

## Understanding the Daesh Economy

by Jamie Hansen-Lewis and Jacob N. Shapiro

### *Abstract*

*Beliefs about the long-run economic prospects of Daesh, often known as the Islamic State or ISIL, inform international decisions over how to counteract the group. We analyze Daesh as an economic entity, demonstrating first that the amount of productive activity in areas it controls is small and second that its institutions are inimical to sustained growth. Unless one believes that the group's ideology will enable it to manage an extractive autocratic economy with historically unprecedented efficiency, then its long-run prospects are poor. This observation has a number of policy implications at both operational and strategic levels.*

**Keywords:** Jihadism, ISIS, financing, economics, rebel governance

### *Introduction*

Decisions over how to combat Daesh, often known as the Islamic State or ISIL, must hinge to some extent on beliefs about its long run prospects and ability to continue its military expansion. If the group cannot afford to wage a war for greater territorial control because its economic model is unsustainable, then containment could be the most appropriate policy.[1] If, however, the group is likely to accumulate enough resources to continue expanding, then active countermeasures such as sustained and forceful military action may be warranted.

Unfortunately, existing literature on the group is not helpful in adjudicating its long-run prospects because the literature has focused primarily on what is exceptional about Daesh. Scholars and journalists have written about a range of characteristics including the group's extreme brutality[2], steady flow of foreign fighters[3], unusually slick propaganda machine[4], apocalyptic ideology[5], and diverse funding sources. [6] Excellent work has also documented how Daesh grew out of the previous Islamic State of Iraq which went underground in Iraq from 2009-12 and re-emerged in 2013 in Iraq through a systematic campaign of assassination and subterfuge.[7] While understandable, this focus on the group's unusual tactical proficiency and extreme brutality are not necessarily germane for assessing its long-run outlook.

Instead, if we consider seriously Daesh's claimed aspirations, then we have to ask about its economic potential as a state. As of April 2015, the group maintained dominant authority in an area of roughly 138,000 square kilometers that contained a pre-war population of eight million people.[8] Within this region the group regulates the economy, taxes civilians, and maintains an army. It functions, in other words, as a state. If we examine it as such vis-à-vis other developing countries, we can place Daesh in context and generate reasonable expectations about its military potential.

In doing so, we make three contributions. First, we assess the value of the economy it controls using two objective and replicable methods. Both show that the pre-war economic activity in areas Daesh now controls was modest at best. Second, we draw on a rich literature in development economics to ask how effective we would expect Daesh to be at maintaining that economic activity and translating it into military power if we ignored the specifics of their ideology.[9] The final takeaway of this analysis is that the group's prospects are quite poor; given they are an extractive state with exclusionary institutions, they must sell resources at a steep discount and buy weapons without access to state-to-state markets.[10] Third, we explore what Daesh's limited economic capacity implies for countermeasures against it. We argue that it is unlikely Daesh will

garner the revenue required to wage symmetric conflict or even to defend against a sustained conventional assault and that its poor economy will lead to political instability if it is contained within current boundaries. While the group can clearly maintain an asymmetric insurgency over limited territory, its ability to do more is inherently limited.

The bottom line of our analysis is that provided the principles of economics apply equally to an autocratic, extractive state under violent leadership as they do to any other state, the economic outlook for Daesh is poor.[11] And the initial returns on Daesh's economic management are not good. Press reports cite serious inflation, scarcity of key supplies, and failing public services.[12] These are exactly what we would expect based on other countries' experiences, and they do not bode well for the group's long-term survival.

The remainder of this paper proceeds as follows. Section 1 outlines Daesh's economic resources, first examining existing evidence on how the group has been raising funds and then estimating the total volume of economic activity it could draw on. We take two approaches to estimating economic activity in areas Daesh controls: gross cell product based on GEcon data and luminosity based on DMSP-OLS data. We find that Daesh's economy is at best comparable to other small low-income states. Section 2 draws comparisons and lessons from growth economics and historical examples, showing that the current institutional environment is not compatible with known drivers of economic sustainability. Section 3 outlines the viability of the group for an array of scenarios and concludes with policy recommendations.

### ***Daesh economic resources***

This section first describes existing evidence on Daesh revenue sources. It then presents replicable macro-level upper bounds on the pre-war economic potential of the area the group controls. Both approaches underscore the dearth of sustainable enterprise in the territory.

#### *Daesh economic resources: existing evidence*

Daesh collects finances from an array of informal activity. Broadly, its revenue is composed of extraction from fixed resource endowments on the territory it controls, kidnap for ransom, and taxes and extortion. While Daesh may benefit from external financial donations, we do not outline them in detail as they are thought to be modest.[13] Comprehensive presentations of Daesh financial resources are in reports from FATF[14] and Levitt.[15]

#### Extraction of endowments

Control of oil and gas reserves presents a potentially sizable income stream for Daesh. As of March 2015, its area of control included several major oil fields in Iraq and Syria, including al-Omar, Jafra, and Jeribe in Syria and Ajil in Iraq.[16] Reports have placed overall estimates of the group's overall oil potential as high as 80,000 barrels per day for anywhere from three to eight million USD per day in income.[17]

These indications of oil wealth are misleading. First, most widely-circulated production estimates are based on pre-war levels and Daesh struggles to maintain command of the infrastructure and personnel necessary to efficiently produce and process oil. While Daesh provides protection to technical staff of oil operations who keep working[18] and anecdotally offers high salaries to experts willing to work on its territory, its prospects for long-run productivity are poor. The group needs spare parts for equipment[19] as well as skilled technicians to properly perform injections on the fields[20], which are necessary to maintain productivity.

Both resources are hard to obtain within their territory. Moreover, the oil production and transportation infrastructure is vulnerable to destruction from air strikes and drone attacks.[21] Consequentially, they are able to produce oil at only a fraction of typical output.[22] Second, Daesh lacks access to formal markets for sale of processed oil. They smuggle a portion of their output to Turkey, Kurdistan, and Jordan for sale at steep discounts, reported to be anywhere from 20-100 USD per barrel[23], and a large share of the profits on those discounted sales likely go to intermediaries unaffiliated with the group.[24] Internal markets are the primary outlet for Daesh oil, where it is used as a cheap source of energy for Daesh vehicles and civilians. Overall, lack of access to conventional oil production and marketing opportunities will prevent Daesh from earning substantial oil revenue over the long-run.

Figure 1 highlights how poorly Daesh is doing in terms of maintaining and managing its oil resources.[25] Efficient oil production typically requires flaring methane gas that comes up with the oil and thus active oil wells leave a clear signature in night-time imagery. Using data from NOAA on daily flaring activity in Syria and Iraq combined with estimates of Daesh control, we calculated a range of indicators of oil production. Each column of the figure shows a different measure of production: the number of sites flaring on any given day, the average intensity of flaring activity over all sites, which captures total production, and the average intensity of flaring at active sites, which captures the intensity of production among working sites. The top row of the figure shows the raw figures and the bottom row normalizes by activity before the war escalated, March-June 2012, to highlight changes over time more starkly. As anticipated, Daesh’s productive base was small to start with and dropped rapidly (column 1), its total productivity has generally fallen since January 2014 (column 2), and the productivity per well is quite poor compared to that in non-Daesh areas of Iraq and Syria.

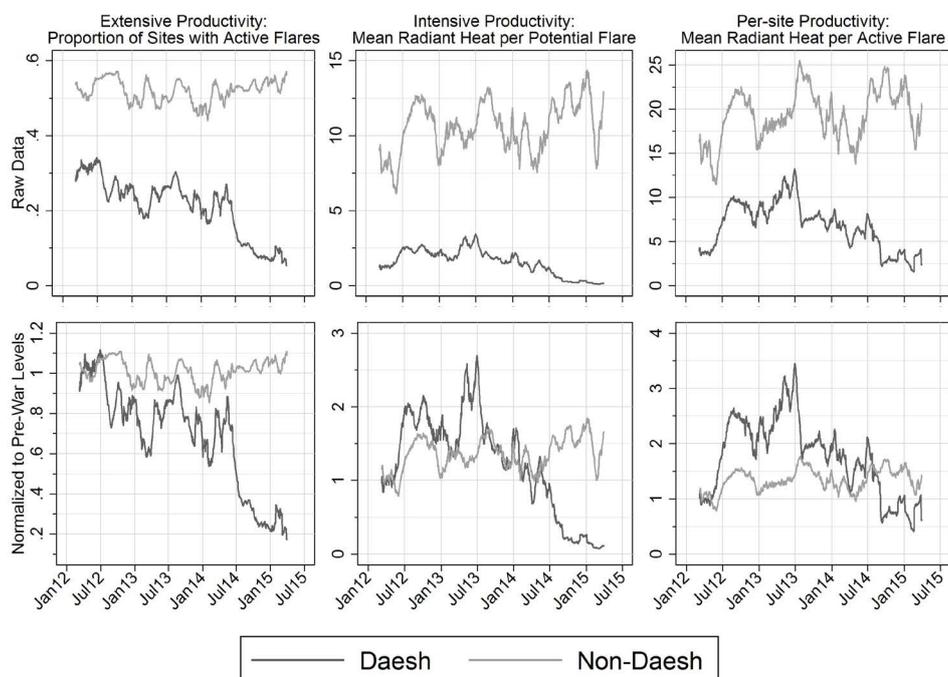


Figure 1: Oil Productivity in Daesh Areas

After illicit oil sales, another large revenue source is the excavation and sale of cultural artifacts. While Daesh has destroyed many sites for publicity, it also excavates them professionally and smuggles the objects for sale near the border with Turkey. It is very difficult to estimate how much revenue this generates. One object representative of what Daesh might excavate sold for fifty million USD in 2007. Nevertheless, as with oil,

lack of access to formal markets prevents the sale of these objects at their full potential, and second hand smugglers reap a portion of the sale revenue.[26] Moreover, for trade in goods generally, the economy is almost surely beset with rent-seeking by those who can manage trade—e.g., tribal leaders with pre-existing connections across territorial borders who likely capture most of the profit from smuggling.

### Ransom

The most widely reported enterprise for Daesh is kidnapping for ransom. Income from ransoms is variable, but has been estimated at about \$20 million USD in 2014.[27] Similarly, they are involved in human trafficking of women and children. While payments for kidnappings might be substantial, human trafficking appears to be used for payment in kind to soldiers and does not provide large revenue.[28] There is limited evidence of Daesh running other types of business for profit. Daesh reportedly operates wheat silos in Iraq, and smuggles wheat and limited agricultural products[29], but these activities are not cited as being particularly lucrative.

### Taxation and extortion

Asset seizures and extortion also generate revenue for Daesh. According to the excellent report from FATF[30], Daesh imposes a broad range of revenue-generating fees including: fuel and vehicle taxes, school fees for children, cash withdrawal taxes at banks (cited as 5% in one source), forced “donations” by businesses, crop confiscation, seizure and leasing of agricultural machinery, transit duties on smugglers crossing its territory (often to trade looted antiquities), and customs duties on trucks entering Iraq through border crossings in areas it controls. The first three revenue streams amount to regressive consumption taxes which are generally thought to reduce incentives for work and savings *a priori*. [31] The others appear to be inconsistently imposed across Daesh territory based on press reports. Such ad hoc business taxes create uncertainty around the regulatory environment which has been cited in less conflictual settings as a major barrier to firm growth.[32]

Perhaps the largest source of Daesh tax revenues comes indirectly from the Iraqi and Syrian governments. Both governments continue to pay salaries to employees living in Daesh controlled areas.[33] These employees typically need to pay a tax when they withdraw cash or when they return home from collecting cash salaries in government controlled areas.[34] Such unpredictable income taxes reduce civilians’ incentives to spend cash as well as their motivation to use banking institutions as they have low confidence in how they will access their accounts in the future.

### Human capital

The steady flow of foreign fighters in theory provides ample labor supply for Daesh to conduct state enterprise and fill out its military. But recruiting foreigners also comes at a cost. Diversity in any organization can raise management costs and lead to a range of conflicts between locality-specific goals and the larger goals of foreigners. As Bakke[35] and Rich and Conduit[36] document in the case of foreign participation in the Chechen insurgency against Russia and the Syrian conflict, bringing in transnational fighters can reduce a movement’s local appeal and hinder its cohesion. Together these costs can overwhelm the value of additional personnel and the infusion of skills they may bring. While foreigners clearly fill out the Daesh governance apparatus and military units, we could find no replicable, transparent estimates of the share of the organization’s fighters who come from abroad.

*Daesh economic resources: macro estimates*

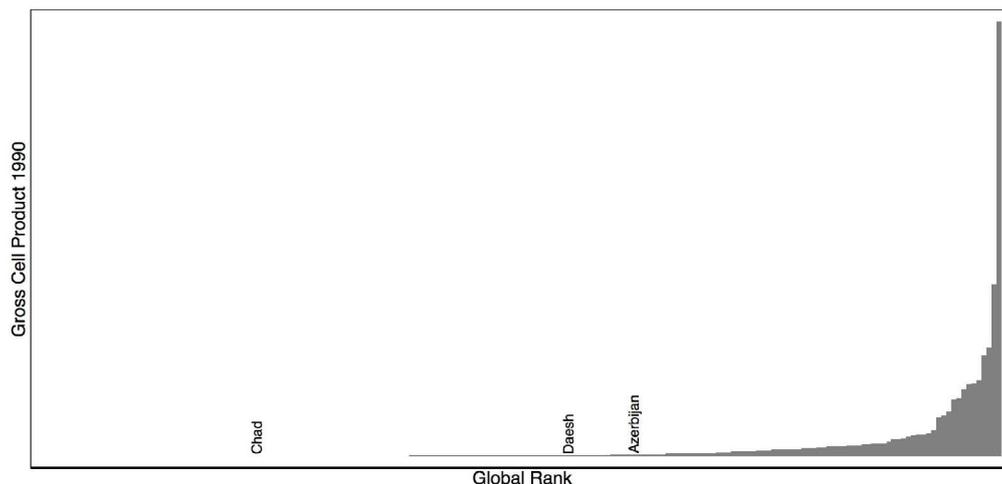
We take two approaches to compare the potential value of economic activity in Daesh controlled areas with that of other countries. Both rely on measuring pre-war activity in the areas it now controls. First, we compute an estimate equivalent to gross domestic product based on G-Econ, a widely-used geospatial database of economic activity.[37] Second, we calculate the average nighttime luminosity of Daesh controlled areas. This approach takes advantage of the fact that visible light emissions correlate strongly with economic activity under normal conditions.

For both approaches we approximate Daesh territory using a geo-referenced March 2015 map of Daesh control from the Institute for the Study of War. The map divides Daesh territory into two areas: (1) the “Support Zone” which is “an area free of significant action against ISIS and which permits effective logistics and administrative support of ISIS forces”; and (2) the “Control Zone” which is “an area where ISIS exerts physical/psychological pressures to assure that individuals/groups respond as directed.” Estimates are similar if we use maps of Daesh control released by the U.S. Department of Defense.

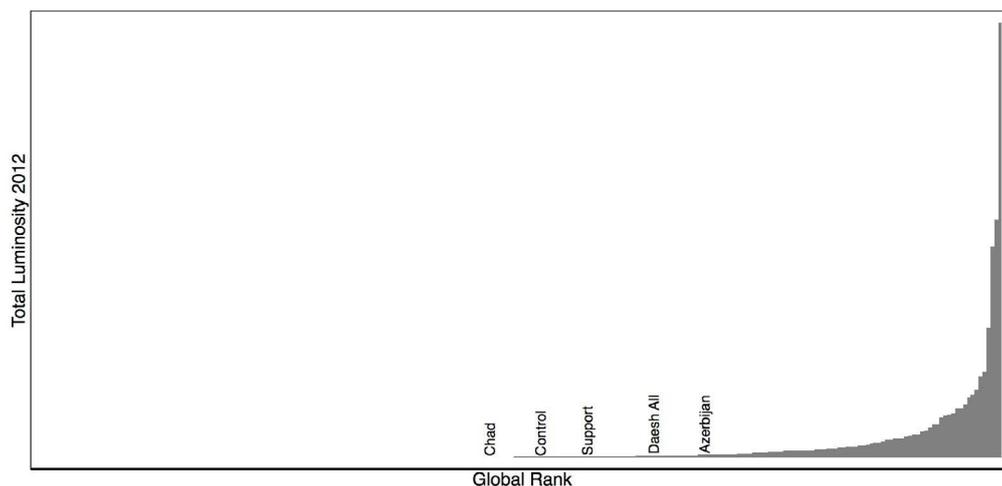
Method 1

The G-Econ data aggregates local economic activity for each one degree by one degree grid cell of the globe. [38] The method of calculation and available dates vary by country. In Iraq and Syria, the estimates are available for the gross cell product, roughly 110 km by 90 km cells, in 1990. The gross cell product in Iraq is generated from provincial level statistics of labor force participation rate and in agriculture and non-agriculture sectors, national product accounts of output, and oil production for wells in the cell area. Using these data combined with the ISW maps we calculated the total gross cell product for cells with any portion of Daesh control. Since the distribution of economic activity is especially uneven in cells with urban areas, such as Mosul, Iraq, we take a liberal approach of including the gross cell product in the Daesh total if any portion of the cell was under Daesh control. We do not weight the cell by area under Daesh control. This method yields an upper bound on the Daesh economy.

Assuming changes in economic activity for the Daesh cells vis-à-vis other countries have been modest since 1990, we compare the rank of the aggregated Daesh cells to the aggregated cells for all other countries in the same year. Daesh ranks among the poorer countries under this method (see Figure 2a). Pre-war output in areas it now controls was comparable to Cameroon and Cote d’Ivoire.



(a) Gross Cell Product 1990



(b) Luminosity 2012

Figure 2: Global Rank of Daesh Economy

**Method 2**

The luminosity data comes from the National National Oceanic and Atmospheric Administration’s (NOAA) National Center for Environmental Information (NECI) Version 4 Defense Meteorological Satellite Program’s Operational Linescan System Nighttime Lights Time Series (DMSP-OLS). The luminosity from stable light sources is reported for thirty arc second cells, just under a square kilometer at the equator, on a scale of 0 to 63. We used the 2012 global composite of the stable lights product, which excludes observations of clouds and ephemeral events. We do not correct the data for gas flares as we believe they are relevant for estimating an upper bound on Daesh economic potential. Again, we followed the Institute for the Study of War March 2015 Daesh boundaries to define support and control areas. We calculated the total luminosity for every country and for areas under Daesh support and control.

We compare the rank in aggregated luminosity of Daesh areas with other countries in 2012. While this method draws on more recent data than the gross cell product approach, the Daesh area once again ranked among the world's smaller economies based on output prior to Daesh's involvement (see Figure 2b). Daesh luminosity for combined support and control areas is comparable to Ghana and Uruguay.

### Revenue conclusions

Both methods show that Daesh has limited economic activity to draw on. Daesh area's total economic activity according to G-Econ was at most one-fifth of the rest of Iraq's and one-third of the rest of Syria's. Using the more refined DMSP-OLS data the group's poverty is equally stark, with 2012 illumination in the regions it now controls amounting to no more than one-third of the rest of Syria and one-eighth of the rest of Iraq.

And these methods almost surely overestimate Daesh's current revenue base. First, we included areas of Daesh support from which their economy might draw in part, but it is not clear how much authority the group has to extract in these areas. Second, we use pre-war data, but the massive population movements that accompanied the Daesh takeover means these areas surely have less economic activity than they did in 1990 (for the GEcon data) or 2012 (for the DMSP-OLS data).[39]

Assuming Daesh is able to transform that economic activity into military spending at rates similar to comparably sized states we should not expect it to be able to sustain large defense expenditures. Worldwide defense expenditures peak at 10.2% of GDP in South Sudan, with many conflict-affected countries spending only 3% of GDP on defense.[40] Countries close to Daesh's Gross Cell Product had a 2014 GDP of approximately \$30B or \$4,700 per capita. Combined with the range of observed expenditures this suggests the group could support defense expenditures in the range of \$900M to \$3B per year. While Daesh's potential spending totals are large compared to its economic neighbors, they pale in comparison to Iraq's 2014 spending of \$9.5B, Turkey's \$20B, UAE's \$22.6B, or Saudi Arabia's \$80B.[41] While spending clearly translates only indirectly into military power, the gap between what is monetarily feasible for Daesh over the long-run and what its neighbors spend is striking.

Moreover, if we turn to the population under Daesh's control it is fairly sparse. Figure 3 shows the areas where Daesh was "dominant" in April 2015 according to U.S. Department of Defense estimates with the population estimated by the LandScan program for each grid cell in 2012.[42] Outside of Mosul all the places Daesh controls are quite small, and most of those have seen significant population exodus which the group has had to stem through coercive measures.[43]



Figure 3: Population and Daesh Control

Overall the group simply does not have a large economy to draw on. Unless we believe its institutions will enable it to be uniquely effective at supporting economic activity and extracting revenue over the long run, and the early returns provide no reason to expect that, then we should not anticipate its ability to project military power to increase.

**Comparisons and lessons from elsewhere**

In this section, we compare evidence on Daesh’s economic institutions to what the literature in development economics has found to be important elsewhere. Broadly speaking, development economics explores how firms, governments, and people allocate resources towards productive ends. Much work has focused on the importance of the political and institutional environment for fostering economic growth. This literature implies that Daesh’s long-term revenue-generating potential, and hence ability to project force, hinges on the quality of the economic environment it cultivates. We document several ways in which Daesh falls short of meeting the conditions for economic sustainability.

First, Daesh does not guarantee the legal protection for investments, personal freedoms, and intellectual property that are necessary to spur growth. Firms with secure rights invest more than those without.[44] Individuals with secure land and property rights investment more and have higher output.[45] Political rights for civilians, notably the political empowerment of women and minority groups, have also been shown to enable growth.[46] Given the group’s practice of seizing civilians’ personal property and tenuous

territorial control, there is little evidence that it can provide the kind of predictability needed for its economy to succeed. We can thus expect little in the way of new private investment in Daesh-held areas. Their current productivity likely represents a high point.[47]

Second, Daesh does not allow for access to the kinds of credit and insurance markets potential investors depend on. There are large payoffs to improving access to credit in developing countries. Profits rise when firms have ready access to bank credit and other sources of capital.[48] Credit markets also help individuals save and smooth consumption over risks.[49] Lack of insurance hinders investment. Households without access to insurance save assets as a substitute for insurance when their cash could be more efficiently allocated elsewhere.[50] Besides informal *hawala* networks which allow peer-to-peer insurance, we could find no evidence of substantive social or private insurance markets in Daesh-held areas and individual entrepreneurs in their territory do not have easy access to non-Daesh banking facilities within Daesh territory to obtain credit.

Third, low human capital as a consequence of poor health and education limits growth. Healthy people have greater income potential from both higher productivity and more schooling.[51] Further, access to education yields substantial economic returns[52], and effective public intervention in the market for education can have great impact.[53] Based on other countries' experiences Daesh needs to pay careful attention to civilian human capital investment in order to maintain the well-being of its populace. But it has manifestly failed to do so. By all accounts aggregate health statistics in Daesh-held areas are appalling and these regions have seen significant human capital flight.[54] Moreover, the simple provision of social services touted in Daesh propaganda likely fails to address the underlying constraints to investment in human capital like pricing and access mechanisms.

In addition to the microeconomic evidence on investment, macroeconomic examples of historical growth also illustrate the challenges Daesh will face over the long run. A primary hypothesis of the growth literature is that institutions that provide incentives for investments—e.g. secure property rights—lead to societies that are wealthier in the long run. By contrast, extractive institutions, which inefficiently allocate wealth in the hands of a corrupt few, persist over time and discourage development.[55] Moreover, coercive labor practices such as those reportedly employed by Daesh, can lead to long-run setbacks.[56]

States that begin with institutions unsuitable for economic prosperity can clearly endure; however, we argue that Daesh is distinct from historical examples in this category. Extractive states that persist for long periods tended to allow civilians enough production surplus to invest in future production.[57] Historical evidence suggests that Daesh will need to limit taxation and provide its citizens sufficient certainty in the future that they will save and invest. But if it does the former, then its military capacity will necessarily be constrained as it has a small revenue base to draw on. And if it does the latter it would no longer resemble the group currently in power. Such new institutions would indicate an erosion of defining mentality of the current group that extorts its population at will and offers no opportunity for them to have a say in governance. Moreover, many reports suggest that Daesh imposed their current tax and governance systems in accordance with their religious doctrine. If Daesh leaders genuinely consider their policies to be imperatives of Sharia law, then to alter any of them would violate their theological premise.[58]

Overall, the prominent aspects of the Daesh economy—oil extraction, seizure of assets, and forced labor—are not consistent with the broad characteristics of states that have economic growth, to wit inclusive institutions that beget investment in people, production, and technology. The primary argument for this is intuitive and supported by a broad range of evidence. Arbitrary and unpredictable taxation degrade the incentives to invest, and unstable rights encourage productive people to migrate to where they will benefit from their

labor. Thus, both physical and human capital will decline over time. Evidence from other cases indicates that the conditions for stability in extractive regimes historically would require limits on taxation that are fundamentally in conflict with continued military expansion. Daesh will be able to sustain its economy at current levels only if it adjusts its approach to provide enough certainty so that people who would like to make investments can afford to and can accrue some of the benefits. But if Daesh adopted such institutions or abandoned its effort to expand, it would have changed into something fundamentally different from what it is today.

### *Future directions and policy options*

Thus far, we have established that Daesh's revenue is comprised predominately of resource extraction and extortion over an area with economic potential comparable to poor countries. Further, the group's management of its physical and human capital is not compatible with economic growth. It is difficult to compare the revenue to the expenditure needs since expenditures will depend on a multitude of unknown factors, in particular the group's military strategy. Nevertheless, Daesh is unlikely to acquire the revenue necessary to sustain prolonged war over a large territory. Even if it subsists as a state, it will be fragile. In either scenario, limited revenues indicate that containment is an informed policy option.

Daesh's economy seems insufficient to pursue its stated objectives—i.e., expansion via military force and bribery. A Daesh which seeks to expand is extremely unlikely to be sustainable given the risk of collapse for any state which overextends itself financially. If Daesh seeks to consolidate control over the areas it currently governs instead, then the group's expenditure may remain low and Daesh might be able to endure (barring of course a concerted counter-offensive by neighboring states which would be costly to fight off). This scenario is contradictory to the group's mission; as Wood[59] writes “the waging of war to expand the caliphate is an essential duty of the caliph,” and even if it were to occur, the long-run prospects for Daesh would still be dire. As a poor autocratic state Daesh would likely be fragile and vulnerable to revolt, at least if history is any guide. Since 1991 non-democratic states (those with a Polity2 score of less than 6) with incomes between \$2,000 and \$7,000 per capita (the credible range for Daesh) faced an 18% chance of internal conflict in any given year, while those with lower incomes faced a 25% chance.[60] Whereas the statistical association does not demonstrate that poverty and autocratic government cause coups[61], it does suggest that given existing instability in the territory, revolt will be more likely for Daesh than not. An argument might be made that Daesh would differ from historical trends on account of its strict adherence to conservative ideology. Unless the idea of the caliphate proves to be unusually powerful, ideology will not counteract the impacts of the group's use of oppressive violence to maintain control and tenuous alliances with marginalized groups in the region. And in the event that Daesh is content to be a small, fragile state, then containment remains a suitable strategy.

Thus, regardless of the group's expenditure needs, limited revenues reinforce the rationale for containment. It is, of course, impossible to eliminate the potential externalities from Daesh's existence (e.g. terrorist attacks and the PR value of the “caliphate's” existence). Accordingly, the international community could take actions which will hasten Daesh's economic demise. The foremost challenge in doing so is to avoid compounding the misery of the population under its control, thereby worsening the humanitarian disaster. To strike the right balance, several policies could be considered. First, Iraqi government salaries to employees living in Daesh-controlled areas could be paid in-kind with goods which are less fungible than cash; perishable foodstuffs, for example. This would make it harder for Daesh to turn taxes on salaries into resources to pay fighters or purchase weapons. Second, efforts to inhibit revenue collection should be emphasized. Targeting oil extraction infrastructure is important here, but targeting border checkpoints, revenue offices, and tax officials

could also be considered. Third, public messaging campaigns should emphasize Daesh violations of property rights. Interviews with refugees who had businesses confiscated or who suffered unpredictable shakedowns should feature prominently in Western counter-messaging.

### **Conclusion**

We have argued that Daesh is extremely unlikely to be sustainable from a financial perspective. Its economy is small compared to its enemies, its institutions are not conducive to economic growth, and it is reliant on extractive industries, which in non-democratic environments are easily subject to elite capture and therefore do a poor job of allocating natural resource wealth. Perhaps Daesh's leaders are sufficiently committed to their political goals that they will eschew such opportunities. Maybe they can turn their economy's entire productive capacity to making war in a uniquely efficient way, one with no historical precedent. But the odds are certainly against that.

As such, containment seems a viable strategy to counter Daesh. Given limited economic potential the group will surely struggle to maintain its expansionist strategy, and even if it endures as a fragile state, it will be vulnerable to internal strife. Daesh's inherent economic fragility also implies there may be long-run political benefits in allowing the group to collapse of its own inherent contradictions. Few groups talk about communism or large-scale wealth redistribution as a motivating ideology for rebellion anymore because communism was such a manifest failure as a political project, as evidenced by the collapse of a series of apparently strong communist states from the late-1980s onward. A containment policy towards Daesh will allow the same process to play out with its particularly aggressive *jihadi* ideology. If, instead, the international community takes the lead in defeating the group, then the source of the failure will not be clear and it will take longer for Daesh's motivating ideology to find its proper place in the dustbin of history.

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### **Notes**

- [1] Provided that the negative externalities from the group's activities are not too large, as they have not been to date.
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- [3] Stern, Jessica and J. M. Berger. 2015. "ISIS and the Foreign Fighter Phenomenon." *The Atlantic*.
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- [6] Fowler, Jennifer L. 2015. U.S. Efforts to Counter the Financing of ISIL. Statement for conference "Taking the Fight to ISIL: Operationalizing CT Lines of Effort Against the Islamic State Group" Washington Institute for Near East Policy.
- [7] Craig Whiteside has written a series of excellent articles on this which can be found here: <http://warontherocks.com/author/craig-whiteside/>
- [8] These figures represent upper bounds based on a United States Department of Defense April 2015 classification of areas where Daesh was dominant.
- [9] We leave arguments about whether that ideology is unusually effective or not to others.

- [10] On discounts, see Rahman, Fareed. 2014. "ISIL raises over \$2m per day by selling oil: Southern Turkey and Kurdistan emerge as major black markets." Gulf News. On weapons, the group has not been documented purchasing and seems to rely on captured weaponry for anything beyond small arms.
- [11] Others have reached this conclusion as well, see Woertz, Eckart. 2014. How Long Will ISIS Last Economically? Notes Internacionals 98 CIDOB–Barcelona Centre for International Affairs.
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- [20] Johnson, 2014.
- [21] Lister, Charles. 2005. "Cutting Off ISIS' Cash Flow." Technical report.
- [22] In ongoing work, we are using remote sensing tools to estimate the trends in productivity after Daesh gains control of production.
- [23] FATF, 2015; Levitt, 2014.
- [24] Belli et al., 2014.
- [25] Figure derived from data used in working paper with a full description: Do, Quy-Toan, Chris Elvidge, Jamie Hansen-Lewis and Jacob N. Shapiro. 2015. "Daesh Oil Production: Estimates from Remote Sensing." Working Paper.
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