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Sanitary and Phytosanitary approval procedures: Key issues, their impact on trade and ways to address them

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This paper was prepared by Edith Laget and Annelies Deuss. The first two sections are based on the preliminary version of this report written by Tom Baragwanath (external consultant). The authors are grateful for the contributions of Federica Maggi (external consultant) to Section 3.1. The report has greatly benefited from expert input from Silvia Sorescu, Ellie Avery, Lee Ann Jackson (OECD), Camille Fléchet, Arti Gobind Daswani, Marlynne Hopper, Christiane Wolff (WTO), Shane Sela (World Bank), and Gianluca Orefice (CEPII). The authors wish to thank country representatives and the professionals from national SPS agencies who helped complete the survey.

This paper forms part of the work mandated under Expected Output Result 3.2.2.3.1 "Enhancing predictable markets for agro food products" of the 2021-22 PWB of the CoAg. Specifically, this report contributes to the stream of work that examines the policy implications of Sanitary and Phytosanitary (SPS) measures implemented by countries in the face of changing environmental conditions, pests and diseases, and technologies.

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Key messages

What are the issues?

- Approval procedures are a critical component of Sanitary and Phytosanitary (SPS) systems as they check and ensure the safe movement of animals, plants and food between markets.
- However, approval procedures can create significant costs and act as non-tariff barriers to trade if they are administered poorly.
- This report focuses on the seven most pressing issues related to approval procedures and examines how they can affect international agro-food trade and the actions countries are undertaking to address these issues.
- These issues are: i) undue delay; ii) inconsistency and discrimination between domestic and imported products; iii) lack of transparency; iv) excessive information-gathering and administrative requirements; v) excessive fees; vi) lack of trust in country or product equivalence; and vii) the application of approval procedure requirements in excess of objective scientific risk assessment.

What did we learn?

- Only few Preferential Trade Agreements cover concrete commitments to tackle the most pressing issues related to approval procedures.
- The analysis of the Specific Trade Concerns (STCs) raised on a voluntary basis by Members in the context of the WTO SPS Committee shows the growing prevalence and systemic nature of concerns regarding approval procedures: 63% of the STCs raised in 2021 are linked to approval procedures.
- Results of a structural gravity model show that non-tariff barriers related to approval procedures as identified by the existence of a corresponding STC reduces trade by 26% whereas other types of issues raised in STCs reduce trade by 12% on average. Furthermore, the estimated coefficients vary across sectors, demonstrating the importance of considering the differentiated effects of approval procedures across sectors when designing SPS measures. While raising STCs is not compulsory for WTO Members, the gravity estimates provide a lower bound for the overall impact of non-tariff barriers caused by approval procedures on observed trade.
- Responses to the OECD survey on countries' administration of approval procedures indicate that "undue delay" is the most frequent issue and is mentioned in 68% of the case studies. The case studies confirm the relevance of electronic certification and highlight the role of emerging solutions such as remote audit in creating efficiencies in SPS systems.

Further considerations

- The challenges and opportunities associated with approval procedures are closely intertwined but in-country positive experiences show that there exists a menu of solutions to simultaneously tackle several approval procedures issues and help national SPS authorities meet their WTO obligations.
- The report reaffirms the fundamental role played by the WTO SPS Agreement and guidance provided by the standards setting organisations and supports the need to analyse the full spectrum of opportunities provided by the digitalisation of SPS systems.

Executive Summary

Sanitary and phytosanitary (SPS) measures have taken on an increasingly central role within global agro-food trade. This is a result of the increasing volume of international agro-food trade, the growing complexity of regulations impacting this trade, and the high degree of interconnectedness among country approaches to the management of the risks to plant, human, and animal health.

Approval procedures are a critical component of SPS systems as they check and ensure the safe movement of animals, plants and food between markets. The WTO Agreement on the Application of SPS Measures (SPS Agreement) sets the basic rules for SPS measures that affect trade, including approval procedures, to prevent them from being used for protectionist purposes. When functioning well, approval procedures uphold countries' commitments to facilitate safe trade. However, when approval procedures are administered poorly, they can create significant costs for businesses and act as non-tariff barriers to trade.

This report takes stock of the most pressing issues related to approval procedures and examines how they can affect international trade. The overall analysis focuses on seven specific issues relating to countries' administration of approval procedures in a manner that is inconsistent with the SPS Agreement. These issues are: i) undue delay; ii) inconsistency and discrimination between domestic and imported products; iii) lack of transparency; iv) excessive information-gathering and administrative requirements; v) excessive fees; vi) lack of trust in country or product equivalence; and vii) the application of approval procedure requirements in excess of objective scientific risk assessment.

The focus on these seven specific issues was key to disentangle the effects of approval procedures from those of other SPS measures. The detailed analysis developed in this report goes beyond the aggregate approaches that are usually found in the empirical literature studying Non-Tariff Measures (NTMs).

Every country is responsible for implementing its own distinct approval procedure requirements, but when countries trade, they are also dependent on their trading partner's approaches to approval procedures. The report therefore first examines whether and how Preferential Trade Agreements (PTAs) include arrangements on SPS approval procedures. The analysis finds that, even though PTAs cover the broad topics of transparency and cooperation, they still lack concrete commitments to tackle undue delay, excessive fees, lack of transparency or trust in equivalence based on the principle of appropriate level of protection.

The report then takes a balanced approach to quantitatively analyse the impact of approval procedures on trade. This balanced approach consists in first addressing the negative aspects by analysing Specific Trade Concerns (STCs) raised by Members in the context of the SPS Committee that are directly related to approval procedures in agro-food trade. After examining the occurrence, keywords and trade covered by STCs, it uses a gravity model to estimate the trade costs of non-tariff barriers related to approval procedures identified by the existence of STCs. While raising STCs is not compulsory for WTO Members, the gravity estimates provide a lower bound for the overall impact of non-tariff barriers caused by approval procedures on observed trade. In the second part, the analysis highlights positive developments through the evaluation of the responses to the OECD survey that collected countries' positive experiences in addressing one or more of the seven issues of interest.

Key findings of the STC analysis are:

- The share of STCs related to approval procedures has been consistently high over time, representing on average 35% of the new records of concerns raised each year since 1995. In 2020 and 2021, this share increased to 75% and 63%, respectively, indicating a growing importance of approval procedures for exporting countries, which was also confirmed by the steady increase in trade covered by such STCs.
- More than 75% of Members raising or supporting STCs related to approval procedures are high income and more than 80% of Members receiving them are high and upper-middle income.
- Network analysis of the characteristics describing STCs confirms that the selection of the seven issues is not only relevant in the context of approval procedures but also central to overall SPS systems, as approval procedure related concerns are closely intertwined with topics related to harmonisation, risk assessment or regionalisation. The systemic nature of concerns related to approval procedures highlights that solving their burden may have positive spill-over effects on all other SPS issues.

Results of the structural gravity model show:

- The existence of an STC related to approval procedures is associated with a trade reduction of 26% whereas other types of STCs are associated with a 12% trade reduction.
- The trade impacts of STCs differ by sector. Concerns related to approval procedures matter most for food products with an estimated 80% reduction in trade in food products, whereas they do not have a significant impact on animals and plants products. Conversely, other types of concerns reduce trade in animals and animal products by 20% and trade in plants and plant products by 28%. This product level analysis demonstrates the importance to consider the differentiated effects of approval procedures across sectors when designing SPS measures.

Key insights from the OECD survey are:

- The responses indicate that “undue delay” is the most frequent issue mentioned in 68% of the case studies, followed by “lack of transparency” (29%).
- The principal actions undertaken to improve SPS approval procedures aimed at simplifying SPS measures (42% of actions undertaken) and implementing digital solutions (39%). 29% made greater use of international standards, and the same percentage aimed to improve coordination between SPS agencies and other border agencies.
- The case studies confirm the relevance of electronic certification in creating efficiencies in SPS systems and enhancing agro-food trade. Emerging solutions such as remote audit also provided good examples of initiatives taken by countries despite the lack of intergovernmental regulations.
- The survey responses showed that a menu of solutions exists to simultaneously tackle several approval procedures issues and help national SPS authorities meet their WTO obligations.

In conclusion, the analysis of STCs and in-country positive experiences both shed light on the intertwined nature of approval procedures’ challenges and opportunities. The report reaffirms the fundamental role played by the SPS Agreement and guidance provided by the World Organisation for Animal Health (WOAH), International Plant Protection

Convention (IPPC) and Codex Alimentarius Commission (Codex) and supports the need to analyse the full spectrum of opportunities provided by the digitalisation of SPS systems.

1. Introduction and motivation

1. Sanitary and phytosanitary (SPS) measures[1] have taken on an increasingly central role within global agro-food trade. This is a result of the increasing volume of international agro-food trade, the growing complexity of regulations impacting this trade, and the high degree of interconnectedness among country approaches to the management of the risks to plant, human, and animal health (OECD, 2020[1]). The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement" which entered into force with the establishment of the WTO on 1 January 1995) acknowledges the importance of managing risks to human, animal, and plant health, while setting the basic rules to prevent SPS measures from being used for protectionist purposes. It also encourages the use of international standards, as set by the three international standard-setting bodies ("three sisters"): the World Organisation for Animal Health (WOAH founded as OIE), the International Plant Protection Convention (IPPC) and the Codex Alimentarius Commission (Codex) to ensure that measures are science-based and that associated transaction costs imposed on imported products are not higher than the actual costs of procedures.

2. Approval procedures are a critical component of SPS systems. According to Annex C of the SPS Agreement, control, inspection and approval procedures refer to any procedure to check and ensure the fulfilment of SPS measures (WTO, 1995[2]). This comprises a wide-ranging set of measures, encompassing activities from pre-export health checks through to consignment documentation verification and product sampling upon arrival in the importing country. The nature, extent, and execution of control, inspection and approval procedures (hereafter referred to as 'approval procedures') has a significant impact on the trade of goods between countries. Efficient approval procedures are also particularly important for the ability of the global trading community to manage shifts in international trading relationships.

3. SPS approval procedures are key tools through which countries ensure the safe movement of animals, plants, and food between markets. They help manage the safety of food and the inherent risk of the spread of pests and diseases to protect human, plant and animal life or health (WTO, 2019[3]). When administered consistently with the obligations outlined within the SPS Agreement, approval procedures uphold country commitments to manage risks to human, animal, and plant health while balancing these commitments against the need for unencumbered trade. When administered in a manner inconsistent with these obligations, approval procedures can create delays and significant additional costs for businesses, and can function as non-tariff barriers to trade ((APEC Business Advisory Council, 2016[4]); (STDF, 2014[5])).

4. The WTO Trade Facilitation Agreement (TFA), which came into force in 2017, aims at expediting the movement, release and clearance of goods and reducing transaction

[1] As defined by Annex A of the SPS Agreement, SPS measures are measures applied to protect human, animal, and plant life or health, or the territory of a WTO member against certain SPS risks. SPS measures include "laws, decrees, regulations, requirements and procedures including, *inter alia*, end product criteria; processes and production methods; testing, inspection, certification and approval procedures; quarantine treatments including relevant requirements associated with the transport of animal or plants, or with the material necessary for the survival during transport; provisions on the relevant statistical methods, sampling procedures and methods of risk assessment; and packaging and labelling requirements directly related to food safety."

costs in trade. While the TFA is relevant for all border agencies, including SPS management authorities, it does not preclude Members' right to take measures to protect human, animal and plant health (WTO, 2014[6]). The TFA's focus on bureaucratic delays and red tape further emphasises the importance of addressing the unintended costs associated with approval procedures implemented in a manner inconsistent with the SPS Agreement.

5. Country responses to disruptions caused by socio-political events, climate change or global health emergencies can have significant impacts on supply chain resilience (Box 1.1), so ensuring transparent and risk-proportionate approval procedures is critical (OECD, 2020[1]). Countries have the right to design and implement SPS measures, but also have the obligation to ensure predictable and non-discriminatory approval procedures, as these contribute to a more accessible, equitable, and functional trading system. To progress the global economic recovery from the COVID-19 pandemic, countries must make it a priority to reduce unnecessary costs and barriers to trade, including the costs and barriers associated with approval procedures (CEPS, 2021[7]).

6. Global business surveys have noted a growing frustration with the increasing complexity and burdensome nature of trade regulations, in particular by small and medium-sized businesses (SMEs), which are more vulnerable to unexpected delays and increases in trade costs (APEC Business Advisory Council, 2016[4]; International Trade Centre, 2016[8]; OECD, 2019[9]). Moreover, despite continued improvements in the trade facilitation environment across economies at all levels of development, the trade costs associated with perishable and time sensitive agro-food products remain higher than the costs associated with manufactured goods (OECD, 2020[10]) that may be subject to fewer inspection procedures. Approval procedures that are administered inconsistently with the requirements of the SPS Agreement are a key contributing factor to these costs. Analyses based on the World Bank Logistics Performance Index have repeatedly identified that supply chain performance is constrained by SPS border agencies, which in many countries may be undermining progress made by other border agencies that have been faster to automate and streamline procedures (Arvis et al., 2018[11]).

7. This report takes stock of the most pressing issues related to approval procedures and examines how they can affect international trade. The analysis is timely given the growing importance of these procedures to the ability of the global community to ensure the reliable and safe supply of plant, animal and food products. In particular, it provides a detailed and comprehensive view of the areas where gaps remain between countries' administration of approval procedures and the obligations set by the SPS Agreement.[2] The objective of the analysis is twofold: first, to allow policy makers to better understand the effects of approval procedures on international trade in agro-food products; and second, to offer insights into how to improve these procedures to build a resilient trading system.

8. The analysis is organised as follows. Section 2 provides an overview of the different regulations and guidelines relevant to the administration of approval procedures, examines seven key issues and challenges relating to the administration of approval procedures, and analyses countries' relevant plurilateral commitments in Preferential Trade Agreements (PTAs). Section 3 assesses the prevalence of the identified seven issues and is informed by two sources of information. It first examines the Specific Trade Concerns raised within the WTO Committee on Sanitary and Phytosanitary Measures (SPS Committee) that are directly related to approval procedures. It then presents the results of the OECD survey on approval procedures that collects positive experiences from countries' SPS competent

[2] This report is not intended to evaluate the legal conformity of countries' administration of approval procedures.

authorities describing new or updated measures that aim to improve performance under some of the seven issues. This quantitative section is complemented with a gravity analysis to evaluate the impact on trade of approval procedures implemented by importing countries in a manner perceived as being inconsistent by their exporting counterparts with the SPS Agreement. The final Section 4 of the report highlights the key findings related to the different approval procedures issues, in particular how these issues are linked to each other and how they can be remedied and proposes practical policy recommendations to move forward.

Box 1.1. Approval procedures and the COVID-19 pandemic

The COVID-19 pandemic has given rise to an unprecedented health crisis and caused significant trade disruption, contributing to a decrease in global trade in goods of 8.1% in 2020, and a 3.4% decline in world real GDP (OECD, 2022[12]). In this context, transparent and predictable systems for trade (including approval procedure regulations) are critical to maintaining trade, avoiding negative economic impacts, and protecting human health and livelihoods (FAO, 2020[13]). This ongoing global crisis is a reminder of the interconnectedness of the global economy and of the importance of country co-operation in responding proactively to such crises (OECD, 2020[1]). In the context of economic recovery, efforts to reduce unnecessary trade costs and barriers to trade – including unnecessary approval procedure requirements – are of paramount importance (CEPS, 2021[7]).

Several of the policies implemented to contain the spread of COVID-19 resulted in unprecedented stresses on food supply chains, with challenges for border controls, transport, and logistics (Moïsé and Sorescu, 2021[14]). At the same time, a number of WTO Members have made temporary and emergency changes in response to the pandemic, including streamlining approval procedures, introducing new requirements to address risks in trade of animals and relaxing technical regulations in the trade of food. More precisely, there were 453 notifications by WTO Members related to the COVID-19 pandemic as of March 2022, of which 122 concerned SPS measures (WTO, 2022[15]). COVID-19 SPS relief measures notably included shifting to remote or electronic procedures, such as remote inspection or electronic certificates (see WTO (2020[16]) and Section 3).

According to the obligations set up by the SPS Agreement, WTO Members shall base their SPS measures on international standards, guidelines, and recommendations developed by Codex, OIE, and the IPPC, and this is crucial for a coherent, organised, and effective pandemic response on behalf of the global community. The pandemic has highlighted the importance of clear and prompt communication in relation to approval procedures. Several governments have listed their COVID-19 measures in online platforms for regulators and businesses (OECD, 2020[1]).

However, many countries' initial policy responses to the pandemic were not coordinated internationally, and exposed weaknesses in regulatory co-operation between countries in response to global crises. While these responses can be justified by different national realities and divergent approaches to crisis management, differences in regulatory approaches may also stem from inadequate consideration of the international environment. As such, they can result in ineffective policy interventions, delays in access to (and even shortages of) essential goods, and losses in administrative efficiencies (OECD, 2020[1]).

The COVID-19 pandemic also demonstrates the case for shifting to digital tools (such as SPS e-certification) in administering approval procedures. While many countries are taking these steps, some of these measures are temporary in nature and include sunset

clauses to ensure that they remain in effect only for the duration of the pandemic (OECD, 2021[17]).

2. Key issues and recent developments in approval procedures

2.1. Intergovernmental obligations and guidelines

9. There is no precise definition for approval procedures as their scope covers a broad array of measures and processes. In Annex C of the SPS Agreement, the term "control, inspection, and approval procedures" includes *inter alia* procedures for sampling, testing and certification. Article 8 of the SPS Agreement specifies that such procedures encompass national systems for approving the use of additives or for establishing tolerances for contaminants in foods, beverages or feedstuffs, which include but are not limited to:

- point of entry inspections (including physical inspections for signs of pest infestation or contamination)
- audit or inspection of exporting inspection systems
- procedures for the veterinary inspection of live animals for contagious disease
- testing consignments of plant products for compliance with maximum residue levels (MRLs) set by countries
- the inspection, storage, and verification of documentation confirming compliance with SPS measures such as quarantine, shipment origin, or any other requirements or stipulation imposed by a country or regional economic body, and
- pre-market product approvals conducted in advance of the arrival of a shipment or consignment of goods in an importing country.

10. Approval procedures are designed to facilitate compliance with SPS measures, yet under the definition of Annex A(1) of the SPS Agreement, SPS measures include both substantive requirements *and* the procedures designed to check compliance with these requirements (WTO, 1998[18]). Moreover, Annex C holds that ancillary or dependent procedures designed to check compliance with an approval procedure (for example, risk assessment procedures associated with pest fumigation requirements for fresh food products) are themselves considered approval procedures for the purposes of the SPS Agreement, and are therefore required to comply with its core obligations (WTO, 2020[19]).

11. Approval procedures are critical components of SPS systems and are independently designed and maintained by countries. However, WTO Members must abide by the obligations set out by the SPS Agreement to prevent trade distortions (see Box 2.1 for a summary of the most relevant parts that apply to approval procedures, readers interested in the complete rights and obligations package of the SPS Agreement are invited to consult the official text). As noted above, the SPS Agreement explicitly recognises three standard-setting bodies (the 'three sisters'): the Codex Alimentarius Commission for food safety, the WOAH for animal health and zoonoses, and the IPPC for plant health, which are responsible for developing standards, guidelines, and recommendations for WTO Members to harmonise their systems (WTO, 2020[20]).

12. Every four years, WTO Members evaluate the operation and implementation of the SPS Agreement. In June 2020, the WTO SPS Committee adopted the Report of the Fifth Review of the Operation and Implementation of the SPS Agreement (hereafter referred to

as "The Fifth Review"), which contains various recommendations on topics proposed by WTO members and provides an overview of the work undertaken by the SPS Committee during the 2014 to 2019 review period. This report notably reflected an ongoing focus on country administration of approval procedures, including (WTO, 2020[20]):

- avoiding undue delays and maintaining transparency of key information
- the use of risk-based scientific assessment, including the need for continued discussions on the topic of risk and management of situations involving insufficient scientific evidence
- enhanced assistance for, and cooperation with, developing countries
- the importance to notify agreements reached on the recognition of equivalence between regulatory systems approaches for approval procedures, and to continue related discussions and information exchanges
- the importance of regionalisation (i.e. the concept where an area, whether all of a country, part of a country, or all or parts of several countries, is identified as pest or disease-free or with low pest or disease prevalence and therefore requires to adapt measures to the SPS characteristics of the area) to support the safe trade of agricultural products, and the need to respond to regionalisation requests in a timely manner without creating unnecessary requests for information
- the need for further discussions to enable a more productive maximum residue levels MRL system for plant protection products, including greater transparency and predictability on MRLs through notification of proposed MRL changes.

13. Additionally, a key component of the Fifth Review was Members' acknowledgement of the need to share experiences and information on the recognition of equivalence, including on systems approach of approval procedures. A thematic session on equivalence was held in this context. Members reaffirmed the importance of equivalence as a trade-facilitating tool, highlighted the role of the appropriate level of protection as the driving principle to assess alternative processes and methods. Members stressed that the obligations set out by Article 4 of the SPS Agreements and guidance from the three sisters shall be followed in the process from recognition of equivalence of individual measures, groups of measures, or entire control systems.

14. The Fifth Review also resulted in the development and strengthening of regionalisation frameworks, as well as the procedures and processes for requesting recognition of pest- or disease-free areas and/or recognising regional conditions. The recommendations resulting from this review highlighted the work of the WOAH and IPPC on regionalisation and welcomed additional information and activities from these organisations to improve the understanding and implementation of WOAH and IPPC standards (WTO, 2019[21]).

15. The trends and issues identified in the Fifth Review provide a good overview of Member priorities and preferences in relation to approval procedures. Recognising the importance of well-functioning approval procedures, WTO Members agreed to create a working group under the auspices of the WTO SPS Committee to further examine issues and opportunities for cooperation (WTO, 2020[20]; WTO, 2019[21]).

Box 2.1. Relevant multilateral rules: The WTO SPS and Trade Facilitation Agreements

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) is a legally binding multilateral agreement that aims to facilitate safe trade in agricultural and food products, while ensuring adequate SPS protection. It recognises the right of Members to set their own SPS measures according to their desired level of health protection as long as the development of such measures remain based on science and risk analysis. The agreement sets out obligations to prevent discrimination between countries where identical or similar conditions prevail and ensure that SPS measures do not results in unnecessary barriers to trade. The SPS Agreement is based on five core obligations:

(i) Harmonisation of SPS measures based on international standards, guidelines, or recommendations (Article 3), in particular those developed by the three sisters organisations

(ii) Equivalence of SPS measures applied by countries if they achieve the appropriate level of protection (Article 4)

(iii) Risk assessment and determination of appropriate SPS protections based on scientific evidence (Article 5)

(iv) Regionalisation: SPS measures shall be adapted to the SPS characteristics of the area – whether all of a country, part of a country, or all or parts of several countries – from which a product originated and to which it is destined (Article 6)

(v) Transparency: changes in SPS measures shall be notified to allow interested partners to become acquainted with them before their entry into force; SPS measures shall be published promptly and enquiry points shall be established to provide information on SPS regulations, controls, inspection procedures, risk assessment procedures, and membership and participation in international and regional SPS organisations and systems, as well as multilateral agreements and arrangements (Article 7 and Annex B).

By ensuring country and business compliance with SPS measures, approval procedures are a key step in facilitating the trade of agriculture and food products in a manner limiting the potential spread of human, animal, or plant diseases and pests, or risks to human health from unsafe foods. A transparent, fair, and risk-proportional approach to approval procedures is therefore crucial to maintaining a safe and productive international trade system (WTO, 2019[3]).

In addition to these obligations, the WTO Trade Facilitation Agreement (TFA), which entered into force in February 2017, also includes relevant Member country commitments, including the accessibility of information; transparency; risk proportionality; due process; and non-discrimination (WTO, 2014[22]). Specifically, Article 5 of the TFA outlines Member commitments to measures enhancing impartiality, non-discrimination, and transparency, including notifications for enhanced SPS controls and inspections, fair sampling and testing practices, disciplines on fees and charges imposed, and the release and clearance of goods (WTO, 2014[22]).

2.2. Key issues and challenges with administration of approval procedures

16. Actions inconsistent with the obligations set out by the WTO SPS and Trade Facilitation Agreements can lead to additional costs, uncertainty, and delays for trading

partners. There is an extensive literature studying the costs of SPS measures serving as disguised protectionism,[3] as governments may be lobbied to shield domestic producers from international competition. However, approval procedures that are unintentionally implemented in an inconsistent fashion or even just lacking transparency and efficiency can also create costs to traders.

17. Surveys of businesses report increasing complexity and the burdensome nature of food trade regulations, including approval procedures (APEC Business Advisory Council, 2016[4]). This is particularly relevant for small-to-medium-sized businesses (SMEs), which are more affected by unexpected delays or increases in costs. As SMEs operate at a smaller scale, the costs of complying with SPS requirements tend to represent a higher share of the value of their exports (OECD, 2019[9]), which implies that their participation in international trade remains limited relative to that of larger firms.

18. Just as there are multiple ways to characterise approval procedures, exporting countries may encounter many different issues in undergoing them. The current analysis focuses on the following seven specific issues, which are addressed by the requirements outlined in Annex C of the SPS Agreement. These issues were selected based on discussions with in-country SPS expert trade negotiators, as well as statements made during the WTO's thematic session on control, inspection, and approval procedures in November 2019 (OECD/WTO, 2019[23]):

- undue delay
- inconsistency and discrimination between domestic and imported products
- lack of transparency
- excessive information-gathering and administrative requirements
- excessive fees
- lack of trust in country or product equivalence
- the application of approval procedure requirements in excess of objective scientific risk assessment.

19. Equivalence in this context implies reaching a similar and comparable end-result, namely health outcome, without requiring sameness of methods or procedures. The principle of appropriate level of protection is therefore key in providing a benchmark against which alternative approval procedure approaches should be assessed.

20. Moreover, the issues of timing and undue delays; transparency; communication or information exchange; justification and discrimination of approval procedures; and the use of international standards in the application of approval procedures were all challenges raised for further work within the WTO SPS Committee working group on approval procedures (WTO, 2020[24]). The issue of undue delays was also raised by WTO Members as warranting specific attention during the Fifth Review (WTO, 2019[21]).

2.2.1. Undue delay

21. WTO Members must undertake and complete approval procedure without undue delay, as stated in Annex C(1)(a) of the SPS Agreement. Undue delay in the operation of approval procedures is one of the most longstanding issues with implementation of the SPS

[3] See, for example, (Disdier, Fontagné and Mimouni, 2008[55]; Fontagné et al.[51]; Cadot and Gourdon, 2014[76]).

Agreement. For instance, the prompt and timely movement of food between countries is a key consideration for businesses participating in international trade, especially in the case of fresh produce subject to a risk of spoiling (APEC Business Advisory Council, 2016[4]).

22. In practice, WTO guidance has held that for a delay to be considered undue it must involve an unjustifiable loss of time, or a period of time that is unwarranted, disproportionate, or excessive (WTO, 2019[3]; WTO, 2020[19]). The length of time taken to process an approval is not in itself indicative of whether a delay is considered undue. The panel in "*EC – Approval and Marketing of Biotech Products* (DS291)" held that a delay of two years in processing the approval of items produced via biotechnology had not been proven undue in the circumstances, as the Member involved required this time to determine with adequate confidence whether their SPS requirements were fulfilled (WTO, 2008[25]). However, the panel in *Indonesia – Chicken* (DS484) considered as undue a delay of 257 days in responding to a request for SPS approval due to pending non-SPS related information on halal slaughtering requirements in veterinary health certificates (WTO, 2019[26]).

23. Resource constraints and administrative gaps are the principal cause of undue delay. In practice, one competent government authority asks another competent authority or authorities for approval to export without a published or predetermined timeline. Typically, this approval involves officials progressing several administrative steps, including through bilateral discussions, agency visits, or elevating matters to more senior officials for bilateral discussions or in the form of written communication. The speed and efficiency with which these issues are progressed depends on available resources, governmental priorities, and trade relationship dynamics and geopolitical relationships.

24. Nevertheless, countries may intentionally apply a policy of delayed processing, or allow such delayed processing to occur, in order to create an indirect non-tariff barrier or domestic market protection mechanism.

2.2.2. Inconsistency and discrimination between domestic and imported products

25. Annex C(1)(a) also requires WTO Members to undertake and complete approval procedures that do not discriminate against like imported products. From a trade perspective, the commitment to non-discrimination is one of the most significant aspects of the SPS Agreement, especially the commitment to apply approval procedures in a consistent manner to like products regardless of their origin.[4] Deviating from this commitment can have significant impacts on trade costs, and can create uncertainty for business (Wood et al., 2017[27]).

26. Countries may find indirect ways to treat imported products in an inconsistent and discriminatory fashion. One example of a measure that is not based on scientific assessment is the application of restrictive product shelf-life requirements to imported food products, which creates a shorter window of opportunity for sale in comparison to domestically produced items.

27. Country statements suggest that importing partners may be finding indirect ways to treat imported products in an inconsistent and discriminatory fashion, including

[4] It should be noted that the main non-discrimination provision in the SPS Agreement relates to non-discrimination between countries where similar conditions prevail, and deals both with discrimination between different exporting WTO Members (Most-Favoured Nation principle) and discrimination between the importing WTO Member and other Members (National Treatment principle). In contrast, Annex C refers to non-discrimination between imported products and like domestic products.

maintaining measures that do not reflect the presence or absence of particular pests and/or diseases in exporting countries (Canadian Government, 2019[28]) (European Commission, 2019[29]; Van der Meer, 2014[30]; Rathbe, 2015[31]). Others face issues with discriminatory fees, sample selections, and other practices that make a distinction between domestic and imported products (Ministry of Agriculture and Forestry of the Republic of Türkiye, 2019[32]).

2.2.3. Lack of transparency

28. The transparency requirement is central to support dependable and predictable trade and is set out in Article 7, Annex B and Annex C(1)(b). In the context of approval procedures, transparency entails easy access to information on both domestic regulations and procedures that applicants shall follow to export. From the regulatory perspective, the SPS Agreement requires Members to engage in early notification of draft regulations and provide the opportunity for affected trading partners to comment on those regulations. The SPS Committee serves as a platform to notify and discuss SPS measures among Members.[5]

29. For approval procedures, the obligation of transparency under Annex C of the SPS Agreement consists of the following five elements (WTO, 2020[19]): i) the publication or communication to applicants of the processing period of each procedure; ii) the examination of the completeness of the documentation and the communication to applicants of deficiencies; iii) the transmission of results of the approval procedure; iv) the processing of applications which have deficiencies; and v) the provision of information about the stage of a procedure and the provision of an explanation of any delay.

30. The requirement for transparency applies not only to Member administration of specific approval procedure requirements, but also to the process by which each Member develops regulations to establish these requirements. For example, the 2012 *Recommendation of the Council on Regulatory Policy and Governance* (OECD, 2012[33]) highlights that this transparency is a key part of the broader open government principles and goes hand in hand with participation and stakeholder engagement in the regulatory process. This involves the requirement that all regulations can be easily accessed by the public.

31. Despite the difficulties faced by many national administrations in implementing transparent SPS systems, the Standards and Trade Development Facility (STDF) reports positive impacts of improved transparency in SPS procedures, including lower trade costs, greater predictability, and greater trade accessibility (Rathbe, 2015[31]; Van der Meer, 2014[30]).

[5] Several transparency initiatives were recently implemented on behalf of Members. These include: (i) eAgenda, whereby Members can add points to the SPS Committee agenda, raise and support specific trade concerns, and upload statements ahead of SPS Committee meetings; and (ii) the new ePing SPS&TBT Platform to serve as a one-stop-shop to allow users from the public and private sectors to search and follow-up on SPS and TBT notifications, register to receive alerts on notifications or products or markets of interest, search for STCs discussed in the SPS and TBT Committees, and check contact details for National Notification Authorities and Enquiry Points, and to allow National Notification Authorities to submit notifications online (eping.wto.org). Moreover, transparency was a key theme in the presentations made by the People's Republic of China (hereafter "China"), Ukraine, Canada, South Africa, the European Union, New Zealand, and Türkiye during the 2019 Thematic Session on Approval Procedures (WTO, 2019[75]).

2.2.4. Excessive information-gathering and administrative requirements

32. WTO Members must limit the information requirements to what is necessary and appropriate for the conduct of approval procedures as required by Annex C (1). However, many traders complain about the costs of the numerous administrative steps and the repetitiveness or sometimes irrelevance of information requested to export to certain Members, which is inconsistent with the guidance from the three sisters.

33. In practice, a national competent authority makes an official request on behalf of exporting businesses to the competent authority of a destination market for the approval to export agro-food products. Once this right to export has been granted, exporters typically must fulfil market access requirements that may include pre-export inspections, pre-clearance inspections, and port of entry inspections. Each one of these steps gives the importing country the opportunity to request the same information on multiple occasions. Furthermore, several government agencies may be involved in reviewing and approving documentation for a consignment of imported goods. Lack of co-ordination between agencies in the importing countries may result in inconsistent and divergent interpretations of information requirements, including multiple inspections and documentation reviews (STDF, 2013[34])

34. To help address the issue of excessive information requirements, Codex Alimentarius proposed a set of principles and guidelines[6] in 2016 to help standardise the exchange of information between importing and exporting countries to support the trade in food (Codex Alimentarius, 2016[35]). While these principles were adopted in 2016, issues remain, as countries are not always harmonising their practices with these international guidelines (USAID, 2019[36]).

2.2.5. Excessive fees

35. WTO Members are required by Annex C(1)(f) to charge equitable fees no higher than the actual cost of the approval procedures performed. However, some Members continue to levy excessive fees in various circumstances. Some importing countries require government officials from their competent authorities to travel to exporting countries to conduct in-persons inspections of establishments alongside the domestic government officials already required. These supply chain inspections may even occur between countries where national health and safety standards are equivalent. Other Members are charging for their consulates to approve physical certification as part of approval procedure requirements. These costs could be substantially reduced by recognising systems equivalence.

36. STDF regional studies reveal the consequences of financing difficulties of SPS authorities. For example, a 2014 study of SPS practices in Cambodia, Lao PDR, the

[6] The following principles should apply to the exchange of information and/or the associated assessment process: a) be between the relevant competent authorities of the exporting and importing countries; b) be appropriately transparent, structured, focused, interactive and timely; c) be in English or a language mutually agreed between the importing and exporting countries; d) in addition to other means, allow for and promote electronic transmission, including the ability to appropriately reference information already supplied or that may be readily available online; e) recognise existing experience, knowledge and confidence already gained or possible to extrapolate from assessments by other countries or international organisations; f) not require the submission of commercially sensitive information for specific food business operators unless essential to assess the public health objective, in which cases, it should be protected from inappropriate use or disclosure to other parties. The full details of principles, processes and information exchange content are provided in document CAC/GL 89-2016 (Codex Alimentarius, 2016[35])

Philippines, and Thailand demonstrated that a lack of adequate funding for SPS agencies can result in the use of SPS regulatory powers for para-fiscal purposes, which can have undesirable consequences for health protection, SPS Agreement compliance, and trade facilitation (Van der Meer, 2014[30]).

37. The increasing use of digital technologies within SPS systems (including approval procedures) may offer a way to improve the situation and reduce some of the costs imposed on trading partners. For example, the use of video calls and videoconferencing technology, remote establishment inspection via drones, and the switch to electronic SPS certification, may offer countries the chance to speed up administrative processes and therefore reduce the costs charged to exporting businesses to recoup expenses (OECD, 2021[17]).

2.2.6. Lack of trust in country or product equivalence

38. Article 4 of the SPS Agreement requires that WTO Members recognise the SPS measures of other Members as equivalent if the exporting Member objectively demonstrates to the importing Member that its measures achieve an appropriate level of sanitary and phytosanitary protection. The SPS Committee's Decision on Equivalence (WTO, 2001[37]) outlines concrete options for Members as to how to deal with Article 4's equivalence provision. Recognition of equivalence should allow countries to avoid the unnecessary cost to meet additional approval procedure requirements to import goods.

39. In practice, however, importing countries appear to avoid recognising approval procedure systems (or specific steps) as equivalent, and expect exporting countries to fulfil prescriptive requirements that replicate their own systems, instead of taking an outcomes-based view of risk management. Additional requirements are even applied in cases where health and safety standards in place in the country of origin are more stringent than those of the importing country.

40. Annex C requires relevant international standards to be used as the basis for access pending a determination otherwise, meaning Members should ideally take a system-wide view of the relevant approval procedures active in an exporting country and decide whether these policies manage risks to ensure the safety of products for consumers and markets. However, research suggests countries are setting a default position of maximum restriction and zero risk in the absence of a full and comprehensive assessment of the appropriate level of protection (ALOP) for each country and product (APEC Business Advisory Council, 2016[4]). Given how time-consuming this process of ALOP determination can be, this means exporting businesses may face significantly higher transaction costs than necessary. This also suggests Members are not complying with international standards set by the three sisters, including Codex guidelines around recognising equivalence between food inspection and safety systems (Codex Alimentarius, 2016[35]), and are instead submitting the same products to multiple inspections of equal efficacy with little to no justification.

2.2.7. Application of approval procedure requirements in excess of objective scientific risk assessment

41. Article 5 of the SPS Agreement requires WTO Members to assess SPS risk and determine the appropriate level of protection based on scientific evidence. Measure 7.4 of the WTO TFA on Risk Management states that border agencies, including phytosanitary agencies, should concentrate their measures on high-risk consignments and expedite the release of low-risk goods. Moreover, increased global trade means that SPS border agencies are under growing pressure to manage increasing volumes of imports and exports, often with limited resources (Sela and Zandarski, 2020[38]). In these respects, border agency

cooperation (Article 8 of the WTO TFA) within and between Members is essential to support timely release and clearance of goods.

42. The majority of WTO Members are taking a more conservative approach within approval procedure systems. In some cases, WTO Members are alleged to be performing inspections far in excess of what is required to ensure compliance with risk-based approval procedures. This can include inspecting 100% of imports regardless of product origin; substantially damaging product packaging or the product itself during the inspection process; excluding entire lines of animal carcasses when a single carcass is selected for inspection; or charging fees for excessive sampling, which then gets passed on to importers or farmers. In other cases, countries appear to be requiring trading partners to regularly apply for pre-market approval, which is conditional on establishment inspections, even where relevant conditions have not changed (New Zealand Ministry for Primary Industries, 2019[39]).

43. Establishment inspections are used as a condition for import approval even where the food safety and animal health policies prevalent in the exporting country are more robust. These not only result in uncertainty for exporting businesses, but also contribute to additional costs at every step in the approval procedure process.

44. The application of requirements in excess of reasonable and scientific assessments of risk can give rise to asynchronous or misaligned approval. The costs resulting from this misalignment may then be passed on to the consumer, leading to distorting price effects.

2.3. Approval procedures in preferential trade agreements

45. Each country's administration of its approval procedures regulations and systems represents a balance between its pursuit of trade objectives and ensuring the safe movement of plant and animal products according to national policy standards and priorities (Phoku, 2019[40]). Trading partners are co-dependent to an extent in their approaches to approval procedures, as importing countries must rely on interfacing with the approval procedure systems established by exporting countries and vice versa.

46. Trading partners make arrangements for SPS measures – including approval procedures – through bilateral, plurilateral or multilateral trade agreements (WTO, 2020[41]). The inclusion of approval procedures within trade agreements allows countries to specify in further detail how principles such as acting in good faith, avoiding undue delay, and transparency will be implemented in practice. This also gives countries the opportunity to address trade-inhibiting aspects of approval procedures, and to recognise equivalent approval procedures within trade agreements.

47. In addition to the process provided by the SPS Agreement to effectively implement SPS measures, the inclusion of chapters dedicated to SPS systems in PTAs allows trading partners to reiterate their commitments taken at the WTO and to agree on specific institutional aspects, transparency, or integration approaches. Arrangements on approval procedures are often set out in these SPS chapters.

48. In this report, the term PTA stands for Preferential Trade Agreements and refers to all types of *reciprocal* trade agreements (regional trade agreements, free trade agreements and customs unions), both within and across regions. This definition differs from that of the WTO, which uses the term PTA for Preferential Trade Arrangements, which grant *unilateral* trade preferences. An example is the Generalized System of Preferences schemes, under which developed countries grant preferential tariffs to imports from developing countries. Moreover, the concept of "deep trade agreements" refers to PTAs that contain provisions aimed at deepening economic integration between trading partners.

The OECD has collaborated with the World Bank on its Deep Integration project, which aims at identifying the content of "Deep Trade Agreements".[7] The project defines Deep Trade Agreements as "reciprocal agreements between countries that cover not just trade but additional policy areas, such as international flows of investment and labour, and the protection of intellectual property rights and the environment, amongst others" (Mattoo, Rocha and Ruta, 2020[42]). The project also aims at understanding how these additional policy areas deepen economic integration between trading partners. The project was conducted into two phases. A first database released in 2017 documented the overall scope of PTAs and how the inclusion of a rather comprehensive set of 52 policy areas had evolved over time (Hofmann, Osnago and Ruta, 2017[43]). The second database, which is the one studied in this section, further explores the content of the 18 policy areas most frequently covered in PTAs and captures the detailed commitments that countries set up beyond trade (Mattoo, Rocha and Ruta, 2020[42]).

49. The OECD's contribution to the Deep Integration project consisted in mapping the content of 58 SPS-related disciplines across the entire set of PTAs notified to the WTO as of 2018, focusing on standards, risk assessments, and audits, controls and inspections. The methodology of the mapping is described in (Casalini and Stone, 2020[44]) and the complete list of disciplines, in the form of questions, is provided in Annex B. The 58 questions are organised under broad sections namely: I. Reference to the WTO SPS Agreement, II. Integration Approach (A. Standards, B. Risk Assessment, C. Audit/Control Inspections), III. Transparency requirements, IV. Institutions, V. Further Cooperation Among Members, VI. Mutual Recognition Agreements, and VII. Other provisions. The information recorded allows the development of indicators on the "depth" of trade agreements, assessment of the similarities between these arrangements, and benchmarking of countries' PTAs relative to their partners.

50. Countries' approaches to addressing SPS issues bilaterally or regionally varies greatly across PTAs. As analysed by (Casalini and Stone, 2020[44]) some agreements are deep, with entire chapters covering a comprehensive set of issues, while others are shallower with a simple one-line reference to the SPS Agreement. Of the 272 PTAs mapped for the dataset, 235 include SPS chapters, but half of those cover no more than six disciplines and hence are considered as shallow in relation to SPS matters. These shallow agreements mostly refer to the commitments already taken at the WTO or acknowledge equivalence to regional standards and reference to international standards.[8] This means that most of PTAs do not build preferential arrangements for SPS matters, including the most pressing issues. It is worth noting that the Deep Integration project does not treat the EU Treaty as a PTA, and is therefore excluded from the mapping. Any reference to EU-PTAs in what follows corresponds to PTAs signed between the European Union and third countries, which explains why coverage of SPS chapters is often much shallower than the SPS obligations enforced within the Union.

51. Considering the whole content of SPS chapters included in PTAs, the dataset ranks the Trans-Pacific Strategic Economic Partnership as the "deepest" agreement, which includes 32 disciplines related to SPS. Most of the 58 possible SPS-related disciplines (Annex B) are covered by the top 5% deepest PTAs, which include more than 25 disciplines

[7] The Deep Integration project is the result of collaboration among the World Bank, the OECD, the International Trade Centre (ITC), the WTO, and experts from academic institutions.

[8] The five disciplines that are most frequently included in shallow PTAs are: "Is there an SPS chapter or provision?"; "Does the Agreement refer to the WTO SPS Agreement?"; "Does the Agreement us e the same rules as the SPS Agreement?"; "Is there a provision on exchange of information?"; "Is the creation of concerted/regional standards referenced?".

on average. The "deepest" PTAs also tend to be negotiated by OECD countries among themselves or with third countries. Control and inspection matters are included less often than transparency requirements (with provisions on exchange of information) or institutional arrangements (with the creation of an SPS committee, working group or enquiry points).

52. The SPS mapping dedicates a total of 10 questions to characterise commitments taken on the integration approach related to "Audit/Control Inspections" (Annex B). These ten questions do not exactly match the seven issues outlined in the previous Section 2.2 but some connections can be drawn. For instance, the question "Is mutual recognition in force?" may connect to the issue of *trust in country or product equivalence*. The questions "Are there provisions for pre-certification processes for exporting firms?" and "Are there provisions for advance rulings?" may connect to the issue of *undue delay*. Table 2.1 reports the number of PTAs that cover each specific question related to "Audit/Control Inspections", and organises countings by countries or group of countries involved in the PTAs. The vertical entries refering to single countries are not mutually exclusive. For instance, Canada, the United States, and Mexico have signed respectively 11, 14 and 15 PTAs among those mapped in the dataset as of 2018, but the North America Free Trade Agreement (NAFTA)[9] is counted in each column.

53. The counting exercise presented in Table 2.1 shows that out of the 163 PTAs signed by at least one OECD country and which have an SPS chapter, only 30 include a "provision on control and inspection" (18%). This ratio is smaller than the coverage of control and inspection in PTAs signed by non-OECD members (27%). However, 14% of any PTAs including an SPS chapter (PTAs signed by OECD or non-OECD members) express the "right to audit the exporting party's competent authorities, inspection systems, or production procedure".

54. At the country level, Latin American countries of the OECD participate in PTAs that often include disciplines related to controls and inspection. In particular, Chile, Mexico, Colombia, along with New Zealand, are countries most frequently involved in PTAs granting the right to audit the exporting party's competent authorities, inspection systems and production procedures. New Zealand, Chile, Switzerland, the United States and Colombia are the only OECD countries that negotiate PTAs with provisions related to pre-certification processes.

[9] NAFTA was replaced by the United States-Mexico-Canada Agreement (USMCA) that entered into force on 1 July 2020. The new agreement is not mapped in the version of the deep integration dataset used for this present report.

Table 2.1. Mapping of Audit/Control Inspections in PTAs

	All members	PTA involving at least one OECD member	PTA not involving any OECD country	Japan	European Union	Korea	New Zealand	Chile	Costa Rica	Australia	Iceland	Israel	Norway	Switzerland	Türkiye	Canada	United States	Mexico	Colombia
Number of PTAs mapped in SPS database:	272	178	94	16	18	18	12	23	10	13	24	6	24	25	19	11	14	15	12
Number of PTAs including an SPS chapter	235	163	70	15	11	17	12	21	10	12	24	5	24	25	19	11	13	13	10
Is there a provision on control and inspection?	49	30	19	2	1	1	4	9	6	4	1	0	1	1	0	2	2	8	7
Are there provisions for pre-certification processes for exporting firms?	12	6	6	0	0	0	2	1	0	0	0	0	0	1	0	0	3	0	1
Are there provisions for advance rulings?	2	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Is mutual recognition in force?	8	7	1	0	0	0	1	2	0	1	0	0	0	0	0	1	0	0	0
Does the importing party have the right to audit the exporting party's competent authorities, inspection systems, or production procedure?	33	23	10	1	0	3	5	7	1	2	0	0	0	1	0	1	1	5	4
Is the burden of justifying non-equivalence on the importing country?	3	1	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Is the participation of interested parties referenced?	3	3	0	1	1	0	1	2	0	1	1	0	1	0	0	0	0	1	0
Are there specified existing standards to which countries shall harmonise?	6	3	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Is the use or creation of regional standards promoted?	18	6	6	1	0	0	1	5	2	1	0	0	0	0	0	0	0	2	1
Is the use of international standards promoted?	12	9	9	0	0	0	0	3	3	0	0	0	0	0	1	0	0	1	1

Note: The dataset covers PTAs notified to the WTO as of 2018. Statistics represent the number of PTAs that include each discipline appearing in the horizontal entry given the countries or group of countries indicated in the vertical entry and should be read as: out of the 163 PTAs negotiated by at least one OECD country and having an SPS chapter, 30 include a provision on control and inspection. Zeros indicate that a provision is never addressed in the PTAs negotiated by a given country.
Source: Mattoo, Rocha and Ruta (2020[42]).

55. Analysis of the content of SPS chapters in PTAs highlights the fact that, despite covering the broad topics of transparency and cooperation among members, concrete commitments are still lacking in PTAs and disciplines that would help resolve issues related undue delay (such as "Is there a specified minimum time period for comments?"), excessive fees ("Is there a provision on technical assistance"), application of approval procedure requirements in excess of objective scientific risk assessment ("Is testing data to be made available?") or lack of transparency ("Is there a duty to translate the document in the language of the other party(ies)?") remain rarely included (Table 2.2).

Table 2.2. Mapping of PTA disciplines facilitating approval procedures

	PTA involving at least one OECD country	PTA not involving any OECD country
Number of PTAs mapped in SPS database	178	94
Transparency Requirements		
Is there a provision on electronic publication?	15	3
Is there a duty to translate the document in the language of the other party(ies)?	3	2
Is there a specified minimum time period for comments?	16	9
Further cooperation among members		
Is there a provision on technical assistance?	34	10
Other provisions		
Is testing data to be made available?	6	2
Is there a provision on certifications?	13	5

Note: The dataset covers PTAs notified to the WTO as of 2018.
Source: Mattoo, Rocha and Ruta (2020[42]).

56. While these agreements outline a high-level commitment to trade principles of market access, including relating to approval procedures, the practical details are typically considered in official level working groups, committees, or similar administrative mechanisms established under the PTAs. These administrative mechanisms are typically not made public. For example, Article 9 of the EU-MERCOSUR[10] trade agreement states that an exporting party may request a determination of equivalence regarding a specific SPS measure or measures, but states that the actual determination of equivalence should be considered by the relevant parties in accordance with provisions, recommendations, and procedures established by a dedicated subcommittee in line with relevant guidelines, standards, and recommendations (EU, 2019[45]). The report commissioned by the European Parliament's Committee on Agriculture and Rural Development to assess the regulatory rapprochement of the European Union at the international level (Zezza et al., 2018[46]) argues that "scientific cooperation, collaboration between risk assessment bodies, harmonisation of control procedures and early warning systems for emerging hazards can facilitate progress in this direction, reducing transaction costs and information asymmetries in agri-food trade."

[10] The EU-MERCOSUR PTA is not yet in force and has not been notified to the WTO and hence is not part of the SPS mapping.

3. Quantitative analysis of issues related to approval procedures

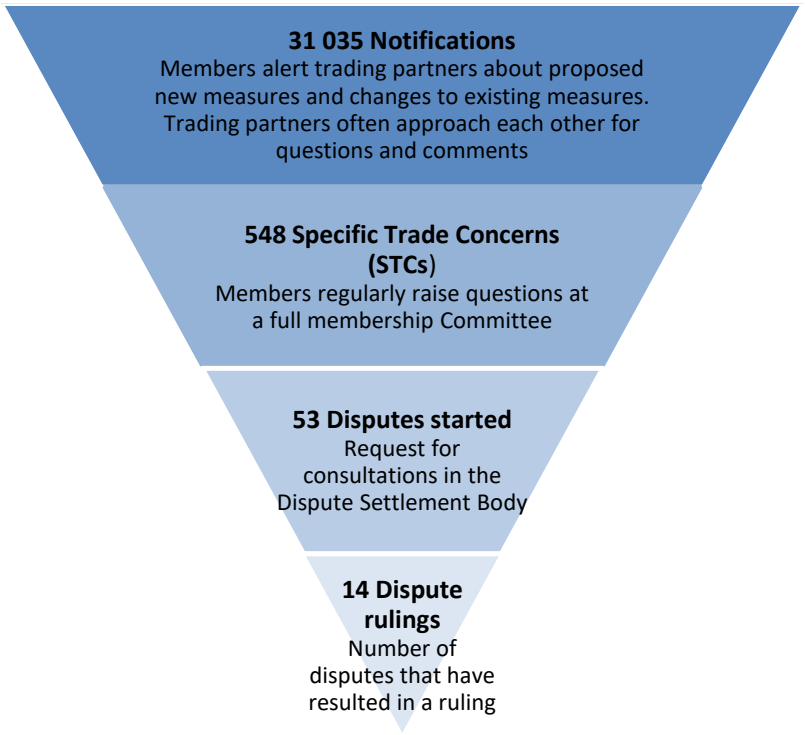
57. This section takes a balanced approach to analyse the impact of approval procedures by examining problems associated with the most prevalent issues and solutions to address them. It first focuses on the negative aspects by analysing Specific Trade Concerns (STCs) raised by Members in the context of the SPS Committee that are directly related to approval procedures in agro-food trade. After examining the occurrence, keywords and trade covered by STCs, it exploits the gravity model to assess the trade costs of concerns directly related to approval procedures. The section then highlights positive developments through the analysis of the results of the OECD survey that collected in-country positive experiences in addressing one or more of the seven issues of interest.

3.1. Specific trade concerns

58. As part of the WTO's efforts to enhance transparency, the SPS Committee provides a forum to facilitate discussions among Members. One feature of this forum is the possibility for Members to raise STCs in which they can request further information on measures introduced by other Members. As such, STCs are a tool that Members can use to improve regulatory quality, promote transparency, prevent disputes, and actively contribute to the implementation of the SPS Agreement.

59. Figure 3.1 illustrates the number of STCs that have been raised over the period January 1995–August 2022 and compares it with the number of notifications and official disputes. As pointed out by Horn, Mavroidis and Wijkström (2013[47]), STCs are an effective transparency mechanism that helps avoid formal disputes. The authors acknowledge that the comparison between the number of STCs and number of dispute rulings is not sufficient to affirm any causal effect. However, the technical nature of the work taking place in the SPS Committee is separated from the legal or political considerations that usually characterise formal dispute settlements.

Figure 3.1. Number of SPS notifications, STCs, and disputes (January 1995–August 2022)



Source: Adapted from WTO (2021[48]).

60. Whereas notifications of new or amended SPS measures are informative, STCs correspond to measures that are perceived by exporters to plausibly create unjustified barriers to trade. This makes STCs a useful tool to gauge the effects of SPS measures on trade. However, there are some caveats to using the database of STCs to infer the impact of SPS measures on international trade. Most notably, Members have no obligations raising an STC, which means that STCs do not report all possible SPS measures that could hinder trade. There are several reasons why countries might not raise an STC. First, some countries tend to raise STCs much more frequently than others, most likely due to differences in national capacities related to SPS matters. Second, many trade issues (including approval procedures) do not lead to a formal STC. A review of concerns raised in the context of the Agreement on Agriculture suggests some countries may be hesitant to raise STCs due to the possibility of negatively impacting existing bilateral trading relationships, and may only use STCs as a last resort, if at all (Jackson et al., 2020[49]). Finally, countries might have several concerns but will only raise a selected set as STCs as they must prioritise their concerns. Countries will usually try to deal with these issues via bilateral channels, including direct diplomacy or departmental engagement in lieu or in addition to raising an STC.

61. Nevertheless, STCs have been used extensively in the literature (Orefice, 2016[50]; Fontagné et al., 2015[51]))[11] because they are a good proxy for non-tariff measures (NTMs)

[11] Fontagné et al. (2015[51]) study the differential impact of restrictive SPS measures on French exporting firms and shows the SPS concerns discourage new exporters as well as reduce volumes of existing export flows, with attenuated impacts for larger firms. Orefice (2016[50])studies the determinants of STCs raised against the WTO and finds empirical evidence that SPS and TBT concerns are raised by exporting countries as a consequence of importer's tariff cut (as NTM may become effective barriers to trade when tariff protection lowers).

that represent a barrier to trade. Most importantly for the present analysis, the level of detail recorded in STCs can help understand the importance of very specific subjects such as controls, inspections and approval procedures. Finally, compared to other datasets covering NTMs, the dataset with STCs has the advantage that it covers more countries and a longer time period.[12]

62. Even if the nature of STCs varies considerably, they are always raised because of a perceived misalignment between the SPS systems of importing and exporting partners. In some cases, concerned WTO Members may simply seek clarification concerning draft trade regulation measures set to be introduced by other WTO Members. In other cases, concerns may relate to potential violations of the rules of the SPS Agreement. The availability of the STC process gives WTO Members an avenue to identify and address issues relating to existing or planned trade regulations, including approval procedure regulations (CEPS, 2021[7]).

63. STCs are recorded in the online platform ePing.[13] The STCs dataset (ePing, 2022[52]) includes information on: i) the exporting countries that raise or support the concerns and the importing countries that maintain the SPS measure; ii) the affected products assigned to up to 6-digit Harmonised System tariff codes; iii) the year in which the STC was raised, as well as subsequent years in which the STC was raised again and solved; and iv) text descriptions of the concerns and keywords from a closed list of 60 possibilities[14] to identify the nature of the concerns. To ensure consistency and facilitate searches, the WTO Secretariat enters the keywords and products associated to each STC based on the records of concerns raised during the SPS Committee's meetings.

64. The analysis below is based on the STCs dataset and covers those STCs raised between January 1995 and December 2021. The first part of the analysis exploits the keywords variable in the STCs dataset to examine the occurrence of STCs that are related to approval procedures. In the second part of the analysis, the STCs dataset is merged with data on trade flows from COMTRADE (UN COMTRADE, 2022[53]) to identify specific patterns.

3.1.1. Analysis of STCs related to approval procedures

65. According to the STCs dataset, there were 532 trade concerns raised between January 1995 and December 2021. The data show that trade concerns are usually associated with several keywords (some include up to ten keywords). Overall, there is a list of 60 different keywords in the dataset, but not of equal significance due to the level of detail they entail. For instance, "Human health", "Food safety", "Animal health", and "Plant Health" identify the main SPS areas, or primary subjects, and are included by the WTO Secretariat as much as possible. If none of these primary subjects apply, then the keyword "Other concerns" is used. If feasible, more specific keywords are included to describe each STC. Table 3.1 shows the 20 most common keywords associated with the STCs raised between January 1995 and December 2021.

[12] Another example of a dataset recording SPS measures in a framework of Non-Tariff Measure for a large set of countries is the UNCTAD Trade Analysis Information System (TRAINS). It is an inventory-based dataset of trade-related regulations, including SPS (broadly defined) as well as 15 other types of NTMs.

[13] The ePing platform can be accessed at Home - ePing SPS&TBT platform (https://eping.wto.org/).

[14] A "COVID-19" keyword was created to identify COVID-19 related measures circulated via SPS notifications or other official WTO documents since the beginning of the pandemic. This keyword has only been allocated to four STCs since early 2020.

Table 3.1. Top 20 keywords assigned to the STCs raised between January 1995 and December 2021

Keywords	Frequency
Human health	45%
Food safety	42%
International Standards / Harmonisation	37%
Animal health	36%
Risk assessment	33%
Plant health	24%
Control, inspection and approval procedures	**24%**
Zoonoses	13%
Sufficiency of scientific evidence	12%
Transparency	**11%**
Undue delays	**11%**
Pest- or Disease- free Regions / Regionalisation	11%
Maximum residue limits (MRLs)	9%
Equivalence	8%
Foot and mouth disease	7%
Technical Barriers to Trade (TBT)	5%
Bovine Spongiform Encephalopathy (BSE)	5%
Other concerns	5%
Certification, control and inspection	**4%**
Avian Influenza	4%
Pesticides	4%
Pests	4%

Note: The four keywords that are related to approval procedures are indicated in bold font.
Source: Authors' calculations based on ePing (2022[52]).

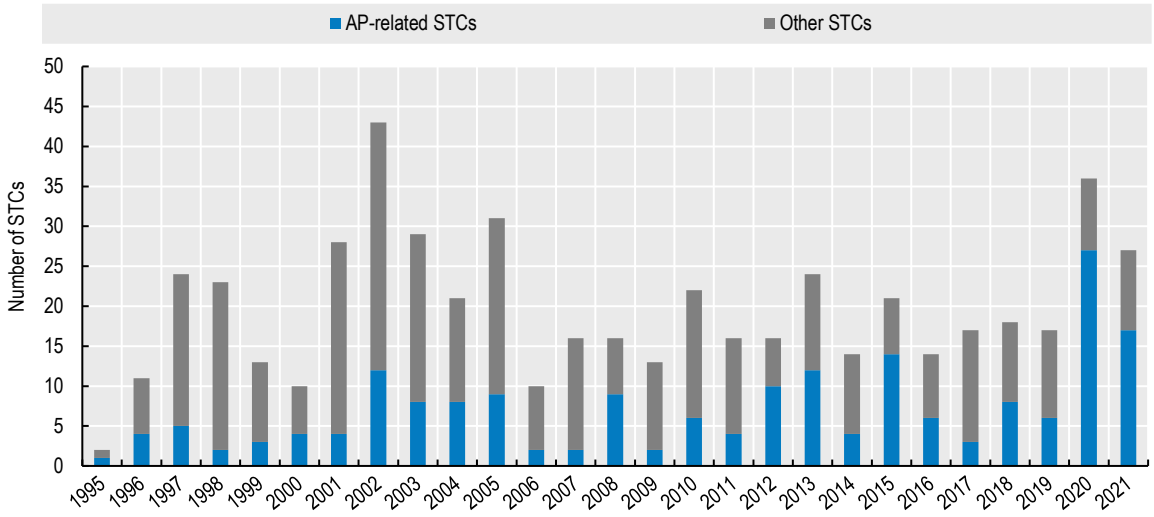
66. A selection of four keywords can be identified as the most closely related to approval procedures, with the following occurrence within the 532 concerns available in the dataset: "Control, Inspections and Approval Procedures" (24% or 126 STCs), "Transparency" (11% or 61 STCs), "Undue delay" (11% or 59 STCs), and "Certification, control and inspection" (4% or 21 STCs). It is important to note that STCs may include any combination of these four keywords. By combining these four keywords, a total of 192 approval procedures related STCs are identified in the dataset.[15]

67. Figure 3.2 considers the new STCs introduced each year between 1995 and 2021 and compares the approval procedures (AP)-related STCs, i.e. the STCs which include at least one of the four keywords associated with approval procedures, with the other STCs (i.e. the STCs that do not include any of the four AP– related keywords). The figure shows that the share of entries related to approval procedures has been consistently high over time. AP-related STCs represent on average 35% of the new records of concerns raised each year since 1995. In 2020 and 2021, the share of AP-related STCs increased to 75% and 63%,

[15] The SPS Committee thematic session on approval procedures on November 2019 identified all but the "Transparency" keyword as being the most closely related to approval procedures STCs (WTO, 2019[75]). The use of "Transparency" to describe an STC is highly correlated with the use of any one of the three other keywords, therefore omitting "Transparency" from the list of approval procedures related keywords changes only slightly the sample of approval procedures related STCs, which falls from 192 to 155 records.

respectively, indicating a growing importance of approval procedures for exporting countries.

Figure 3.2. Evolution of new records of STCs related to approval procedures



Note: Approval Procedures (AP) related STCs are trade concerns associated with at least one keyword from "Control, Inspections and Approval Procedures", "Certification, control and inspection", Transparency", and "Undue delay". AP-related STCs may include other keywords. Other STCs are concerns that include none of the four AP-related keywords.
Source: Authors' calculations based on ePing (2022[52]) .

68. EPing data show that some trade concerns may be raised multiple times and sometimes remain "open" for a long period of time if the questioners do not receive a satisfactory answer to their concerns. Approval procedures related concerns are no exception, with only 29% of STCs marked as solved. In the calculation, an STC is assumed to be solved if it has been more than two years since it was raised for the last time, i.e. if it has been absent from the SPS Committee agenda for more than six meetings. This is an arbitrary rule derived from (Horn, Mavroidis and Wijkström, 2013[47]). The authors distinguish "serious" concerns from simple "clarification" concerns, where the former are often raised in three or more meetings of the SPS Committee, and the latter which are not necessarily formally resolved during a meeting. In practice, this implies that the STCs first raised or raised again after 2018 are considered as still open.

69. As shown in Section 2, issues pertaining to approval procedures are closely interconnected. The WTO Secretariat assigns keywords to describe the trade concerns raised during the SPS Committee meetings. Because several keywords can be associated to a single STC, analysing the descriptions of the 532 STCs included in the dataset allows identifying which keywords are more often associated with each other.

70. Network analysis is used to examine and visualise these relationships between SPS issues. Networks are represented by nodes and edges connecting the nodes, whereby thicker edges indicate a stronger relationship between nodes. In this study, the nodes are the keywords, and the edges represent the number of times the two keywords have been simultaneously used to describe an STC. A description of the methodology followed to construct the network graphs is provided in Box 3.1.

Box 3.1. Methodology to construct the network of SPS issues

The information required to develop the network of SPS issues is organised in a three-column table. Each row in the table specifies a pair of nodes at either end of an edge (first and second columns) and the width of the edge (third column). This table is developed in several steps.

- First, the STCs that have at least two keywords are identified. Most STCs are tagged with at least two keywords, including the primary subject keyword (i.e. "human health", "plant health", "animal health", "food safety"). Two STCs are described by only one primary subject keyword, and were dropped from the sample used to generate the network visualisation.
- Second, all possible pairs of keywords are listed. For instance, an STC tagged with only two keywords provides only one pair, but an STC described by three keywords (A, B, C) provides three pairs (A-B; B-C; A-C) because A-B and B-A are considered equivalent.
- Third, the number of times each pair of keywords is encountered across all STCs is counted. This number provides the width of the edge, i.e. the strength of the relationship between two keywords.

The network of SPS issues is visualised using *flourish.studio*, a free web-based data visualisation tool that provides a user-friendly interface to create network graphs (https://flourish.studio/). *Flourish.studio* uses a force-directed graph drawing algorithm to position the nodes in a two-dimensional space so that all the lengths of edges are more of less equal and there are as few crossing edges as possible.

For practical reasons, some of the labels for the keywords (nodes) have been shortened: ALP=Appropriate Level of Protection, ASF=African Swine Fever, BSE=Bovine Spongiform Encephalopathy, CSF=Classical Swine Fever, DS=Good Offices/Consultations/Dispute Settlement, FMD=Foot and Mouth Disease, HACCP=Hazard Analysis Critical Control Point, MRLs=Maximum Residue Limits, OAH=Other Animal Health, Regulatory info=Member's regulatory information, Risk=Risk assessment, Special treatment=Special and differential treatment, STDF=Standards Trade Development Facility, Sc. evidence=Sufficiency of scientific evidence, Scope=Modification of content/scope of regulation, TA=Technical Assistance, TBT=Technical Barrier to Trade, TSE=Transmissible Spongiform Encephalopathy.

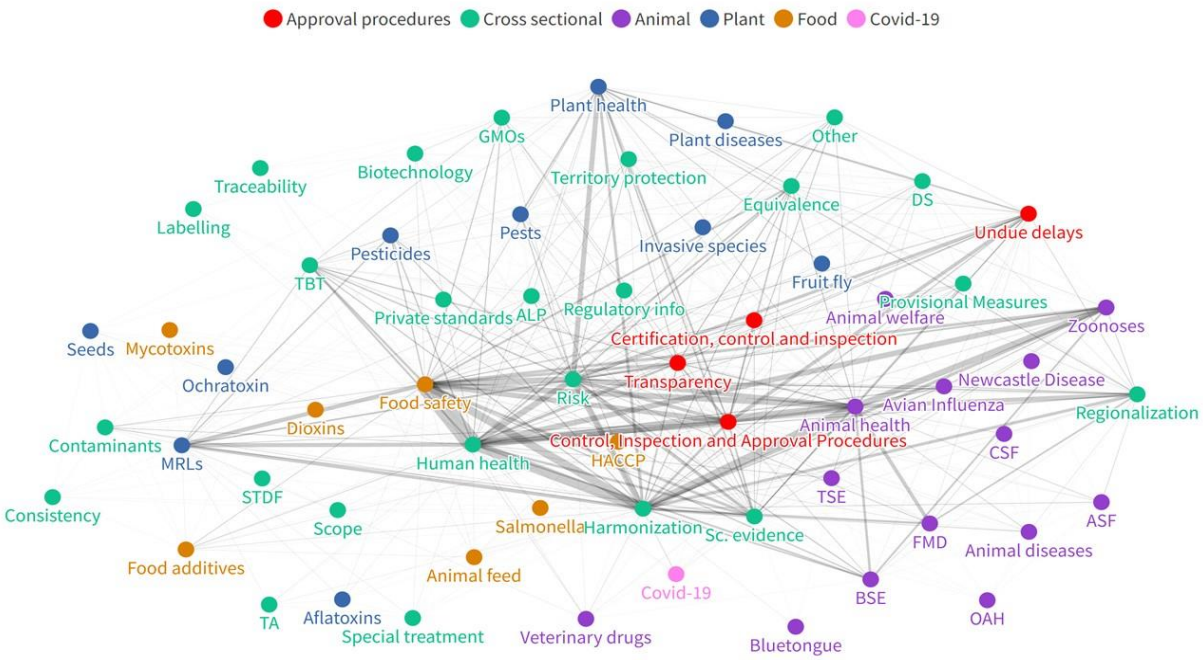
71. Figure 3.3 to Figure 3.7 represent the network graphs, where each node corresponds to a keyword and the different colours identify groups related to the six topics of interest. More specifically, the red nodes correspond to the four keywords identifying STCs related to approval procedures, namely ("Control, inspection and approval procedures", "Certification, control and inspection", "Transparency" and "Undue delay"). The purple nodes identify concerns related to animal health (e.g. "CSF Classical Swine Fever"), the dark blue nodes identify concerns related to plant health (e.g. "MRLs Maximum Residue Limits") and the orange nodes identify concerns related to food (e.g. "Salmonella"). The green nodes are cross-sectional (e.g. "harmonisation) and may apply to any of the four broad topics (food, animal, plant or human health). Finally, one pink node identifies concerns related to COVID-19. Note that the size of the node is uniform and does not correspond to anything.

72. Figure 3.3 is the network visualisation of all the keywords. “Harmonisation” and “Risk assessment” are at the centre of the network cloud along with the four primary subject keywords (“human health”, “plant health”, “animal health”, and “food safety”). Interestingly the four approval procedures related keywords (“Control, inspection and approval procedures”, “Certification, control and inspection”, “Transparency” and “Undue delay”) are well connected too. Figure 3.3 gives a good general overview of all the keywords but contains too much information to identify the connections of the AP-related keywords. Therefore, Figure 3.4 to Figure 3.7 represent the same network cloud as Figure 3.3, but each focus on just one of the four approval procedures keywords and its connections.

73. In addition to the strong ties with any of the four primary subject keywords, “Control, inspection and approval procedure”, “Certification, control and inspection”, “Transparency” and “Undue delay” are strongly linked with each other, especially “undue delay” with “Control, inspection and approval procedures”. Figure 3.4 shows that “Control, inspection and approval procedure” connects strongly with “Harmonisation”, “Sufficient scientific evidence”, and “Equivalence”. Figure 3.5 illustrates that “Certification, control and inspection” seems slightly less strongly connected to other keywords but relates often to “Sufficient scientific evidence”. Figure 3.6 focuses on the connections of the “Undue delay” keyword and shows that it connects strongly with “Risk assessment”, “Harmonisation”, “Sufficient scientific evidence”, and “Regionalisation”. Finally, Figure 3.7 shows that “Transparency” connects strongly with “Risk assessment”, “Harmonisation” and “Sufficient scientific evidence”.

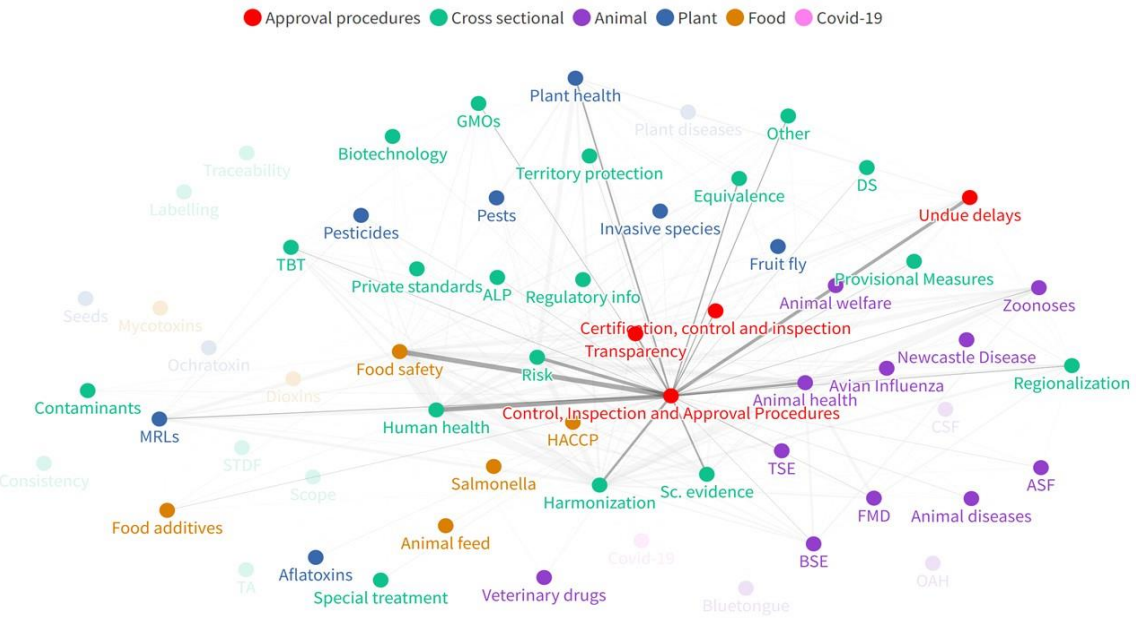
74. Overall, this network analysis confirms the high relevance and interconnectedness of the seven issues highlighted in Section 2. The three pairs with strongest connections outside the four primary subject keywords are: “Harmonisation” and “Risk assessment”, “Risk assessment” and “Control, inspection and approval procedures”, “Undue delay” and “Control, inspection and approval procedures”. Concerns related to approval procedures stand out within the cloud of STCs topics and should be considered as systemic issues affecting the overall SPS systems. This statement does not diminish the importance of other concerns related to product characteristics (such as “food additives”, “contaminants”, or any animal diseases) but it highlights the positive spill-over effects that solving burdensome approval procedures may have on all other SPS issues.

Figure 3.3. Network representation of keywords' associations in STCs as of December 2021



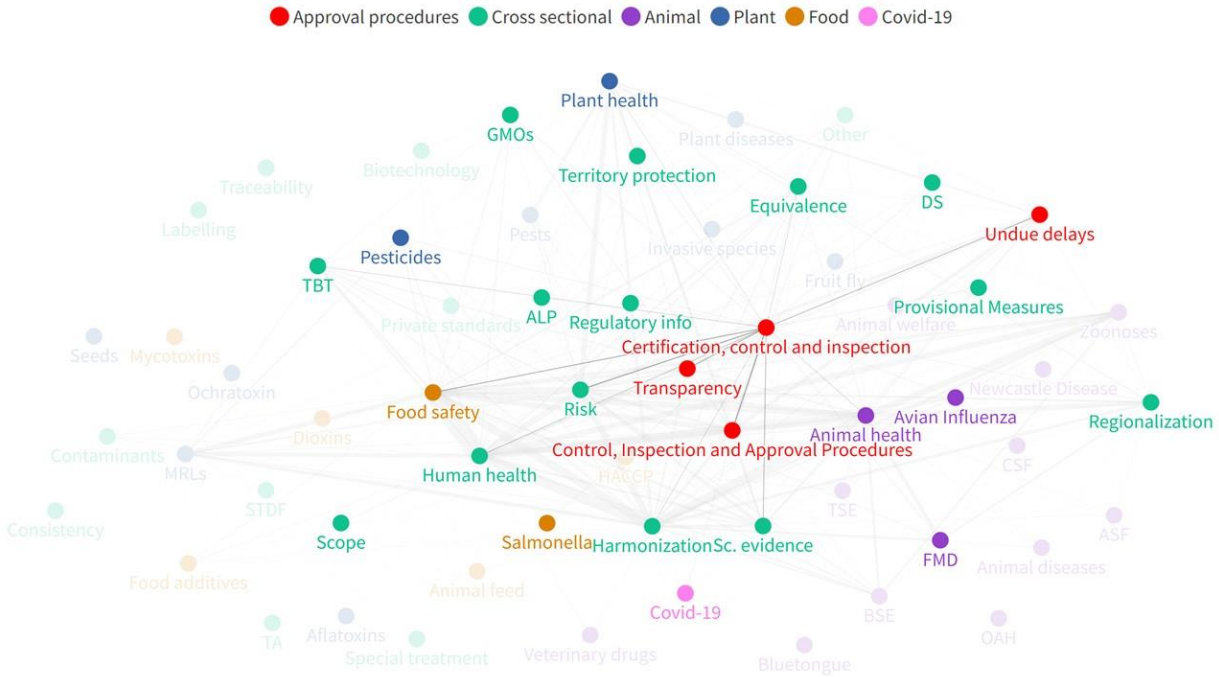
Note: Nodes' labels have been shortened for practical reasons and stand for the following: ALP=Appropriate Level of Protection, ASF=African Swine Fever, BSE=Bovine Spongiform Encephalopathy, CSF=Classical Swine Fever, DS=Good Offices/Consultations/Dispute Settlement, FMD=Foot and Mouth Disease, HACCP=Hazard Analysis Critical Control Point, MRLs=Maximum Residue Limits, OAH=Other Animal Health, Regulatory info=Member's regulatory information, Risk=Risk assessment, Special treatment=Special and differential treatment, STDF=Standards Trade Development Facility, Sc. evidence=Sufficiency of scientific evidence, Scope=Modification of content/scope of regulation, TA=Technical Assistance, TBT=Technical Barrier to Trade, TSE=Transmissible Spongiform Encephalopathy.
Source: Authors' calculations based on ePing (2022[52]) for the period 1995-2021 and created with flourish.studio.

Figure 3.4. Connection of "Control, Inspection and Approval Procedures" with other keywords



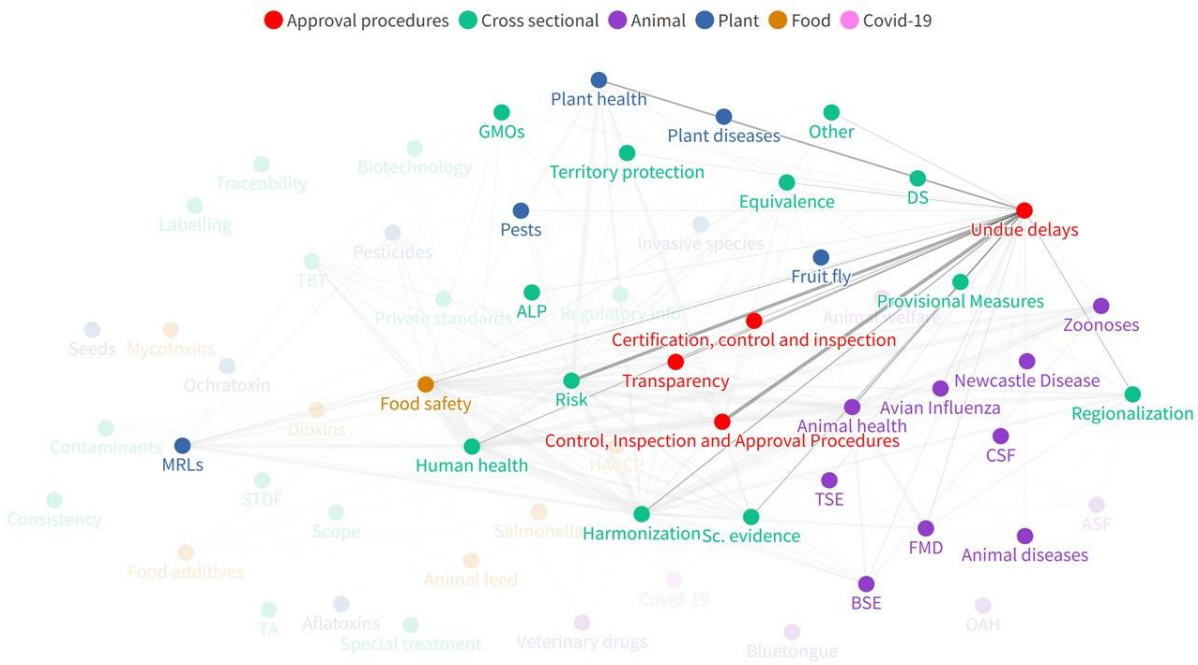
Source: Authors' calculations based on ePing (2022[52]) for the period 1995-2021 and created with flourish.studio.

Figure 3.5. Connection of "Certification, control and inspection" with other keywords



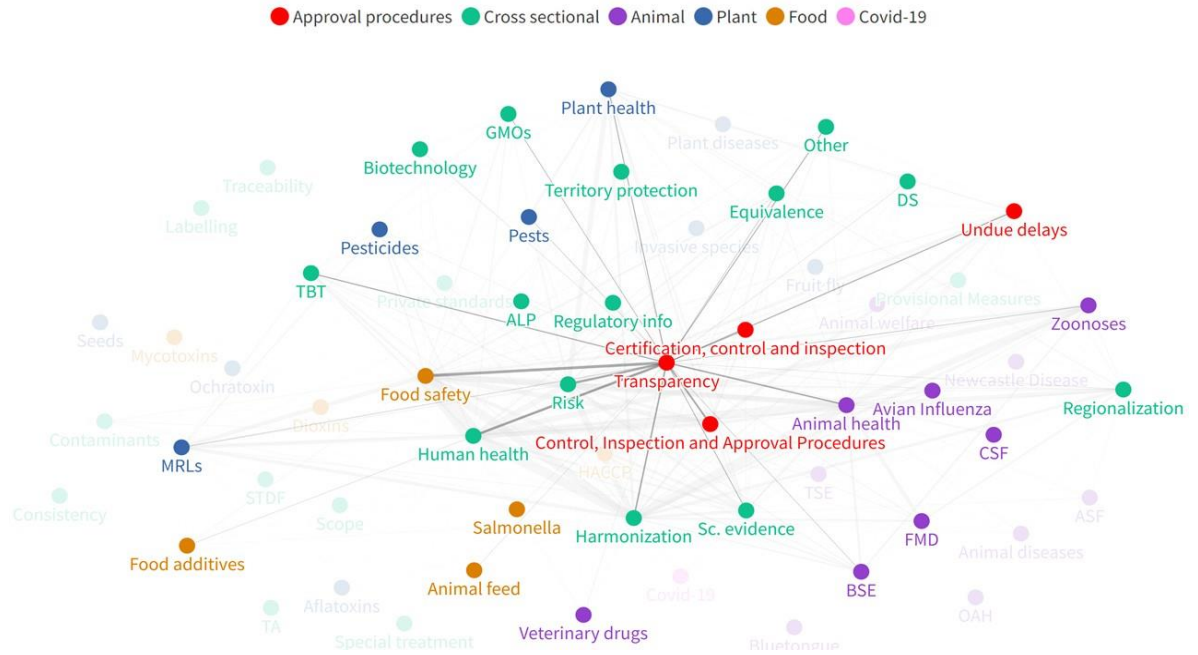
Source: Authors' calculations based on ePing (2022[52]) for the period 1995-2021 and created with flourish.studio.

Figure 3.6. Connection of "Undue delays" with other keywords



Source: Authors' calculations based on ePing (2022[52]) for the period 1995-2021 and created with flourish.studio.

Figure 3.7. Connection of "Transparency" with other keywords



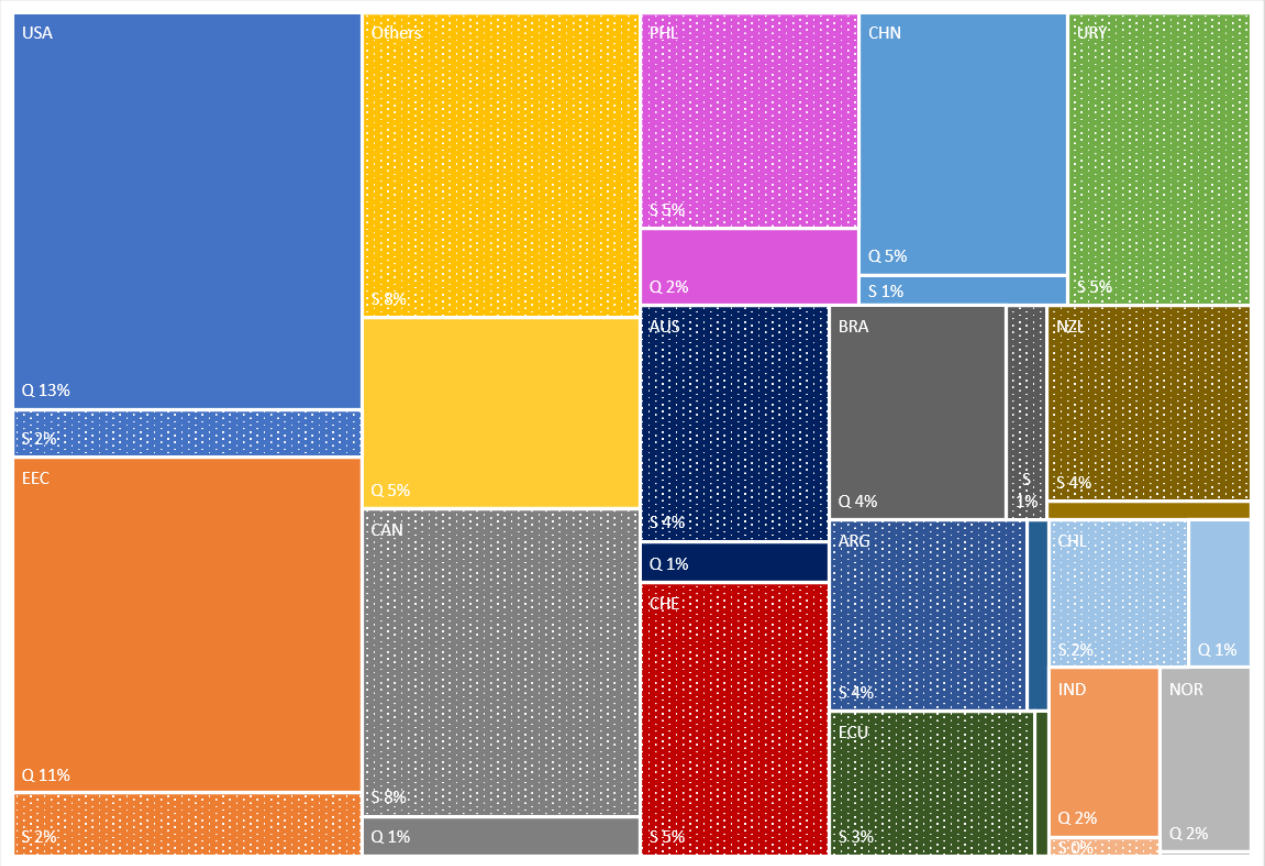
Source: Authors' calculations based on ePing (2022[52]) for the period 1995-2021 and created with flourish.studio.

75. To complete the analysis of STCs, this section examines the countries raising and receiving trade concerns during the SPS Committee's meetings. From 1995 to 2021, 36 Members raised an STC on approval procedures and 52 Members supported an existing AP-related STCs raised by other Members. More than 75% of Members raising or

supporting AP-related STCs were high income. On average, each AP-related STC was raised by two Members and supported by four other Members. Figure 3.8 shows that the United States and the European Union together raised 28% of STCs on approval procedures. They were followed by Canada (9%), Philippines (7%), and China (6%). Canada and the Philippines tended to support existing AP-related STCs more than introducing them while China was more proactive in starting new ones.

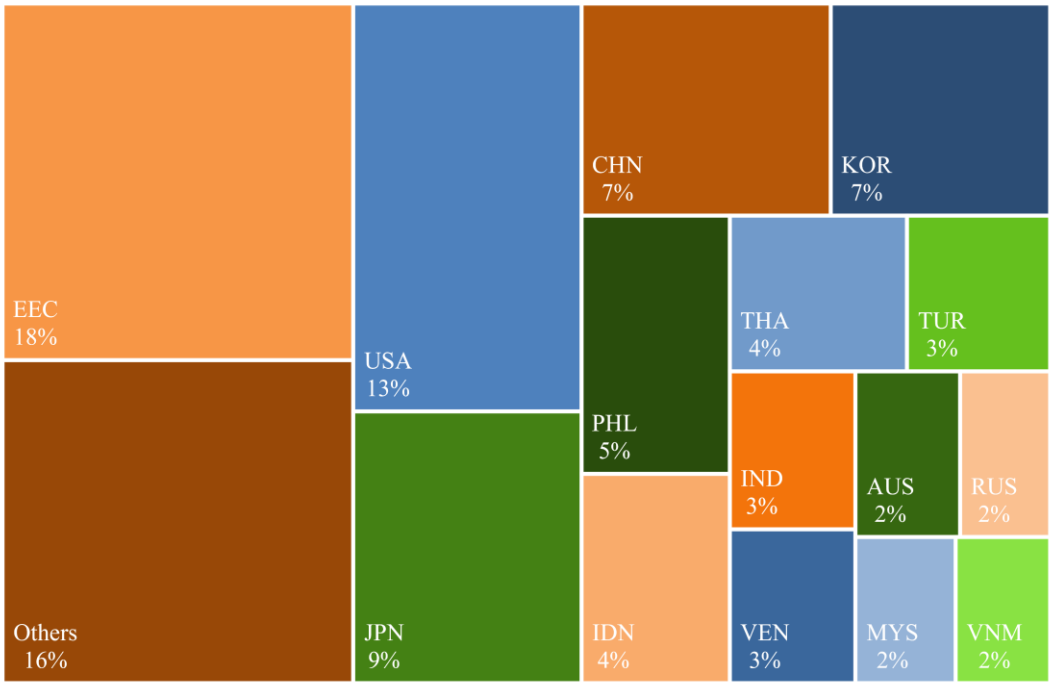
76. In general, an STC is addressed to only one Member. Overall, during the 1995-2021 period, 52 Members were requested to provide information on approval procedures they had imposed. High and upper-middle income Members received 83% of the requests for information. Half of AP-related STCs were addressed to five Members, the European Union received 18% of the requests, the United States 13%, followed by Japan (9%), China (7%), and Korea (7%) (Figure 3.9).

Figure 3.8. Members raising and supporting STCs related to Approval Procedures over the 1995-2021 period



Note: Members may either directly raise a STC and be flagged as main Questioner (Q percentage in the figure and plain area) or support a concern raised by another Member and be flagged as Supporter (S percentage in the figure and dotted area). For clarity, values less than 1% are not reported in the figure.
Source: Authors' calculations based on ePing (2022[52]) for the period 1995-2021.

Figure 3.9. Members receiving STCs related to Approval Procedures over the 1995-2021 period



Source: Authors' calculations based on ePing (2022[52]) for the period 1995-2021.

3.1.2. Trade covered by STCs

77. The analysis below combines information on the exporters (Members raising concerns), importers (Members maintaining measures subject to concerns) and products from the STCs database with trade flows from UN COMTRADE (UN COMTRADE, 2022[53]).[16] Examining the trade covered by STCs is essential to understand the incidence of trade concerns relative to the overall trade flows and identify the most affected sectors. Each STC has been decomposed by exporter, importer, product, and year. Therefore, if the same STC is raised by two Members and refers to three products in a given year, it is decomposed into six observations in the trade database. This procedure is essential to match each STC to the corresponding bilateral trade flow.

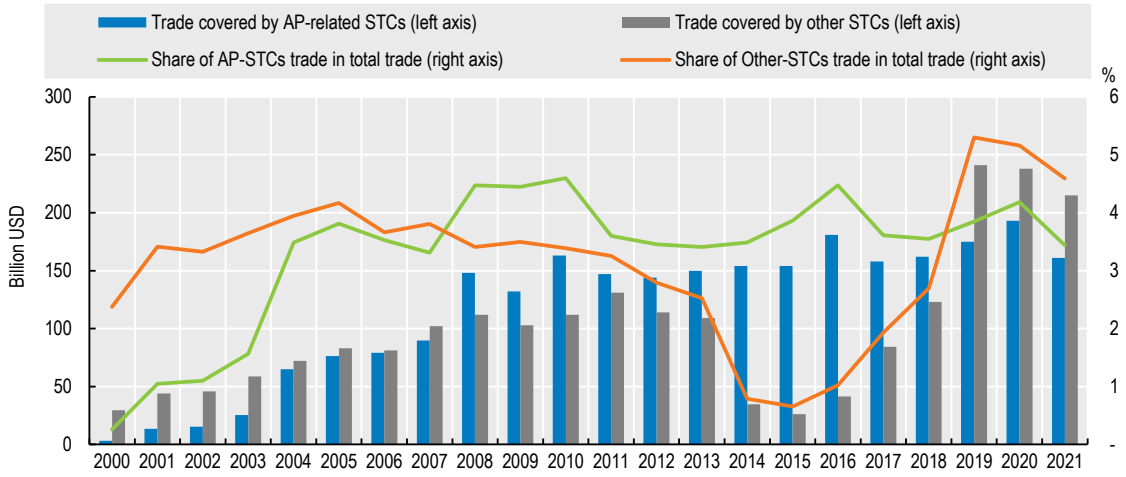
78. Figure 3.10 shows the evolution of trade in agricultural products[17] covered by approval procedures related STCs compared to trade covered by other types of STCs. The left axis indicates the dollar amount of exports covered by STCs whereas the right axis indicated the shares in total agricultural exports. The value of trade covered by approval procedures related STCs steadily increased over time from only USD 3 billion in 2000 to almost USD 193 billion in 2020, and the corresponding share to overall agricultural trade was multiplied by 16 in those 20 years. During the same period, trade covered by other STCs also increased and reached a peak at USD 238 billion (5.2% of total agricultural trade) in 2020 but experienced a drop between 2014 and 2017 driven by an absence of STCs directed towards some previously important plant and food sectors (HS09: coffee,

[16] The UN COMTRADE database was selected because at the time of preparing this report, COMTRADE provided the most recent data up to 2021.

[17] Export flows in agricultural products covering HS chapters 01 to 24.

tea and spices, HS22: beverages, and HS21: miscellaneous edible preparation). This suggests the constant and growing economic weight of NTMs related to approval procedures in discussions taking place within the WTO SPS Committee.

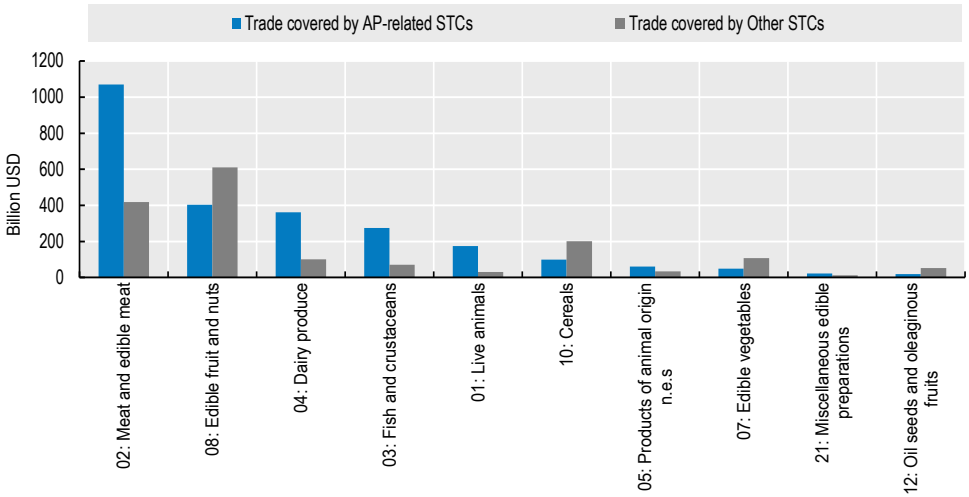
Figure 3.10. Total trade covered by STCs (1995-2021)



Note: AP-related STCs stands for approval procedure-related STCs. Total trade used to compute the share of trade covered by STCs (right axis) is limited to the relevant agricultural sectors (HS chapters 01 to 24).
Source: Authors' calculations based on UN-COMTRADE (2022[53]) and ePing (2022[52]).

79. Figure 3.11 represents the sectoral disaggregation of trade covered by STCs. The trade values displayed in this figure correspond to overall trade over the 1995-2021 period. It shows that the meat, edible fruits, dairy, and fish sectors are the most affected by STCs. Together, these four sectors represent 82% of trade covered by concerns related to approval procedures and more than twice as much trade as what is covered by STCs related to other concerns.

Figure 3.11. Sectoral coverage of STCs related to approval procedures (1995-2021)



Note: Top 10 sectors in terms of trade volumes by 2-digit sectors. Trade exports are aggregated over the period 1995-2021
Source: Authors' calculations based on UN COMTRADE (2022[53]) and ePing (2022[52]).

3.2. Measuring the impact of issues related to approval procedures on agricultural trade

80. The diversity in SPS measures makes them complex instruments to study in both theoretical and empirical economics. Weighting the negative impact caused by increasing fixed costs of trading against the positive impact of improved consumers' confidence in imported products is a task that can only be addressed empirically. As data collected on the prevalence of SPS measures becomes more comprehensive (in terms of measures type, time span, country, and product coverage), empirical studies can unveil stylised facts about the relative impact of such measures on trade. This section relies on commonly used data and methodology in the NTMs literature to identify some stylised facts pertaining to the impact of SPS approval procedures on the patterns of trade at a detailed product level – the STCs dataset (introduced in Section 3.1) and the gravity model.

81. Early investigations of SPS measures used broad-based inventories of NTMs obtained from countries' notifications such as the UNCTAD's TRAINS database or the WTO notification of SPS measures. Leading studies using these databases include the widely cited (Looi Kee, Nicita and Olarreago, 2008[54]) for TRAINS, and (Disdier, Fontagné and Mimouni, 2008[55]), (Felbermayr et al., 2016[56]) for the WTO notification of SPS measures. These studies compute ad-valorem equivalents of SPS measures (or NTMs in general) and find that they significantly contribute to the overall level of trade restrictiveness. However, a major drawback of relying on such broad-based inventories is that it is impossible to distinguish the trade impeding measures from the trade facilitating ones.

82. To overcome these constraints researchers started using case studies to identify the existence of specific SPS measures. (Grant, Peterson and Ramniceanu, 2015[57]) study the impact of SPS concerns related to the treatments of fresh fruit and vegetables with which US exporters must comply in foreign markets. Using a product-level gravity model, they find that such treatments reduce trade, but their actual restrictiveness diminishes over time as US exporters learn to comply with foreign measures. (Arita, Mitchell and Beckman, 2015[58]) investigate the effects of selected SPS measures on agro-food trade between the United States and the European Union. They use selected concerns raised by American and European exporters to the US Trade representative, the European Commission Market Access database and formal complaints and specific trade concerns raised at the WTO. They estimate individual gravity models for each of the concerns therefore narrowing scope to the following nine sectors: beef, pork, poultry, corn, soy, wheat, fruit, vegetables, and nuts. In most of these commodities, the estimated ad valorem equivalents of SPS measures are greater than existing tariffs.

83. Finally, several studies have relied on the WTO's STCs dataset, described in Section 3.1, to identify where SPS measures are administered inconsistently with the obligations stated by the SPS Agreement and evaluate their impact on trade. (Crivelli and Groeschl, 2016[59]) empirically assess the effects of SPS measures on the intensive and extensive margins of trade in agricultural products and identify specific channels distinguishing the concerns related to conformity assessment (i.e. certificate requirements, testing, inspection and approval procedures) from the concerns related to product characteristics (i.e. requirements on quarantine treatment; pesticide residue levels, labelling or packaging). Using a Heckman selection model to control for zero trade flows and selection bias, they find that "conformity assessment-related SPS measures constitute a market entry barrier, as such measures might be particularly burdensome and costly, while SPS measures related to product characteristics explain most of the increase in the amount of trade". (Grant and Arita, 2017[60]) push further the analysis of STCs by building

categories of concerns based on discussion and meeting minutes. Descriptive statistics using this breakdown confirms that issues on customs, procedures, certification, licensing requirements and conformity measures are occurring more frequently in developed markets that tend to implement standards that are more stringent than those established by the "three sisters". Moreover, their descriptive approach shows that agricultural trade flows are 41% lower on average when two countries are dealing with an STC than when they are not.

84. This report employs a standard structural gravity model estimated at the country pair, product, and year level to examine the impact of SPS approval procedures on trade. More specifically, it separates the effect of measures related to approval procedures (AP-related STCs) from those not related to approval procedures (other STCs). The baseline model and data sources are explained in detail in Box 3.2. Annex D provides more background on the gravity model in general.

Box 3.2. Capturing the effects of SPS approval procedures in a gravity model

The basic gravity model estimated in this paper separates the effect of measures related to approval procedures (AP-related STCs) from those not related to approval procedures (other STCs). The model is given by equation (1):

$$X_{ijkt} = exp\left(\begin{array}{c} \beta_1 STC_{approval_{ijkt}} + \beta_2 STC_{other_{ijkt}} + \beta_3 ln(1 + t_{ijkt}) \\ +\beta_4 PTA_{depth_{ijt}} + \beta_5 ln(Dist_{ij}) + \beta_6 border_{ij} + \beta_7 lang_{ij} \\ +\beta_8 colony_{ij} + \delta_{it} + \delta_{jt} + \delta_k \end{array}\right) + \varepsilon_{ijt} \quad (1)$$

Where,

- X_{ijkt} is the value of product *k* traded from country *i* to country *j* in year *t*
- $STC_{approval_{ijkt}}$ and $STC_{other_{ijkt}}$ are indicator variables which equal one when there is a trade concern related to approval procedures raised by country *i* and maintained by country *j* about product *k* in year *t* related to approval procedures and any other topics, respectively, and equals zero otherwise
- t_{ijkt} is the ad valorem applied tariff applied by country *j* to country *i* on product *k* in year *t*
- $PTA_{depth_{ijt}}$ represents the depth of a Preferential Trade Agreement (PTA) between countries *i* and *j* in year *t*, which can take value from 0 (no trade agreement) to 52 (all possible broad policy areas are included in the trade agreement).[1]
- $Dist_{ij}$ the geodesic distance between the most important cities (in terms of population) of countries *i* and j
- $border_{ij}$, $lang_{ij}$ and $colony_{ij}$ are dummies indicating whether the two countries *i* and *j* share a border, an official language or had a common coloniser after 1945, respectively
- δ_{it}, δ_{jt} and δ_k are exporter-year, importer-year, and product fixed effects, which control for unobservable multilateral resistance terms and help address potential endogeneity issues.

In terms of data sources, the analysis used trade flows data at the HS2 level between 1995 and 2021 as reported in United Nations Commodity Trade Statistics database COMTRADE (UN COMTRADE, 2022[53]), which is the standard source of information on merchandise trade, and downloaded from the World Bank's World Integrated Trade Solution (WITS). The scope of the analysis is restricted to countries with population greater than 1 million in year 2011[2] in order not to include the smallest countries in the sample that often lack data for most explanatory variables. It covers 131 countries across all geographic regions.

Concerning the independent variables used in the gravity regression, $STC_{approval}$ and STC_{other} are indicator variables constructed using the relevant keywords as described in Section 3.1.1. Data for geographic and historic variables such as distance, common border, common language, and colonial ties are obtained from the latest version of CEPII's Gravity database (Head and Mayer, 2014[61]). Information on the depth of Preferential Trade Agreements is obtained from the World Bank Deep Integration Dataset (Mattoo, Rocha and Ruta, 2020[42]). Applied tariff data at HS 6-digit level is downloaded from the International Trade Centre's Market Access Map (ITC, 2022[62]) and aggregated at the HS 2-digit with a simple average.

1. This variable is based on the first phase of the World Bank's Deep Integration Project described in Section 2.3.
2. Population data are obtained from the WDI database (World Development Indicators, 2022[63]).

85. The regression results are presented in Table 3.2. It should be noted that the estimates are describing trade effects based on voluntarily reported STCs. However, despite its non-compulsory nature, the STC reporting has been increasingly used by Members of all income levels. Therefore, the gravity estimates explained in this section provide a lower bound for the overall impact of NTBs caused by approval procedures on observed trade.[18]

86. Different samples are used to test the variation of coefficients across sectors. The sample in column (1) covers all sectors, whereas the other three columns show results for samples restricted to specific sections: column (2) relates to "animals and animal products" (HS 01 to 05), column (3) covers "plants and plant products" (HS 06 to 15), and column (4) covers "food stuff" (HS 16 to 24). The tariff variable tends to reduce the sample of available data but is kept in the equation for comparison purposes. A robustness check omitting the tariff data in order to increase the sample size showed that the overall results did not change.

[18] The econometric model used to identify the effects of NTBs related to approval procedures can only inform about the reduction of trade that is officially reported. Measuring the effect of barriers fully impeding trade (i.e. when no trade is ever observed in the data) is out of the scope of this report.

Table 3.2. Trade impact of approval procedures administered inconsistently with the SPS Agreement

Variables	(1)	(2)	(3)	(4)
Sample	All sectors	Animal	Plant	Food
STCapproval	-0.304***	-0.124	-0.0596	-1.595***
	(0.116)	(0.117)	(0.322)	(0.206)
STCother	-0.127**	-0.220*	-0.334***	-0.0871
	(0.0598)	(0.131)	(0.0836)	(0.143)
ln(tariff+1)	-2.035***	-7.186***	-0.961	-2.658**
	(0.436)	(0.950)	(1.339)	(1.114)
PTAdepth	0.0183***	0.0288***	0.0350***	0.0165***
	(0.00204)	(0.00261)	(0.00479)	(0.00249)
Distance	-0.000117***	-9.35e-05***	-9.90e-05***	-0.000135***
	(1.04e-05)	(1.23e-05)	(2.26e-05)	(1.07e-05)
Sharing a border	1.113***	1.452***	1.264***	1.373***
	(0.0705)	(0.0924)	(0.117)	(0.0808)
Sharing official language	0.241***	0.404***	0.192	0.486***
	(0.0827)	(0.111)	(0.124)	(0.0766)
Sharing coloniser	0.808***	0.796***	0.796***	0.786***
	(0.133)	(0.228)	(0.210)	(0.126)
Constant	19.59***	19.62***	19.24***	18.94***
	(0.0691)	(0.0940)	(0.154)	(0.0931)
Observations	1 604 870	201 494	431 984	475 053

Note: *** p<0.01, ** p<0.05, * p<0.1. Clustered standard errors at the country pair level.

87. When examining the values in Table 3.2, it is important to note that for regressors without log (i.e. all regressors except tariff), the elasticities cannot be read directly from the coefficients in the table. Instead, it is necessary to transform these values. More specifically, the semi-elasticities of regressors entering the regression without log are computed as 100*(exp(beta) -1)%, which is approximated by 100*exp(beta)% for beta close to zero. The values in the text below are hence the computed elasticities.

88. Column (1) shows that STCs are negatively associated with trade, i.e. the NTMs underlying the STCs restrict trade. More specifically, the existence of an AP-related STC reduces trade by 26% whereas other types of STCs reduce trade by 12%. Splitting the regression sample between the three groups of products helps identify which sectors are mostly driving the negative effect associated to the STCs. In the case of AP-related STCs, the effect seems to matter most for food products since the AP-related STCs are estimated to reduce trade in food products by 80% (column 4), whereas the coefficients are not significant for animals, plants and their products. Conversely, other types of concerns reduce trade in animals and animal products by 20% (column 2) and trade in plants and plant products by 28% (column 3) but have no impact on trade in food. The effect on trade is larger in the case of approval procedure concerns for food products, than for other concerns related to animals, plants and their products.

89. The rest of the results are in line with the trade gravity literature in terms of signs and magnitude of the coefficients. Bilateral tariffs are almost always significant with a negative impact on trade flows. Tariffs reduce trade by 2% when all products are considered together (column 1), approximatively 7% for animal and animal products (column 2) and 2.7% for food products (column 4). The depth of PTA variable remains

significant and positive despite the inclusion of tariffs in the model. This is because the depth variable represents the integration efforts made by partner countries beyond tariff reduction. Since the variable PTA_{depth} counts the number of policy areas covered in a trade agreement, its coefficient can be interpreted the following way: deepening a trade agreement with one more policy area is associated with a 1.8% increase in trade flows on average when all products are considered (column 1). The effect of deep trade integration is bigger for trade in plant products, which increases by 3.5% with deeper integration column 3). This may be explained by the fact that trade agreements tend to cover more easily provisions on plants than animals or foods, which are more sensitive areas in negotiations. Control variables (sharing a border, an official language, or colonial ties) are all positively correlated with trade as expected when significant.[19]

90. Overall, using standard tools of the empirical trade literature this analysis provides estimations of the burden that inconsistently administered approval procedures may have on agro-food trade. The effects estimated in the report are of the same order of magnitude than those found in the literature using STCs to identify trade barriers caused by SPS issues, for instance (Arita, Mitchell and Beckman, 2015[58]) find ad-valorem equivalent effects of SPS concerns ranging from 37% for EU vegetables to 102% for US poultry. The results show that SPS issues can sometimes have a trade restrictive impact that is ten times larger than import tariffs.

91. The analysis also reveals that issues related to approval procedures mostly impact trade in food products, while animals, plants and their products are relative more affected by other types of SPS issues. Therefore, this product level analysis sheds light on the importance to consider the differentiated effects of approval procedures across sectors when designing SPS measures.

3.3. Survey on country administration of approval procedures

92. In 2022, the OECD conducted a survey of national competent authorities to assess recent efforts in improving their control, inspection and approval procedure systems (the survey is available in Annex C. The survey was disseminated through multiple channels[20] to obtain a global perspective. National Veterinary, Plant Protection and Food Safety services were invited to share positive experiences with adjusting existing approval procedures or introducing new approval procedures that were able to address one or more of the seven issues that were outlined in Section 2.2, namely i) undue delay; ii) discrimination against imported products; iii) lack of transparency; iv) excessive administrative requirements; v) excessive fees; vi) lack of country or product equivalence; and vii) approval procedure requirements misaligned with objective scientific risk

[19] Several robustness checks were ran to test the sensitivity of the results. These robustness checks included replacing country-time fixed effects with the usual factors on GDP per capita or remoteness indices, using a simple dummy variable to identify the existence of a preferential trade agreement, and using lags of the STC dummy variables. These robustness checks confirmed the results in Table 3.2 and are therefore not shown. The regression was also ran using domestic trade data, which has become an important improvement for the gravity literature thanks to the recent availability of such data for a broader time period and countries coverage (notably the USITC International Trade and Production Database for Estimation ITPD-E). However, the lack of information relative to the cost of SPS approval procedures implemented domestically does not allow identifying significantly consistent effects of such measures when the trade data were expanded with domestic trade.

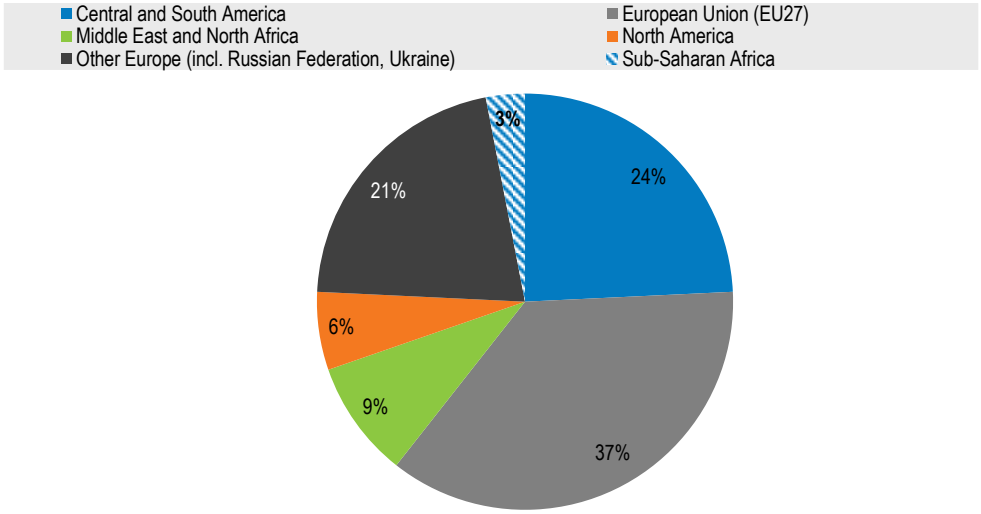
[20] The survey was disseminated through OECD Agriculture Delegates Corner, the WTO Working Group on Approval Procedures, the WTO SPS Committee, the STDF Working Group, and the International Plant Protection Convention (IPCC).

assessment. The survey first asked respondents to describe a specific case study in detail and then to answer several questions, primarily multiple choice, related to this case study.

93. The positive approach of the survey departs from previous studies in the literature that mostly focused on the cost of non-tariff measures. It has enabled the collection of valuable real-world experiences to inform the development of workable policy recommendations. The qualitative responses provide a sample of practical solutions that interested countries can use to tackle similar approval procedure issues. The respondents were also asked to share the difficulties encountered and crucial elements to overcome while implementing those solutions. Excerpts of the case study descriptions provided by countries that authorised their publication (after validating their content) illustrate practical experiences with remote auditing, e-certification, and whole-of-government approach, and are provided in Boxes 3.3, 3.4 and 3.5 respectively.

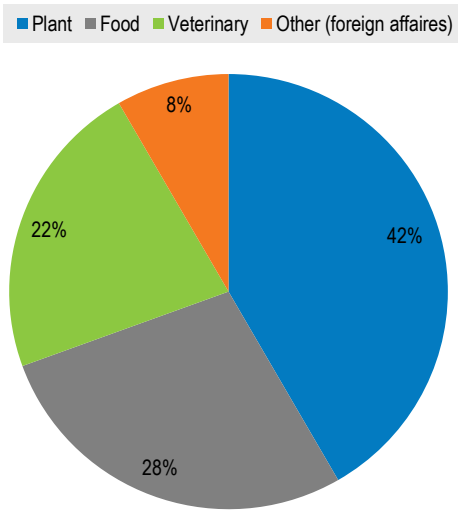
94. Overall, 25 countries, of which 16 OECD Members, shared a total of 34 case studies. Figure 3.12 shows the geographic distribution of countries who responded to the survey. More than one-third of the case studies were provided by countries from the European Union, however these shared experiences with trading partners that are not part of the Union. Figure 3.13 indicates that Plant Protection Services provided 42% of the case studies, and Food Services and Veterinary Services provided 28% and 22%, respectively. From a regulatory perspective and independently from the geography of the nature of the respondents, two-thirds of the case studies are revisions to existing measures while the remainder are new measures.

Figure 3.12. Countries responding to the survey



Note: Based on answers of 34 case studies.
Source: Results from OECD survey on country administration of approval procedures.

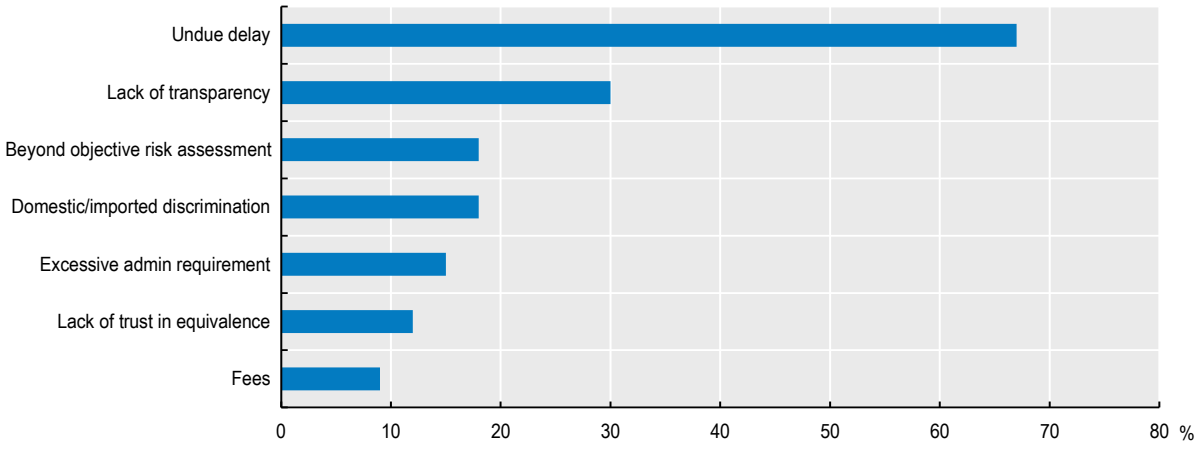
Figure 3.13. SPS competent authorities responding to the survey



Note: Based on answers of 34 case studies.
Source: Results from OECD survey on country administration of approval procedures.

95. The first question of the survey inquired which of the seven issues the new or revised measures aimed to improve. Multiple answers were possible, and half of the responses involved more than one issue, and some even mentioned four or five issues. Out of the seven issues, "undue delay" was indicated most frequently (68% of the case studies), followed by "lack of transparency" (29%). Almost one in five case studies describes measures dealing with the "application of approval procedure requirements in excess of objective scientific risk assessment" or "discriminatory treatment between domestic and imported products" (Figure 3.14). The case study descriptions often highlighted the fact that all seven issues are interdependent.

Figure 3.14. Distribution of issues improved in case studies



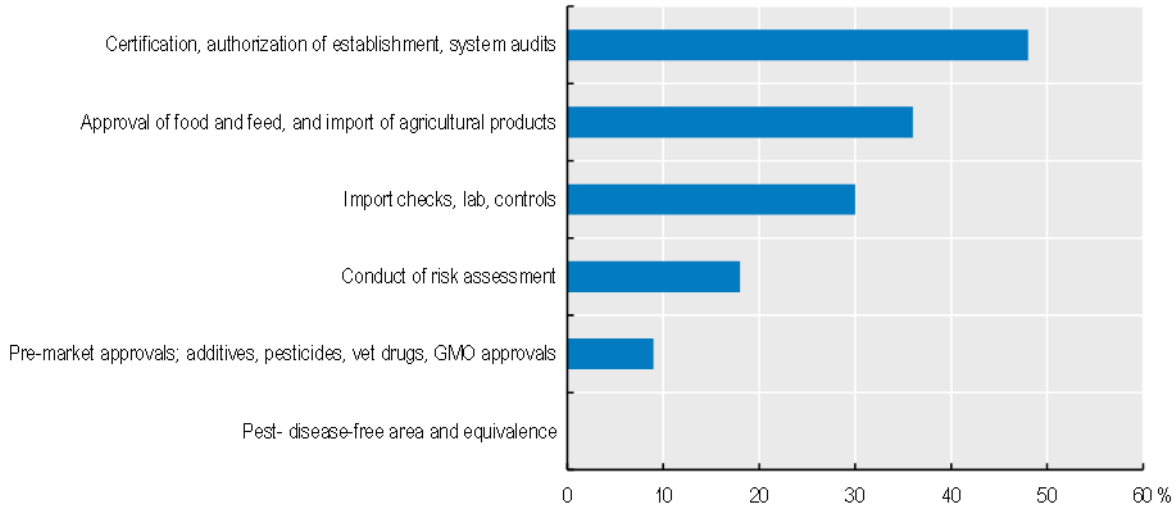
Note: Based on answers of 34 case studies, several issues can be improved per case study.
Source: OECD survey on approval procedures.

96. The survey also inquired about the type of approval procedure that was improved. Figure 3.15 shows that, in almost half the case studies, the conduct of audits to certify or

authorise foreign establishment or audits of overall SPS systems were facilitated. About a third of changes improved either how border agencies approved food, feed, plants, animals, and derived products or how they controlled imports upon arrival. In the text description accompanying the answers, all contributors to the survey mention building their SPS management systems on a risk-based approach. Six case studies described measures that improved the way countries conducted the risk assessment of a product.

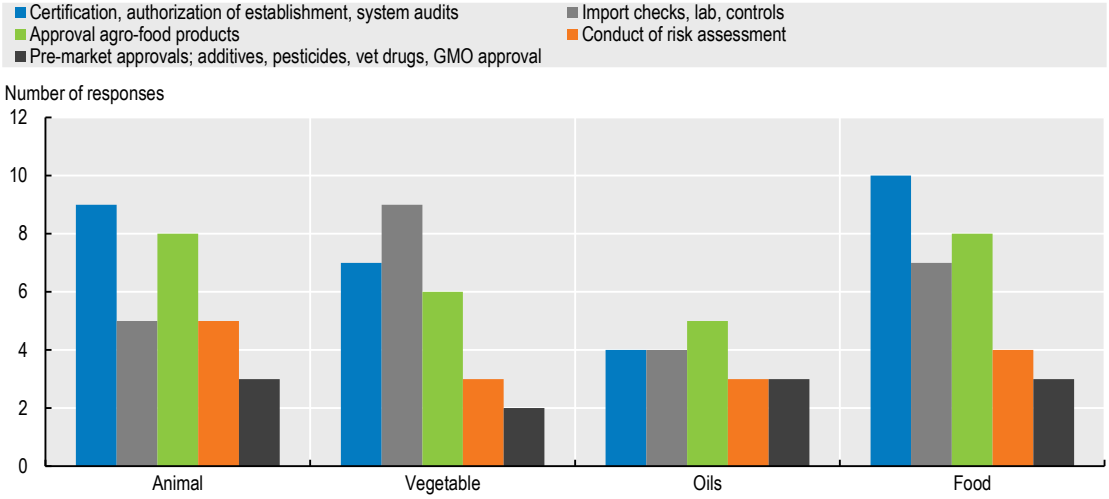
97. The survey inquired which product(s) were covered. Figure 3.16 combines the product information with the type of approval procedures that were improved. More specifically, it aggregates the product information to the four main sectors (animal, vegetable, oils, and food) and then matches it with the types of procedures that were improved. Actions regarding imports of animal and food products focused more on improvement of certification and audits of establishments than import checks and laboratory controls, while vegetable products were more concerned by import checks. Certification, authorisation of establishment and system audits are procedures that mostly pertain to agro-food products, which is the reason why this type of approval procedures is better ranked for trade in animal and food products. Finally, survey responses reported improvement of the conduct of risk assessment more often for the import of animal products than for the other sectors.

Figure 3.15. Type of approval procedures improved in case studies



Note: Based on answers of 34 case studies. Several issues can be improved per case study
Source: OECD survey on approval procedures.

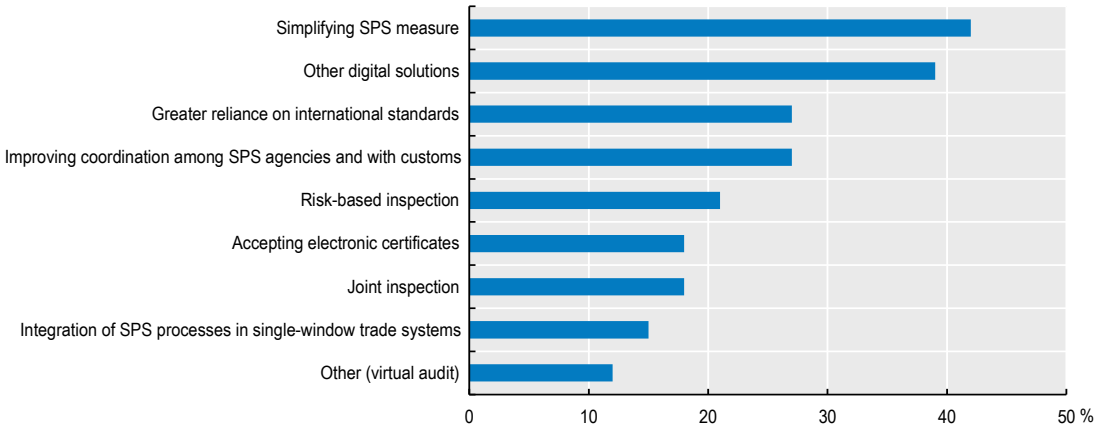
Figure 3.16. Sector distribution within type of approval procedures improved



Note: Based on answers of 34 case studies.
Source: OECD survey on approval procedures.

98. Figure 3.17 shows the principal actions undertaken to improve SPS approval procedures. It is important to note that in 75% of the case studies several actions were undertaken at the same time, with countries implementing two actions on average and some responses associated with up to six actions. Forty-two per cent of the actions undertaken were aimed at simplifying SPS measures, and 39% at implementing digital solutions (such as online platforms), to help manage increases in administrative operations. Around 29% of actions sought to make greater use of international standards, and the same percentage aimed to improve co-ordination between SPS agencies and other border agencies. Risk-based inspection was mentioned 23% of the time, while acceptance of electronic certificates and implementation of joint inspection were undertaken in 19% of the case studies (see Box 3.3 for countries' positive experiences working on electronic certifications). Electronic certification is a key component of the overall digitalisation of SPS systems. The digital trend has the potential to create efficiencies in SPS systems and enhance agro-food trade (OECD, 2021[17]) (OECD, 2023[64]).

Figure 3.17. Principal actions undertaken



Note: Based on answers of 34 case studies. Several actions possible per case study.
Source: OECD survey on approval procedures.

99. Less frequent types of action are related to the integration of SPS processes into single window systems (16%). These actions tend to entail significant upfront investment to introduce but reduce operational costs considerably once set up (see Box 3.5 for two case study examples illustrating this type of action). Finally, 12% of the case studies shared positive experience on remote auditing. While the intergovernmental organisations have not introduced guidelines for remote auditing yet, this type of action is capturing growing interest from the private sector and has recently led to positive experiences as described in Box 3.3. Current work at the OECD aims to provide a better understanding of experiences with remote audit, including which are their main benefits and challenges (Deuss and Honey, forthcoming[65]).

Box 3.3. Remote auditing

Chile

"Following the suspension of international travel because of the COVID-19 pandemic in early 2020, in a first instance the Chilean Agricultural and Livestock Service (SAG) renewed the authorizations of livestock establishments that intend to export animal products to Chile through a documentary review, postponing on-site inspections for a maximum period of one year or until these on-site visits can be carried out. At the same time, the SAG modified the regulations on authorization procedures, including the possibility of carrying out remote audits as an alternative to on-site verifications. This alternative procedure consists, in a first stage, in performing a documentary and audio-visual records review to the facilities. In a second stage, in coordination with the respective competent authorities of the exporting country, SAG officials proceed to carry out a remote verification in real time. This modality can only be carried out in case of countries that already have authorized establishments for authorized export products and for which previous evaluation and authorization processes have been favorable."

Brazil

"The Brazilian requirements for the importation of animal products are defined by article 486 of Decree nº 9013/2017. Importation shall only be authorized when products: i) come from countries whose health inspection system has been assessed or recognized as equivalent by the Department of Inspection of Animal Products (DIPOA); ii) come from establishments eligible to export to Brazil; iii) have been previously registered by DIPOA; iv) are labelled in accordance with the specific legislation; and v) are accompanied by a health certificate issued by the competent authority in the country of origin, under the terms agreed bilaterally.

The procedures for recognizing health inspection systems and the eligibility of foreign establishments, authorization of imports, re-inspection, checking and transit of imported animal products are regulated by the normative instructions IN 34/2018 and IN 35/2018.

Due to the COVID-19 pandemic, and in line with Art. 9 of IN 35/2018, a new procedure for the qualification of establishments started to be carried out by DIPOA, the international video audits. This procedure proved to be effective and economical. An update of IN 35/2018 is planned for the first half of 2022 to formalize and include more details regarding video audits, increasing the transparency of the process."

100. The survey offers two additional ways to examine the principal actions reported by the SPS authorities to address the seven selected issues. First, the responses to the two multiple choice questions on "issues" and "actions" can be represented in a matrix

(Table 3.3). The horizontal entries correspond to the principal actions undertaken (as reported in Figure 3.17) and vertical entries to the issues improved (as reported in Figure 3.14). For instance, greater reliance on international standards is often identified as an action that can address lack of trust in equivalence, beyond objective risk assessment, lack of transparency and undue delay. This table clearly shows that out of the seven issues, undue delay is most often addressed through multiple actions. It also illustrates that simplifying SPS measures has been identified as the action that can address multiple issues.

101. The second and more qualitative way to study these actions is provided in the free text descriptions of case studies that outline three topics of great relevance, namely remote auditing, e-certification, and whole-of-government approach, illustrated in Boxes 3.3, 3.4 and 3.5, respectively. The information in those boxes and in Table 3.3 confirm that there exists a menu of solutions that could help national SPS authorities meeting most of their WTO obligations.

Table 3.3. Cross cutting solutions to address multiple issues

Actions \ Issues	Use of excessive fees	Lack of trust in equivalence	Excessive admin requirement	Domestic/imported discrimination	Beyond objective risk assessment	Lack of transparency	Undue delay
Reducing the need for original certificate		1				1	3
Recognition of international risk assessment		1	1	1	1	2	3
Other (virtual audit)	1			1			2
Integration of SPS processes in single-window trade systems	1	1	1		1	2	2
Joint inspection	1			1	1		4
Accepting electronic certificates	1	2		1	1	2	3
Risk-based inspection	1	1	2	1	3	1	5
Improving coordination among SPS agencies and with customs	1	2	1	2	1	4	5
Greater reliance on international standards	1	4	1	2	4	5	8
Other digital solutions		2	3	2	1	3	11
Simplifying SPS measure	2	4	3	5	3	7	8

Note: Based on answers of 34 case studies. Numbers in the table indicate how many case studies reported to have undertaken an action from the row entry, given that an issue from the column entry was identified. Several answers were possible per case study.
Source: OECD survey on approval procedures.

Box 3.4. E-certification

Argentina

Over the past 12 years, Argentina's National Food Safety and Quality Service (SENASA) has developed a computerised system called SIGCER to execute certification procedures to export products of animal origin. SIGCER allows interoperation with other systems that receive certification information to move towards

paperless transmission of data. In 2022, SENASA began to test the interoperability between SIGCER and the European system TRACES NT, in view of moving towards paperless certification in the future. The greatest benefit is associated with greater transparency, costs and times linked to international trade in relation to computerised and electronic certification. For its implementation, the political will to advance in this objective was crucial, as well as the demand of certain importing markets.

Croatia

Accepting electronic certificates, especially during the increased delays during the COVID-19 pandemic restrictions speeded up the trade and eased some of the pressure for supplying the market. During the most restrictive times due to the COVID-19 pandemic all available deliveries of the original document were used, including sending them by postal services or even with the other consignments arriving from the same area or country. Now only recognised electronic certificates and the transmission ways are used.

Mexico

"In August 2019, Mexico begins the formal exchange of electronic Phytosanitary Certificates (PC) with Chile, Colombia, and Peru in the Pacific Alliance initiative, and in April 2021 with the United States under the ePhyto initiative. Furthermore, Mexico has carried out tests with several countries such as Costa Rica, the European Union, and Argentina. Electronic Certification has benefited international trade by avoiding loss or theft of original documentation, avoiding paper deterioration due to erasures or amendments, shortening the time for PC validation, improving import logistics, or advancing review of applications in the destination country. The implementation of electronic certification has been encouraged with the COVID-19 Pandemic by accelerating the exchange processes and strengthening the Single Window scheme without the need for physical presentation of the person requesting the PC. One of the main challenges to implement this electronic exchange scheme was to have an electronic foreign trade system that complies with the international standard established in NIM 012 of International Plant Protection Convention (IPPC-FAO) and the UNCEFACT code. After several years of implementation and testing, Mexico is now ready to receive and send electronic PCs to other countries under the same ePhyto mechanism as the IPPC".

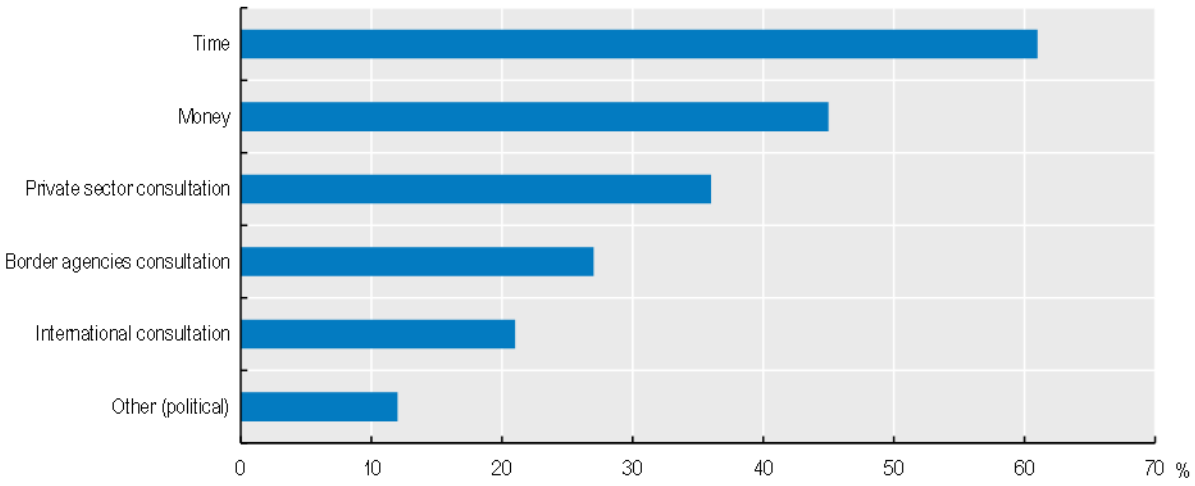
102. The competent SPS authorities that took part in the survey reported that time was the most common limiting factor (61%) encountered during the implementation of the new or updated SPS measures (see Figure 3.18). While 52% of the case studies were implemented in less than a year, 39% of actions needed more than two years to be fully operable (with some changes taking close to ten years to be completed). Funding is also a constraint, closely linked with time (45%).

103. Not surprisingly, consultation with the private sector is more of a challenge than consultation with other border agencies. But even intra-governmental consultation can represent a constraint to the management of changes (21% of the time). Individual constraints and sector specificities[21] led to different degrees of automation or digital

[21] Electronic certification is more prevalent for documentation accompanying the trade in plant and plant products, aided by the IPPC's multilateral ePhyto Hub solution. Adoption of electronic certification for the trade of animal and animal products (e-sanitary certification) is lagging behind with only a small number of large exporters from developed countries having negotiated bilateral e-sanitary arrangements with their trading partners. This is partly due to the greater risks of animal

adoption. For instance, in the case of e-certification solutions, survey responses shared experiences ranging from the preliminary acceptance of scanned copies of certificates to the implementation of the IPPC ePhyto solution[22] (case of Mexico in Box 3.4).

Figure 3.18. Principal constraints faced during the implementation of the new or updates SPS measures



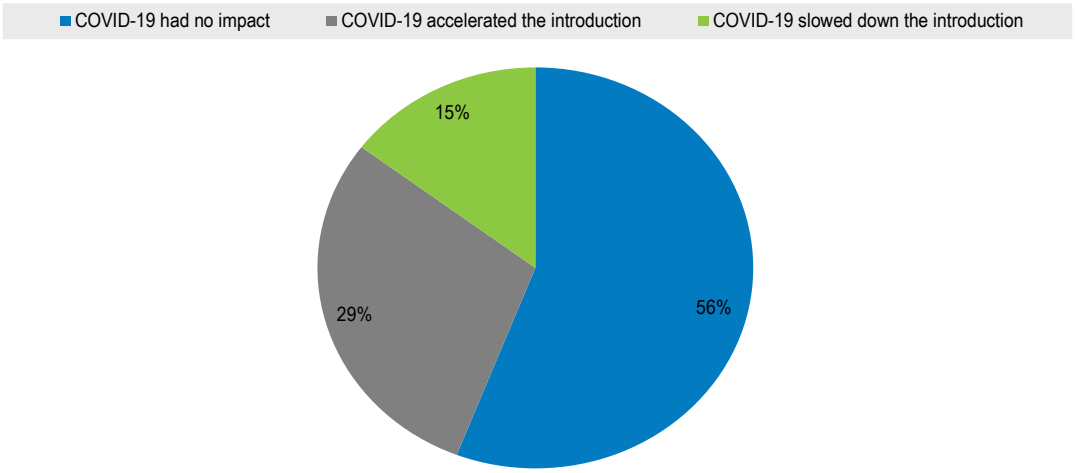
Note: Based on answers of 34 case studies. Several issues can be improved per case study
Source: OECD survey on approval procedures.

104. The COVID-19 pandemic seems to have accelerated the implementation of 29% of the most recent measures shared in the survey, which were designed to quickly address backlogs caused by public health and social distancing measures (Figure 3.19). Box 3.3 and Box 3.4 show examples of remote auditing and e-certification experiences respectively that were implemented as part of governments' digital transformation to enhance services (Jouanjean, 2019[66]; OECD, 2021[17]). The COVID-19 pandemic accelerated the uptake of technologies to protect worker health and expedite border procedures; some temporary measures have the potential to become permanent. However, 15% of responses also indicate that COVID-19 slowed down the implementation of planned measures. This is particularly true for measures adopting a whole-of-government approach, which require more time and resources to handle the regulatory, technical, and organisational changes (Box 3.5).

products to human health and the numerous SPS requirements entailed including veterinary certificates for animal health and food safety certificates.

[22] ePhyto is short for "electronic phytosanitary certificate", an electronic equivalent of a phytosanitary certificate in XML format. The IPPC ePhyto solution comprises: (i) a system to facilitate the exchange of ePhytos between National Plant Protection Organisations, called the HUB; (ii) a centralised web-based system that allows countries without their own system to produce send and receive ePhytos through the HUB; and (iii) a harmonised and standardised approach to format, structure, and codes in the certificate exchange process.

Figure 3.19. Impact of COVID-19 in the implementation of new or updated measures for approval procedures



Note: Based on answers of 34 case studies.
Source: OECD survey on approval procedures.

Box 3.5. Whole-of-government approach

Ireland

"As a result of Brexit, Ireland's Department of Agriculture, Food, and the Marine moved from a paper-based system for records of SPS inspections to an online system for trade with the United Kingdom. The new portal allows for the internal recording keeping of inspections carried out (documentary/physical inspection etc.), details of non-compliances and a system where import documentation can be submitted through to staff by import agents, allowing for pre-verification of information prior to the arrival of goods at the border control posts. A recent update of the system allows for staff to communicate with import agents where issues with documentation have been noted and further communication is required. There are tools in the system to allow for interaction with other competent authority agencies, namely fisheries authority and customs. The portal system also connects with IMSOC (Traces NT). The new portal system is in the process of being rolled out for imports from all countries across Ireland's border control posts, and as countries move to electronic export certification there is scope for this system to be integrated with IMSOC to have all records electronic."

Spain

"In 2014, Spain introduced a new decree to improve the veterinary certification procedures of Spanish establishments and products for export to countries outside the European Union. The new regulation aimed at streamlining the export certification process. Over the course of its implementation, it achieved several measures such as the creation of the Veterinary Certification Committee for Export; the harmonisation of procedures for authorization of establishment and harmonisation of criteria for carrying out health certifications (completed for products for human consumption); the use of third-party auditing system, partially replacing the controls carried out by the competent authority; the introduction of the new management IT environment in 2016; the direct

exchange of information with the Spanish customs IT systems to speed up the passage of goods through customs and reduce paperwork; and finally the preparation for the issuance of electronic certificates and connection with systems in other countries (which still needs to be rolled out with any third country."

4. Conclusions

105. SPS approval procedures are critical components of the SPS systems as they check and ensure the safe movement of animals, plants, and food between markets. Every country is responsible for implementing its own distinct approval procedure requirements. They must balance the commitments to open and fair trade while also ensuring as much as possible the safe and secure supply of imported food products in a manner consistent with national policy standards and priorities for human, animal, and plant health. However, literature review and interviews with SPS experts suggest countries do not always administer their approval procedure systems consistently with the requirements of the WTO SPS Agreement. This can lead to complexities and uncertainties, which can make trade systems less accessible and affect trade costs.

106. This report analyses the seven most pressing issues related to approval procedures, examines how they can affect international trade and which actions countries have undertaken to successfully address these issues. The focus on seven specific issues was key to disentangle the effects of approval procedures from those of other SPS measures. The detailed analysis developed in this report goes beyond the aggregate approaches that are usually found in the empirical literature studying NTMs.

107. After an in-depth description of the seven issues, the report examines the content of SPS chapters in PTAs. It shows that, despite covering the broad topics of transparency and co-operation, concrete commitments are still lacking in PTAs and disciplines that would help resolve issues related to undue delay, excessive fees, lack of trust in equivalence or lack of transparency remain rarely included.

108. The quantitative analysis takes a balanced approach to examine the impacts of approval procedures by using two different sources of information. More specifically, it first addresses the negative aspects by analysing STCs that are directly related to approval procedures in agro-food trade. It then highlights positive developments through the analysis of the responses to the OECD survey that collected countries' positive experiences in addressing one or more of the seven issues of interest.

109. The STC analysis comprises several key findings. First, the share of STCs related to approval procedures has been consistently high over time, representing on average 35% of the new records of concerns raised each year since 1995. In 2020 and 2021, this share increased to 75% and 63%, respectively, indicating a growing importance of approval procedures for exporting countries, which was also confirmed by the steady increase in trade covered by such STCs. Second, more than 75% of Members raising or supporting STCs related to approval procedures are high income and more than 80% of Members receiving them are high and upper-middle income. Third, network analysis of the characteristics describing STCs confirms that the selection of the seven issues is not only relevant in the context of approval procedures but also central to overall SPS systems, as approval procedure related concerns are closely intertwined with topics related to harmonisation, risk assessment or regionalisation. The systemic nature of concerns related to approval procedures highlights that solving their burden may have positive spill-over effects on all other SPS issues.

110. Fourth, results of the structural gravity model show that the existence of an STC related to approval procedures reduces trade by 26% whereas other types of STCs reduce trade by 12%. These numbers apply to the context of voluntarily reported trade concerns. Nevertheless, they represent a lower bound of the overall effect of NTBs caused by approval procedures as some of these barriers might still not be reported despite the consistently increasing participation by Members into the STC reporting scheme. Fifth, the trade impacts of STCs differ by sector. That is, concerns related to approval procedures matter most for food products with an estimated 80% reduction in trade in food products, whereas they do not have a significant impact on animals and plants products. Conversely, other types of concerns reduce trade in animals and animal products by 20% and trade in plants and plant products by 28%. Therefore, this product level analysis demonstrates the importance to consider the differentiated effects of approval procedures across sectors when designing SPS measures.

111. The OECD survey on countries' administration of approval procedures presented several key insights. First, the responses indicate that "undue delay" is the most frequent issue mentioned in 68% of the case studies, followed by "lack of transparency" (29%). Second, the principal actions undertaken to improve SPS approval procedures aimed at simplifying SPS measures (42% of actions undertaken) and implementing digital solutions (39%). Twenty-nine per cent made greater use of international standards, and the same percentage aimed to improve coordination between SPS agencies and other border agencies. The case studies confirm the relevance of electronic certification in creating efficiencies in SPS systems and enhancing agro-food trade. Emerging solutions such as remote audit also provided good examples of initiatives taken by countries despise the lack of intergovernmental regulations. Finally, the survey responses showed that there exists a menu of solutions to simultaneously tackle several approval procedures issues and help national SPS authorities meet their WTO obligations.

112. The analysis of the current challenges in the administration of approval procedures can be used to reaffirm the fundamental role played by the SPS Agreement and guidance provided by the WOAH, IPPC and Codex. In-country positive experiences are supporting the need to analyse the full spectrum of opportunities provided by the digitalisation of SPS systems.

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Annex A. SPS Agreement Annex C

ANNEX C: CONTROL, INSPECTION AND APPROVAL PROCEDURES[23]

1. Members shall ensure, with respect to any procedure to check and ensure the fulfilment of sanitary or phytosanitary measures, that:

(a) such procedures are undertaken and completed without undue delay and in no less favourable manner for imported products than for like domestic products;

(b) the standard processing period of each procedure is published or that the anticipated processing period is communicated to the applicant upon request; when receiving an application, the competent body promptly examines the completeness of the documentation and informs the applicant in a precise and complete manner of all deficiencies; the competent body transmits as soon as possible the results of the procedure in a precise and complete manner to the applicant so that corrective action may be taken if necessary; even when the application has deficiencies, the competent body proceeds as far as practicable with the procedure if the applicant so requests; and that upon request, the applicant is informed of the stage of the procedure, with any delay being explained;

(c) information requirements are limited to what is necessary for appropriate control, inspection and approval procedures, including for approval of the use of additives or for the establishment of tolerances for contaminants in food, beverages or feedstuffs;

(d) the confidentiality of information about imported products arising from or supplied in connection with control, inspection and approval is respected in a way no less favourable than for domestic products and in such a manner that legitimate commercial interests are protected;

(e) any requirements for control, inspection and approval of individual specimens of a product are limited to what is reasonable and necessary;

(f) any fees imposed for the procedures on imported products are equitable in relation to any fees charged on like domestic products or products originating in any other Member and should be no higher than the actual cost of the service;

(g) the same criteria should be used in the siting of facilities used in the procedures and the selection of samples of imported products as for domestic products so as to minimise the inconvenience to applicants, importers, exporters or their agents;

(h) whenever specifications of a product are changed subsequent to its control and inspection in light of the applicable regulations, the procedure for the modified product is limited to what is necessary to determine whether adequate confidence exists that the product still meets the regulations concerned; and

(i) a procedure exists to review complaints concerning the operation of such procedures and to take corrective action when a complaint is justified.

Where an importing Member operates a system for the approval of the use of food additives or for the establishment of tolerances for contaminants in food, beverages or feedstuffs which prohibits or restricts access to its domestic markets for products based on the absence

[23] Control, inspection and approval procedures include, *inter alia*, procedures for sampling, testing and certification.

of an approval, the importing Member shall consider the use of a relevant international standard as the basis for access until a final determination is made.

2. Where a sanitary or phytosanitary measure specifies control at the level of production, the Member in whose territory the production takes place shall provide the necessary assistance to facilitate such control and the work of the controlling authorities.

3. Nothing in this Agreement shall prevent Members from carrying out reasonable inspection within their own territories.

Annex B. Mapping of SPS Chapters in Preferential Trade Agreements

(1) Is there an SPS chapter or provision?

I. Reference to the WTO SPS Agreement

(2) Does the Agreement refer to the WTO SPS Agreement?

(3) Does the Agreement use the same definitions as the SPS Agreement?

(4) Does the Agreement use the same rules as the SPS Agreement?

(5) Are any specific Annexes of the SPS Agreement adopted?

II. Integration Approach

A. Standards

(6) Do parties recognise the adaption to regional conditions (including regionalisation, zoning and/or compartmentalisation)

(7) Do parties reference international standards?

i. Equivalence

(8) Is equivalence recognised?

(9) Are Parties encouraged to take into account other parties' standards when elaborating new standards?

(10) Is the burden of justifying non-equivalence on the importing country?

ii. Mutual Recognition

(11) Is mutual recognition recognised?

(12) Is there a time schedule for achieving mutual recognition?

iii. Harmonisation

(13) Are there specified existing standards to which countries shall harmonise?

(14) Is the creation of concerted/regional standards referenced?

B. Risk Assessment

(15) Do the parties recognise that SPS measures are based on documented and scientific (if not available, objective) evidence?

(16) Is the participation of interested parties referenced?

(17) Is the burden of evaluating risk on the exporting country?

(18) Is there reference to international standards/procedures?

C. Audit/Control Inspections

(19) Is there a provision on control and inspection?

(20) Are there provisions for pre-certification processes for exporting firms?

(21) Are there provisions for advance rulings?

i. Mutual Recognition

(22) Is mutual recognition in force?

(23) Does the importing party have the right to audit the exporting party's competent authorities, inspection systems, or production procedure?

ii. Equivalence

(24) Is the burden of justifying non-equivalence on the importing country?

iii. Harmonisation

(25) Is the participation of interested parties referenced?

(26) Are there specified existing standards to which countries shall harmonise?

(27) Is the use or creation of regional standards promoted?

(28) Is the use of international standards promoted?

III. Transparency Requirements

(29) Is there a transparency provision?

(30) Is there a provision on exchange of information?

(31) Is there a provision on electronic publication?

(32) Is there a duty to translate the document in the language of the other party(ies)?

(33) Is there a limitation to the obligation to notify, for reasons of law enforcement, public interest, or commercial interest?

(34) Do parties have to notify each other prior to the entry into force of a new standard or regulation?

(35) Is there a specified minimum time period for comments?

(36) Is there a derogation clause on notification period for emergency?

(37) Does the Agreement allow the participation of interested parties of the other party in the development of standards?

(38) Does the agreement specifically reference the participation of regulatory authorities of the other party in the development of standards?

IV. Institutions

(39) Do parties establish SPS contact/enquiry points?

(40) Do parties establish a SPS committee?

(41) Is there a fixed periodical meeting for the committee?

(42) Is the SPS Committee the designated first place for dispute resolution?

(43) Is the SPS Committee open?

(44) Do parties establish a working group?

(45) Is there a mechanism to issue recommendations?

(46) Is there a mechanism mandated to issue administrative decisions?

(47) Is a body for administering the Agreement established?

(48) Is the recourse to the DS for SPS chapter disallowed?

V. Further Cooperation Among Members

(49) Is there a general IRC clause/Common policy/standardisation programme (beyond trade-related objectives)?

(50) Is there a provision on technical assistance?

(51) Is there a provision for technical consultations/cooperation?

VI. MRAs

(52) Is there an MRA in force?

VII. Others

(53) Is there a provision on special/preferential treatment?

(54) Is there a provision on certifications?

(55) Is there a provision on labelling, marking, and packaging?

(56) Is there a provision on traceability?

(57) Is coordination for participating in international or regional accreditation agencies referenced?

(58) Is testing data to be made available?

Annex C. OECD Survey on SPS Approval Procedures

Introduction

Online version: To respond to the online version of the survey, please click here.

The Organisation for Economic Co-operation and Development (OECD) is conducting a study that examines specific issues and recent developments in country administration of **control, inspection and approval procedure systems** (hereafter referred to as "approval procedures"). The specific issues examined in the study are:

1. undue delay
2. inconsistency and discrimination between domestic and imported products
3. lack of transparency
4. over-reliance on information-gathering and administrative requirements
5. use of excessive fees
6. lack of trust in country or product equivalence
7. application of approval procedure requirements in excess of objective scientific risk assessment.

This survey aims to incorporate countries' **positive experiences** with adapting existing approval procedures or introducing new approval procedures that were able to address one or more of these seven issues.

In order to obtain a large response rate, this survey is short: it invites you to describe **one specific case study** and to answer several questions (primarily multiple choice) related to this case study.

It is of course possible (and encouraged) to share more than one case study. In this case, you can complete the survey multiple times, one for each case study.

The information you provide in this survey is **strictly confidential**. At the end of the survey, you will be asked for general background information (e.g. country, authority). These questions are optional and you can choose to submit your answer anonymously.

Thank you for sharing your views and experience with us. If you have any questions or comments on the survey, please do not hesitate to contact Annelies Deuss (annelies.deuss@oecd.org).

A) General information

1. **In which region are you located?** *[Select **one** option]*
   - ☐ Middle East and North Africa
   - ☐ Sub-Saharan Africa
   - ☐ North America
   - ☐ Central and South America
   - ☐ East and South East Asia (incl. China, Japan, Korea)
   - ☐ Central and South Asia (incl. India)
   - ☐ Oceania
   - ☐ European Union (EU27)
   - ☐ Other Europe (incl. Russian Federation, Ukraine)
   - ☐ Other (please specify):

     Click or tap here to enter text.

2. **Is your country a developed, developing or least-developed country?** *[Select **one** option]*
   - ☐ Developed country
   - ☐ Developing country
   - ☐ Least-developed country

3. **For which Authority do you work?** *[Select **one** option]*
   - ☐ Veterinary Services
   - ☐ Plant Protection Services
   - ☐ Food Safety Services
   - ☐ Other (please specify):

     Click or tap here to enter text.

B) Case study

Please share an example of a change your country introduced in an existing approval procedure or of a new approval procedure that improved one or more of the following seven issues:

1. undue delay
2. inconsistency and discrimination between domestic and imported products
3. lack of transparency
4. over-reliance on information-gathering and administrative requirements
5. use of excessive fees
6. lack of trust in country or product equivalence
7. application of approval procedure requirements in excess of objective scientific risk assessment.

1) Description:

In your answer in the text box, it would be helpful to describe the "old" procedure and the "revised" procedure or the new procedure, why this change was introduced, how long it took to develop, what were the main benefits, what was crucial to implement it, what were some of the complications, etc.

Click or tap here to enter text.

☐ Check this box to indicate that we can publish your answer in the text box in the report.
→ *If we consider including your answer in the study, we will contact you to check whether you still agree that this information can be published and whether you would like to make changes to your answer. We might edit the text to match our formatting and length requirements – if so, we would work with you to adjust the text.*

2) Follow-up questions:

For the case study you described above, please select the relevant answer(s) from the list or specify your answer. The purpose of these questions is to compare the different submissions and aggregate the answers.

1. **Which of the seven issues was/were improved?** *[Select all that apply]*
   - ☐ Undue delay
   - ☐ Inconsistency and discrimination between domestic and imported products
   - ☐ Lack of transparency
   - ☐ Over-reliance on information-gathering and administrative requirements
   - ☐ Use of excessive fees
   - ☐ Lack of trust in country or product equivalence
   - ☐ Application of approval procedure requirements in excess of objective scientific risk assessment

2. **Was an existing measure revised or a new measure introduced?** *[Select **one** option]*
   - ☐ Revision existing measure
   - ☐ New measure

3. **When was the new or revised measure first conceived?** (month-year)

Click or tap here to enter text.

4. **When was the new or revised measure actually introduced?** (month-year)

Click or tap here to enter text.

5. **a) How did the COVID-19 pandemic influence the introduction of this new or revised measure?** *[Select **one** option]*

☐ COVID-19 accelerated the introduction
☐ COVID-19 slowed down the introduction
☐ COVID-19 had no impact

b) If the introduction of this measure was influenced by COVID-19, is this measure intended to be temporary or permanent? *[Select **one** option]*

☐ Temporary
☐ Permanent

6. **a) Are the benefits bilateral, plurilateral or multilateral?** *[Select **one** option]*

☐ Bilateral
☐ Plurilateral
☐ Multilateral

b) If the benefits are bilateral or plurilateral, can you specify the benefiting trading partner(s)?

Click or tap here to enter text.

7. **Which product(s) were covered?** *[Select all that apply]*

Select the HS chapter code(s) from the list below.

If the product(s) cannot be found in the list, please specify the product(s):

Click or tap here to enter text.

☐HS01 Live animals
☐HS02 Meat and edible meat offal
☐HS04 Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included
☐HS05 Products of animal origin, not elsewhere specified or included
☐HS06 Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage
☐HS07 Edible vegetables and certain roots and tubers
☐HS08 Edible fruit and nuts; peel of citrus fruits or melons
☐HS09 Coffee, tea, maté and spices
☐HS10 Cereals

☐HS11 Products of the milling industry; malt; starches; inulin; wheat gluten
☐HS12 Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder
☐HS13 Lac; gums, resins and other vegetable saps and extracts
☐HS14 Vegetable plaiting materials; vegetable products not elsewhere specified or included
☐HS15 Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes
☐HS16 Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates
☐HS17 Sugars and sugar confectionery
☐HS18 Cocoa and cocoa preparations
☐HS19 Preparations of cereals, flour, starch or milk; pastrycooks' products
☐HS20 Preparations of vegetables, fruit, nuts or other parts of plants
☐HS21 Miscellaneous edible preparations
☐HS22 Beverages, spirits and vinegar
☐HS23 Residues and waste from the food industries; prepared animal fodder
☐HS24 Tobacco and manufactured tobacco substitutes
☐HS33 Essential oils and resinoids; perfumery, cosmetic or toilet preparations
☐HS35 Albuminoidal substances; modified starches; glues; enzymes
☐HS41 Raw hides and skins (other than fur skins) and leather
☐HS43 Fur skins and artificial fur; manufactures thereof
☐HS51 Wool, fine or coarse animal hair; horsehair yarn and woven fabric
☐HS52 Cotton
☐HS53 Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn

8. Which type of approval procedure was improved? *[Select all that apply]*

☐ Approval of food and feed, and approval of the import of plants, animals, plant and animal products
☐ Pre-market product approvals, approval of the use of additives or for the establishment of tolerances for contaminants in food, beverages and feedstuff, approval of plant protection products (pesticides) and veterinary drugs, and approval of genetically modified organisms
☐ Conduct of risk assessment for a product, Pest Risk Analysis, and Import Risk Analysis
☐ Certification, authorisation/approval of establishments, and animal or plant life and health and food safety control system audits
☐ Pest- or disease-free area recognition and equivalence determination
☐ Import checks, sampling, laboratory analysis, and control measure
☐ Other (please specify):

Click or tap here to enter text.

9. **What was/were the main type(s) of action?** *[Select all that apply]*

☐ Simplifying SPS measures
☐ Improving coordination among SPS agencies and with customs
☐ Joint inspections

☐ Integration of SPS processes in single-window trade systems
☐ Accepting electronic certificates
☐ Other digital solutions
☐ Reducing the need for original certificate
☐ More targeted and risk-based inspections
☐ Recognition of international risk assessment
☐ Greater reliance on international standards
☐ Other (please specify):

Click or tap here to enter text.

10. What was crucial to introduce this revised or new measure? *[Select all that apply]*

☐ Time
☐ Money
☐ Consultations with the private sector
☐ Consultations between different public agencies responsible for border processes
☐ International consultations/acceptance
☐ Other (please specify):

Click or tap here to enter text.

11. Can you share examples (e.g. studies, trade flows, articles …) that show the benefits of this revised or new measure?
If answering survey by email: please attach relevant documents to your email

C) Additional information from respondents (optional)

12. What is the name of your country?

Click or tap here to enter text.

13. For which authority do you work?

Click or tap here to enter text.

14. Can we contact you to ask follow-up questions, if necessary?
If yes, please enter your email address below:

Click or tap here to enter text.

☐ Check this box to indicate that you would like your answer to stay anonymous

Thank you very much for completing this survey.

Annex D. Econometric model

The gravity model in international trade provides some of the most robust empirical findings in economics and is considered a workhorse for empirical analysis in the field. (Tinbergen, 1962[67]) used the analogy with Newton's universal law of gravitation to describe the patterns of bilateral aggregate trade flows between two countries and showed that they are proportional to gross national products of those countries and inversely proportional to the geographic distance that separates them. Not only the empirical validation of the model has been strong and stable over time, but it has also found theoretical grounds in the literature with the seminal contributions of (Anderson, 1979[68]), (Krugman, 1980[69]) who derived gravity expressions from existing theoretical trade models. The derivation of the gravity equation has been proven robust to other modern versions of models as in (Eaton and Kortum, 2002[70]), (Melitz, 2003[71]) or (Chaney, 2008[72]), and many other settings with or without firm heterogeneity as shown by (Arkolakis, Costinot and Rodriguez-Clare, 2012[73]).

The empirical strategy adopted in this report follows the most recent recommendations in the literature for the estimation of the gravity equation.[24] From the theoretical trade literature, one can describe the gravity model with three equations, (1) for trade values X_{ijkt}, (2) for outward Π_{it} and (3) inward P_{jt} multilateral resistance terms, for exporting country *i*, importing country *j*, product *k*, and year *t*. These equations are expressed in terms of income *Y*, expenditure *E*, and trade costs τ.

$$X_{ijkt} = \frac{Y_{it}E_{jt}}{Y}\left(\frac{\tau_{ijkt}}{\Pi_{it}P_{jt}}\right)^{1-\sigma} \quad (1)$$

$$(\Pi_{it})^{1-\sigma} = \sum_{j}\left(\frac{\tau_{ijkt}}{P_{jt}}\right)^{1-\sigma}\frac{E_{jt}}{Y} \quad (2)$$

$$(P_{jt})^{1-\sigma} = \sum_{i}\left(\frac{\tau_{ijkt}}{\Pi_{it}}\right)^{1-\sigma}\frac{Y_{it}}{Y} \quad (3)$$

Linearisation of equation (1) provides the usual gravity equation (4) that defines X_{ijkt} the value of product *k* traded from country *i* to country *j* in year *t*, which can be further developed by replacing the bilateral trade costs τ_{ijkt} with a linear combination of Specific Trade Concerns, bilateral applied tariffs, indicator variable of Preferential Trade Agreement, , geographical distance, indicator variables for sharing a common border, a common language and having colonial ties. Unobservable multilateral resistance terms

[24] The different theoretical advancements in the explanation of the patterns of trade has helped refine the estimation strategy of the gravity equation. The extensive use of the gravity equation for empirical analyses of the effect of geography, trade policies or institutions has motivated the development of toolkits and handbooks laying down the best practices for its estimation and interpretation for bilateral trade (see (Head and Mayer, 2014[61]) or (Yotov et al., 2016[74])).

defined by (2) and (3) are controlled for with the use of importer-year and exporter-year fixed effects δ_{it} and δ_{jt}.[25]

$$ln(X_{ijkt}) = ln(Y_{it}) + ln(E_{jt}) - ln(Y) + (1-\sigma)ln(\tau_{ijkt}) - (1-\sigma)ln(P_{jt}) - (1-\sigma)ln(\Pi_{it}) \quad (4)$$

The estimation strategy relies on Pseudo-Poisson Maximum Likelihood (PPML) method with high dimensional fixed effects, which has become standard in the recent gravity literature. It conveniently accounts for the issues of zeros and heteroskedasticity of trade data, which usually make Ordinary Least Square estimates biased and inconsistent. By combining the different expressions outlined above and preserving the exponential form of the gravity equation, one can obtain equation (5) describing the baseline model to be estimated with the PPML method at the HS 2 digits level.

[25] The country-year fixed effects also absorb the variation of GDP. Alternatively, remoteness indices as defined in (Wei, 1996[77]) can be used, which are expressed as the GDP weighted distance $RemExp_{it} = \sum_j \frac{Dist_{ij}}{\left(\frac{E_{jt}}{Y_t}\right)}$ and $RemImp_{jt} = \sum_i \frac{Dist_{ij}}{\left(\frac{Y_{it}}{Y_t}\right)}$.