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The *Journal of Public and International Affairs (JPIA)* is a joint publication of the Association of Professional Schools of International Affairs (APSIA) and the Woodrow Wilson School of Public and International Affairs at Princeton University. It seeks to publish scholarly articles on a diverse range of subjects, covering the areas of international affairs, development studies, and domestic policy. *JPIA* is an annual publication that accepts submissions from any advanced student at an APSIA institution. Submissions are reviewed in a blind screening process by an editorial board comprised of students at Princeton University and contributing editors from other APSIA schools. Subscription or copy requests may be sent to jpia@princeton.edu or *JPIA*, Robertson Hall, Woodrow Wilson School, Princeton University, Princeton, NJ 08544-1013.

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Foreword

The *Journal of Public and International Affairs* is a unique asset for the policy community. As the former dean of a policy school, I can attest to the importance of any endeavor that builds connections among the growing number of policy schools worldwide and helps to foster a genuinely global public policy community. *JPIA's* model of soliciting papers from advanced students at all schools that are members of the Association of Professional Schools of International Affairs creates personal ties among students and promotes an awareness of shared purpose across schools. That approach is one that could and should be replicated by encouraging joint course preparation and collective research projects among faculty members at different APSIA institutions.

As a former government official, I can also affirm the value of papers and reports that are explicitly designed for consumption by policymakers. Many of the subjects addressed on the pages of *JPIA* are also analyzed in the pages of disciplinary journals aimed at academic audiences, but academic pieces tend to present their conclusions in a format that is very difficult for busy policy practitioners to digest.

Finally, as a professor who is delighted to find herself back in the classroom, I am reminded every day that many great insights and ideas come from the bottom up—from smart, motivated, and connected students who often have already spent time working in government and civic organizations. *JPIA* manages to capture some of the very best student work and to disseminate it widely on the important premise that graduate students are contributors to, as well as consumers of, policy analysis.

I commend the authors, editors, and submitters to the *JPIA* enterprise. The Woodrow Wilson School is very proud to be its host.

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Letter from the Editors

As editors of the *Journal of Public and International Affairs*, we are often asked how the research of graduate students in public affairs fits into the larger debate on pressing public policy issues.

Our answer is actually quite simple. Many (perhaps most) of today's policy dilemmas will not be resolved this month, this year, or even within the next decade. Solving these domestic and international issues will be the challenge of the current and recent graduate students of elite policy schools.

Enter *JPIA* into the policy debate. The journal is an entirely student-run publication that showcases research on a broad set of issues submitted by graduate students at member institutions of the Association of Professional Schools of International Affairs.

Each year, student editors representing over a dozen schools review this research and, through a blind selection process, choose the highest-quality pieces for publication. A team of Princeton University student editors then compiles the chosen pieces to create a final product that encompasses the very best research that APSIA graduate students have to offer.

As the career accomplishments of previous *JPIA* authors demonstrate, many of these individuals ultimately assume responsibility for crafting policy within their respective areas of specialization. The selected authors of previous editions have indeed produced research and ideas that have informed future policy solutions.

Now in its 23rd year, *JPIA* continues to shape the current policy debate and offer a preview of what concerns tomorrow's leaders. The eight articles featured in this edition of the journal were selected from nearly one hundred submissions and address a number of the long-term challenges that will become the life's work of today's graduate students – from climate change to the growth of China's influence in international affairs to research and development for vaccines. This is the space that *JPIA* uniquely occupies in the policy community, and we believe that this forms the core of the journal's success.

We would be remiss if we did not thank all those who made this publication possible. First and foremost, we are grateful to the Woodrow Wilson School of Public and International Affairs at Princeton University as well as APSIA for generously supporting *JPIA*. We would also like to thank Melissa Lyles, Director of the Graduate Program Office at the Woodrow Wilson School, for her guidance throughout the 2011-2012 academic year, and Leona Rosso-Dzugan, Graphic Designer at Princeton University, for her work on the layout and design of the journal. Our phenomenal staff worked tirelessly to produce a high-quality journal, and we thank them for all of their efforts. Finally, we would like to extend special thanks to Gregory Rosalsky and Sarah Schleck, who managed to keep us on track throughout this year-long process. We, however, take full responsibility for any shortcomings of the journal as well as for any errors contained within its pages.

Dan Fichtler and Andrew Shaver
JPIA Editors-in-Chief

1

EMBRACING THE EURO CRISIS: GERMAN POWER POLITICS

Utz J. Pape

The European sovereign debt crisis is surprisingly persistent in defying any solution. Germany would be a natural candidate to lead the implementation of measures to stop the crisis. However, Germany has shown only limited effort in doing so, although it benefits significantly from the Euro. Germany is often accused of weak leadership and questionable economic assumptions by the media. Instead, this paper will argue that Germany has acted rationally and benefits from a delay of the crisis. The analysis of the current situation, which is based on a game-theoretic model, offers evidence that some countries maximize their benefits by delaying the crisis. The crisis stimulates exports due to an undervalued Euro and significantly decreases interest rates for safe sovereign bonds. The delay of the crisis introduces a high risk that the monetary union will break up, even if all countries would individually prefer to keep the monetary union. This risk is created by the structure of the decision making process, which has an inherent tendency towards the delaying of a solution. A different decision making process based on majority rule would increase the likelihood that a solution to the crisis would be developed more quickly. Alternatively, concessions by countries suffering from a delay of the crisis to countries like Germany can compensate for any foregone benefits.

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I. INTRODUCTION

Since the onset of the European sovereign debt crisis in 2009, the Economic and Monetary Union (EMU) has been facing a significant threat of falling apart. Greece suffers from an unsustainable burden of debt, with immediate pressure for refinancing at a high level of interest rates making a default likely. A default not only puts vulnerable nations like Ireland, Portugal, Spain, and Italy at risk of infection, but could, in turn, trigger the collapse of the entire EMU. A convincing bailout of Greece could have stopped the crisis as early as the summer of 2011. Instead, half-hearted measures and insufficient funds prolonged and intensified the crisis. This result is surprising, given the risk of infection of other nations and the significant costs of a breakup or collapse of the EMU. Given Germany's vital interest in, and benefits from, the Euro, it is especially perplexing to observe its limited efforts to solve the crisis.

Backed with a political economy model, I argue that Germany's delays in developing and implementing a solution to the crisis are not due to indecisiveness (Warner 2011), different economic assumptions (Kovacheva 2012) or a weak German chancellor (Maguire 2011), but instead a rational regional strategy. Despite the costs of the ongoing crisis, Germany profits in a number of important ways. An undervalued Euro stimulates exports, bolstering the German economy. Germany can also access money at lower interest rates during the continuing crisis since German bonds have been seen as a safe haven for investments. In fact, at the time of writing, German bonds were being sold with negative interest. Additionally, the duration of the crisis increases the likelihood of a larger haircut from private investors for Greece. With French banks relatively more exposed than German banks to Greece's debt, such a debt trim would further improve Germany's relative weight within the European Union.

In this paper, the decision process for EMU countries is designed in a model with three possible choices: agreeing to solve the crisis, delaying any solution to the crisis, or acting to break up the monetary union. I assume that the crisis can only be solved if all countries unanimously decide to solve it. In contrast, the decision of any one country, regardless of the decisions of all others, can break up the monetary union. Each country in the EMU has the sovereign power to leave the monetary union. Because this will likely lead to a domino effect, the whole union would collapse under this scenario (Deo, Donovan,

and Hatheway 2011). Finally, resolution is delayed if at least one country is determined to delay the solution and there are no countries that choose to break up the union. Instead of modeling all countries in the EMU explicitly, I distinguish between "strong" countries like Germany and the Scandinavian countries and "weak" countries like Greece, Ireland, or Spain. While both types consider breaking up the union to be the worst choice, strong countries prefer to delay the crisis and weak countries prefer to solve the crisis directly.

In this simple setup, the crisis will be delayed in the Nash Equilibrium. This delay motivates a repeated game structure in which the same decision – whether to solve the crisis, prolong it, or break up the monetary union – is merely shifted to a later time period. With increasing costs associated with deciding to delay solving the crisis until later, the model can be collapsed into one round. This single-period model captures the costs of the ultimate outcome after delaying the crisis in probabilistic terms. The model highlights a crucial risk of delaying the crisis. Although all countries prefer solving the crisis to breaking up the union, the delay of the crisis increases the costs of solving the crisis later. This can cause a breakup of the monetary union despite the fact that this is the worst outcome for all countries. Alternatively, strong countries stop delaying the crisis and advance a solution before a breakup is triggered.

The next section gives an overview of the Euro crisis, tracing both its origins and possible solutions. This includes a summary of different scenarios for possible outcomes from the crisis, supplemented with a rough cost estimation for a solution to the crisis and a breakup of the union. The costs are key ingredients for the game-theoretic model, which is developed in the subsequent section. Finally, the implications of the model are discussed and related to the current situation.

II. THE EURO CRISIS

In this section, I briefly review the origins of the crisis with an emphasis on economic fundamentals, which helps to explain the emergence of the crisis. I will focus particularly on Germany as an example of a strong country and Greece as an example of a weak country. This analysis is followed by a description of the self-reinforcing nature of the crisis, which makes a timely solution increasingly important.

This motivates an overview of solutions and a cost-benefit analysis of the choice to leave the monetary union. The derived costs are used to rank the cost parameters included in the model presented in the next section.

Before the Crisis

Low costs of credit

Upon entry into the Eurozone, peripheral countries like Greece, Portugal, Spain, and Ireland took advantage of very low interest rates for borrowing money (Higgins and Klitgaard 2011). In 1992, before the existence of the EMU, Greek ten-year bonds yielded 25 percent compared to 7 percent for German bonds. This relative spread of 1,800 basis points indicates that external money was significantly more expensive for Greece than it was for Germany at the time. The spread declined to less than 100 basis points in 2000 and further dropped to 25 basis points in 2007. Apparently, investors assumed the risk of investment in Germany was comparable to that in Greece. One of the many reasons is that investors believed that the European Central Bank would continue the anti-inflationary course of the Deutsche Bundesbank, the German central bank. Reducing the chance of depreciation and devaluation makes investment more attractive. Also, risk of default was considered to be equal in all European countries on the Euro. The three leading rating agencies graded all Euro countries positively. With cheap access to investment, the peripheral Euro countries like Ireland, Spain, Portugal, and Greece borrowed increasingly higher sums (Higgins and Klitgaard 2011).

Investment vs. consumption

High debt is not necessarily an indicator of bad governance or economic difficulties. It can be a useful instrument to supply the economy with required capital. Investments due to debt should generate a surplus bigger than the costs of the debt. The current account of a country reflects the balance of trade. A surplus in the balance of trade corresponds to a purchase of foreign assets. Equivalently, a surplus country must have higher domestic savings than domestic investment spending. While Germany has had a surplus in its current account since 2001, the peripheral countries have been running increasing deficits. For example, Greece had a deficit of 6 percent as a share of GDP in 2000, which increased to 15 percent in 2008. The deficit can be caused by smaller domestic savings or by higher domestic investment spending. As pointed out before, higher domestic investment spurs economic growth. Smaller domestic savings, however, translates into higher consumption not compensated for by production. While domestic savings increased for Germany from 20 percent as a share of GDP in 2000 to 25 percent in 2008, it deteriorated for Greece from 17 percent in 2000 to 6 percent in 2008. In the same time period, private real consumption spending only slightly increased for Germany by 7 percent

but rocketed for Greece by over 40 percent. In summary, the monetary union allowed peripheral countries to borrow money at low rates with no fiscal union to encourage fiscal discipline from members (Higgins and Klitgaard 2011). A fiscal union could have imposed credible threats in the case of unsustainable deficits and ensured profitable investments of borrowed money.

Export boom for Germany

At the same time, Germany increased its exports as the undervalued currency decreased prices for exported goods, increasing its competitiveness in the world market. Because the value of the Euro is an average across all the countries in the EMU, the Euro is undervalued from the perspective of the strong German economy. German exports became relatively cheap and demand for them increased significantly. Another significant factor further contributed to increased German exports: the reunification of Germany lowered real wages because of the increased labor force and the substantially lower real wages in East Germany. This makes labor cheaper and, hence, the economy more competitive.

Crisis Onset

Increased credit costs

With the onset of the crisis, borrowing money suddenly became much more expensive for peripheral countries. For Greece, the spread to Germany for ten-year government bonds increased from 25 basis points in 2007 to over 1,200 basis points in 2011. Similar increases can be observed for Portugal and Ireland, up to 800 basis points (Higgins and Klitgaard 2011). Investors realized that risks are higher in peripheral EMU countries and pulled out liquidated assets. Governments refrained from new foreign investment and sold existing assets to pay off debt, which hampered future growth.

Refinancing

More importantly, a significant fraction of external debt is short-term rather than long-term, meaning that debt has to be refinanced continuously. With quickly increasing interest rates, a country spends increasingly more money on debt service rather than investment. In turn, lower investment decreases growth and makes interest payments more difficult to complete. Rapidly increasing interest rates become self-perpetuating. A higher risk for default increases interest rates; if higher interest rates in turn increase risk of default, interest rates increase even more.

From illiquidity to insolvency

A Greek default would further spur credit risk in other countries. Currently, the market has not given up on the possibility of a bailout of Greece, which would limit the losses for investors. A Greek default, however, would show the insufficient political will to rescue countries within the EMU. Other peripheral countries with high debt to GDP ratios will be confronted with higher interest rates due to the higher risk for investors. This can make solvent countries illiquid and force them to borrow money at high interest rates. The increased costs can lead to lower productive investment and, hence, reduced economic output. Without growth backing up debt, a formerly solvent country can become insolvent. This is the contagion effect that specifically threatens Portugal, Spain, and Italy.

Solutions

The first Euro area summit on the subject of the debt crisis in July 2011 decided to make inexpensive loans available to Greece, demanded strict fiscal austerity, and proposed a voluntary 23 percent haircut for debt from private investors. At the same time, the European Financial Stability Facility (EFSF) provided capital for bank recapitalization. The following paragraphs provide an overview of the different components of the current program.

Inexpensive loans

A straightforward solution to the crisis is the supply of inexpensive, long-term loans to reduce the burden of interest payments and decrease the need of refinancing. This approach, however, assumes that the country can repay its debt in the long-term. An appropriate measure for the potential of repayment is competitiveness, which can be inversely measured in relative unit labor costs. Greece's competitiveness decreased between 1999 and 2007 with increased relative unit labor costs in manufacturing of 110 percent while Germany decreased unit labor costs to 90 percent. As such, the uncertainty of whether Greece can repay its debt, stemming from its losses in competitiveness, makes the provision of loans risky. Even if countries would be politically willing to supply cheap loans, they run into the danger of being downgraded by credit rating agencies. With a lower credit rating, access to new investment will become more expensive for the creditor. This will negatively affect the sensitive balance between high investment and ability to service debt. Even for countries which have a productive economy like Italy, the increased costs of refinancing debt can increase the risk of an unsustainable debt burden where refinancing costs exceed growth.

Fiscal austerity

To repay the debt and decrease external borrowing, the peripheral countries reduced fiscal expenditures dramatically. Reduced fiscal spending can negatively affect consumption as well as investment, both contributing to slower growth. The decline in domestic demand reduces imports, improving the current account (Abiad et al. 2011). For a floating currency, reduced imports depreciate the currency. Depreciation increases exports by making export goods cheaper in the world market. This monetary stimulus is limited in countries belonging to a monetary union since the nominal exchange rate is less sensitive to imports of one member country. However, the current account still improves in comparable size for a country under fiscal austerity, but by a different mechanism. The adjustment takes place by a contraction of economic activity. The real exchange rate depreciates because of lower real domestic wages and decreased real prices. If multiple countries consolidate fiscal policy, the current account only improves relative to the consolidation of the other countries. This is intuitive because the current accounts of all countries need to be balanced. In general, the effect of fiscal adjustment is slow due to the stickiness of prices and is limited in scope to sustain growth. In addition, such measures need to be closely monitored and credibly imposed, which can be achieved by a fiscal union of the member states.

Haircut

The most prominent solution is a haircut of debt with contributions from private investors. In a haircut, creditors forego part of the credit and often extend the duration of the remaining credit with lower interest rates. For Greece, this would reduce its debt burden and allow it to use its capital to make investments instead of exclusively debt repayments, putting the country back on a path of growth. However, creditors suffer from a partial loss of their investments because of the haircut. Banks with high exposure to Greece's debt will run into the danger of illiquidity and, in the worst case, insolvency. Without knowledge of the exposure of creditors, banks can become reluctant to borrow money. Ensuring sufficient capitalization of banks, however, can prevent a freeze of the credit market. Another risk is the reaction of investors upon realizing that sovereignty bonds are indeed riskier than expected. A downgrading of other peripheral countries of the EMU can lead to a pullout of investments and increased interest rates for government bonds. As discussed above, this can initiate the vicious circle of higher interest rates resulting in illiquidity and insolvency: the contagion effect. The supply of inexpensive loans can help to prevent this situation.

Breakup

So far, the three components of a solution have been examined. What follows next are arguments to support the view that for both weak and strong countries, solving the crisis is a better option than breaking up the union without considering the option to delay the crisis. The estimates of the costs are used to rank country preferences for action during the crisis (estimates are taken from Deo, Donovan, and Hatheway 2011). Although there is disagreement about the costs among politicians and economists (Yousuf 2011), the model introduced in the next section only relies on the referenced cost estimation. Since the model only uses a ranking of the costs, the model is invariant for changes in the cost estimates as long as the ranks are preserved.

A breakup of the EMU could happen in different scenarios. Germany could leave the EMU on its own or with other countries. Greece could secede and potentially be followed by other countries. Also, two monetary unions could be created. For the sake of simplicity, we do not distinguish between these scenarios but discuss generally the costs and benefits of leaving a monetary union for strong and weak countries.

Weak Countries

For a weak country in the EMU, there are three main advantages of leaving the monetary union (Donovan et al. 2010). First, the country regains controls over monetary policy and can set interest rates. Second, monetization is placed under the direct control of the country. Third, the currency would devalue because of the trade deficit. This would increase exports through lower prices of export goods. These gains are countered by three main costs. Country default becomes more likely because debt is denominated in a foreign currency. With the expected devaluation of the domestic currency, the burden of the debt increases because it is denominated in the currency of the former union. The higher burden of debt makes a default more likely because of the self-reinforcing mechanism discussed above. Printing money only contributes to further devaluation without decreasing debt. Second, the banking system is likely to collapse because depositors will move money out of the country to prevent being subject to depreciation or default. Third, redenomination of national savings into a quickly depreciating currency will extirpate all national savings. People who worked for years or decades to accumulate savings are unlikely to accept the elimination of these savings. With a sense that the crisis is not caused by them but by banks and other institutions, civil unrest is likely to generate significant costs. Costs for a weak country are estimated to be

around 10,000 Euros per person in the first year with annual follow-up costs of about 3,500 Euros per person. This translates into 40 – 50 percent of GDP in the first year and subsequently annual costs of about 15 percent.

Strong Countries

For stronger countries like Germany, the cost-benefit analysis is different. For them, the Euro is undervalued and a further improvement of interest rates is hardly possible. Therefore, a strong country would not benefit from setting the domestic interest rate nor would the currency depreciate and improve exports. Rather, the new domestic currency is likely to appreciate, decreasing the value of foreign assets denominated in Euros, especially for net creditors like Germany. Also, trade with former EMU countries would be negatively impacted because of appreciated domestic currency and depreciated foreign currencies. Estimations for costs for a strong country are about 7,000 Euro per person in the first year and 4,000 Euro per person in each subsequent year. This equates to around 20 – 25 percent of GDP in the first year and about 10 – 15 percent for each following year for weak countries in the European Union. In contrast, a complete bailout of Greece, Ireland, and Portugal would cost about 1,000 Euro per person. The moderate costs of a bailout are not surprising because the debt of each peripheral country is large relative to its own GDP but small relative to the total GDP of strong countries or the complete union. With a German GDP of 2.5 trillion Euros in 2010, for example, Greece's debt of 180 percent debt to GDP with a GDP of about 220 billion Euros in 2010 is relatively small. Given these cost estimates, Germany and other strong countries have a vital interest in holding the EMU together.

Conclusion

Greece, as well as other weak countries, would clearly win from a rescue of the Euro. For stronger countries, bailout costs are moderate relative to their GDP while costs for leaving the EMU are significantly higher. The model proposes an explanation as to why the crisis is still not solved but rather delayed. Postponing a solution to the crisis has varying costs for different countries. For weak countries, costs are high because of increasing interest rates and increasing interest rate volatility. Strong countries like Germany, however, gain from a delay of the crisis. The undervalued Euro due to the crisis helps its exports. In addition, a strong country could obtain capital inexpensively due to low, or even negative, interest rates enhanced by the crisis. The haircut affects private investors and not governments.

Using the example of Germany as a strong country and Greece as a weak country, the gains can be described more specifically. German banks

have already written down most of Greece's debt while French banks have a significantly greater exposure to Greece's debt and still carry the assets on the balance sheet. The suggested haircut was increased from 23 percent in July to 50 percent in October. With the lower exposure of German banks to Greece's debt than French banks, Germany gains relative to France from a higher private haircut. Also, Germany is the biggest contributor to the EFSE, though the fund is not a transfer of money but used for investment in accumulating foreign assets. As long as Greece does not default, these foreign assets will be realized in the future.

III. MODEL

In the last section, it was argued that all countries are better off if the crisis is solved rather than if the monetary union is broken up. However, it was also shown that, for some countries like Germany, the crisis itself advances their relative power. Therefore, these countries will try to delay a solution of the crisis. Next, a model is developed to explain the dynamics of the decision making process in the crisis where at least one country has an interest in delaying the solution. First, it is assumed that the benefits from the delay of the crisis are exogenous. In a subsequent step, the benefits from the delay are modeled endogenously and predictions of the model are explored.

Exogenous Delay

Based on a stylized game-theoretic model, the decision-making process for a strong country, exemplified by Germany, which gains from a longer duration of the crisis, is formalized. Each country in the monetary union is represented by a player in a simultaneous game. Each player can either decide to stop the crisis, delay the solution to the crisis, or break up the monetary union. A unanimous vote is needed to solve the crisis, while one vote is sufficient to break up the monetary union. Therefore, the crisis is delayed only if there are no votes for a breakup and at least one vote for delaying the crisis.

The three outcomes of the vote – solving the crisis, delaying the solution to the crisis, and breaking up the union – result in benefits s , d , and b for the member states. Note that benefits are used as variables rather than costs. For a strong country, it is argued that the immediate benefits from a delay d are higher than from solving the crisis s , which in turn outweighs the benefits of a breakup b . Thus, we obtain the inequality $d > s > b > 0$. For all other countries, it is better to solve the crisis rather than delay the solution to the crisis. Denoting the benefits of other countries with a

prime, we obtain the inequality $s' > d' > b' > 0$. Without loss of generality, all other countries are summarized to one player since they have the same relative benefit scheme. The resulting simultaneous two-player game is shown in Table 1. A generalization of the game for multiple strong and weak countries is straightforward. Due to the special structure of the pay-off matrix, the results hold for any number of strong and weak countries.

Based on the pay-off matrix, dominant strategies can be identified. For a strong country, it is always best to delay the crisis independent of the strategy chosen by the other countries. In contrast, the other countries always try to solve the crisis. Also, there are two Nash equilibria (Nash 1950). The first equilibrium occurs if the strong country delays the crisis, while the other countries try to solve the crisis. The second equilibrium also has the outcome of delaying the crisis, but both the strong country and the other countries delay the crisis. We can conclude that the model predicts a delay of the crisis, derived from the dominant strategies as well as from Nash equilibria.

Table 1: Pay-off Matrix

Germany/ Others	Stop**	Delay	Breakup
Stop	Stopped: (s , s')	Delayed: (d , d')	Breakup: (b , b')
Delay**	Delayed: (d , d')*	Delayed: (d , d')*	Breakup: (b , b')
Breakup	Breakup: (b , b')	Breakup: (b , b')	Breakup: (b , b')

*The pay-off matrix contains in each cell the outcome and the benefits for Germany followed by the benefits for 'Others' for $d > s > b$ and $s' > d' > b'$. Dominant strategies are marked by ** and Nash equilibria are indicated with *.*

Endogenous Delay

Next, the previously exogenous parameter of the benefits of a delay d is modeled as an endogenous variable. In addition, focus is placed on the perspective of the strong country. The strong dynamics of the crisis create an unpredictable momentum in the evolution of benefits. Consequentially, it is assumed that the change of benefits from delaying the crisis are not precisely known but captured in a probabilistic term.

Endogenous Benefits

The benefits of delaying the crisis can be decomposed into two parts: known short-term gains Δ from the ongoing crisis and benefits from solving the crisis in the future $\delta\phi$ or breaking up the union δb . The benefits s from

solving the crisis and the breakup benefits b are discounted by a known parameter $0 < \delta \leq 1$ because they are not realized directly. In addition, the benefits from the solution of the crisis are further decreased because of the smaller benefits for solving the crisis later. The decrease is denoted by an unknown factor $0 < \varphi < 1$ with expected value φ^* . The empirical motivation for smaller benefits is the increasing debt-to-GDP ratio, which makes it more expensive to solve the crisis the longer it endures. Other countries do not obtain short-term gains from delaying the crisis ($\Delta' = 0$). Since the decreased benefits of a delay are divided among all countries, the benefits s' for the other countries decrease accordingly, resulting in $\delta\varphi's'$. Note that the same discount rate δ is assumed, but the model allows for a different unknown factor $0 < \varphi' < 1$ with expected value φ'^* for more generality. In the special case of $\varphi = \varphi'$, the conclusions do not change qualitatively.

The benefits from the delay depend on the outcome of the decision after the delay: either the crisis is solved or the union breaks up. As before, the crisis is solved after the delay if the strong countries and the other countries decide to solve the crisis. The condition for the strong country deciding to break up the union becomes $\varphi s < b$ and for the other countries it is $\varphi's' < b'$. Accordingly, the crisis is solved if nobody is better off by breaking up. With φ and φ' being random variables, we can denote the likelihood for the corresponding events with $r = P[\varphi < b/s]$ and $r' = P[\varphi' < b'/s']$. With p denoting the likelihood of a breakup, we obtain that the likelihood for solving the crisis after the delay is given by $1 - p = (1 - r)(1 - r')$. For strong countries, the expected benefits of delaying the crisis in the first place are therefore:

$$d = \Delta + \delta[pb + (1 - p)\varphi^*s]$$

and for weak countries correspondingly:

$$d' = \delta[pb' + (1 - p)\varphi'^*s']$$

Solving the Crisis

Fixing the ranking of the initial preferences for weak countries as before with $s' > d' > b' > 0$, we can analyze when the strong country prefers to solve the crisis. If a strong country only delays the crisis with the real intention to solve it afterwards, then it must be the case that $\varphi^*s > b$. In this case, the condition for a strong country to solve the crisis is different from the exogenous model and can be calculated as:

$$d < s$$

$$\Delta + \delta[pb + (1 - p)\varphi^*s] < s$$

$$p(b - \varphi^*s) < \delta^{-1}(s - \Delta) - \varphi^*s$$

$$p > (\delta^{-1}(s - \Delta) - \varphi^*s)/(b - \varphi^*s) \quad (1)$$

Note that the denominator $b - \varphi^*s$ of the right side of inequality (1) is negative by definition, resulting in a switch of the inequality sign in the previous line. Thus, the model predicts that the strong country will solve the crisis if the likelihood p of a breakup after a delay is greater than the term on the right side of (1). Because the denominator $b - \varphi^*s$ of the right side of inequality (1) is negative, the right side of inequality (1) will be negative and, thus, the inequality is necessarily fulfilled if:

$$((s - \Delta)/\delta) > \varphi^*s$$

$$\Delta < s(1 - \delta\varphi^*)$$

Accordingly, if the benefits from the ongoing crisis Δ are too small to outweigh the decreased benefits from postponing the solution of the crisis ($s - \delta\varphi^*s$), the risk of a breakup is too high and the strong country would not delay but vote to solve the crisis directly.

Delaying the Crisis

Next, we derive a condition that the strong country will never solve the crisis but continuously delay it given that $b < \varphi^*s$. Using $p \leq 1$, the strong country would always decide against solving the crisis if the right hand side of inequality (1) exceeds unity:

$$1 < (\delta^{-1}(s - \Delta) - \varphi^*s)/(b - \varphi^*s)$$

Considering that $b - \varphi^*s$ is negative, the condition can be rewritten by:

$$((s - \Delta)/\delta) - \varphi^*s < b - \varphi^*s$$

$$\Delta > s - \delta b$$

Hence, a very large gain from the ongoing crisis Δ will make it beneficial to continue the crisis.

Breaking up the Union

Note that with decreasing benefits φ^*s , the defining assumption for this result, $b < \varphi^*s$, will be violated. As soon as the expected decrease factor φ^* is smaller than the ratio of the benefits from a breakup and a solution b/s , a

strong country would break up the union after a delay. As with inequality (1), the strong country would solve the crisis directly if the benefits from a solution exceed the benefits from a delay:

$$d < s$$

$$p < (\delta^{-1}(s - \Delta) - \varphi^*s)/(b - \varphi^*s)$$

Note that the derived inequality is equal to inequality (1) except for the flipped inequality sign because the denominator is positive by definition of a subsequent breakup. This inequality is necessarily violated if the right side is negative because the likelihood of a breakup p cannot be negative:

$$0 > (\delta^{-1}(s - \Delta) - \varphi^*s)/(b - \varphi^*s)$$

$$(1 - \delta\varphi^*)s < \Delta$$

Thus, the strong country would delay the crisis and subsequently break up the union if the discounted benefits from a solution are smaller than the short-term gains from a delay of the crisis. A higher expected value for the factor φ^* , which decreases the benefits from solving the crisis after a delay, increases the discount effect. Accordingly, even for small short-term gains Δ , a high decrease in the benefits from solving the crisis after a delay can result in a breakup of the union after a delay. This happens if the delay of the crisis decreases benefits significantly. With high short-term benefits, it becomes most attractive for a strong country to delay the crisis and subsequently break up the union.

Returning to the results with the strong country delaying the crisis, it was assumed that the other member states of the monetary union do not gain from a delay of the crisis. Hence, they would try to influence the strong country to solve the crisis directly. Based on the developed model, a threat of breakup pushes the strong country towards solving the crisis rather than delaying it. However, as long as breakup costs for the other countries are higher than their costs of delaying the crisis, any attempts at coercion by small countries would be seen as a non-credible threat. Even if the strong country would delay the crisis, the other countries would still be better off accepting the delay than breaking up the monetary union. Therefore, it is paramount for a solution of the crisis that the gains for the strong country from the ongoing crisis are diminished.

IV. DISCUSSION

The review of the crisis of the Euro showed that all countries in the EMU have an interest in the survival of the Euro. To understand the delay in

solving the crisis, the model served to analyze trade-offs for solving or delaying the crisis or breaking up the union. The main motivation is that, at the least, Germany as a strong country gains from a longer duration of the crisis. The model only used the difference in gains from a longer crisis and can be employed to derive several conclusions. First, the setup of costs leads to an equilibrium which indeed delays the crisis. This is in great accordance with the situation in the second half of 2011. Second, delaying the crisis increases the risk of a breakup due to the higher costs for solving the monetary union problem at a later point. This is the main driver for a strong country to give up the delaying strategy and solve the crisis. Third, the model identifies a risk that by increasing costs for solving the crisis after a delay, the future bailout costs can outweigh breakup costs and, hence, lead to a breakup of the monetary union. As we have seen in the discussion of the costs of a bailout and a breakup of the monetary union, it is very unlikely that at any point the breakup will be a better option than a bailout. Finally, the model implies that the remaining countries cannot threaten Germany with a breakup because the threat would not be credible.

The model shows that the short-term gains from the delay for strong countries have to be eliminated to allow a timely solution of the crisis. However, it is difficult to neutralize the short-term gains, as the continuing delay of the crisis proves. International markets create the benefits of a delay for a strong country by buying its export goods and supplying it with investment. Accordingly, it is not feasible to directly eliminate or reduce the benefits from delaying a solution. Also, diplomatic efforts to address strong countries' disproportionate benefits from delaying the crisis are unlikely to yield much candid discussion. In the case of Germany, German politicians conveniently use their citizens' rejection of a bailout to justify delaying the crisis.

Weak countries can, however, apply pressure to strong countries by linking the decision to solve the crisis to other independent policy decisions (Riker 1986). This would allow strong countries to benefit from other policies under which weak countries bear lower costs than that of delaying the crisis. For example, weak countries could agree on higher product standards where strong countries have a comparative advantage. This would reduce competitiveness of weak countries for these products while increasing market power of strong countries. As long as the costs for weak countries are lower than the costs of a delay of the crisis, weak countries would benefit if strong countries agree to solve the crisis without delay in return of higher product standards. At the same time, strong countries would agree to this bargain if they benefit at least as much from

the higher product standards as they would from a delay of the crisis.

This analysis helps to identify three policies that could prevent a breakup of the monetary union. First, the requirement of unanimity among countries to solve the crisis is a lethal component. It allows any strong country to profit from the crisis through the use of delay tactics, even though the overall costs for all countries in the union are likely to outweigh the benefits of delaying for the strong country. Institutional changes in the current crisis are infeasible, but would be key to preventing similar sovereign debt crises within the European Union in the future. Second, one could demand a financial contribution increasing with the delay of the crisis from strong countries, punishing delay tactics. However, this is a risky strategy because of its adverse effects. As this decreases the relative benefits of a solution for the strong country, high benefits from the delay will let the strong country accept the ultimate breakup after delaying the crisis. As this outcome can be foreseen, the union would be broken up directly. Therefore, attempting to force strong countries to compensate weak countries for delaying the crisis is not advisable. Third, weak countries cannot credibly threaten to break up the union because their breakup costs are larger than the costs of solving the crisis even with a delay. Thus, weak countries need to search for alternative threats to breaking up the union.

In the next paragraph, the situation within Germany is analyzed and related to the predicted outcome of the model. Finally, an objection to the evidence of the model based on the behavior of financial markets is discussed.

Germany

Recent public polling suggests that a majority of German citizens have lost their faith in the Euro. An abundant feeling is that the Euro is a burden rather than a win for Germany (Guérot and Leonard 2011; Guérot and Hénard 2011). This triggers the question: “why do politicians not put more effort into explaining the gains for Germany from the monetary union?” Based on the model, it can be seen that the German government has an interest in delaying the crisis. The model did not elude how the German government can convince its partners in the monetary union that the crisis cannot yet be solved. Its strong position and limited flexibility for compromise delay the achievement of a solution. Given the political difficulty of explaining the delay out of Germany’s self-interest, the government declares itself to be constrained by the domestic situation (Putnam 1988). As long as German voters object to a bailout, the German government can adduce this for being less flexible and slowing down negotiations. This

might explain the poor transmission of the benefits of the monetary union for Germany by German politicians and related media.

Financial Markets

Interestingly, at first glimpse, the markets do not seem to confirm the results of the model. If the model were correct, a breakup of the monetary union would be extremely unlikely. Therefore, high interest rates for other peripheral countries like Italy and Spain appear inconsistent with the model. This objection to the model can be countered in several ways. First, the market does not always react rationally. Especially in the last few years, the volatility observed was too high to be attributed to the rational actions of investors. Hence, even a rationally acting investor has to incorporate irrationally acting investors into his or her prediction of market behavior. Believing that many investors irrationally fear the breakup of the monetary union would suffice for a rational investor to demand higher spreads to insure against risk. Higher risk premia can initiate the cycle from illiquidity to insolvency and, in conjunction with the private haircut of Greece, the investments are indeed at higher risk. Second, the model suggests that strong countries like Germany might take some risk gaining from the crisis. With uncertainty about the exact benefits and costs of other countries as well as irrational behavior of the other countries, a breakup of the monetary union cannot be ruled out. Different attitudes towards risk can further influence the decision making process for countries. From this perspective, there is indeed a danger of an inadvertent breakup of the union, although this is very unlikely.

In summary, the model is in good alignment with empirical evidence. It suggests two attacking points toward a fast solution of the crisis. First, the structure of the decision making process yields a delay as a very likely outcome. We can illustrate this point in an even more conservative version of the decision making process where each country can only vote for or against a solution of the crisis. As in the model, the crisis is delayed if neither all countries vote for solving or against solving the crisis. With an assumed country likelihood of $0 < q < 1$ to vote for solving the crisis and n countries, the crisis is delayed with probability $1 - q^n - (1 - q)^n$. Independent of q , the likelihood converges towards unity as the second and third terms converge towards zero for increasing n . Allowing countries to vote directly for a delay further accelerates convergence. Thus, the structure of the decision making process has an inherent tendency towards a delay of a solution. Accordingly, altering this structure – towards a majority vote, for example – could prevent similar delays for future crises. With the

Treaty of Lisbon, the European Union expanded decision making based on qualified majority rules. The current crisis emphasizes the importance of this step.

Second, decreasing the positive gains for strong countries from the ongoing crisis can prevent a delay of the crisis. The model emphasizes the important distinction between increasing future costs of solving the crisis and decreasing ongoing benefits. While the former bears the danger of an immediate breakup of the EMU, the second can efficiently push strong countries towards solving the crisis. Given the superior negotiating position of a strong country, it will be difficult to adjust ongoing benefits from delaying the crisis within the context of the crisis. Nevertheless, some countries like Italy apply pressure to Germany to compensate for their gains from the crisis. Another option is linking other policy decisions to the current crisis. Weak countries can offer concessions in other areas if a strong country forgoes the benefits from the delay by solving the crisis directly.

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2

TOWARDS A COMPREHENSIVE CURRICULUM FOR PREGNANCY PREVENTION: COMBINING CHILD SUPPORT EDUCATION AND SEXUAL EDUCATION PROGRAMS

Laura Noonan

Nonmarital births have sharply increased over time, and teenage births remain a significant problem in the United States, both of which are correlated with negative social outcomes. Reviewing evidence on efficacy, or the ability to follow through on the intention to avoid pregnancy, this paper concludes that equal attention should also be paid to strengthening the intention of young adults to avoid pregnancy before they can handle the emotional, legal, and financial consequences. The paper argues that current sexual education programs, which aim to increase participants' knowledge of how to delay sexual activity and effectively use contraception, should be paired with child support education, which emphasizes the economic, emotional, and legal realities of parenting. The Office of Adolescent Health should pilot and evaluate a comprehensive pregnancy prevention curriculum, featuring both sexual education and child support education components, in the form of a mandatory high school

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program incorporated into existing health classes. The author believes that such a program, which emphasizes both the 'why' and the 'how' of pregnancy prevention, will provide participating young adults with the tools necessary to make informed family planning decisions for years to come, reducing teenage pregnancy rates in the short term, as well as having a greater impact than sexual education alone on nonmarital pregnancy rates in the longer term.

I. SUMMARY: RECOMMENDATION FOR COMPREHENSIVE TEENAGE PREGNANCY PREVENTION CURRICULUM

Though many sexual education programs are effective at limiting risky sexual behavior and increasing contraceptive use among teenagers, the high number of teenage births, as well as the high and increasing number of births to unmarried parents, demonstrates that current solutions are not enough. Although efficacy, or the ability to follow through with the intention of avoiding pregnancy, is often a focus of pregnancy prevention efforts, there is reason to believe that indifferent attitudes regarding teenage and unwed parenthood should also be an important concern. In other words, current programs tend to focus on "how" one can avoid pregnancy, not "why" one should consider delaying pregnancy. But many of the pregnancies which are assumed to be entirely unplanned may not be. Many teenagers and young adults place a high social value on having children and tend to underestimate the opportunity costs associated with having them before they are fully prepared.

Child support education, which emphasizes the economic, emotional, and legal realities of parenting, when coupled with effective sexual education programs, may be able to fill this gap. Promising child support education programs such as *Parenting and Paternity Awareness*, *No Kidding: Straight Talk from Teen Parents*, and *Dads Make a Difference* show positive results in influencing adolescent attitudes towards parenting. This paper recommends that the Office of Adolescent Health (OAH) run a pilot of a comprehensive pregnancy prevention curriculum, featuring both sexual education and child support education components, in the form of a mandatory high school program incorporated into existing health classes. Further, this pilot should be evaluated using random assignment to demonstrate the effectiveness of the comprehensive program.

Such a combined program has the potential to not only further reduce teenage pregnancy rates in the short term by teaching students how to avoid pregnancy, but also to affect the nonmarital birth rate in the long

term, as students learn lifelong skills they can draw on when deciding when and why to start a family.

In addition to directly impacting the communities participating in the pilot, evaluations of the program can help assess where further changes are needed to keep the teenage birth rate on the decline and reduce the overall incidence of unplanned pregnancies throughout the life cycle. While the long-term impact on nonmarital childbearing will be the most important metric for evaluating the effectiveness of the recommended comprehensive program, by looking at both intentions to avoid pregnancy as well as efficacy levels in following up these intentions with positive behaviors, researchers can learn more about the reasons behind trends in the future.

II. BACKGROUND: BOTH TEENAGE AND NONMARITAL BIRTHS ARE CORRELATED WITH NEGATIVE SOCIAL OUTCOMES AND REMAIN A SIGNIFICANT PROBLEM

In 2008, teenage pregnancies still accounted for 377,100 births (Hamilton et al. 2010). See Figure 1. Though the teenage birthrate has declined substantially over the last two decades, dropping from 117 births per one thousand women aged 15-19 in 1990 to 72 births in 2006, there is still significant work to be done (Guttmacher 2010).

Figure 1: Distribution of Total Unwed Births by Age of Mother

	1990		2008	
<15 years	10,700	<1%	5,700	<1%
15-19 years	350,000	30%	377,100	22%
20-24 years	403,900	35%	641,200	37%
25-29 years	230,000	20%	397,700	23%
30-34 years	118,200	10%	193,600	11%
35-39 years	44,100	4%	89,000	5%
40+ years	8,500	<1%	23,700	<1%
Total	1,165,400		1,728,000	

Table Notes:

1. Numbers rounded to the nearest hundred.
2. Table compiled by Debra Pontisso, Federal Office of Child Support Enforcement.

Sources: Hamilton BE et al. *Births: Preliminary Data for 2008, National Vital Statistics Reports, Volume 58, Number 16, April 6, 2010*; Ventura SJ and Bachrach CA. *Nonmarital childbearing in the United States, 1940-99. National Vital Statistics Reports, Volume 48, Number 16, October 18, 2000.*

Births to teenage mothers are linked to poorer outcomes for both mother and child. Teen mothers are less likely to complete high school (Maynard 1996). Of women who have their first child before age 18, only 40 percent ever graduate high school, and less than 2 percent complete college by age 30, compared to 75 percent and 9 percent, respectively, of women who delay childbearing until age 20 or 21 (National Campaign 2009). Teen mothers are also more likely to end up on welfare: approximately one-quarter of teen mothers will go on welfare within three years of the child's birth (National Campaign 2010).

In addition, the children of teenage mothers have lower birth weights, associated with poorer health (Wolfe and Perozek 1997), and they are more likely to experience cognitive development and behavior problems (Terry-Human et al. 2005). They are also at greater risk of abuse and neglect (George and Lee 1997), and are more likely to perform poorly in school and less likely to pursue higher education (Maynard 1996; Kirby 2007). Sons of teenage mothers are also more likely to become incarcerated (Kirby 2007; Maynard 1996), while daughters are more likely to become adolescent parents themselves (Kirby 2007; Maynard 1996).

While teenage pregnancy is slowly declining, the proportion of births to unmarried women has increased dramatically in recent decades, rising from 11 percent in 1970 to an estimated 41 percent in 2009 (Wildsmith 2011). Even while a large proportion of unmarried parents are living together, involved in serious romantic relationships, or both at the time of their child's birth, births outside of marriage are closely linked with childhood poverty, negative child health outcomes, and poorer educational and socioeconomic outcomes for parents (McLanahan 2010; Amato 2010).

Despite often high hopes of future marriage, continued cohabitation, or father involvement, the children of unmarried parents experience high levels of domestic instability throughout their childhoods. For example, according to the *Fragile Families and Child Wellbeing Study*, which has been following approximately 5,000 children born in large U.S. cities between 1998 and 2000, only 35 percent of unmarried parents are living together five years after the birth of their child, and less than 20 percent are married. In addition, father involvement declines over time. By the child's fifth birthday, only 50 percent of non-resident fathers have seen their child in the past month (McLanahan 2010).

There are also significant disparities in the rates of teenage and out-of-marriage births by race and ethnicity. 52 percent of Hispanic and 50 percent of African American teenage women will become pregnant before

their 20th birthday, in contrast to only 19 percent of their non-Hispanic, white peers (National Campaign 2010). African American women make up the largest share of births to unmarried mothers, with 72 percent of total births in 2008 occurring outside of marriage (Hamilton et al. 2010). Figure 2 presents a breakdown of births to unwed parents by race and ethnicity.

The negative outcomes associated with teenage and nonmarital births illustrate the urgency to improve the effectiveness of current interventions.

Figure 2: Distribution of Total Unwed Births by Race and Ethnicity of Mother

	1990		2008	
	Unwed births	% of total births	Unwed births	% of total births
Non-Hispanic White	443,000	17%	651,000	29%
Black	455,300	67%	482,300	72%
American Indian or Alaska Native	20,900	54%	32,600	66%
Asian or Pacific Islander	18,700	13%	42,900	17%
Hispanic	218,500	37%	545,900	53%

Tables Notes:

1. Numbers rounded to the nearest hundred.
2. Table compiled by Debra Pontisso, Federal Office of Child Support Enforcement.

Sources: Hamilton BE et al. Births: Preliminary Data for 2008, National Vital Statistics Reports, Volume 58, Number 16, April 6, 2010; Ventura SJ and Bachrach CA. Nonmarital childbearing in the United States, 1940-99. National Vital Statistics Reports, Volume 48, Number 16, October 18, 2000.

III. OVERVIEW: CURRENT TEENAGE SEXUAL EDUCATION PROGRAMS

There are hundreds of programs sponsored by both government and private entities to help teenagers delay sexual activity, increase effective contraceptive use, and prevent pregnancy. Some of these programs focus on non-sexual factors, from childhood development programs to welfare reform for adults. However, this paper focuses on those programs that aim to change the sexual risk and protection behaviors of teenagers. For this reason, these programs will be referred to as “sexual education programs,” since the main goal is to alter sexual behavior. Sexual education programs focus on changing psychosocial risk and protective factors such as teens’ knowledge, beliefs,

and attitudes about sex, perceived norms, their confidence in their ability to abstain from sex or to use condoms or contraception, as well as their intentions regarding sexual behavior and the use of contraception. These include curriculum-based education programs, offered as part of regular school classes or as part of after-school programs on school grounds or in community centers; service learning programs, where participants engage in direct service work; youth development programs, often combining health care, academic assistance, sex education, and extracurricular activities; parenting programs, which seek to improve parent-child communication on sex and related topics; and community-wide programs, such as public service announcements, educational activities for the community, and community-wide health fairs (National Campaign 2010).

Current curriculum-based programming can be further divided into abstinence programs, which encourage and expect young people to avoid sex, and combined programs, which generally still promote abstinence as the safest choice but also encourage the use of condoms and other contraception methods. In a review of programs by the National Campaign to Prevent Teen and Unplanned Pregnancy (National Campaign), over 40 percent of combined programs delay the initiation of sex, reduce the number of sexual partners, and increase condom or contraceptive use, and more than 60 percent reduce instances of unprotected sex. Importantly, there is no evidence that using a combined message emphasizing both abstinence and safer sex sends mixed messages; none of the comprehensive programs hastened the initiation of sex or increased the frequency of sex among participants (Kirby 2007). Promoting the delay of sexual activity as well as the use of contraception for when it does occur should be viewed as complementary rather than oppositional goals.

A comprehensive survey by the National Campaign regarding the combined results of dozens of program evaluations identified a number of common characteristics of successful teenage pregnancy prevention curricula. First, programs must have a clear message that delaying sex and using contraception consistently and carefully is the responsible thing to do, as opposed to simply laying out the pros and cons of different sexual choices (National Campaign 2010). The programs must also have a significant duration, rather than just a few weeks. In fact, programs in which reduced teen pregnancy rates persisted over time, such as the *CAS-Carrera* program, were very intensive and worked with participants over many years (Kirby 2007). These programs should address peer pressure, teach communication skills, and reflect the age, sexual experience, and culture of the participants. In addition, actively engaging participants to allow for personalization of the information is vital

Figure 3: Effective Teenage Sexual Education Programs, Evaluated Using an Experimental Design

Program Name	Setting	Selected effects
All4You! (2006)	In-school program evaluated with teens in alternative schools; the intervention also included a service learning component; urban setting	6 months after the program ended: - Program participants were 2 times more likely than those in the control group to report using a condom at last sex.
Aban Aya Youth Project (2004)	In-school and after-school youth development program for African American students grades 5–8; urban setting	At the end of the program: - 78–80% of boys in the two intervention groups used condoms compared to 65% of boys in the control group.
Becoming a Responsible Teen (1995)	After-school program for African American teens aged 14–18; urban Southern setting	1 year after the intervention: - Girls in intervention were 44% more likely than girls in control group to use condoms. - Virgins in the intervention group were 61% less likely to initiate sex than virgins in the control group.
A Theory-Based Abstinence-Only Program (2010)	After-school program (implemented on Saturdays in school classrooms) for African American teens in grades 6–7; urban setting	Among virgin participants, 2 years after baseline: - 33.5% of those in the intervention group had initiated sex compared to 48.5% of those in the control group. - Among those who had sex in the past 3 months, there was no difference in condom use between the intervention group and control group 2 years after baseline.
Be Proud! Be Responsible! (1992)	In-school or after-school program for African American boys grades 10–12; urban setting	3 months after the intervention: - Program participants reported that they did not use a condom during intercourse for 0.64 days compared to 2.38 days in the control group

Figure 3 Cont'd: Effective Teenage Sexual Education Programs, Evaluated Using an Experimental Design

Children's Aid Society (CAS)—Carrera Program (2002)	Multi-year after-school youth development program for high-risk high school students aged 13–15; urban setting	At the end of the program: - Girls in intervention group were 18% less likely to have had sex than girls in the control group; were 55% less likely to become pregnant; and were 80% more likely to use dual methods of contraception at last sex. - Males in the intervention group did not positively change sexual behavior.
iCuidate! (2006)	After-school program for Latino teens in grades 8–11; urban setting	At 3 months, 6 months, and 12 months after the program ended: - Teens in the intervention group were significantly less likely than those in the control group to have recently had sex, and to have had multiple partners (although the evaluation did not report initiation of sex). - Teens in the intervention group were significantly more likely than those in the intervention group to report consistent condom use. - The intervention was particularly effective for Spanish speaking teens. Spanish speaking teens in the intervention group were 5 times more likely than Spanish speaking teens in the control group to report using a condom at last sex.
Draw the Line/Respect the Line (2004)	In-school program for youth grades 6–8; urban setting	At 36-month follow-up: - 19% of boys in the program had sex compared to 27% in control.
Focus on Kids (1996) (packaged as Focus on Youth)	After-school program for African-American youth aged 9–15; urban setting	6 months after the intervention: - Youth in intervention were 39% more likely to have used a condom at last sex than control group.
Focus on Kids plus ImPACT (2004) (packaged as Focus on Youth plus ImPACT)	After-school program for African-American youth aged 13–16 years and their parents; urban setting	6 months after the intervention: - Participants in both the parent program and the parent program with booster sessions were more likely than those in the group without the additional parent intervention to report using a condom. - 24 months after the intervention: - Participants in the parent program were less likely than those in the group without the additional parent intervention to report getting pregnant or causing a pregnancy (those in the parent plus booster session group showed no difference).

to success. Lastly, leaders must be selected carefully, believe in the program, and receive adequate training (National Campaign 2010). Figure 3 provides a summary of some of these effective programs and their results, evaluated using experimental designs in which participants were randomly assigned to treatment and control groups over a variety of settings.

IV. REMAINING ISSUE: MANY TEENS UNDERESTIMATE THE COSTS OF PARENTHOOD

As discussed above, the most successful sexual education programs provide students with vital knowledge around sexual decision making. However, when it comes to sexual behavior and contraceptive use, there are still apparent gaps between knowledge, intent, and behavior. 88 percent of unmarried women aged 18 to 29, as well as 86 percent of their male peers, say it is important to avoid pregnancy right now. But even among these young adults wishing to avoid pregnancy, 19 percent use no contraception at all, 24 percent use contraception inconsistently, and 34 percent say it is at least slightly likely they will have unprotected sex in the near future (Kaye et al. 2009).

Kathryn Edin et al. take a closer look at efficacy, or the ability or inclination to engage in behaviors that advance one's goals (in this case, to avoid pregnancy). They divide pregnancies into several categories: planned, between planned and unplanned, and four types of unplanned pregnancies (inconsistent contraception, not using contraception, technical contraceptive failure, and those who have a reason to believe they or their partner is infertile) (Edin et al. 2007).

They find that for all categories except for unplanned pregnancies with no contraception, the stronger one's intention to avoid pregnancy, the more one's behavior follows suit. They also show that abortion is somewhat more common among those who used contraception than among those who did not (51 percent versus 43 percent), suggesting a stronger desire not to become pregnant. Additionally, they find an inverse relationship between the reported seriousness and length of relationships with condom use, possibly indicating that couples becomes less concerned about pregnancy as the relationship develops (Edin et al. 2007).

Edin et al. conclude that two parallel phenomena account for pregnancies which are not fully planned: a lack of efficacy with regard to effective contraception, as well as a "high social value of children and lack of perceived opportunity costs associated with having them young." Sexual education programs often concentrate on the first of these processes and may not give enough attention to the second, making the base assumption

that teenagers intend to avoid pregnancy. In fact, they show that efficacy may not be as low as we think, while the intention to avoid pregnancy may be lower than expected: in other words, many of the pregnancies assumed to be entirely unplanned may not be.

The seemingly low efficacy exhibited by young adults in the National Campaign survey can also be at least partially explained by ambiguous intentions. The study finds that 45 percent of 18 to 19 year-old women and 30 percent of 18 to 19 year-old men agree that, "if things were different in my life, I would love to have a baby now." Even among the teenagers who report that it is important for them to avoid pregnancy right now, 34 percent of men and 16 percent of women say they would be pleased if they found out today that they or their partner were pregnant (Kaye et al. 2009). These statistics seem to indicate that teenagers and young adults may underestimate the potential consequences of having a child too young or outside of a stable relationship. This supports the need for a comprehensive program which can assist teenagers in thinking through under what circumstances they would wish to start a family in the future.

Cognitive Theory as it Pertains to Family Formation Intentions

Psychological theory provides an explanation of the complexities that arise when people evaluate the inter-temporal costs and benefits of a decision. Teenagers and young adults participating in sexual education programs may suffer from cognitive biases which lower their efficacy. For instance, they may have difficulty assigning an accurate discount rate to the delayed future benefits associated with avoiding teenage parenthood. This may be because they have biased expectations of the risks of their actions and/or overvalue the future benefits and undervalue the future costs of parenthood through hyperbolic discounting. Misperceptions about the future can occur in two ways: (1) underestimating the *risk* of incurring a loss in the future, and (2) undervaluing the magnitude of those future losses. Sexually active teenagers may commit both of these errors. First, they optimistically (or naively) believe that they can have unsafe sex without conceiving a child. Second, they fail to comprehend what they will lose by becoming a teen parent. In both cases, the assessment of future costs and benefits skews the inter-temporal decision-making process, making it less likely that the teenager chooses to abstain from or practice safe sex.

V. HOW TO SHIFT PERCEPTIONS OF PARENTHOOD: CHILD SUPPORT EDUCATION PROGRAMS

Along with the OAH, the Office of Child Support Enforcement (OSCE) has a vested interest in reducing the number of births to teenage and unwed parents who may not be fully prepared for the responsibilities of parenthood. Child support caseloads increased steadily along with non-marital birth rates. For example, in six states in 2007 (Connecticut, Iowa, Michigan, New Hampshire, Virginia, and Texas), over half of the child support caseloads were unwed parents (Pontisso 2010).

In addition to its main tasks to locate parents, establish paternity, and institute and enforce child support orders, the OSCE has begun to provide additional family support programming. While OSCE's enforcement strategies currently work well for about 75 percent of the parents in their caseload, these additional supports are designed to further increase the rate of payment of child support obligations (Turetsky 2010). This strategy includes programming aimed at preventing the need for child support enforcement by reducing the nonmarital birth rate, as well as five other areas: engaging fathers in the parenting process from the birth of their first child, promoting family economic stability, helping men and women form and maintain healthy families, ensuring that families have good health care coverage, and preventing and reducing family violence.

Several promising programs were developed by, or in collaboration with, state child support enforcement offices to support these efforts. These programs raise awareness of the financial, legal, and emotional responsibilities of parenthood with the aim to reduce demand for OSCE services. Three successful models will be discussed: the *Parenting and Paternity Awareness (P.A.P.A.)* and *No Kidding* programs developed by the Texas Office of the Attorney General, Child Support Division (OAG); and *Dads Make A Difference*, designed in collaboration with the Ramsey County (MN) Attorney's Office, Child Support and Collections.

It is important to note that these initial results do not definitively show behavior change or a reduction in teenage pregnancy rates among participants – only changes in knowledge and attitudes. In addition, since all three studies use pre- and post-test assessments to gauge improvements (an admittedly imperfect device for assessing genuine attitude changes or testing the likelihood that newly acquired knowledge will be applied in the future), their policy implications may be limited.

However, changes in participant attitudes are important to track, just as changes in knowledge on how to avoid pregnancy are tracked for sexual

education programs. This distinction can help to advance target interventions in the future by allowing researchers to better identify the causes of teenage and nonmarital births in a given community, whether they are due to apathy toward avoiding parenthood, low knowledge of how to avoid pregnancy or the responsibilities of parenting, or a combination of these. The results from these innovative programs do demonstrate evidence of a shift in attitudes about responsible parenting.

Parenting and Paternity Awareness (P.A.P.A.)

Parenting and Paternity Awareness (P.A.P.A.) is a school-based curriculum that aims to teach students about the rights and responsibilities of parenthood and paternity establishment, the consequences of becoming a parent, and the elements of a healthy relationship. The program was developed in the 1980s by the Texas Attorney General's Child Support Division and now consists of 14 stand-alone units to be taught over the course of an academic semester. During the 2008-2009 and 2009-2010 school years alone, more than a half-million Texas students participated in the program (USA Today 2010).

A comprehensive evaluation of the P.A.P.A. program, led by Lyndon B. Johnson School of Public Affairs Professor Cynthia Osborne, surveyed 9,539 students from a representative sample of 50 Texas high schools. The results suggest that this type of child support prevention programming can fill some of the gaps left by traditional sexual education programs.

Based on pre- and post-intervention surveys, the number of students reporting plans to have a child at an earlier age than the age they plan to get married declined by 21 percent. The number of students who could correctly identify the average cost per month to raise a child in Texas increased by 62 percent; the number who knew the percent of net income that a noncustodial parent generally pays in child support increased by 46 percent; and the number who knew the legal methods to establish paternity increased by 23 percent. In addition, after P.A.P.A., more than twice as many students knew that an unmarried biological father does not have the same legal rights and obligations as the mother; students were more likely to report that they would establish legal paternity if they have a child outside of marriage; and students were more likely to agree that "it is important for a child to have two actively involved parents, even if the parents do not live together" (Osborne 2010). Figure 4 provides a summary of selected pre- and post-test student responses.

Figure 4: Selected Changes in Students' Knowledge from P.A.P.A. Pre- to Post-Assessment

Question (answer)	Pre-Test Correct	Post-Test Correct	% Change
If parents separate or divorce, their children will benefit if they: (Work together as a team to keep the child out of arguments)	83.5%	89.3%	6.9%*
A noncustodial parent who stops paying court-ordered child support can have his/her IRS tax refund or lottery winnings taken away or withheld. (True)	80.3%	89.7%	11.7%*
Which of the following is a warning sign of a potentially abusive or violent relationship? (Jealous because he/she loves you so much)	73.2%	79.7%	8.9%*
A noncustodial parent who stops paying court-ordered child support can have his/her driver's license suspended. (True)	67.4%	84.4%	25.2%*
There are three pathways to establish legal paternity for a child born to unmarried parents. Which of the following is NOT a pathway? (Give the baby the father's last name)	58.9%	72.5%	23.1%*
In most cases, what percentage of the noncustodial parent's net income would be paid in child support for one child? (20%)	43.1%	62.9%	45.9%*
When a child is born to unmarried parents, the biological father automatically has the same legal rights and responsibilities as the biological mother. (False)	25.9%	53.1%	105%*
The average additional cost per month for an adult to take care of a child (childcare, diapers, food, housing, medical care, clothing) in the state of Texas is: (Over \$700 per month)	16.9%	27.3%	61.5%*

Table Notes:

1. Selected scores listed from highest to lowest correct response on pre test.

2. *Indicates post-test and pre-test scores differ significantly at the $p < .05$ level. $N = 5,730$.

Source: Osborne, Cynthia (2010). *Evaluation of the Parenting and Paternity Awareness Curriculum: Final Report 2008 – 2010*. LBJ School of Public Affairs, University of Texas at Austin.

There were also important racial and ethnic differences in the perceived consequences of becoming, or getting a partner, pregnant. The average score on P.A.P.A. pre-tests was 74 percent for white students, compared to 69 percent for black students and 67 percent for Hispanic students (Osborne 2010). In their study, Sonenstein et al. noted some additional nuances: white males are less likely to anticipate having to provide financial support for a child, while black males generally have less negative reactions to the possibility of a pregnancy in the near future (Sonenstein et al. 2004).

That white students, as well as students in more advantaged schools, scored significantly higher on the P.A.P.A.'s pre-assessments may indicate that minority students have the most to gain from such programming. However, gains in knowledge were slightly but significantly higher for white boys as compared to black and Hispanic boys. The average score on the pre- and post-assessments increased by 12.2 percent for white male students, compared to increases of 9.9 percent and 11.8 percent for Hispanic and black male students, respectively. For girls, there were no significant differences in knowledge gains by race or ethnicity (Osborne 2010). More research is needed to fully understand the reasons behind these differences, but as discussed in more detail in the recommendation section, OAH and OCSE must work to ensure equal effectiveness of their programs across racial and ethnic groups.

No Kidding: Straight Talk from Teen Parents

In 2004, the Texas Office of the Attorney General also began a peer education program, *No Kidding: Straight Talk from Teen Parents*, in which teenage parents host interactive sessions with middle and high school students, encouraging them to delay parenthood. The program's goal is to increase participants' knowledge of paternity and child support, positive perceptions of establishing paternity, and understanding of the time and maturity necessary to be a successful parent. By the 2007 school year, *No Kidding* served 7,596 students and nearly 200 community members throughout six Texas school districts and other community organizations (LaTurner 2007).

Students showed significant knowledge gains about establishing paternity and child support, as well as regarding how the OCSE can assist people on these issues. Student attitudes about the responsibilities and realities

of parenting also shifted significantly; more acknowledged the difficulties they would face as a parent financially and in pursuing education goals (LaTurner 2007). See Figure 5.

Figure 5: No Kidding: Changes in Students' Attitudes Related to Parenting and Paternity Pre- to Post-Program, 2006-2007

	% Pre-Program	% Post-Program	Percent Change
It is easier for parents in their 20s, 30s, and 40s to care for their children than it is for teen parents	82.9%	87.3%	4.4%
It is very important to be married before having children.	60.8%	77.5%	16.7%***
Having a baby can negatively affect a couple's relationship.	49.6%	63.3%	13.7%***
Parenting involves a great deal of commitment and time.	86.2%	92.3%	6.1%**
If I was not married and had a child, I would do everything possible to establish paternity for my child.	65.1%	84.3%	19.2%***
If the parents are not married, a child can still have a very close and meaningful relationship with both of his or her parents	68.7%	80.1%	11.4%***
I could/can afford to raise a baby as a teenager.†	64.3%	71.2%	6.9%*
I could/can easily raise a child and continue my education.†	59.8%	68.2%	8.4%**
Being a teen parent would/does make me more important with my friends.†	59.2%	66.4%	7.2%*

†For the last three statements only, the percentage shown marks the number of students who DISAGREE with the statements. For all others, the percentage shown represents the students who AGREE with the statements.

Table Notes:

1. *Indicates post test and pre test scores differ significantly at the $p < .1$ level, ** $p < .05$ level, *** $p < .01$ level, N=660.

Source: LaTurner, R. Jason (2007). *NoKidding: Straight Talk from Teen Parents: End of Year Report 2006-2007*. Shore Research, Inc.

Dads Make a Difference (DMAD)

The *Dads Make a Difference* (DMAD) program began in Minnesota in

1993 as a collaborative effort between the Ramsey County Attorney's Office of Child Support and Collections and three other agencies. The program is designed to teach young people about the importance of a father's presence in a child's life, and the legal, financial, and emotional responsibilities of parenting. Since 1994, DMAD has trained 2,773 teen peer educators from 162 schools and agencies, and these educators have taught an estimated 62,000 middle-school-aged youth in schools, agencies, faith-based organizations, and juvenile detention settings statewide.

Pre- and post-tests from teen trainings indicated that after the program, the percentage of teenagers who reported that they would be emotionally and financially ready to support a child at age 27 or above significantly increased from 20 percent to 37 percent, and the number of teenagers who indicated age 23 or younger decreased from 25 percent to just 11 percent. The middle school students participating in the program also experienced measurable results, with significantly better scores in areas like identifying risks, as well as knowledge of child support and legal fatherhood on the post-program assessment compared to pre-program (Dads Make a Difference 2001a). See Figure 6. In sum, these initiatives were associated with shifts in participant attitudes, away from teenage and nonmarital pregnancy, and with increases in knowledge about the consequences and responsibilities of parenting.

Figure 6: Dads Make a Difference: Change in Middle School Student Knowledge in All Areas, Pre- to Post-Assessment

	Pre-test	Post-test	% Change
Identifying Risk	44%	62%	18%*
Knowledge of child support	67%	79%	12%*
Knowledge of legal fatherhood	49%	60%	11%*
Attitudes about too early parenting, paternity and dads	62%	71%	9%*
Projected age student will be ready to have a child > 18	90%	95%	5%*
Identifying benefits of legal fatherhood	37%	40%	3%
Defining "Dad"	74%	75%	1%

Tables Notes:

1. Numbers rounded to the nearest percent.
2. *Indicates post test and pre test scores differ significantly at the $p < .05$ level. N=434.

Sources: *Dads Make a Difference* (2001a). *Dads Make a Difference: Evaluation of Middle School Students*. Professional Data Analysts, Inc.

Child Support Incentives by Gender

Research by Plotnick et al. demonstrates that stricter child support enforcement may reduce unwed childbearing, presumably by raising the costs of fatherhood (2007). In fact, economic theory tells us that stronger child support enforcement increases the costs of nonmarital childbearing for males but reduces the costs for females, since the economic and legal burden for parenthood is shifted towards males.

However, the evaluations of the reviewed child support education programs indicate that boys and girls are similarly impacted by the interventions. One possible explanation is that child support enforcement does not lower the costs of nonmarital births for women receiving TANF benefits since the child support collected would go to the state as reimbursement. Given the high rates of cash assistance among teenage mothers, this may play an important role.

VI. RECOMMENDATION: PROVIDE A COMPREHENSIVE TEENAGE PREGNANCY PREVENTION CURRICULUM WITH SEXUAL EDUCATION AND CHILD SUPPORT EDUCATION COMPONENTS

Both teenage sexual education and child support education are key components of a comprehensive curriculum to empower young people to make smart decisions with respect to starting a family. Child support education focuses on the 'why' of pregnancy prevention, strengthening intentions regarding the delay of parenthood. At the same time, sexual education programming provides information on the 'how', increasing student efficacy in pursuit of this goal.

While the stated goal of child support education programs is to alter the behavior of young adults once they become parents, there is also reason to believe that such interventions can play a role in reducing teenage and out-of-marriage pregnancy rates. For example, Sonenstein, Pleck, and Ku find that adolescent males are more likely to modify their sexual behavior and contraceptive use when they have greater knowledge about paternity establishment, since it raises the perceived costs of childbearing, and it creates and reinforces community expectations that nonmarital births should be discouraged (1994). And while the proposed program would focus on teenagers, lessons learned about the consequences and requirements of successful parenthood would be useful into adulthood.

Timing Comprehensive Program Implementation

According to Rebecca Turnbow, P.A.P.A. Program Coordinator, teachers

report that the child support enforcement curriculum is more effective with students who have been exposed to sex education previously. For this reason, a comprehensive program should begin with the basic principles of sex education, and then incorporate elements from child support education as the semester or school year progresses. The comprehensive pregnancy prevention program could also be introduced to students who have already had some exposure to sex education.

Since the goal of a comprehensive program is pregnancy prevention, ideally students would receive the program as they begin to face social pressures and make choices regarding their sexual behavior. This starts well before high school: 6 percent of high school students report the first time they had sex was prior to age 13 (National Campaign 2010). However, depending on school policies, parental permission to participate in the program may be hard to obtain for younger grades, causing some students to not participate. In addition, some of the curriculum's topics, particularly the more complex legal elements, may not be understood or absorbed by younger students as readily. In fact, even high school teachers have given feedback that some of the material is too complex, with nearly 25 percent of teachers omitting at least some aspects of the curriculum they deemed too complex for themselves and their students (Osborne 2010).

In high schools, on average, 46 percent of students have had sex, and 34 percent are currently sexually active.⁵ Some students have had a friend or family member who became pregnant as a teenager (National Campaign 2009). This makes high school an important juncture for reaching students. In addition to the pregnancy prevention effects, the child support education curriculum is more likely to have an impact on parenting behavior since students are more likely to recall lessons from high school, rather than middle school, if and when they eventually become parents. While a mandatory program can be hard to fit into already tight high school class schedules, all things considered, high school may be the most appropriate time for a comprehensive program.

While older teens may be outside the scope of traditional school-based teen pregnancy prevention programs, workforce, community college, or social service programs for older teens and young adults are also likely to have significant impacts on early nonmarital childbearing. 66 percent of births to teenage women are to 18 and 19 year-olds, suggesting that young adults in this age range should continue to receive pregnancy prevention and child support education or reinforcement (National Campaign 2010).

Recommended Reach of Comprehensive Program

To achieve the greatest reductions in teenage and nonmarital birth rates, a mandatory program is recommended to be incorporated into health curricula. Before P.A.P.A. became mandatory in Texas, many schools added the curriculum to Home Economics courses, which tended to be heavily skewed towards young women (Turnbow 2010). By placing the curriculum in health classes instead, both genders can be reached. P.A.P.A. is an example of a program design that coincided with knowledge increases across the genders: although female participants generally had higher baseline pre-assessment scores, boys and girls demonstrated comparable increases in knowledge from the curriculum (Osbourne 2010). A co-educational curriculum may have additional benefits, as it allows for conversations to develop around parenting issues and fosters understanding of the unique challenges faced by each parent.

The gender of the instructor may also matter. Health education, often paired with physical education, tends to have significantly more male teachers than other subjects. For example, in 2010, 50 percent of high school physical education and health teachers in Texas were male, compared to only 22 percent across all subjects (TPEIR 2010). Teenage boys may be more likely to accept messages from a male teacher, and this also sends the message that preventing pregnancies is a joint task shared by both partners.

Racial and Ethnic Disparities

While more information is needed to fully understand the disparity in knowledge gains by race and ethnicity, OSCE should ensure that the ways in which a child support education curriculum is taught does not contribute to these disparities. The most recent evaluation found that 70 percent of P.A.P.A. teachers modified the curriculum in some way to fit their class schedules and existing health curriculum, but also because many find the legal aspects of the curriculum too complex. As noted earlier, 25 percent of teachers omitted some aspects of the curriculum altogether due to perceived complexity. This directly impacts students' comprehension, as student knowledge is lowest in the areas that are the least familiar to teachers (i.e., establishing paternity).

It is necessary to adapt the curriculum to meet the varying needs of the communities being served. In fact, Jan Hayne, Executive Director of Dads Make a Difference, also stressed the importance of tweaking and modifying the DMAD curriculum to fit different educational settings (Region V Collaboration Call 2010). However, if components of the curriculum are regularly left out, the intervention will not have its desired effects

and could be disproportionately affecting racial and ethnic minorities. Additional training and guidance at a local level should be provided to teachers and trainers to ensure that all students benefit from the program, and to work towards reducing the racial and ethnic disparities in teenage and out-of-marriage birth rates over time.

Comprehensive Program Evaluation

Evaluations of such a comprehensive program should strive to be primarily outcome-based, versus knowledge acquisition-based, measuring the change in pregnancy rates over time in communities implementing the program. In reality, however, it can often be difficult to measure direct outcomes, and nearly impossible to show direct causality from the program to reduced pregnancy rates for a community. Lacking community-level outcome data, programs should collect information on changes in student behaviors based on a random assignment evaluation. In addition, the program should measure student attitudes towards parenthood and knowledge on methods to avoid pregnancy (such as contraceptive use). However, evaluations should be careful not to focus on any one individual attitudinal variable, but instead look across variables to better understand the intentions of students.

These metrics will not only help program managers evaluate the effectiveness of programs where outcome data is unavailable, it will also help decision makers pinpoint where further improvements can be made. Apathy toward avoiding parenthood at a young age may point to a greater need for effective intentions-based programming, while low knowledge of how to avoid pregnancy may indicate room for improvement in the sexual education curriculum. These two factors together should result in a reduction in risky sexual behaviors and a real decrease in teen pregnancy rates. However, if efficacy scores remain low—indicating a large gap between intentions to avoid pregnancy and behaviors to follow up on this goal despite awareness of prevention techniques—further examination should be pursued to pinpoint the breakdown in this process of behavioral change.

VII. CONCLUSION

Teenage and nonmarital births are correlated with negative social outcomes and remain a significant problem in the United States. Many sexual education programs have been developed to change participants' behavior regarding sexual risk and protection by increasing their knowledge of how to both delay sexual activity and effectively use contraception when it does occur.

Additional progress can be made in preventing teenage pregnancies, as

well as nonmarital births later on, by focusing on the responsibilities associated with parenthood. This theory is supported by evidence suggesting that many unmarried young adults are uninformed about the emotional, financial, and legal consequences of parenthood, leading to ambivalence surrounding becoming a young parent.

The Office of Adolescent Health should run a pilot comprehensive teenage pregnancy prevention curriculum, featuring both sexual education and child support education components, in the form of a mandatory high school program incorporated into existing health classes. Such a combined program has the potential to not only further reduce teenage pregnancy rates, but also to affect the nonmarital birth rate more generally, as students learn lifelong decision-making skills regarding when and why to start a family. In addition, evaluations of the program based on random assignment can help to assess where further changes are needed to keep the teenage birth rate on the decline, by looking both at intentions to avoid pregnancy, as well as students' efficacy levels in following up these intentions with positive behaviors. Such a program, teaching students both the 'why' and the 'how' of pregnancy prevention, will provide participating young adults with the tools necessary to make informed family planning decisions for years to come.

NOTES

- ¹ The reader should note that there is also a large body of literature which challenges the idea that teen childbearing has a causal effect on child outcomes, instead arguing that poor outcomes for teenage mothers are a result of poverty – not of having a child at a young age.
- ² The authors attempt to exclude “user error” from this category, though those who said that they forgot to take the pill or buy condoms were sometimes put in the “inconsistent contraception” category.
- ³ Establishing paternity is the process of determining the legal father of a child, which, unlike for married parents, is not an automatic process.
- ⁴ Of these randomly selected students, 1,787 completed only a pretest, 1,712 completed only a post assessment, and 310 students did not have complete data on either assessment. Student attrition from the evaluation process was based largely on teachers leaving the study or not teaching the P.A.P.A. curriculum in the semester, rather than individual student attrition.
- ⁵ One important limitation of the data is that they are limited to youth in high school and do not include students who have dropped out or were absent from school on the day of the survey, so the overall rates for high school-aged teenagers may actually be higher than estimated.

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3

DEVOLUTIONARY POLITICS IN SOMALIA: PROSPECTS FOR PEACEKEEPING, PEACEBUILDING, AND DEVELOPMENT

Matthew Hoisington

No centralized government has existed in Somalia since the fall of the Siad Barre regime in 1991. Many policy makers see the country as hopeless and ungovernable, but, since 1991, a number of devolved mechanisms and institutions, including cross-clan collaborations, regional groupings, ideological federations, and business alliances have emerged to close the governance gap. These informal, local types of governance present unique opportunities for peacekeeping, peacebuilding, and development, as well as the eradication of pernicious spoilers such as the armed Islamic group al Shabaab and the making of a new Somali political constitution. To capture these possibilities, the international community should embrace the politics of devolution and tailor its policies to fit the complex, fragmented, and interdependent reality of Somali society.

Channeling Thomas Hobbes' vision of the state of nature, the prevailing view depicts life in Somalia as nasty, brutish, and short. The facts are

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overwhelming. For the fifth year in a row, the country has topped *Foreign Policy* magazine's "Failed States Index" (Foreign Policy Online 2012). No effective national government has existed since the fall of Muhammed Siad Barre's regime in 1991. Persistent conflict has displaced more than 1.5 million people and resulted in an additional 800,000 refugees (Internal Displacement Monitoring Centre 2011). Life expectancy is among the lowest in the world. Famine and drought wreak havoc throughout the countryside. The toll on Somalis from hunger and violence in the last twenty years is staggering: between 450,000 and 1.5 million have died (Norris and Bruton 2011). The economy is in tatters with an average GDP of only \$600 per capita (CIA World Factbook 2011). Proliferation and nonexistent law enforcement have precipitated the rise of dangerous armed groups such as al Shabaab, Hizbul-Islam, and al Qaeda. In the absence of a functioning economy, pirates operate unfettered, tormenting both the population and international waters in search of sustenance. It is T.S. Eliot's *Waste Land* meets Mad Max's *Thunderdome*.

In the midst of the chaos, suffering, and violence, international engagement has focused almost exclusively on reviving the central government (ICG 2011). Despite international sponsors' combined expenditure of more than \$55 billion dollars (Norris and Bruton 2011), thirteen separate incarnations of a central government have ended in failure. The latest, the Transitional Federal Government (TFG), which was created through protracted international mediation brokered by the Intergovernmental Authority for Development (IGAD)—a consortium of East African states committed to regional cooperation—and the United Nations (UN) in Nairobi from 2002 to 2004, currently teeters on the edge of another downfall. These repeated attempts have foundered due to poor design and corrupt execution, leaving the population deeply distrustful of national government. The time has come for more enlightened perspectives. In order to provide security, stability, and development in Somalia, the international community must move beyond its stale centralization policies and embrace alternative approaches. In short, it must accept the politics of devolution and facilitate a transfer of powers from central governing institutions to local and informal actors.

Current efforts aimed at the provision of governance in Somalia reflect antiquated notions of how to engineer stable political and economic communities. By coupling compulsory political organization with centralized government, the international community perpetuates its failed policies of the past and underappreciates modern perspectives on governance and institution building. These modern perspectives include fresh ideas on

devolution, which refers to the distribution (or redistribution) of authority from centralized to local governments. The possibilities for such systems are limitless, bounded only by each community's vision for its collective future. While difficult to implement effectively, especially given the perils of Somalia's fragmented political landscape, devolution offers a closer match to the real distribution of political power within the country. It also shifts the discussion toward the building-up of viable political processes at the local level, which have a much greater impact on the daily life of Somalis, and away from the delusions of centralized governance that have dominated policy-making to date.

Somalia serves as a case study for both the failures of centralized government and the possibilities of alternative forms. Since 1991, a number of mechanisms and institutions, including cross-clan collaborations, regional groupings, ideological federations, and business alliances have emerged to close the governance gap left by the absence of a centralized government. Precipitated by necessity yet closely linked to the underlying sociological characteristics of the region, these various local and informal actors have combined to create a complicated yet resilient mosaic of overlapping governmental authority. Somalia today is not *ungoverned*, as is commonly purported. Rather it is *alternatively governed* in unique and constructive ways.

Somalia's informal systems of governance have generally been accorded little to no role in external efforts to revive the Somali political landscape (Menkhaus 2007). The UN Political Office for Somalia (UNOPS), for instance, has continuously pursued a policy emphasizing the importance of national government. In his recent reports on Somalia to the UN Security Council, the Secretary-General has reiterated the importance of "assisting the TFG in consolidating its authority" (UN Security Council 2011). In his own words, the strategy of the international community since 2008 has been to support the TFG in completing the tasks needed to end the transition, notably finalization of a constitution; to assist the TFG to broaden the base of the peace process through outreach and reconciliation; and to support the development of basic state governance and institutions, especially in the security sector (UN Security Council 2012a). By acting as a *de facto* military for the TFG, the African Union (AU) Mission in Somalia (AMISOM) also perpetuates the idea that governance structures in Somalia must adhere to the tenets of centralization. The recent increase of AMISOM troops authorized by the UN Security Council only propagates the myth of TFG power (UN Security Council 2012b).

These kinds of policies run counter to the realities of Somali society.

The TFG would control no territory at all were it not for extensive and continuous counterinsurgency action carried out by AMISOM forces against al Shabaab, an armed Islamic fundamentalist group with links to al Qaeda. By artificially propping up the TFG, both the AU and the UN exaggerate form at the expense of substance. The long-term implication of such misaligned strategies is the continuation of the present cycle—another failure of centralized governance and more suffering for the Somali people. While challenges to devolution exist, including finding ways to counter pernicious local governance authorities such as al Shabaab, Hizbul-Islam—another Islamic fundamentalist group that has fought the TFG in the past—and other "spoilers" (Stedman 1997), it is by identifying, leveraging, enfranchising or disenfranchising, and "responsibilizing"¹ constructive forms of local governance that the international community will best assist in stabilizing and developing Somalia.

I. DEVOLUTION AND THE POLITICAL CULTURE OF SOMALIA

Devolution is characterized by the transfer of powers from the central government to local and even informal political units. While the process generally fits within a "top-down" conception of governance, the principles that it enshrines, including subsidiarity and local responsibility, might also function within a "bottom-up" system. For example, under the top-down variant of devolution, the central government would retain overall legal control (*e.g.* equal protection under the laws, voting eligibility, allocating authority to raise revenue, ensuring general law and order, and regulating fraud and corruption) and the authority to alter local government powers, but local entities would have substantial authority to hire, fire, tax, contract, expend, invest, plan, set priorities, and deliver the services they choose (Wunsch 1998). In a bottom-up form of devolution, local and informal actors might hold all legal authority and forgo centralized leadership altogether. The latter is more likely to succeed in Somalia because of the "uncentralized" political mindset of most Somalis (LSE 1995).

It should be noted that devolution does not equate with decentralization, although the two concepts are related. According to its foundational document, the Transitional Federal Charter (TFC), the TFG is a "decentralised system of administration based on federalism" (Somali Transitional Charter 2004), but in function it favors centralized institutions and the consolidation of power in the hands of the elite. Decentralization enables this kind of "recentralization" (Wunsch 2001) because, unlike devolu-

tion, it envisions local entities acting largely as local agents of the central government rather than as quasi-independent actors. Such a system only operates to the extent that centralized institutions are willing to relinquish power. Decentralization enables power-hungry central actors to retain and retract authority because it envisions them as the orchestrators of the process. In contrast, a devolutionary process places central and local actors in a multi-level governance partnership with one another, thus limiting the power disparity between them.

The key to understanding the prospects for devolution in Somalia lies in appreciating the factors that motivate the Somali conception of political organization, namely kinship and its specific kind of social contract (Gundel 2006; Mohamed 2007; Lewis 1961). The Somali kinship structure is premised on agnatic (patrilineal) lineage, or clans. There are approximately 100 clans for the five million people in Somalia, though the size and power of each clan varies considerably. All clans belong to a clan family, which consists of related clans and represents the highest level of political solidarity within the Somali nation or ethnic group. There are six major clan families that fall into two groups, the agro-pastoral (*Digil* and *Rahanweyn*) and the nomadic (*Hawiye*, *Dir*, *Isaq* and *Darood*). While clanship represents the first principle of Somali politics, such allegiance is “imaginary” absent the rules of order (Mohamed 2007). The foremost ordering mechanism, and the most important level of social organization for each individual, is the *mag-paying*² (or blood payment) group, which is premised on lineal sub-sets within each clan. Members of a *mag-paying* group pay and receive damages in concert for death or injuries sustained or inflicted by a member of the group. All Somali men belong to a *mag-paying* group, and their social and political relations are defined by contracts (customary laws or *xeer*) that are entered into within and between *mag-paying* groups (Gundel 2006).³

The juridical-political operational structures of the clans are also indispensable to an understanding of Somali attitudes toward governance. Disputes that arise between members of the same *mag-paying* group are taken before a *shir*, an open council administered by *xeer beegti* (or wise judges) who are selected for their legal expertise. The *shir* represents the most important institution of governance in the Somali pastoral society, and, in addition to serving as the venue for mediating disputes, it is also the place where groups take decisions on war and peace, debate political issues, and alter existing contracts (Lewis 1961; van Notten 2005; Gundel 2006). Next to the *shir*, the *Gurrti* serves as the governing body of the clan, consisting of elders (or *odayaal*) from the various social units that

make up a given community. Its responsibilities include nominating heads of the *mag-paying* groups, called *aqiil*,⁴ who lead the *mag-paying* groups and function as decision-makers, judges, and conflict-mediators for their fellow clan members (Gundel 2006). Operating above the *aqiil* at the level of the clan-family are the clan-heads, known as *Suldaan* in Somaliland, and referred to as *Issim* in Puntland and *Duub* in south central Somalia⁵ (Gundel 2006). They are also selected by the *Guurti* through a decision called *Guurti Ka Hadh* (a decision no one can deny). As the “corporate political head” of the clan, the *Suldaan* exercise considerable authority (Gundel 2006). They are the most important conflict mediators in inter- and intra-clan relations, and their status makes them *biri-mageydo* (untouchable) during periods of armed conflict (Lewis 1961).

In this very fluid social order there are no completely stable political units, and substantial overlap and redundancy exists. Nevertheless, the Somali people adhere to the rules created by this social structure and since the collapse of the Somali state, the clan system as a whole has been indispensable in creating a modicum of peace, security, and order among the population. For example, during the 1990s traditional structures formed the basis for the emergence of Somaliland and Puntland, two autonomous sub-regions in Somalia, as self-sufficient political units (Gundel 2006). In the south and central areas of Somalia clan leaders have also attempted to establish new administrations premised on traditional structures. Unlike their northern counterparts, however, their efforts have been frustrated by a precarious security situation, typified by warlordism and the rise of al Shabaab, as well as the disruptive effects of the large-scale international intervention projects aimed at reestablishing the centralized state in Mogadishu (Gundel 2006).

Clans present two paradoxes to governance that are particularly relevant to peacekeeping and peacebuilding. First, the majority of armed conflicts in Somalia have been fought along clan lines, yet their engagement also offers the best chance for peace and reconciliation. *Suldaan*, *aqiil*, and *xeer beegti* serve as multi-level conflict mediators; *xeer* provides a basis for negotiated settlements; and *mag-paying* groups deter killing by increasing its costs. Al Shabaab’s insurgency against the TFG and the group’s interaction with the clans clearly illustrates this paradox. Al Shabaab is composed mostly of members of the *Hawiye* clan family, but, in the south and central portions of the country, opportunistic clan elders from other families who are bent on expanding their own powers have also cooperated with al Shabaab. This has enabled the group to expand its footprint and influence in Somalia with a relatively small fighting force of only several thousand

fighters. However, because it is self-serving, such support is also precarious. It will last only as long as al Shabaab remains influential. The number of hardcore ideological believers within al Shabaab's ranks is estimated to be only 300 to 800 individuals out of a group of several thousand (Hanson 2011). By generating political empowerment through the implementation of a devolved system of governance, rather than asking clans to ally with the TFG and then relying on the centralized government to enfranchise them, the international community may be able to incentivize the non-ideologically aligned, non-*Hawiye* members of al Shabaab to take part in the legitimate construction of a Somali polity, thus undercutting the armed group's operational basis of support.

Second, despite internal organization, clans are highly resistant to exogenous control and centralized governance. In this "nation of poets" (Samatar 1996), the Somali preference for individualism and unilateral action is reflected in the following proverb:

I and Somalia against the world. I and my clan against Somalia.
I and my family against the clan. I and my brother against the family. I against my brother.

This kind of sentiment helps to explain why efforts at centralized governance have failed repeatedly in Somalia. Individual freedom is closely guarded and it is not something that Somalis forfeit lightly. The imposition of governance from outside of Somalia has been anathema to the Somali conception of individual, localized empowerment. Moreover, because TFG officials gained their positions through international negotiations, rather than local elections, Somalis have never had a chance to participate in the government's formation. This disconnect was exacerbated by the TFG's inability to convene on Somali territory until 2006. Its failure to garner political legitimacy among the local population has placed the TFG at real risk of collapsing without ever emerging out of the transitional phase.

As a result of these shortcomings, as well as the continued battle against al Shabaab and Hizbul-Islam in the south and central portions of Somalia, the TFG most resembles the government of a city-state with the capital, Mogadishu, as its only area of effective control. Instead of serving as the nucleus for what may one day become an effective central government, the TFG should be seen as one potential player among many in the constellation of Somali governance. Equal and persistent attention must also be paid to the local and informal entities, such as clans, *mag*-paying groups, *aqiil* and *Suldaan* that organize daily life for Somalis. By reimagining what is possible in terms of structures outside of the centralized state, the vari-

ous mechanisms and institutions of governance can be stitched together in novel ways that are both more appropriate and more effective for the Somali population.

II. DEVOLUTIONARY THEORIES OF GOVERNANCE FOR SOMALIA

Devolutionary theories of governance for Somalia are not new, but they remain underappreciated and under-implemented. Writing in 1995, a group of scholars from the London School of Economics and Political Science (LSE), led by I.M. Lewis and James Mayall, offered four models of "decentralised constitutional government" that would be most appropriate for Somalis: a confederation; a federation; a decentralised unitary state with strong guarantees of local or regional autonomy; and a consociational, non-territorially-based form of decentralization premised on power sharing. A confederation is a union of independent sovereign units which nonetheless agree to join together for certain purposes to create common institutions to manage their common affairs. Over time, it may evolve into either a federation or a decentralized unitary state. A federation is an association of states that agree to form a union under a federal government while retaining full control over their own internal affairs. The decentralized unitary state, meanwhile, envisions a sovereign central government that for reasons of administrative convenience and political legitimacy transfers many of its powers to regional and local authorities. Finally, a consociational model involves non-territorial power sharing among all important communities within a state (*e.g.* clans, *mag*-paying groups, etc.). They generally have four key features: executive power sharing; proportional representation in all public institutions; community self-government; and veto powers for minorities (LSE 1995).

The LSE report concluded with a "menu of options" outlining the advantages and disadvantages of each approach. It also considered a final form of governance with the highest degree of decentralization, which the authors called functional cooperation. This form could exist "without the creation of formal state machinery at all" because it relies upon cooperative arrangements that could work without reference to political authority (LSE 1995). *Xeer* represents one example of functional cooperation that already exists in Somali society. Additional functional arrangements could be constructed between clans or *mag*-paying groups on the basis of shared interests. For instance, nomadic pastoralists might create land and water use agencies, while coastal groups could agree on oversight for fisheries

and enlist *Saldaan* to serve as administrative heads. The challenge is capturing the cooperation mechanisms that are already present in Somalia while keeping the sovereign state out of the process. According to the LSE report's conceptions, Somali sovereignty could lie with all adult Somali citizens, in the constituent territorial units of a Somali state or states, or with the clans (LSE 1995). Importantly, each of these possibilities would transfer sovereignty away from centralized governance institutions and toward more localized control.

The most innovative aspects of the LSE "menu" are the consociational and functional cooperation models. Both deemphasize the role and even the necessity of the central government in ways that fit the clan dynamics and political realities of Somalia. Despite the merits of these more creative proposals, the international preference toward centralized government led the negotiators who created the TFG to settle on something straddling the line between a federation and a decentralised unitary state with strong guarantees of local or regional autonomy, namely a "decentralised system of administration based on federalism" (Somali Transitional Charter 2004). The result has been a government with little or no popular support. Moreover, while the TFC directed the TFG to "ensure that the process of federating Somalia shall take place within a period of two and a half years" (Somali Transitional Charter 2004), the government has thus far demonstrated neither the will nor the capacity to devolve power. Corruption and short-sighted Somali leadership have played a role in the TFG's failures, as has uninspired external diplomacy (Menkhaus 2007). However, its centralized form is also intrinsically flawed given Somalia's underlying social structures (ICG 2011).

Taking the failures of centralization into account, Ken Menkhaus has proposed a "mediated state" for Somalia, in which "the government relies on partnership—or at least coexistence—with a diverse range of local intermediaries and rival sources of authority to provide the core functions of public security, justice, and conflict management in much of the country" (Menkhaus 2007). While admittedly "messy, contradictory, illiberal," and subject to constant renegotiation, in Menkhaus's view the mediated state offers "the best of [the] bad options" for Somalia (Menkhaus 2007). According to his approach:

[T]he "top-down" project of building a central government and the organic emergence of informal polities are not viewed as antithetical (though they are invariably political rivals, co-existing in uneasy partnership), but are instead harmonized or nested together in a negotiated division of labor. The nascent

central state limits itself to a few essential competencies not already provided by local, private sector, or voluntary sector actors (Menkhaus 2007).

By focusing on developing a "minimalist state and harmonizing state authority with local systems rather than displacing them," Menkhaus believes that Somalia could be "at the forefront of a seismic shift in the nature and scope of the sovereign state in Africa" (Menkhaus 2007). His idea accentuates the positive aspects that could be wrought by matching governance arrangements with Somalia's unique sociology, as well as the change it might have on the Somali mindset and political attitudes. Instead of forcing centralization on recalcitrant Somalis who by and large exhibit a preference for informal and traditional arrangements, the national government would act merely in response to governance deficits at the local level. Arranged this way, the relationship between the central and local forms of government would be less adversarial and threatening. The "negotiated division of labor" might serve the interests of both sides and the locus of sovereignty could shift to where it belongs, away from the central government and toward individual Somalis.

The subject of a redefined statehood for African countries is taken up by Letitia Lawson and Donald Rothchild, who have written that Africans "have begun to move away from colonially designed juridical statehood to fashion empirical formulas that respond to the messiness of their current realities" (Lawson and Rothchild 2005). However, it remains to be seen "whether these new, flexible structures prove [to be] an effective response to a political environment in which state weakness poses severe challenges" (Lawson and Rothchild 2005). Overcoming the status quo and implementing radically different notions of statehood and sovereignty will undoubtedly represent a difficult process in places where entrenched powerbrokers have little incentive to embrace wholesale changes. Nonetheless, the force of these ideas lies in their flexibility and compatibility with each society's underlying characteristics.

Finally, Alex de Waal has put forth a creative policy proposal for political organization in Somalia that emphasizes the driving force of the resource base of the Somali political economy to the formation of governance structures (de Waal 2007). This resource base includes "the riverine agricultural land, pastureland, remittances from overseas workers, and the resources that can be captured and dispensed by a sovereign state, including foreign aid and currency ('sovereign rents')" (de Waal 2007). For de Waal, the clans are epiphenomenal; they are secondary to the primary economic drivers of social organization. In order to design a structure for governance "it is

necessary to attend [first] to the economics of conflict and state viability” (de Waal 2007). This includes radically reconfiguring the relations between the state and the productive and commercial sectors (de Waal 2007).

Accordingly, de Waal suggests three theoretical solutions to the problem of statelessness in Somalia: consensus among all groups; political dominance of a commercial class with its economic base in the productive sector and no expectation of foreign patronage; and a Leviathan—a political leader that commands sufficient military force to be able to impose a solution (de Waal 2007). The TFG represents an attempt at a Leviathan, with contributions from the UN and the AU designed to provide the logistical and military support necessary to enforce the government’s will on the population. To date this strategy has failed. The TFG remains a weak institution and the Somali state is no closer to reconstruction than it was twenty years ago. In effect, the international community has its sequence backwards. By supporting the establishment of a central government prior to stabilizing Somalia’s economic dysfunctions, the UN, AU and others pursue a policy that instigates further discord between the TFG and the actors who presently control the factors of economic production—the clans, the mercantile class, and the regional governments they have created. A better approach would be to address the deficiencies and imbalances in the current economic system as a prelude to building the political arrangements necessary to delineate roles for each actor. In short, “Somalia needs a chamber of commerce before it needs a cabinet” (de Waal 2012).

The policy implication of de Waal’s analysis is that in order to be effective, peacekeeping, peacebuilding, and development strategies in Somalia must maintain a focus on the actual drivers of Somalia’s political economy. For de Waal, these are primarily economic, not political. His “economy first” approach may understate the importance of kinship to Somalia’s clans, but because it is grounded in factual analysis, his point is salient. In order to build a better future, it is necessary to identify the underlying factors of Somali society and allocate power where it is actually concentrated, which in this case is with the clans and other local level actors.

De Waal’s proposal also highlights the ways in which the unique economic situation in Somalia undercuts the centralized state building project and provides opportunities for devolved governance. In the absence of a central government, the private sector has emerged as a health care and education provider, as well as an operator of seaports, airports, electrical grids, and water pipelines (Menkhaus 2007). This “privatization of everything” (Menkhaus 2007) has also presented a rare chance for inter-clan cooperation. The vitality and cross-clan collaboration in the private sector

starkly contrasts with Somalia’s inability to engage in formal state building (Menkhaus 2007).

Further, through substantial remittances from the Somali *diaspora*, a number of interesting and potentially scalable economic phenomena have emerged at the local level. Finance mobilized through the remittance sector, known as the *hawala* system in Somalia, has become the basis for investment in other sectors including telecommunications, media, transportation, construction, and related activities (de Waal 2007). This has led to impressive growth. In the absence of state regulations for financial institutions, *hawala* “relies on reputation and trust,” and the clan system serves as its guarantor (de Waal 2007). The flow of remittances has not been controlled by any one major political or clan affiliation; however, the process has established “thriving urban enclave economies and brought political power to the major businessmen operating in these sectors” (de Waal 2007).

Political empowerment through economic development at the local level has arisen most explicitly in Somaliland and Puntland, where largely autonomous governance structures have formed to provide “physical security and an enabling environment for the return of relative prosperity” (de Waal 2007). The predominant economic activity in Somaliland is livestock trading, and the coordination of this sector has been instrumental to the formation of the regional government. In fact, according to de Waal, the Republic of Somaliland may be described as “a profit-sharing agreement among the dominant livestock traders with a constitution appended” (de Waal 2007). Both Somaliland and Puntland maintain intricate governance arrangements, fostering trade, security, and economic development far surpassing that achieved by the TFG in Mogadishu. Similar situations also exist to a lesser extent in Galmudug and Ximan and Xeeb, although these latter areas have only recently begun to develop the capacity to engage in self-governance.

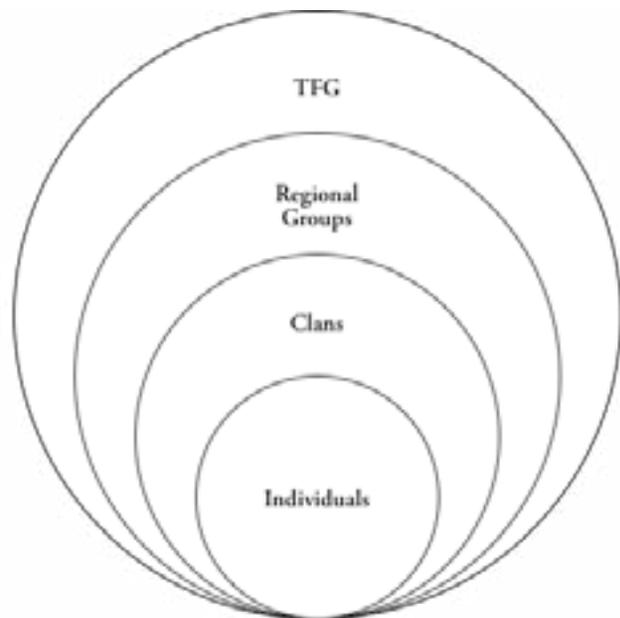
III. PROSPECTS FOR PEACEKEEPING, PEACEBUILDING, AND DEVELOPMENT

The various theories regarding the reconstruction of Somalia present myriad prospects for peacekeeping, peacebuilding, and development. By shifting the focus from the TFG to local or informal actors, devolution provides a method through which the international community can support meaningful change for Somali citizens. Because it serves an integral coordinating function in the country, a change in UNPOS policy in particular would have pervasive effects.

Presently, UNPOS's responsibilities include the implementation of the Djibouti peace process (between the TFG and Alliance for the Re-Liberation of Somalia or the "ARS," a former Islamic opposition group that has agreed to participate in the peace process); assisting the re-establishment, training, and retention of the Somali security forces (military, police, and judiciary); providing good offices and political support for the efforts to establish lasting peace and stability; coordinating counter-piracy initiatives in the region; working with the TFG to improve its capacity to address human rights issues, justice, and reconciliation, and; coordinating the work of the UN in Somalia (Center on International Cooperation 2011; UN Security Council 2009). The mission is based in Nairobi but also maintains offices in Mogadishu, Somaliland, and Puntland.

Based on its current mandate and activities, it is clear that UNPOS operates with the prevailing picture of Somali political organization in mind:

**Figure 1: The Prevailing Picture of Somali Political Organization
(The "Concentric Model")**



This graphic depicts a preeminent role for the TFG with all other actors operating under its auspices. While regional groups, such as Somaliland and Puntland, are recognized and engaged by UNPOS, they are seen as

within Somalia and the goal is always to bring them *under the authority* of the TFG. Moreover, the picture perpetuates the fiction of the TFG as the *de jure* and *de facto* government of Somalia, even though it lacks legitimacy among the Somali people and exercises minimal effective control. Finally, clans and individuals are relegated to a subordinate role. The goal is also to bring them *under the authority* of the TFG, instead of figuring out ways to place them *alongside* or *in a relationship with* the TFG, which would more closely reflect the situation on the ground as well as the consciousness of the population.

The concentric model of the Western ideal of governance results in a specific interpretation of the UNPOS mandate. For instance, the training of Somali security forces translates into *the training of Somali security forces for use by the TFG*. Similarly, the provision of good offices and political support for the efforts to establish lasting peace and stability becomes *the provision of good offices on behalf of the TFG to establish lasting peace and stability within Somalia*. A more accurate depiction of Somali society may look something like the following:

**Figure 2: The Devolved Picture of Somali Political Organization
(The "Devolutionary Model")**



Note: Large circles represent spheres of life and smaller circles and lines represent the actors in those spheres and their connections to other actors

The devolutionary model does not depict any particular relationship; rather it highlights the different ways in which political actors in Somali society interact with one another. The larger background spheres may represent particular sectors of Somali life, such as security, or specific industries in which Somali political actors engage in a certain amount of cooperation or build special relationships. The smaller spheres may represent individual or group actors, and the lines between them signify political, legal, kinship, clan, or economic connections. Referring back to Menkhaus' conception of the mediated state or the LSE report's consociational model, any actor may occupy any of the spheres as they are drawn

above. The nature of the political relationship between actors becomes a function of their underlying characteristics, including their geographical location, their functional specialty, their connections with other actors, and their ability to project power. As these relationships multiply, they create a complex web of interdependencies and fragmented loyalties. Instead of being geared towards increasing the power of one actor over others, this model is focused on how best to build and strengthen ties between various political actors in a way that adheres to the underlying sociology of the region.

Applying de Waal's ideas, it is possible to imagine the drivers of organization and connectivity being economic instead of political. As the capital derived from remittances is used to finance other industries, connections are made between the different clans or powerful individuals controlling those industries. Similarly, as economic activity builds in "urban enclaves," those enclaves exercise more political power and forge connections with other economic and political actors. The resulting political organization reflects these underlying conditions, but politics is not the sole, or even the primary, driver. Corruption is a concern, but clans, as the guarantors of the system, would engage in self-policing. The resulting complex web of interdependencies would also naturally disincentivize any unfair practices or unequal treatment between actors.

Using the devolutionary model instead of the concentric model to interpret the UNPOS mandate yields a much different set of responsibilities and possibilities for the mission. For instance, security forces would no longer need to belong to the TFG. Instead they can be devolved to regional governments and properly vetted informal actors operating in areas of instability and insecurity. This would provide an opportunity for more effective and widespread operational expertise because security forces would be forced to interact with the local actors who are the actual drivers of peacekeeping, peacebuilding, and development in the country. It also offers a larger pool from which to pull eligible and able-bodied fighters. Moreover, on specific issues, such as the training and development of the judiciary, UNPOS would be empowered to recognize *xeer* and to conceptualize creative ways to organize the different *xeer* systems into relationships with one another. This type of policy would reflect the unique sociological attributes of Somali society, including the importance of the *mag*-paying groups and the *Suldaan* to the settlement of disputes. Finally, with regard to good offices, instead of being limited to facilitating the TFG's negotiations with other actors, UNPOS would be mandated to entertain any and all relevant political actors operating in Somalia, in-

cluding al Shabaab, and to facilitate negotiations or settle issues of mutual concern between them.

The usefulness of the devolutionary model is also evident with respect to the new "roadmap" for ending the transition in Somalia, which the TFG, TFP, EU, UN, AU, IGAD, government of Galmudug, government of Puntland, League of Arab States, Organization of the Islamic Conference, and the Islamic group Ahlu Sunna Wal Jama'a (ASWJ) signed on September 6, 2011 in Mogadishu. The roadmap sets ambitious goals along four pillars: security; constitution (drafting); reconciliation; and good governance. Moreover, it is informed by four principles: Somali (TFG) ownership; inclusivity and participation; provision of resources; and monitoring and compliance.

A review of the responsibilities included in the roadmap reveals the shortcomings of the concentric approach. For example, the TFG is granted a great deal of autonomy under the constitution pillar, which superficially reflects the preference for "Somali ownership" while also perpetuating the international preference for centralized governance. In drafting the constitution, the TFG is directed to consult with all stakeholders. However, the modalities for this cooperation are left to the discretion of the TFG, which in practice has led to the exclusion of most citizens from political decision-making. Because the TFG sees itself as operating within a concentric model, which the language of the roadmap supports, the TFG's method of consultation will likely reflect its own self-image as the central government of Somalia. Instead of supporting "Somali ownership" over the transitional process, the manner in which the constitutional process is conceived actually undercuts and disenfranchises the various local actors who are not voluntarily consulted by the TFG. In effect, the principle of Somali ownership is replaced by a principle of "TFG ownership."

The Garowe Principles, agreed upon by representatives from the TFG, TFP, ASWJ, Puntland, Galmudug, and UNPOS at the first Somali National Consultative Constitutional Conference on December 24, 2011 make some improvements to the roadmap framework, but unresolved issues remain. In particular, it is unclear to what extent the new process of constitution-making departs from the failed initiatives of the past. The timeline for the process is also extremely condensed, which may lead to hasty compromises and sloppy draftsmanship. The Principles envision a three-step process to the formation of a constitutional parliamentary system. First, a committee of experts will draft the constitution. That draft will then be handed over to a National Constituent Assembly for review and ratification. Finally, after provisionally adopting the draft constitu-

tion (presumably), the assembly will dissolve, giving way to a new federal parliament. The entire process is supposed to be completed by August 21, 2012. While the sequential build-up of the system makes logical sense, it is overly formulaic, and the composition of the particular bodies is not representative of the Somali population. For instance, the National Constituent Assembly is not an elected body. Rather, delegates will be nominated by “all roadmap signatories and civil society” on the basis of the 4.5 formula (The Garowe Principles 2011). The formula requires the four largest clan families (*Rahanweyn*, *Hawiye*, *Dir* and *Darood*) to receive equal representation, while all other clans split the remaining “one-half.” This formally disproportionate arrangement has angered and disenfranchised many communities and delegitimized the TFG in the eyes of much of the Somali population. Even worse, because the “prevailing security situation will not permit direct elections,” the initial composition of the federal parliament will also be formed according to the same 4.5 formula (The Garowe Principles 2011). The Principles do envision discarding the 4.5 formula after the expiration of the parliament’s first term (The Garowe Principles 2011), but by that point the damage will already have been done. Once again, an unrepresentative and detached body will attempt to enforce its vision of governance on a recalcitrant and disenfranchised Somali population.

By switching to a devolutionary model, it is possible to imagine a different conception of Somali ownership over the constitution-drafting process envisioned by the roadmap and the Garowe Principles. It would be more inclusive, more representative, less hurried, and less formulaic than the present proposal. For instance, instead of funneling responsibility through the TFG and then relying on the TFG to bring other actors into the process, the whole process could be reframed so as to allow each actor to undertake the responsibility to consult with one another with a view to organizing the political arrangements (*i.e.* “constitution”) for a Somali state. The resulting bilateral and multilateral arrangements may be “messy, contradictory, illiberal,” and subject to constant renegotiation (Menkhaus 2007), but they also would be more closely aligned to the realities of Somali society. The difficult task of incentivizing the various actors to participate in the process should not be overlooked; however, by shifting the focus from the TFG to thinking about how to organize the system as a whole, the devolutionary model frames the unique political dynamics in Somalia as they exist and not how the international community wishes them to be. Further, it creates a framework within which an inclusive conversation about how to incentivize actors to participate

in the process of organization and constitution-making can take place.

The devolutionary model also makes it much easier to conceptualize ways to disenfranchise spoilers, including al Shabaab. The group emerged as an insurgency movement against the TFG and its Ethiopian supporters in 2006. At that time it utilized terrorist tactics to attack AMISOM troops and government institutions in Mogadishu. Over time, however, it has evolved into a form of shadow government. For example, the group’s members have begun handing out food and supplies to poor Somalis. They have also instituted mobile *sharia* courts to give suspected criminals quick trials and attempted to mediate local disputes (Hanson 2011). Through these methods, the group has sought to take control of towns in southern and central Somalia by political, rather than violent, means.

Applying Stephen Stedman’s pioneering framework on spoiler strategies, al Shabaab should be categorized as a “total” spoiler (Stedman 1997) because it holds immutable preferences, espouses radical ideologies, and sees the world in all-or-nothing terms. The group seeks to destroy the TFG and impose their strict version of Islam on all Somalis. Accordingly, they may only be dealt with coercively. However, the group’s diversification to non-violent methods complicates this analysis. The concentric model creates a set of conditions by which victory over al Shabaab can only be accomplished by either killing its members or expelling them from Somali territory. As experience has shown, the TFG lacks the capacity to fulfill such a mission. The result has been AMISOM forces thrust into the unenviable position of fighting a protracted counterinsurgency on the TFG’s behalf.

By using the devolutionary model, it is possible to re-conceptualize the threat posed by al Shabaab as well as the tools that may be available to address it. Instead of an internal threat that must be purged, under the devolutionary model al Shabaab would represent one actor among many in a fragmented political landscape. While no less pernicious, it would be more isolated (and more susceptible to *increased isolation*). Coercive means may still represent the best way to address al Shabaab, but these means could be employed in different ways. For instance, it might not be necessary to kill or expel al Shabaab in order to “destroy” it. Rather, it might be possible to address the threat by “disconnecting” or “severing” al Shabaab from the local support network that allows it to thrive. As the experience of other armed groups operating in Somalia, including al Qaeda, (Menkhaus and Shapiro 2010) has shown, support from the local population and connections with other like-minded actors represents the single most important prerequisite to success.

IV. CHALLENGES TO THE IMPLEMENTATION OF DEVOLUTION

The full-fledged implementation of a devolutionary system presents significant practical challenges, especially in the south and central portions of the country where the security situation is the most precarious. However, by addressing these hurdles at the lowest level of abstraction—the local level—the devolved system confronts the problems at their genesis and creates the necessary conditions for the development of sustainable peace and stability in the country.

One way to drive devolution is to make incremental progress. For some time, the international community has experimented with the so-called “building-block” approach to peacebuilding. While this technique has been known to Somalia stakeholders since the end of colonialism in 1960, practitioners thus far have not gone far enough in its implementation (Bøås and Rotwitt 2010). Instead of taking the methodology to its logical conclusion and empowering actors on the truly local level, they have made the mistake of focusing on regional entities. Operating at such a level of abstraction worked in Somaliland and Puntland, but it has failed miserably in south and central Somalia, where the ethnic divisions are greater and the on-again, off-again interventions of the international community have disrupted local dynamics. In order to effectively build incremental progress in these difficult areas, the international community must reinvigorate the building-block approach through a renewed commitment to local engagement. This means talking with the *Suldaan*, *aqiil*, and *Guurti* on an individual or small-group level, empowering local actors to participate in the provision of their own security, and dispersing aid directly to local leaders.

Engaging on a local level through the reinvigorated building block process will not be easy. Efforts will undoubtedly encounter resistance from the warlords and armed groups operating in the south and central parts of the country. The security situation in these areas represents a major problem for the implementation of the devolutionary approach. Gaining access to al Shabaab strongholds will require careful diplomacy and firm resolve. In certain limited circumstances it might also demand the use of force. As the only major military actor in the region, AMISOM is in a position to provide the security to facilitate engagement (UN Security Council 2007; UN Security Council 2012b). Under the mission’s original mandate, it was directed “[t]o support dialogue and reconciliation in Somalia by assisting with the free movement, safe passage and protection of all those

involved with the [political process]” (UN Security Council 2007). The list of “those involved,” however, included *only* politicians involved with centralized institutions. In order to truly undercut al Shabaab’s base of support, AMISOM’s perspective needs to become more inclusive of actors at the local level.

Another security issue that complicates devolution is piracy. Critics of the devolutionary proposal might presume that the lack of a centralized government and the absence of a national military will make Somalia powerless to respond to pirates. This critique mistakes the root of the piracy issue, which lies in the failure of the Somali economic system, not in the absence of security forces. Further, while it is true that a devolved approach does not emphasize military capacity, it does not preclude certain functions taking place at a national or international level, such as coastal defense. Finally, because the devolutionary model addresses the Somali political system at the local level, it enfranchises individuals who might otherwise have engaged in piracy. Citizens are generally more likely to participate in the local political process where local government is perceived to be independent and responsive to their needs (Cheema 2007).

The presence of the al Shabaab mobile courts and the practice of Islamic law raises the important question of whether *sharia* and *xeer* can coexist, or, if not, whether one system will swallow the other. Based on Somalia’s history, it will be very difficult for *sharia* to displace *xeer*. As a general rule, where the two conflict, Somalis prefer *xeer* to *sharia* (van Notten 2005). Another guiding principle of the Somali legal consciousness is that the law exists separately from politics and religion. A piece of Somali folk wisdom expresses the difference as *Diinta waa la baddali karaa, xeerka la ma baddali karo* (“one can change one’s religion; one cannot change the law”) (van Notten 2005). This principle is deeply entrenched. It therefore appears extremely unlikely that *sharia* will ever replace *xeer* as the dominant form of legal practice.

Additional practical difficulties to the exercise of the devolutionary model include apportioning legal status, creating ownership over the process, managing diverse interactions between the different elements, ensuring responsibility and accountability, and facilitating the rules of access for the various informal actors (Hydén 2007). These challenges are only exacerbated in unstable, post-conflict environments, where individuals may be desperate and suffering from acute, basic needs. These practical hurdles should not be overlooked in Somalia. Rather, they should be confronted directly. The best way to address the management, responsibility and accountability dilemmas, for instance, is to engage local leaders on an

individualized basis. By emphasizing the traditional governance structures, the international community might also gain access to local communities and give their engagement credibility.

To the doubters of the practical implementation of devolution, the success of Somaliland and Puntland should be held up as concrete illustrations of the merits of the approach. While the south and central parts of Somalia pose their own unique challenges to peacekeeping, peacebuilding, and development, there are useful lessons to be drawn from the north of the country. For instance, one of the major reasons that Somaliland and Puntland emerged as self-sufficient and largely peaceful political units was local leaders' promotion of traditional structures and mechanisms. While regional politicians have gained prominence over the past decade, the key to Somaliland and Puntland's ongoing success has been an erstwhile commitment to these underlying elements.

Finally, critics of the devolutionary system might worry that a renewed focus on local engagement will further fragment an already disunited Somali population. This reflects a misunderstanding of Somali history and politics. In fact, it is the drive toward centralization that is creating conflict between the clans, inciting power grabs, and causing local leaders to disregard *xeer* and other traditional structures (von Notten 2005). Rather than a solution, clan leaders view the formation of a centralized government as a threat to their traditional way of life. Their involvement in the process of government formation and their insistence on certain levels of participation are actions taken out of self-defense and self-preservation rather than a belief in the merits of the enterprise. The international community's inexorable drive for centralized government fosters rivalries and competition between clan leaders who fear the loss of power to other groups. In a country where every man is his own king, the very idea of a detached, Western-style democratic system ruling over the population is anathema. It divides rather than unites.

V. CONCLUSION: SUPPORTING DEVOLUTION THROUGH INTERNATIONAL POLICY

One way to help operationalize devolution is to picture Somali political organization as a complex web of fragmented and interdependent loyalties and then tailor policy-making to fit that vision. Seeing the world in this way presents prospects for peacekeeping and peacebuilding that may otherwise go unrealized. The possibilities for security, constitution-making, and spoiler eradication, in particular, may be bolstered by re-conceptualizing

Somalia through the lens of devolution.

At a minimum, the international community should take the following substantive steps immediately:

Postpone the constitutional process. The mechanisms envisioned by the roadmap and the Garowe Principles entrench the illegitimate power disparities of the past while disenfranchising important local political leaders. A period of relative calm does exist in Somalia but this should not be wasted on a rushed and maladroit political compromise. Rather, it should be seized as an opportunity to connect with local and informal actors so that they may participate in the making of a new Somali political economy. Therefore, the constitutional process should be postponed until direct elections and a national referendum on the draft constitution can be held.

Rejuvenate the traditional governance system. Because the traditional structures represent a delicate ecosystem, this rejuvenation would have limitations. However, certain non-disruptive actions present attractive possibilities. For instance, the provision of infrastructure and technology and the training of low-level administrative personnel to support the *shir* and *Guurti* might increase the efficiency and effectiveness of the traditional governance system. In addition, these actions might empower more individuals to participate in governance decisions (Bertucci and Senese 2007).

Redirect UNOPS' focus. At present the leadership of UNOPS and the UN is far too focused on the constitutional drafting process and the security situation in the south and central parts of Somalia. These important actors must widen their perspective and engage directly with the local and informal actors that make the Somali political system work. In their reports to the UN Security Council, both the Secretary-General and his Special Representative must emphasize the importance of the traditional governance structures to the future of Somalia. A more enlightened vision of security is also necessary. While the instability in the south and central parts of the country presents real problems, the peacekeeping and peacebuilding approach must have multiple facets. Cutting-off al Shabaab's local support network by engaging with opportunistic clan elders, for instance, will be much more effective than strictly military action.

Adjust the AMISOM mandate. The international community must place a renewed emphasis on AMISOM's protection responsibilities. In particular, it must extend those responsibilities to include local, informal actors. By

engaging with such leaders, the military force will undercut al Shabaab's local support network in a much more effective way. Distancing AMISOM from the TFG will also legitimize the mission among the population.

Institutionalize the remittance sector. Because economic activity financed through the remittance sector is such an important driver of the Somali economy, international engagement should focus on making the system as efficient and productive as possible. This might include appointing an international liaison to the different clan groups that administer the remittance sector, as well as the provision of matching funds from international donors for important public service projects. Over time the international community could encourage local clan elders to pitch their investment ideas in more public, institutionalized settings, keeping in mind that the rules of order and final decision-making authority will be apportioned according to *xeer* and other customary rules. By institutionalizing and publicizing remittances, the international community will enable the subsequent development of spin-off, self-funded, domestic economic projects.

It should be noted that despite the positive aspects of devolution, important challenges remain. First, in order to avoid unintended consequences, it is crucial to temper expectations for the success of a devolved political order in Somalia. While devolution certainly has the potential to be more effective than centralization, it still comes with significant challenges and risks. Raising expectations unrealistically could result in the proliferation of unviable regional governments and "briefcase" regimes that have no real connection to the population (ICG 2011). Such power grabs would undercut the legitimacy of the devolved order. Second, it is important to anticipate resistance from the TFG and other actors who are antithetical to devolution. Despite its shortcomings, the TFG wields enough power to weaken and destabilize an intrinsically fragile devolutionary system. They too must be sold on the system's benefits. Third, local governance actors must be held accountable if the system is to function. The traditional mechanisms provide the requisite framework but they should be supported and fortified where necessary. For instance, by institutionalizing the *shir* and publicizing decisions, the international community can encourage compliance and dissuade potential violators. Finally, devolution does not represent the end but rather a new beginning. Sustained work and skillful application is necessary in order to strike a delicate balance between the various political actors. Uncertainty is inherent in the system and it must be embraced and managed in order to realize Somalia's devolutionary prospects.

POSTSCRIPT

Since this article was submitted to press, the Transitional Federal Institutions (TFIs) have given way to a new Somali Federal Parliament (NFP) and a Provisional Somali Constitution. These new institutions, which formally took effect on August 20, 2012 in accordance with the "roadmap" process, break new ground in the modern Somali political landscape. For instance, under its Chapter 5, entitled, "Devolution of the Powers of Government in the Federal Republic of Somalia," the Provisional Constitution recognizes both federal and sub-federal levels of government and, importantly, requires that power should be given to the level of government where it is most likely to be exercised effectively (Somali Provisional Constitution, Article 50(b)). It also stipulates that each level of government shall respect and protect the limits of its powers (Somali Provisional Constitution, Article 51(2)). The possibilities for such a system far exceed those provided by the TFIs. While the system envisioned by the Provisional Constitution will be difficult to implement effectively, especially given the perils of Somalia's fragmented political landscape, it offers a closer match to the real distribution of political power within the country than anything that has come before it. It effectively shifts the discussion toward the building-up of viable political processes at the local level, which was the general position taken by this article.

Notably, in the creation of these new institutions, Somalia's local and informal systems of governance played an unprecedented role. With regard to the NFP, a group of 135 clan elders, referred to in the process as the "Traditional Leaders", nominated the new parliamentary members to a Technical Selection Committee (TSC), consisting of twenty-seven Somalis, two non-voting UNPOS representatives, and seven international observers. The TSC vetted the candidates and approved qualified individuals for inclusion in the new parliament. Despite significant difficulties, the Traditional Leaders and the TSC were able to cooperate in the NFP's formation. In the absence of direct elections, the fact that the Traditional Leaders acted as the catalysts of the process represents a positive development. In reviewing the Provisional Constitution, Somalia's new political leaders would do well to find a continued role for these alternative governance actors. The Provisional Constitution will be subject to a public referendum in late 2012, and general elections of parliamentary members will occur shortly afterward.

In the latter stages of the transitional period, UN and AMISOM representatives seemingly adopted a more devolved approach to carrying out

their activities. In his most recent report to the Security Council, the UN Secretary-General remarked that “representatives of UNPOS engaged the [clan] elders in frank discussions on their roles in and expectations of the new political framework”. Similarly, following the increase in its forces, AMISOM engaged in a mapping of stakeholders in the newly-controlled areas of south-central Somalia. The force commanders analyzed the power dynamics in these areas, identified the political and security leaders present, and attempted to discern their alignment and capacities. These new activities accord with the recommendations contained in the conclusions of this article. It is hoped that in the prelude to general elections and public referendum on the Provisional Constitution, the UN and AMISOM will continue to take the tenets of devolution into account. Despite significant improvements in policy and implementation, substantial work remains.

Matthew Hoisington

NOTES

- ¹ The process of “responsibilization” represents a novel idea for extending provisions of public international law that have historically applied between states to non-state actors, including the local and informal institutions operating in Somalia. By treating local and informal actors as subjects of international law (*i.e.* “subjectifying” them), such a regime closes a potential loophole in international legal responsibility that might otherwise result from the absence of a centralized government. Even if no central government exists in Somalia, by applying techniques of responsibilization, including monitoring, sanctions, and intervention, the international community could still hold local and informal actors accountable for any or all of their internationally wrongful acts. The resulting framework would be analogous to the current rules applicable to state responsibility.
- ² *Mag*-paying groups are also referred to as *diya*-paying groups.
- ³ It should be noted that the participation of women in the formation and practice of *xeer* is negligible because they do not enjoy equal political rights (Le Sage 2005).
- ⁴ In south and central Somalia, these individuals are called *nabadoon*. The *aqiil* system in Somaliland is not purely a traditional system. In fact, it was an innovation introduced by the British during the colonial administration, and it has since evolved as a hybrid between modern and traditional forms of governance (Gundel 2006).
- ⁵ For the sake of simplicity and because the terms are used to describe the same level of traditional leader in each region, *Suldaan* will be used to refer to all three.

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4

OPTIMAL USE OF DONOR FUNDING TO INCENTIVIZE VACCINE RESEARCH & DEVELOPMENT FOR NEGLECTED DISEASES: AN ANALYSIS OF DIFFERENT R&D INCENTIVE MECHANISMS

Koh Jun, Ong

Neglected diseases present a tremendous burden for developing countries. Research and development (R&D) activities to tackle these diseases have largely been absent due to “small market problems,” which occur as a consequence of the severe poverty of those typically affected. Large-scale vaccination is highly cost-effective in preventing the incidence of diseases; however, the vaccine R&D process is plagued with uncertainties and scientific challenges that increase R&D costs. These conditions indicate that external funding is inevitably needed to motivate R&D activities targeted at vaccines for neglected diseases. Although external funds are available, they are limited. Consequently, there is an urgent need to identify the optimal use of these limited resources. Historically, “push” incentives, which provide initial funding to encourage R&D participation,

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have been used to reduce upfront R&D costs to developers. These include direct grants, Product Development Partnerships (PDPs), and tax credits for R&D. More recently, pull incentives, which reward developers for successful R&D projects, have been advocated. As expected, all have their unique advantages and drawbacks. Some have suggested a hybrid mechanism (combined push and pull incentives) that harnesses the best of each approach. This paper uses a model to test the cost-effectiveness of different mechanisms. It finds that a hybrid mechanism is more cost-effective than all-pull or all-push mechanisms. The hybrid approach featured in this paper suggests a combination of push funding (PDPs) to cover basic research up until Phase II clinical trials¹ before transitioning to pull funding (Advance Market Commitments) thereafter. Policymakers should nevertheless exercise caution in applying any particular incentive mechanism. Further research is necessary to refine the model, including the utilization of updated data and analysis of other potential combinations for the hybrid model.

I. INTRODUCTION

Study Background

Neglected diseases are diseases that receive little research and development (R&D) investment (Burri 2004). They affect vast segments of the population in developing countries and are the leading cause of death in low-income countries (World Health Organization 2011c). Diarrheal diseases, HIV/AIDS, malaria, tuberculosis, dengue fever, intestinal nematode infections, and leishmaniasis all constitute the leading global burden of selected neglected diseases, based on World Health Organization (WHO) 2004 estimates (BVGH 2011b; WHO 2011b).

Despite high R&D costs, drug companies will still invest in pharmaceutical and vaccine R&D if the return on investment is predictable, above a given threshold, and bears an acceptable level of risk (Pauly 2005; Webber and Kremer 2001). In addition to the low purchasing power of those whom neglected diseases affect most and the uncertainties related to access, the commercial market for vaccines and other pharmaceuticals for neglected diseases is also too small to attract R&D investments by pharmaceutical companies (Buckup 2008; Sloan 2007). Thus, private R&D investments into neglected diseases are much lower than the socially desirable levels and remain a low priority for private pharmaceutical companies. Instead, efforts

are concentrated on diseases affecting richer and more developed nations (BVGH 2011b; Kremer and Glennerster 2004). Even when R&D efforts are in place, e.g. for human immunodeficiency virus infection / acquired immunodeficiency syndrome (HIV/AIDS), they are often focused on the viral strain that affects developed – rather than developing – countries (Kremer and Glennerster 2004).

The Potential of Vaccines

Some studies have shown that vaccination is highly cost-effective and produces large health and economic benefits (Sloan 2007; Struck 1996). Smallpox eradication is perhaps the best illustration of the promise of vaccines (Flight 2011). Immunization against communicable diseases including diphtheria, measles, and pertussis has dramatically reduced mortality and morbidity (Kobayashi 2010; the Merck Manual for Health Care Professionals 2010), both directly and indirectly (i.e. through herd immunity). In contrast, antibiotics and other drugs used to treat existing infections can, if used incorrectly, result in drug resistance that can compromise containment efforts. For example, strict adherence to the tuberculosis drug regime (lasting six to eight months) is crucial to avoiding drug resistance. Thus, the development of successful vaccines presents a promising alternative to tackling neglected diseases.

Objectives

Given the market failure associated with neglected diseases, government and philanthropic organizations play an important role in providing external funding to foster innovation. Traditionally, R&D incentives in this area have concentrated on push funding, or mechanisms that provide upfront funds to support R&D. Recently, there has been growing interest in pull incentives, in which funds are only delivered upon successful completion of R&D.

The aim of this paper is to analyze push and pull incentives discussed in the literature and identify the optimal approach for using donor funding for vaccine R&D. Section II discusses methodology, followed by an analysis of different R&D incentives in Section III. A cost-effectiveness model is presented in Section IV. Section V draws on findings of both the analysis and the cost-effectiveness model to address policy implications. Subsequently, caveats of the study are acknowledged and final conclusions are presented.

II. METHODOLOGY

Based on the analysis of R&D incentives for neglected diseases in Section III, the cost effectiveness of three hypothetical incentive scenarios was compared. The three scenarios were: all-push, all-pull, and hybrid (a mix of push and pull) incentives. For simplicity, only options that involve direct cash transfers (as opposed to tax and other non-cash-based incentives) were considered. The model approaches each option from the perspective of donors, who are assumed to be maximizing health gains per unit of cost.

Estimates of costs, timelines, and transition probabilities specific to R&D for vaccines obtained from the literature (detailed in Section IV) were used to calculate the amount of push funding needed. To allow for relative comparisons, reward sizes for pull mechanisms were based on total estimated R&D costs capitalized at a real cost of capital of 8 percent to account for opportunity costs forgone for the private sector (Berndt et al. 2007). The hybrid scenario was based on non-capitalized R&D costs from the preclinical period up until Phase II and on capitalized R&D costs thereafter, as pull mechanisms take over after Phase II. All cost data are presented in 2011 U.S. dollars, assuming a 3 percent rate of annual inflation (Berndt et al. 2007). Net present values (NPVs) at year zero for each scenario were calculated.

Effects are measured in Disability-Adjusted Life Years (DALYs)² averted. However, an absolute number of DALYs averted for a hypothetical vaccine was not found. Therefore, to calculate the health gains of a potential new vaccine, a number of assumptions (detailed in Table 1) were made that are believed to result in health gains. This is not particularly problematic, though, because the model aims to compare the relative, not actual, cost-effectiveness of different R&D incentives. For simplicity, a base case of potential DALYs averted per immunization for malaria was calculated, referenced on previous work by Berndt et al. (2007). This base case estimate was multiplied by the estimated number of individuals vaccinated annually (assuming three doses for each individual vaccinated) to determine total DALYs averted per year, applying a 3 percent discount rate. This estimate was then given a weight, different for each R&D incentive mechanism, based on a set of key criteria derived from an analysis of the existing literature.

III. ANALYSIS OF R&D INCENTIVES

Definitions, advantages, and limitations of various push and pull R&D incentives are presented here, with examples provided when available.

Push Incentives

Push incentives are used to reduce upfront R&D costs to incentivize R&D activities (Webber and Kremer 2001).

Direct grants

Definition: Direct grants include funds provided to developers upon presenting potentially promising leads, without the involvement of intermediate governance/central planners (Kremer and Glennerster 2004).

Advantages: The provision of funds to encourage start-up or continued progress of R&D will increase the volume of R&D activities. This incentivizes smaller companies with less capital to carry out further research.

Limitations: This incentive is subject to market failure in the form of asymmetric information where developers, having more information on the potential success/failure of their lead, might exaggerate the potential of their finding, even when it is not expected to progress to a marketable product. They may also exaggerate the R&D costs in order to obtain more funding. The problem is worsened by further failures to revise funding decisions upon subsequent evidence, again due to information asymmetry. Furthermore, it does not guarantee the demand for the product upon successful product generation (WHO CIPIH, 2005b).

Product Development Partnerships

Definition: Product Development Partnerships (PDPs) are similar to direct grants. The key difference is that funds are provided through intermediate governance (Towse et al. 2011). PDPs are specific to neglected diseases and have the advantage of ensuring or facilitating uptake through global access agreements, where developers agree *ex ante* on price and supply should a product emerge. Intellectual property (IP) rights, however, either remain with the developer, as in the case of the International AIDS Vaccine Initiative, or become a public good, as with the Special Programme for Research & Training in Tropical Diseases (Mrazek and Mossialos 2003). In Medicines for Malaria Venture, on the other hand, IP rights remain with developers only outside of less-developed countries.

Advantages: Funding is provided stage-by-stage, allowing donors to pull out of the program upon completion of a given stage (Towse et al. 2011). There is a potential for cost savings, particularly when PDPs directed by not-for-profit organizations have the ability to negotiate for lower input costs through in-kind contributions from the industry. PDPs also encourage knowledge sharing and information transfer, enabling research scientists to improve on the work of their colleagues (Kremer and Glennerster 2004) and minimizing duplicate activity (Mrazek and Mossialos 2003). For example, there is collaborative activity to encourage malaria vaccine R&D between the European Malaria Vaccine Initiative, the U.S. Agency for International Development Malaria Vaccine Development Program, and the Malaria Vaccine Initiative.

Limitations: The drawbacks of PDPs include the risk of Type I error, when leads with low prospects of making it to market are not removed from the pipeline soon enough (Towse et al. 2011). This has been attributed to the fact that PDPs are judged on quantity – not quality – of the leads. This scenario is exacerbated by the PDPs’ “spend it or lose it” arrangement. Again, similar to direct grants, information asymmetry and the tendency to exaggerate potential for success are present. Finally, since donors are allowed to opt out after a certain stage, this might result in the R&D process coming to a standstill if a major donor decides to discontinue funding (Kremer and Glennerster 2004).

Tax credits for R&D on neglected diseases

Definition: Developers who invest in R&D on neglected diseases are eligible for reduced taxes (Towse and Kettler 2005; Kremer and Glennerster 2004). For instance, the proposed “Vaccines for the New Millennium Act of 2001 (United States)” allows companies a 30 percent tax credit for pursuing R&D pertaining to vaccines for HIV, tuberculosis, and malaria (Kremer and Glennerster 2004).

Advantages: Participation in R&D activities is encouraged as companies are entitled to pay less in taxes.

Limitations: The potential benefits of tax credits can really only

be harnessed by companies with large tax burdens, making it particularly problematic for smaller biotechnology companies that have potentially successful leads. There is also risk of creative accounting by companies that stand to benefit. Moreover, IP rights remain with the product developer, risking monopoly pricing. Finally, similar to other push incentives, there is no guarantee of final product uptake (Towse and Kettler 2005).

Patent pools

Definition: Companies contribute their patented leads into a pool, which they can jointly utilize for further research (Towse et al. 2011; Mossialos et al. 2009). Examples include the Pool for Open Innovation against Neglected Tropical Diseases (“The Pool”) and UNITAID’s Medicines Patent Pool (Mossialos et al. 2009). The former is managed by BIO Ventures for Global Health (BVGH) and currently holds more than two thousand three hundred patents (BVGH 2011a).

Advantages: This mechanism overcomes problems of patent thickets and stacking licenses, reduces risks of legal challenges, and reduces royalty payments to obtain legal rights to the patent, subject to certain specifications and restrictions (Verbeure et al. 2006). Furthermore, a lead abandoned by one company can be pursued by another (Towse et al. 2011).

Limitations: From the company perspective, further R&D costs still need to be borne. There are also concerns of anti-competitive behavior due to the potential for cartel formation (Verbeure et al. 2006).

Pull Incentives

Pull incentives guarantee a reward upon the production of a successful vaccine that meets certain criteria.

Advance Market Commitments

Definition: Also called advanced purchase commitments, Advance Market Commitments (AMCs) involve a prospective guarantee by donors to purchase a successful vaccine at a fixed price for a fixed amount of doses (Berndt et al. 2007).

After the pre-agreed doses have been supplied, the developer is committed to sell the vaccine at marginal cost or to transfer the license to another manufacturer (Towse et al. 2011, PRPP 2005, Mossialos et al. 2009). To ensure that the vaccine is used by developing countries, the supply of vaccines can be tied with an optional low co-payment by target countries (Towse and Kettler 2005; Kremer and Glennerster 2004). The first and only AMC to date has been targeted at pneumococcal disease (Bill & Melinda Gates Foundation 2011), with a total commitment of \$1.5 billion announced in 2007 (Bill & Melinda Gates Foundation 2009).

Advantages: Commitment to sell at marginal cost after the pre-determined doses have been supplied ensures the long-term sustainability of vaccine supplies (Towse and Kettler 2005). In addition, AMCs are attractive to donors because, by rewarding only successful ventures, they transfer risk to product developers (Kremer and Glennerster 2004). Thus, information asymmetry ceases to be much of a problem (Maurer 2005).

Limitations: As firms compete for the same reward, there is risk of increased secrecy and less knowledge sharing, potentially leading to duplication of efforts (Light 2005; Mossialos et al. 2009). Moreover, developers bear not only technical risks but also demand risks, as reward is based on both quality and willingness to purchase the vaccine on the part of target countries (Towse et al. 2011). Given that drugs take ten to fifteen years to develop, another limitation is the difficulty in determining a pre-determined “fixed” price in the face of future uncertainty (Mossialos et al. 2009). Also, much rests on the reputation and respectability of donors, who can (in practice but not in theory) use their monopsony power to impose a lower price for drugs once they are developed than was originally agreed upon (Light 2005).

Priority Review Vouchers

Definition: In the United States, Priority Review Vouchers (PRVs) are given to developers upon successful product development addressing neglected diseases (Grabowski 2011). To qualify, the neglected disease must itself be granted priority review status. The vouchers then allow for faster review (six

months) for a different drug of choice. For example, Novartis was granted a PRV for its contribution to malaria in the formulation of Coartem (artemether/lumefantrine) (BVGH 2011c).

Advantages: Since PRVs are transferable, both small and large developers are incentivized to participate in the R&D process (Grabowski 2011). Faster review would allow earlier market entry and sales, provided that regulatory submission is complete and the product is approved. Benefits include potential first-mover advantages and social welfare gains as society has earlier access to new and potentially useful products.

Limitations: First, granting of a PRV does not require product delivery and uptake. Second, early entry into the market does not translate into longer patent periods, as the patent period is fixed, starting from the date of molecule patent registration. Consequently, this mechanism does not enable companies to cash in on a high-selling pharmaceutical product beyond their patent period through patent extension. Lastly, the value of a PRV can be diminished for products that already qualify for priority review in their own right. Moreover, the Food and Drug Administration (FDA) has steadily improved its drug review time.

Transferable IP rights

Definition: Companies are awarded an IP extension for a product of their choice should they successfully bring a neglected diseases product into the market and ensure product delivery to the target population. Examples of assistance in product delivery include free manufacturing licenses (Towse and Kettler 2005; Mossialos et al. 2009).

Advantages: The transferability of Transferable IP Rights (TIPRs) makes them particularly attractive to smaller companies that can sell them to larger companies. The rent from IP extension is more predictable than from PRVs because companies can choose drugs with known high sales for IP extensions.

Limitations: The value of TIPRs depends strictly on the awarding body being able to identify neglected diseases products of high social value to offset deadweight loss from delayed generic

entry of another product. Issues of equity have also been raised, as the burden of financing neglected diseases R&D is now transferred to patients/third party payers who continue to pay a premium price for drugs during the periods where patents are extended.

Patent buyouts

Definition: Instead of committing to buy a certain quantity of vaccine, donors can purchase IP rights (Mossialos et al. 2009). A similar concept has been suggested by Granslandt et al. (2001), by which a large international organization purchases patent rights to deliver products to developing countries on an annual basis (Towse and Kettler 2005).

Advantages: Improvements to the vaccine by other researchers can be carried out should the patent become a public good (Mossialos et al. 2009).

Limitations: Developers are not responsible for product uptake (Towse and Kettler 2005). Additionally, vaccine production can be hard to replicate, which might result in donor dependence on the original developer for manufacture and supply, thus giving them monopoly power and duplicating the reward. Furthermore, it may not be politically feasible to pay a large amount upfront. The long-term effectiveness and side effects of the vaccine are also not readily apparent when IP rights are purchased.

Research tournaments

Definition: A prize is awarded to the developer that is first to bring a product into the market (Towse and Kettler 2005).

Advantages: A prize to the forerunner product encourages faster product development.

Limitations: This is a winner-takes-all approach that disregards subsequent superior products.

Tax credit from sales

Definition: Instead of granting tax credits only for R&D, which does not ensure product delivery, tax credits based on sales can provide the necessary incentives for product uptake and delivery (Kremer 2000; Towse and Kettler 2005).

Advantages: This mechanism ensures end-product uptake and aligns R&D activities with neglected diseases that affect developing countries (Kremer 2000). Also, while tax credits for R&D offer incentives mostly to large pharmaceutical companies with more tax liabilities, credits based on sales attract both small and large developers.

Limitations: Given the small size of the market, tax credits may not provide a large enough reward to invest in neglected diseases (Mrazek and Mossialos 2003).

Hybrid Incentive Mechanisms

Definition: Hybrid incentives use a combination of push and pull mechanisms (Towse and Sharma 2011; CIPIH 2005a; Mossialos et al. 2009). An example of a hybrid incentive is the Orphan Drug Act (ODA), which offers tax credits (push incentive) for R&D and early clinical trial grants and seven-year market exclusivity for a successful product (pull incentive) (Grabowski 2005).

Advantages: A hybrid mechanism harnesses the benefits of push and pull incentives while segregating risk between donors and developers (Towse and Sharma 2011). Given the higher risks associated with basic research, it has been suggested that pull mechanisms are better suited for late-stage R&D projects, due mainly to feasibility, practicality, and predictability (of reward size) concerns (Towse et al. 2011; Towse and Kettler 2005). Evidence thus far has shown large pharmaceutical companies responding to pull incentives by advancing their already completed vaccine projects to obtain the reward (Mossialos et al. 2009). Different combinations of push and pull incentives are possible. The literature indicates that providing push funding during the earlier phases of R&D will encourage participation from small and large companies alike to explore a larger portfolio of potential leads (Mossialos et al. 2009). It is also believed that developers are more likely to respond to pull incentives later in the R&D process when more promising leads have been identified. This might even encourage developers to invest in costly Phase III clinical trials.

Limitations: An optimal combination of push and pull incentives still needs to be identified to harness the merits of each incentive mechanism.

IV. COST-EFFECTIVENESS MODEL

Vaccine R&D Process

The timeline of a typical vaccine R&D process is illustrated in Figure 1. Three scenarios are considered for the model: PDP (all push), AMC (all pull) and hybrid (PDP until Phase II trials, followed by AMC thereafter). For simplicity, PDP and AMC were the only push and pull options considered, as both mechanisms involve direct cash transfers (as opposed to tax and other non-cash-based incentives). PDPs pay R&D costs before the start of each R&D phase. AMCs provide rewards upon successful product delivery, and are assumed to provide payment at the end of each year of product delivery. Transition from PDPs to AMCs after Phase II trials is in accordance with the suggestion by Mossialos et al. that a pull incentive closer to the end of the R&D process might encourage participation in Phase III trials (Mossialos et al. 2009).

Estimates of years spent on R&D are rounded up for simplicity. At best, these estimates represent a close approximation, given uncertainties in the R&D process. Moreover, gaps and overlaps (DiMasi et al. 2003) within the R&D process are not considered, again, for simplicity. Historically, pharmaceutical products tend to achieve peak sales at year seven (Berndt et al. 2007). Consequently, the model assumes that it takes seven years to cover the target population.

The transition probabilities used in this model are based on historical records specific to vaccines (Struck 1996), and are much higher than those reported elsewhere, such as those pertaining to drugs (DiMasi et al. 2003) or HIV vaccines (Wong et al. 2006).

Estimating Costs to Donors

The model uses estimates of R&D costs for drugs calculated by DiMasi et al. (2003), with the exception of estimates of manufacturing scale-up (Plotkin et al. 2008) and product registration (Wong et al. 2006). However, vaccine R&D costs are different from those of drugs; the former tend to be more unpredictable (Pflumm 2011; Light et al. 2009) and require consideration of the ability of large-scale manufacturing to ensure product stability and reproducibility (Plotkin et al. 2008; Moran et al. 2007). Nevertheless, since the purpose of the model is to allow comparison of the

Figure 1: Typical R&D Timeline and Transition Probabilities Estimates

(Years) ^a	(2) ¹	(2) ²	(3) ²	(1) ¹	(5) ²	(2) ³
	Preclinical Phase (includes basic research and animal trials)	Phase I clinical trials	Phase II clinical trials	Manufacturing scale-up	Phase III clinical trials	Product registration
Transition probability ¹	0.57	0.72	0.79	1.00	0.71	0.96
Compound needed ^b	4.53	2.58	1.86	1.47	1.47	1.04
	← ALL PUSH →		← →	← →	← ALL PULL →	
	← →		← →	← →		← PULL →
						1

^a Estimates rounded up

^b Compound needed = (Compound needed for the next phase) / (Transition probability for the current phase)

Sources:

¹. Struck 1996

². Wong et al. 2006

³. Grabowski 2011

three incentive mechanisms in a relative sense, cost estimates of drugs but not vaccines and the uncertainties in these estimates, although recognized, will not pose a problem. Total R&D costs in 2011 dollars represent the NPV for the all-push mechanism.

Under pull scenarios, the present value of the total size of the reward is first calculated based on total R&D costs capitalized at 8 percent to account for the private sector's real cost of capital (Berndt et al. 2007). This amount is then divided by \$18, an estimate of the unit price for a three-dose vaccine used by Berndt et al. (2007), to obtain a total of 65.5 million individuals to be vaccinated. Next, the 65.5 million individuals are allocated to the seven years of product delivery, arbitrarily set in an increasing manner to achieve a peak at year seven. This step enables an estimate of annual vaccination and is critical when calculating DALYs averted (further explained later in the paper). The sum of annual delivery costs in 2011 dollars represents the NPV for the all-pull mechanism.

For the hybrid scenario, non-capitalized R&D costs are used to cover the preclinical phase to Phase II trials. The size of the AMC is then the capitalized R&D costs incurred after this phase. This amount is then segregated across seven years. Unit price for a three-dose vaccine is now decreased to \$13. This price has been adjusted in order to ensure the same number of individuals vaccinated as in the all-pull scenario. The lower price is acceptable, as developers have received push funding for early-phase R&D. The NPV for the hybrid scenario is then calculated from the total of early push R&D funding and annual delivery costs.

Estimating Effects

It is beyond the scope of this study to estimate the absolute number of DALYs for any specific neglected disease (Berndt et al. 2007, 506), which largely depends on the DALY burden of disease (which differs widely across countries), vaccine efficacy, and externalities including potential herd immunity (Kobayashi 2010; Berndt et al. 2007). However, since this model only compares the three scenarios in a relative sense, the model first estimates a baseline case measure of DALYs averted. For simplicity, a specific disease (malaria) is considered. The baseline estimate is determined based on research by WHO reports that, at a steady state, an estimated 14 million DALYs will be averted annually for every 54 million individuals vaccinated. This means that for every individual vaccinated, 0.26 DALYs will be averted. Thus, the annual DALYs averted for the model is calculated based on the product of the number of individuals vaccinated annually (determined earlier) and 0.26.

The baseline value is then given different weights, based on the impact of the three options on a defined set of key criteria. These criteria are determined via their ability to impact DALYs averted. Justification for each criterion is provided in Table 1. Each criterion is given equal weight and the total weight for each is applied to estimate the number of DALYs averted under each scenario.

Table 1: Criteria Considered to Affect DALYs Averted

Criterion	Justification
Competition	Increased participation will boost the number of potential leads, translating to faster product discovery and increasing the probability of bringing a successful product to market (Berndt et al. 2007), which enables faster product delivery and uptake, potentially resulting in more DALYs averted. Factors that might affect participation and competition include whether or not subsequent entrants are considered (e.g. for AMCs), credibility of donors, and potential developers (whether small biotechnological companies with higher innovative activities or large pharmaceutical companies).
Knowledge sharing	Knowledge sharing will decrease the time needed for successful product discovery and potentially increase the quality of the final product. However, if there is competition, companies will tend to be more secretive about their scientific discovery and reduce knowledge sharing.
Efficiency	Improved efficiency in conducting R&D can reduce costs. Thus, from a technical efficiency standpoint, more can be delivered with the same budget. This in turn increases the number of leads, which increases the probability of success.
Product delivery and uptake	The final product must be delivered for any benefits to be harnessed. Thus, incentives must be structured to reach consumers.

The criteria are rated 0, 1, or 2. Table 2 provides justification for each rating. The baseline case assumes perfect attainment of these scores, yielding 100 percent weight.

Table 2: Ratings

Criteria	All push	All pull	Hybrid	Baseline case
Competition	0 <i>Fixed reward recipient</i>	1 <i>Uncertainties about credibility of donors (time inconsistency issue); costly upfront R&D costs, thus discouraging participation from smaller biotechnology companies, which decreases potential innovative leads</i>	1 <i>Shorter time to receiving reward for product delivery (smaller time inconsistency issue); push mechanisms encourage participation from smaller biotechnology companies; however, due to initial push funding, the amount of actual competition is dependent on initial push funding</i>	2
Knowledge sharing	2 <i>Funding is provided by donors to conduct R&D; scientists are willing to publish their work</i>	0 <i>Developers are competing for the final reward; thus, they will not share their knowledge</i>	2 <i>The initial phase with push funding encourages knowledge sharing up until transition to pull incentives</i>	2

Table 2: Ratings Cont'd

Efficiency	1 PDPs take a 'spend it or lose it' stand, which may lead to less cost savings; however, there are grounds for increased efficiency as PDPs enable partners to capitalize on their individual expertise	2 Companies have to save on all aspects of out-of-pocket payments, from R&D through to product delivery	1.5 The R&D phase is funded by the push mechanism, so similarly there is less incentive to be efficient; however, post-product registration is rewarded by an AMC, which pays upon product delivery. Thus, developers will be more efficient in order to gain a larger net revenue	2
Product delivery and uptake	0 Funding covers up until product registration; thus, there is no further mechanism to ensure that product delivery is considered	2 AMC only rewards when products are delivered, so developers have an incentive to ensure final product uptake	2 Similar to all pull for product delivery	2
Total (%)	3 (37.5)	5 (62.5)	6.5 (81.25)	8 (100)

Results

As shown in Table 3, the hybrid mechanism is the most cost-effective option with the lowest cost per DALY averted (\$148.29/DALY). Although the all-push mechanism is the cheapest, the number of DALYs averted is much lower than the other two options. Detailed calculations are available in Appendices A1 to A4.

Table 3: Results of the Illustrative Cost-Effectiveness Model

R&D incentive	Cost to donors in 2011 dollars (millions)	Health effects as DALYs averted (millions)	Cost-effectiveness (\$/DALY)
All push	760.83	3.51	216.51
All pull	1,179.00	5.86	201.31
Push + pull (hybrid)	1,129.04	7.61	148.29

V. DISCUSSION AND POLICY IMPLICATIONS

Recognizing the potential of a hybrid mechanism to balance the advantages and limitations of push and pull incentives, the cost-effectiveness model appears to support this option. Nevertheless, caution should be exercised in interpreting the results. With a hybrid model, there is a risk of agency capture, given that push funding is used to initially fund the R&D process but in the long run, if there is only a single successful product left in the pipeline, donors might lose control of final determination of the size of the pull reward.

Nonetheless, for any incentive mechanism chosen, it is vital that the reward size not be overly excessive so as to engage in overspending, but at the same time not too low so as to discourage participation. This is not an easy task, as R&D costs are generally unknown, given the associated uncertainties and complexities of scientific discovery, as well as the tendency for companies to refrain from reporting actual R&D costs (Maurer 2005). A bidding procedure to elicit a developer's lowest tolerable price might overcome this information asymmetry problem.

In addition, it is important to account for potential revenue to developers from other sources, such as richer consumers from the military and holiday-makers' market (Berndt et al. 2007). Since companies will obtain revenue from these alternative sources, donors do not have to duplicate their incentives. Ultimately, there are the neglected diseases, and there are

the very neglected diseases, the latter of which constitute an even smaller market size with no alternative developed countries market and thus require higher incentives for any R&D activities.

It is crucial to remember that, as scientific knowledge advances, the timeline and costs of R&D become less predictable (Maurer 2005). Also, some diseases, such as HIV, face greater scientific challenges, given the existence of different strains of the virus. Consequently, the transition probabilities for HIV vaccine R&D have been reported to be lower than those of vaccines for other diseases (Wong et al. 2006). In short, the R&D timeline, transition probabilities, and costs will vary depending on several factors including disease and level of scientific knowledge. It is also uncertain that the size of the reward considered in the model presented in this paper will be sufficient to cover costly vaccine manufacturing processes (GAVI 2011). These issues have to be considered by policy makers when making decisions based on any future economic models.

The three options examined in this paper are relatively simple versions of the all-push, all-pull, and hybrid mechanisms. When policies are made, there will more likely be a mixture of incentive mechanisms, such as the ODA mixture of tax credits for R&D and grants for early clinical trials (Grabowski 2005). There are also no clearly defined boundaries as to the point at which a hybrid model transitions into a pull mechanism. The model presented began with an AMC for a hybrid after Phase II studies, but future research could examine other options regarding the timing for transition.

Finally, it is also vital that any combination of incentive mechanisms used is updated regularly with frequent revisits of policies and funding decisions made. For instance, donors must make sure that milestones set in upfront push funding are met. Companies will also need to be rightfully represented to enable them to voice their concerns over changes in the R&D process and any associated costs. Most importantly, perhaps, is also the role of the public who represent the ultimate recipients of innovative vaccines. Changing epidemiology of neglected diseases might, for example, increase the incidence of dengue fever, which potentially increases vaccine demand and overall utility obtained if a vaccine is available. Should policy makers be kept abreast in consumer demand for neglected diseases, this would influence how resources are used.

VI. CAVEATS OF THE STUDY AND IMPLICATIONS FOR FUTURE RESEARCH

Some R&D incentives analyzed (e.g. TIPRs and tax credits) are based on theoretical arguments. Thus, evidence on their feasibility and drawbacks

will not be obvious until tested in real world. Nonetheless, they have been presented in the analysis to highlight other potential options for donors.

The model following the analysis is a simplified representation of the R&D process for vaccines. It aims to illustrate the relative cost-effectiveness of different incentive mechanisms from a donor perspective. However, it is based on the limited data available on costs, timelines, and probability of failure. Data on costs are obtained from DiMasi et al. (2003), which focuses on drugs. Some have suggested, though, that these figures have been overestimated (Light et al. 2009).

Furthermore, assumptions on the weights given to the DALYs averted are based on analysis of the literature with no supporting empirical studies. Therefore, the results must be interpreted bearing these caveats in mind. Further studies using different key criteria with sensitivity analyses should be performed.

As more accurate data become available, the cost-effectiveness model built in this study can be refined and tailored to specific neglected diseases and target markets, and sensitivity analyses can be performed. Consequently, further work is needed to develop more sophisticated models. In addition, given the fact that potentially cheaper developers from emerging markets are growing (GAVI 2011), more reliable estimates of neglected diseases vaccine R&D costs need to be identified.

VII. CONCLUSION

Vaccines have the potential to eradicate neglected diseases in developing countries. Despite the large number of individuals affected by these diseases, severe poverty has resulted in small market problems and unattractive R&D investment returns. Consequently, external funding is the major source needed to incentivize R&D activities. Nonetheless, these funding opportunities are limited and should be used in an optimal manner.

There are different mechanisms to incentivize participation in neglected diseases vaccine R&D. However, each has its own advantages and limitations. Push mechanisms have been used for some time, and empirical evidence shows some success of mechanisms like PDPs. Pull mechanisms, on the other hand, are a fairly new concept. It remains to be seen whether an all-pull incentive will effectively incentivize early-stage R&D. The argument thus far seems to support the use of a hybrid mechanism, with initial push incentives followed by pull incentives later in the R&D process.

Applying the initial analysis of different R&D incentives to build an illustrative cost-effectiveness model, this study finds that a hybrid mechanism is indeed the most cost-effective. This mechanism lowers initial R&D costs

for developers before incentivizing participation in the late-stage R&D process and final vaccine delivery through payment for a fixed number of individuals vaccinated.

In conclusion, a hybrid mechanism could well represent an optimal policy option to be considered by decision makers in allocating limited donor funding to incentivize R&D on vaccines for neglected diseases. Nevertheless, future studies are needed to examine other potential combinations for the hybrid model and to determine the actual size of funding, in addition to potentially tailoring the cost-effectiveness model to specific neglected diseases.

NOTES

¹ Major phases of clinical trials (ClinicalTrials.gov 2008) are:

- a. Phase I clinical trials are intended to determine safety and efficacy of pharmaceutical products in a small number of human subjects
- b. Phase II clinical trials study the efficacy of pharmaceutical products in groups of patients with conditions for which the product is indicated
- c. Phase III clinical trials study the overall safety and efficacy of pharmaceutical products in a larger number of patients to form a foundation for product labeling and prescribing

² DALYs are the measure used to determine the Global Burden of Disease and are used in this model to determine the effectiveness of different R&D incentive mechanisms at preventing neglected diseases (Murray and Acharya 1997). DALYs combine a measure of mortality (YLLs) and morbidity (YLDs), where YLLs = Years of Life Lost and YLDs = Years Lived with a Disability (Hollinghurst et al. 2000).

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A1: Base Case R&D Cost Calculations

Inflation rate	0.03																							
	0.03																							
Private real cost of capital	0.08																							
	End year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Timeline	Preclinical phase (basic research and animal trials) and production increase	Phase I	Phase II	Phase III	Manufacturing scale-up	Product registration																		
Transition probabilities (Struck, 1996)	0.57			0.72	0.79	1.00	0.71	0.96																
Number of compounds needed	4.53			2.58	1.86	1.47	1.47	1.04																1.00
Average R&D cost per phase per compound (OOP in 2000 \$ in millions, except for manufacturing costs, which are denoted in 2008 \$, and product registration costs, which are denoted in 2006 \$) Sources: DIMasi 2003; Plotkin et al. 2008 (only for manufacturing costs); Wong et al. 2006 (only for product registration costs)	26.00			15.20	23.50	175.00	91.50	14.00																
Average R&D cost per phase per compound in 2000 \$ (mil)	26.00			15.20	23.50	138.15	91.50	11.72																
Average R&D cost per phase per compound in 2011 \$ (mil)	35.99			21.04	32.53	191.23	126.66	16.23																
R&D cost per successful compound in 2011 \$ (mil)	162.86			54.27	60.41	280.56	185.82	16.91																
R&D cost per successful compound in 2011 \$ (mil) to private developer	162.86			63.30	82.19	480.82	343.95	45.98																

A2: Pull Reward Size and Base Case DALYs Averted Calculations

End year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Timeline	Preclinical phase	Phase I	Phase II	Phase III	Manufacturing scale-up	Product registration																		
R&D cost per successful compound in 2011 \$ (mil) to private developer	162.86			63.30	82.19	480.82	343.95	45.98																
R&D cost per successful compound in 2011 \$ to private developer	162,861,636.55			63,301,121.03	82,188,375.95	480,824,323.73	343,946,605.75	45,978,176.96																
Number of vaccinations (assume 3-dose vaccine)																	3,000,000.00	4,000,000.00	5,500,000.00	8,000,000.00	11,000,000.00	14,500,000.00	19,500,000.00	65,500,000.00
Unit cost of vaccination in 2011 \$																	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
Annual cost to donors of vaccination in 2011 \$																	54,000,000.00	72,000,000.00	99,000,000.00	144,000,000.00	198,000,000.00	261,000,000.00	351,000,000.00	1,179,000,000.00
Annual cost to donors of vaccination in 2011 \$ (mil)																	54.00	72.00	99.00	144.00	198.00	261.00	351.00	1,179.00
Annual DALYs averted																	777,777.78	1,037,037.04	1,425,925.93	2,074,074.07	2,851,851.85	3,759,259.26	5,055,555.56	
Discounted annual DALYs averted																	484,685.40	627,424.46	837,581.20	1,182,815.46	1,579,001.22	2,020,787.09	2,638,456.53	9,370,751.37

Note: Base case DALYs averted for all push assumed to be the same, only differ by the weight

5

AN ANALYSIS OF ENERGY CONSUMPTION ON THE GALÁPAGOS ISLANDS: DRIVERS OF AND SOLUTIONS TO REDUCING RESIDENTS' ENERGY CONSUMPTION

Alyssa Westerman

Humans have placed increased stress on the Galápagos Islands' pristine environment, which has created a host of problems that are threatening the Galápagos' fragile ecosystem. Reducing fossil fuel consumption is critical to increasing energy independence and successfully mitigating humans' environmental footprint. This paper seeks to explore the drivers of Galápagos residents' energy consumption and strategies for reducing this consumption in the terrestrial transportation and electricity sectors. Based on data collection and interviews with households, businesses, and industry experts, it is evident that the primary drivers of residents' energy consumption on the Galápagos Islands are subsidies, inefficient electrical appliances, and lack of awareness. To curtail current energy consumption, community leaders should

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redesign subsidies to promote energy efficiency and conservation, incentivize the use of energy-efficient electrical appliances and apparatuses, and offer workshops to boost awareness and train residents on how to best utilize renewable energy technologies.

I. INTRODUCTION

Overview

The Galápagos Islands, located 600 miles west of mainland Ecuador in the Pacific Ocean, were declared a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site in 1978 for the islands' and surrounding marine reserve's unique ecology (UNESCO 2012). In the past two decades the annual number of visitors to the Galápagos has increased 321 percent and the number of inhabitants has increased 157 percent (INEC 1990; INEC 2010; Galápagos National Park 2011).¹ The increased environmental stress placed on the local environment by humans has created a host of problems that are threatening the Galápagos' fragile and relatively untouched ecosystem (Kerr et al. 2004, 11). The need to minimize this environmental stress while also providing economic opportunity and adequate living conditions for residents of the Galápagos presents a great challenge that will determine the future of the islands. Energy consumption lies at the center of this challenge.

The Galápagos Islands are completely reliant on fossil fuel imports from mainland Ecuador.² This dependence increases the risk of spills, the prevalence of pollutants, and the unnecessary cost of energy subsidies for the government (Kerr et al. 2004; Jácome Montenegro 2010). An illustrative example of these dangers occurred in 2001 when the tanker *Jessica*, carrying fuel on a regular supply run to the Galápagos, crashed into the reef 800 yards off of San Cristóbal Island, costing approximately \$2 million to clean up (*New York Times* 2001; *Travel Weekly* 2001). Luckily the currents at the time carried the oil slicks away from land, which mitigated the spill's effect on coastal vertebrates; different climatic conditions might have resulted in more severe impacts on coastal wildlife (Charles Darwin Foundation 2002). Although scientists found the true effects difficult to measure because of a lack of adequate baseline data, oil spills present a great threat to the Galápagos' environment, and since this tragedy there have been numerous smaller spills from ships (Charles Darwin Foundation 2002). Electricity generation is also known to contribute to pollution in areas such as Puerto Ayora, the Galápagos' most populous area (ERGAL 2008, 7).

Continued reliance on fossil fuels has other negative consequences for residents of the Galápagos, as well. Energy dependence on fossil fuel imports from mainland Ecuador creates energy insecurity, since the archipelago's energy supply is vulnerable to supply chain interruptions. The Galápagos' capacity to deal with such interruptions is very limited, as the islands' energy supply lacks diversification (ERGAL 2008, 7). If there were a supply chain interruption, which frequently happens with cooking gas supplies destined for the Galápagos, the islands would be without energy – a situation that would impose high economic and social costs (ERGAL 2008, 7). Furthermore, the lack of investment and maintenance of the existing electricity system have contributed to expensive energy losses, since much of the existing machinery is old and inefficient (ERGAL 2008, 8). Energy losses equate to greater fossil fuel consumption.

The Galápagos' dependence on fossil fuels also represents a significant cost to the Ecuadorian government, since energy is highly subsidized on the archipelago. Energy in all of Ecuador is heavily subsidized, and on the Galápagos Islands energy is even more subsidized when taking into account transport, which requires additional resources.³ The Ecuadorian government spent an estimated \$13,402,294 on gasoline and diesel subsidies for the Galápagos in 2005, and this does not include the additional subsidies provided in the electricity sector (Jácome 2007, 69). Although this only represents approximately 0.6 percent of Ecuador's total energy subsidies, this is significant since the resident population of the Galápagos comprises only 0.2 percent of the total population (INEC 2010; *Hoy* 2006; Jácome 2007, 69).⁴

In April 2007, the Ecuadorian government announced the program “Zero Fossil Fuels in the Galápagos,” which aims to eliminate the use of fossil fuels in the electricity sector by 2015, and eventually in the transportation sector (ERGAL 2008, 8). In October 2007, the first large-scale renewable energy project on the Galápagos, the San Cristóbal Wind Project, began operation (Eolicisa 2012b). Despite the intent of the Ecuadorian government to make the islands a model for renewable energy, action has been slow, plagued with political, technical, and financial setbacks, and energy demand and fossil fuel imports to the Galápagos continue to grow.

Any system-wide changes aimed at boosting energy efficiency or reducing reliance on fossil fuels must be met with reduced consumption and energy conservation at the consumer level. Understanding the drivers of residents' domestic and commercial energy consumption on the Galápagos Islands in the electricity sector, which is the second highest consumer of fossil fuels after tourist vessels, is a critical first step to boosting energy

efficiency and minimizing overall reliance on fossil fuels.

This paper will explain the important role that subsidies, inefficient electrical appliances, and energy awareness play in driving Galápagueños' energy consumption.⁵ It shall enable community stakeholders to better understand the drivers of local energy consumption and to make informed decisions about future energy policy, which will be critical for eliminating fossil fuels in the Galápagos' electricity sector by 2015.

Methodology

This study took place on the Galápagos Islands and in Quito, Ecuador in June and July of 2011. The methodology can be divided into three parts: archival-based research, structured interviews with individual households and businesses, and open-ended interviews with industry experts.

The archival-based research consisted of collecting billing, production, and consumption data in addition to other unpublished documents, and was completed in collaboration with Galápagos Provincial Electric Company, Inc. (ElecGalápagos), Petroecuador Galápagos, the Governing Council of the Special Regime for Galápagos (Consejo de Gobierno), and Renewable Energy for the Galápagos (ERGAL).

In the second part of the study, twenty-nine heads of household, spouses of heads of household, owners of businesses, and primary decision-makers of businesses answered six structured interview questions.⁶

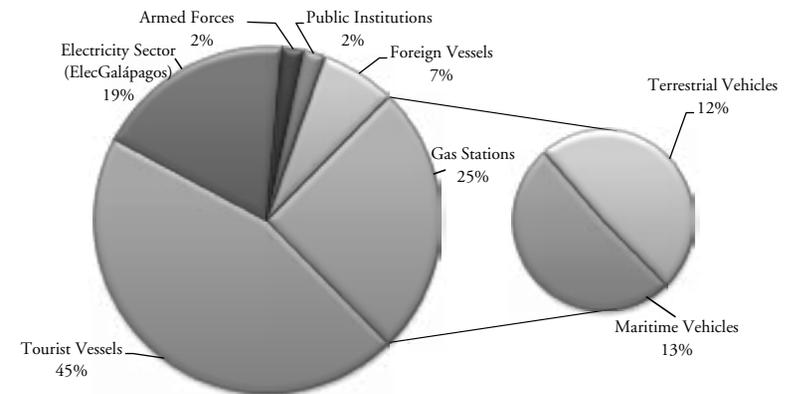
Finally, thirteen industry experts, who extensively study or work in the energy sector, were asked seven open-ended interview questions to gain a qualitative understanding of barriers to renewable energy development, the effect of petroleum on the islands, and the effect of subsidies.⁷

II. ENERGY CONSUMPTION ON THE GALÁPAGOS

In 2010, the Galápagos Islands imported 12,570,660 gallons of fossil fuels (Petroecuador 2011).⁸ As shown in Figure 1, maritime vehicles and the electricity sector (comprised of ElecGalápagos, the state-run electricity company) represent 65 percent and 19 percent of total consumption, respectively.⁸ Tourist vessels consume 45 percent of fossil fuel imports to the Galápagos, but the tourism industry as a whole is responsible for considerably more than 45 percent of consumption. For example, many of the terrestrial and maritime vehicles that purchase fossil fuels from gas stations are tourist vehicles (i.e. taxis) or smaller boats that operate inter-island transportation, which make more frequent trips as the number of tourists rises and demand increases (Figure 1). Furthermore, tourism is the principal economic activity of the Galápagos Islands, and the industry

accounts for additional fossil fuel consumption in the electricity sector.

Figure 1: Fossil Fuel Consumption by Sector 2010



Generalized Sectors	% of Total Consumption
Maritime Vehicles	65 percent
Electricity Sector	19 percent
Terrestrial Vehicles	12 percent
Armed Forces	2 percent
Public Institutions	2 percent

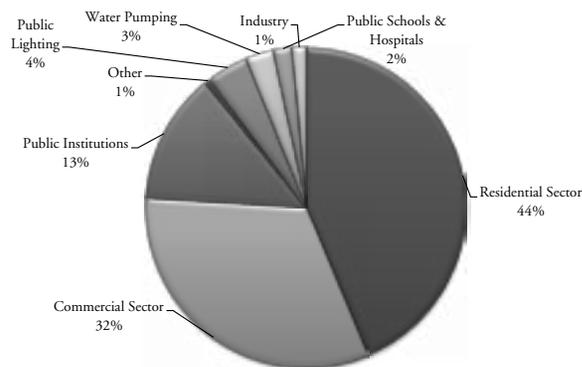
Source: Petroecuador 2011; Graphics created by author.

Despite the fact that tourist vessels consume the greatest amount of energy, energy reductions in this sector would not be easy to achieve. This is because renewable energy technologies are not as readily available for maritime vehicles as they are for terrestrial vehicles and electricity generation, and because the tourism industry represents approximately 63 percent of the Galápagos economy; limiting the number of tourist vessels is unlikely from an economic standpoint (Watkins and Cruz 2007, 12). Furthermore, most of the accommodations, tourist excursion operators, restaurants, and taxis are owned by residents, whereas most of the cruise ships are foreign-owned. Therefore, if residents are more mindful of energy consumption, this will undoubtedly reduce the tourism industry's energy consumption in the terrestrial transportation and electricity sectors. This paper discusses the possibility of reducing fossil fuel consumption by roughly 35 percent, which would be sufficient to reach the goal of "Zero Fossil Fuels in the Galápagos."

Diesel generators currently provide 100 percent of the electricity to the insular grids on the islands of Santa Cruz, Isabela, and Floreana. On San Cristóbal approximately 63 percent of the electricity supplied to the electrical grid is provided by diesel generators and the remaining 37 percent is provided by three 800 kilowatt (kW) wind turbines, run by San Cristóbal Wind, Inc. (Eolicsa) (Eolicsa 2012a; ElecGalápagos 2010b). Although electricity in all of Ecuador is subsidized, with the state paying approximately 40 percent of residential electric bills, the cost of generating electricity on the Galápagos is greater because of the islands' heavy reliance on isolated thermoelectric plants (Jácome 2007, 66; MEER 2011).¹⁰ The price per kilowatt hour (kWh) of electricity to the consumer is set by the National Electricity Board (CONELEC) and is uniform across the country, but the cost of generating one kWh of electricity on the Galápagos is higher, requiring larger government subsidies. Although the average real cost of generating one kWh of electricity in 2010 for ElecGalápagos was \$0.64, the highest price paid by any consumer was \$0.11 per kWh, with subsidies accounting for the variance (Jácome Montenegro 2010; ElecGalápagos 2011).

In 2010, the residential sector accounted for 44 percent of electricity consumption, followed by the commercial sector, which accounted for 32 percent of electricity consumption (Figure 2). Furthermore, the per capita electricity consumption of ElecGalápagos residential clients increased by 22 percent from 2000 to 2010 (ElecGalápagos 2000; ElecGalápagos 2010a).¹¹ The expected continued growth of electricity demand represents a challenge for renewable energy development on the Galápagos, given the high investment costs and the fixed capacity of renewable energy projects.

Figure 2: Electricity Consumption by Consumer (kWh) 2010



Source: ElecGalápagos 2010a; Graphics created by author.

III. DRIVERS OF CONSUMPTION

There are numerous drivers of electricity consumption on the Galápagos that lead to greater fuel imports from the continent, increased risk of spills, larger quantities of carbon dioxide emissions, more money spent at the household, commercial, and state levels, and an increased challenge to meeting demand with renewable energy.

The following sections are based on structured interviews. Since the purpose of interviewing households and businesses was to gauge general behavior as it relates to energy consumption and to better understand local knowledge of energy issues, questions were open-ended. Therefore, participants may fall into more than one answer category for many of the questions. For example, for Question 2, five participants mentioned that they would reduce their consumption and/or invest in energy-saving technologies or appliances. Although this study's sample size is not large enough to draw definitive conclusions on all residents' energy-related behavior and beliefs, the structured interview results suggest trends in behavior and beliefs regarding energy consumption, subsidies, the environment, and renewable energy.¹²

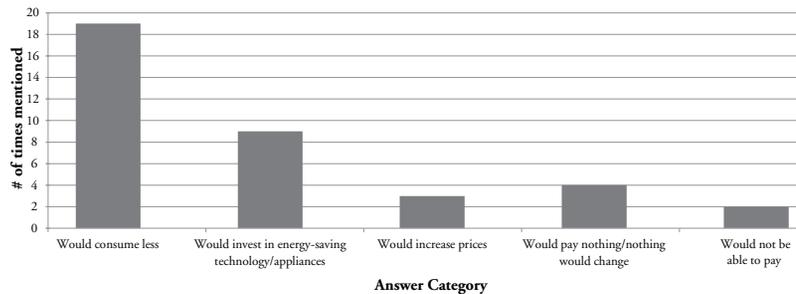
Subsidies

Electricity sector

As previously mentioned, subsidies pervade the electricity sector on the Galápagos, making energy cheaper to the consumer and encouraging greater levels of consumption. Although most industry experts and locals agree that there is a need for subsidies, since without them electricity would be unaffordable to the majority of the population, subsidies encourage energy use. When interview participants were asked what they would do if they had to pay approximately four times more for their electricity monthly (roughly the true cost of electricity), 66 percent mentioned that they would reduce their consumption, 31 percent mentioned that they would invest in energy-saving technologies or appliances, 14 percent said that they would pay and nothing would change, 10 percent said they would have to increase prices, and 7 percent said that they would not be able to pay (Figure 3). The responses to this question suggest that that residents' electricity consumption is largely affected by price.

Figure 3:

Structured Interview Question 2: The true cost of electricity on the Galápagos Islands is at least four times more than what you pay now. If you had to pay four times more for electricity every month, what would you do?¹³



Source: Structured interviews with households and businesses.

The low cost of electricity on the islands does not encourage energy-saving behavior and makes investing in energy-saving technologies and appliances less appealing because of the longer payback period; nine participants mentioned that they would invest in energy-saving technology and appliances if they had to pay more for electricity.¹⁴ For example, subsidies make the payback period for energy-efficient technologies, such as LED light bulbs, longer. However, if subsidies were eliminated and a consumer had to pay the same price that ElecGalápagos pays to power a 100 watt light bulb for a year, purchasing an energy-efficient LED light bulb would be more appealing.¹⁵

During one interview, the owner of one of the largest hotels on San Cristóbal mentioned that he had been considering installing solar panels on the hotel, but mentioned that it was too expensive. This example illustrates how raising electricity prices by reducing subsidies would make solar panels seem less expensive over the long run, thereby encouraging residents to install solar panels. Encouraging the islands' largest hotels to install solar panels would reduce the commercial sector's electricity use, and move the islands substantially closer to the goal of "Zero Fossil Fuels in the Galápagos" by 2015.

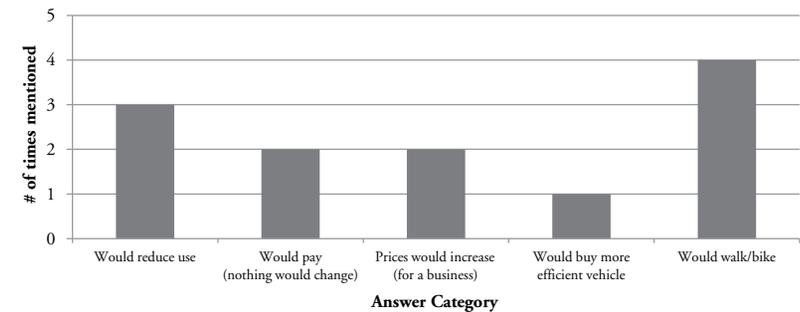
Transportation

Question 1 illustrates that subsidies also affect the transportation sector. A study published in the most recent *Galápagos Report* highlights the overpopulation of taxis on Santa Cruz Island, and the fact that many residents will take a taxi even if their destination is only a few blocks away

(Cléder and Grenier 2010, 34).¹⁶ The overpopulation of taxis is due to a lack of regulation on the entrance of vehicles and the lucrative nature of the industry (Cléder and Grenier 2010, 35, 38). The overpopulation of taxis on Santa Cruz also fits the profile of a population that is increasingly accustomed to motorized vehicles despite the environmental degradation from increasing use of vehicles. Taxis on Santa Cruz account for 55 percent of the fuel used by terrestrial vehicles on Santa Cruz, and they emit up to 12 tons of carbon dioxide daily (Cléder and Grenier 2010, 31, 34).

Figure 4:

Structured Interview Question 1: The true cost (the cost that includes production and distribution costs) of a gallon of gasoline on the Galápagos Islands is three times greater than the price that you pay now. If you had to pay three times more for a gallon of gasoline what would you do?¹⁷



Source: Structured interviews with households and businesses.

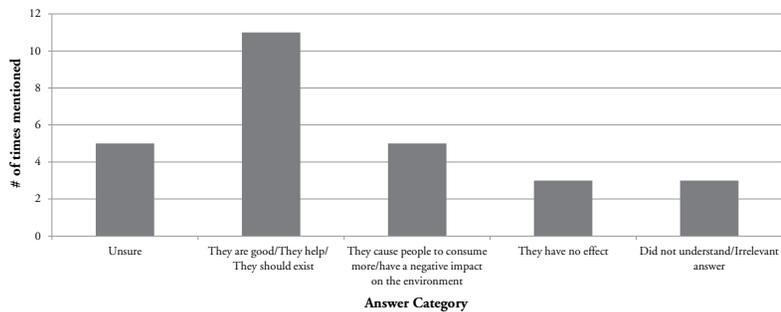
Terrestrial vehicles represent 12 percent of fossil fuel consumption on the Galápagos, a figure that could be substantially reduced by reducing subsidies, which would make operating a taxi less lucrative and would increase prices for passengers (Petroecuador 2011). When respondents were asked what they would do if they had to pay three times more for a gallon of gasoline, 58 percent of these responses included reducing use or walking or biking (Figure 4). Although reducing subsidies is an important component of encouraging walking or cycling over driving, other incentives should also be pursued. For example, several industry experts mentioned expanding bicycle lanes, introducing electric vehicles, and expanding public transportation (for example, public buses that travel up to the highlands on Santa Cruz, Isabela, and San Cristóbal) as ways of reducing the use of terrestrial transportation and fuel use by the sector.

Understanding Subsidies

It is also clear that many residents do not understand the true effect of subsidies; only 20 percent of those surveyed mentioned that subsidies increase consumption or harm the environment (Figure 5). This suggests that reducing subsidies is a difficult political decision to make, since a majority of constituents fail to understand the harmful effects of subsidies and see subsidies as a necessary benefit. Even if subsidies are necessary to some extent, it is important for residents to understand their effects and their costs to the government.

Figure 5:

Structured Interview Question 3: What do you think of petroleum subsidies? How do they affect life on the Galápagos Islands?¹⁸



Source: Structured interviews with households and businesses.

It is also interesting to note that, in spite of 44 percent of interview participants mentioning that subsidies are good, should exist, or help in some way, 55 percent of participants said that they would consider paying more for fuel and electricity if they were generated by renewable sources. Moreover, only 24 percent said that they would not consider paying more. Ideally, relying more on renewable energy and less on fossil fuels would make electricity generation cheaper over the long run, but this indicates that residents might be willing to pay more for electricity if the money spent were going toward renewable energy development. This also suggests that perhaps residents would be supportive of investment in small-scale renewable energy projects for household use, such as solar panels.

Although Ecuador seems to be heading in the right direction by reducing subsidies to discourage energy consumption, reforms have been minimal. The government recently passed a law that increases the rate for residential clients that consume over 500 kWh monthly; however, this will only affect

3 percent of the Ecuadorian population in the residential sector (MEER 2012b). Additionally, as of April 2011, CONELEC will be providing feed-in tariffs to renewable energy project developers to incentivize renewable energy development by offsetting part of the initial start-up cost (Gipe 2011).

Continuing to redesign subsidies in such a way that encourages energy efficiency, promotes renewable energy development, and protects the most economically disadvantaged households will help the Galápagos reach its goal of “Zero Fossil Fuels in the Galápagos” in the electricity sector by 2015.

Inefficient Electrical Appliances

GalápagoSolar, a non-profit organization that works with the government of Ecuador and local high school and university students on the Galápagos, measures the electricity consumption of electrical appliances and apparatuses on the islands. The organization has been working with local high school students to monitor the energy use of refrigerators, which consume more energy than most appliances because they are constantly running. This study finds that the average refrigerator on the Galápagos consumes 1,105.23 kWh annually, equaling approximately 90 gallons of diesel (GalápagoSolar 2011; ElecGalápagos 2010b).¹⁹ For comparison, the most energy-efficient full size refrigerator and freezer combination for sale in the United States in 2010 consumed 334 kWh annually (Barrios 2011).

If approximately all households own a refrigerator and ElecGalápagos has 6,495 residential clients, this equates to 584,550 gallons of diesel used to power residential refrigerators per year, which represents roughly 6 percent of the 9,900,000 gallons of diesel shipped to the Galápagos in 2010 (ElecGalápagos 2010a; Petroecuador 2011).²⁰

In an effort to reduce nation-wide energy consumption, the government has launched the “Programa Renovadora” (Renewal Program), which seeks to replace refrigerators that are older than ten years with 330,000 new energy-efficient refrigerators at a low cost to residential clients who consume less than 200 kWh per month (MEER 2012a). The new refrigerators will consume 780 kWh annually, and 3,000 will be sent to the Galápagos (Meza 2011). On the Galápagos, the new refrigerators will represent a savings of 975,690 kWh and 79,518 gallons of diesel annually (Meza 2011; GalápagoSolar 2011; ElecGalápagos 2010a).²¹ Although this is an improvement, if the Galápagos were to receive 3,000 of the most energy-efficient refrigerators (annual consumption of 334 kWh), savings would be equal to 2,313,690 kWh and 188,564 gallons of diesel (Meza

2011; Barrios 2011; ElecGalápagos 2010a).²² Although the most energy-efficient refrigerators are undoubtedly more expensive, the greater energy savings translates into lower expenditures on electricity at the household level, fewer subsidies at the national level, and greater environmental benefits since less diesel would need to be transported to the Galápagos and fewer emissions would be released. Further, it remains to be seen how the government will dispose of the used refrigerators.

Boosting energy efficiency is the cheapest way to save energy, and encouraging residents to replace older, inefficient electrical appliances and apparatuses is an effective way to conserve energy. The “Programa Renovadora” should be expanded to encourage the replacement of other appliances and apparatuses with high energy-saving potential, like light bulbs.

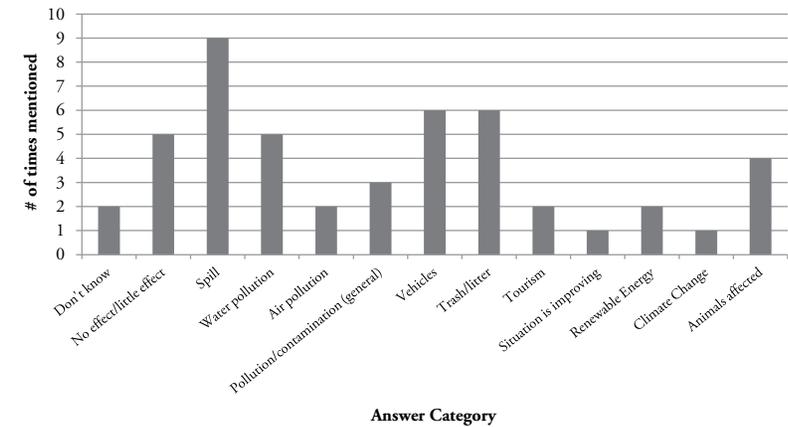
Lack of Awareness and Access to Renewable Energy

If the Galápagos is going to achieve its goal of eliminating the use of fossil fuels in electricity generation by 2015, it is imperative that residents understand the importance of boosting energy efficiency and the motive behind setting such a goal in the first place. Improving residents’ awareness of the importance of household energy conservation, understanding of the effects of energy consumption on the environment, awareness of alternate sources of energy, and access to renewable energy is also critical to instigating energy-efficient behavior and reducing energy consumption in the tourism sector, since many residents own establishments that serve tourists.

Even though all structured interview participants agreed that protecting the environment of the Galápagos is important, few showed a clear, comprehensive understanding of how energy consumption affects the islands. Respondents’ answers to the Questions 4, 5, and 6 demonstrate that the majority of residents think that petroleum products affect the environment of the Galápagos, that renewable energy is good, and that there is a relationship between the consumption of energy and the environment. For Question 4, 32 percent of responses mentioned oil spills as the principal way that petroleum products affect the environment, 21 percent mentioned vehicles, and 21 percent mentioned trash or litter; none of the responses mentioned electricity (Figure 6).

Figure 6:

Structured Interview Question 4: How is the environment of the Galápagos Islands affected by petroleum products (fuel)?²³

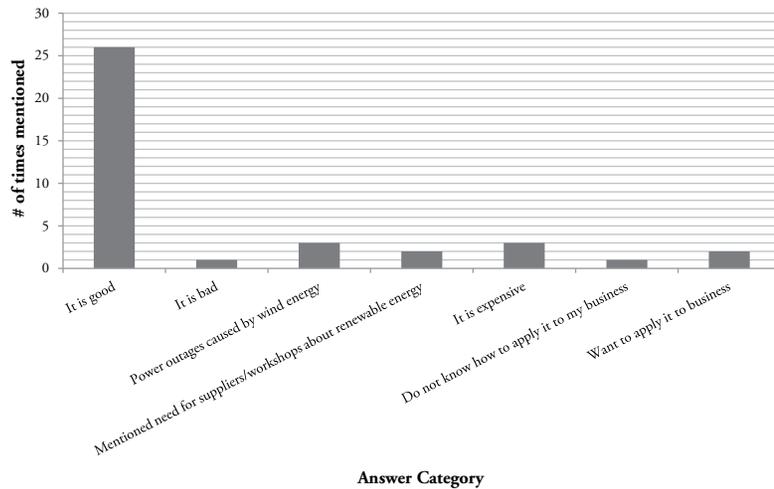


Source: Structured interviews with households and businesses.

For Question 5, 93 percent of responses mentioned that renewable energy is good, 11 percent mentioned power outages from wind energy, 11 percent mentioned that renewable energy is expensive, and 18 percent mentioned a need for suppliers or workshops about renewable energy, a desire to apply it to a business, or that the respondent was unsure how to apply it to his or her business (Figure 7). More specifically, the same two hotel owners mentioned that they were unaware of companies or organizations that were capable of installing and maintaining solar panels, and that such companies were needed in order to promote the use of solar panels. These results highlight a potential gap in services and suggest that if renewable energy were more affordable and accessible, more people would consider utilizing it for their business or even their home. Offering workshops to train people to install solar panels and solar water heaters could also encourage people to capitalize on renewable energy sources, which would lead to greater energy independence, save money, and conserve diesel.

Figure 7:

Structured Interview Question 5: What do you think of renewable energy?²⁴

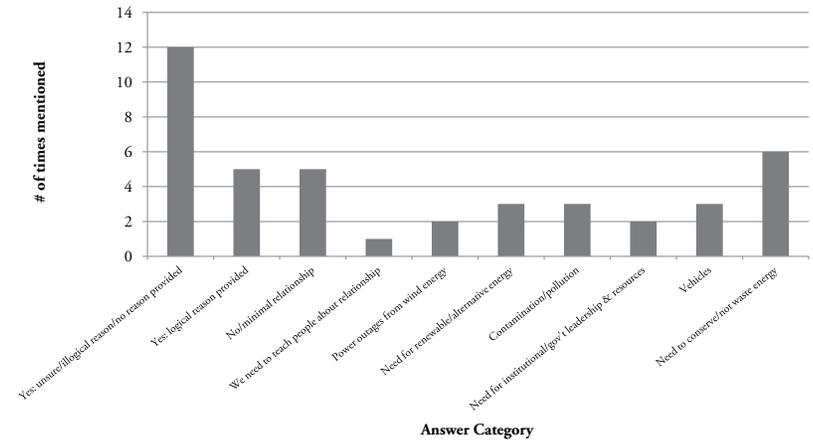


Source: Structured interviews with households and businesses.

For Question 6, 48 percent of responses mentioned that there was a relationship between energy consumption and the environment, but these responses did not include a valid description of this relationship; 24 percent mentioned a need to conserve or not waste energy; 20 percent said that there was no relationship or a minimal relationship between the consumption of energy and the environment; and 20 percent mentioned that there was a relationship between the consumption of energy and the environment and provided a valid description of this relationship (Figure 8). Answers to Question 6 are particularly insightful because this question required a deeper analysis of the connection between fossil fuels and the environment, and while most respondents knew that there was a relationship, only 20 percent of responses provided a valid description of this relationship. Furthermore, there was no mention of electricity consumption. The answers to Question 6 illustrate the fact that many residents do not fully understand the relationship between energy consumption and the environment, particularly at the household level.

Figure 8:

Structured Interview Question 6: Do you see a relationship between the consumption of energy and the environment?²⁵



Source: Structured interviews with households and businesses.

The lack of awareness and accessibility to renewable energy resources at a micro-level drives residents' energy consumption by preventing energy-saving behavior and adoption of renewable energy technology. Residents that are unaware of the relationship between energy consumption and the environment do not see a need to conserve energy at home or at work, other than to save money. Boosting residents' awareness of energy conservation and its impact on the environment and improving accessibility to and affordability of renewable energy resources would require financial resources; however, such efforts are critical to reducing the Galápagos' dependence on imported fossil fuels and all of the problems related to this dependence.

The project La Onda Verde, implemented by GalápagosSolar, trains students to implement energy monitoring projects in addition to informing them about energy consumption, the relationship between energy consumption, diesel usage, and the environment, and energy conservation. Furthermore, La Onda Verde and GalápagosSolar inform residents of the Galápagos about energy consumption, ways to conserve energy, the translation of kWh to diesel, and the cost of electricity as they enter people's homes to monitor the energy consumption of electrical appliances and apparatuses. Expanding projects such as these to reach more residents, while also incentivizing the use of energy-efficient electrical appliances and

apparatuses and reducing subsidies, would encourage energy conservation. This, in turn, would reduce national and household expenditures, the likelihood of oil spills, and greenhouse gas emissions.

IV. CONCLUSIONS AND RECOMMENDATIONS

The Galápagos Islands' dependence on fossil fuel imports from mainland Ecuador contributes to energy inefficiency and insecurity, increases the risk of oil spills, leads to inefficient governmental expenditures in the form of subsidies, and contributes to climate change and pollution from the emission of greenhouse gases. Although the tourism sector is the biggest consumer of fossil fuels, residents themselves must first become conscientious of their own energy consumption before significant changes related to energy consumption will be made within the tourism sector. This is especially true since many of the hotels, taxis, and other establishments that attract tourists are owned by residents. Because the electricity sector is the second largest consumer of energy, understanding the drivers of residents' electricity consumption is particularly important to reducing the Galápagos' overall energy consumption and to achieving the goal of "Zero Fossil Fuels in the Galápagos" in the electricity sector by 2015.

The survey data of this study provide some interesting insights into residents' knowledge of energy issues and beliefs regarding renewable energy, subsidies, and the relationship between energy and the environment. The results indicate that the primary drivers of residents' energy consumption are subsidies, inefficient electrical appliances, and a lack of awareness of and accessibility to renewable energy. Based on these findings, the following policies are recommended:

- **Redesign subsidies:**

To curtail these drivers of energy consumption on the Galápagos, policy makers should seriously consider redesigning subsidies to encourage energy efficiency, conservation, and renewable energy development, while continuing to support the most economically disadvantaged households. Electricity prices for the largest hotels and other businesses that consume the most electricity should continue to move upwards towards their unsubsidized prices to discourage excessive use, encourage electricity conservation, and reduce the pay-back period for investments in renewable energy or energy-efficient technologies. Furthermore, the price of gasoline should be increased to discourage the use of terrestrial vehicles, such as taxis. Although such efforts will undoubtedly be met with political resistance, the

government could use the money saved by reducing subsidies to offer technical and financial support to businesses wishing to utilize renewable energy technologies. Fuel subsidies must also be reduced to decrease the demand for taxis.

- **Encourage the use of efficient electrical appliances and apparatuses:**

Policy makers should also consider extending the "Programa Renovadora" to include other electric appliances and apparatuses, such as light bulbs, and should ensure that the replacement appliances are the most energy-efficient so as to have the greatest effect on reducing fossil fuel consumption. Expanding projects such as these to include businesses and reach more residents would boost awareness of energy issues and encourage the use of energy-efficient electrical appliances and apparatuses, thereby reducing expenditures at all levels, reducing the likelihood of oil spills, and decreasing greenhouse gas emissions.

- **Increase accessibility to renewable energy technologies:**

Since policy makers agree that utility-scale renewable energy projects will never be able to provide 100 percent of the Galápagos' electricity needs, residents should be encouraged to develop small-scale renewable energy projects at their homes and businesses. Workshops should be offered to train people how to install solar panels and solar water heaters. This would provide another great forum for boosting awareness of energy issues while also encouraging people to capitalize on renewable energy sources, which would lead to greater energy independence, save money, and conserve diesel.

- **Expand transportation options:**

The terrestrial transportation sector also offers promising solutions. Narrowing roads and expanding bicycle lanes in the busiest areas, such as in Puerto Ayora, may encourage people to ride bicycles rather than take taxis and drive personal motorized vehicles. Bicycle taxis could also decrease demand for traditional taxis and take advantage of expanded bicycle lanes. Introducing electric vehicles is also an option. For example, policy makers on San Cristóbal are considering introducing electric vehicles since they could be hooked up to the electrical grid at night when the wind blows and no one uses the electricity that the turbines generate. Yet another option is expanding public transportation. For example, establishing public bus systems that provide service up to the highlands on Santa Cruz,

Isabela, and San Cristóbal and to other popular destinations would reduce demand for taxis.

• **Find solutions for reducing the consumption of existing maritime vehicles:**

Although this paper does not specifically address maritime vehicles' fossil fuel consumption, it is worth noting that one policy maker mentioned the possibility of installing renewable energy technologies on-board ships to provide electricity in cruise cabins and reduce the fuel being used by on-board generators. This could be a viable solution for making existing maritime vehicles more fuel-efficient.

Although the Galápagos Islands are geographically, socially, and culturally unique, successful implementation of the above-mentioned policies on the Galápagos could serve as a pilot project and lead to their implementation in other communities that face energy insecurity and environmental degradation. This study provides preliminary evidence on the drivers of residents' energy consumption in the terrestrial transportation and electricity sectors, but more research should be done to better gauge residents' interest in workshops and micro-level renewable energy technologies. Focus group discussions would also provide a valuable tool for taking into account residents' ideas on how to decrease the islands' energy consumption.

There is much that needs to be done to effectively reduce the Galápagos Islands' energy dependence and resulting environmental degradation, but understanding the drivers of local energy consumption is a critical first step. If the Galápagos can effectively combat the challenges presented in this paper, the archipelago will pave the way for other communities to follow suit, resulting in compounded benefits to the environment and the global community.

NOTES

¹ In 1990, the resident population of the Galápagos Islands was 9,785 and there were 41,192 annual visitors. In 2010 the resident population was 25,124 and there were 173,297 annual visitors.

² For the remainder of this paper, "fossil fuels" will refer to gasoline extra and diesel 2; the Galápagos also import liquefied petroleum gas for cooking, but this falls outside of the focus of this paper.

³ Transporting fossil fuels to the Galápagos requires 164,779 gallons of fuel annually (Yanez 2011; Petroecuador 2008).

⁴ Total fuel subsidies in 2006 were estimated to be \$2,147 million USD, and \$13,402,294 USD/\$2,147 million USD=.00624. In 2010 the total Ecuadorian population was 14,483,499 and the population of the Galápagos was 25,124; $25,124/14,483,499=.00173$.

⁵ Galápagueños refers to residents of the Galápagos Islands.

⁶ There were twenty-two participants on San Cristóbal, five participants on Santa Cruz, and three participants on Isabela.

⁷ Interviews with industry experts occurred on San Cristóbal and Santa Cruz and in Quito.

⁸ 79 percent of total imports was diesel 2 and 21 percent was gasoline extra.

⁹ 45 percent Tourist Vessels + 13 percent Maritime Vehicles + 7 percent Foreign Vessels = 65 percent.

¹⁰ Isolated thermoelectric plants are more expensive because each island must have its own power plant, which prevents economies of scale, making electricity generation more expensive.

¹¹ In 2000, there were 3,396 residential clients that consumed a total of 5,511,668 kWh. In 2010, there were 6,495 residential clients that consumed 12,842,165 kWh.

¹² More in-depth, comprehensive interviews are needed to accurately gauge residents' beliefs and behavior on San Cristóbal, Santa Cruz, Isabela, and Floreana Islands.

¹³ There were twenty-nine respondents to Question 2.

¹⁴ Payback period refers to the time it would take for the money saved from using energy-saving technology to be equal to the cost of the initial investment in the energy-saving technology.

¹⁵ If a 100 watt light bulb were on for 24 hours per day for one year, ElecGalápagos would pay an average of \$560 USD: $100W=0.100\text{ kWh} * 24\text{ hours} * 365\text{ days} = 876\text{ kWh/year} * \$0.64\text{ USD} = \$560\text{ USD/year}$ (Jácome Montenegro estimates that the average cost of generating 1 kWh on the Galápagos Islands is \$0.64 USD [Jácome Montenegro 2010]).

¹⁶ The Galápagos Report, a compilation of socio-economic and biological analyses that are critical to decision-making in the Galápagos, is published every other year.

¹⁷ There were eleven respondents to Question 1.

¹⁸ There were twenty-five respondents to Question 3.

¹⁹ This is based on the average yield of 12.27 kWh/gallon of diesel on San Cristóbal: $1,105.23\text{ kWh}/12.27\text{ kWh/gallon} = 90\text{ gallons of diesel}$.

²⁰ $6,495\text{ residential clients} * 90\text{ gallons/year} = 584,550\text{ gallons of diesel used to power residential refrigerators annually, and } 584,550\text{ gallons}/9,900,000 = 5.91\text{ percent}$.

²¹ $1,105.23\text{ kWh} - 780\text{ kWh} = 325.23\text{ kWh savings} * 3,000\text{ refrigerators} = 975,690\text{ kWh saved}/12.27\text{ gallons of diesel/kWh} = 79,518\text{ gallons of diesel saved}$.

²² 1,105.23 kWh – 334 kWh = 771.23 kWh saving*2,000 refrigerators = 2,313,690 kWh saved/12.27 gallons of diesel/kWh = 188,564 gallons of diesel saved.

²³ There were twenty-eight respondents to Question 4.

²⁴ There were twenty-eight respondents to Question 5.

²⁵ There were twenty-five respondents to Question 6.

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6

ARE CHINESE NGOs “GOING OUT”? THE ROLE OF CHINESE NGOs AND GONGOS IN SINO-AFRICAN RELATIONS

David Brenner

As Chinese investments on the African continent have grown, many African non-governmental organizations (NGOs) have expressed concern over the negative side effects of China's expansion on the continent on labor rights, local production, the environment, and local governance. Evidence suggests that Chinese government leadership realizes that it must effectively engage African NGOs in order to continue to advance its business goals in Africa. For this reason, the Chinese government has organized a variety of official NGO fora to augment the triennial ministerial-level Forum on China-Africa Cooperation (FOCAC) between China and African states. While these fora allow invited African NGOs to discuss issues related to the Millennium Development Goals with Chinese government-organized NGOs (GONGOs), the Chinese government remains reluctant to engage in substantively meaningful dialogue with African NGOs about issues of concern related specifically to Chinese investments in Africa. Instead, the government utilizes

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GONGOs as a liaison with African NGOs with the aim to manage and restrict NGO involvement in Sino-African relations. Some GONGOs have, however, managed to distance themselves from the central government and have developed agendas of their own. Be that as it may, such GONGOs remain primarily concerned with promoting China's image in African countries rather than engaging with politically sensitive aspects of soaring Chinese overseas investments in Africa. Independent Chinese NGOs that promote environmental and social responsibility for Chinese enterprises in Africa do exist, however. At present, though, they remain a rare exception, as the bulk of China's NGO community lacks the resources, expertise, and networks to engage on issues relevant to Africa, and are preoccupied with China's own social and environmental problems. Furthermore, despite the Chinese government's promise to promote NGO involvement in Sino-African relations, it is far from supporting a greater international engagement by supporting independent Chinese NGOs, as it is doing with Chinese firms via its "going out" strategy.

I. INTRODUCTION

In 1999, the Chinese government began supporting outward foreign direct investment by subsidizing the overseas investments of Chinese state-owned and private enterprises in strategic sectors such as resource extraction. This approach has become known as China's "going out" policy (Salidjanova 2011, 5). Subsequent growth in investment and trade between China and various African countries has gradually made their relations more complex. Although many African NGOs view growing Chinese activities in their countries with suspicion, these NGOs have thus far not featured prominently in Sino-African relations.

Yet, African NGOs have begun voicing greater concern over Sino-African relations, pointing specifically to problematic side effects of Chinese investment and trade engagement in Africa including labor rights violations, the crowding out of local production, environmental degradation, and potential adverse effects of China's non-interference policy on efforts to promote good governance principles in the administration of African states (Manji and Marks 2007). Some African scholars have even called upon Chinese NGOs to cooperate with their African counterparts to hold the Chinese government and Chinese companies accountable for their activities

on the continent (Ong'ayo 2010, 243). Yet, given China's authoritarian political system, China's immense domestic socio-economic problems, and the overall immaturity of China's NGO community, serious Chinese NGO engagement in Sino-African relations would seem unlikely. Nevertheless, in the closing communiqué of the 2009 Forum on China-Africa Cooperation (FOCAC), the Chinese government stated its intention to promote NGO involvement in Sino-African relations (Forum on China-Africa Cooperation 2009). Are these just empty words or is there reason to suspect that Chinese NGOs will receive governmental support, as have Chinese companies under the "going out" policy?

To answer this question, this paper analyzes three different Chinese organizations that are regarded as non-governmental in China and are involved in Sino-African relations. The cases were chosen for their organizational differences, which primarily owe to their varying degrees of autonomy from Chinese leadership. Findings suggest that Chinese NGOs engage only in topics with relevance for Sino-African relations when doing so is beneficial for their own organizational development.

The paper is organized as follows: first, the general differences between government-organized NGOs (GONGOs) and NGOs in China and their roles in international affairs are described. An organizational theory framework is then introduced and used to analyze three specific Chinese NGOs. The first of these is a young GONGO that was founded and remains closely supervised by the International Department of the Central Committee of the Communist Party of China (CPC); the second is a more independent GONGO that, while funded primarily by Chinese enterprise donations, nevertheless promotes the official Chinese government approach towards Sino-African relations. Finally, the third is an independent NGO that has successfully promoted the development of environmental and social safeguards for Chinese overseas investment.

The paper finds that the Chinese government's support for Chinese NGOs engaged in Sino-African relations is considerably less than that provided to Chinese firms under the policy of "going out." Nevertheless, Chinese government leadership has begun to promote the role of GONGOs in international affairs in order to manage and control NGO involvement in Sino-African relations and promote its image in Africa. New funding opportunities from the Chinese government, the CPC, as well as Chinese companies working in Africa have made greater engagement in Sino-African relations attractive for some Chinese GONGOs. In contrast, most independent Chinese NGOs are neither capable of nor interested in working on topics related to Sino-African relations. Although

this is mainly attributable to China's restrictive political system and Chinese NGOs' preoccupation with domestic problems, the analyzed NGO shows that it is still sometimes the case for these organizations to engage on issues with relevance to Sino-African relations. Beijing's support remains a prerequisite for doing so.

II. CHINA'S NGO COMMUNITY – NGOs AND GONGOS

Since China embarked on its reform process, the number of Chinese NGOs has risen steadily (Wang and Liu 2009, 12-13). Yet, China's rulers continue to restrict independent citizens from organizing. Given the high bureaucratic hurdles for official NGO registration, many NGOs operate formally as different legal entities or are not registered at all (Wang and Liu 2009, 30). For this reason, the exact number of Chinese NGOs is currently unknown. Estimates, however, suggest that several hundred thousand Chinese NGOs have been established since the 1980s (Wang and Liu 2009, 12-13).

Because apolitical NGOs face fewer constraints in China, most of the country's NGOs provide some form of social welfare service. Environmental protection is another area of focus that has provided fertile soil for NGOs to grow because it is not regarded as a political issue in China (Wong 2005).¹ In order to remain viable, NGOs in China cannot pursue strategies which contravene the interests and policies of the state. For this reason, and in order to secure resources, implement projects, and influence policy, these NGOs often seek alliances with the state (Hsu 2010).

In addition to NGOs, China has seen a massive increase in the number of GONGOs over the last three decades. Unlike NGOs, GONGOs are established by a government institution and are only quasi non-governmental. Described differently, GONGOs are agents that fulfill roles within Chinese policy-making and policy implementation that cannot be performed by the state itself (Economy 1997). The first generation of GONGOs, China's communist mass organizations founded in the 1950s, were mostly intended to function as a "transmission belt" between the state and society to encourage popular participation in political life, as well as for educational purposes (China Development Brief 2007).² After China embarked on its opening-up reforms, it became common practice for government institutions to set up GONGOs for financial purposes such as channeling private money to public causes or tapping international expertise and donor money.

Yet, China's austerity reforms of the late 1990s steadily cut financial support to GONGOs, forcing them to identify alternative funding sources. In order to raise funds from the general public and international donors and to contend with growing competition from the growing community of independent Chinese NGOs, they developed new agendas and strategies (Wu 2002, 53-54). With increasing financial independence, some of them gained greater autonomy from their founding institutions, which is reflected in their changing behavior. The success of "Project Hope", a fund with which the GONGO China Youth Development Foundation (CYDF) raises money from the Chinese public for improving access to education for children from poor families, for instance, granted the GONGO significant operational independence from its patron, the Communist Youth League of China. Moreover, the project allowed the organization to publicly criticize the Ministry of Education's practice of privatizing education in rural China (Lu 2007, 193-194). With growing technical expertise and extensive professional networks to international NGOs and donors, some GONGOs have established themselves as integral stakeholders influencing policy and legislation (Wu 2002, 52-53).³ Thus, while lacking full independence, some GONGOs have nevertheless developed a greater degree of autonomy from the Chinese government than others.

III. CHINESE NGOs AND GONGOS IN INTERNATIONAL AFFAIRS

In addition to domestically focused communist mass organizations, some of these first-generation GONGOs have been founded to promote international exchange in times of diplomatic isolation. The Chinese People's Association for Friendship with Foreign Countries (CPAFFC), for instance, has been a particularly valuable diplomatic tool for engaging foreign governments and opposition groups with which official Chinese channels had been closed or otherwise proved problematic (Anonymous official, Central Committee of the CPC 2011). Yet, many internationally active GONGOs were founded more recently, particularly since the 1980s, when emerging neoliberal values motivated the international development community to praise NGOs as more efficient than the state in promoting development. This led Western donors to divert official development aid away from state programs and towards NGOs (Lewis 2010, 334). The Chinese government established GONGOs in order to tap these international funds now unavailable to state institutions (Wu 2002, 49-51). Many Chinese GONGOs now participate in international

conferences and have been granted NGO-consultant status by the United Nations' Economic and Social Council (Wu 2002, 49-51). Beijing has also begun to facilitate GONGO engagement in international affairs in order to access the growing private charitable donations of Chinese citizens and firms to humanitarian and development projects worldwide. For instance, the Chinese Red Cross and the China Charity Federation, two of China's largest GONGOs, raised tens of millions of dollars for relief efforts that followed the 2004 Asian tsunami and the 2005 Pakistani earthquake (Brautigam 2009, 122). Chinese GONGOs, such as China Poverty Relief, have also started providing emergency relief and executing health and education projects (MqVU 2010).⁴ Influential Chinese policy consultants have recently recommended promoting the outreach capacities of GONGOs in order to better influence global public opinion and project soft power (MqVU 2010).

How China is represented on the world stage remains a very sensitive topic for the Chinese leadership. It is perhaps not surprising then that, while gradually utilizing GONGOs as a foreign policy tool, the Chinese government is critical of Chinese NGOs that work on transnational and global issues and curbs their operations (Anonymous official, Central Committee of the CPC 2011).

In addition to government restrictions, most of China's NGOs are too underdeveloped to operate internationally. Unlike many Western NGOs and Chinese GONGOs, most Chinese NGOs lack the resources, experience, networks, and knowledge of foreign policy-making and contemporary international relations to engage effectively outside of China's borders (Fu 2008, 244-245). A variety of domestic problems including environmental degradation, poverty, and widening inequalities are pressing concerns for the vast majority of Chinese. Chinese NGOs dependent upon public support can typically focus on global issues only when they are locally relevant as well, such as cross-border river protection or climate change (Denker 2008, 7). Thus, the vast majority of China's NGOs engage solely on domestic issues. Due to the political sensitivity of foreign policy in China, Chinese NGOs working on international issues must frame their engagement in apolitical terms. The small number of Chinese NGOs that have begun looking into global governance are, thus, all concerned foremost with environmental issues. The 2002 World Summit on Sustainable Development in Johannesburg was the first such event that saw sizeable Chinese NGOs participation (Wu 2009, 1). Since then, such NGOs have established a small but common presence in global environmental and climate summits; this group even hosted its own side event to the

2010 United Nations climate negotiations in Tianjin (Anonymous staff, Heinrich Boell Foundation 2010).

IV. CHINESE NGOs AND GONGOS IN SINO-AFRICAN RELATIONS

The discussion of Chinese NGOs and GONGOs has shown that some NGOs willingly trade autonomy from the state against alliance with the state for greater influence in policy-making, and some GONGOs enjoy a larger degree of independence from state institutions than others. There are, however, vital differences between and amongst Chinese NGOs and GONGOs concerning their outlook on and engagement in Sino-African affairs. Organizational theory provides a framework for analyzing these differences.

Conceptual Framework – An Organizational Perspective

Carolyn Hsu's organization theory perspective on state-NGO relations in China reveals that many NGOs are not necessarily seeking greater autonomy from the state, as is often conceived by Western observers (Hsu 2010). Extrapolating from her conceptual framework, the main concern of NGOs and GONGOs is with organizational viability and not the building of civil society or the delivery of services. Like most other organizations, NGOs are driven primarily by their need to secure resources (Pfeffer and Salancik 2003). Unsurprisingly, NGOs devote significant amounts of time to fundraising activities. In order to successfully attract funds, they must develop a distinctive institutional account, an argument with which they present their comparative advantages over competing institutions in order to attract funding (DiMaggio 1988). In creating this argument, organizations vary in their approaches due to their already available funding sources and their institutional environment (DiMaggio 1988). For example, NGOs working in international development mostly try to attract funding from donor agencies and states. Thus, they often risk catering to Western donors' conceptions of development as opposed to that of local communities (Tvedt 2006).⁵ Another central part of an NGO's institutional account is its self-portrayal. This derives from its founder's ideological and cultural frameworks that construct the narrative explaining the organization's *raison d'être* (Friedland and Alford 1991). The organization's identity, as well as its *modus operandi*, is also shaped by its individual members' institutional experience, such as previous employment with other institutions. Such experience leaves individuals with certain sets of expectations and skills that

influence their respective NGO's work strategy and professional capacity (DiMaggio and Powell 1991).

This analytical concept can be used to explain the varying interest and roles of Chinese GONGOs and NGOs in Sino-African relations. Specifically, institutional accounts differ according to 1) the sources of their operating budget; 2) the organization's institutional environment; 3) its explanatory framework and self-portrayal; and 4) the institutional experience of its staff.

Beijing's Rationale for Involving GONGOs in Sino-African Relations

With the shift away from ideas about state led-development, which followed the ascendancy of neoliberal economic ideology in the 1980s, major donors started to view government-to-government aid as increasingly inefficient. NGOs were regarded as the new panacea for development (Lewis 2010, 334-335). Western donors, international finance institutions, and aid agencies perceived NGOs as flexible, innovative, and connected at the grassroots level (Lewis 2010, 334-335) and praised them for their entrepreneurial ability to implement projects more efficiently and effectively than traditional aid agencies (Stewart 1997, 13). Since the donor community began funding NGOs directly, NGO influence has steadily grown. With the concurrent rollback of state institutions by donor-prescribed macro-economic structural adjustment, NGOs have gradually assumed many functions of the state in countries throughout Africa, including welfare service provision. NGOs have, therefore, not only become an important lobbying group on the African continent, but are now also central stakeholders in the governance of many African states (Manji 2007, vii-viii).

African NGOs are often critical of China's presence on the African continent, citing labor rights violations, suppression of local production, environmental degradation, and potential adverse effects of China's non-interference policy on efforts to promote good governance (Manji and Marks 2007). Not surprisingly, these NGOs have demanded participation in government-dominated Sino-African relations to make their voices heard (Marks 2011). It appears that the Chinese government leadership realizes that it must eventually engage African NGOs as it further expands its business activities in Africa. The government first promulgated this new awareness at the 2009 FOCAC, the fourth ministerial-level meeting between China and African countries that has been held since 2000. According to the summit's closing communiqué, state governments encourage greater cooperation between Chinese and African NGOs (Forum on China-Africa

Cooperation 2009). Since then, the Chinese government leadership has initiated several dialogue platforms that bear the official FOCAC logo and center around poverty eradication between hand-picked African NGOs and Chinese GONGOs.

The Chinese government nevertheless remains reluctant to liaise directly with African NGOs. According to a senior official of the CPC Central Committee's African Bureau, the government is uncertain of their individual objectives and, thus, cannot act to promote cooperation until these objectives can be ascertained (Anonymous official, Central Committee of the CPC 2011). This is because China's non-interference policy prohibits government civilians from establishing official communication with any NGO affiliated with opposition movements in Africa. As a result, only those African NGOs in good standing with their respective state governments or that are apolitical are invited to FOCAC seminars. Another prerequisite for NGOs to participate in these events is that they are welfare oriented and do not engage in government lobbying efforts, whether they are African or Chinese (Anonymous official, Central Committee of the CPC 2011). Consistent with China's domestic NGO management strategy, the Chinese government supports the participation of welfare service provision-oriented and apolitical nonprofit organizations to assist the state in fulfilling its duties, while scrutinizing NGOs with mission statements or modes of operation similar to those of political pressure groups. In its attempt to manage African NGOs' involvement in Sino-African relations, Beijing draws heavily on some GONGOs for their NGO-like appearance.

China NGO Network for International Exchange – GONGOs as a Diplomatic Tool?

Because most GONGO staff members are affiliated with the Chinese government, these organizations are generally viewed as trustworthy and capable of representing China on the global stage and advancing the interests of Chinese leadership (Anonymous official, Central Committee of the CPC 2011). For this reason, in 2005, the International Department of the CPC's Central Committee set up the China NGO Network for International Exchange (CNIE),⁶ an umbrella organization whose membership comprises other GONGOs and whose leadership includes experienced former Chinese diplomats. Despite identifying itself as an NGO, CNIE manages the involvement of foreign NGOs in China's foreign policy, liaises with NGOs in other developing countries on behalf of the CPC, and briefs Chinese leadership on the activities of international NGOs. Although CNIE's focus is not restricted to the African continent, most

of its efforts are aimed at African NGOs (Anonymous official, Central Committee of the CPC 2011).

In order to manage NGO involvement in Sino-African affairs on behalf of Chinese leadership and liaise between Beijing and African NGOs, CNIE organizes capacity building seminars and exchange programs for handpicked African NGOs and Chinese GONGOs. Issues of focus at these platforms include rural poverty relief, minority issues, and NGO affairs (China NGO Network for International Exchange 2010). Until recently, most of these activities had been small relative to other international NGO gatherings. However, in August 2011, CNIE held a sizeable NGO conference in Nairobi, an apparent demonstration that Chinese leadership is gradually increasing the number of resources used in efforts to charm African NGOs. In partnership with the Kenyan government agency for NGO affairs, CNIE convened more than one hundred NGOs from across Africa with twenty Chinese GONGOs⁷ to address issues of food security, HIV and AIDS, and climate change (Xinhua 2011). CNIE has also become a regular participant at international NGO conferences and summits. At the 2007 World Social Forum (WSF) in Nairobi, CNIE organized a panel discussion on China in Africa, where it attempted to assuage African NGOs' concerns over Chinese investments in Africa. However, a heated debate which ensued once the discussion had begun ultimately triggered CNIE's secretary general to fiercely defend the Chinese government's investment policy. Such reaction, in turn, provoked even more accusations by African NGO representatives. Since African NGOs are often critical of their own government elites, CNIE's overt defense of its government appears to have disqualified it as a serious dialoguing partner (Bello 2007).

As a consultant to Chinese government leadership, CNIE deputy secretary-general Shen Beili recently edited a book on African NGOs and Sino-African relations⁸ (Shen and Liu 2009) that is intended to serve as explicit guidance for Chinese state institutions dealing with Chinese investments in Africa (MqVU 2010). Despite CNIE's alleged mission of promoting NGO exchange, the handbook claims that most African NGOs serve as mouthpieces of Western interests and are potential threats to Sino-African relations. The piece contends that NGOs pose a "challenge to national sovereignty, an intervening factor in foreign relations [and] a factor in shaping a country's image" and references the United States' role in financing NGOs around the world, which, according to the publication, contributed to the overthrow of authoritarian regimes in various "color revolutions" (Shen and Liu 2009, 29, as cited in MqVU 2010). African

NGOs are further portrayed as influenced by Western governments, with the effect being that they are biased against China's emerging role in Africa (Shen and Liu 2009, 72, as cited in MqVU 2010), a dynamic which threatens to "damage China's international standing", "weaken China's soft power", and "erode the basis of China-Africa cooperation" (Shen and Liu 2009, 74-75, as cited in MqVU 2010). The piece recommends that the government develop a long-term strategy to manage African NGOs, utilizing GONGOs to improve outreach and propaganda efforts (Shen and Liu 2009, 74-75, as cited in MqVU 2010).

Despite its name, CNIE acts more as a gatekeeper than as a facilitator for African NGOs to become involved in Sino-African relations. CNIE's staff and projects are exclusively funded by the International Department of the CPC's Central Committee, which concurrently functions as the supervisor of CNIE's work. As the organization is still very young and comprised of former state officials and diplomats, it is perhaps not surprising that it is not promoting the engagement of critical African or Chinese NGOs in Sino-African relations. Instead CNIE is operating as it was designed – as a manager of international NGO affairs for the Chinese leadership.

Chinese-African People's Friendship Organization – Further Roles for GONGOs?

The Chinese-African People's Friendship Organization (CAPFA) was founded in 1960 by seventeen communist mass organizations. CAPFA's initial purpose was to promote official relations between China and African states during a time of significant diplomatic isolation. The organization is overseen by CPAFFC, which also functions as its supervisor. Since its founding, the organization has changed considerably. As recently as ten years ago, most of CAPFA's members were central government officials and their efforts were focused primarily on supporting the government's diplomatic initiatives.⁹ Today, two-thirds of its members come from non-governmental sectors including business, academia, and media. Such change has affected the organization's activities (Lin 2011).

Similar to CNIE, CAPFA hosts discussions with select African NGOs on poverty, public health, and other relatively uncontroversial topics. CAPFA and CNIE also cooperate in organizing the NGO fora affiliated with FOCAC. However, most CAPFA seminars focus on capacity building for African NGO staff and administrative clerks from local African governments that are financed through the Ministry of Commerce's aid budget. According to Secretary General Lin, CAPFA invites NGOs working on a variety of issues to participate in its discussions. To avoid inviting NGOs

that have been critical of China, potential African participants are vetted through CAPFA's long-standing networks of African government officials and so-called China Friendship Associations in Africa (Lin 2011).¹⁰ These associations were only recently founded in what appears to be a top-down approach of African governments and tend to be headed by former African ambassadors to China (People's Republic of China, Ministry of Foreign Affairs 2011).

Yet, compared with CNIE, liaising with African NGOs for the Chinese government is only a minor activity for CAPFA. CAPFA is increasingly engaged as a philanthropic charity arm for Chinese private and state-owned enterprises that work in Africa. The organization, for instance, frequently sends eye surgeons to African countries to operate on cataracts and related diseases. To finance these activities, CAPFA lobbies Chinese enterprises for donations (Lin 2011). Although CAPFA only recently began supporting charitable projects, philanthropic activities make up the organization's single greatest line of work, and these activities are expected to grow further. While philanthropy in general is still a relatively new and underdeveloped concept in China itself, some Chinese companies carry out charitable projects to improve their image within the African countries in which they work. Because Chinese government funding for GONGOs has decreased and Chinese companies are increasingly willing to invest in philanthropic activities but tend to lack the experience to do so, CAPFA views its future to be in charity. At present, only CAPFA's staffs' salaries are still paid by the Chinese government, and the operating budget must be raised separately for each charitable project on which the organization engages. CAPFA operations are now almost entirely funded by donations from private and state-owned enterprises. According to the secretary, this trend is expected to continue (Lin 2011).

In contrast to the tightly supervised CNIE, CAPFA operates with greater independence. While the organization is formally supervised by CPAFFC, CAPFA's daily work proceeds without external interference, as its president also functions as the Vice Chairman of the 11th National Committee of the Chinese People's Political Consultative Conference and, thus, enjoys the confidence of the Chinese government. The organization's institutional account has changed over time and today resembles that of a charity organization. Besides the need for innovative ways of securing resources outside of the state, this development can also be explained by the institutional experience of the organization's members. Secretary General Lin did not have previous experience in government, but began her career at CAPFA upon graduating from universities in China and abroad. She has appar-

ently found it natural to make use of her contacts to Chinese enterprises, African NGOs, and the Chinese government. She organizes workshops within this network in order to promote the idea of charity on which a growing part of CAPFA's institutional account is based (Lin 2011).

GONGOs are agents within the Chinese policymaking establishment that fulfill roles that cannot be performed by the state itself (Economy 1997). While CNIE acts as a liaison between China's leadership and African NGOs, CAPFA functions as a charity arm of Chinese enterprises. Both organizations' work is conducted in accordance with Beijing's aim of improving China's image in Africa. Chinese policy consultants, including scholars from the Central Party School of the CPC, advocate for greater GONGO involvement in international affairs so as to influence global public opinion toward China and as a means of projecting soft power (MqVU 2010). Thus, their engagement in Sino-African relations can be expected to grow in the coming years.

Global Environmental Institute (GEI) – Genuine NGOs in Sino-African Relations?

There are far fewer Chinese NGOs engaged on issues germane to Sino-African relations than Chinese NGOs focused on global environmental issues, such as climate change. The Global Environmental Institute (GEI) is the only privately initiated Chinese NGO whose work is related to Sino-African relations (Anonymous staff, Heinrich Boell Foundation 2010). Not surprisingly, the organization is focused on environmental issues. However, in addition to operating within China, GEI is also working on environmental protection programs in Southeast and South Asia. After being founded in 2004 by Jin Jiamen, a former government think tank researcher, the organization grew rapidly to over twenty employees, which makes it one of the bigger Chinese independent-run NGOs. Although GEI has not yet implemented projects in Africa, its work on environmental and social safeguards is directly related to Chinese resource exploitation in Africa countries.

GEI began its work on technically and economically feasible approaches to sustainable rural development in remote areas of China, including Tibet. Based on its success in these locations, GEI expanded its activities to Sri Lanka, where it teaches poor livestock farmers how to construct simple biogas facilities capable of producing electricity and otherwise increase their profits. In addition to technical capacity building and its program on climate change, GEI has also worked with Chinese local governments as well as the central government to advance its objective of environmentally

sound development. In partnership with the Party School of the Central Committee of the CPC and the United Kingdom's Department of Environment, Food and Rural Affairs, GEI has developed teaching material and curricula for a workshop on sustainable development for high-level policy makers in China. According to Ren Peng, a program officer in GEI's environmental governance project, this cooperation shows that the Chinese government welcomes GEI's work and research findings (Ren 2011). However, GEI is not just another GONGO. Its cooperative approach towards working with the Chinese government is shared by Western NGOs and foundations that want to successfully implement projects in China (Ford Foundation 2011, 16).

GEI has also developed a set of environmental and social safeguards that it recommends to Chinese enterprises working abroad and to China's financial institutions funding overseas investments. The organization has also run a program by the title "Integrated Policy Package for Overseas Chinese Enterprises" in research collaboration with the Environmental Planning Institute (EPI) at China's Ministry of Environmental Protection (MEP) and the University of International Business and Economics in Beijing. This ambitious project materialized out of successful cooperation with China's State Forestry Administration and the Ministry of Commerce, which in August 2007 resulted in the introduction of best practices for ecological protection as well as local community development for Chinese logging companies operating overseas (People's Republic of China, State Forestry Administration 2010). Since then these guidelines have been developed further, drawing on a comprehensive set of up-to-date international standards, including the Environmental Impact Assessments and Corporate Social Responsibility (CSR) norms. GEI also seeks collaboration with relevant enterprises. In order to consult on its policy suggestions, the NGO invited Chinese firms to the symposium "Environmental Policy for China's Overseas Investment and Aid", which was jointly organized with EPI in 2009. Moreover, GEI cooperates with Chinese companies to test its schemes in practice. It has, for instance, recently implemented environmental safeguards for hydropower plants in a pilot project with the Chinese state-owned hydropower firm Sinohydro at one of the company's dam construction sites in Lao PDR (Ren 2011).

This exception can again be explained by GEI's institutional account, which in many ways differs from those of most other Chinese NGOs. The organization was founded by Jin following her retirement from the Chinese Research Academy of Environmental Sciences, a government think tank under the MEP. She had decided to start her own NGO as she considered

it the best way in which to continue her work on environmental protection and implement innovative ideas. Making use of her professional contacts within international environmental foundations, she raised GEI's start-up money through fundraising events held in the United States. During this period, GEI could not yet legally raise funds in China. Yet Jin's professional networks, combined with her work experience within a Chinese GONGO, allowed her to overcome China's bureaucratic hurdles, which have often proved insurmountable to other NGO officials (Ren 2011).

Due to its recently expanded cooperation with Chinese central government entities, the NGO began receiving funds from the government which made up fifteen percent of its operational budget in 2009. And while the majority of GEI's staff has work experience in Chinese government environmental protection institutions, including the MEP and the State Forestry Administration, staff members also tend to have studied abroad and developed personal ties to international NGOs. These networks enable GEI to defray its operating costs through donations made by private sector and international foundations where Chinese government funding falls short. The organization's largest financial share comes from international sources such as the United Kingdom's Department of International Development, the World Bank's China Foundation for Poverty Alleviation, and the Rockefeller Brothers Fund (Ren 2011).

International funding enables GEI to focus on issues of international relevance without obvious direct references to local livelihoods in China. Yet GEI still maintains a focus on domestic issues and views its work on Chinese overseas investments as contributing to its work on environmental protection within China. According to its staff, the global activities of Chinese companies do not only offer the opportunity to hold these firms responsible to international best practices overseas, but also make it easier to subsequently demand for upgrading environmental and social standards of their operations in China (Ren 2011).

In constructing its institutional account relating to environmental governance of Chinese overseas investments, GEI's explanatory frameworks and self-portrayal play a central role. Its name "Global Environmental Institute" points to two other elementary concepts of the organization's identity alongside its international outlook. Its focus on the environment, which is regarded as apolitical in China, allows GEI to work on issues, such as CSR, that go far beyond environmental protection. Another relevant notion that can be derived from the organization's name is its scientific self-conception.¹¹ GEI officials do not conceive of the organization as a watchdog or advocacy group but instead as an expert body established to

draft policy recommendations for Chinese firms and the Chinese government. Its reports are accordingly developed for client consumption and are not publicized. Furthermore, the NGO portrays environmental safeguards for overseas investments to be in China's national interest by allowing the country's government to present itself as a responsible power on the world stage. Such an approach facilitates deep cooperation between GEI and state institutions and reflects the viewpoint of GEI's staff and Chinese officials that NGOs should support the government by providing expertise and not pursuing confrontational strategies such as naming and blaming (Ren 2011).¹² According to GEI's founder, the organization's role in augmenting the Chinese central government's foreign policy is largely responsible for the autonomy the government has granted to the organization. This autonomy, in turn, is GEI's main advantage over GONGOS, which are characterized by their hierarchical structures and strict procedures that lead to greater risk aversion and ultimately prevent the development of new and creative ideas (Hsu 2010, 272).

In sum, the case of GEI shows that earning Beijing's trust and securing stable financial resources are the most important prerequisites for autonomous engagement with issues touching upon Sino-African relations. GEI managed to establish such a position by positioning itself as a research and solutions-focused technical expert body, and utilizing professional staff members with networks in government and abroad who also possess a deep knowledge of China's policy-making. This institutional account explains how GEI is able to work on critical issues with relevance for Sino-African relations, which is exceptional for a Chinese NGO.

V. CONCLUSION AND POLICY SUGGESTIONS

While the role of Chinese NGOs and GONGOs in China's domestic socio-economic and political development has been the subject of many controversial debates among scholars from China and abroad (Wang and Liu 2009; Ho and Edmonds 2007; Lu 2007), the academic literature is lacking in regard to the role of Chinese NGOs and GONGOs in international affairs. This paper sheds light on this blind spot by studying their engagement in Sino-African relations and finds that their involvement is still very limited. However, it demonstrates that they are not completely absent and that independent Chinese NGOs are actually able to address critical downfalls of Sino-African relations under certain circumstances. In order to promote such engagement, the role of China's NGO community in international affairs should be studied further.

This paper finds that whereas African NGOs are increasingly vocal

about China's activities in Africa, Chinese NGOs and GONGOs remain absent from discussions of Sino-African relations. Yet a closer look reveals that some GONGOs are more and more focused on issues concerning Africa. This shift is supported by Chinese government leadership seeking to utilize GONGOs in a manner that promotes China's soft power and image amongst the African public and African NGOs. However, many African NGOs clearly recognize GONGOs, such as CNIE, as agents of the Chinese state. Nevertheless, some favorable African media coverage shows that CNIE's charm offensive towards African NGOs has not been totally unsuccessful in promoting China's image amongst the African public (Okulo 2011). Moreover, the charitable work of CAPFA for Chinese enterprises in Africa demonstrates that GONGOs can also have an interest in expanding their work agenda in Sino-African relations without direct project funding from the government. Many environmental and humanitarian GONGOs are developing an increasingly sophisticated international outlook. Although their numbers in Africa remain limited, Beijing's attempt to utilize them for managing NGO involvement in Sino-African relations and promoting China's image in Africa countries points to the growing importance of such organizations.

Most Chinese NGOs are, however, far from engaging in Sino-African relations, as they are generally neither capable of nor interested in working on international affairs. This is due mainly to China's restrictive political system, the immensity of domestic problems with which Chinese NGOs are currently preoccupied, lack of capacities, and a general lack of shared problems afflicting communities in both Africa and China. The case of GEI, however, shows that meaningful engagement by Chinese NGOs on issues with relevance to Sino-African relations is not only possible, but occurs under particular circumstances. A combination of professionalism, cooperation, international networks, and knowledge of the Chinese policy-making process has earned GEI the trust of Chinese government officials. This, in addition to the organization's secure finance base, has made GEI's work on international topics with relevance to Africa feasible. However, GEI's work is far from being exemplary for most other independent NGOs in China. There is perhaps little reason, then, to expect these organizations to contribute substantially to Sino-African relations in the near future. Nevertheless, the following suggestions can be drawn from these conclusions:

1. As Chinese NGOs are not able to engage in public relations and advocacy
 - particularly not on the sensitive issues affecting Sino-African relations
 - stable funding by international foundations and donors appears to be

a prerequisite for them to work on issues with relevance for Africa. To attract such funds, Chinese NGOs might intensify their focus on building professional capacities and relevant international networks. As the example of GEI illustrates, the educational background of an NGO's staff appears to be instrumental to achieving such a position.

2. GEI's work has shown that a cooperative strategy with state agencies and, thus, good networks within the state are necessary for Chinese NGOs to introduce ideas with the policy-making establishment. Potential international partners, however, often possess little knowledge of the circumstances in which Chinese NGOs are working, and expect more confrontational approaches. As the founder of GEI has remarked, a prevalent flaw of international donor cooperation with Chinese NGOs is the fact that approaches that do not match Western concepts are difficult to fund, even if they are suitable for the working conditions of Chinese NGOs (Hsu 2010, 268). To promote the involvement of genuine Chinese NGOs in Sino-African relations, international financiers should, therefore, be more open to unorthodox approaches.
3. Growing engagement of Chinese GONGOs in work related to Africa is a recent development. Parties with interest in Africa's development must determine whether Chinese GONGO engagement in Africa holds real benefits for improving issues in Sino-African relations, such as the conduct of Chinese firms operating in Africa. As for now, the case of CAPFA demonstrates that some GONGOs can gain partial autonomy from the Chinese government. Be that as it may, it is still obvious that charitable projects are carried out by Chinese enterprises for the primary purpose of promoting China's image in Africa and are, thus, in the interest of the Chinese government. To be sure, most charitable projects funded by Western companies are not driven by altruism alone. Nor is aid provided by Western governments detached from the policy interests of those states. Philanthropy alone, irrespective of its source, can, moreover, not fundamentally remedy structurally induced economic injustice. Yet the charitable work of Chinese GONGOs in Africa should not generally be dismissed, as it may still serve to alleviate poverty on the continent.
4. As African NGOs intensify their criticisms of Sino-African relations, Beijing is likely to attempt to improve its image in Africa. For this reason, the government has promised to promote engagement with NGOs at the FOCAC summit in 2009. However, as Beijing further scrutinizes domestic NGO development, it is perhaps natural that the government will seek to manage

the involvement of NGOs in Sino-African relations. On the whole, it appears that the Chinese government is actually attempting to limit NGO involvement in Sino-African relations. African NGOs should, therefore, temper their expectations for meaningful engagement with China's GONGOs and explore other opportunities for making their voices heard.

NOTES

- ¹ Western environmentalists often criticize green Chinese NGOs for their non-confrontational methods. This critique, however, ignores the gap between apolitical rhetoric and the actual activities of Chinese environmental NGOs, which often include advocacy and lobbying, as well as the restrictive political environment in which Chinese NGOs operate (Ren 2011).
- ² The All-China Women's Federation, for instance, enlisted women in community volunteering and promoted gender equality by assisting in family planning and protecting women's rights (United States Library of Congress 2012).
- ³ The Chinese Energy Industry Association (CREIA), for instance, has become an authority with respect to the setting of professional norms and standards in China's renewable energy sector, which acts with considerable autonomy from Chinese state institutions (Wu 2002, 52-53).
- ⁴ China Poverty Relief engaged in relief operations in post-Hurricane Katrina New Orleans and earthquake-afflicted Pakistan. The GONGO also constructed gynecological clinics in Sudan.
- ⁵ That these conceptions are not necessarily the same is evidenced by World Bank-financed international NGOs that combat desertification according to the World Bank's environmental policy blueprint in regions where there is no desertification happening on the ground (Bassett and Zuéli 2000).
- ⁶ Unlike other organizations and interview partners, CNIE has not responded to the author's numerous requests for an interview.
- ⁷ Among others, the All-China Women's Federation, the Chinese People's Association for Peace and Disarmament, the Chinese Association for International Understanding, and the All-China Environment Federation participated for the Chinese side.
- ⁸ Original title: 非洲非政府组织与中非关系 (MqVU 2010).
- ⁹ In contrast to CNIE, CAPFA members are individuals, not organizations.
- ¹⁰ The first China Friendship Associations emerged in Europe and have a long tradition of promoting unofficial cultural relations with China. The British Society for Anglo-Chinese Understanding, for instance, dates back to the period of public activism against the imperial Opium Wars of the 19th century (Society for Anglo-Chinese Understanding 1999).

- ¹¹ This becomes even more explicit in its Chinese name 全球环境研究所, in which 研究所 literally translates as “research institute”.
- ¹² Naming and blaming is a popular strategy among Western and African NGOs in their attempts to enforce international human rights and environmental laws and norms by publicizing violations of governments or firms and urging reforms or sanctions.

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7

PRESCRIBING A HEALTHY DOSE OF SKEPTICISM TO REVEAL A WEALTH OF POSSIBILITY: CORPORATE SOCIAL RESPONSIBILITY AND THE CHALLENGE TO IMPROVE ACCESS TO MEDICINE IN LOW-INCOME COUNTRIES

Tim Wilson

This paper advances a broader conception of corporate social responsibility (CSR) in dealing with problems of access to medicine in low-income countries. In particular, it casts a critical eye over CSR initiatives that have been used to improve access to essential medicine. Many of these initiatives are not within the traditional realm of pharmaceutical CSR, which has primarily entailed drug donations or price reductions. This paper makes the case that the “traditional,” redistribution-focused CSR is often inadequate. Instead, a broader conception of CSR – combined with a healthy dose of skepticism – will enhance the extent to which CSR can be leveraged to improve access to medicine in low-income countries.

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One-third of the world's population lacks access to essential medicines (Hogerzeil and Mirza 2011). Meanwhile, the combined profit of the five largest pharmaceutical companies was more than \$32 billion in 2010 (CNN Money 2011). This juxtaposition does not sit comfortably with most people, including many in the pharmaceutical sector.

A typical response to this ugly situation is to demand some form of redistribution from the pharmaceutical sector to the developing world, typically in the shape of drug donations or reduced prices. The purpose of this paper is to caution against such an approach. In some instances redistribution can have a powerful and beneficial effect in improving access to essential medicines. However, in many other cases, it simply fails to address the market failures that are behind this problem. Instead of merely focusing on redistribution, a broader conception of corporate social responsibility is required.

Specifically, this paper analyzes the role that for-profit corporations—either independently or voluntarily in conjunction with non-profits, governments, or multilateral organizations—can play in improving access to medicine in low-income countries. It argues that corporate social responsibility can be an important force to improve health outcomes around the world, including in low-income countries. However, in order to realize the full potential of corporate social responsibility in this area, it is necessary to move beyond drug donations and price reductions. Contrary to popular belief, these forms of redistribution are not a panacea. In fact, many well-publicized initiatives of this kind should be viewed with a high level of skepticism.

Awareness of this complexity opens the door to a wealth of different ways in which corporations can be involved in providing solutions. Corporations can be involved in addressing failures on the demand-side and supply-side of the markets for medicine. They can also team up with governments, non-profits, or multilateral organizations. This paper provides an overview of these initiatives and briefly discusses some of their implications.

To be sure, this paper does not argue against price reductions or redistribution in all cases. In fact, there are many situations in which these measures can have lasting benefits, such as in the case of anti-retroviral drugs. Instead, this paper argues for a more nuanced approach in which corporate initiatives are viewed with a critical eye (or a healthy dose of skepticism). This approach will make it more likely that voluntary corporate initiatives result in meaningful improvements in access to medicine in low-income countries.

The paper is structured as follows. Section I juxtaposes the access to

medicines problem with the immense wealth of the pharmaceutical sector. Section II explores the limitations of using drug donations or price reductions to address the access to medicines problem. Section III explores other ways in which corporations can be involved in addressing the problem. Specifically, it provides examples of initiatives that address market failures in both the supply and demand for essential medicines. Section IV draws implications from the preceding analysis. Section V concludes.

I. INTRODUCTION AND MOTIVATION

A brief glance at the global access to medicines situation suggests that great need sits alongside great wealth.

Great Need – The Access to Medicines Problem

In the first exact measure of access, a recent study published in the *Lancet* found that within thirty-six low- and middle-income countries, public sector facilities had essential medicines in stock only one-third of the time and private sector facilities had them in stock only two-thirds of the time (Cameron et al. 2009). The WHO currently estimates that one-third of the world's population has no access to essential medicines (Hogerzeil and Mirza 2011).

The result is a situation in which 1.7 million children die from illnesses that could have been prevented by the use of vaccines each year. Most of these children are in low-income countries (GAVI 2011). At the same time, the total reported cases of malaria each year rose from around 34 million in 1991 to 94 million in 2006 (WHO 2011c). This is despite the fact that there were significant improvements in malaria drugs over the same period. In all, the global inequalities in accessing essential medicines are a key reason why the life expectancy in Sub-Saharan Africa is 45, while in Switzerland, it is 75 (UNDP 2011).

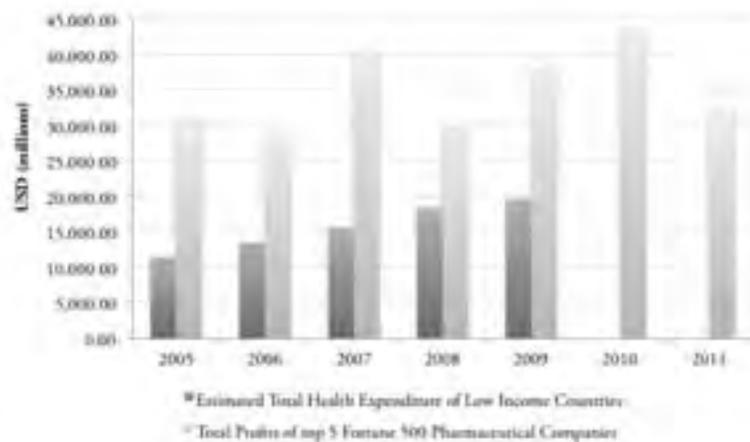
At the same time, it is important to note that access to medicine is not a problem confined to low-income countries. Considerable barriers exist throughout the world, including in affluent nations. Nonetheless, in the interest of achieving greater focus, this paper concentrates solely on access to medicine in low-income countries.

Great Wealth – Pharmaceutical Profits

In contrast to the bleak picture facing the one-third of the world's population who lack access to essential medicines, the pharmaceutical industry is currently one of the most profitable industries in the world (Heal 2008). The value of the global pharmaceutical market is expected to have grown

to \$880 billion by the end of 2011 (IMS Institute 2011a). The total global spending on medicines is expected to increase to \$1.1 trillion by 2013 (IMS Institute 2011b). Table 1 places the profits of the pharmaceutical industry in perspective.

Table 1: Pharmaceutical Industry Profits and Health Expenditures



Sources: CNN Money 2011; World Bank 2011b

This comparison serves to illustrate a simple point: the pharmaceutical industry's resources are of sufficient magnitude that they can have a considerable influence on health outcomes in low-income countries. This is especially the case given that the revenues of the pharmaceutical companies are a great deal larger than the profits reported above. In 2008, the revenues of the top five Fortune 500 pharmaceutical companies were \$182 billion; in comparison, health care expenditures of low-income countries were merely \$18 billion that year. If only a small fraction of these revenues were channeled toward meaningful medical initiatives in low-income countries, significant improvements could be achieved.

To be clear, however, this paper does not argue that corporate profits should necessarily be redistributed to low-income countries, voluntarily or otherwise. As Section II will demonstrate, lower drug prices or the donation of drugs will not always address the root cause of restricted access to medicines. Instead, Table 1 suggests that using corporate social responsibility initiatives to make *more effective use* of the pharmaceutical industries' ample resources could have significant payoffs. Before discussing these payoffs though, it is useful to briefly define corporate social responsibility.

Corporate Social Responsibility Defined

This paper refers to any initiative in which a for-profit, private sector organization voluntarily adjusts its behavior to achieve outcomes that are more aligned with the interests of society or the environment as corporate social responsibility (CSR). As such, CSR may take many forms. It includes corporations undertaking initiatives that generate profits if the initiatives also increase beneficial outcomes for society or the environment. Section III provides many examples of this.

CSR is not without controversy, particularly when it is related to development challenges in low-income countries. To some, CSR holds great potential. To others, the potential for CSR to contribute to the development challenge is overstated (Jenkins 2005) and the ability of private firms to contribute to development is significantly constrained (Frynas 2005). A focus on CSR may also distract from the important task of addressing economic, political, and social problems such as poor local governance (Frynas 2005).

This paper contributes to this literature by demonstrating that, regardless of the merits or otherwise of CSR, it is happening in numerous different ways in the area of access to medicines. If we look beyond the commonly conceived notion of CSR in this area (a voluntary reduction in drug prices), we notice that there are a great deal of different initiatives and possibilities. This paper also explores the implications of these multiple approaches. In so doing, it hopes to shed light on how CSR can best be encouraged in order to promote greater access to medicine in low-income countries.

II. A HEALTHY DOSE OF SKEPTICISM

The Case for Demanding Lower Prices

Given pharmaceutical companies' large profit margins, redistributing profits in the form of cheaper drugs is tempting. This argument gains further traction after considering that many pharmaceutical companies operate as monopolists. In short, this means that they are able to restrict the quantity of drugs that they supply so that they can maximize profits, even though this may reduce the welfare of consumers (Krugman, Obstfeld, and Melitz 2011). Although this may be justified on the grounds that pharmaceutical companies need to recoup significant fixed costs from the research and development required to get the drug to market, there are situations in which pharmaceutical companies are able to charge prices that go well beyond meeting these costs. These situations fuel the flames of public demand for lower prices.

At the same time, there are many high-profile examples of circumstances

in which pharmaceutical companies have lowered the prices of their drugs or given them away for free. Perhaps one of the most remarkable of such cases is that of onchocerciasis, or river blindness. River blindness is an insect-borne disease transmitted by black flies. It is a major cause of blindness in many African countries (WHO 2011a).

In the 1980s, scientists at Merck realized that there was a possibility that one of their veterinary drugs, ivermectin, could be used to treat it. Despite being aware that the expected customers of this drug would be unlikely to be able to afford to purchase it themselves, the company invested over \$200 million in its development. Merck sought to come to a supply arrangement with some of the large multilaterals, including the World Health Organization (WHO). Yet negotiations fell through. Instead, in 1987, they offered it for free to anyone who needed it (Bollier, Weiss, and Hanson 1991).

Between 1988 and 1990, treatment plans for river blindness had been approved and/or drugs had been distributed to 1.5 million people, many in some of the world's hardest-to-reach places (Bollier, Weiss, and Hanson 1991). By 2001, in combination with insect control, the drug treatment had alleviated river blindness in over 200 million people, mainly in Africa (Drisdelle 2007). Since then, river blindness has been entirely eliminated as a public health threat in West Africa (WHO 2002).

There are numerous other high-profile examples of drug donations. Pfizer has donated 225 million treatments of Zithromax (azithromycin) to treat trachoma (Bansal 2011). Trachoma is the cause of blindness for an estimated six million people and 150 million people are in need of treatment (WHO 2011b). Novartis has donated more than 400 million doses of Coartem (artemether and lumefantrine) to treat malaria. Meanwhile, GlaxoSmithKline has recently promised to donate one billion tablets of Albenza (albendazole) annually to treat worms (Bansal 2011).

Accordingly, it is no surprise that donations or voluntary reductions in prices are often perceived to be essential in addressing the access to medicines problem. However, there are many reasons why this is not the case.

Other Barriers to Access

To begin, the binding constraint is not always affordability. There are many markets in which the treatment is exceedingly cheap; it is other problems that are impeding access. The case of Neglected Tropical Diseases (NTDs) is instructive in this respect. NTDs are parasitic and bacterial infections that are most common in the poorest areas of the world. They are estimated to affect around one billion people at the present moment (Liverpool School

of Tropical Medicine 2011).

One such NTD is schistosomiasis, caused by worms that live in the blood of humans and lay eggs that cause numerous debilitating symptoms. It is estimated that schistosomiasis affects more than 207 million people worldwide (WHO 2010). The treatment for schistosomiasis, like for most NTDs, is very cheap. Merck has developed a drug that is now available for 8 cents per tablet (Bansal 2011). It has been estimated that an integrated control program to treat seven major NTDs in Africa would cost about 40 cents per person per year. This is in contrast to the treatment of other diseases, such as HIV/AIDS and TB, which each cost about \$200 per person per year (Molyneux, Hotez, and Fenwick 2005). This suggests that demands for pharmaceutical companies to reduce their prices to improve access to NTD medicines are misguided. Prices are already very cheap. Yet the problem remains.

Instead, the constraints to effective access are far more complicated. In particular, a lack of awareness and inadequate public education campaigns are inhibiting the effective delivery of the drugs to many areas. Patients often refuse treatment for fear of unfounded side effects or potential conspiracy theories. In Uganda, the treatment for schistosomiasis and soil-transmitted helminthes is increasingly being rejected because of inadequate understanding and education, among other factors (Allen, Parker, and Hastings 2008). In Tanzania, distribution of tablets for schistosomiasis and soil-transmitted helminthes to schools provoked riots in 2008 as locals distrusted the medicine being provided to their children (Allen and Parker 2011). There are also concerns that the method of distribution of the drugs in some areas may be causing active resistance to the treatment (Allen and Parker 2011). The donation of free treatment will not address these problems. Yet Merck has recently pledged to donate 200 million praziquantel tablets (Burns 2010).

Limited Circumstances

Yet even when affordability is the main problem inhibiting access to medicine in a given market, it is often not possible for corporations to make large-scale donations. The directors of most corporations, including those in the United States, are generally required by law to focus on maximizing shareholder value. Granted, this obligation is arguably less stringent than it once was (Nelson 2011). Nonetheless, at the very least, the obligation places an upper bound on the extent to which corporations can engage in corporate philanthropy.

At the same time, most of the landmark cases of large-scale dona-

tions are limited to unusual circumstances. For example, Merck's famous contribution to the eradication of river blindness occurred at the same time that the company was generating significant revenues from veterinary sales of drugs using the same active ingredient (Bollier, Weiss, and Hanson 1991). Companies may not be able to "afford" such generosity in other circumstances. Further, at the time of the development of the drug, Merck's workplace environment was very progressive and employees were encouraged to think of the work as contributing to the alleviation of disease and suffering worldwide (Bollier, Weiss, and Hanson 1991). This workplace environment does not appear to have persisted and the likelihood of Merck investing \$200 million in a drug that is not expected to generate any revenue seems remote in today's environment.

A Healthy Dose of Skepticism

Yet even where affordability is the main constraint and the circumstances exist such that it is possible for corporations to make large-scale donations or lower their prices, it may still not be the most desirable response. In particular, the very fact that corporations are not primarily motivated by altruism suggests that they might not be the ideal organizations to address the issue. For example, strategic donations of patented drugs can be used to consolidate loyalty with patients, clinicians, and NGOs that can be exploited after the donation (Baker and Ombaka 2008). Donations can also be used to retain monopoly power or to distort the market in ways that will undercut generic drugs when they are introduced (Baker and Ombaka 2008). Thus, even the mere donation of drugs may have self-serving consequences that are not consistent with the interests of the recipients.

An important example is the case of Gleevec, a treatment for leukemia and stomach cancer, which was developed by Novartis. Given the benefits of the drug, Novartis launched an international assistance program to improve access and provide free treatment in certain areas. However, within two years, concerns were raised about the program. To begin, the program's reach was very limited – only eleven people in the forty-nine poorest countries actually received the free medication. More importantly, some patients only received a portion of the treatment for free and were left to fund the rest. Meanwhile, other patients were encouraged to become "advocates" for the treatment (Strom and Fleischer-Black 2003). For many recipients, the donation system was no more than a marketing campaign. In New Zealand, the thirty patients receiving Gleevec for free were told that their supply would end. This meant that their only financially viable option was to apply pressure on Pharmac – the national pharmaceutical

purchaser – to fund the drug. Only months before relenting to the building public pressure and agreeing to purchase the drug, Pharmac criticized the maneuver as "a marketing exercise" (PHARMAC 2002).

At the same time, Novartis warned governments that the free medications would stop if they allowed local producers to make a generic version. In India, Natco Pharmaceutical did just that. In response, Novartis is challenging India's domestic patent legislation in court. Advocates for access to medicine such as Médecins Sans Frontières fear that this Supreme Court battle could compromise medicine production for the developing world in general because India is such an important producer of generics (Newman 2011).

This example demonstrates that even when the donation of drugs has the potential to make a positive impact, there is a risk that corporations will fail to realize this potential because they will be driven by other incentives, namely profits.

Summary

Donating drugs or lowering prices does not deliver a silver bullet for improving access to medicine. This is because in many markets, the price of drugs is already very low. In other markets where the price is high, the ability of corporations to make such donations is often limited. In particular, prevailing economic conditions and the obligation to shareholders may render drug donations infeasible. Yet even when they are feasible and the price of drugs is high, they may still not be the best response. The donation of drugs or the lowering of prices may not result in the best outcome for consumers, but rather, the best outcome for the corporation.

Granted, there are isolated circumstances in which the voluntary reduction of prices can realistically make a significant contribution to improving access to medicine, as illustrated by Merck in the case of river blindness. However, the key point to note is that lower drugs prices are not a comprehensive solution to the access to medicines problem. Instead, the key to utilizing CSR in improving access to medicines is to embrace the complexity of both the problem and the solution.

III. A WEALTH OF POSSIBILITY

There is a vast array of current and potential CSR initiatives that can contribute to improving access to medicine in low-income countries. To place these initiatives within a framework, it is useful to consider the various markets for medicines. On the one hand, there are market failures that impede access on the supply-side of essential medicines. On the other

hand, there are market failures on the demand-side, as well. CSR initiatives can be directed towards addressing the failures on either (or both) sides.

Supply-Side CSR Initiatives

Research and development

There is a deficit of research and development into the medicinal needs of low-income countries. This deficit arises from the fact that it is very expensive to invest in the necessary steps to bring a drug to market. It is estimated that the cost to develop a drug to treat infectious diseases or rare conditions is in the vicinity of \$100-200 million. In the case of developing a completely new drug or a new molecular entity to treat a chronic illness or disease, the average cost rises to about \$900 million (The Economist 2003).

These massive costs encourage large pharmaceutical companies to only invest in drugs that are expected to generate very large revenues (The Economist 2003). This results in a situation where approximately 90 percent of medical research and development efforts are targeted at only 10 percent of the global burden of disease (Médecins Sans Frontières and Drugs for Neglected Diseases Working Group 2001). It is also estimated that as little as 1 percent of the drugs that have been brought to market over the past thirty years were developed for tropical diseases or tuberculosis (Médecins Sans Frontières 2011).

While government policy and non-governmental agencies can take steps to address this imbalance, CSR can also contribute in various ways. First, pharmaceutical companies can voluntarily invest in research and development on these issues despite being aware that it may be unlikely to generate profits. They may do this to generate positive publicity or to increase their exposure to potential customers in new parts of the world. For example, Astra Zeneca has set up a research institute in Bangalore, India. The first research priority of the institute was tuberculosis (Silicon India News 2007).

At the same time, pharmaceutical companies can team up with non-profit research institutes or establish other partnerships to research and develop new drugs. This allows the pharmaceutical companies to leverage the research power of the non-profit institutes while retaining the use of corporate strengths such as efficiency. These arrangements can involve patent pools, where companies cross-license patented products and technologies to facilitate collaboration (Bansal 2011). This approach may be particularly effective in the area of NTDs, where big pharmaceutical companies typically remain reluctant to invest in developing new drugs on their own

(Bansal 2011). Partnerships for addressing NTDs have increased fivefold since 2005, to a point where 80 percent of research efforts are conducted through collaborations (Bansal 2011). As one example, Novartis has formed a team with various organizations, including the Swiss Tropical and Public Health Institute (Bansal 2011). On November 17, 2011, they announced that they have discovered a new class of dual-acting antimalarial compounds, called imidazolopiperazines (Novartis 2011).

Yet CSR in this area does not need to be confined to spending on research centers or partnerships. Pharmaceutical companies can also allow their scientists to contribute their time to research projects. For example, University of Sydney scientists were running a project to use open-source methodologies to develop a new version of praziquantel that would have fewer side effects (Woelfle, Olliaro, and Todd 2011). They sought external assistance as part of the open-source methodology. In response, 70 percent of the external input came from for-profit pharmaceutical companies (Bansal 2011).

Finally and perhaps most importantly, the research and development deficit can be addressed in ways that do not require corporations to proactively change their behavior. In particular, the establishment of new market infrastructure can provide improved incentives for research and development. The most prominent example is the Global Alliance for Vaccines and Immunization (GAVI), which has transformed the market for vaccines in low-income countries. The GAVI brings together the buying power of major multilaterals, including the WHO and the World Bank, as well as major private donors, such as the Bill and Melinda Gates Foundation, and donor governments to negotiate the purchase of vaccines on behalf of low-income countries. This simultaneously creates demand in some markets and lowers prices in other markets. When this occurs, it gives pharmaceutical companies an incentive to invest in developing the vaccines. In this way, the profit-centered participation of pharmaceutical companies remains socially responsible in itself (GAVI 2011; Heal 2008).

Voluntary monitoring of drug safety and ethical advertising

A further restriction to effective access to medicines is a lack of capacity. Many low-income countries lack the health infrastructure and regulatory capacity to provide adequate oversight of drug safety and ethical advertising (Bluestone, Heaton, and Lewis 2002). This can result in unexpected side effects being missed or unsafe prescription practices being followed, among other concerns. The Access to Medicines Index estimates that more than 40 percent of the pharmaceutical products that it monitors have significant

quality issues when they reach patients in low-income countries, including contamination and low levels of active ingredients (Mehrpooya 2010).

At the same time, pharmaceutical companies may often be tempted to cut corners and seek approval to supply in low-income countries without adequate scientific testing. The opportunity arises from the fact that the relative need for the medicine in low-income countries tends to be much higher than in developed countries, so potential side effects and risks are more likely to be overlooked in the approval process. For example, GlaxoSmithKline launched a new vaccine for rotavirus in Mexico rather than in potentially more profitable developed country markets. This may have been because it was more likely to gain expedient approval there (Jack 2007). Similarly, the Drugs for Neglected Diseases Initiative and Sanofi-Aventis (a French pharmaceutical producer) launched a low-cost drug for malaria in Morocco, where it gained approval without meeting the testing standards of developed countries. This use of different safety standards for different parts of the world was viewed with concern by the Medicines for Malaria Initiative (Jack 2007).

Consequently, CSR initiatives in this area can take the form of voluntarily abiding by higher standards than those required by domestic legislation. This could involve investing in the monitoring of drug safety as well as ensuring the ethical delivery of the drug. As it happens, non-governmental organizations and observers have increasingly called for pharmaceutical companies to undertake this form of CSR, although the uptake has been limited (Bluestone, Heaton, and Lewis 2002). This is because, as will be discussed in Section IV, some forms of CSR have different payoffs than others. In particular, it may well be that establishing monitoring systems for potential side effects does not attract the same level of positive media attention as donating drugs free of charge.

Improving the supply chain infrastructure

An additional hurdle to effective access to medicines in low-income countries is that deficiencies in the supply chain infrastructure can often lead to prohibitively high supply costs. In the most recent human development report, it is estimated that 35 percent of the world's poor lack access to clean water (UNDP 2011). If clean water cannot be supplied to the population, the likelihood of delivering fragile medicines seems remote. Oxytocin, for example, is a medicine that is routinely used in nearly all childbirths in developed countries. It prevents and treats excessive bleeding after childbirth. It is not only inexpensive but often life-saving. Unfortunately, however, it must be kept between 2 and 8 degrees Celsius. This cannot be

achieved in many areas of the world that have unreliable electricity supply or inadequate health facilities (PATH 2008). This contributes to a situation where the maternal mortality ratio is 619 deaths per one hundred thousand live births in Sub-Saharan Africa, while it is 5 or below in many European countries (UNDP 2011).

CSR can contribute to improving supply chain infrastructure in various ways. GlaxoSmithKline has recently committed to invest 20 percent of profits originating from least developing countries towards assisting frontline health-workers in those countries (GlaxoSmithKline 2011). Similarly, Merck was able to ensure the distribution of its treatment for river blindness to some of the most remote areas of the world by an Independent Distribution Committee, which had expert independent academics serving on it (Bollier, Weiss, and Hanson 1991). In this way, the Committee was able to utilize the knowledge and technical expertise of Merck, while insulating the company from political risk (Bollier, Weiss, and Hanson 1991).

Yet CSR initiatives in this area do not have to be confined to pharmaceutical companies. For example, Simon Berry of Coca-Cola initiated a very promising CSR initiative in this area when he noticed a perplexing contrast. Specifically, he noticed that bottled soda drinks, including Coca-Cola, can be purchased throughout the world, even in remote areas. Yet in many of those areas, huge numbers of children die of dehydration and diarrheal diseases that can be treated with simple medication. If the supply chain for soda works so well, why not use it for medications? As a result, Simon Berry designed the AidPod and set up ColaLife, a non-profit organization. The AidPod fits in between the bottles of soda in the usual transport crate and contains anti-diarrheal supplies. It is tamper-proof and can be tracked with mobile technology. The medications are distributed along with the soda bottles and can reach communities that previously had no access. While still in its early stages, there is potential for the initiative to be replicated and considerably up-scaled (Altman 2011; Colalife 2011).

At the same time, there is significant potential for mobile health systems to be used to enhance the capacity of health systems in low-income countries (Glassman 2011). The *Lancet* recently reported a randomized control trial in which patients with HIV were sent weekly SMS messages, which they had to respond to within 48 hours. This resulted in significant improvements in adherence to anti-retroviral treatment as well as suppression of the virus (Lester et al. 2010). Corporations can assist such initiatives by providing financial and technical support.

Reduction in prices

Notwithstanding the earlier discussion about the limits of this type of CSR, there are some circumstances in which the voluntary reduction of prices can be a very effective tool in improving access to medicines. Perhaps the treatment of HIV/AIDS is the best example.

Pharmaceutical companies first developed anti-retroviral treatments (ARVs) in the late 1980s. While they do not cure AIDS, ARVs manage the illness and can allow patients to live full lives. Yet ARVs are very expensive, particularly those subject to patent. In fact, patented ARVs were prohibitively expensive for many countries. This led to a considerable degree of public pressure on pharmaceutical companies to relax their patents in order to meet the massive public health concern that AIDS presented (Heal 2008). Many pharmaceutical companies responded. In combination with other factors, this resulted in a tenfold increase in the number of people receiving ARVs in low- and middle-income countries in the five years leading up to 2009 (WHO 2009). There is now a global strategy to reduce new HIV infections and AIDS-related deaths to zero, which involves the use of ARVs (UNAIDS 2011).

The reduction of prices may be having a beneficial impact in other markets, as well. Novartis has delivered 400 million doses of anti-malarial treatment at cost price to around sixty malaria-endemic countries for public use (Novartis 2011). The Clinton Foundation has also been assisting producers to reduce prices of anti-malarial drugs and HIV diagnostics (William J. Clinton Foundation 2011).

Yet reduced prices do not always have to be philanthropic or driven by public pressure. Instead, the development of new market infrastructure can also reduce the price of drugs. In such a case, the mere participation of pharmaceutical companies may be CSR in itself. As discussed above, institutions such as GAVI have been able to negotiate much lower prices of vaccines in market transactions. The Pan American Health Organization (PAHO) is another example. It has established the Revolving Fund, a bulk-purchasing arrangement for vaccines and related supplies. The Revolving Fund procures these supplies at lower prices than smaller and less-developed countries could if they negotiated them on their own (PAHO 2008). Individual PAHO member countries pay the overall cost of the vaccines plus a 3.5 percent surcharge. This additional amount goes toward administration costs, as well as credit for member states that may not be able to finance their required immunization schedule (PAHO 2011). In the past, pharmaceutical companies have successfully lobbied against the establishment of similar institutions in the United States (Heal 2008).

Thus, the mere fact that they are now participating in these institutions is socially responsible in itself. Such participation is also an increasingly significant contributor to improving access to medicine.

Demand-Side CSR Initiatives

Financial support

Suppose that the markets for essential medicines were subject to perfect competition such that pharmaceutical companies produced and sold drugs for the lowest sustainable price. In many cases, consumers in developing countries may still not be able to afford them. For example, medicines for diabetes are unaffordable for the majority of least developed and developing countries (Mehrpouya 2010). Thus, even if the supply side of markets for medicine is working perfectly, binding financial constraints may still limit the ability of the markets to allocate the medicine to those who most need them.

CSR initiatives can be one way of addressing these constraints through financial transfers or providing support to organizations that operate on behalf of the financially disenfranchised. For example, Chevron has pledged \$55 million to the Global Fund (The Global Fund 2011a). The Global Fund aims to provide large-scale prevention, treatment, and care for AIDS, tuberculosis, and malaria. It estimates that it saves one hundred thousand lives per month (The Global Fund 2011b).

Education

A further constraint to effective access to medicines is education. As noted above, many consumers in low-income countries may be unaware of certain health risks or may be misinformed about treatment effects. This has constrained the uptake of medicine in many areas, including Uganda and Tanzania, where the treatment for schistosomiasis was rejected, sometimes violently.

Corporations can be involved in addressing the education barrier. In fact, they have been particularly active in doing so in the area of HIV and AIDS. For example, the South African Business Coalition Against HIV/AIDS works with businesses and government agencies to encourage and promote HIV testing for workers (Little 2010). In addition, the Standard Chartered Bank "Living with HIV" program has established a network of employee volunteers called HIV Champions. The Champions deliver workshops and education material around the world, including training other organizations in establishing their own HIV education programs. So

far, they have provided education programs in India, Nigeria, Singapore, and Sri Lanka, as well as educated ten thousand students in Cote D'Ivoire (Standard Chartered 2009).

Holistic initiatives

In addition to addressing specific demand-side or supply-side failures, corporations can also develop holistic initiatives to simultaneously address failures on both sides of the market. A useful example is Pfizer's "Mobilize Against Malaria" program. Launched at the Clinton Global Initiative in 2006, the \$15 million program is aimed at improving both the supply of and demand for malaria treatment in Ghana, Kenya, and Senegal. In Ghana, for instance, Pfizer conducted baseline research and then worked with a local NGO and international NGOs to raise community awareness of malaria symptoms and the importance of early treatment (demand-side), while also training local health care workers (supply-side) (Pillai 2011).

Standard Chartered Bank's "Living with HIV" program also has a holistic component. It simultaneously addresses the education barrier and the supply chain infrastructure barrier through the use of ATM machines. Specifically, the bank uses ATM machines to provide information on local HIV testing centers as well as encourage people to take the test. The ATM messages are used in Thailand, Malaysia, and Dubai (Standard Chartered 2009).

Summary

Section III has demonstrated that CSR can contribute to addressing the problems regarding access to medicines in many different ways. Just as there are numerous and varied barriers to access to medicine, there are also numerous and varied ways in which CSR can be involved in the solution. In particular, Section III gave examples of CSR initiatives that address failures in the supply of medicines, initiatives that address failures in the demand for medicines, and initiatives that address both. All in all, it makes for a promising, yet complicated picture. Having observed this complexity, we will now explore some of its implications.

IV. ANALYSIS

The key theme of the preceding analysis was that there are a variety of ways in which corporations can be involved in addressing the key barriers to access to medicine. This section briefly discusses some implications that flow from this point.

Looking Beyond the Pharmaceutical Sector

Since the barriers to accessing medicine do not lie solely within the production of drugs, corporations outside the pharmaceutical sector can contribute to their realization. Banks and business coalitions can contribute to raising awareness, as in the case of Standard Chartered's "Living with HIV" program. Meanwhile, energy companies can provide financial support for organizations that generate demand for essential medicines, as in the case of Chevron and the Global Fund.

The fact that these corporations can contribute to improving access to medicines may be liberating for anyone seeking to pressure corporations into doing more good in low-income countries. Large energy companies, for example, have massive infrastructure investments in many oil-producing countries with poor health outcomes. Perhaps their resources could be harnessed towards improving access to medicine in those areas.

At the same time, many CSR initiatives have involved partnerships between non-profit organizations and for-profit corporations. Chevron's partnership with the Global Fund, the Clinton Foundation's work with producers of anti-malarial drugs, and Novartis teaming up with the Swiss Tropical and Public Health Institute are just a few examples. This illustrates that non-profit organizations can play an important role in channeling the potential of CSR in some areas.

In short, the key point is to avoid a myopic focus on pharmaceutical companies. In many cases, corporations in other sectors, NGOs, or even other actors such as governments, can play a key role in harnessing the potential for CSR to improve access to medicines.

The Value of a 'Diagnosis-Driven' Approach

The absence of any single solution to the access to medicine issue also suggests that CSR initiatives should not be accepted at face value. In some cases, the CSR initiative may do little to address the underlying problem driving the limited access to medicines in a particular market. For example, Merck's recent commitment to donate 200 million tablets to treat schistosomiasis should be viewed within the context of the limited uptake of the drug in many areas, not to mention the riots that its distribution sparked in Tanzania. Instead, the most effective form of CSR initiative in this area would begin by identifying the problem and then designing the solution so that it best addresses that problem. In a way, this is no different from the approach expected of any medical professional: a diagnosis-driven approach.

The Value of Benchmarking

At the same time, the incentive for corporations to adopt a diagnosis-driven approach is limited. In most jurisdictions, their underlying mandate is to generate profits. CSR initiatives should be viewed within this context. In particular, when corporations are faced with multiple solutions to address the same problem, they have an incentive to choose the solution that will ultimately maximize profits. This may not always be the solution that is best suited to address the problem. In this regard, Novartis' strategic donation of treatment for leukemia and stomach cancer springs to mind, particularly given its relationship to potential future profits.

Meanwhile, consumers, shareholders, and other end-users of CSR information are not always in the best position to critically analyze whether the initiative is well-designed. In many cases, it will require a prohibitively large investment of time or an excessively high level of previous knowledge. The combination of these two factors suggests that full transparency is not enough. Transparency alone will not ensure that CSR initiatives are adequately scrutinized and judged and thus effective.

Instead, CSR rating systems or benchmarks are necessary. In particular, a method for taking into account all relevant information and then using expert skills and knowledge to analyze the suitability of a CSR initiative will be much more likely to provide the right incentives for corporations than the mere disclosure of information. In fact, the Access to Medicines Index seeks to do exactly that. Delivered by an independent, non-profit organization that does not receive any money from pharmaceutical companies, the Access to Medicines Index provides an annual ranking of pharmaceutical companies in terms of their efforts in this area. This analysis suggests that the work of the Index is highly important in leveraging the potential for corporations to improve access to medicines. It is a conclusion that is also consistent with previous work on this subject (Lee and Kohler 2010).

Socially Responsible Market Participation

A remaining point worth noting is that in many cases, a corporation's participation in a market may be socially responsible in itself. In this regard, the participation of pharmaceutical companies in developing and delivering essential vaccines through GAVI and PAHO is achieving significant health outcomes. Perhaps in some cases, the most enduring way to generate improved CSR may be to change the market infrastructure and not the market participants.

V. CONCLUSION

A short walk through the broad contours of access to medicine-related CSR suggests that the terrain is far bumpier than it first appears. The donation of drugs or the voluntary reduction of prices is not always an ideal solution. In many cases, it can be irrelevant or have unintended consequences. Instead, corporations wishing to contribute to improving access can draw from a range of possible initiatives to tackle a range of difficult problems.

An implication of this landscape is that those wishing to harness corporate resources to tackle problems with access to medicine should carefully scrutinize CSR initiatives. The most effective form of CSR will begin with an accurate diagnosis of the problem. It will then match a specific treatment to that problem. This is no easy task. It is unlikely to occur without expert benchmarking systems to accurately judge and publicize the effectiveness or otherwise of the CSR action. Thus, the continual development of benchmarking systems may improve the contribution that CSR makes to the addressing the problem.

At the same time, an important policy implication for the non-profit sector is that it can play a key role in directing CSR resources to where they will be most effective. There are numerous examples of powerful partnerships between corporate and non-profit actors in this area. Being mindful of the complexity of problems regarding access to medicines can be a useful starting point for such relationships.

Meanwhile, public health demands in low-income countries are changing rapidly and the barriers to access to medicine are changing with them. If CSR is to continue to be relevant, it will need to change as well. This adds urgency to the ongoing search for new and improved ways to align the great wealth of our corporations with the great needs of our world. It makes for a significant and fascinating challenge.

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8

THE IMPERATIVE, UN-FUNDABLE TOOL TO FIGHT CLIMATE CHANGE: OVERCOMING REGULATORY BARRIERS TO CARBON CAPTURE AND SEQUESTRATION

Derek Sylvan

Carbon capture and sequestration (CCS) is the process of capturing carbon dioxide emissions from point sources such as power plants and storing these greenhouse gases underground so that they cannot enter the atmosphere. This technology is widely cited as an imperative tool in any large-scale effort to mitigate global climate change, but numerous commercial-scale CCS pilot projects will be required to resolve the technical, economic, and environmental uncertainties associated with this technology. Despite federal and state-level attempts to stimulate utility investment in CCS projects, utilities often face barriers to recovering costs for CCS investments, and development has been limited. This paper examines a variety of legal frameworks that have been used to address cost recovery barriers, such as carbon pricing, portfolio standards, emissions performance

standards, technology carve-outs, and direct financial incentives for utilities. A series of case studies in the development of CCS projects reveals how these frameworks have had varying levels of success. Other potential policies to align utility incentives with national research goals, such as a national portfolio standard, federal mandates, and altered Department of Energy funding schemes, are also analyzed. Past projects suggest that a combination of policies will likely be necessary to stimulate CCS pilot project development.

A 2009 pilot project at the Mountaineer coal-fired power plant in New Haven, West Virginia was hailed as a monumental achievement. Engineers had successfully captured flue gas from the three-decade-old plant, separated out the carbon dioxide (CO₂), and sequestered it deep underground, where it could not enter the atmosphere. Visitors from as far away as China and India, cognizant of the major implications this technology could have for climate change mitigation, came to tour the project that the *New York Times* called “one of the most advanced and successful in the world” (Wald and Broder 2011). The project was set to expand toward commercial-scale implementation in 2011, and the Department of Energy (DOE) had already guaranteed a grant of over \$334 million—half the costs needed for the upcoming phase. That phase never began, though, as the plant’s owner, American Electric Power (AEP), abruptly halted the project in July 2011.

Despite the project’s technological success and the federal government’s assertions of its importance, the public utility commissions (PUCs) of Virginia and West Virginia denied requests for electricity rate increases to cover AEP’s project costs. Without an available means of cost recovery or a regulatory policy incentivizing expensive, low-carbon energy investments, AEP lacked the business or legal motivation to move forward. The project was suspended indefinitely.

Carbon capture and sequestration (CCS) technology is widely cited as an imperative tool in any effort to mitigate global climate change and ensure the long-term viability of fossil fuel energy. Commercial-scale CCS pilot projects will be required to resolve the technical, economic, and environmental uncertainties associated with this technology. The patchwork of legal and regulatory efforts designed to stimulate utility investment in CCS projects has thus far struggled to solve utility cost recovery problems. Creative policy solutions will be needed in order to align utility incentives with national research goals and promote CCS development in the United States.

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I. THE IMPORTANCE OF CCS

Nearly every high-profile climate change mitigation strategy put forward in recent years identifies CCS as a crucial technology in the effort to reduce greenhouse gas emissions. The International Energy Agency's *World Energy Outlook 2011* projects that CCS would need to account for roughly one-fifth of the new emission reductions required to reach a "450 Scenario" (stabilizing atmospheric greenhouse gas levels at 450 parts per million, which is projected to limit climate change to approximately 2 degrees Celsius above pre-industrial levels). The report states that if CCS is not widely deployed in the 2020s, "unprecedented pressure" would be placed on other low-carbon technologies, and a ten-year delay in CCS deployment would increase total abatement costs under this scenario by \$1.1 trillion (IEA 2011).

The Intergovernmental Panel on Climate Change (IPCC) identifies CCS as a key mitigation technology to be implemented in the short to medium term (before 2030), calling for CCS integration with coal, gas, and biomass power plants as well as cement, ammonia, and iron manufacturing facilities (IPCC 2007). McKinsey, MIT, and numerous other sources similarly identify CCS as a fundamental technology in any long-term effort to meaningfully reduce greenhouse gas emissions.

Due largely to rapidly growing energy demand in the developing world, coal (and other fossil fuels that could potentially integrate CCS) will constitute a sizable portion of the international fuel mix for decades to come. CCS is generally seen as the only viable way to continue or expand coal use without drastically increasing greenhouse gas emissions.

Widespread implementation of CCS could also have significant energy security benefits for the United States, as it would allow for heavy reliance on domestic coal and gas even if global or national emissions limits (or carbon pricing) are adopted.

A number of small CCS pilot projects have taken place around the world in recent years, and while some large-scale power plant demonstration projects have been planned, none have yet become operational. Seven power plant-based CCS projects, using a variety of technologies, are currently in development in the United States (not including three others that have been formally placed on hold). None are expected to commence operation before 2014 (MIT 2012).

While CCS plays a major role in most global carbon mitigation plans, the technology is still in its infancy. Without aggressive support for commercial-scale pilot projects, CCS will not be available for deployment in

the time frame hoped for by both government entities and environmental groups, resulting in increased mitigation costs and a likely failure to meet emission reduction targets.

II. TECHNICAL DESCRIPTION

The Capture Process

Capturing CO₂ from large point sources such as power plants is generally accomplished through one of three technologies. Post-combustion capture involves separating CO₂ from flue gasses after coal (or another fuel source) has been combusted. Pre-combustion systems process the primary fuel source to produce separate streams of CO₂ and hydrogen gas (which can be used as a fuel), allowing CO₂ to be captured from a relatively pure exhaust stream. Oxy-fuel combustion uses oxygen instead of air in the combustion process, producing a flue gas made of CO₂ and water vapor. The water vapor condenses through cooling, leaving a nearly pure stream of CO₂ that can be transported for sequestration. Commercial CO₂ capture systems can reduce power plant CO₂ emissions by roughly 90 percent (IPCC 2005).

The Sequestration Process

Captured CO₂ is generally transported by pipeline to storage sites. Thousands of miles of CO₂ pipelines are already in use in the United States to supply CO₂ to oil wells, where it is used for enhanced oil recovery (IPCC 2005). CO₂ sequestration options include liquid storage in the ocean, solid storage by chemical reaction to produce stable carbonates, and gaseous storage in deep geological formations such as saline aquifers and exhausted oil or gas fields. Geological storage is the primary method of sequestration under consideration for current and planned CCS projects. Three large-scale geological CO₂ sequestration projects are currently active in Sleipner, Norway, Weyburn, Canada, and In Salah, Algeria. Underground saline aquifers have a projected global carbon storage capacity of between four hundred and ten thousand gigatons (Balat, Balat, and Öz 2009), and the United States is projected to have over six thousand miles of underground rock formations suitable for CO₂ sequestration (LiveScience 2009). It is considered likely that over 99 percent of CO₂ injected in geological formations will be safely retained for over one thousand years (IPCC 2007).

III. THE NEED FOR AGGRESSIVE RESEARCH AND PILOT PROJECTS

Most climate change mitigation plans anticipate widespread deployment of CCS within the next ten to fifteen years. However, due to the dearth of currently operational CCS projects, significant uncertainty remains about the environmental and economic implications of CCS implementation. Research and pilot projects are urgently needed if policymakers are to understand and resolve these issues and encourage widespread CCS development.

Environmental Uncertainty

Major research efforts are needed in order to understand the environmental dynamics of underground carbon storage. Because varying locations can have vastly different geological characteristics, pilot projects will be needed at a wide array of sites.

CO₂ leakage from storage sites, potential drinking water contamination, and seismic impacts all must be considered in an evaluation of CCS. Concerns about each of these issues have been raised in the past, though most comprehensive technical evaluations have concluded that CCS is likely to be safe and effective (MIT 2007).

Regulatory structures to govern and monitor CCS will be necessary, and these structures cannot be appropriately designed without additional CCS research and pilot projects. Monitoring, Verification, and Accounting (MVA) programs for CCS currently exist within the DOE, but they are young and largely untested (NETL 2009). Methods for handling long-term responsibility and liability for storage sites must also be developed, most likely involving transfer of storage site responsibility from the firms operating CCS projects to the federal government after some period of time.

Economic Uncertainty

Implementation of CCS technology will clearly add significant costs to coal electricity generation, though cost estimates vary greatly. The IPCC estimates that carbon capture would add between 1.8 and 3.4 cents per kilowatt-hour (kWh) to the cost of electricity from a pulverized coal plant and 0.9 to 2.2 cents per kWh to the cost of electricity from an Integrated Gasification Combined Cycle (IGCC) plant. Cost increases for a natural gas combined-cycle plant would range from 1.2 to 2.4 cents per kWh. Additionally, transport and storage costs would add just less than one cent

per kWh, though some CCS projects could earn a profit by selling CO₂ for enhanced oil recovery or coal bed methane recovery (IPCC 2007). Researchers at MIT have estimated that the cost of running a full-scale CO₂ injection and storage project would be roughly \$15 million per year (MIT 2007).

Capturing and compressing CO₂ also requires significant energy, and it is projected that a commercial-scale CCS system would increase the fuel needs of a coal-fired power plant by 25 to 45 percent (MIT 2007). In most cases, the costs of new conventional plants with future CCS retrofits are projected to be higher than the costs of building fully integrated plants with CCS (MIT 2007).

Clearly, CCS projects have major economic implications for utilities, ratepayers, and the government. However, the true costs (and ultimate viability) of CCS cannot be determined until commercial-scale pilot projects are launched to help clarify economic uncertainty.

The scale of CCS implementation needed to make a significant impact on global carbon emissions is massive. Coal electricity generation currently emits roughly 2.5 gigatons of carbon, and this amount is projected to grow to roughly 9 gigatons by 2050 under a business-as-usual scenario (MIT 2007). Capturing and storing one gigaton of carbon would require CCS implementation at six hundred different one-gigawatt coal plants. Given the monumental scope of this effort, there is an urgent need to determine the economic feasibility of CCS.

Multiple technologies exist for both the capture and sequestration processes, and pilot projects are needed to determine which of these are economically (and environmentally) realistic at scale. Furthermore, pilot projects will accelerate technology development, potentially driving down costs.

Many electric utilities and fossil fuel energy interests have an economic incentive to develop CCS so that fossil fuel electricity generation remains viable if CO₂ emissions limits are put in place. However, most of these entities have shown a limited interest in funding expensive CCS research projects given the uncertainty surrounding emission regulation and cost recovery.

IV. LEGAL FRAMEWORKS FOR UTILITY COST RECOVERY

The infrastructure investments of regulated utilities are generally guided by legal requirements and profit motives. Investor-owned utilities are guaranteed a rate of return on investments approved by PUCs, so their risk appetite for investments that may not be approved tends to be very

low. Mastery of a successful CCS technology could have financial benefits for a utility if CO₂ emission limits are mandated. However, without a legal requirement to pursue emission reductions, most utilities will be unlikely to make major investments in CCS unless cost recovery can be reasonably guaranteed.

PUCs seek to ensure reliable service and reasonable electricity rates for their ratepayers, and can only be expected to approve rate increases for CCS investment if adopting CCS is either economically advantageous or legally necessary. Therefore, legal frameworks to promote utility cost recovery must focus on restructuring the economics of carbon-intensive energy generation or formally requiring CCS deployment.

Carbon Pricing

The economic viability of CCS is frequently discussed in relation to carbon pricing. A cap and trade program or carbon tax would effectively put a price on carbon emissions and force utilities to recalculate the economics of their fuel mix for electricity generation. Avoided emissions would therefore become valuable, especially for fossil fuel sources that are used for baseload power. It is estimated that a carbon price of \$25 to \$30 per ton of CO₂ (which would add roughly 25 cents to the price of a gallon of gasoline) is sufficient to make coal plants with CCS economically viable, though these projections are highly uncertain due to the lack of commercial-scale CCS cost data (MIT 2007).

Some utilities, including AEP, have voiced support for cap and trade legislation (AEP 2009). Legislative certainty about carbon pricing would help utilities make long-term resource planning decisions. Additionally, legislation that requires or incentivizes major investments in low-carbon technology could potentially have financial benefits for utilities. Many low-carbon infrastructure investments could presumably be added to the rate base, allowing utilities to both recover costs and earn a rate of return. In a scenario in which carbon prices make CCS retrofits (or new plants with CCS) economically desirable to alternatives, utilities could be expected to invest in CCS, and PUCs could be expected to approve resulting rate increases.

Portfolio Standards

Portfolio standards—legal requirements that a certain percentage of energy needs are met by low-carbon sources—are the most common state-level framework to encourage energy investments that reduce greenhouse gas emissions. More than half of the states in the U.S. now have some form of

portfolio standard (Coward et al. 2008). Making CCS a qualifying technology in renewable/alternative energy portfolio standards could theoretically spur investment and encourage PUCs to approve related rate increases. However, CCS will likely be more costly than other low-carbon options, at least until economies of scale have been achieved. Given that portfolio standards generally allow utilities (and PUCs) to prioritize the lowest cost methods of meeting targets, simply adding CCS to a list of qualifying technologies will unlikely be sufficient to spur significant investment.

West Virginia's Alternative and Renewable Energy Portfolio Standard illustrates this predicament. Enacted in June 2009, this provision requires investor-owned utilities with more than thirty thousand residential customers to meet a series of targets culminating with a 2025 requirement that 25 percent of retail electric sales be supplied by approved alternative or renewable sources. Coal with CCS is among the qualifying "alternative energy resources," though this expansive category also includes natural gas (allowable for 10 percent of the standard), as well as coal bed methane and a host of other sources (WVPSC 2009). Compliance is based on Alternative Energy Credits, with one credit equating to one megawatt-hour of alternative or renewable generation, or one ton of CO₂ reduced or offset. Given the wide range of options that qualify for credits, it is highly unlikely that CCS will be cost competitive with other options before the 2025 goal. As such, the West Virginia Public Service Commission (WVPSC) will likely discourage utilities from pursuing CCS if doing so entails passing along costs that could be lower with other planning choices.

Technology Set-Asides and Carve-Outs

Some states have established set-asides for particular technologies (such as solar or biomass), requiring a certain level of uptake independent of portfolio standard targets. These obligations can also be specifically mandated within portfolio standard targets as carve-outs. North Carolina's portfolio standard includes carve-outs for energy from solar and swine waste sources, while New Mexico requires that wind and solar sources each supply at least 20 percent of the state's mandated amount of renewable power (Coward et al. 2008). Set-asides or carve-outs for CCS would likely ensure that PUCs allow cost recovery for utility CCS investments, at least until target levels were met. These policy mechanisms could be particularly effective in states with large amounts of coal-fired generation.

Emissions Performance Standards

States could design emissions performance standards, requiring electricity

retailers to meet specific CO₂/kWh targets across their portfolio of generating facilities or power purchase agreements. These standards could be designed to make CCS implementation necessary for most coal plants, and PUCs would therefore be likely to approve rate increases to cover CCS investments.

A similar approach could be used to target generators themselves, rather than retailers, but this approach would be prone to leakage as new companies could simply avoid building plants in states with emissions performance standards. Applying emissions standards to electricity retailers rather than generators would ensure that imported electricity is regulated.

California currently requires electricity retailers' new long-term contracts with baseload generators to meet a standard of 1,100 pounds of CO₂ per megawatt-hour (Cowart et al. 2008). Thus far, emissions performance standards have not been adopted in states that are heavily reliant on coal-fired power plants.

DOE Funding

DOE efforts to promote CCS indicate that advancing this technology is a federal policy priority. The American Recovery and Reinvestment Act (ARRA) designated \$3.4 billion for CCS programs, accounting for 49 percent of energy-related ARRA funding (Short 2011). While DOE project funding does not constitute utility cost recovery per se, the DOE has subsidized major portions of most domestic CCS projects, drastically reducing the financial commitment needed from utilities and ratepayers for these investments.

The DOE Carbon Sequestration program, run largely through the National Energy Technology Laboratory, focuses on three areas: core research and development, infrastructure, and global collaborations. The infrastructure projects include a variety of demonstrations with ARRA funding, as well as projects associated with the Clean Coal Power Initiative (CCPI), which originated in 2002 as a cost-shared partnership between government and industry. Three CCPI demonstration projects have been completed, while seven are currently active (NETL 2012).

Large-scale funding from the DOE will likely be critical to the advancement of most CCS pilot projects, though this funding may not be sufficient to generate major utility investment without additional regulations governing carbon emission reductions or technology development.

State Financial Incentives and Utility Cost Recovery Mechanisms

Six states have currently passed legislation creating various forms of util-

ity cost recovery mechanisms for CCS projects (Pew Center on Global Climate Change 2010). Examples include Virginia, which allows utilities to receive an enhanced rate of return for certain projects, which may include CCS (State of Virginia 2007a), and Illinois, whose Clean Coal Portfolio Standard Law guarantees electricity purchase agreements for the first in-state coal facility with CCS and creates other financial incentives tied to CCS development (State of Illinois 2007). Many other states offer CCS development grants or tax incentives. The success of these measures is as yet unclear, as Virginia's State Corporation Commission denied cost recovery for the Mountaineer CCS project and most other states have seen limited growth in CCS development.

Voluntary PUC Approval

In theory, PUCs could choose to allow ratepayer funding for CCS without outside legal requirements, though this has not commonly occurred in the past. Traditional ratemaking considerations focus on reliability and low cost, making investments in undemonstrated technologies such as CCS highly undesirable. Unrequired cost recovery approval would likely hinge on a PUC's interpretation of whether utility CCS expenditures are "reasonable and prudent." While CCS pilot projects may have tremendous merit in terms of climate change mitigation and energy policy goals, they are unlikely to help deliver cost-effective electricity service to local ratepayers in the near term, and as such few PUCs can be expected to deem these investments "reasonable and prudent" unless they are required by outside regulations.

V. MOUNTAINEER: A CASE STUDY IN THE FAILURE OF CCS REGULATORY POLICIES

The inability to align federal policy goals with the economic concerns of utilities and PUCs led to the cancellation of the Mountaineer CCS project in West Virginia. The CCS retrofit at the 1,300-megawatt Mountaineer plant was the most advanced project of its kind undertaken in the United States to date. Operated by AEP subsidiary Appalachian Power (APCo), Mountaineer used a post-combustion chilled ammonia capture process developed by the French conglomerate Alstom. Captured CO₂ was transported via pipeline to nearby well sites and pumped 1.5 miles below the surface for sequestration in the Mount Simon Sandstone, a geologic deep saline formation thought to have ideal properties for large-scale CO₂ storage. Phase 1 of the project, targeting a 30-megawatt portion of the plant, was brought online in 2009, and captured 21,000 metric tons of CO₂ at a

capture rate greater than 90 percent. Roughly 15,000 metric tons of CO₂ were sequestered without any known technical or environmental problems. Phase 2, which had been scheduled to commence in 2011, would have scaled the project up to 235 megawatts, but AEP postponed the project indefinitely in July 2011.

AEP, one of the United States' largest utilities, frequently touted Mountaineer as a major success and an illustration of the company's environmental aims. AEP invested \$70 million of shareholder money in the demonstration project (Gallucci 2011). The DOE supplied the bulk of the funding for the project's initial research and Phase 1, while Alstom and other partners supplied additional funding. The DOE had already granted \$334 million, half of the projected project costs for Phase 2, when AEP announced the project's cancellation.

In 2008, APCo requested a rate increase from the Virginia State Corporation Commission (VSCC) to cover costs associated with the Mountaineer CCS project. The request sought to include roughly \$74 million in the rate base, which would have entailed a rate of return as well as recovery of expenses (VSCC 2010). As discussed above, Virginia's Senate Bill 1416/ House Bill 3068 had been enacted in 2007, allowing for utility cost recovery and an enhanced rate of return on certain project investments (CCS is specifically referenced in the legislation as a potentially allowable technology). Despite the legal basis for cost recovery, APCo's request was denied due to uncertainty about carbon emissions regulation, and an argument that "although AEP asserts that this demonstration project will benefit customers of all of AEP's operating companies and of all utilities in the United States, APCo's ratepayers (and not shareholders) are being asked to...shoulder the entire financial burden and risk associated with AEP's CCS research and development" (VSCC 2010). In a post-hearing brief, the commission added the following:

Furthermore: (1) this project significantly increases operation and maintenance expenses at the Mountaineer plant; (2) this project decreases the efficiency of the Mountaineer facility, which results in increased fuel costs; (3) the CCS technology decreases the Mountaineer plant's operating capacity, which further increases APCo's capacity deficit position within the AEP-East pool and, thus, increases APCo's capacity equalization charges; and (4) the potential benefits to Virginia ratepayers currently are speculative at best (VSCC 2010).

The West Virginia Public Service Commission also denied APCO's 2010

request for a rate increase, largely due to the project's experimental status. The Commission argued that even a commercial-scale CCS facility should receive rate base treatment only for the West Virginia pro-rated portion of project costs, based on load sharing among AEP operating companies (Wyckoff 2011). Essentially, the Commission argued that the costs for a CCS project should be shared among all states where AEP does business. Though West Virginia's Alternative and Renewable Energy Portfolio Standard makes specific attempts to encourage CCS investment, these policy incentives were inadequate to support cost recovery even for a widely heralded CCS project with federal funding in place to cover half of the project's costs.

The arguments of both state PUCs are understandable, as any benefits of the Mountaineer project would likely be national or global rather than local, while local ratepayers would be asked to fund much of the project. Likewise, AEP's reluctance to take on shareholder expenses for a project with highly uncertain financial returns is sensible from a business perspective. The AEP "Corporate Citizenship" webpage explains the decision to halt the Mountaineer CCS project with the following statement:

Due to the current uncertain status of U.S. climate policy and the continued weak economy, AEP has made the business decision to place the project on hold until such time that economic and policy conditions create a viable path forward. AEP has advised the U.S. Department of Energy (DOE) that it is terminating its contract with DOE and will put the project on hold upon completion of the project's initial phase of front-end engineering and design (AEP 2011).

Unless changes to the United States' climate policy can better align the incentives of utilities and PUCs, other CCS projects will likely face a fate similar to that of Mountaineer.

VI. OTHER KEY CCS PROJECTS AND REGULATORY HURDLES

FutureGen

The FutureGen CCS project disperses costs among a large group of energy industry stakeholders in addition to relying on heavy federal funding, thus minimizing the importance of utility cost recovery. While the project has been slowed by a variety of setbacks since its inception in 2003, this dispersed funding model could prove to be a successful means of limiting financial risk for participating utilities.

The FutureGen Industrial Alliance is a non-profit partnership of groups from the power and coal industries. The group is currently working with the DOE to repower a 200-megawatt coal plant in Meredosia, Illinois to use oxy-combustion capture technology. Siting issues and local opposition have slowed and changed the project numerous times since it began in 2003. The original FutureGen project sought to create a new IGCC plant and CO₂ storage site in Coles County, Illinois. This project was halted after cost overruns prompted the federal government to withdraw funding, only to later restore project funds and mandate changes that prompted Coles County to sever its involvement. The new project in Meredosia will require a 175-mile pipeline network to transport CO₂ for sequestration in deep saline aquifers in Morgan County, Illinois. Construction is expected to commence in 2012, with completion anticipated in late 2015.

The DOE formally committed \$1 billion to the FutureGen project in 2010 as part of the ARRA. FutureGen partners will each commit between \$4 million and \$600 million over the life of the project. Twenty members are needed to meet FutureGen's financial goals, and eleven members are currently in place. Some past members (including AEP) have dropped out of the alliance (MIT 2012b).

The FutureGen development process highlights the difficulties of aligning multiple stakeholders and navigating the economic, environmental, and regulatory barriers inherent in a CCS project.

This dispersed funding model could serve as a partial solution to the problem of limited PUC cost recovery approval. However, it is unclear if the reduced cost burden will be sufficient to entice significant investment by utilities. The economic motivations for investing in pilot projects are still unclear for many utilities and their shareholders, as the nature of future carbon emission regulations are unknown. Furthermore, utilities that choose not to invest in CCS pilots can still likely reap many of the benefits of CCS once the technology is more fully developed.

Dominion Virginia Power

Because CCS technology is still developing, uncertain definitions of what constitutes CCS have created controversy and aroused suspicions of improper utility profit seeking at the expense of legislative goals.

In July 2007, Dominion Virginia Power applied to the VSCC for approval of a new coal-fired power plant in Wise County that would be "carbon capture compatible." The projected cost of the 585-megawatt plant was \$1.8 billion, and Dominion sought to earn the enhanced rate of return (100-200 basis points) that Virginia allows for certain projects,

potentially including CCS. Dominion touted its plans to capture carbon at the plant in print and radio advertisements, while a coalition of environmental groups led by the Southern Environmental Law Center disputed the plant's actual capability for CCS (SELC 2008).

In testimony before the VSCC, it was determined that Dominion had made no investments or efforts to integrate CCS into the design of the plant other than designating an "area of sufficient size based on conceptual carbon capture equipment." Dominion argued that "carbon capture technology is not commercially viable or available at the present time. The Company has taken steps to make the plant highly efficient and compatible with anticipated future carbon capture technology" (State of Virginia 2007b).

The VSCC approved construction but classified the plant as a conventional coal facility, disallowing Dominion's request for an enhanced rate of return. Construction of the plant began in June 2008 and commercial operation is targeted for 2012. Dominion's September 2010 Integrated Resource Plan included no discussion of integrating CCS at the Wise County facility (Dominion 2010).

Mississippi Power

In some instances, utilities have been able to recover costs for CCS investments even without regulatory mandates. In 2010, Mississippi Power (an affiliate of Southern Company) received cost recovery approval from the Mississippi Public Service Commission for a proposed \$2.4 billion IGCC plant in Kemper County, Mississippi. The plant will capture 65 percent of CO₂ with pre-combustion capture technology, and CO₂ from the plant will be sold for use in enhanced oil recovery projects. The 582-megawatt plant is currently under construction, and is projected to begin operation in 2014.

The Kemper County IGCC project was selected to receive funding from the Clean Coal Power Initiative. The project received a \$270 million DOE grant and \$133 million in IRS investment tax credits, allowed under the National Energy Policy Act of 2005 (Rickman 2009). The Mississippi commission voted to allow rate recovery in 2010, so long as Mississippi Power agreed to cap costs at \$2.4 billion (an original request had sought \$3.2 billion). Under Mississippi law, the utility is allowed to recover costs associated with construction as the plant is built. Customer rates are projected to increase by 33 percent over a ten-year period (Ayers 2011).

While the cost to ratepayers for an IGCC plant is considerably higher

than for a conventional coal plant, the PUC's decision to allow rate recovery was likely based on both economic and environmental factors. The plant's proximity to vast in-state reserves of mineable lignite coal (which will fuel the plant) are projected to keep fuel costs down and create significant economic benefits for the state (AP 2011). The low pollutant emissions from an IGCC plant (relative to a conventional coal plant) were also referenced in the commission hearings.

The Sierra Club mounted multiple legal challenges to the plant's approval on both economic and environmental grounds, seeking to halt construction and contest the legality of the DOE grant (Sourcewatch 2011). However, both the Mississippi State Supreme Court and the U.S. District court ruled to uphold the public service commission's approval (Janquart 2011).

The Kemper County project demonstrates that formal legal mandates are not required for a utility to be granted CCS cost recovery from a PUC. However, this case appears to be largely anomalous, as the project benefited from a combination of ample federal funding, local economic motivation, and available markets for captured CO₂. It is unclear whether other utilities could follow Mississippi Power's path to cost recovery with their own CCS projects.

VII. POTENTIAL POLICY SOLUTIONS

In order to stimulate the development of commercial-scale CCS projects in the United States, it will likely be necessary to create both financial incentives for utilities and regulations governing CO₂ emissions. Differing policies may prove to be beneficial in different regions and contexts, and it is likely that multiple policies will be needed to stimulate development at the pace called for by most climate change mitigation strategies. All of the utility cost recovery frameworks discussed earlier can be successful in encouraging CCS deployment, if implemented properly. Some other possible policy solutions are discussed below.

A National Portfolio Standard with CCS Carve-Outs or Set-Asides

At the national level, a portfolio standard that mandates CCS use for at least a percentage of fossil fuel power plants could force utilities (and PUCs) to fund CCS projects. A national standard with such a CCS provision would be an ideal way to stimulate pilot projects in different regions, which would help researchers gain an understanding of carbon sequestration under varying geological conditions. State-level standards would be helpful for guaranteeing cost recovery; however, some state governments may

be opposed to standards that make their ratepayers responsible for costly demonstration projects if other states are not enacting similar legislation.

Federal Mandates for Public Utility Commission Cost Recovery

The DOE's aggressive programs to promote CCS demonstrate a belief at the federal level that development of this technology is in the national interest. While the federal government has shown willingness to use taxpayer money to develop CCS, state PUCs are primarily focused on keeping electricity rates low, rather than on achieving energy research goals. While the DOE can continue to fund portions of CCS projects, utilities may still be reluctant to participate if they cannot recover costs for their portion of CCS project investments.

Federal legislation could conceivably attempt to mandate state funding for certain energy projects, including cost recovery approval for some utility CCS investments. For example, such legislation could target specific DOE-approved projects for CCS (or other high-priority technologies), mandating state funding equal to a percentage of DOE project expenditures. This legislation would need to be creatively designed in order to avoid jurisdictional infringement on intrastate energy matters, and its constitutionality could possibly be challenged. Recent budget crises in many states also limit the political viability of such legislation in the near term. If these barriers are overcome, such federal energy legislation could be an important tool to help ensure that states share some of the costs of CCS projects, and that utilities be able to invest in CCS with some assurance of cost recovery.

Targeted CCS legislation is likely less desirable than comprehensive emissions regulation or a national portfolio standard. However, it may be more politically viable to pass a bill with a narrow scope focusing on "clean coal" funding, as opposed to new regulations governing the entire national energy sector. A rare political consensus exists on CCS issues between traditionally Democratic interests (including the Obama administration) and fossil fuel interests. It is conceivable that this consensus could produce some form of new legislation to expand federal support for CCS development.

Increased DOE Funding for CCS

While recent DOE expenditures on CCS are upwards of \$1 billion per year, increasing this funding even further may prove to be the easiest method of accelerating CCS development. Given the difficulty many utilities have had in recovering investment costs, it may be beneficial for the DOE to

consider funding most or all of some CCS projects. This funding method would essentially disperse costs among all taxpayers in the country, rather than ratepayers in the region of a pilot project. Given the diffuse benefits of national energy technology research, this is arguably a more equitable funding method.

Opposition to some CCS projects could persist regardless of additional DOE funding. Even if utilities engaged in CCS pilots were not seeking cost recovery, PUCs could take issue with utility participation on the grounds that CCS implementation requires additional energy inputs of 25 to 45 percent for a power plant (MIT 2007). A PUC could thus argue that CCS pilot projects negatively affect ratepayers or electrical service. Despite this risk, increased DOE funding would likely help facilitate the alignment of utilities and PUCs with respect to CCS demonstration projects. However, securing the necessary funds for such an expansion of the DOE's CCS development efforts would likely prove difficult in the current economic climate.

Carbon Pricing

A federal carbon pricing scheme would likely be the most efficient way to connect utility incentives with carbon reduction goals, thereby spurring investment in CCS. Regional and state-level carbon markets could also help in this regard, though they are only likely to be effective in coal-intensive areas. The only currently active carbon market in the United States, the Regional Greenhouse Gas Initiative (RGGI), regulates power plant CO₂ emissions, allowing carbon offsets and allowance trading. This system could theoretically incentivize CCS development by providing both regulatory and economic incentives for utilities. However, the northeastern and mid-Atlantic states participating in RGGI are not heavily dependent on coal, so this initiative is unlikely to lead to major CCS investment. Given that California's electric power sector ranks 45th among states in annual coal use (EIA 2011), the cap and trade system that the state will launch in 2013 is also unlikely to foster many CCS projects.

A carbon pricing system in a coal-rich region (or a national carbon pricing system) would provide a market-based mechanism for encouraging CCS investments in the long term. However, the short-term effect that such a system would have on CCS development is unclear. As an untested technology, the costs and offset potential of CCS are uncertain. If allowance prices do not reach a sufficiently high level, the owner of a coal-generating plant might be more apt to buy allowances than to invest in CCS.

A carbon pricing system is likely the best available policy for incentivizing low-carbon technology investments across the energy sector. This is a desirable goal, and while carbon pricing would be expected to expand CCS implementation over time, rapid CCS development may require additional regulatory efforts, as well. The House of Representatives passed the American Clean Energy and Security Act in June 2009, which would have instituted a cap and trade system to limit carbon emissions. However, the Senate failed to pass similar legislation after more than a year of discussion and some bipartisan efforts to move a bill forward. The current makeup of Congress is less favorable to a carbon pricing scheme, greatly limiting the political viability such legislation in the near term.

VIII. LOOKING AHEAD

The outlook for comprehensive federal climate change legislation in the United States is currently unfavorable given the makeup of Congress and the state of the economy. While the national political situation could change after the 2012 elections, meaningful progress in low-carbon energy legislation may be more likely to occur at the state level in the near term.

Cost recovery is probably the greatest incentive that can be used to spur utility investments in CCS, and this can best be guaranteed through a combination of financial incentives and regulatory requirements for CCS development. A number of potential policies can be used in each category, and the states that aggressively pursue these policies will likely be the leaders in domestic CCS deployment.

Given the significant barriers to CCS development in the United States, the federal government has shifted some of its focus to foreign opportunities. In January 2011, the DOE announced the creation of the U.S.-China Clean Energy Research Center, to be bilaterally funded with \$150 million in public-private money (Gallucci 2011). This is one of many efforts to link American CCS experts with active pilot projects springing up around the world. It remains to be seen if policy solutions to utility cost recovery and other regulatory barriers will allow more of those pilot projects to materialize in the United States in coming years.

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