

Changing Channels?

Evaluating the Efficiency of Aid Delivery Mechanisms

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Scholars and policy makers disagree on the best way to deliver foreign aid. Government channels are hailed as better for building capacity and creating policy ownership, while bypass channels allow corrupt and inept public officials to be side-stepped in aid delivery. This article compares the two channels in tandem to determine the conditions under which each is most efficient in spurring economic production and encouraging democratic consolidation in recipient countries. Studying US aid to 43 countries over 8 years, I find that government-channeled aid is more efficient than bypass aid at generating production and fostering consolidation in least-income countries with poor governance, but the efficiency in economic production plummets, and the efficiency in democratic consolidation increases, as governance improves. Overall, bypass aid is more efficient at spurring both production and consolidation, and these efficiencies increase with improvements in governance. Additionally, democratization efficiency levels are less than 20% of economic efficiency, suggesting aid is *five times more efficient* at achieving economic production than it is at achieving democratic consolidation. This article moves past searching for new ways to buy more growth or democracy, and instead investigates which of the available means is more efficient at achieving the development policy makers seek.

After more than fifty years and \$5 trillion of foreign development assistance, aid donors, policy makers, and scholars are still undecided as to how to make aid as effective as possible. A contested issue is the optimum delivery channel for aid. Some say aid is best delivered via government mechanisms, essentially transferred from a bilateral or multilateral donor directly to the recipient government. Others argue that aid should bypass the recipient government and be delivered directly to the public by third-party agents, such as non-governmental organizations (NGOs), private firms, or other intergovernmental organizations.

Both arguments have theoretical and empirical support. Government channels were used almost exclusively from the inception of aid through the 1980s, until development scholars realized recipient governments could appropriate aid moneys for corrupt ends and had little incentive to implement aid effectively (Easterly 2003; Dollar and Levin 2006; Easterly and Williamson 2011). When this incentive structure was blamed for aid's under-performance in the 1990s, scholars began to tout bypass agents as being free of political incentives, and therefore likely to be more efficient and effective in their implementation (Fisher 1997; Robinson 1997; Sollis 1996; Uvin 1996; Boutros-Ghali 1996; Hulme and Edwards 1997; McCoskey 2004). Since aid delivered via bypass channels has generated enough data to be analyzed, however, support for government channels has grown again. Arguing that bypass aid undermines recipient government capacity-building, drains the public sector of prime labor, and fosters competing aid projects (Knack 2001; Bräutigam and Knack 2004; Acharya, de Lima, and Moore 2004; Easterly 2007), critics advocate a return to government delivery. Though previous empirical studies have supported one side of the argument or the other, few have compared and evaluated both delivery mechanisms at once. This study is thus designed to assess the efficiency of bypass and government delivery mechanisms side-by-side, in pursuit of an answer to the question: which delivery mechanism is more efficient at achieving donor goals?

I argue that each delivery mechanism is better at achieving different goals, and that the use of different delivery mechanisms by the same donor implies the desire to achieve a diverse set of goals with aid. We should want to know more about aid than how much a recipient country's economy grows, or how consolidated its government becomes, for each dollar of aid given. We need to know how efficiently that aid achieves its potential outcomes, in that as little as possible of the aid is wasted. It is the waste of aid, primarily via transaction and information costs, that many believe have plagued and undermined aid's effectiveness (Acharya, de Lima, and Moore 2006).

In this article I examine two facets of development, economic production and democratic consolidation, and the efficiency of aid delivered via bypass and government channels at reaching each. Examining 43 recipient countries from around the world from 2005-2012, I use stochastic frontier analysis to generate efficiency scores at achieving each goal for each recipient during each year. The efficiency score represents the recipient's efficiency at reaching its economic or political potential, given its collection of inputs and endowments that year. By using this type of model, I am able to see exactly how efficiently foreign

aid contributes to each goal when delivered via bypass channels versus government mechanisms. I can assess the efficiency of each delivery mechanism at achieving each goal.

Using the United States as an exemplar, I find that government-channeled aid is more efficient than bypass aid at achieving economic production among low-income countries with poor governance, but this efficiency plummets as the quality of governance grows. Government-channeled aid and bypass aid are indistinguishable in their efficiency levels for lower-middle income countries, but in upper-middle income countries bypass channels show efficiency gains as governance improves, while government channels show efficiency losses. Overall, economic production is spurred more efficiently with aid delivered via bypass channels, and that efficiency increases with improvements in the quality of governance.

In the pursuit of democratic consolidation, among least-income countries government channels again show superior efficiency, which *increases* as governance quality improves. As income levels rise, bypass aid and government-channeled aid become indistinct in their efficiency levels. Throughout democratization estimates, efficiency levels remain less than 20% of those in the economic estimates, suggesting that the aid examined here is *five times more efficient* at achieving goals of economic production than it is at achieving goals of democratic consolidation.

We have sought effectiveness in foreign aid for decades. Effectiveness and efficiency should not be confounded. Separating the concepts shows the importance of analyzing the ability of aid both to achieve economic and political development, and to reduce the inefficiencies of recipients in pursuit of those achievements.

This work speaks to at least three important literatures. First, consider recent work on donor motives and aid delivery channels. Bueno de Mesquita and Smith (2009) take the position that aid is used to purchase policy concessions, that each dollar of aid is completely and uniformly fungible, and that recipient governments therefore have complete discretion over how aid moneys can be used. If this is the case, there would be no use for delivering aid via bypass channels. Dietrich (2013) argues that the use of bypass channels implies a genuine donor desire for improved governance among recipients, an argument supported by Knack's (2013) findings that donors are beginning to channel their aid according to recipient governance indicators. My work speaks to this ongoing conversation by comparing the two channels in tandem and illuminating the conditions under which each is more efficient than the other.

Second, there is a more extensive policy debate regarding which delivery channel is better for building state capacity. Capacity building is argued necessary for creating sustainable economic and political development. Emblematic of this trend is the Paris Declaration on Aid Effectiveness (2005), in which 137 countries commit to prioritize government delivery channels. In nearly a decade since the Declaration, however, the aid community still disagrees on which aid delivery channel is best. Few signatories of the Paris Declaration have adjusted their delivery mechanisms (OECD 2014a; see also Table 1, below), though limited evidence shows some change in donor behavior (Knack 2014). Yet the debate that one channel is best cannot

be settled until we answer: best at what? It turns out that each channel is better at reaching different goals, under different conditions, and my research helps us understand how those processes work.

Speaking more broadly to the development community as a whole, this work is about more than aid delivery mechanisms. In 2003, William Easterly stated (2003) that “the idea that ‘aid buys growth’ is an integral part of the founding myth” of aid agencies and the development community (p. 34). Since then he has persistently criticized efforts to find “the Next Big Idea” that will purchase more and more growth with each dollar of aid (2006; 2007). Stochastic frontier analysis has been applied to foreign aid flows in recent years by scholars in an effort to push aid research in a new direction (Koch 2010; Reinhardt and Koch 2010). By analyzing aid’s efficiency, rather than its effectiveness, I add to these authors’ endeavor to stop asking the question of *how much* of its goals aid is purchasing, and instead ask *how well* aid is purchasing its goals. I do not try to find new means through which to buy more growth, more democracy, more output in general. I instead try to find which of the available means are the least wasteful at achieving the economic and political development output policy makers seek. This work has the potential to push development studies and policy forward in new and exciting ways.

Foreign Aid for Economic and Political Development

From early in the history of foreign development assistance, scholars and policy makers have debated exactly what it is donors are trying to “develop” in recipient countries. US President John F. Kennedy advocated for economic development in his inaugural address and tied it to political development. He pledged “to oppose aggression or subversion anywhere in the Americas” (1961a), and later argued that aid was designed to stabilize countries politically by helping them develop economically (1961b). Subsequently, the study of aid effectiveness became a study of poverty reduction (Berthélemy 2006; Dollar and Levin 2006; Thiele et al 2007; Dreher, Molders, and Nunnenkamp 2010). Although we expect diminishing returns to aid (Hansen and Tarp 2000; Dalgaard and Hansen 2001; Roodman 2007), we also expect aid to spur growth under certain conditions (Demekas, McHugh, and Kosma 2002; Pettersson 2007a, 2007b).

Specifically, studies indicate that governments with low corruption and strong institutions are more likely to use aid effectively (Burnside and Dollar 2000, 2004; Dietrich 2011; Collier and Dollar 2001, 2002; Grant 2005). These findings echo Kennedy’s sentiments and highlight the intertwining of economic and political factors in determining aid effectiveness and efficiency. A new focus on states in conflict argues that newly-emerging states are “fragile” in that they have low income, weak policies, and poorly performing institutions (Feeny and McGillivray 2009; Collier, Hoeffler, and Soderbom 2008; Guillaumont and Chauvet 2001; Chauvet and Collier 2006; McGillivray 2006). Stronger governments have a firmer rule of law, reduced corruption, and well managed expenditure and revenue generation (Bräutigam and Knack 2004, p. 256).

Political and economic vulnerability in these cases has led some to use development aid to pursue political development and consolidation in these states. Balla and Reinhardt (2008) detail the mechanisms

through which aid can facilitate or hinder this consolidation (also McGillivray 2006). Subsequent studies link aid to the stabilization of recipient governments (Kono and Montinola 2009), the ability to withstand threats of deposition (Bueno de Mesquita and Smith 2010), and the encouragement of democracy (Bermeo 2011).¹

Essentially, a recipient's income level and quality of governance set the initial stage for its capacity to produce economically, and its capabilities to consolidate as a state. States with the lowest incomes and most corrupt governments are economically and politically vulnerable, predisposed to have a harder time with both growth and democratic consolidation (Guillamont and Chauvet 2001; Chauvet and Collier 2006). In their fragile conditions, these states have a low capacity to absorb aid (McGillivray 2006). As income rises, a country has more revenues to spend on citizen needs, and as corruption decreases, the increased revenues are more likely to be spent where needed, rather than absorbed for personal gains. In other words, rising income and improving governance increases states' ability to effectively and efficiently implement aid.

Effectiveness and Efficiency

At this point we should distinguish between *effectiveness* and *efficiency*. Michael Koch and co-authors (Koch 2010; Reinhardt and Koch 2010) have been exploring the difference between the two concepts. Although efficiency analysis is not new to the economic literature, applying it to foreign aid analysis is rare, as typical work in aid and development is either concerned exclusively with effectiveness, or equates one with the other (though see Batana 2010).

Effectiveness is defined according to an outcome of interest, such as aid's ability to achieve high levels of economic production and low levels of poverty (see Jensen and Paldam 2006; Roodman 2007; Dalgaard, Hansen, and Tarp 2004) or democratic consolidation and reform (Chauvet and Collier 2006; also McGillivray 2006). Aid effectiveness is typically assumed to be the ability of aid to achieve a particular goal. The higher the score on the outcome measure, the more of that goal is achieved, and the more effective the aid.

Aid *efficiency*, on the other hand, refers to using aid optimally, in the least wasteful manner possible. Often effectiveness and efficiency are used interchangeably, but the terms are distinct (see Feeny and McGillivray 2009). Effectiveness is about completing the right task: aid is more effective the more productive the economy, or the more consolidated the democracy. Efficiency is about completing tasks the right way: aid is more efficient the better it spurs production or consolidates democracy without being wasted.

These differences are not trivial. The pursuit of effectiveness is a constant quest for greater levels of output (more production, more consolidation), while the pursuit of efficiency is a quest with a limit (zero waste). Tests of effectiveness ask whether money spent is producing intended results, whether money *should be* spent. Tests of efficiency ask whether money is providing a good return on investment, *given that it is* spent. This distinction is particularly important below when we compare aid delivery mechanisms, because it allows us to ask *which* delivery channel generates greater waste, under given conditions.

¹ Hereafter I therefore use the terms "consolidate states" and "consolidate democracy" interchangeably.

We now know that donors use aid to pursue economic production and democratic consolidation, and that the effectiveness of aid at achieving these goals increases with a recipient country's income and quality of governance. Easterly (2003) implores scholars to stop expending effort looking for "the Next Big Idea" that will enable aid to buy more and more growth. In the pursuit of efficiency, we can stop trying to find new mechanisms to buy growth or state consolidation, and instead begin to decipher which of donors' available options provides the best return on a donor's investment.

Foreign Aid and Principal Agency

The principal-agent paradigm is a useful framework for viewing aid implementation. When not implementing aid directly, the donor acts as the principal, with the implementer as agent. Like any principal, foreign aid donors are at an informational disadvantage; they do not know what recipients will do with aid funds once distributed. And just as in the standard principal-agent scenario, the resulting moral hazard can lead to problems such as rent-seeking and fungibility. The quest for an optimal aid delivery mechanism has recently been discussed as a search for a way to avoid these problems (Brautigam and Knack 2004).

Aid donors have a choice of two main delivery mechanisms through which to funnel their aid: government channels and bypass channels. When delivered by *government channels*, the donor or recipient government controls funds until converted into goods or services and distributed to the target population (these are the OECD's "public sector" channels; OECD 2014a). When delivered via *bypass channels*, a third party such as an NGO, research institute, firm, or multilateral organization delivers the aid (hereafter *bypass aid*) with minimal recipient government involvement.

Because both recipient governments and bypass delivery mechanisms are agents in this context, it should not be surprising that both can fall victim to the pitfalls of principal agency. *Moral hazard* is a change in behavior resulting when a recipient uses its donor's resources differently, presumably less carefully, than it would use its own (see McAfee and McMillan 1987; Hart and Holmstrom 1986). A government might make risky or wasteful decisions with donor funds (Ranis and Mahmood 1992) because it does not bear the cost if things go poorly. Bypass agents sometimes fail to reach the neediest populations as they pursue the goals of their own stake-holders and core missions (Hug and Jäger 2014; Johansson et al 2010; Barber and Bowie 2008). Moral hazard endangers the efficiency of both delivery mechanisms in achieving production and consolidation because funds are diverted from their intended pursuits.

Rent-seeking is the jockeying over the economic spoils aid provides. The rent-seeking of government aid can foster cronyism, clientelism, and corruption (Economides, Kalyvitis, Philippopoulos 2008; Tavares 2003), and exclude political parties from participation (Djankov, Montalvo, Reynal-Querol 2006), which is particularly damaging to the pursuit of democratic consolidation (see Collier, Hoeffler, and Soderbom 2008). With bypass aid, agents competing for rents directly from the donor in the form of aid grants and contracts, necessary to their survival, and in so doing divert resources away from actual implementation (Moxham 2009;

Reinhardt 2008; Barber and Bowie 2008). Rent-seeking is thus likely to sabotage government aid's efficiency at fostering democratic consolidation and bypass aid's efficiency at spurring economic production.

Aid is argued *fungible* because it can be used to pay for something such as a health program, and then the money that would have paid for that program can be used to pay for something else. If the aid was meant to increase the quantity or quality of health programs, this re-allocation defeats the donor's intentions. Pettersson (2007b) maintains that the fungibility of government-channeled aid is desirable because it allows governments to allocate resources efficiently, and it builds capacity in public management and finance, fostering ownership and responsibility (see also Pettersson 2007a; Wagstaff 2011). In fact, it is this ownership, responsibility, and capacity building in the public sector that Brautigam and Knack (2004) argue is incapacitated by the fungibility of bypass aid. When bypass agents provide public goods, recipient governments can still re-allocate government resources accordingly, but with no credit for providing the goods. This undermines government credibility and legitimacy, removing ownership from the policy making process. The principal of fungibility has not been eliminated by switching to bypass agents, but the consequences of it may indeed have been worsened. If fungibility is indeed a problem, it should hurt efficiency levels for bypass aid in terms of democratic consolidation.

It may seem that government and bypass channels are equally inefficient (or equally efficient) delivery mechanisms. When we recall, however, the mitigation of income and governance, it becomes clear that this is not the case. Studies have shown that donors condition both aid levels and delivery mechanisms on governance indicators (Dietrich 2011, 2013; Knack 2013), suggesting that recipients with strong governance are more trusted to implement their own aid. Drawing from these discussions of income, governance, and channel delivery in the pursuit of growth and state consolidation, I develop the hypotheses below.

Hypotheses

I begin with the efficiency of aid at encouraging economic production. If both government and bypass agents are likely to seek rents, government channels are more likely to spend those rents in the recipient economy. In likely rent-seeking environments, then, we are more likely to see government-channeled aid spur economic production, whether it is driving pro-poor policies, or being funneled into purchases and services from the appropriated rents. Meanwhile, bypass agents are more likely to spend the rents in other economies, paying for goods and services elsewhere that they then bring into the recipient to distribute. In these poor-governing situations we should therefore expect government-channeled aid to have more efficient economic production than bypass aid.

As governance improves, the likelihood of competing for rents declines, and struggling economies benefit less from rent distribution, because the higher quality governments will have fewer rents to distribute. Holding economic levels low, then, government aid will lose efficiency in generating production as governance improves. Bypass agents, already spending aid outside the system, will keep efficiency low.

At higher income levels, the economy is more diversified, and aid is less likely to represent a major share of the economy or the labor force. The efficiency of bypass aid at encouraging production should therefore rise as income rises, and as the quality of governance rises at higher levels of income. In fact, the bypass aid efficiency is expected to surpass that of government-channeled aid at the highest income levels of income and governance. Here, the labor force is diversified, the middle class is larger, and bypass agents are more able to utilize national labor, thus less likely to spend (or “waste”) it by purchasing goods and services outside the local economy. Government aid efficiency should also rise as governments are able to supplement aid with higher levels of their own income and more able to allocate aid fungibly and efficiently to the places it is needed most. Therefore:

- 1) The efficiency of government-channeled aid at helping countries reach their economic production potential will be highest among countries with the least income and lowest-quality governments, but will *decrease* as the quality of governance increases among this low-income group.
- 2) The efficiency of government-channeled aid at helping countries reach their economic production potential will generally *increase* as the quality of governance and income rise together.
- 3) The efficiency of bypass aid at helping countries reach their economic production potential will be low among countries with the least income and lowest-quality governments, but will generally *increase* as the quality of governance and income increase.

Consolidating a government and spurring economic growth can often work at cross purposes (Easterly 2003), so we should not expect efficiency outcomes for the goals studied here to be the same. In the pursuit of democratic consolidation, with least income and low-quality governments, government-channeled aid begins at a low level of efficiency due to its potential to fuel rent-seeking and corruption. As corruption dwindles, however, government aid should become more efficient at promoting consolidation. Similarly, bypass agents will be better able to implement aid as the quality of governance increases and the environment becomes less corrupt. These efficiency increases should be the most noticeable with the least-income countries, where small amounts of aid will represent large increases in resources. Therefore:

- 4) The efficiency of government-channeled aid at helping countries reach their potential to consolidate democracy will be lowest among the least income lowest-quality governments, and will *increase* as the quality of governance increases.
- 5) The efficiency of bypass aid at helping countries reach their potential to consolidate democracy will be lowest among the least income lowest-quality governments, and will *increase* as the quality of governance increases.

Data and Methods

To test these hypotheses, we need to compare the aid delivered through bypass channels to that delivered through governments. I explore the efficiency of government-channeled and bypass aid from the US to 43 recipient countries from 2005-2012. The unit of analysis is the recipient-year. The universe of recipient-years includes Official Development Assistance (ODA) eligible countries and years for which the United States has provided aid allocation data according to channel of delivery. I choose the US for several reasons. With respect to generalizability, the US offers an average case in terms of allocation according to channels. Table 1 shows that from 2008-2011, the US consistently gives roughly 59% of aid via bypass channels, more than countries such as Japan and France who tend to stick with government channels, but less than countries such as Australia and Canada that give almost exclusively via bypass agents. By occupying the middle ground, the US gives enough variance to analyze the effectiveness and efficiency of both channels of delivery during the short time frame for which channel-specific aid data is available.

Table 1

Amount of ODA Implemented via Bypass Agents per Donor, in Absolute and Proportional Terms

	2008		2009		2010		2011	
	Gross Disb.	Prop.	Gross Disb.	Prop.	Gross Disb.	Prop.	Gross Disb.	Prop.
France	344.63	0.04	345.15	0.04	448.97	0.05	401.34	0.04
Portugal	14.98	0.04	59.19	0.19	78.32	0.17	38.15	0.07
Korea	66.53	0.11	85.33	0.11	80.25	0.08	117.79	0.11
Japan	2212.31	0.12	1898.69	0.13	2398.67	0.15	2369.35	0.15
Italy	400.32	0.19	263.68	0.25	209.76	0.20	367.88	0.18
Germany	1871.69	0.17	1880.55	0.22	3158.44	0.32	3173.73	0.31
New Zealand	124.15	0.37	98.33	0.32	85.21	0.28	104.95	0.31
Denmark	365.30	0.24	384.52	0.22	850.91	0.37	1013.25	0.46
Greece	25.38	0.08	19.66	0.06	94.43	0.42	74.89	0.49
Belgium	491.55	0.33	591.61	0.34	1001.36	0.44	1057.59	0.53
Switzerland	1017.78	0.53	1109.63	0.51	1081.43	0.53	1286.27	0.54
Austria	283.96	0.22	273.78	0.51	308.19	0.47	265.83	0.54
Luxembourg	160.43	0.53	156.92	0.52	196.62	0.59	151.58	0.54
Sweden	1864.24	0.55	2210.63	0.61	1919.80	0.58	2086.87	0.56
United States	14522.17	0.57	16017.65	0.61	16477.03	0.59	16183.37	0.57
Netherlands	3223.53	0.59	2890.45	0.57	2912.05	0.55	2807.31	0.62
Ireland	587.48	0.70	427.54	0.63	377.92	0.61	376.79	0.62
Canada	1152.04	0.31	2570.21	0.66	2698.22	0.63	2639.21	0.63
Finland	510.43	0.72	573.76	0.71	613.88	0.68	591.51	0.69
Norway	2194.23	0.66	2578.63	0.64	2595.47	0.68	2469.09	0.69
Australia	1837.21	0.51	2094.51	0.62	2424.54	0.64	2967.25	0.71
Spain	3392.37	0.64	2395.58	0.50	3220.93	0.69	1845.55	0.72

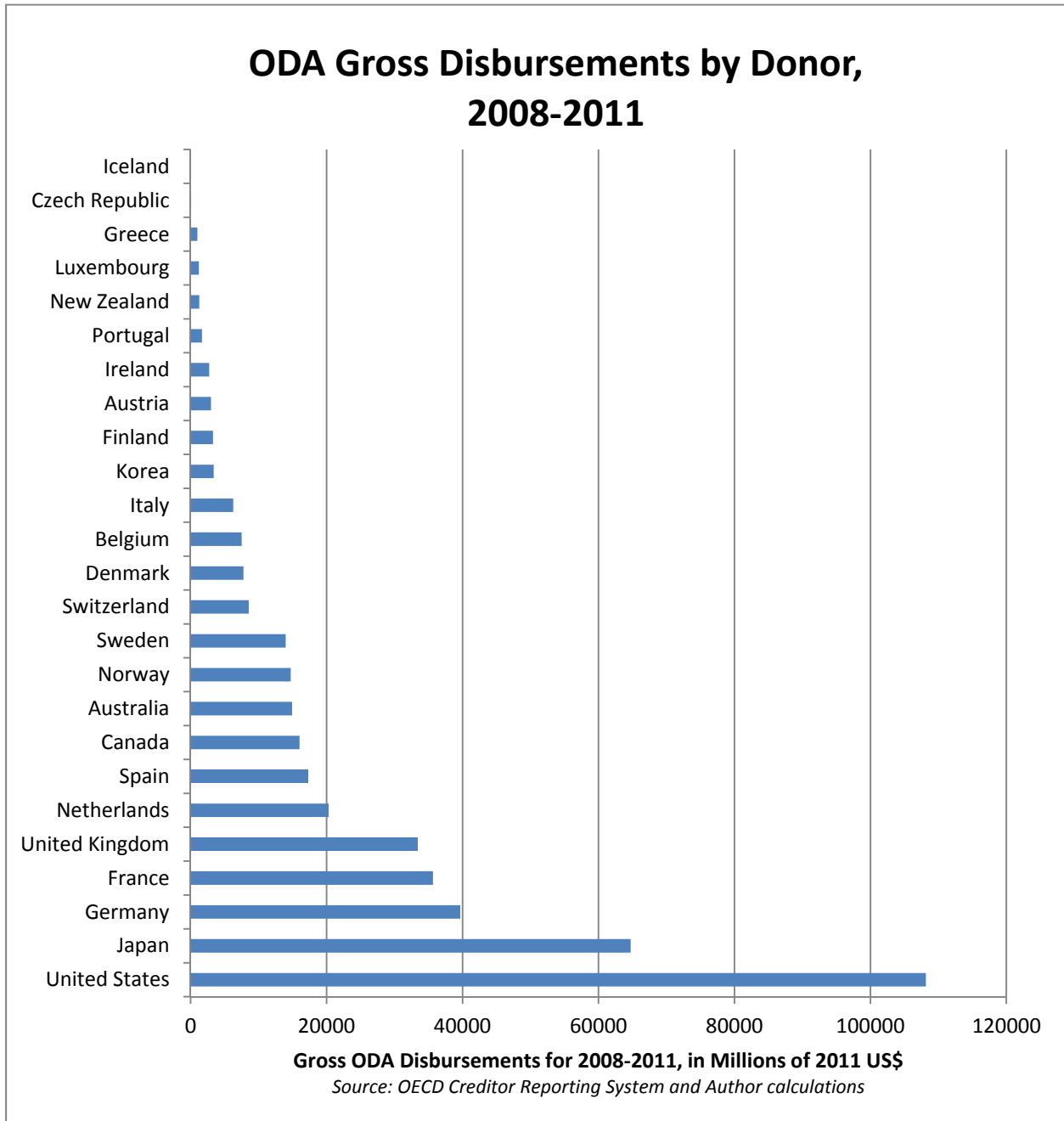
United Kingdom	2489.72	0.33	4151.45	0.50	6245.65	0.70	6484.62	0.74
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Source: OECD Creditor Reporting System and Author calculations.

Additionally, the US is the largest donor of bilateral foreign aid in the world. Figure 1 illustrates the distribution of ODA by donor over the 2008-2012 period, showing the US giving more than any other bilateral donor, more than 25% of the entire quantity. Conclusions regarding efficiency have wide-reaching implications for this generator of such a large amount of the world's aid funds.

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Figure 1



Dependent Variables: Economic Production and Democratic Consolidation

My empirical analysis asks: Which delivery channels are more efficient at achieving donor goals? The outcomes of interest are therefore defined in terms of those goals: economic production and democratic consolidation. *Economic production* is measured as a recipient's GDP per capita in a given year (World Bank 2012). *Democratic consolidation* is measured with Polity IV scores (Marshall, Jaggers and Gurr 2011). The Polity score is a single indicator that captures the regime authority spectrum on a 21-point scale ranging from -10

(hereditary monarchy) to +10 (consolidated democracy). Please see Supplemental Materials for descriptive statistics, plus information on scaling, coding, and coverage.

Explanatory Variables: Channel Designation, Governance, and Income

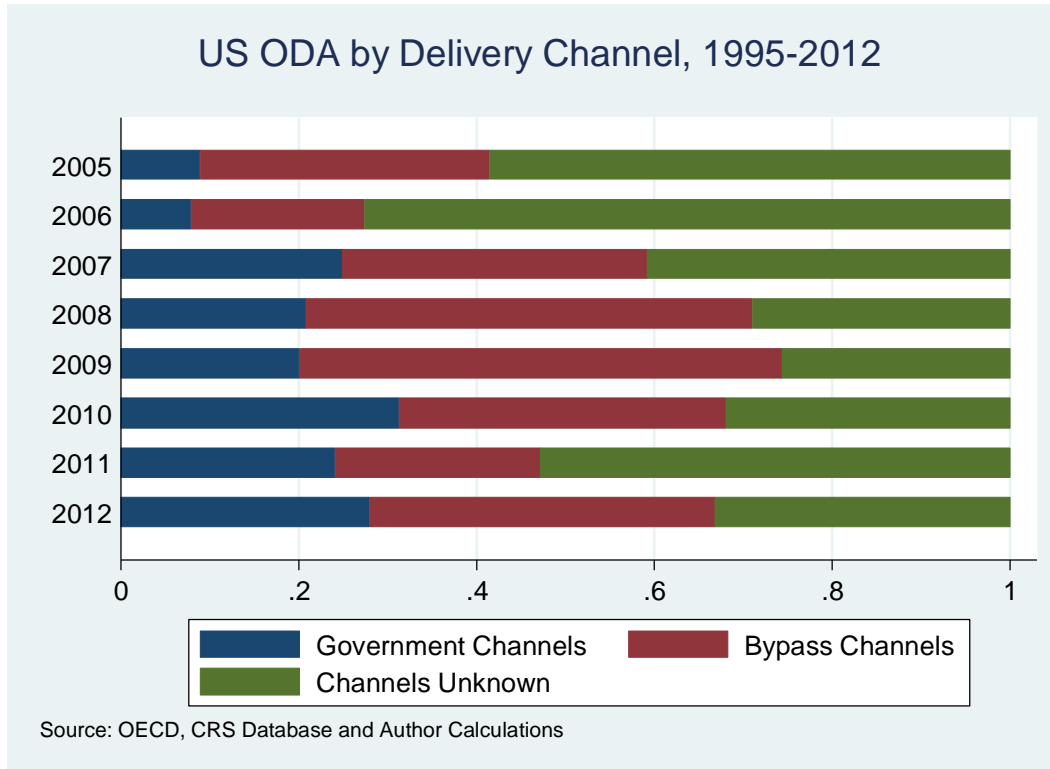
My argument is that donor goals are more efficiently achieved when delivered via particular channels, conditional upon the governance quality and income level of the recipient. The main variables of interest are therefore *bypass share* and *government share*, and the conditional variables are *income* and *governance quality*. Data to construct *bypass share* and *government share* is collected from the OECD Creditor Reporting System, which asks donors to report each aid project and that project's delivery channel. Since the CRS is relatively new, channel information is available for the US from 2005-2012 (prior to 2005, the US reports projects to the database, but channels are uniformly non-specific).² I use the *bypass share* of aid to capture how much of that country's US aid is delivered via bypass channels, dividing the recipient's amount of US bypass aid by its total amount of US aid. The variable *government share* performs the same operation for aid delivered via the public sector. These shares do not exhaust the quantity of US aid in a particular year, because there is always a portion of US funds reported in the CRS with undesignated delivery channels. Figure 2 shows the distribution of bypass, government, and undesignated-channel aid for the US annually from 2005-2012.

Governance quality is measured using the World Bank Transparency International's Corruption Perceptions Index (CPI; Transparency International 2013). The CPI measures perceived corruption in each recipient country through polls asking analysts, businesspeople, residents, and experts about aspects of governance such as bribe prevalence, the ease of doing business, and public sector accountability. The CPI has been widely used as an indicator of corruption (see Sandholtz and Gray 2003; Lipset and Lenz 2000; Dietrich 2011), and recent analysis shows it is robust from year to year within countries, despite the use of multiple sources and changing methodology over time (Saisana and Saltelli 2012). Higher scores indicate better governance.

Income is categorized broadly according to OECD groupings, which adjust every 3 years. From 2010-2013, Least-Developed Countries (LDCs) had per capita Gross National Incomes (GNIs) below \$1005. Lower-Middle Income Countries (LMICs) were \$1006-\$3975, and Upper-Middle Income Countries (UMICs) \$3976-\$12,275 (see OECD 2014b for annual thresholds).

Figure 2

² Money given to multilateral institutions is given specifically for those multilaterals to implement as bypass agents. Money given as dues or funds for the multilaterals is measured in a separate category of funding.



Controls

Previous scholarship has identified a collection of influences driving economic production and democratic consolidation. I control for these influences and lag all time-varying right-hand side variables by one year. Data on endowments such as population, arable land, and regional fixed effects come from the World Bank Development Indicators (2012). Measures of imports and exports come from the IMF *Direction of Trade Statistics* (2013), and are measured as a share of the recipient's overall GDP. Political indicators of human rights and conflict come from the Cingranelli, Richards, and Clay (2014) dataset and the Uppsala Conflict Data Program, v.4 (Gleditsch et al 2002), respectively. Cultural indicators of ethnic fractionalization and colonial heritage come from Fearon and Laitin's (2003) project on ethnic and cultural diversity. A control for total aid from the US comes from the OECD (2014a).

First, consider what might condition economic production. Because larger populations add to the labor force, I expect population to be positively related to production. I expect the same relationship to hold true with arable land and imports from the US; more arable land is more likely to yield more food and productivity and higher import shares should be associated with increased consumption based on increased disposable income that comes from higher productivity. Export shares should show the reverse relationship. I expect higher levels of ethnic fractionalization to have more damaging effects on productivity. Because conflict is likely to stop economic activity, I expect conflict to hinder productivity. Because democracies allow people to produce freely according to their own choice, I expect democracies to have higher productivity.

Now consider the factors conditioning democratic consolidation. Here I expect countries with greater dependency on oil to have lower scores on democracy, and I expect total aid from the US to show the same pattern (Djankov, Montalvo, and Reynal-Querol 2006). I expect increased imports to be associated with increased flexibility and personal choice, and thus with greater democratic freedoms, and I expect the reverse to be true with exports. I expect higher levels of ethnic fractionalization and the presence of conflict to be associated with lower levels of democratization. Because the outcome is democratic consolidation, in this case I also control for human rights, which I expect to be positively associated with consolidation.

Estimation Strategy

Imagine each donor gives a recipient aid with the idea that there are maximum, optimal levels of production and consolidation that can be reached, a possibility frontier for each goal. These frontiers are constrained by a recipient's factor endowments, such as land and labor. Some assets help push the possibility frontier outward for a recipient. If an asset helps expand the frontier of production possibilities, it is making the recipient *more effective* at production. If that asset constrains the frontier of possibilities, causing it to contract inward, it is reducing the possibilities a recipient can achieve, making it *less effective* at achieving production (or consolidating democracy).

If a recipient is operating on its production or consolidation frontier, it is operating *efficiently*. If the recipient is operating within the bounds of that frontier, it is operating *inefficiently*. When aid causes a recipient to increase its distance from the frontier of possibilities, moving farther inward from the optimum level of production or democratization, aid is *decreasing efficiency*. When aid causes a recipient to decrease its distance to the frontier of possibilities, moving closer to the optimum level, aid is *increasing efficiency*.

Stochastic frontier analysis (SFA) allows me to model the efficiency of aid. The coefficients of controls can tell us whether any factors are making recipients more or less effective by moving the production possibility frontier itself; that is, we see which determinants are expanding the frontier of possibilities, and which are forcing it to contract. The error components illuminate which factors are moving recipients with respect to the frontier itself. In other words, we can find out what factors make one recipient more efficient than another in that the distance between actual goal achievement and potential goal achievement is lessened. The theory of the statistical method falls precisely in line with my theory of the underperformance of aid. I will use SFA to compare the efficiency of bypass aid to that of government aid in helping recipients reach their fullest production and consolidation potential.

Formalization of the Stochastic Frontier

The stochastic production frontier model was developed by Aigner, Lovell, and Schmidt (1977) and Meeusen and van den Broeck (1977), and this discussion is based on a presentation by Kumbhakar and Lovell (2000) and augmented by StataCorp (2013). The idea behind the stochastic production frontier is that error and inefficiency lead an organization to produce less than its ultimate production possibility, given its inputs. As my data covers several countries over a series of years, I use the heteroskedastic panel data

stochastic frontier model with time-varying technical efficiency, which allows for a truncated-normal error term and relaxes any assumptions of fixed efficiency (Battese and Coelli 1995).

Imagine i , a recipient country. The production function of this recipient is $f(z_{it}, \beta)$. In an efficient world the i th recipient would use its inputs and technology to produce the maximum amount of goals, q_i , possible, according to the equation:

$$q_i = f(z_i, \beta).$$

But stochastic frontier analysis rests on the assumption that each recipient's output is less than it could be, because of technical and allocative inefficiencies. So actual production for each recipient is:

$$q_i = f(z_i, \beta)\varepsilon_i$$

where $\varepsilon_i \in (0, 1]$ is the efficiency for recipient i . If $\varepsilon_i=1$, the recipient is implementing at optimum efficiency and achieving optimum output given its inputs in the function $f(z_i, \beta)$. If $\varepsilon_i < 1$, the recipient is operating below its possibility frontier. The recipient's output q_i is assumed to be strictly positive ($q_i > 0$), so technical efficiency is also assumed to be strictly positive ($\varepsilon_i > 0$).

In addition to inefficiency the SFA assumes a random error, adding another term:

$$q_i = f(z_i, \beta)\varepsilon_i \exp(v_i).$$

We can transform the equation by taking the natural log of both sides to reveal:

$$\ln(q_i) = \ln\{f(z_i, \beta)\} + \ln(\varepsilon_i) + v_i.$$

If there are k inputs and the production function is linear in logs, we can define $u_i = -\ln(\varepsilon_i)$ and yield:

$$\ln(q_i) = \beta_0 + \sum_{j=1}^k \beta_j \ln(z_{ji}) + v_i - u_i.$$

as u_i is subtracted from $\ln(q_i)$, restricting $\ln(q_i) \geq 0$ indicates that $0 < \varepsilon_i < 1$, as stated above (see Kumbhakar and Lovell 2000 for full derivation).

To adjust the model for cross-sectional and longitudinal data, we simply consider that there are I aid recipients, $i = 1, \dots, I$, through T time periods, $t = 1, \dots, T$. The frontier can then be written as:

$$\ln(q_{it}) = \beta_0 + \sum_{j=1}^k \beta_j \ln(z_{jit}) + v_{it} - u_{it} \quad (1)$$

Where:

- q_{it} is observed achievement of growth (or democratic consolidation);
- $\beta_0 + \sum_{j=1}^k \beta_j \ln(z_{jit})$ is the production frontier;
- z_{jit} is a $(1 \times k)$ vector of inputs such as a recipient's natural resources, a vector of values of known explanatory variables associated with the i th recipient in the t th year;
- β is a $(k \times 1)$ vector of unknown parameters to be estimated;
- v_{it} is the random noise component, assumed iid $N(0, \sigma_v^2)$ and independently distributed of the u_{it} s;

- u_{it} is a one-sided error term capturing the technical inefficiency of goal achievement (development); these errors are assumed independently distributed such that u_{it} is obtained by truncation (at zero) of the normal distribution with mean $x_{it}\delta$ and variance σ^2 ;
- $x_{it}\delta$ is a $(1 \times m)$ vector of explanatory variables associated with the inefficiency of recipients at developing over time; and
- σ^2 is an $(m \times 1)$ vector of unknown coefficients. (Battese and Coelli 1995)

Equation (1) gives the stochastic frontier production function in terms of the original production values. The technical inefficiency effects, the u_{it} s, are assumed to be a function of a set of explanatory variables, the x_{it} s, and an unknown vector of coefficients, δ . The technical inefficiency effect u_{it} in Equation (1) could be modeled as:

$$u_{it} = x_{it}\delta + W_{it} \quad (2)$$

Where the random variable, u_{it} , is defined by the truncation of the normal distribution with zero mean and variance, σ^2 , such that the point of truncation is $-x_{it}\delta$, that is, $W_{it} \geq -x_{it}\delta$. This final assumption is consistent with u_{it} being a non-negative truncation of the $N(x_{it}\delta, \sigma^2)$ distribution (ibid.).

This panel frontier specification has several advantages over other frontier specifications. First, it does not assume identical distribution of the W -random variables, meaning the inefficiency components can vary among recipients and over time. Second, these variables are not required to be non-negative. Finally, the mean $x_{it}\delta$, which is truncated at zero to yield the distribution of u_{it} , is not required to be positive for each observation (Battese and Coelli 1995; Belotti et al 2012).

This specification also has advantages over other panel specifications in that it enables me to estimate the effects of governance quality and aid delivery channel not on the level of development itself, but on how well resources are used to achieve that development. We can estimate both the frontier and the one-sided error. The model is based on natural log specifications, so all time varying variables are estimated in their natural log form. I employ the Stata 13 software program with the package for panel data (Belotti et al 2012).

Interpretation

Stochastic frontier analysis is particularly apt for my purposes because it allows me to estimate the effect of *bypass share* and *government share* on efficiency (the distance between a particular recipient's actual achievement and its possibility frontier). A word about interpretation will be helpful because the stochastic frontier will be new to many in the aid literature (although not all, see Batana 2010). In the models below, we can estimate the share of bypass aid as a part of the inefficiency in the one-sided error term of the model. In this case a significant coefficient on *bypass share* would signify that the amount of aid given via bypass channels was affecting how close the recipient is to attaining its goals. A negative sign on this coefficient would mean bypass aid is reducing the inefficiency, decreasing the gap between actual achievement and the possibility

frontier, helping recipients improve efficiency. A positive sign would mean bypass aid is increasing inefficiency, increasing the distance between the actual output and potential achievements.

We can also compare the performance of bypass share to that of government share as components of the inefficiency. Although the two variables are not jointly exhaustive for a given recipient-year, they are collinear, so including them in the same estimation gives us little information. But comparing them between estimations will be fruitful. The strongest evidence that the two channels work at cross purposes will be if their coefficients are significant with opposite signs. But those would not be the only findings consistent with my theory. If bypass share causes the inefficiencies of achieving production to shrink while government share has no effect on them, for example (indicated by a negative significant coefficient on *bypass share* and an insignificant coefficient on *government share*), it would still indicate that bypass aid was more efficient than government aid.

Results

Frontier estimates can be challenging to interpret, and often their marginal effects are presented instead. Table 2 presents coefficients estimating production and consolidation. These models are estimated with determinants of these goals as inputs to their production frontiers, and with three components of the one-sided error term, or inefficiency. These three components are a recipient's *quality of governance*, its *share of aid* delivered via government (or bypass) channels, and the governance and share terms interacted (*governance*share*). Because of the interaction, these coefficients demand special interpretation. The coefficient on *quality of governance* in the government share models will be the "effect on inefficiency when the share of aid given via government channels is zero." The coefficient on *government share* will be the "effect on inefficiency when the recipient's quality of governance is zero." And the coefficient on the interaction term will be the "effect of increasing the government share of aid, as the quality of governance increases."

Both the frontier and the efficiency terms are estimated simultaneously. After estimation, each recipient is given an efficiency score for a particular year. This efficiency score can be thought of similarly to a predicted probability score, or a marginal effect, in an OLS or logit model. We can plot the efficiency scores according to other variables of interest to see how a recipient's predicted efficiency varies according to those observable variables. Often the interpretation of efficiency, particularly with interaction terms, is perhaps best left to a visual understanding, which I offer in Figures 3-4.

Growth

Begin with growth, estimated in Models 1 and 2. The one-sided error components behave as expected. In Model 1, *quality of governance* is entered alone, and interacted with the *government share* of aid. The positive and significant coefficient on the governance variable indicates that when the share of aid delivered via government channels is zero, that is, when bypass aid is presumably high, improvements in governance

actually *increase inefficiencies* in achieving growth. In line with this finding, the negative and significant coefficient on *government share* shows that when governance quality is zero, or as low as possible, even tiny increases in the amount of aid given via government channels reduce inefficiencies in achieving growth. And the positive and significant interaction term seems to exhibit diminishing returns, showing that as the recipient's quality of governance increases, increasing the share given via government channels makes the pursuit of growth less efficient.

Table 2
Estimating the Economic Production Frontier with
Channel of Delivery in the One-Sided Error

	Government Aid (1)	Bypass Aid (2)
Inefficiency Components		
Governance	13.60** (3.91)	-4.23 (2.53)
Share of Aid via Government Channels	-2.45** (0.50)	
Government Share Interacted with Governance	11.84** (1.96)	
Share of Aid via Bypass Channels		3.11** (0.53)
Bypass Share Interacted with Governance		-4.36** (1.38)
Frontier Components		
Polity IV Score	0.04** (0.01)	0.02* (0.01)
Armed Conflict	-0.29** (0.07)	-0.18** (0.06)
Ethnic Fractionalization	0.33 (0.18)	-0.10 (0.15)
Total Aid from USA	-0.10** (0.01)	-0.10** (0.02)
Exports to USA	-0.04* (0.02)	-0.09** (0.02)
Imports from USA	0.17** (0.03)	0.21** (0.04)
Population	0.08** (0.03)	0.12** (0.03)
Arable Land	-0.63* (0.26)	-0.27 (0.25)
Former British Colony	-0.48**	-0.21*

	(0.09)	(0.09)
Former French Colony	-0.44**	-0.31**
	(0.10)	(0.09)
Europe	0.52*	0.64**
	(0.21)	(0.16)
Latin America and Caribbean	-0.16	0.14
	(0.12)	(0.10)
Middle East and North Africa	0.51**	0.47**
	(0.10)	(0.09)
North America	-0.35	0.05
	(0.20)	(0.22)
Polynesia	-1.04	-1.04
	(0.00)	(0.00)
Sub-Saharan Africa	0.07	0.31**
	(0.11)	(0.12)
Lower-middle Income Group	0.84**	0.99**
	(0.06)	(0.05)
Upper-middle Income Group	0.43**	0.45**
	(0.06)	(0.05)
Constant	7.52**	6.87**
	(0.38)	(0.55)
μ	1.85**	2.33**
	(0.17)	(0.36)
$U\sigma$	-4.01**	1.62*
	(1.10)	(0.77)
$V\sigma$	-5.28**	-4.30**
	(0.38)	(0.39)
Observations	255	244
Number of Recipients	43	43

Notes: Standard errors in parentheses; ** $p < 0.01$, * $p < 0.05$; All time-varying variables lagged one year; Dependent variable is GDP per capita; Arable land is percent of total land area; Export and Import share are each percent of total GDP

At first glance, these results may seem counterintuitive to arguments I advanced earlier, but they are not. The reasons have to do with the complex interactions among governance, economic production, and aid. Remember that when government share is zero, bypass aid is likely to be quite high. My theory predicts that high levels of bypass aid are inefficient at production, and that is what the coefficient on governance, alone in

Model 1, is indicating. The coefficient on *bypass share* in Model 2 confirms this, as it is positive and significant. Viewed together, these two models show that: bypass aid is inefficient when governance is poor (bypass share coefficient in Model 2: 3.11; $p < .01$); even high quality governments have a hard time achieving production when bypass aid represents a large share of overall aid and government share is zero (governance coefficient in Model 1: 13.60; $p < .01$); and increasing the aid given via government channels reduces inefficiencies even when governance is bad (government share coefficient in Model 1: -2.45; $p < .01$).

The interaction terms, however, may still seem puzzling. But these interactive effects cannot be interpreted straightforwardly. Recall that I expect relationships among governance, efficiency, aid channel, and income. Because the sample is so small, I control for income group with income dummies (for LDC, LMIC, and UMIC, as defined above). This obviates the need to interact the income variable with governance and aid share, and thus significantly reduces the number of coefficients required in the estimation. I can then observe predictions by income group in post-estimation.³

Figure 3 plots the predicted efficiency (on the y-axis, right side) of government-channeled aid (red lines) and bypass aid (green lines) as the recipient's quality of governance increases (on the x-axis). The sample is divided into plots according to income group for the first three plots, and then all recipients pooled in the final plot. Also on each plot, we can see the distribution of recipients in that income group (the frequency of this distribution is indicated on the left side of the y-axis).⁴

Seen this way, we can tell exactly how our key variables interact. For LDCs, bypass aid yields low efficiency at achieving growth, beginning and ending below 8% at all levels of governance quality. Government aid, on the other hand, has an 18% effect on efficiency at first, and then precipitously drops in efficiency the greater the share of government aid becomes, until it bottoms out at approximately 5.5% efficiency. Not coincidentally, this lowest level of efficiency occurs when LDCs reach their highest exhibited level of governance quality, at 36%.

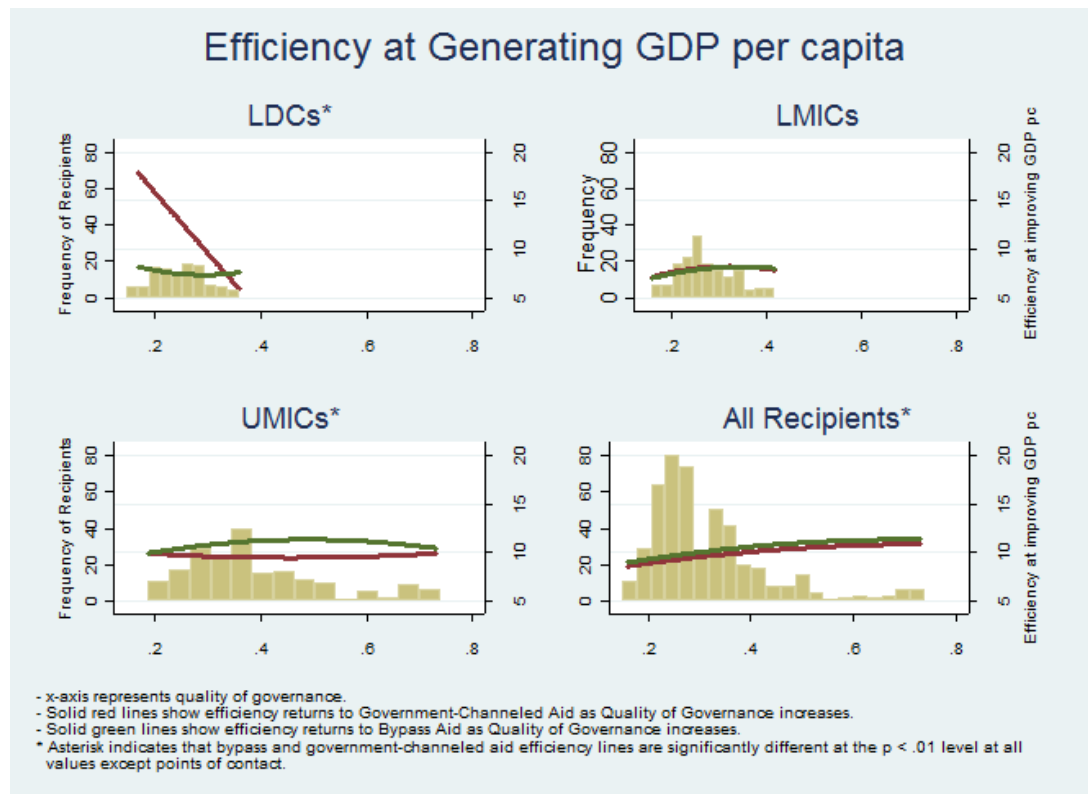
LMICs, however, use both government and bypass aid at efficiency levels similar to each other regardless of the recipient quality of governance. Further, as the quality of governance changes, efficiency at production changes minimally. Over the 16%- 42% governance quality exhibited by this group, the efficiency

³ Estimates of growth and democratic consolidation on sub-samples divided by income classification can be found in Supplemental Materials. Results for all efficiency term estimates are as expected and conform to the figures presented in this text. Although frontier coefficient estimates for LMICs and UMICs are also as expected, estimates for the frontier coefficients on the sub-sample of LDCs differ between models using government v. bypass share in the one-sided error. This is likely due to the small sample size of this income group, as reducing the number of covariates in the estimation yielded consistent results across models. These results do not affect the ultimate conclusions regarding efficiency but may be confusing to readers new to the stochastic frontier estimation, so I choose not to present them in the text, and caution the reader to interpret these ancillary coefficients with care.

⁴ For comparison, each plot has identical y and x scales. This makes the plotting of confidence intervals too difficult to give visual purchase, so an asterisk on the plot title indicates significant ($p < .01$) separation between bypass and government efficiency lines, except when indicated at intersections or endpoints.

of the lowest-quality governments is 7%, while that of the best-quality governments is 8% (difference statistically significant at the $p < .01$ level).

Figure 3



A large difference between aid delivery channels is evident again with UMICs, in the third plot. For this group it is bypass aid that steals the efficiency prize, growing from 10% to a peak of 13% efficiency as quality of governance among recipients increases from 20% to 48%, at which point efficiency drops to a final 10.4% when governance quality peaks at 74%. Meanwhile government-channeled aid begins at the same 10% but drops to 9.5%, then increases back to 10% (all points except the endpoints are statistically different at the $p < .01$ level).

When the sample is pooled in the final plot, the effects of bypass and government-channeled aid are differentiated (at the $p < .01$ level), but the differences in income levels are smoothed out, and we can see why the coefficients and interactions in Table 1 might be confusing. Perhaps most illuminating in this graph is the large distribution of recipients in the lower end of the quality of governance spectrum, with governance scores from 20%-35%. These are pulling the efficiency of aid down for the pooled sample, and for LDCs in particular. Also interesting is how tremendously efficient government aid is to LDCs with poor governance, while bypass aid wavers in zones of much lower efficiency. Meanwhile, aid to UMICs ends up being the most efficient of all aid at economic production.

In the end, the effect of a particular type of aid on a recipient's efficiency at economic production depends on both its level of income and the quality of its governance. As governance improves, recipients are more likely to move out of low-income categories, which gives aid the opportunity for increased efficiency overall. The next set of results will tell whether or not these higher-quality governments are also more likely to consolidate as democracies.

Democratic Consolidation

Table 3 reveals estimations for democratic consolidation, with the same three central components of the one-sided error: *quality of governance*, *aid share*, and the interaction of the two. Again we see expected efficiency results. Bypass aid is inefficient at helping recipients reach their democratic consolidation frontier when governance is poor (bypass share coefficient in Model 4: 1.91; $p < .01$); and increasing the aid given via government channels reduces inefficiencies even when governance is bad (government share coefficient in Model 1: -3.02; $p < .01$). In this case, however, it seems as though higher quality governments have a hard time achieving democratic consolidation when either bypass aid represents a large share of overall aid and government share is zero (governance coefficient in Model 1: 9.45; $p < .01$) or when government aid represents a large share of overall aid and bypass share is zero (bypass coefficient in Model 2: 7.98; $p < .05$). This suggests that the optimum allocation of aid, if democratic consolidation is the goal, should be delivered via a mix of government and bypass channels.

Table 3
Estimating the Democratic Consolidation Frontier with
Channel of Delivery in the One-Sided Error

	Government Aid (3)	Bypass Aid (4)
Inefficiency Components		
Governance	9.45** (2.35)	7.98* (3.80)
Share of Aid via Government Channels	-3.02** (0.34)	
Government Share Interacted with Governance	14.07** (1.11)	
Share of Aid via Bypass Channels		1.91** (0.42)
Bypass Share Interacted with Governance		2.06 (1.39)
Frontier Components		
CIRI Human Rights Score	0.01** (0.00)	0.05** (0.01)
Armed Conflict	0.16**	0.30**

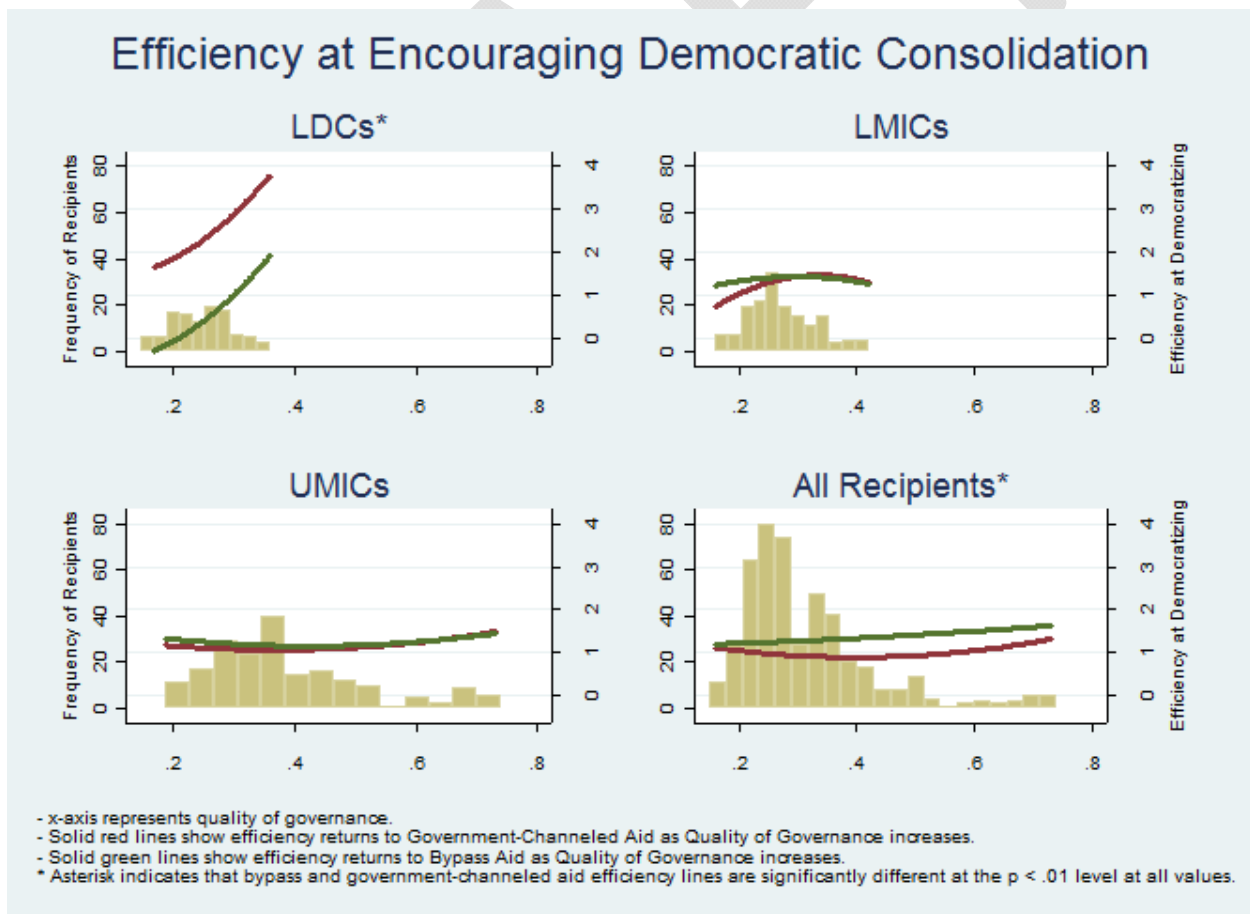
	(0.02)	(0.03)
Ethnic Fractionalization	0.00	0.21*
	(0.05)	(0.09)
Oil Revenues	-0.33**	0.01
	(0.03)	(0.04)
Total Aid from USA	-0.01**	-0.04**
	(0.00)	(0.01)
Exports to USA	-0.05**	-0.05**
	(0.01)	(0.01)
Imports from USA	0.02	0.14**
	(0.02)	(0.01)
Former British Colony	-0.43**	-0.18**
	(0.04)	(0.06)
Former French Colony	-0.43**	-0.21**
	(0.03)	(0.07)
Europe	-0.19	0.67**
	(0.16)	(0.05)
Latin America and Caribbean	0.15**	0.32**
	(0.04)	(0.06)
Middle East and North Africa	-0.42**	-0.00
	(0.06)	(0.09)
North America	-0.41	-0.09
	(0.37)	(0.00)
Polynesia	-0.41	-0.41
	(0.00)	(0.00)
Sub-Saharan Africa	0.43**	0.62**
	(0.05)	(0.10)
Lower-middle Income Group	0.18**	-0.07
	(0.03)	(0.05)
Upper-middle Income Group	0.09**	0.01
	(0.02)	(0.07)
Constant	0.91**	1.07**
	(0.10)	(0.11)
μ	0.31**	0.79**
	(0.01)	(0.05)
$U\sigma$	-1.99*	-0.29
	(0.77)	(1.04)
$V\sigma$	-18.31**	-20.57**
	(3.03)	(3.42)

Observations	254	243
Number of Recipients	43	43

Notes: Standard errors in parentheses; ** $p < 0.01$, * $p < 0.05$; All time-varying variables lagged one year; Dependent variable is Polity IV score; Arable land is percent of total land area; Oil revenues, Export and Import share are each percent of total GDP.

Before drawing a conclusion, consider the efficiency of each channel according to income group. Figure 3 plots these relationships just as Figure 2 did. Predicted efficiency at consolidating democracy is on right side of the y-axis. Government-channeled aid (red lines) and bypass aid (green lines) span the graph as the recipient's quality of governance increases on the x-axis. The sample is divided into plots according to income group for the first three plots, then recipients are pooled in the final plot. On each plot we can see the distribution of recipients in that income group (frequency is indicated on the left side of the y-axis).

Figure 3



As before, we see remarkable difference among income groups. Within LDCs, the two channels contribute very little to efficiency among the lowest-quality governments, though government aid is more

efficient. Then the efficiency of each rises sharply as the quality of governance increases. By the time the group reaches its highest level of governance, government aid has reached almost 4% efficiency. Interestingly, although bypass aid has risen at roughly parallel rates, it has still only reached half the efficiency levels of government aid, and tops out at levels just under 2%, barely more efficient than where government aid began.

Within LMICs and UMICs, the two types of aid begin and end with indistinguishable efficiency levels (indistinguishable from each other, and indistinguishable from one endpoint to the other within each income group). Looking at the pooled recipients, however, we can see clear differences between efficiency in each aid channel, although both do increase in efficiency as the quality of governance increases. Government-channeled aid is *less* efficient overall.

Compare the democratic consolidation efficiency scale in Figure 3 to the economic production scale in Figure 2. The greatest level of efficiency of foreign development assistance at consolidating democracy, regardless of the channel of delivery, is 4%, and this is only among the least-developed countries. The average efficiency at democratic consolidation is less than 2%. The greatest efficiency levels in the pursuit of economic production are 18%, with an average of 10%. This reflects that aid on the whole has been 5 times more efficient at helping recipients reach their economic production potentials than their democratic consolidation potentials.

Concerns

Endogeneity is a constant concern in the study of aid and development. Theoretically we know that even if one country's economic growth is determined by the amount of aid it receives, the aid it receives most likely depended on its previous levels of economic growth. Because of this complication, most studies predicting growth, or predicting aid, instrument for their main predictor.

Recall, however, that I am not focusing on growth, but rather on production. And importantly, my conclusions do not depend on the values attributed to my estimators, but to my *errors*. In fact, my key conclusions depend on comparing errors to each other, rather than attributing weight to the errors, in and of themselves. My concern is with comparative efficiency, not definitive causality.

Perhaps it is due to the focus on errors and efficiency that stochastic frontier analysis has not developed a model that tests for or eliminates endogeneity concerns. For those concerned with the relationship between total aid allocation and economic production, I can offer the following. First, I include lagged right-hand side variables to ensure temporal causality. Although I cannot estimate a two-stage least-squared (2SLS) panel regression model because too many of the right-hand side variables do not vary significantly according to recipient country, I also estimate a set of panel regression models, including fixed effects for years. These results are not inconsistent with those from the stochastic frontiers, and are shown side-by-side in Supplementary Materials. Though not all coefficients will have the same power because they are estimating different shapes, and in particular the panel regression is forcing the data to a straight line while the frontier is allowing it to curve, the fact that the results do not contradict each other should give us

confidence that the frontier estimates are sound (remember, too, that the error estimates for governance and aid channel should not be the same as their regression estimates, because they are estimating different elements of their respective equations). I acknowledge that neither of these maneuvers conclusively tests for or eliminates endogeneity effects.

Conclusion

My empirical findings are consistent with my theoretical description of the complex interplay among aid delivery mechanisms and recipient governance and income. The two channels are both susceptible to the hazards of asymmetric information, and each channel is a more efficient delivery mechanism under particular circumstances. My argument and evidence contribute to the literature by advancing our conversation regarding aid delivery mechanisms, showing the conditions under which each channel is superior at reaching different ends.

This research also carries implications for studies of donor intent. Balla and Reinhardt (2008) and Alesina and Dollar (2000) explore the aid donor's decision as a multi-faceted calculus based on political, economic, and altruistic factors. Recent work by Dietrich (2013) expands on this and enhances our understanding of donors that derive utility specifically from development. In light of my research, a new set of questions arises as to whether donors are aware of the comparative efficiency of the two delivery channels at accomplishing each goal, and the comparison of efficiency levels at accomplishing one goal versus the other. If donors are savvy to these differences, those favoring one channel at 90% of their allocation (or more) are disregarding efficiency for the sake of other factors. The study of these donors, individually and in the aggregate, demands attention. If donors are unaware of the differences, we are forced to wonder why not.

Comparing the efficiency of delivery channels is undertaken preliminarily here, and has applications on many other levels that the study of aid and development are beginning to explore. For example, Fielding (2011) and Batana (2010) have shown that the pursuit of development in the form of health or education improvements can be more thoroughly investigated by focusing on health-specific and education-specific aid. Merging these movements to study sector-specific aid with analysis of the efficiency of channel delivery can more clearly specify when and how each mechanism is optimum.

From a policy perspective, it is crucial to know whether and how these channels and their efficiency gains and losses are at odds with each other. Numerous theoretical arguments have been advanced that bypassing recipient governments weakens the state and undermines efforts at development and consolidation. With an initial test of where, when, and how those forces compete, this article motivates future studies to pursue a more refined and specific understanding of the comparative efficiencies of different types of aid.

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