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Iceland: Selected Issues

INTERNATIONAL MONETARY FUND

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ICELAND

SELECTED ISSUES

November 2018

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ICELAND

SELECTED ISSUES

October 29, 2018

Approved By
European Department

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CONTENTS

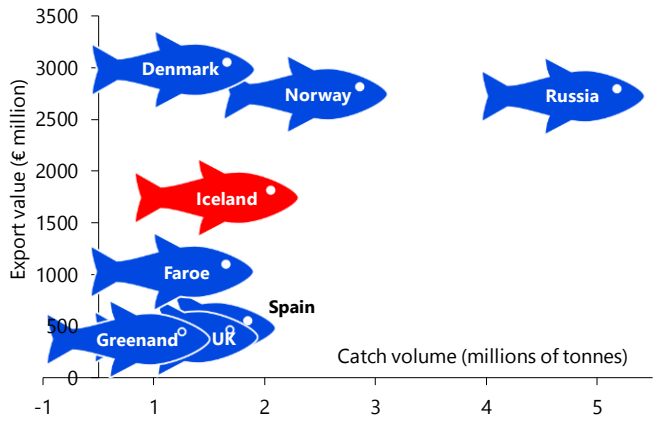
ICELAND'S FISHERIES SECTOR—TAKING STOCK[1]

Fishing and fish processing form a core sector of Iceland's economy. Major developments in the management of the sector have included the introduction of a catch limitation system in the 1980s and a fishing fee in 2004, both of which continue to evolve. These policy measures have helped improve environmental sustainability and, thereby, the sector's medium-term prospects. Some fish stocks, however, notably of several of the migratory species, remain under threat. Seeking coordinated fishing agreements amongst coastal states therefore remains a high priority.

A. Iceland as a Fishing Nation

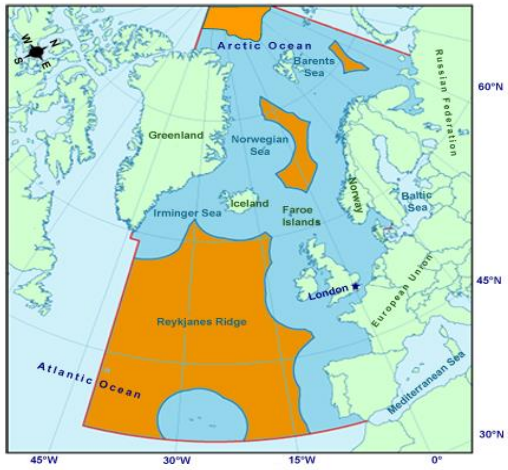
1. Iceland has the third largest fish catch in the northeast Atlantic, after Russia and Norway. By volume, its total catch amounted to 1.1 million tonnes in 2016, exceeding those of larger countries such as Spain and the United Kingdom. By value, Iceland is the fourth largest exporter of marine products in the Northeast Atlantic Fisheries Convention Area.[2] Besides Norway and Russia, Iceland's other main competitors in these fishing grounds are the ten EU states with Atlantic coastlines as well as Greenland and the Faroe Islands.[3]

Northeast Atlantic Fish Catch by Value and Volume, 2016 1/



Sources: Eurostat; UN Food and Agriculture Organization (FAO); and national statistical offices.
1/ Or most recent.

Northeast Atlantic Fisheries Convention Area



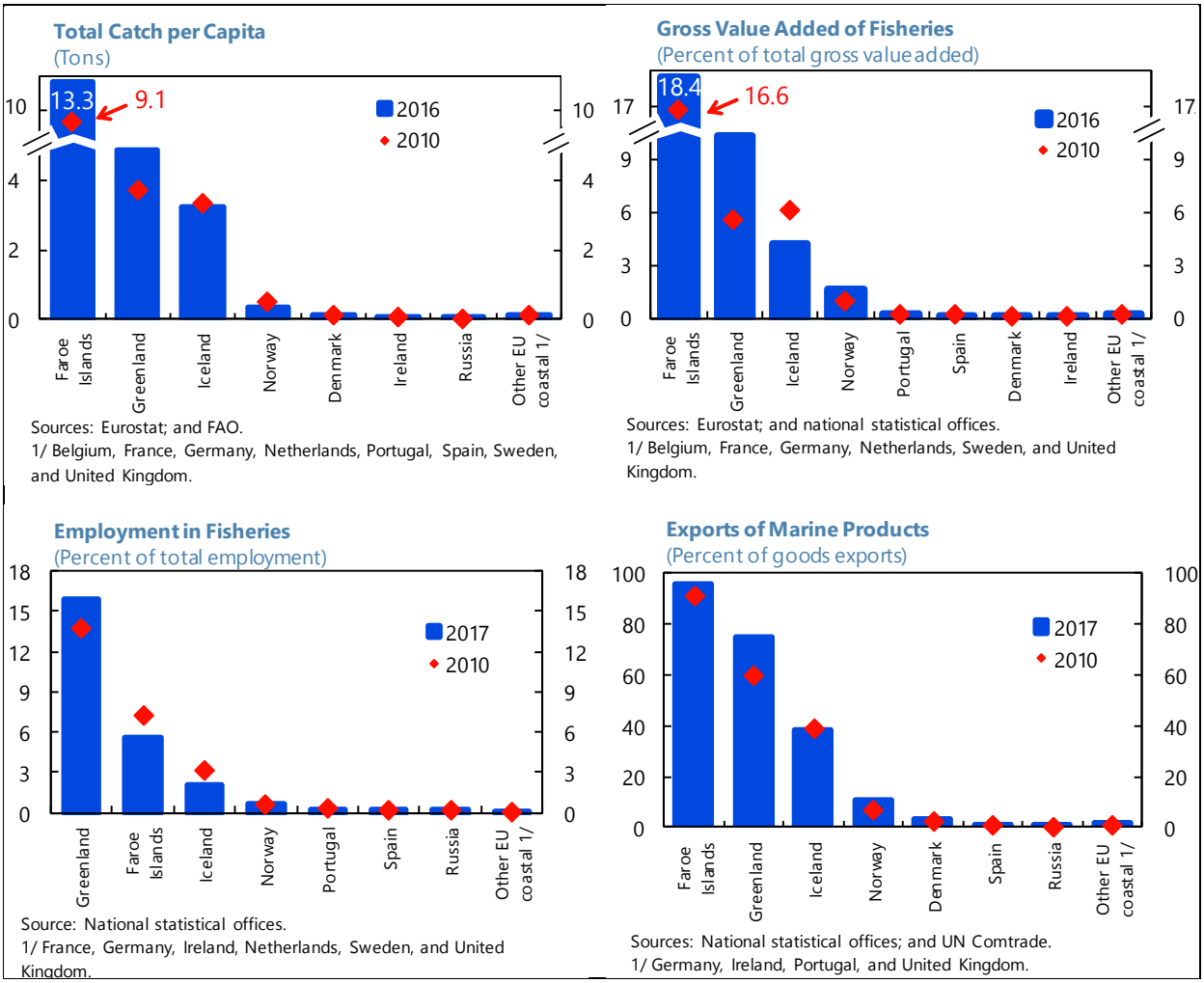
Source: Northeast Atlantic Fisheries Commission.

[1] Prepared by Uwe Böwer, Chikako Baba, and Ashok Vir Bhatia, with research support from Morgan Maneely (all EUR). This paper would not have been possible without the Ministry of Industries and Innovation, the Central Bank of Iceland, and the Marine and Freshwater Research Institute. Special thanks are given to Brynhildur Benediktsdóttir, Ásgeir Daníelsson, Jóhann Gudmundsson, Arnór Snæbjörnsson, and Gudmundur Thórdarson for their inputs.

[2] The Area spans the Atlantic and Arctic Oceans and their dependent seas north of 36° latitude and between 42° west longitude and 51° east longitude, as well as north of 59° north latitude and between 44° west longitude and 42° west longitude, excluding the Baltic Sea and the Mediterranean Sea.

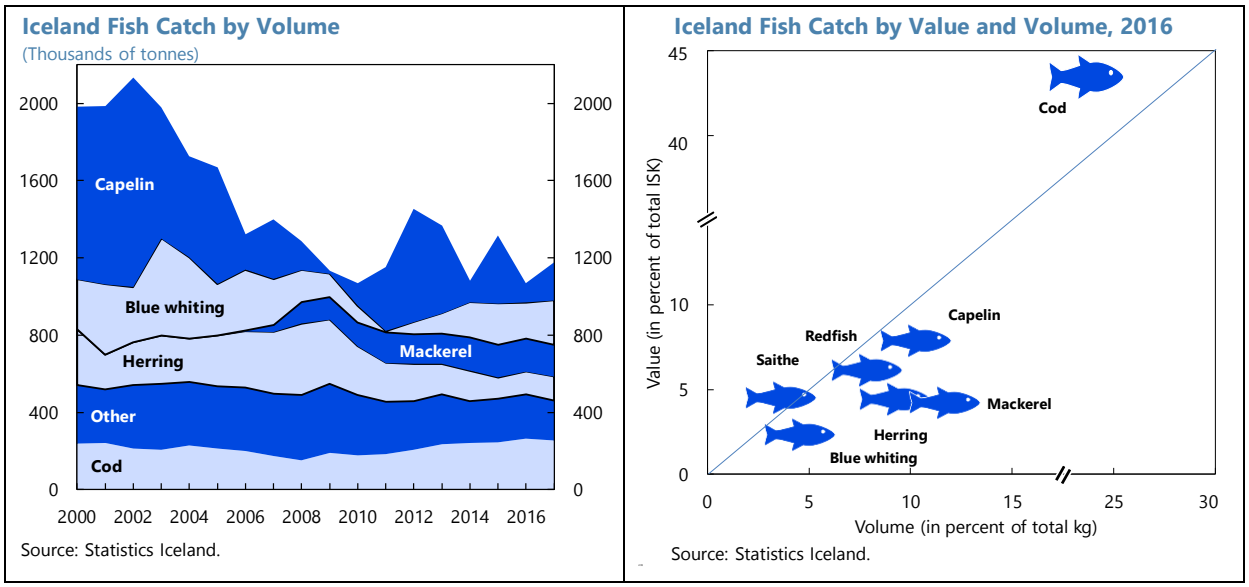
[3] The EU-10 comprises Belgium, Denmark, France, Germany, Ireland, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Greenland and the Faroe Islands are autonomous territories within Denmark, but not members of the EU and not bound by its Common Fisheries Policy.

2. The fisheries sector remains a major contributor to Iceland's economy. Icelandic vessels caught 3.2 tonnes of fish per Icelander in 2016, a per capita haul exceeded only by the Faroe Islands and Greenland. The sector's direct contributions to gross value added and employment were about 7 percent and 4 percent, respectively, in 2017. But, including large indirect benefits, one estimate puts the total economic contribution of the so-called "ocean cluster" at some 25 percent of GDP and up to 20 percent of the workforce in 2010 (Íslandsbanki, 2012). Marine products contributed 17 percent of goods and services exports by value in 2017, making them Iceland's third-largest export earner, after the tourism sector and aluminum and silicon.

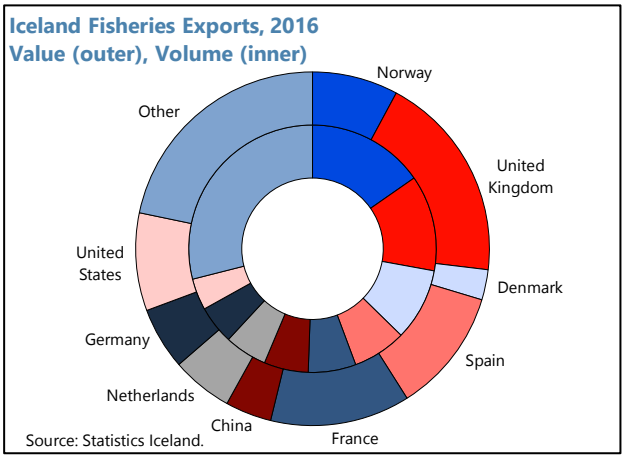


3. Catch volumes have varied over time and by species type. The two broad categories of species are the demersals, also referred to as groundfish—sea-bottom dwellers, including cod, golden redfish, haddock, ling, tusk, and saithe—and the pelagics—migratory mid-depth shoal swimmers, including blue whiting, capelin, herring, and mackerel. Some species, notably capelin, have proven to be highly variable in stock size. Others have seen rising catch volumes, most notably for mackerel, which is a recent arrival in Icelandic waters. Catch volumes of both pelagic and demersal species dipped over the winter of 2016–17, partly owing to a fishermen's strike. While the

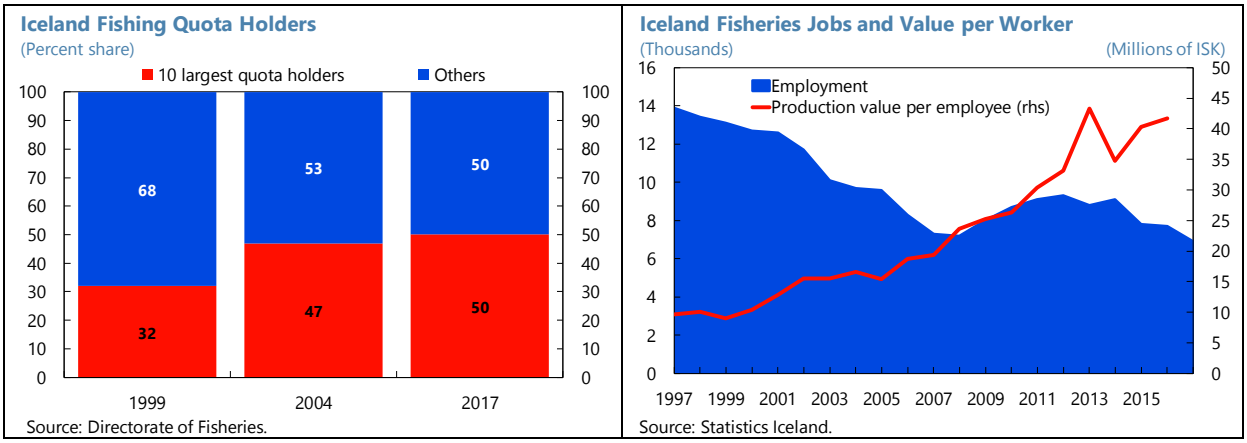
pelagic species make up a larger share of Iceland's total catch by volume, the demersals dominate by value. Cod is the single most valuable species and a consistent revenue generator.



4. The United Kingdom and Norway are Iceland's largest export markets. By value, the largest buyer is the United Kingdom, which takes a significant share of Iceland's cod catch among other items, followed by Spain and France. By volume, Iceland's largest buyer is Norway, importing mainly fishmeal, followed by the United Kingdom and Denmark. Other markets include destinations as diverse as Nigeria and Russia. While exports of demersals have remained relatively unimpeded, exports of pelagics have faced new obstacles in recent years. Russia imposed a retaliatory import ban on agricultural products including fish in response to the EU's economic sanctions on it (to which Iceland is a party as a member of the European Economic Area). Nigeria proscribed importers of certain goods, including selected fish products, from accessing foreign exchange on its interbank market.



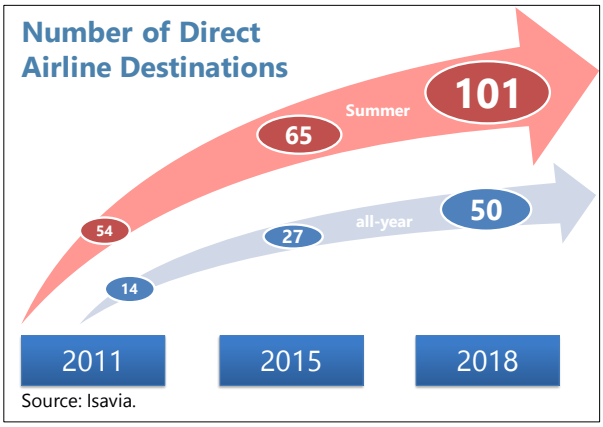
5. Major productivity improvements have been made in recent decades, amid significant industry consolidation. Since the launch of the quota system in 1984, and especially after quota shares were made transferable in 1991, fishing firms have had strong incentives to maximize value added from their quotas by importing the most technologically advanced boats, including from Norway and Turkey, scrapping older and less efficient equipment. The transferability of quotas has led to consolidation in the most efficient operators. By 2016, the ten largest firms accounted for half of the total allowable catch. Production value per employee has risen substantially over time.



6. As a major export earner, most of the sector's financing is in foreign currency. Total debt—comprising bank loans, typically secured by vessels, as well as export credit—is estimated at about €2.1 billion as of end 2016, equivalent to 11 percent of GDP. Some 90 percent of this is owed to domestic banks, with the remainder mostly from Nordic banks with marine sector experience. Equity participation by the domestic pension funds is limited, and only one large fisheries firm is listed. In recent years, the industry has increasingly financed equipment upgrades from retained earnings. Icelandic banks' outstanding loans to the sector accounted for 11 percent of total loans to customers as of mid 2018, the third largest sectoral exposure after households and real estate. The nonperforming ratio on these exposures was 7 percent in Q3 2018, up from 4 percent at end 2017.

7. Value added has been lifted by advances in fish processing. Iceland's fishing companies have invested in state-of-the-art technologies to link fishing with processing. Plants processing fresh and frozen products operate in various parts of the country, focusing on groundfish, pelagics, or roe, with the pelagic plants also processing fishmeal and oil. Large freezing vessels also process catches on board, allowing them to land finished products. Most of the large fishing companies are vertically integrated, covering fishing, processing, and marketing.

8. The sector has also benefited from improved air connectivity related to Iceland's tourism boom. This has supported the latest trend in enhancing marine products' value added: exporting fresh fish that has never been frozen. Since 2001, as tourist arrivals have soared, the number of direct air connections in the peak summer tourist season has nearly doubled while that of year-round connections has increased more than threefold. This has allowed fishing companies to dispatch ever greater volumes of high-value unfrozen product, to a broader range of markets (IMF, 2017a; IMF 2017b).



9. A wide range of ancillary businesses has emerged. Products and activities range from fishing gear to packaging and logistics, helping form Iceland's wider "ocean cluster" (Íslandsbanki,

2012). Technology has advanced to include assembly lines equipped with x-ray and waterjet technologies, and innovation has blossomed, helping ensure that no part of the catch goes to waste. Fishing-related biotechnology activities have found applications ranging from therapeutics to cosmetics to transplantation (Iceland Ocean Cluster, 2014).

B. Governance of Fishing Rights

10. Iceland's fishing grounds are defined by the global concept of the exclusive economic zone (EEZ), and foreign participation in its fisheries sector is restricted (Box 1). Act No. 34/1991 on Investment by Nonresidents in Business Enterprises, as amended, restricts fishing operations in Icelandic territorial waters and fish processing in Iceland to Icelandic citizens and Icelandic-controlled legal entities generally with no more than 25 percent ownership by citizens of other countries, including member states of the EU or the European Economic Area.

Box 1. Iceland and the Concept of the EEZ

The concept of the EEZ is enshrined in the UN Convention on the Law of the Sea. Amounting to a maritime extension of sovereign territory, the EEZ extends to 200 nautical miles from a country's coastal baseline. According to the Convention, each coastal state enjoys sovereign rights over its EEZ for the purposes of exploring, exploiting, conserving, and managing the natural resources therein. The Convention notes that each state shall determine the allowable catch of the living resources in its EEZ, considering the best scientific evidence and ensuring proper conservation and management measures to protect from over-exploitation. States shall cooperate with other coastal states and with international organizations to this end. States can give other states access to their EEZs while applying regulations relating to the licensing of fishermen and vessels, catch quotas by species, and enforcement procedures. Besides fisheries, states also have the freedom of navigation, overflight, the laying of submarine cables and pipelines, and the construction of artificial islands and other installations and structures in their EEZs.

The establishment of the EEZ concept helped put to rest a long history of north Atlantic fishing disputes. In the late 19th century, technological progress including steam power extended the range of fishing vessels and resulted in repeated disputes between Icelandic and U.K. fishermen both seeking to explore the rich fishing grounds surrounding Iceland. The Anglo-Danish Territorial Waters Agreement of 1901 set a 3 nautical mile limit to each country's offshore zone ("the range of a cannon shot"). Disputes erupted anew in 1952 when Iceland's decision to extend its fishery limit to 4 nautical miles was met with a ban on landing Icelandic fish in the United Kingdom, Iceland's primary export market. After the Soviet Union stepped in to purchase Icelandic fish, the U.K. recognized Iceland's 4 nautical mile claim. Iceland went on to extend its fishing limit to 12 nautical miles in 1958, 50 nautical miles in 1972, and 200 nautical miles in 1975. These extensions led to ugly confrontations involving naval vessels, known as the Cod Wars. Ultimately, international law came down in favor of Iceland's position when, in 1982, the UN Convention on the Law of the Sea formally adopted the universal 200 nautical mile limit.

11. Icelandic fishing is governed by a system of catch limitations and quotas. The Marine and Freshwater Research Institute (MFRI), an official research body in Iceland, issues advice for about 35 marine species each year, and has developed harvest control rules for eight stocks, starting with cod in 1995 (see Assessing and Ensuring Sustainability). These now include haddock, saithe, golden redfish, capelin, Icelandic summer-spawning herring, ling, and tusk, potentially soon to be joined by Atlantic wolffish, Greenland halibut, and plaice. Informed by the MFRI's scientific advice, the minister of fisheries sets species-specific total allowable catch (TAC) quantities for each fishing year, running

September–August, currently for 25 species. Some 98 percent of Iceland's total landed catch is subject to TACs. Each vessel holds fixed shares of the TACs by species, known as Individual Transferable Quota Shares (ITQSs), such that its annual catch quotas are a simple multiple of the TACs and its ITQSs. There are also direct catch limitation measures, including permanent area closures to conserve vulnerable habitats and temporary closures to protect spawns or juveniles.

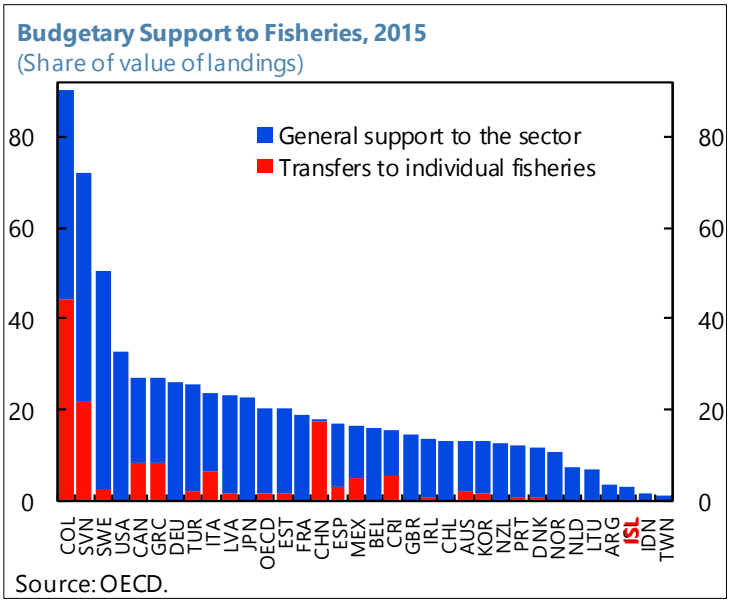
12. Both the fixed ITQSs and the annually adjusted catch quotas are transferable, subject to certain restrictions. They are also perfectly divisible, meaning any fraction of a given ITQS or quota may be transferred. The main restrictions on transferability are between the category of small boats, which fish with hand lines, and larger vessels that can use other fishing gear. The quotas of the larger vessels can be transferred to the smaller boats, but not vice-versa. Industry concentration is addressed under Act no. 116/2006 on Fisheries Management, as amended, which states that the combined quota share of vessels owned by related firms or individuals may not exceed 12–35 percent, depending on the species, and 12 percent in the aggregate.

13. First distributed in 1984 based on each vessel's past catch, the quotas led to a significant reduction of total fleet capacity. Early on, there was some tendency to set TACs higher than scientific advice and not all catches came under the TAC system., Since 2013, however, the TACs for all national stocks have been set equal to scientific advice. Moreover, through refinements in regulations, implementation errors in the system have been reduced sharply. Results included less overfishing and higher productivity (Íslandsbanki, 2016). Internationally, Iceland's quota system and strict oversight have received positive recognition for enhancing efficiency, eliminating discards, and ensuring full value extraction from catches (OECD, 2017).

14. Iceland also participates in numerous International cooperation arrangements. In addition to various bilateral agreements, Iceland is a member of the Northeast Atlantic Fisheries Commission, alongside Norway, Russia, the EU, and Denmark (on behalf of the Faroe Islands and Greenland); the International Council for the Exploration of the Sea (ICES), an international body based in Denmark that issues advice on the conservation and utilization of living marine resources to competent authorities; the North Atlantic Fisheries Commission; the International Commission for the Conservation of Atlantic Tuna; and the North Atlantic Marine Mammal Commission.

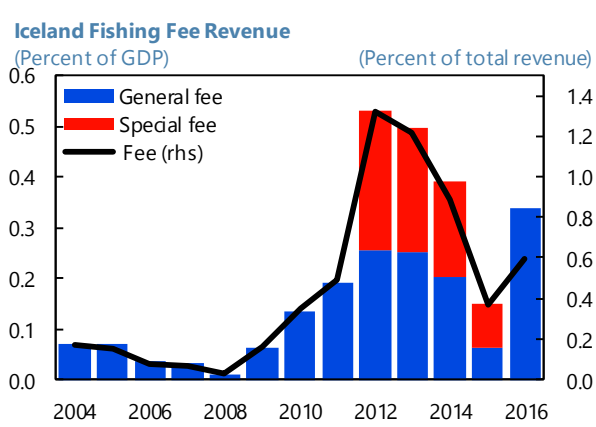
C. Fishing Outlays and Revenues

15. Direct budget support to Iceland's fisheries sector is minimal, unlike in many other fishing nations. Iceland does not provide direct transfers to individual fisheries firms.

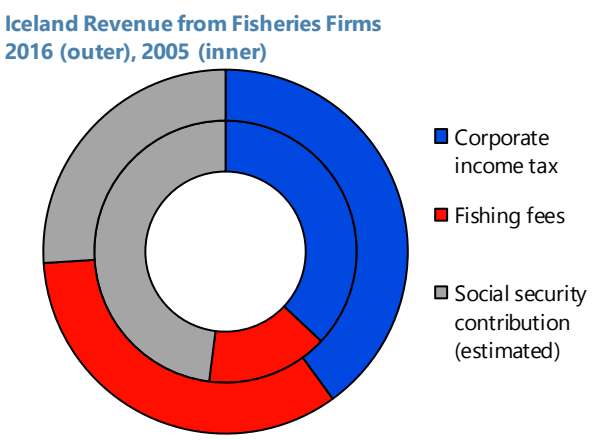


In contrast, several OECD countries apply decommissioning schemes tied to the reduction of productive capacity, including Australia and Spain; Slovenia made a one-off payment using EU funds in 2015. China's individual transfers include fuel subsidies and vessel construction payments. General support payments, in contrast, are paid to the sector as a whole. These typically include support for infrastructure, marketing and promotion, community support, education and training, research and development, and resource management (OECD, 2018). Iceland's general support expenditure is among the lowest of OECD countries and is fully recovered by its fishing fee.

16. Iceland also has a fishing fee. The vessel-specific ITQSs, which were allocated free of charge when they were introduced, have risen in value over time. This gave rise to calls for a social contribution from the sector, which profits from a natural resource regarded as a national treasure. A general fee was introduced in 2004 to cover the costs of the public system of oversight and research. A special fee was added in 2012 as a resource tax to vary with industry profits. This new fee boosted revenue from the fisheries firms. The two fees were unified in 2015. In 2016, revenues from the fishing fee stood at ISK 8½ billion, or about 0.3 percent of GDP—the budget for 2018 includes a figure of ISK 10 billion, and the Fiscal Strategy Plan has ISK 7 billion per year for 2019–23. Including corporate income tax and social security contributions, one estimate puts total revenue from the fisheries firms at 4 percent of general government revenue in 2016 (Íslandsbanki, 2016).



Sources: Ministry of Industries and Innovation; and Ministry of Finance.



Source: Íslandsbanki.

17. The fee is based on industry profits. The fee for groundfish is set as the sum of 33 percent of earnings before taxes (EBT) in fishing, 5 percent of EBT in salting, drying, and fresh fish processing, and 78 percent of EBT in onshore freezing; the fee for pelagics is set as 33 percent of EBT in fishing plus 25 percent of the sum of 22 percent of EBT in freezing and 100 percent of EBT in fishmeal and oil production. Regarded as a tax, the fee is subject to strict rules on transparency, predictability, and parliamentary decision making, including a requirement that, once it is set for a given year, it must remain unaltered for 12 months. One result is that, by necessity, the fee is based on EBT with a 20 month lag from the close of accounts to the point where it goes into effect—the fee for the 2017/18 fishing year, for example, was set in early 2017, before the fisheries firms' audited accounts for 2016 were available, and was therefore based on EBT for calendar year 2015.

18. The fee system seeks to guard against profit shifting. As the fee started to rise in 2008, the profit share of fish processing expanded steadily (Gunnlaugsson and others, 2018). This gave rise to concerns that vertically integrated fisheries firms were artificially lowering landing prices to shift profits from fishing to processing, for tax efficiency. In vertically integrated fisheries firms, landing prices are often prices for off-market sales from vessels to onshore processing or marketing units within the same group. These prices are loosely linked to market prices, which in turn reflect international prices, but tend to be some 10–15 percent lower. The decision, in effect since 2012, to include profits from fish processing in the fee basis sought to address the transfer-pricing problem.

19. The overall fee is allocated across fish species to generate a specific, króna-denominated fee per unit weight, species by species. Traditionally, this was done based on average landing prices, using a system of "cod equivalences": a species with a per-kilogram landing price equal to, say, 60 percent of that on cod had a cod equivalence of 0.6, and a fee equal to 0.6 times the per-kilogram fee on cod. Since 2015, the minister of fisheries has notionally also taken into account the cost of catching each species, and thus the species-specific profitability, although in practice the allocation remains closely linked to landing prices. The allocation is based on price and cost information with a 4 month lag—allocating the fee for the 2017/18 fishing year, for example, used landing prices and costs for the 12 month period ending in April 2017.

20. The fee system is constantly evolving. Between 2012 and 2015, the fishing fee was reformed every year. With the current fee legislation expiring at end 2018, the government has put a bill to parliament proposing to adjust the system of calculation. Specific proposals include:

- **Removing the exchange rate and inflation adjustments that are now factored into the calculation of the fee base**. Such adjustments are viewed as making the fee excessively volatile, linking it not only to catch volumes and prices but also to the exchange rate.
- **Shortening the lag between fee setting and the EBT upon which it is based**. This would be done by shifting the fee to a calendar year basis—thus the fee for calendar year 2019, for example, would be based on audited financial statements for 2017, a lag of 12 months.
- **Removing EBTs of the fish processing sector from the fee base**. Here the argument is that fishing, not processing, is the activity that should be subject to natural resource taxation, and that the ultimate safeguard against transfer pricing is the time-honored industry practice of linking vessel crew remuneration to landed value—such that integrated fisheries groups that set excessively low landing prices will risk losing their most talented seamen.[4]

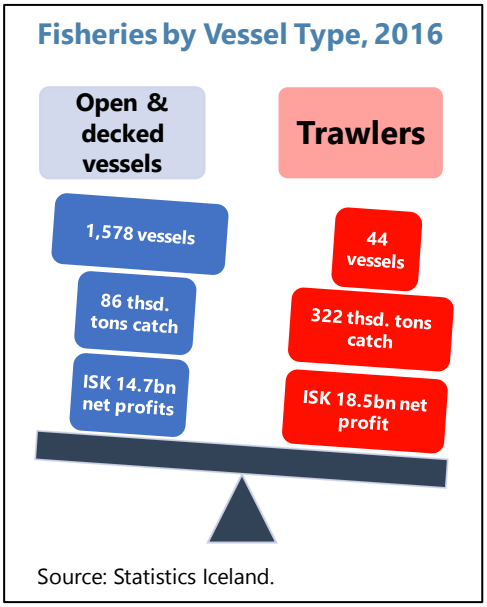
21. If approved, these changes would reduce the fee in the first year, 2019, by leapfrogging the highly profitable year of 2016 from the base calculation. Much of those profits, however, were from the exchange rate adjustments to the calculated EBT—the appreciation of the króna in 2015–16 meant lower earnings in local currency terms but a substantial "revenue" from exchange rate effects on the sector's mostly foreign currency-denominated debt. Preparatory discussions for the bill had also considered other options such as the government auctioning fishing rights to collect resource rents, but these were not included in the final legislative proposals.

[4] Stevedores and most other onshore personnel receive fixed hourly wages.

D. Prospects and Sustainability

22. Iceland's policy framework seeks to ensure sustainability. The authorities view the UN Convention on the Law of the Sea and the principle of sustainable development as adopted at the 1992 UN Conference on Environment and Development as central elements of their fisheries policy. Their overarching policy is laid out in the 2007 Statement on Responsible Fisheries in Iceland, sponsored by the government, the MFRI, and the Fisheries Association. The catch limitation system is central, supported by strict monitoring and enforcement to ensure that each vessel's catch remains within its quotas—all catch is brought ashore and measured.[5] As noted, the TAC is determined, species by species, based on scientific advice issued by the MFRI—although the Statement also indicates that social and economic factors play a role. Thus, the TAC has at times exceeded MFRI advice, although this has not been the case last 5–6 years.

23. Although the framework includes provisions for area restrictions by type of gear, it has generally resulted in a shift to larger vessels, with potential environmental implications. Demersals are caught mainly by longlining or trawling the sea floor—where trawling is economically more efficient due to its scale effects but also has the potential to significantly damage vulnerable marine ecosystems on the seafloor, and where one argument against longlining is that it is less good at discriminating by species than trawls. Within each vessel type, smaller vessels are generally not as efficient, although some argue they are more protective to the environment as most only fish for demersals with handline. Pelagics are usually caught by large vessels using midwater trawls or purse seines. Overall, 44 trawlers catch a larger volume of fish than all 1,578 other vessels combined.

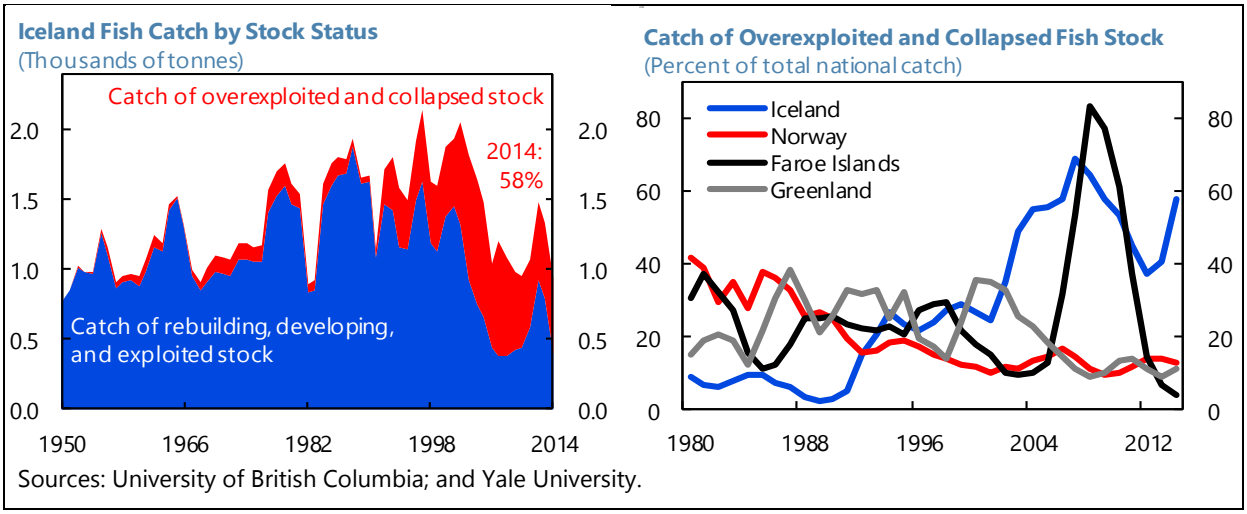


24. Assessing fishing sustainability is not straightforward, with several well publicized methods subject to serious scientific critiques:

- **One method is the catch-based approach used by Yale University's Environmental Performance Index**. This was launched at the UN to help assess the Sustainable Development Goals. The method used for calculating the sub-index for fishing assumes that if, after a peak, the catch of a fish stock falls to 10–50 percent of its peak catch, then the stock is overexploited; if it falls to below 10 percent, the stock is collapsed (Wendling and others, 2018). On this measure, Iceland's catch of overexploited or collapsed stocks has risen sharply, while

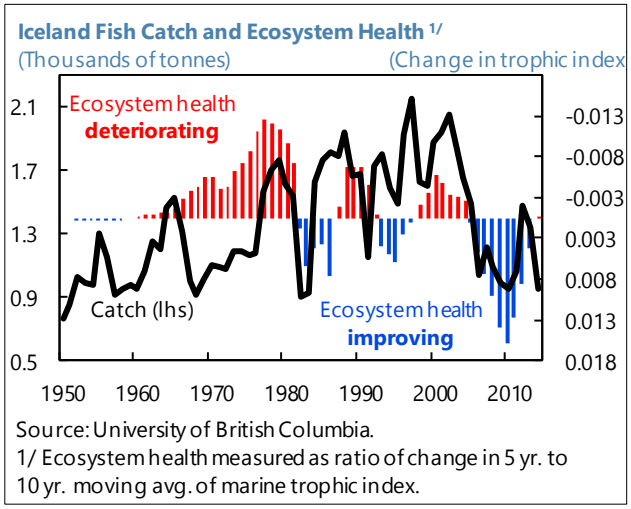
[5] Discards are banned. All bycatch, including of noncommercial species such as seabirds, must be recorded in logbooks, usually in electronic format. Small or damaged fish weighing up to 5 percent of the demersal catch are set aside and not counted against quotas. This fish is sold at auction and most of the revenue flows to a public fund.

Greenland's and Norway's shares have fallen in recent decades.[6] Critics point out, however, that omitting stock size from the evaluation is a fatal flaw. If managers decide to reduce catches to rebuild the stock, then the stock can be deemed "overexploited" even if it is close to B_{MSY} (the spawning stock biomass that results from fishing for a long time at $\mathbf{F_{MSY}}$ (the fishing mortality consistent with achieving maximum sustainable yield), or "collapsed" even if it is well above $\mathbf{B_{lim}}$ (the limit reference point for spawning biomass).



Sources: University of British Columbia; and Yale University.

- **Another method looks at ecosystems from the perspective of the food chain**. This method, by focusing on the trophic level of each species (its position in a food web), seeks to detect whether there is "fishing down the food chain," implying that larger, high-level species have already been exploited and smaller, lower-level species are increasingly targeted, with a negative impact on ecosystem health (Wendling and others, 2018). To better isolate the effect of fishing intensity on biodiversity, a region-based marine trophic index has been developed which accounts for changes in trophic levels caused by geographic expansions of fisheries (Kleisner and others, 2014). Iceland's trophic index has fluctuated over the post-war period, with ecosystem improvements since the mid 2000s. Critics, however, find no link between trophic level and fish value—some of the most prized quarry are prawns, crabs, scallops, and lobsters, all relatively



Source: University of British Columbia.
1/ Ecosystem health measured as ratio of change in 5 yr. to 10 yr. moving avg. of marine trophic index.

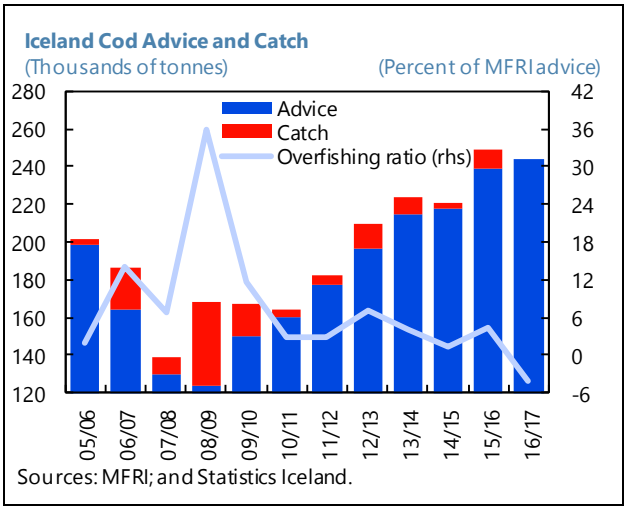
[6] Catch data are compiled across countries by SeaAroundUs, a research project at the University of British Columbia's Institute for Oceans and Fisheries. The data are based on FAO landings statistics (FAO, 2004) and supplemented by estimations to fill data gaps. For Icelandic data, see also Valtýsson (2014).

low trophic level species, and even among higher trophic level fish there is no correlation between trophic level and value (Sethi and others, 2010).

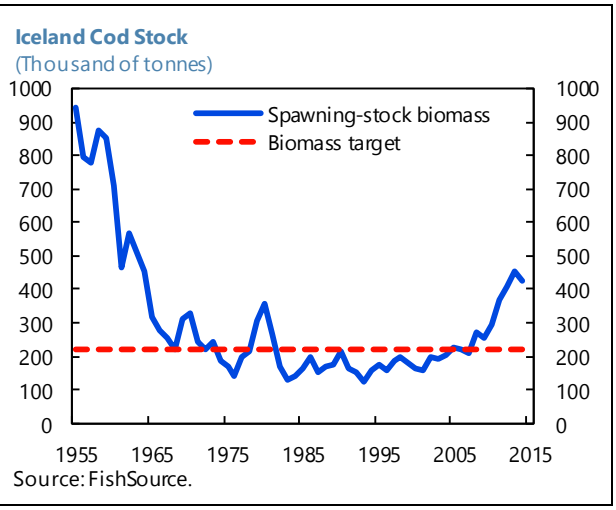
25. Iceland's view is that evaluation methods based on virtual population analysis and sampling are preferred. Both the MFRI and ICES focus on this approach in determining their recommendations on catch sizes for groundfish. The MFRI provides the government with scientific advice on the sustainable use and protection of the environment and the ecosystem, including sustainable exploitation levels for the main fish stocks. The ICES develops advice at the north Atlantic regional level, based on the work of its large network of marine scientists. These analyses look at sustainability from multiple ecosystem angles. Each year, the MFRI's recommendations for the main Icelandic commercial species, including its multi-annual harvest control rules, are peer reviewed by the advisory committee of the ICES to ensure consistency.

26. The MFRI uses multiple methodologies. For long-lifespan demersal species, it mainly relies on data on catch by age, weight, and gender, analyzing samples from the catch all year round and reviewing logbook data on all hauls by trawlers and other gear. Twice a year, the MFRI conducts special research projects for estimating changes in catchability of demersal species by sampling fish in the same fishing areas with the same fishing methods. Fishing areas are also cross checked by a survey of boat captains. The information from all these sources are combined to obtain estimates of individual year-class and stock size. For pelagics, especially the short-lifespan species such as capelin and blue whiting, stocks have to be estimated using sonar. In some cases, neither virtual population analysis nor acoustic measurements are possible and data on catch per unit effort are used.

27. Such methods suggest Iceland's all-important cod stock is well above its target size, having overcome past episodes of overfishing. Cod, as Iceland's most profitable species, is also its most-fished demersal in terms of both volume and value—and has seen bouts of overfishing. Most recently, in a "calculated risk" to help mitigate the effects of Iceland's financial crisis, the TAC for cod was raised to exceed the MFRI's scientific advice by around 23 percent in 2008/09, while actual catches exceeded those recommendations by more than 30 percent. Since 2013, however, quotas have matched recommendations, and catches have been within the permitted 5 percent deviation from quota. Stocks of cod and most other demersal species have recovered.



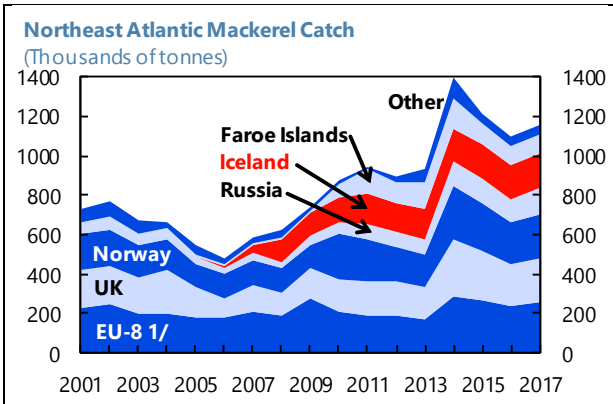
Sources: MFRI; and Statistics Iceland.



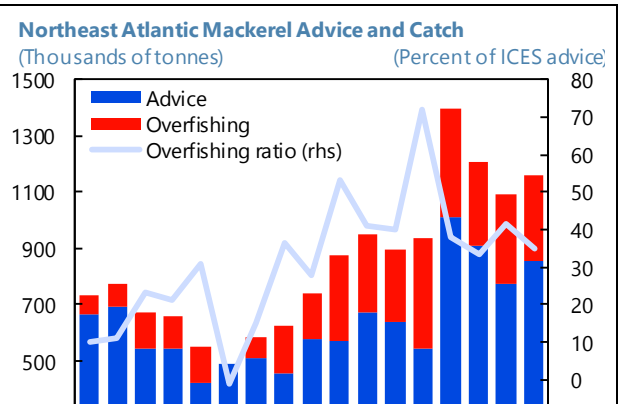
Source: FishSource.

28. Overall, Iceland's efforts have been broadly successful in ensuring sustainable fishing in its waters, boding well for the future. The policy framework and its strict application have resulted in a significant decrease in catch volumes relative to the period 1950–90, but also much larger stock sizes, leading to higher catch per unit effort—fishing has become more profitable. The most recent ICES ecosystem overview for Iceland finds that (i) the main commercial stocks are close to their largest sizes since 1985; (ii) effort in terms of hours trawled has plummeted from around 500,000 hours in 1992 to 150,000 in 2015; and (iii) the trawling footprint has shrunk concomitantly.

29. Looking beyond Icelandic waters, however, international cooperation failure has bred severe overfishing, most notably for mackerel. Potentially related to global warming, the migration pattern of this species began to change around 2007, when it first appeared in large numbers in the north Atlantic. With the drivers and permanence of this phenomenon in dispute, the coastal states have failed to achieve agreement thus far (Spijkers and Boonstra, 2017). Initially, Iceland was not recognized as a coastal state for mackerel; in 2010, Iceland was granted that status, but disagreements remained around its rightful share (as well those of Russia and Greenland). Pending agreement, Iceland took unilateral steps to set its own quotas for mackerel, among other pelagic species. At the regional level, however, total mackerel catches by all countries fishing in the north Atlantic started to exceed ICES advice by as much as 72 percent.

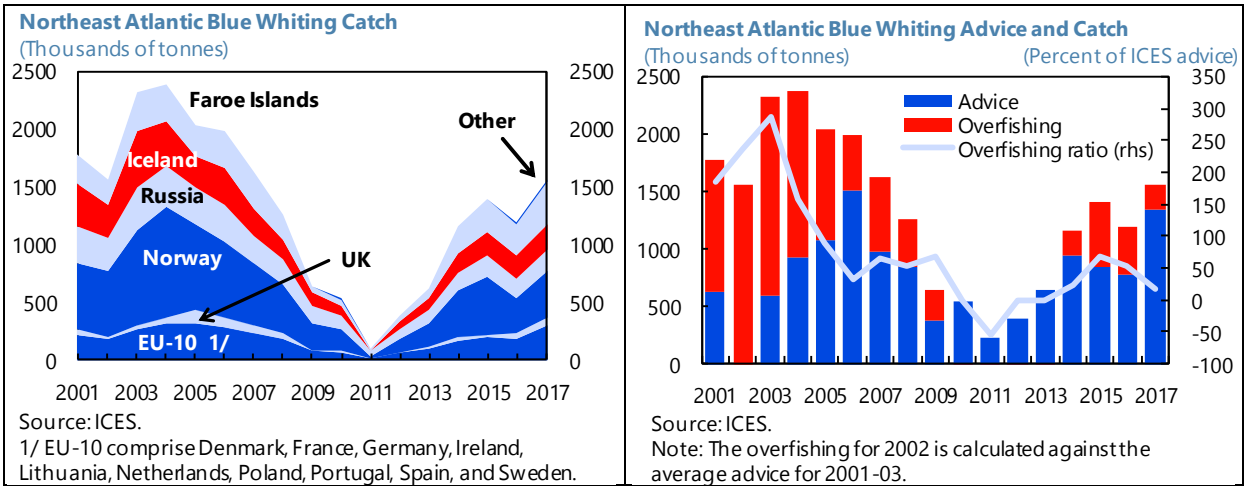


Source: ICES.
1/ EU-8 comprise Denmark, France, Germany, Ireland, Netherlands, Portugal, Spain, Sweden.



Source: ICES.

30. Other migratory species have faced similar problems. Landings of pelagic fish, notably herring, capelin, mackerel, and blue whiting, account for over half of Iceland's total annual catch by volume and about one-fifth by value. All these species have experienced episodes of overfishing and stock collapse. Capelin is the only straddling stock in the north Atlantic subject to a regional agreement. That agreement, between Iceland, Greenland, and Norway, grants Iceland an 80 percent share in the regional TAC. Mirroring the plight of mackerel, the aggregate blue whiting catch was 67 percent above ICES advice in 2015, and 11 percent above the sum of the unilateral quotas of the coastal states. Herring has lacked an accord since 2013, and blue whiting since 2014. Much effort has been expended in seeking to find agreement, but with no success thus far.



31. The challenges that make the needed international agreements elusive could be further complicated by Brexit (Box 2). Fisheries featured prominently in the pro-Brexit campaign leading up to the U.K. referendum, with many in the U.K. fisheries sector declaring the vote to leave a great opportunity for the sector (House of Lords, 2016). Brexit brings a U.K. departure from the London Fisheries Convention and, most likely, from the EU's Common Fisheries Policy. After Brexit, the United Kingdom is likely to negotiate its own fishing agreements with neighboring coastal states (Phillipson and Symes, 2018). As such negotiations take place, the very existence of one additional, autonomous player will further complicate the discussion.

E. Conclusions

32. Fisheries remain at the heart of Iceland's economy. Despite trend reductions in catch volumes and the emergence of other economic sectors, fisheries are still a core element of Iceland's production, employment, and export chain. Productivity has been lifted by the catch limitation system, which has shifted the emphasis from volume to value added. Transportation synergies with tourism have facilitated growing exports of unfrozen product. Innovative ancillary businesses have emerged to form the wider ocean cluster, with further contributions to GDP and employment.

33. At home, efforts to ensure sustainability have generally been successful, boding well for the future. Iceland's fisheries framework and its rigorous application have resulted in much larger stock sizes, supporting catchability and profitability, and have slashed waste. International studies find the main commercial stocks to be healthy, effort per unit catch to have fallen, and the trawling footprint to have shrunk. Efforts to fine-tune the fee system are generally welcome, and further enhancements to the catch limitation system should be seen as a continuous process.

34. Looking beyond Icelandic waters, however, there are serious collective action problems in the northeast Atlantic. Several pelagic species remain threatened, leaving environmental sustainability as an important, pressing, and shared challenge. Protecting the transboundary fish stock requires better international cooperation, which has proven elusive thus far. Icelandic efforts in this regard have been energetic, and should remain so. But eliminating overfishing of the migratory species will require good faith by all parties.

Box 2. Fisheries in a Game Theory Framework

The management of shared fish stocks offers a prime application for game theory. With a transboundary fish stock, the harvesting decisions of one country impact the possible harvest of another country, as well as the long-term viability of the stock available for future harvesting. One country will thus try to incorporate the expected reaction of the other in its decision making process, and vice versa. This process can be cooperative, leading to a maximized payoff for all participants in terms of fishing stock sustainability, or can be competitive and result in free riding and overfishing, essentially the "tragedy of the commons" (Hardin, 1968). Game theory is often used to analyze this type of challenge. Schelling and Aumann were awarded the Nobel Prize in 2005 for addressing the question, "Why do some groups of [...] countries succeed in promoting cooperation while others suffer from conflict?" (Royal Swedish Academy of Sciences, 2005). Since the seminal work of Munro (1979), game theory has been applied to better understand strategic interactions in fisheries management, as reviewed by Bailey and others (2010).

Competitive harvesting can lead to severe damage to the fishing stock. Non-cooperative game theory shows that rational choices by individual players can result in a suboptimal result, as illustrated by the well known prisoners' dilemma—a situation where two separately detained criminals rationally choose to betray each other, although both would be better off by jointly staying silent. Similarly, fishing nations tend to deviate from attempted cooperation if commitment cannot be enforced and the payoff from free riding exceeds that of cooperation (Miller and others, 2013). Hannesson (2013) shows that, with two players of different size and fixed fish migration patterns (which is not the case in practice), the minor player has no incentive to leave any fish behind, so the conservation burden falls entirely on the major player; with more than two players, the likelihood of complete extinction of the species increases further. Jensen and others (2015) note that, indeed, all players in the mackerel dispute have an incentive to act non-cooperatively, and that the observed limited amount of cooperation between some of the northeast Atlantic coastal states cannot be explained by the model; moreover, Iceland is very much the "new entrant" for this species.

Regional fisheries cooperation tends to be beneficial but fragile. Using a coalition-formation model, Pintassilgo and others (2010) analyze the stability of regional fisheries management organizations such as the Northeast Atlantic Fisheries Commission. They find that a larger number of competing fishing states, as well as higher harvesting efficiency, tends to increase the gains from cooperation but weigh on the stability of the network, as members cannot exclude non-members from harvesting anyway, thereby free riding on the organization's efforts to keep the stock sustainable. Toumasatos and Steinshamn (2018) show that the United Kingdom becoming a standalone player in the mackerel dispute adds uncertainty as outsiders are better off free riding despite the positive effects of cooperation on profits and stock preservation. One of their stable constellations is a coalition of Iceland and the United Kingdom acting against the existing EU–Norway–Faroe Islands coalition. Hence, new entrants, be it on the back of altered fish migration patterns in Icelandic waters, or caused by political choices such as Brexit, have a destabilizing effect on the overall system and put further pressure on the mackerel stock.

The destructive potential of competitive harvesting highlights the need to facilitate cooperation. Additional incentives may be required to avoid a catch-22 situation, some of which can be incorporated into the game theory framework while others go beyond. Models can be extended to feature side payments which broaden the scope of negotiations and compensate actors that might otherwise act non-cooperatively (Bailey and others, 2010). Coalitions that tilt the relative size of actors, as well as more specific assumptions on stock-dependent migration patterns and cost asymmetry, can increase the potential gains from cooperation (Hannesson, 2013; Pintassilgo and others, 2010). The threat of total extinction can also prevent a destructive result, formalized within the Folk Theorem, according to which a strategy threatening to revert to a Nash equilibrium could support a cooperative outcome (Hannesson, 2013). Better information about the damages of competitive harvesting, potentially coupled with prior experience of near-extinction, can change the expected payoffs from cooperation (Miller and others, 2013). Beyond the realm of game theory, political economy factors can influence harvesting choices in both directions. Lobbying from small yet effective pressure groups such as fisheries associations can push national choices towards overfishing while binding international commitments, such as highly valued trade agreements in other sectors, as between the EU and Norway, can induce discipline (Toumasatos and Steinshamn, 2018).

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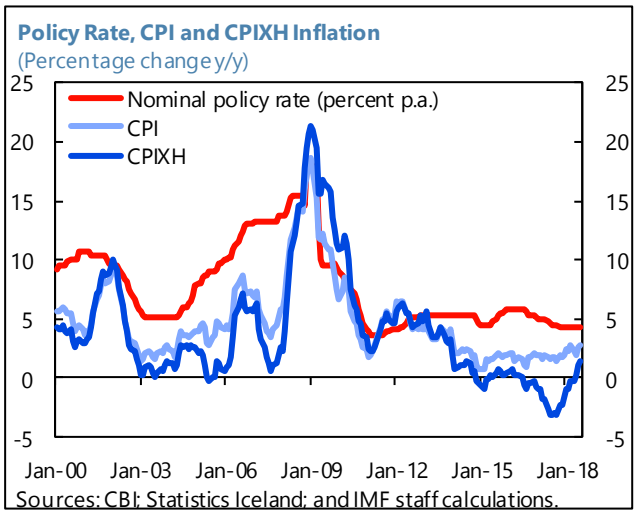
INFLATION TARGETING IN ICELAND—THE ISSUE OF HOUSING COSTS[1]

The recent divergence between housing costs and other prices in Iceland's consumer price index (CPI) has reignited the debate about the most suitable reference index for Iceland's inflation target. Reviewing alternatives and considering the effects on inflation and monetary policy suggests a case for smoothing the impact of high-frequency movements in housing prices on targeted inflation while continuing to target CPI inflation including housing costs. Any adopted changes could have implications for monetary policy, however, which would need to adjust accordingly.

A. The Issue

1. Inflation in Iceland has been close to target in recent years, but inflation excluding housing has tended to be negative. Since Iceland introduced inflation targeting in 2001, overall CPI inflation has been higher on average than inflation based on the CPI excluding housing (CPIXH), and more procyclical—higher in booms, and lower in busts. The contribution of housing costs to CPI inflation reached an all-time high of almost 5 percentage points in mid 2017, allowing CPI inflation to hover close to the 2½ percent target despite CPIXH inflation falling to as low as -3 percent—its lowest rate in nearly 60 years.



2. This divergence has reignited the debate about the most suitable reference index for Iceland's inflation target. It has revived questions about whether the CPI is the appropriate reference index and whether there is scope for improving the way housing costs are incorporated in Iceland's CPI. These issues were also debated in the mid 2000s (IMF, 2006; and Herbertsson and Mishkin, 2006). More recently, the Central Bank of Iceland (CBI) has highlighted the benefits of sticking to the CPI (CBI, 2016). Finally, this year, a government-commissioned taskforce of external experts suggested that for monetary policy purposes the CPI should be replaced by a measure that excludes housing costs (Task Force on Monetary Policy, 2018).

[1] Prepared by Sílvia Domit (EUR), Shakill Hassan (SPR), Morgan Maneely (EUR), and Niall O'Hanlon (STA).

B. Measurement Considerations

3. Housing costs can be incorporated in the CPI in different ways. Total housing costs are a combination of renters' and homeowners' spending on shelter. Whereas the former tends to be measured by data on rents, the latter has to be estimated. There is no international consensus on whether or how to include owner-occupied housing (OOH) expenses in the CPI. Three broad approaches are typically used to include OOH (Consumer Price Index Manual, 2004). OOH costs may be proxied using at least three methods: [2]

- **Rental equivalence**. This approach calculates how much homeowners would have to pay to rent their dwellings, excluding costs typically borne by landlords such as home insurance, maintenance, and property taxes.
- **User cost**. This approach sums recurring actual costs such as home insurance, maintenance, property taxes, and mortgage interest payments, as well as estimated depreciation costs based on the current market value of the OOH stock and an average rate of depreciation.
- **Acquisitions**. This approach looks at the cost of purchasing and owning a dwelling, including renovations, home insurance, maintenance, and transfer costs.

4. Each of these methods has its limitations. The appropriate choice depends on country specific characteristics, data availability, and the primary use of the CPI. Rental equivalence may not be a good proxy for OOH costs in countries where the rental market is small, geographically or demographically concentrated, subject to rent control, or unrepresentative of the stock of OOH (which tends to be of higher quality). By construction, the user-cost approach includes interest rates and house purchase prices in the CPI, directly linking the index to an asset price and creating a cyclical mechanism whereby, as first-round effect, policy rate increases (decreases) raise (lower) CPI inflation. The acquisitions approach can also create a stronger link between CPI inflation and house purchase prices and may prove difficult to implement due to data limitations, including availability (e.g., the lack of a price index for newly built housing), volatility (weights may fluctuate significantly over the housing cycle), and timeliness (Hill, Steurer, and Waltl, 2017).

5. Iceland uses a version of the user-cost approach, with two potential limitations. The flow of services of living in an owner-occupied dwelling is calculated as an annuity, derived from the depreciation of the property, the market price of the house, and real interest rates (Gudnason and Jónsdóttir, 2009; Gudnason, 2004; and Gudnason, 2005). The latter two components could create issues for an inflation targeting central bank by: (i) increasing the sensitivity of targeted

[2] A fourth method, referred to as the payments approach, is based on the expenditure incurred in occupying a house, including deposits on newly purchased dwellings, fees, repayments of mortgage principal, mortgage interest payments, home insurance, maintenance, and property taxes. In practice, this approach has several limitations and is used by very few countries (Diewert, 2003 and Diewert, 2009).

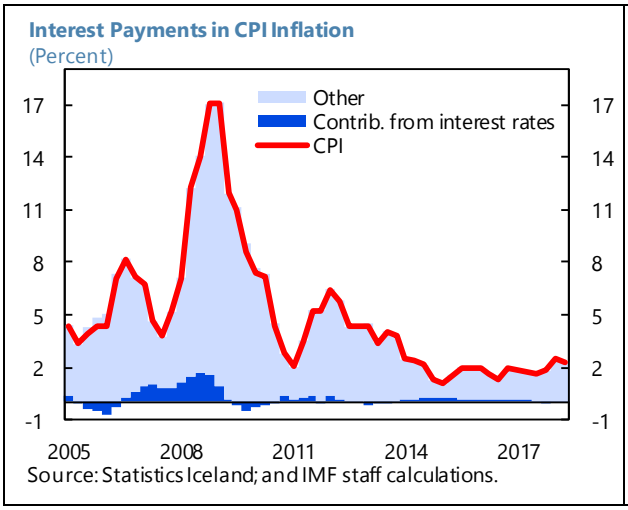
inflation to house prices and (ii) leading monetary policy to "work in the wrong direction," as explained above. The formula Iceland uses is:

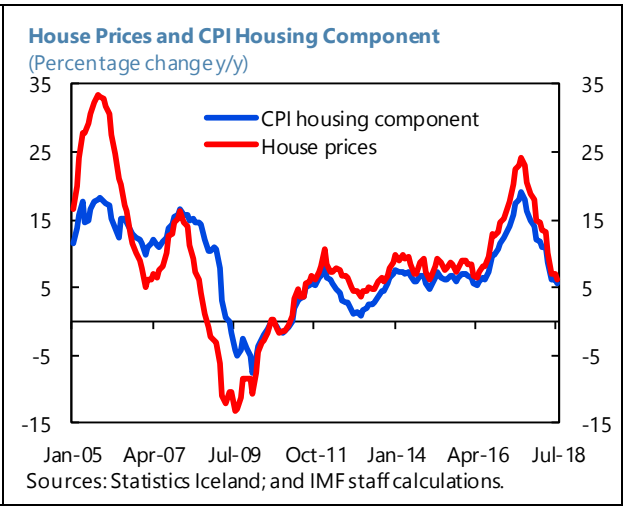
$$A_{HV} = P_H * \left[\frac{r * (1+r)^N}{(1+r)^N - 1}\right]$$

Where:
P_H is the present value of the house;
A_{HV} is the annuity of the house value;
r is the real interest rate; and
N is the lifetime of the property (depreciation is given by an assumed lifetime of 80 years).

6. One potential limitation, the inclusion of interest rates in the methodology, has not been a material issue in practice. Whereas the formula would suggest that interest rates have a significant effect on the OOH services component of the CPI, in practice, the impact has been trivial. This is because the interest rate used in the calculation is broadly fixed: it is essentially a weighted average of: (i) the long-term real interest rate (kept fixed in this calculation) and (ii) real interest rates on new and old mortgages which, in Iceland, are offered by lenders under fairly stable terms: long maturities and fixed real interest rates given a high prevalence of inflation indexation.[3] Provided these methodological assumptions and lending features remain in place, they allay concerns that the current approach could cause monetary policy to "work in the wrong direction."

7. But the other limitation has seen CPI inflation proving very sensitive to housing prices. As is evident from the formula, house prices feed directly into the computation of OOH services, with the calculation based on a three-month moving average of the housing price index. As a result, the correlation between housing prices and the housing component of the CPI is extremely high.





[3] When consumers buy real estate, they finance it partly through their equity and partly with credit. In the methodology, the interest on equity is kept fixed, while interest on the borrowed money is variable. The part of the house price paid in cash is considered the buyer's equity. Its required return is assumed to be constant over the lifetime of the durable and determined in accordance with the long-term rate of return that pension funds require (Gudnason, 2015).

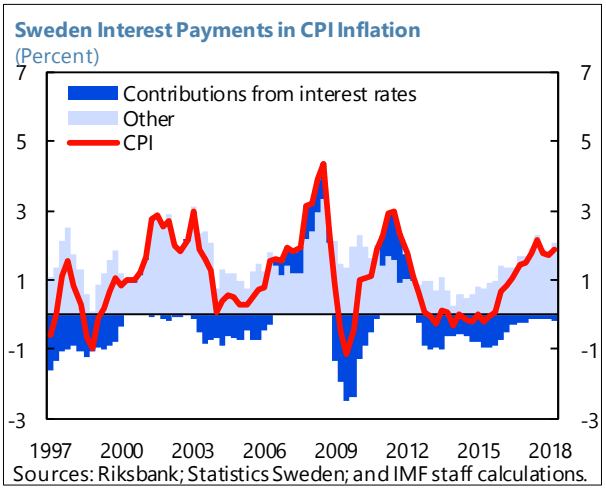
C. International Comparison

8. Iceland's approach is uncommon among its inflation targeting peers. Most advanced economies with inflation targeting central banks avoid the problems associated with the user-cost approach. Many do so either by computing the OOH component through rental equivalence (e.g., Japan, Norway, and the United States) or by excluding it from the reference index (e.g., the euro area and the United Kingdom). Others (e.g., Australia, Canada, New Zealand, and Sweden) adjust their reference index to remove undesired properties, notably its direct link to housing prices and interest rates. Relevant cases include:

- **The United Kingdom, which since 2003 has targeted a harmonized index of consumer prices (HICP) although official publications call it the CPI**. This has remained the case despite the creation, in 2017, of a new index which incorporates OOH using the rental-equivalence approach (called the CPIH). Prior to 2003, the inflation target was based on an index which excluded mortgage interest rate payments (the RPIX). When the benchmark index switched to the HICP (CPI), the numerical inflation target was lowered from 2½ percent to 2 percent to account for differences between the two indices (UK Office for National Statistics, 2017).

- **The ECB, which currently targets the HICP**. In the past, it has noted that spending on OOH was the only significant area not covered by its reference index and that work was underway to potentially incorporate it (Regulation 93/2013/EU and (https://www.ecb.europa.eu/stats/macroeconomic_and_sectoral/hicp/html/index.en.html). More recently, however, the ECB has noted that the inclusion of OOH should not allow the HICP to become representative of asset price developments or compromise the timeliness and frequency of data releases (Draghi, 2018).

- **Sweden, which uses a similar approach to Iceland's but, since 2017, makes adjustments to address conceptual issues with the user-cost approach.** The impact of mortgage rates is removed, and the house price series is smoothed with a 30 year moving average to deliver a modified inflation index (the CPIF). Prior to 2017, the CPI was the formal benchmark inflation target index but, in practice, the Riksbank had already been using the CPIF to guide its monetary policy decisions, reflecting significant differences between the two indices (IMF, 2015; and Riksbank, 2017).



- **Canada, which also uses the user-cost approach and makes adjustments to address conceptual issues**. House purchase prices are smoothed by using a 25 year weighted average and, although mortgage rates are not excluded from the index, their contemporaneous impact is

dampened because new interest rates are weighted by the (small) share of new mortgages in the overall stock of residential mortgages (Analytica, 2018).

- **Australia and New Zealand, which use a version of the acquisitions approach**. Both include construction costs and exclude land prices, thereby seeking to isolate the shelter services component (proxied by the built property) while eliminating the undesirable link to an investment asset and the associated sensitivity to volatile house purchase prices (Hill, Steurer, and Waltl, 2017; and Analytica, 2018).

CPI and Housing in Advanced Inflation Targeting Economies

Central Bank	Inflation Target Benchmark Index	Does the benchmark index include housing?	Which components of housing?	Which approach is used to compute OOH?	Do interest rates feed directly into this calculation?	Do house purchase prices feed directly into this calculation?
Australia	CPI	Yes	Rentals and OOH	Acquisitions (excl. land prices)	N	N
Canada	CPI	Yes	Rentals and OOH	Modified User Cost	Y (but smoothed)	Y (but smoothed)
Czech Republic	CPI	Yes	Rentals and OOH	Acquisitions (excl. land prices)	N	N
Iceland	CPI	Yes	Rentals and OOH	User Cost	Y (but limited)	Y
Japan	CPI	Yes	Rentals and OOH	Rental Equivalence	N	N
New Zealand	CPI	Yes	Rentals and OOH	Acquisitions (excl. land prices)	N	N
Norway	CPI	Yes	Rentals and OOH	Rental Equivalence	N	N
Republic of Korea	CPI	Partial	Rentals Only	-	N	N
Sweden	CPIF	Yes	Rentals and OOH	Modified User Cost	N	Y (but smoothed)
UK	HICP	Partial	Rentals Only	-	N	N
US	PCE deflator	Yes	Rentals and OOH	Rental Equivalence	N	N
Euro Area	HICP	Partial	Rentals only	-	N	N

Sources: National authorities.

D. Considerations on the Choice of Inflation Target

9. Iceland has three options for its choice of reference index for inflation targeting. These are to (i) continue to target the CPI; (ii) target an index which excludes the housing component either fully, as in the CPIXH (which excludes both rental and OOH costs), or partially, as in the HICP (excluding OOH but including rental costs); or (iii) target a modified CPI which addresses the challenges posed by the current measurement approach for OOH costs.

10. As an accountability device, the inflation target should capture as broadly as possible households' spending patterns and be well understood by all. An inflation index which includes housing costs would be a more accurate reflection of consumer spending. Targeting the HICP, which only includes rental costs, would not be representative of Iceland's economy, where 80 percent of households live in owner-occupied dwellings. Targeting the CPIXH, which excludes both rental and OOH, would completely miss the housing component of household expenses.

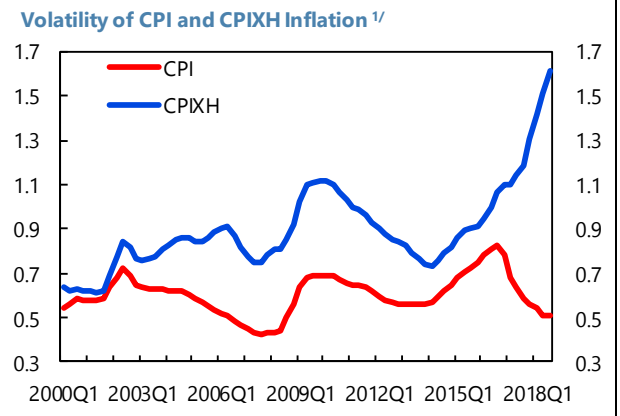
11. Moreover, the reference index for the inflation target should be representative of consumption expenditure, not asset price developments. Retaining Iceland's CPI as currently computed would maintain the tight link between housing prices and targeted inflation. Adopting a reference index which excludes OOH costs as they are currently calculated would have the benefit of

removing the direct link between the inflation target and housing prices, leaving asset price booms to be addressed by macroprudential policy (although the housing market would still affect monetary policy indirectly through its impact on the inflation forecast). This would also be the case if the reference index included OOH costs calculated using a methodology less sensitive to house price movements, as has been done in other several countries.

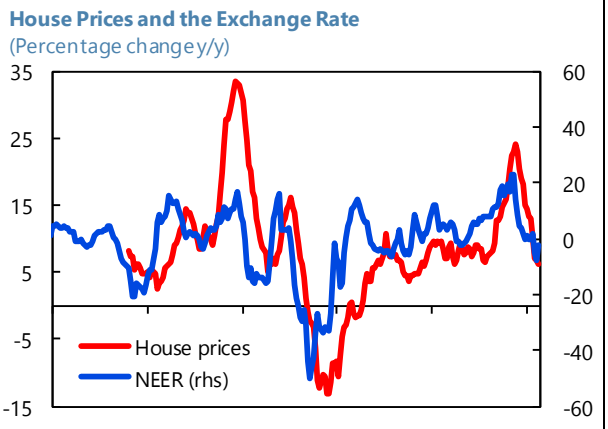
12. The only option that is both broad in measurement and strips out asset price effects is to adjust the technique used to calculate OOH costs. This could result in a more stable CPI for Iceland that is broadly representative of consumer spending.

E. Policy Implications

13. Any changes to Iceland's reference index could have implications for the conduct of monetary policy. The statistical properties of the new index could change materially, and therefore any adjustments should be considered carefully to ensure that the new index allows monetary policy to retain its countercyclical objective and effectiveness in affecting domestic demand.



Sources: Statistics Iceland; and IMF staff calculations.
1/ Rolling ratio of standard deviation to mean, 20 qtr. moving avg.



Sources: Statistics Iceland; and IMF staff calculations.

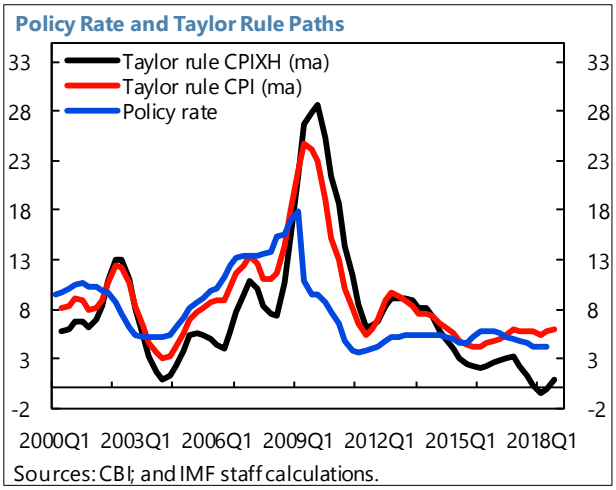
14. Inflation excluding housing has been more volatile than CPI inflation. A common argument for excluding housing prices from the inflation target is that they increase the volatility of the reference inflation index. This does not hold in Iceland, where housing prices have tended to move in tandem with the international value of the króna and exchange rate passthrough to inflation is high. Targeting a more volatile index such as the CPIXH would cause either more output volatility or more variable observed inflation, or both. More variable observed inflation may also raise uncertainty about future inflation.[4]

15. Absent other changes, lower sensitivity of CPI inflation to housing prices could lead to less countercyclical monetary policy. Some studies suggest the conduct of monetary policy since

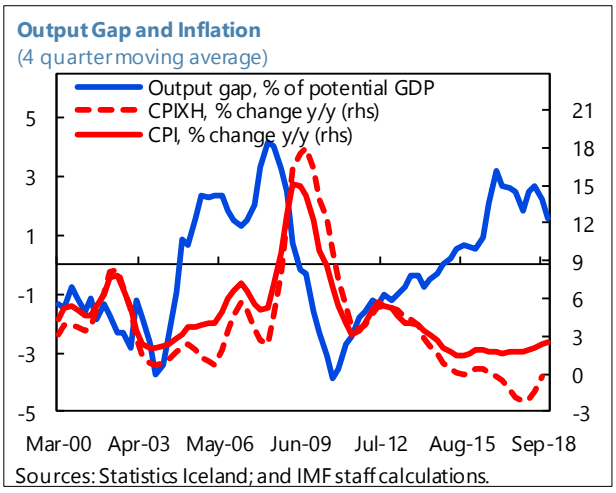
[4] This would be reflected in increased dispersion in the cross section of inflation expectations, and a higher term premium—see for instance Giordano and Soderlind (2003) and Mankiw, Reis and Wolfers (2004).

the adoption of inflation targeting in Iceland has been among the most countercyclical in advanced economies (McGettigan and others, 2013). CPIXH inflation was lower than CPI inflation during the boom preceding Iceland's banking crisis in 2008, and higher during the bust that followed. Targeting the CPIXH over this period would have called for a more expansionary monetary policy stance during the boom, and a tighter stance during the bust.

16. This reduction in countercyclicality can be illustrated by estimating the policy rate that would have prevailed had the CBI targeted CPIXH inflation in 2001–18. A simple Taylor rule, with coefficients of 1.5 and 0.5 on the inflation and output gaps, respectively, and a neutral real interest rate of 3 percent, fleshes out the counterfactual—although two caveats are in order. First, the exercise keeps the numerical inflation target unchanged. Second, the central bank's reaction function could change if the index used to target inflation changed. If either the numerical target changed—as was the case in other countries when the reference index was modified—or the central bank responded differently to the inflation outlook, the implications for the policy stance could be different from those suggested by this exercise.



17. Another effect could be a weaker relationship between inflation and the output gap. An important argument for inflation targeting is the expectation that policymakers can keep economic activity as close as possible to potential by focusing on keeping inflation stable (Blanchard and Gali, 2007). Iceland, as with other economies, can be subject to shocks that drive a wedge between inflation and the output gap—a recent example being when the rapid growth of tourism caused the króna to appreciate vigorously in 2014–16, pushing inflation down even as the output gap rose. Without the effect of rising housing prices in targeted CPI inflation, inflation would have been substantially lower; and keeping inflation close to target would have entailed larger fluctuations in economic activity.



18. The effectiveness of monetary policy transmission is also an important consideration. The impact of changes to the short-term policy rate on longer-term rates (e.g., those on residential mortgages) are an important transmission channel of monetary policy. The weaker the interest rate channel, the more the policy rate might need to change to achieve the same inflation objective.

Some have argued that weak monetary policy transmission is a particularly important issue in Iceland, and that this is linked to the high degree of indexation of mortgages (Honohan and Orphanides, 2018; and Gestsson, 2018). Others suggest otherwise (CBI, 2018).

19. The high degree of indexation also means changes to Iceland's CPI could have wider implications. Most household debt is indexed to CPI inflation, which feeds directly into the principal amount. A large share of nonfinancial corporate debt is also indexed. If changes to the CPI were pursued, these would thus have direct repercussions for households' and companies' debt service, which would need to be factored into the decision making.

F. Conclusions

20. Modifications to CPI measurement could address the challenges posed by the current approach, while continuing to target CPI inflation. Adjusting the technique used to calculate OOH costs would ensure that the inflation target remains as broad as possible while refocusing it away from asset price movements. There are various options on how to do this. One is to modify Iceland's user-cost methodology to minimize the impact of short-term movements in house prices, as Canada and Sweden do. Another is to switch to the rental-equivalence approach. Given the high share of homeownership, Iceland's rental market has typically been seen as too small to support this method (Gudnason, 2004; and Gudnason, 2005). But recent developments might warrant a second look. New "big data" techniques, for example, could help overcome this problem by harnessing information from rental web listings.[5] Even the acquisitions approach need not be ruled out.

21. Any changes should be considered carefully as they could have monetary policy implications. Monetary policy would be influenced by the statistical properties of the new reference index, and it is important that any changes preserve desirable qualities, such as countercyclicality. If changes were made, it would be important that they be well communicated to the public, to preserve the credibility and accountability of Iceland's inflation targeting framework.

[5] Data on rental listings can be used through hedonic indices (IMF, 2018; and Shimizu, Nishimura, and Watanabe, 2009).

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