Researching a Hard Target: 
Analyzing North Korea with Official Economic Data

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Abstract
This paper reviews the growing use of official statistics to draw inferences about the North Korean economy given that the North Korean regime generally treats economic and social data as state secrets. Although it releases some questionable budget data and has collaborated with the UN system in a few areas, such as agriculture and health, most “official statistics” are from trading partners or international organizations. We divide this data into two broad categories—trade and humanitarian aid—and look at through recent developments drawing on data of both sorts. The data underline not only the growing dependence of North Korea on China and the shocks related to sanctions and COVID, but also efforts to circumvent these constraints by participating in new global production networks, among other efforts. Discussion of the limits on such official data includes a possible decline in the integrity of Chinese customs statistics and that errors in the data are not necessarily constant over time, making it difficult to assess trends.

Introduction
This paper reviews some of the benefits and disabilities of using official economic data to study the Democratic People's Republic of Korea (DPRK or North Korea). Defining “official” economic data in this setting is complicated, however, by the fact that the regime treats a variety of statistics as state secrets (Noland 2000; Eberstadt 2007). Because the country is not subject to any effective oversight in regard to data production—as, for example, members of the International Monetary Fund (IMF) or World Bank are—the data it does generate are rightly treated with skepticism. Doubts are compounded by strategic incentives to dissemble. At any given moment, it may be in the regime’s interest to underestimate or overestimate a given economic parameter. An example of the former would be low-balling food production to secure foreign assistance or understating trade to demonstrate the adverse effects of sanctions. An example of the latter would be touting domestic production associated with government campaigns and targets.

Given these constraints, we take a broad view of purportedly official data. We consider efforts to use official North Korean government data, such as in regard to the budget and agriculture. Some data that rest at least partly on such official statistics—including earlier iterations of the well-known Bank of Korea series on gross national income and economic growth—are in fact only estimates, and not even derived in a particularly transparent manner.

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1 Our thanks to Nicholas Eberstadt, Rudiger Frank, and Benjamin Silberstein for comments and data and to Becky Christofferson for research assistance.
The bulk of our focus is therefore on official data from sources outside North Korea, and thus of necessity dealing largely with the foreign sector. We divide this data into two broad types. The first is mirror statistics, which are collected from North Korea’s trading partners to analyze North Korea’s trade. In developing mirror statistics, one uses the bilateral exports (imports) of a partner country as an estimate of North Korea’s imports (exports) from that partner. The analysis of North Korea’s trade permits some inferences about the extent of opening, the direction of trade and even structural change in the North Korean economy. In addition to permitting estimates of total trade, these techniques can also be used to analyze key relationships, most notably those with South Korea (Republic of Korea, ROK) and China. Aid data from the advanced industrial state donors bears a certain resemblance to mirror statistics, in that they show at least one type of financial flow to the country.

The second external source of data is the multilateral institutions. Because North Korea is not a member of the IMF, World Bank, or Asian Development Bank, these sources are primarily limited to the six UN agencies with a presence in the country: the World Food Program, the World Health Organization, UNICEF, the Food and Agricultural Organization (FAO), the UN Fund for Population Activities, and—largely in a coordinating role—the United Nations Development Program. Of particular significance is the long-standing work of the World Food Program and FAO, which have published highly detailed crop assessments, and the Office for the Coordination of Humanitarian Affairs, which provides useful overviews of UN activities and the underlying donors to them. These agencies have also generated a very different type of data: surveys—primarily on food consumption, health, and nutrition—administered jointly by the North Korean government and UN agencies. This data has been crucial in estimating—but not measuring precisely—the extent of humanitarian distress in the country with respect to food security, nutrition, and access to health care, sanitation, and water.

What is excluded by identifying official data narrowly—as that produced by North Korea, its trading partners, and the UN agencies? We exclude rich sources of data generated by surveys of informants collected by scholars, journalists, or NGOs. One example is the well-known series on rice prices and black market exchange rate maintained by DailyNK and the array of surveys of North Korean refugees (Haggard and Noland 2011). We also do not address in detail data from official sources that we believe are little more than informed guesses, such as that on foreign direct investment maintained by UNCTAD (2020), or from prominent think tanks that estimate based on their sleuthing, such as the Stockholm International Peace Research Institute (SIPRI) data on arms trade (2020). We underscore the importance of interesting new work being done by organizations that are exploiting other sources of official data than those mentioned here, including on maritime and air transport and corporate records, but those sources are addressed for the most part in other papers for this project.

What can be done with this official data and what are the risks? In other settings, the purpose of such data would be causal inference: to estimate the effect of one variable, such as sanctions, on another, such as trade (Haggard and Noland 2017, 96–104). Yet the constraints on the ability to do such modeling are fairly clear, and much use of this data has been descriptive or involved mixed methods approaches to inference. A common style of analysis is to look at time series economic data to see whether changes in the series can be correlated, even if loosely, with political or policy developments either inside North Korea or outside it. We pay particular attention to developments...
that constitute constraints on the regime or—conversely—suggest its capacity to adjust. We focus on series covering two periods: from 2000 to the present, in effect, from the onset of the prolonged nuclear crisis that began in 2002 and 2003; and from 2010 to the present, showing developments during the Kim Jong Un era, which began in December 2011.

What are the risks of using such data? In general, we can assume that statistics from multilateral institutions and advanced industrial states are largely accurate or susceptible to acceptable error. For example, we have little reason to doubt South Korean data on trade and aid with North Korea. Survey data collected as a result of collaborative projects between the North Korean government and UN agencies should also be seen as broadly reliable, though some geographical regions of the country may be omitted from coverage.

We cannot be so sure, however, about data from other sources—including China, Russia, and Iran—where silences are also nontrivial. The bottom line is that with a country such as North Korea, no single source of data is likely to be dispositive and official sources need to be supplemented with all of the correctives accessible.

**Trade Data: Understanding North Korea’s Foreign Economic Relations**

To our knowledge, only one effort has been made to estimate a complete, internally consistent series on North Korea’s balance of payments that includes both the current and capital account (Haggard and Noland 2017). Such efforts are rare for good reason—heroic assumptions with respect to a number of variables. How do we estimate North Korea’s illicit activities or remittances? What about capital flows or reserves? Confidence intervals around such estimates are bound to be large.

Most efforts in this vein thus begin with what can be captured by mirror statistics from North Korea’s trading partners. The fine points of using such data are not insignificant; discussions are extensive about how the IMF’s Direction of Trade and the UN Comtrade databases are prone to error, and that the data historically provided by the Korea Trade-Investment Promotion Agency (KOTRA) and now available in its annual review of North Korea’s trade is more reliable (see Kim 2017, 161–73). For our estimates of North Korea’s global trade, we rely on Korea Statistical Information Service (KOSIS), which in turn relies on the Korea Trade-Investment Promotion Agency’s (KOTRA) annual report on North Korea. We also look at other South Korean government sources that can assumed to be reliable and Chinese customs data, which likely involve some omissions, though we think they should not be exaggerated.

**Aggregate Trade and Its Direction**

We start in figure 1 with North Korea’s observed merchandise trade from 1990 through 2019, estimates that exclude any service transactions, which could be significant. A 10 percent cost, insurance, and freight on board adjustment is applied to values reported from partner countries.\(^2\)

\(^2\) Because mirror statistics look at trade data from the perspective of foreign partners, they do not capture earnings from or payments to North Korea. North Korea’s imports, or a partner country’s exports, are usually recorded on a freight on board (FOB) basis, but to import such merchandise, North Korean
Inter-Korean trade designated as noncommercial by the Ministry of Unification is excluded. Typically, such data can be used to measure trade openness: total trade as a share of gross national product (GDP). As we discuss in more detail, however, we lack meaningful estimates of North Korean GDP. More accurately, we are hesitant about the ones we have. Nonetheless, this broadest of trade series can be taken as a rough proxy of the de facto openness of the North Korean economy, particularly during periods when trade appears to be growing very much faster than likely GDP growth. The series tracks fairly well with the known economic history of the country. The descent into the mid-1990s famine is reflected in the decline of both observable exports and imports in the first half of the decade. But North Korea does not adjust even once the famine has subsided: the decline in total trade continues thereafter, reaching a nadir in 1999 at about 40 percent of 1990 values.

Figure 1. North Korea’s Observed Commercial Merchandise Trade

Source: Korea Statistical Information Service.

Starting around 2000—and resulting in part from a rapprochement with China—trade starts to take off. Several hypotheses have been floated about this apparent opening, including shifts in Chinese policy that send signals of greater openness to economic engagement (see Reilly 2014a, 2014b, 2014c) and the rise of global commodity prices (Haggard and Noland 2017). From mid-2006 forward, North Korea was subject to a succession of ever-tightening multilateral sanctions contained in a succession of UN Security Council resolutions.\(^3\) Whether these sanctions had any effect on observed trade is uncertain; trade growth could have been higher still in their absence.

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\(^{3}\) UNSCR 1695 of July 2006; UNSCR 1718 of October 2006; UNSCR 1874 of June 2009 and UNSCR 2094 of February 2013
They were initially defined relatively narrowly, though, around WMD-related materiel, major weapons systems, and a weakly-enforced ban on luxury good exports to the country. The gradual introduction of complementary multilateral sanctions on financial flows in later resolutions was similarly tied to WMD and weapons-related activities and did not in principle affect the financing of commercial trade.

By 2015, total trade was more substantial than at any point in the 1990s and 2000s. That, however, proved to be a peak and total trade began to contract quite rapidly. This contraction does at least map with sanctions: the closing of the Kaesong Industrial Complex in 2016 and a gradual shift in the Chinese approach to sanctions starting in the same year are clearly consequential. Yet, as we argue, we cannot be assured that the contraction is as sharp as it looks if North Korea is shifting toward other foreign exchange generating activities unrelated to the path of its merchandise trade.

Another interesting finding from this simple series is that North Korea manages to maintain a current account deficit with the rest of the world, and that deficit even widens during the rapid trade growth between 2000 and 2015. Some analysts focus on the question of how this deficit is financed (for a review, see Haggard and Noland 2017). The options are limited—and by no means mutually exclusive—and each would require a full paper to explore in its own right. The important point is that no meaningful data pertains to any of the contending hypotheses.

First, the deficit could be made up in part by invisible or service transactions, from labor remittances to other services such as provision of shipping. It could be financed by foreign direct investment or other capital flows; the only related series we have, however, UNCTAD’s guesstimates, shows that net FDI peaks in 2012 and declines to approximately zero in 2017 and 2018 before turning up slightly in 2019. Third, it could be financed by aid, or effective aid in the form of arrears to Chinese companies. Finally, it might be that the regime is financing these deficits by running down reserves, presumably held abroad in banks in jurisdictions willing to flout UN financial sanctions.4

Trade data can be used to capture not only the extent of trade but also its geographical diversification and—conversely—changing patterns of North Korean dependence. Figure 2 shows data on North Korea’s total trade with the so-called Five Parties—China, Russia, South Korea, Japan, and the United States—as well as with the rest of the world; note that these are trade shares and thus capture the relative significance of the countries in question. Data of this sort can be read through both economic and political lenses: Where are there natural complementarities? How has North Korean trade been shaped by political alignments?

It is striking that in 2000, DPRK trade was quite diversified: China, South Korea, and Japan each accounted for about 20 percent of North Korea’s trade and the rest of the world made up much of the difference. That the United States accounts for little of North Korea’s trade is hardly surprising. More noteworthy is the limited economic role that Russia plays. As Eberstadt, Rubin, and Tretyakova (1995) show in an early use of mirror statistics, North Korea’s trade with the Soviet

4 A number of analysts—notably William Brown (2018b)—have focused in on the macroeconomics of the deficit and in particular the question of the exchange rate. A second strand of related work has looked at how trade data may be correlated with the market price data we have from DailyNK (see, for example, Silberstein 2019, 2020b). Both topics are crucial but take us beyond our focus here.
Union and then Russia collapsed between 1989 and 1993 and never really recovered. This outcome cannot be laid at the doorstep of politics; it may reflect a simple lack of natural complementarities and the limited ability for Russia to play a significant economic role in regard to North Korea.

The most interesting developments over time are seen in the South Korean, Chinese, and rest-of-the-world shares. South Korea’s commercial trade with North Korea has depended heavily on politics in the South. South Korea’s trade share grew during the Kim Dae Jung and Roh Moo Hyun eras, but then flattened and even declined during the presidency of Lee Myung Bak before turning up under Park Geun Hye as a result of the Kaesong Industrial Complex coming fully online. But sanctions clearly play a role and North-South trade ultimately falls to virtually zero as a result of the combination of sanctions imposed after the sinking of the Cheonan in 2010 and the ultimate closure of Kaesong in 2016.

The steady decline in trade with the rest of the world likely reflects a combination of general hesitance about dealing with the country after the onset of the nuclear crisis, the sheer difficulties of doing business in the county, and multilateral sanction commitments. However, if we repeat this exercise on direction of trade focusing not on North Korea’s total trade but instead on exports, we see a sharp uptick of roughly 15 percent in exports between 2017 and 2019 (figure 3). The three top rest of the world export destinations in 2018 were Pakistan, India, and Bangladesh, and in 2019, Vietnam, Bangladesh, and Pakistan. Clearly, this increase reflects an effort to diversify by focusing exports on lower-income countries where North Korea’s technological disadvantages are offset by a high degree of price competitiveness.

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**Figure 2. North Korea’s Trade Shares with Five Parties and Rest of the World ( % )**

![Graph showing North Korea's trade shares with five parties and the rest of the world.](image)

*Source: Korea Statistical Information Service.*
Nonetheless, the major storyline from figures 2 and 3 is both clear and well known. Particularly during the Kim Jong Un era, China has come to occupy a dominant position in North Korea’s total observed merchandise trade—accounting for about 95 percent of it in 2019. This finding clearly casts doubt on claims that Beijing has no leverage vis-à-vis Pyongyang. Figure 4 provides a broader look at China-DPRK over the entire nuclear crisis period, demonstrating the more or less steady increase in trade from 2002 to 2014 before it plateaus and then falls, particularly precipitously on the import side. As figure 5 makes more clear, however, the fall-off in trade did not affect North Korean imports and exports equally: exports were constrained by sanctions, imports from China continued and as a result Beijing incurred a steadily increasing current account deficit.
Trade data can not only be used as a guide to total trade and its direction but also be interrogated with respect to commodity composition and even prices. Many projects are possible here; we touch on only a few as examples of how North Korea seeks to break out of existing constraints (for more examples, see Haggard and Noland 2017, chapter 2).

One question is whether China has been indirectly supporting the regime not simply through aggregate trade but through key commodities, including oil, which is subject to complex sanctions caps, and food. Figure 6 looks at the first question, figure 7 at the second. At least in the official data, it appears that Chinese exports of oil products to the DPRK have fallen dramatically with sanctions. Yet this is also precisely the period when a succession of UN Panel of Experts reports, and other intelligence has focused in on ship-to-ship oil transfer and smuggling; the official data here wildly underestimates total trade. Food data may be less sensitive to this problem, but some patterns are distinctive. It appears that China engineered large food exports right around the succession in late 2011 and early 2012. It also appears that China has been responsive to the recurrence of distress in 2018 and 2019 and into 2020 as well although it is far from clear that these imports were enough to fully offset losses.

**Figure 5. North Korea's Trade Deficit with China**


**Figure 6. North Korea's Petroleum Oil Imports from China**

If the Chinese data is accurate in at least suggesting a major external shock to North Korea starting in 2017, data on commodity composition can be used to provide insight into how the country is responding to that shock. One way of doing so is to look at data at the sectoral level and at significant shifts. Figure 8 shows the import share of a number of major commodity groupings at the two-digit Harmonized System Codes (HS Codes) level: mineral fuels, mineral oils and products of their distillation, nuclear reactors, boilers, machinery and mechanical appliances (in fact, a product category not limited to or even reflective of nuclear-related trade), and machinery and electrical machinery and equipment. All have been declining over time, particularly after the announcement of new rounds of UN sanctions (UNSCR 2371, 2375, 2397) in 2017, which capped imports of crude oil, natural gas, and refined petroleum and banned all machinery, metals, and vehicle (HS 72-89) imports. In contrast, the import share of plastics, man-made filament, and clocks and watches has been increasing over time, and now accounts for around 20 percent of North Korea’s total imports.

Figure 9 repeats this exercise on the export side looking at the export share of mineral fuels, mineral oils, and distilled products; articles of apparel and clothing accessories; and fish and crustaceans, all of which declined sharply after UN sanctions fully banned the exports of textile, seafood, and coal in 2016 and 2017. In contrast, the exports share of export-processing and manufacturing products, such as clocks and watches, feathers and down, artificial flowers, medical or surgical instruments, footwear, toys, games, and sports accessories all increased sharply after 2017.

A consideration of this data suggests both a kind of resilience on the part of North Korea and how China facilitates the country’s survival. Putting the export and import sides together, we see a
decline in traditional industries and particularly in sanctioned products, but the simultaneous emergence of new international production networks between China and North Korea in light, labor-intensive manufacturing that is not subject to sanction.

Figure 8. Shares of North Korea Main Import Products in 2019 (%)

Source: Korea Statistical Information Service.

Figure 9. Shares of North Korea Main Export Products in 2019 (%)

Source: Korea Statistical Information Service.
This finding can be reinforced by looking at the import products with highest growth rates in 2019 (figure 10). These include plastics, clocks and watches, man-made filaments, and tobacco products. The plastics and man-made filaments imports have been mostly trending upward, even before 2011. Clocks and watches are a new industry that shot up after 2017. Figure 11 repeats the exercise on the North Korean export side. The graph shows the exports of clocks and watches, feathers and down, artificial flowers, medical or surgical instruments, footwear, and toys and games and sports requisites that have all surged after 2017.

A closer look at China-North Korea trade at still finer sub-categories of clock and watch parts further underscores China’s indispensable role in North Korea’s emerging assembly industry. As figures 12 and 13 show, North Korea clearly imports clock and watch parts from China, and then exports assembled clocks or watches back to China. In 2019, the exports of clock and watches accounted for about 23 percent of North Korea’s recorded merchandise exports to China (KOTRA 2019). Equally interesting, these exports to China constituted only 20 percent of total exports of these goods, suggesting that North Korea is in fact becoming a platform for exports to other markets as well.

Figure 10. North Korea Import Products with Fastest Growth Rates in 2019

Source: Korea Statistical Information Service
Figure 11. North Korea Export Products with Fastest Growth Rates in 2019

Source: Korea Statistical Information Service

Figure 12. North Korea's Exports to China: Article 91 "Clocks and Watches" ($)

Source: China Customs Statistics.
In sum, it appears that the UN sanctions after 2017 not only struck its traditional mining and heavy industry exports to China but also affected North Korea’s emergent apparel and seafood industries. The externally induced economic crisis forced North Korea to begin a process of restructuring to focus on other export-processing activities that could evade sanctions. The economy became more dependent on imported inputs in these sectors—plastics, man-made filaments, and parts of clock and watches—with exports making corresponding gains. In 2019, for example, plastics and man-made filaments imports accounted for 16 percent of North Korea imports from China. The exports of clock and watches and parts increased to take up no less than 23 percent of North Korea’s exports to China and products of prepared feathers and for nearly 15 percent.5

Trade and Aid with South Korea

South Korea keeps extensive records on its economic, policy, and social interactions with North Korea. In addition to a detailed breakdown of trade and aid, the Ministry of Unification (MOU) also maintains statistics that have been a mainstay of the analysis of North-South relations. These data include not only economic exchanges but also inter-Korean traffic (cross-border travelers, vehicles, vessels, aircraft, and railroad cars) and detailed information on refugees (reported on based on age group, professional background, gender, academic background, region of birth, region, and current settlement status, and economic activities). The MOU also maintains statistics on the number of inter-Korean meetings, broken out into those regarding politics, military, economy, humanitarian issues, and society and culture. The summit era is particularly visible in the last of these statistics, no meetings in 2016 and 2017 followed by thirty-six meetings in 2018.

5 North Korean Foreign Trade Trends (년도 북한 대외무역 동향), 2019, KOTRA 자료 20-187
Here we focus again primarily on the economic relationship, which is neatly summarized in figure 14. South Korea breaks down its trade with the North into somewhat unusual categories. We sum general trade and processing on commission trade because these come closest to what we would think of as purely commercial interactions; a first point to make is that though this trade plays an important role in the origins of North-South trade, which actually date to Roh Tae Woo’s Nordpolitik, commercial trade is subsequently overshadowed by two other categories: trade associated with economic cooperation projects—most notably the Kaesong Industrial Complex—and noncommercial trade, which is dominated by food and fuel exports. Nominally financed by loans with the North, it was widely recognized even at the time that this trade was likely to be unrequited.

The Sunshine Policy under Kim Dae Jung and Roh Moo Hyun saw the rapid rise in noncommercial trade that came to dominate total trade through 2004. The Lee Myung Bak administration subsequently pulled back from the open-ended support offered under the center-left governments and that support never revived, even under Moon Jae In. The collapse of more purely commercial trade from 2010 is a result of the so-called May 24 sanctions following the sinking of the Cheonan. Despite these sanctions, Lee Myung Bak and Park Geun Hye did permit the continuation of the most important of the economic cooperation projects: the Kaesong Industrial Complex (KIC). After a tourist was killed at Mt. Kumgang in 2008, however, North-South trade was solely KIC trade, which centered on light-labor manufacturing based on imported South Korean inputs. The shuttering of the KIC ushered in a period of extremely limited North-South economic exchanges that has continued into the Moon Jae In era.

**Figure 14. South Korea to North Korea total exports, 1990-2019**

[Chart showing South Korea's total exports to North Korea from 1990 to 2019, with different categories indicated by different colors and styles.]

*Source: Ministry of Unification.*
Finally, data on the Inter-Korean Cooperation Fund, which tells a broadly similar story (and with even more granular detail than shown in Figure 15), warrants mention. The fund is financed through a particular tax contribution and has continued to grow. Deposits from the Public Capital Management Fund account for the largest share of the fund sources, followed by government and nongovernment contributions and then operating profits. Actual expenditures were concentrated in the Sunshine years and in the last decade much has actually gone to activities and groups in the South. Nonetheless, the fund is a potential instrument for the government were a breakthrough of some sort to be reached.

**Figure 15. Inter-Korean Cooperation Fund (IKCF), 1991-2019**

![Graph showing the Inter-Korean Cooperation Fund (IKCF) from 1991 to 2019.](image)

*Source:* Ministry of Unification.

**Humanitarian and Aid Data: The Role of the IFIs**

UN agencies in North Korea generated additional information on the country. Three quite different types of data from these sources might rightly be considered official. The first deals with aid, and because—like mirror statistics—it comes from donor countries can be considered reliable. The second covers selective data sharing and some collaborative data generation projects. Assessing the veracity of this data is more difficult because of North Korean motivations: the regime shares data selectively and typically when it has some instrumental reason to do so. One likely source of bias in any survey data is that the government may not appreciate the importance of randomization and appears to prohibit access to certain parts of the country. Given this important qualification, the data appears to come from North Korean civil servants and their counterparts in the UN and NGO communities.

Third, the OCHA complex of institutions also reports on the extent of the humanitarian challenges in the country, typically summed up by the number of vulnerable individuals or households. At one level, this data might be dismissed given that it is really nothing more than informed estimate.
On the other hand, it is actually quite informative because it provides insight into planning by these institutions—what they believe the extent of humanitarian need actually is.

The substantive findings from this data are easily stated. First is evidence of aid fatigue: a declining willingness to extend support to the country. Second, the overall humanitarian assessments of North Korea do appear to have an empirical foundation. The country has not managed to resolve long-standing issues in its agricultural sector, whatever role natural shocks might have played, and large swaths of the country’s population remain highly vulnerable as a result.

**Aid Data**

A number of countries sustain aid programs to North Korea and some studies of these efforts have been undertaken, based on official statistics, including from the United States (Manyin and Nikin 2014) and Europe (Alexandrova 2019). A significant share of all aid to North Korea—beyond that extended by South Korea and China⁶—passes through UN agencies.

Each year, the UN Office for the Coordination of Humanitarian Affairs (OCHA) issues a document titled *DPR Korea Needs and Priorities*. As noted, these reports are useful both for actual data they report and for the estimates they outline of humanitarian need, to which we return in more detail.

For tracking actual aid, however, a particularly important source of official data is the Financial Tracking Service (FTS) maintained by OCHA. The FTS is a centralized source of data emanating ultimately from government donors, UN-administered funds, UN agencies, and NGOs. A major FTS shortcoming is that China does not report its bilateral assistance, and other bilateral donors may also not submit information to it. Nonetheless, the FTS does provide credible data for aid from the UN system and from the advanced industrial states that appear to be reliable reporters, including both aid they channel through the UN system that takes place bilaterally. Moreover, the dataset can be used to track not only actual commitments, but also overall estimates of need, whether appeals are funded, and who precisely is contributing to them.

Figure 16 tracks reported aid flows since 2000, when North Korea first shows up on the FTS website. North Korea first opened itself to humanitarian assistance in the middle of the great famine of the mid-1990s. Aid-seeking subsequently became a significant aspect of the country’s foreign economic relations and indeed of its grand strategy. How much aid to supply and in what form also became an ongoing quandary for donors: What should be given to a regime that fails to address the most basic human security of its population? Outside donors have generally been reluctant to provide hard currency to the regime because of fears of diversion. The bulk of reported aid has thus come in the form of in-kind contributions of food and other humanitarian goods; this was true of South Korea as well. Nonetheless, money is fungible, and as Haggard and Noland (2007) show in *Famine in North Korea*, as aid increased following the famine, commercial imports of food actually declined.

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⁶ The one dataset that is seeking to collate Chinese aid data in a way that is useful for researchers specifically warns users away from their North Korean data: “Our dataset uncovered 20 projects to North Korea totaling $272.65 million (including pledges), but we have reason to believe that this is a substantial underestimate of total Chinese official financing to North Korea” (AIDDATA, [https://www.aiddata.org/pages/how-to-use-global-chinese-official-finance-data](https://www.aiddata.org/pages/how-to-use-global-chinese-official-finance-data))
Aid peaked at over $350 million in 2001 and 2002—well after the famine had subsided—but several trends since that time are noteworthy. The first is the obvious decline by the mid-2000s. North Korea has certainly not experienced a humanitarian crisis on the order of magnitude of the famine since then, but it has seen recurrent food deficits, most notably between 2010 and 2013 (when aid does increase) and again between 2018 and 2019 (when that increase is much more modest). It is possible that aid fatigue is related to the onset of the nuclear crisis.

The hypothesis that reluctance to provide extended humanitarian support is increasing is suggested by three noteworthy trends in the data. First, NGO support fell steadily in the first half of the 2000s. Second, reported bilateral assistance—again mostly from the advanced industrial states—followed suit, declining from 2007 or 2008 forward. By 2010, just before the Kim Jong Un era, bilateral aid from these sources had dried up.

Finally, this reticence is also visible in the data on the so-called combined appeals. These outline a broad array of needs but are funded overwhelmingly by commitments from member countries. Combined appeals were issued only once between 2005 and 2010, but we compared the extent to which they were fulfilled between 1996 and 2004 with the period from 2011 to 2019, measured as the ratio of contributions from member states to the stated need. In the first period, appeals secured 68.8 percent of financing, in the second only 35.3 percent, despite the fact that those requests were also falling. We also tracked the number of countries contributing to UN efforts through OCHA. Between 2000 and 2010, an average of seventeen countries contributed; between 2010 and 2020, an average of twelve had.

Much more complementary research would be required to confirm the proposition that North Korea’s aid-seeking strategy has met with greater resistance; we would ideally control for level of need. But North Korea’s turn to China for support is visible not only with respect to trade but on the aid front as well. Moreover, we know from studies of major players including Korea and the United States (Manyin and Nitikin 2014) and Europe (Alexandrova 2019) that aid fatigue has set in, that donors—including both governments and NGOS—are increasingly reluctant to extend humanitarian assistance to North Korea in an open-ended, long-term way.

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7 One result of this decline in support is that a greater share of multilateral funding comes out of the Central Emergency Response Fund, a limited pool of resources that the UN Office for Coordination of Humanitarian Affairs can use if their appeals to country donors fall short (https://cerf.un.org/search/node?keys=DPRK). Given underlying resource constraints, however, the CERF cannot fully substitute for shortfalls in the combined appeals.
Data Sharing and Collaborative Data Generation

UN agencies have also managed to secure selective data sharing efforts and even collaborative data generation activities with their North Korean counterparts. Two particular efforts in this regard bear noting. The first involves the highly detailed WFP-WHO crop assessments, which provide important insights into the rural sector (WFP-FAO 2014; FAO 2015; WFP-FAO 2019; see also Korea Rural Economic Institute). These have been used—sometimes in conjunction with weather and satellite data (Dinville 2017)—to track, estimate, and predict crop yields (for example, Ireson 2013). More important, they have also been used by a number of scholars to estimate overall food balances and possible shortfalls (Haggard and Noland 2007; Haggard, Noland and Weeks 2008; Ireson 2013; Silberstein 2015; Haggard and Noland 2017, chapter 4; Silberstein 2020). This can be done by aggregating total sources of supply—production, food aid, and commercial imports—and comparing those against various estimates of human need, ranging from an absolute consumption minimum to those that would take account of inevitable losses and other uses, particularly animal feed and seed use. In addition, these assessments often included survey data on households, including rations from the Public Distribution System, market prices, and even survey data on household consumption and coping mechanisms, such as the share of households consuming less preferred foods or reducing the number of meals.

These exemplary reports also point to the deeper data problems with respect to North Korea, given that in-country visits were suspended from 2014 to 2019. Yet the richness of potential data is on display in the 2019 report (WFP-FAO 2019)—when North Korea was experiencing shortfalls—and would merit an extended treatment on its own. Among other things, this “rapid food security assessment” includes data on national harvested area, fuel and fertilizer supply, yields and production.
Yet for assessing external constraints on North Korea, the most interesting portion of the report focused on food crop supply-demand balance. The data go to the core of North Korea’s failed agricultural system. Total use outstrips domestic supply by 1.5 million metric tons (MT), but “anticipated commercial imports” are estimated at only 200,000 MT and aid at 21,000 MT. The uncovered deficit: 1.36 million MT, more than 35 percent of total domestic supply.

A second source in this basket of collaborative data exercises are a series of health and nutrition surveys; the latest of these appeared in 2012 (DPRK 2012) and 2018 (UNICEF 2018). These surveys pose two problems. First, they are not regular and thus can chart trends only in a choppy way. Second, outside agencies and donors have faced challenges in regard to geographic access to particular regions of the country. That said, if we take into account the second limitation in particular—that surveys may not be fully representative—they nonetheless do appear to provide useful insights into health and particularly nutrition in the country.

In summing the findings of the data on the rural sector and health and nutrition, it is worth restating the obvious: that whether we think the data is fully accurate, North Korea remains a poor country with a highly vulnerable population. The core findings of OCHA’s most recent DPR Korea Needs and Priorities (2020) bear restating and reflect the organization’s operational priors:

- In a population of approximately twenty-five million, 10.4 have been designated as vulnerable “people in need.”
- Around 10.1 million people—40 percent of the country—are food insecure.
- One-third of children age six to twenty-three months do not receive a minimum acceptable diet.
- According to the 2019 Joint Monitoring Program report, about 8.4 million people, some 33 percent of the population, do not have access to safely managed water sources, that number rising to 50 percent in rural areas.
- Approximately 8.7 million people are in need in regard to delivery of basic health care, the problems ranging from inadequate availability of basic medicines, diagnostic capabilities, equipment for critical and emergency intervention, and inconsistent supply of power and water at health-care facilities.

**North Korean Data**

We have focused so far on official data generated outside North Korea: by trading partners and by international organizations (if working with North Korean officials, as we have seen). What about data generated either by the North Korean government or that rests in whole or part on information generated by North Korean data? Because some confusion is likely, it is worth being precise about definitions. Aside from the joint projects undertaken with the noted international organizations, or data shared with them (such as about crops), North Korea releases only two types of “official” data: annual budget data and the periodic national censuses, the last two of which took place in 1993 and 2008.

What all analysts of North Korea would like to know more than anything else is the aggregate size of the North Korean economy and how rapidly it is growing. For a number of years, Rudiger Frank
(2018, 2019, 2020) has reported on the SPA meetings that generate the budget data, looking at the budget reports both as a signal of policy trends but also treating growth in the budgets as a rough proxy for GDP growth; a time series from his most recent report in this vein is reproduced in figure 17. Initially reported in local currency, the figures are now reported only as annual growth rates. As shown in the figure, the data are broken into three series: planned revenue and expenditure—essentially goals—and achieved revenue, which lags by a year.8

**Figure 17. Official Annual Growth Rates (in %) of the North Korean State Budget, 2000-2020**

Source: Frank 2020, based on Rodong Sinmun and KCNA.

What can these data tell us?9 Frank makes two points about the numbers. The first is that although we really do not have a very good sense of what either revenues or expenditures are, the changes in them over time contain at least some information. As he puts it, “if we assume that the error margin—resulting from deliberate adjustment of the numbers and/or differing accounting standards—is relatively stable over time, a comparative analysis of this kind of data can provide clues on development trends” (2019).

But Frank goes further, arguing that the budget data can be used as a proxy for aggregate output or growth. The state-owned sector is still the largest component of the North Korean economy and about four-fifths of all revenue is derived from transactions taxes and profits of state-owned

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8 As Frank (2019) points out “higher growth rates for expenditure over revenue are not a sign of deliberate deficit spending since the figures for actual, or ‘achieved’ revenue are usually higher than planned and thus lead to a more balanced budget and occasionally even a small surplus, at least according to the official figures.”

9 Our thanks to Rudiger Frank for his comments on the data.
enterprises. The significant military economy and the emergent private sector are not captured by these numbers. But Frank makes an important institutional point: the budget does not only include the SOE sector but captures revenue from the quasi-private markets as well, for example via licenses and stall fees. Critics emphasize uncertainty about what is in the data and the complexities surrounding the fact that it shows nominal and not real growth; we do not know much about inflation, which could vary year to year and thus affect the real growth rate. Nonetheless, Frank argues that it can be seen as a reasonable aggregate measure of the nominal growth of total output.

We are more skeptical. First, the early 2000s are not generally believed to be a particularly good time for the North Korean economy, but this data shows it growing quite dramatically if we take the data as a proxy. The somewhat chaotic period of reform just prior to the onset of the second nuclear crisis in 2002 and 2003 generated very large increases in the budget before growth was brought to heel between 2006 and 2008. This, though, could well have reflected the effects of the very limited price liberalization of the reform era. Second, during the run-up to the succession, budgets increased at steadily increasing rates through 2012, since which time budgets have been largely flat. But it was the early Kim Jong Un era—not the late Kim Jong Il period—that was supposed to relax constraints on growth and in which impressionistic evidence suggested a modest upturn. Finally, if North Korea were growing at the rates suggested here, its performance over the entire period would in fact be quite robust. This means that some downward adjustment from budget growth to GDP growth is required, but by how much? It is impossible to tell.

So, what can we say from official statistics about the size of the North Korean economy and its growth performance? Our view is that the answer is “almost nothing.” Since 1990, the Bank of Korea has estimated North Korean GDP using data on the volume of output, multiplied by South Korean prices for the same goods, and from this derived a nominal—again not real—growth rate. However, it is important to underscore that the data on the volume of goods and services produced by the North are themselves not taken from official North Korean sources (at least, after the late 1980s when a number of official series ceased), but rather are estimated from satellite data and other sources of intelligence collection; the underlying estimates provided to the Bank of Korea come from none other than South Korea’s National Intelligence Service. The Bank of Korea estimates have been subject to recurrent criticisms that need not detain us here (Kim et. al. 2007; Noland 2001, 2014, 2015, 2016, 2017; Kim 2017, 70–83; Brown 2020). But two recurrent problems are worth noting. First, even if we had good series on agricultural and industrial output, we only have consistent data on prices for rice and the exchange rate, and that only from relatively recently and via informants. Second, it is difficult to assess the role of markets and of the service sector more generally. Recently, for example, Byung-Yeon Kim (2019) notes that growth rates in the early Kim Jong Un years may have been significantly underestimated—by as much as one percentage point—by not taking into account market activities. Despite the heroic efforts to generate such estimates, we have little confidence that we are likely to get anything meaningful, and that it may be time to turn to altogether different sources, such as tracking night lights through satellite data.
Conclusion

Academic work has strict standards for data use, which start with concerns about validity and reliability. How much random error is acceptable? What—if anything—can we do about bias or error that takes a consistent direction or form, particularly when magnitudes—food production shortfalls, for example—are consequential? Dealing with black boxes like North Korea pose these problems in spades, and it is tempting to throw up our hands and say that none of the data we have is of much use. This would be a mistake for two reasons. First, we have no choice but to try to make sense of the data we do have. Second, a purist approach is misleading about the extent of error. In fact, some of the data we have are likely to be both valid and reliable. We start with observations about how we can assess data from different sources. We then speak briefly about some of the things we have been able to infer from extant data. We close by arguing for a multimethod approach: that we should not rely on any given source of data on its own, but instead should combine it with sustained conjectures—in effect theories of the case—and triangulation with multiple sources that go far beyond official ones.

Let’s start with a loose hierarchy of likely reliability and validity. Data from advanced industrial states and the UN family about their own activities is likely to be highly reliable. These entities are constrained by strong data-production norms and typically do not have obvious reasons to misrepresent what they are doing. However, even these organizations may be prone to unmotivated error, or less politely, mistakes. For example, we compared the rank order of the DPRK’s export partners in the IMF Direction of Trade database for 2018 with the data reported by the more tightly curated Korea Statistics/KOTRA data in a recent year. We found large movements likely to reflect the most obvious of errors: conflating North and South Korea. For one, North Korea appeared to export more to Ukraine in 2018 than China did. These errors, though, are relatively easy to correct, and Korea Statistics/KOTRA seeks to do so.

When we move beyond the advanced industrial states, however, problems with reliability increase. The issues with KOTRA data lie in the first instance in its narrower coverage of reporting countries, seventy-one countries as of 2012 to 124 in the IMF database. The reasons for these omissions are laudable: KOTRA takes a more conservative approach toward data collection and it discards unverifiable data, which in most cases emanates from developing countries but includes rogue regimes such as Iran and Syria that clearly have some economic ties with North Korea. The result is that the role of developing countries in North Korea’s total trade could well be underestimated (Marumoto 2009; Lee 2014; see also figure 3 notes). A second problem is that KOTRA data on South Korea’s aid to North Korea may also mislead somewhat despite the overall reliability of South Korean trade data. Humanitarian food shipments were valued not at prevailing international cereal prices but instead at the often much higher prices in the ROK’s protected domestic agricultural markets. Moreover, some quasi-official financial transfers to the regime may not show up at all: witness the secret payments by the Kim Dae Jung government to secure the historic June 15, 2000 summit in Pyongyang—a sum whose exact total is still a matter of dispute and needless to say has never been reflected in official ROK figures on its relations with the North.

What about other official sources of consequence that may not be subject to the same reporting norms as those of the advanced industrial states? The most important case in this regard is China. In the Appendix we compare the Chinese customs data with the KOTRA/Korea Statistics data on Chinese exports and imports and note the possibility of some underestimation of Chinese exports.
to North Korea starting in 2014. But the problems could be larger. Some studies have pointed out non-negligible data discrepancies across UN and KITA databases at the product level, which could be due to reliance on different data providers, different product classification methods or simply human errors (Lee 2013). More troubling, we have clear historical evidence that China has obfuscated politically sensitive data. For instance, after North Korea’s second nuclear test on May 25, 2009, and the subsequent UNSCR 1874, the China Customs Bureau subsumed bilateral trade from August to November into the category “Other Asia, Not Elsewhere Specified” (Buckley 2009). Another example is an estimated $500 million in unreported crude oil exports in 2014 or 2015 (Haggard 2016). Although we suspect that the product-level data we have used here is useful for understanding current shifts in North Korean participation in new global production networks, we cannot rule out at some later period that such data would be seen as controversial and then misstated as a result.

One additional issue has not gotten the attention it deserves: China Customs statistics exclude trade through Hong Kong, despite the fact that the city appears to play a considerable role as re-exporter of goods originating from and headed toward the mainland. Moreover, there appear to be tax reasons why trade is routed in this way, suggesting an important channel for DPRK-China trade that tends to be ignored (Schindler and Beckett 2005).

With all of these qualifications, however, the problems with Chinese data may not be in the merchandise trade data itself; rather they lie in the fact that other sources of support for North Korea are not reported except indirectly. The current account deficit suggests at least the possibility of aid, financing or other current account income. The large volume of illicit exports of coal and sand and the acquisition of virtual currencies via cyberattacks disclosed by the UN Panel of Experts report in 2020 provide exemplary clues. Through ship-to-ship transfers, self-propelled barges and direct deliveries by foreign-flagged vessels, North Korea appears to have exported at least 540,000 tons of coal in three observed months in 2019 and one million tons of sand in 2019, as well as $120 million in revenues from fishing rights transferred in 2018. These do not show up in Chinese trade statistics because the y constitute service transactions in the case of fishing, but because they circumvent Chinese Customs altogether in the case of illicit coal and other mineral imports.

What about the data generated by the UN organizations, either as a result of selective data sharing or particularly by the handful of highly detailed surveys conducted jointly by the organizations? These efforts might also be motivated—they are conducted because North Korea has an interest in painting a particular picture—or reflect another sort of bias. An ongoing problem faced by donors was the unwillingness of North Korea to grant access to certain parts of the country, either for security reasons or because they did not want to reveal particular outcomes. Surveys must pay attention to what is said about the representativeness of samples. But as noted, we are inclined to believe that these efforts probably do reflect reasonable approximations to the facts on the ground. The problem is that they are not regularized.

Finally, the national budget data probably do contain some information to the extent we believe that what is reported is reported consistently, but we are doubtful that it can be treated as a proxy for economic growth.

In conclusion, what has all of this official data been able to tell us? Here, we simply tick off those we think are the most substantively significant.
• North Korea did witness a de facto opening and growth of trade starting in 2000 and extending into the mid-2000s. Yet despite Kim Jong Un’s image as a reformer, it appears that North Korea’s efforts in this regard stalled out under his leadership. This could be due in part to adverse external developments such as the decline in commodity prices, the onset of a more vigorous sanctions regime and the COVID crisis. The data, though, suggest that the problems emerged before Chinese sanctions were tightened and thus reflect ongoing disabilities the country faces from its choice to pursue nuclear weapons and the ongoing difficulty in doing business with the country.

• That said, the data on the country’s current account deficit and related research on the stability of prices and the black market exchange rate suggest that merchandise trade is not the only source of foreign exchange for the country. It is clear that additional current account income as well as unrequited transfers—aid or arrears—as well as possible capital flows are not captured in this data. North Korea could well be receiving foreign direct investment from China, and we know that it certainly has in the past, such as in the mining sector. Although those investments have probably ceased, other areas—including real estate and manufacturing—are large blind spots in reported data.

• Official statistics can provide evidence on North Korean efforts to adjust to external shocks. Of particular interest in the recent period are efforts to diversify trade away from China by courting other markets and to develop new industries, particularly light, labor-intensive manufacturing.

• The international community, including South Korea, has tired of providing open-ended support for the country. Aid appears to have fallen from all sources for which we have credible information. It would take more extended discussion to decide if this is the result of shifting need, but if we think North Korea is in fact constrained by external developments, then need should have increased not decreased.

• Not surprisingly, the official data we have provide little insight into the extent of illicit activity.

• The data on agricultural production and health and nutrition that is available suggest ongoing humanitarian concerns: an inability to overcome long-standing problems of productivity in the agricultural sector or to reduce basic distress.

It is important to close by stating the obvious. Given the bounded nature of official statistics from important partner countries and the opaque nature of North Korean data itself, relying solely on official statistics is a fool’s errand. Data analysis on North Korea—no matter how careful—bears a closer resemblance to financial forensics than standard political economy analysis. Supplementing accounts based on these sorts of data with a variety of other sources—from satellite imagery, to other sources of official records such as those tapped by the outstanding work of the Center for Advanced Defense Studies (C4ADS) (Kuo and Arterburn 2019; Arterburn 2018; Sejong Institute 2017; Thompson 2017), to surveys of companies and refugees—is de rigueur.
Appendix: A Note on Chinese Trade Statistics

Figures 18 and 19 compare monthly data and annual data on EPS China Data collected directly from China Customs and the KOTRA/KOSIS data. They are nearly identical for imports over the period but starting in 2014 KOSIS/KOTRA data suggests that Chinese exports to North Korea may be underestimated but the reasons are not clear. KOTRA notes that the methods of collecting North Korea trade statistics since 2014 were changed to reflect information both from Chinese customs and from specialized global trade statistical sources but it did not specify what these organizations are or what corrections were made. Nonetheless, it is worth noting the discrepancy as it could be motivated.

**Figure 18. China Exports to North Korea in EPS China Data & KOSIS**

![Graph showing China Exports to North Korea](image)

*Source: Authors’ tabulation.*

**Figure 19. China Imports from North Korea in EPS China Data & KOSIS**

![Graph showing China Imports from North Korea](image)

*Source: Authors’ tabulation.*
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North Korea Economic Forum (NKEF) is part of the policy program at the George Washington University's Institute for Korean Studies (GWIKS). The Forum aims to promote the understanding of North Korean economic issues, distribute well-balanced, deeply researched, and multi-dimensional insights on the North Korean economy and to expand networks among various North Korea watchers, scholars, and policymakers. The Forum mostly involves closed and off-the-record meetings, where participants can freely and seriously discuss critical issues. Mr. Daniel Wertz is currently the chair of NKEF and is leading the meetings. NKEF also organizes special conferences made public throughout the academic year. The Forum is made possible by a generous grant provided by the KDI School of Public Policy and Management.