggregate shocks that may affect a number of households at the same time. As a result, the quality of the prediction in periods of macro changes (e.g., during economic crisis) is questionable. However, in this case, there is no evidence of important changes in the

Chilean economy in 1996 or other changes related to macro variables that may have affected household incomes and their volatility over time.

A third issue is related to the heteroscedasticy assumption that typically arises in OLS analysis. In cross-section regression, heteroscedasticy implies efficiency loss in the coefficients (though it does not affect them in terms of bias). In order to avoid that problem, I try to find a model specification with the same variance for all households (i.e., homoscedasticity), which is restrictive, since I am trying to measure a proxy of the inter-temporal variance of the household income. For that reason, instead of assuming homoscedasticity, where all households have the same income variance, I followed Chaudhuri (2003) who uses a more general model in which the variation of income could also be related to some observed household characteristics (equation 3).

RESULTS

Based on the described methodology, I present a general description of the structure of the vulnerability to poverty in Chile in the 1990s.[14] I then use this measure of vulnerability to analyze a number of issues. First, using both the observed poverty and vulnerability estimation, I compare different groups that are relevant for social policy purposes. Then, I show a general distribution among the population of the risk of being poor. Finally, in a special section, I assess the predictive power of the model using the observed movements around the poverty line in two later periods.

Distribution of the risk of being poor among the population

The estimation of the vulnerability to poverty at the household level allows a characterization of the population in terms of the risk of being poor, rather than their current observed poverty status. By construction, the average level of vulnerability will be approximately equal to the poverty ratio. From these results, I will be able to make a more complex description of the population that may inform social policies.

The design of social policies typically takes into account two relevant groups among the population: poor and non-poor. The proportion of urban households below the poverty line in Santiago in 1996 was 12.39 percent. However, that number does not take into account the heterogeneity of the people under the poverty line. It also misses the important group of those who are currently not poor but are vulnerable to becoming poor. The combined use of the poverty and vulnerability measures will allow us to identify those groups.

It is not clear how to define the threshold under which a household may be considered "vulnerable." Within the literature I found two different measures. The first definition, called "extremely vulnerable," identifies those house-

the only measure for some policy decisions, such as those that are means-tested.

Although the average predicted income was statistically significant, the gap in terms of observed income is dramatically reduced when I compare the predicted income instead. The main explanation for this gap reduction, or similarity in terms of predicted income, may be the following: although there are some particular differences, both groups present a similar portfolio of assets, demographics, and context characteristics that overall predict a similar income for both groups (poor and vulnerable). That idea may be corroborated to some degree by looking at the main observable variables that affect incomes (see Table 4).

Table 4. Group averages on observable characteristics[17]

	Poor	Vulnerable	Non Poor	Non Vulnerable
Schooling	7.935799	8.31357	10.35631	10.92397
Dep.Ratio	4.68052	4.62275	3.80913	3.55552
Female (D)	0.258786	0.231716	0.242814	0.251495
Age	41.2056	43.7688	48.3218	49.3212
Neigh.Unemp. ratio	0.389141	0.399312	0.369491	0.357893
Neigh Schooling	6.610995	6.883233	8.553651	9.045527
Prop. kids	0.262675	0.229577	0.139387	0.116277
H Owner (D)	0.319939	0.313051	0.510502	0.575965

In terms of each of the characteristics presented in Table 4, the poor and vulnerable groups are very similar to each other, but particularly different from the non-poor and the non-vulnerable group.

VALIDATION

As discussed earlier, a robust estimation of vulnerability requires many panel waves that may allow you to observe the current dispersion of income for a specific household over time. In this paper, I used the cross-section variances of households with similar observable characteristics as a proxy of the inter-temporal variance of income. Although this strategy has merits, particularly in instances when panel data is unavailable, when possible, validation of the method should be explored.

Based on my findings using CASEN (Urban households of Santiago in 1996), I estimate the vulnerability to poverty in each observation of the subsample of CASEN that was re-surveyed later (the PANEL-CASEN 1996-2001-2006). These data allowed for a comparison of the predicted value to the actual observations of the households. Table 5 summarizes the main results for the different poverty transitions between 1996 and 2001.

Table 5. Average vulnerability for groups with different observed trajectories between 1996 and 2001[18]

1996/2001	EP	PNE	NP
EXTREMELY POOR (EP)	0.633	0.468	0.340
POOR, BUT NOT EXTREMELY POOR (PNE)	0.523	0.503	0.316
NON POOR (NP)	0.317	0.321	0.149

As shown in Table 5, there is a correlation between the direction of the trajectory and the estimated vulnerability in 1996. As an example, those who were identified as extremely poor in 1996 and 2001 were also the group with the highest vulnerability level in 1996 (on average a 63.3 percent probability of being poor). The extreme poverty line is based on an ad-hoc definition (z/2) that in a sense represents those households that do not have enough resources to even pay for basic food goods.[19] Similarly, those who were poor in 1996 and also fell into extreme poverty in 2001 were already revealed as the more vulnerable in 1996. The table shows many other trajectories that may predict movements around the poverty line.

Table 6 extends the predictive power of the estimation using a longer observable trajectory looking at the transition of the households also in 2006. As one would expect from a model with good predictive power, those who qualified as chronic poor had a higher probability of remaining in poverty five years later (1996). The opposite was also true since the group that showed a lower vulnerability was more likely to exit poverty and not fall into poverty in the second period of observation. As a result, this methodology has proven to be a useful tool for this specific period that might also encourage a better design of social policies that could lead to a better strategy in terms of sustainable poverty reduction for many developing countries.

Table 6. Vulnerability average for different poverty trajectories observed between 1996, 2001, and 2006.[20]

t_0/t_i	1996-2006		2001-2006*	
Poverty Transitions	P	NP	P	NP
Poor (P)	0.439	0.356	0.479	0.350
Not Poor (NP)	0.200	0.144	0.173	0.148

*Estimated in 1996.

CONCLUSIONS

In this paper, I utilized cross-sectional data to analyze the structure of poverty in Chile. The VEP approach allows estimation at the household level of the probability that certain families will fall into or remain in poverty in the future. While this method has many advantages, it assumes that income variance among households with similar observed characteristics (cross-section variance) is a good proxy of household income variance over time (inter-temporal variance of income). Panel data is preferable for this type of analysis, but I was nonetheless able to validate the predictive power of this model using available panel data; the vulnerability measure was strongly correlated to the direction of the poverty trajectories that were actually observed. In other words, those families who followed a downward (upward) poverty trajectory after 1996 were the ones that actually showed a higher (lower) vulnerability level in the first period (1996).

This article aims to alter the discussion about poverty from being a simple dichotomy (poor and non-poor) to one that recognizes that much more of the population is affected by poverty. There are two main arguments to support this idea. First, as in the case of Chile in the 1990s, the distinction between poor and non-poor missed an important group that was directly affected by the evolution of poverty: the non-poor who were likely to be poor in the future. In 1996, 23.79 percent of the population represented fit into this category, much more than the observed 12.39 percent who were below the poverty line in that year. Moreover, the classic definition of poverty usually considers people in poverty to be a homogeneous group, which leads to "one-size-fits-all" policies. As in the Chilean case, there is a clear distinction in terms of household characteristics and productive assets among those who were in poverty, at least between two relevant groups: the ones who are likely to remain in poverty due to low levels of productive assets (10.09 percent), and those who are likely to exit poverty precisely due to these characteristics (2.39 percent). Different sets of policies are recommended for those different groups. Therefore, in addition to this analysis of vulnerability in Chile in the context of poverty reduction, two further policy implications are presented below.

First, in terms of the poverty measure itself, the empirical estimation of vulnerability to poverty allows one to identify a broader group that faces an important risk of falling into poverty. As we have seen in the case of Chile in the 1990s, though there was a small portion of the population beneath the poverty line, there was still a large portion facing a great risk.

Along those lines, the methodology presented here shows a practical way to characterize the population of a country in order to implement suitable policies that may reduce poverty in a sustainable way. The identification of different groups may encourage the design of suitable policies for the particularities of each group. In this case, the addition of vulnerability as a relevant dimension of a household's wellbeing allows identification for social programs of three relevant groups: (i) current poor and vulnerable, (ii) current poor but non-vulnerable, (iii) current non-poor but vulnerable. Although there is no "one-size-fits-all" policy for each identified group, this framework aims to provide some guidance in terms of the kind of policies that are more appropriate in order to increase the chances of each group to exit or avoid poverty in the future.

Different strategies may work differently for the three different groups. In the case of the third group (the current non-poor but vulnerable), the main goal for social policy purposes is to prevent them from falling into poverty in the future. Programs oriented toward achieving that specific goal may offer a suitable set of policies for that specific group. In a similar way, a distinction can be made between the two groups of people who are observed to be in poverty. In the case of non-vulnerable poor groups, the idea would be to identify the main shock that caused them to fall into poverty and find strategies to lift them out of poverty. Consider a family in which some of the adult members become unemployed: lifting this family out of poverty would hinge on labor strategies that facilitate a rapid return to the labor market. The situation for the group of people characterized as both poor and vulnerable is quite different, since labor market strategies may be neither sustainable nor sufficient for their poverty situation.

We can connect the suitable social policies for each group with the World Bank's framework of resilience, equity, and opportunity. The World Bank report by Robalino et al. states that a major challenge of effective access to Social Protection and Labor is to "ensure that programs—and ultimately the whole SPL system in a country—are responsive to the needs of various groups and risks, drawing a "portfolio" of programs that together provide resilience, equity and opportunity to all who need them." The first group of programs, called equity programs, is designed to protect against destitution and promote equality of opportunity for the entire population. Social assistance programs and safety nets that aim to ensure a basic level of well-being to everyone, including transfers and in-kind transfers such as school feeding and targeted food assistance are presented as clear examples of this kind of policy. Similarly, the World Bank defines those programs that aim to increase opportunity among the population as another pillar of its social protection and labor strategy. The opportunity programs are those that promote improved health, nutrition, education, and skills development and also help individuals secure better jobs. Finally, the resilience programs are those that insure the population against the effects of decreased well being from a range of possible shocks—e.g., unemployment compensation, disability insurance, and old-age pensions. These kinds of programs are more appropriate for those who have a certain level of well being, and whose incomes are

currently above the poverty line but, due to their general set of assets, also face a definite risk.

Based on that classification of social policies I propose the following scheme for a suitable design of social policies for each identified group.

Figure 8. General description of a suitable policy for identifiable groups
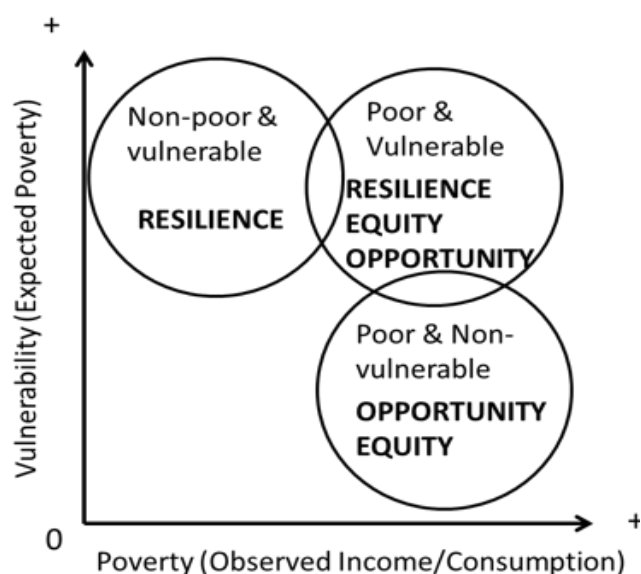
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ENDNOTES

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[2] Adapted from Katzman (1999), Wormald (2003), and Katzman and Wormald (2002).

[3] After Sen (1976) published his seminal article criticizing the poverty measure as the percentage of the population that has an income/ consumption level below a certain

threshold, many articles have highlighted some other possible measures that address different issues related to the aggregation problem. The main idea is to measure not only the percentage of the population that is below a certain cutoff of the poverty line but also to measure how poor are those poor and how unequal they are. An extension of that measure is proposed by Foster et al. (1984). For the Chilean case in the 1990s Contreras & Larrañaga (1999) show that there were significant reductions in all three measures. See Valdés (1999); Contreras et al. (2001); Contreras & Larrañaga (1999); Olavarria-Gambi (2003); Katzman & Wormald (2002); and Meller (2002). For a broader or global perspective on this issue see Ravallion & Datt (1999); Lustig, Arias & Rigolini (2002); and Perry et al. (2006).

[4] See Valdés (1999); Contreras et al. (2001); Contreras & Larrañaga (1999); Olavarria-Gambi (2003); Katzman &

Wormald (2002); and Meller (2002). For a broader or global perspective on this issue see Ravallion & Datt (1999); Lustig, Arias & Rigolini (2002); and Perry et al. (2006).

[5] Source: CASEN (National Socioeconomic Characterization Survey) series. Own Elaboration

[6] Source: Panel CASEN 1996-2001

[7] Source: Contreras et al. (2004)

[8] The small contribution of deciles 1 and 2 to those who fell into poverty is because most of them were already below the poverty line in 1996. At the same time, not all the people in the 2nd decile were poor in 1996. The main factor that accounts for that difference is that deciles are built based on the autonomous per capita income, which does not consider government transfers which are relevant for poverty measures (total per capita income).

[9] This general expression depicts the main intuition behind the estimation of vulnerability to poverty. As a general representation, it allows multiple model specifications that might be constrained by the available data. One of them is the eventual contribution of aggregate shocks in the macrostructure that each household faces (time variant coefficient βt). As we see above, that coefficient is not possible to estimate using only one cross-sectional dataset.

[10] See Pritchett et al. (2000) for an application of this method.

[11] Following Chadhuri (2003) I propose to estimate β and θ using three-step feasible generalized least square (FGLS) procedure suggested by Amemiya (1977).

[12] Actually, households with an educational level of zero may present large log-income variability based on the different working conditions of the parents (employed with at least the minimum wage versus unemployed with no wage), rather than an average estimation based on the entire population.

[13] As an example, without panel data we cannot control for unobserved household-level effects that might bias the coefficient of the observed variables. However, as I discuss here, panel data, as well as cross-sectional data, does not control for macro variables that may change over time and directly affect household income.

[14] Note: full regression results are available at the online appendix.

[15] Source. CASEN Chile, 1996. Special Run.

[16] Source. CASEN Chile, 1996. Special Run.

[17] Source. CASEN Chile, 1996. Special Run.

[18] Source: Panel-CASEN 1996-2001.

[19] The poverty line in Chile is defined as having enough resources (income from different sources, labor, subsidies, imputed rent, etc.) to acquire the basket of basic foods. It is also assumed that a household spends half of its income on food and half on non-food goods. Therefore, to be identified as poor, a household has to present an income lower than z that compounds 2 baskets of basic foods.

[20] Source: Own Elaboration using Panel-CASEN

[21] Chaudhuri et al. (2002); Chaudhuri (2003); Christiaensen & Subbarao (2001), (2004); Kamanou & Morduch (2002); McCulloch & Calandrino (2001)

[22] Ver Pritchett, Suryahadi & Sumarto (2000)

[23] See Ligon & Schechter (2003), Ligon (2003), Kurosaki (2006)

[24] Algunas aplicaiones se pueden

encontrar en: Dercon & Krishnan (2000), Tesliuc & Lindert (2002).

[25] An interesting application of this method is found in Baulch & McCulloch (1998), (2000), Christiansen et al. McCulloch & Calandrino (2003).

[26] This is the idea that Contreras et al. (2004) used to exploit a two-period panel data to analyze the vulnerability structure in Chile.