© *The Pakistan Development Review*
60:3 (2021) pp. 251–282
DOI: 10.30541/v60i3pp.251-282

Non-tariff Measures, Overall Protection and Export Competitiveness: Evidence from Pakistan and Regional Countries

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Pakistan's exports have stagnated since 2013 after growing significantly during the previous decade. While many other factors have undoubtedly contributed to the stagnation in exports, the evidence outlined in this paper indicates that the substantial increase in overall protection, driven by the incidence of non-tariff measures, has had a significant and decisive impact.

The paper investigates the incidence and intensity of non-tariff measures (NTMs) in Pakistan from 1967- 2015, based on trade theory to calculate ad valorem equivalent (AVE) of NTMs and overall trade protection in combination with tariffs. The incidence and intensity of core NTMs and with-it overall protection increased substantially over time, especially after 2013, even though tariffs continued to decline over this period. Overall protection rose from about 18 percent in 2003 to 68 percent in 2015 when the average tariff rate had declined to 12.7 percent and with the tariff equivalent of NTMs, contributing the balance 55 percent. Our results confirm that core NTM protection dominates the increase in overall trade protection in Pakistan. The increase in average AVEs of NTM, from 1 percent in 2003 to 55 percent in 2015, is much higher than regional comparators. Also, the data provided by Niu, et al. (2018) suggests that the AVEs of NTMs in Pakistan's major export markets (reflecting health, safety, labour, and product standards) increased significantly from 2003 to 2015.

To enhance the competitiveness of Pakistan's exports, reducing tariffs will undoubtedly help. Still, this paper presents an urgent need to manage NTMs by reassessing their necessity and coverage, streamlining the regulatory process, harmonising it with trading partners, and improving the infrastructure to help Pakistan's exporters comply with international standards.

Keywords: Non-tariff Measures, Tariff Equivalent, Protection, NTMs on Goods, Export Competitiveness

1. INTRODUCTION

1.1. Context and Rationale

Pakistan's exports have largely remained unchanged in value terms in the last decade (Figure 1). After 2013, Pakistan witnessed a significant decline in goods and exports in subsequent years. This trend exacerbated during the last six months of 2020 by the aftereffects of the pandemic and the associated slowdown in the global economy.

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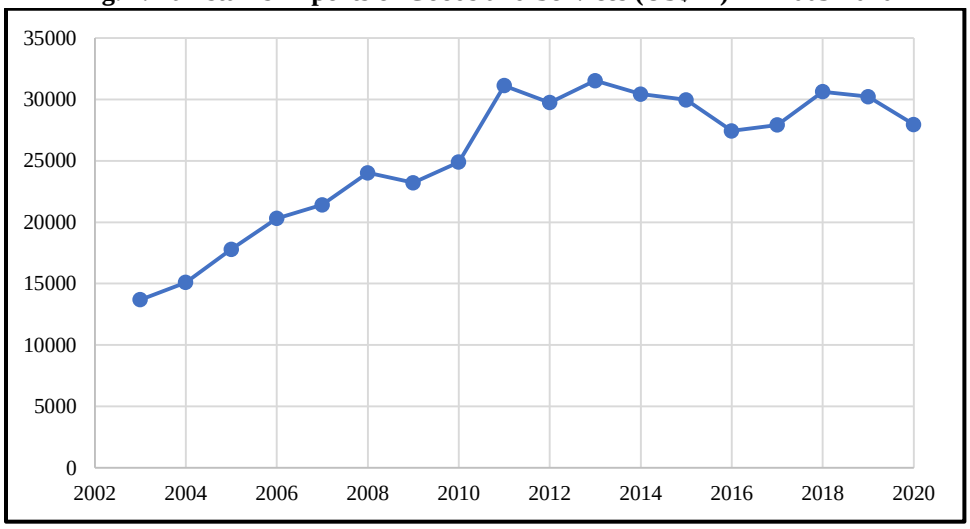
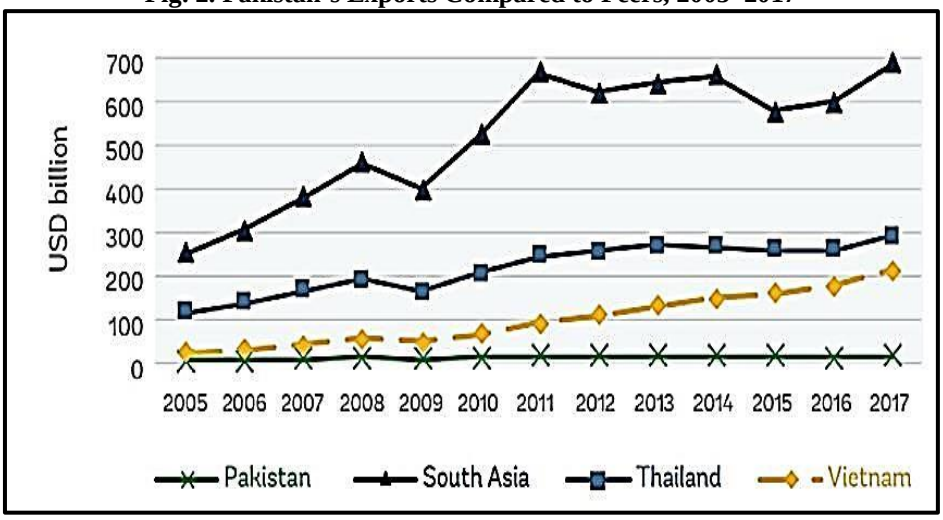
Fig. 1. Pakistan's Exports of Goods and Services (US$ m) FY 2003-2020



Source: Author's calculation based on State Bank of Pakistan/ Haver Analytics data.

The stagnation in Pakistan's export has been accompanied by weak performance relative to comparators. Exports of goods and services in value terms by Pakistan increased by 58 percent between 2005 and 2017, from US$ 17.7 billion to US$ 27.9 billion. This compares with 165 percent growth in total exports by the South Asia Region, 136 percent by Thailand, and 519 percent by Vietnam. 1 (Figure 2). Bangladesh's exports, which were about the same as Pakistan's in 2005, were US$ 47 bn in FY 2018, 50 percent higher than Pakistan's, US$ 30.6 billion.

Fig. 2. Pakistan's Exports Compared to Peers, 2005–2017

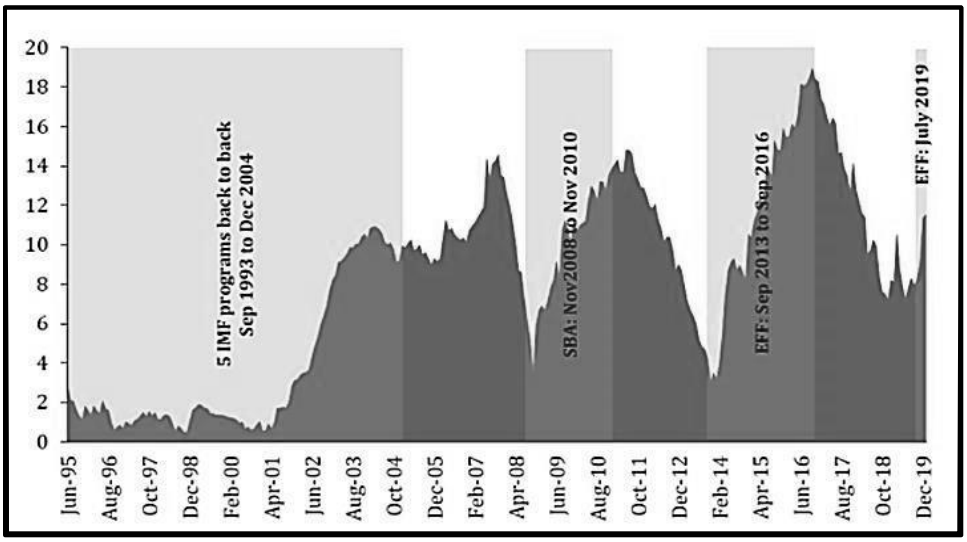


Source: United Nations Conference on Trade and Development (UNCTAD).

[1]Pakistan Trade Strategy Development and Modernising Trade in Pakistan: A Policy Reform Handbook" World Bank, September 2019.

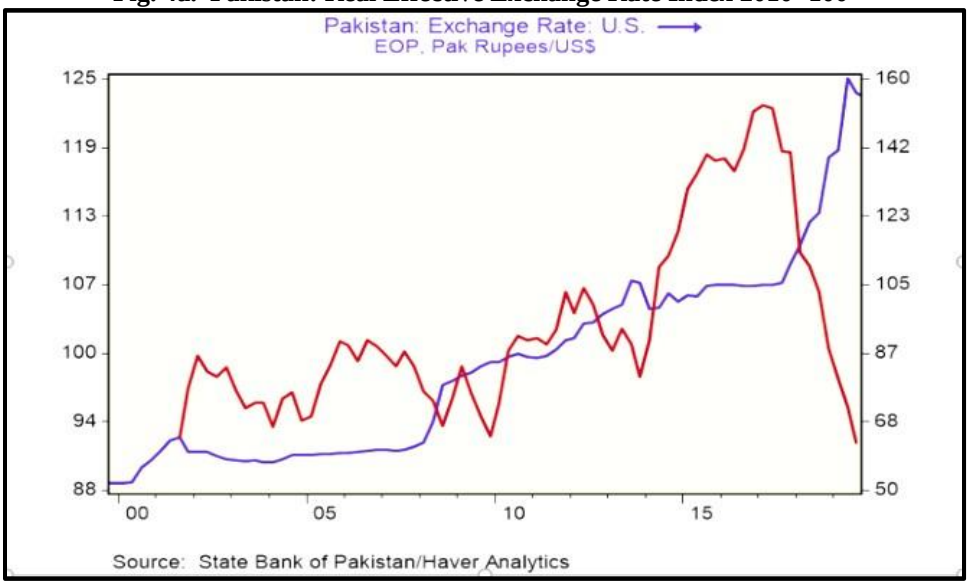
The lack of growth in exports has contributed to lower growth prospects and macroeconomic imbalances. Between 2008 and 2017, Pakistan's GDP rose at an annual growth rate of 3.7 percent, while South Asian countries' GDP grew by 6.6 percent. As exports have stagnated, low reserves have triggered IMF programs repeatedly in the past (Figure 3). Without substantial and sustained growth in export earnings, foreign exchange reserves have been insufficient to provide an adequate buffer to cope with global and internal shocks and debt servicing.

Fig. 3. Pakistan's Foreign Exchange Reserves in US$ Billion



Source: SBP.

Fig. 4a. Pakistan: Real Effective Exchange Rate Index 2010=100



Source: State Bank of Pakistan/Haver Analytics.

Although many factors contribute to the stagnation in Pakistan's past exports, a significant reason for the poor performance in exports is a protectionist trade policy reflected in high tariffs.[2,3] The argument is that such a policy created an anti-export bias suppressing the growth of exports.

Average tariffs (or import duties) in Pakistan were 12.58 percent in 2018, some of the world's highest. These tariffs (customs duties) are about two times higher than the world average and three times in East Asia and the Pacific. According to the Overall Trade Restrictiveness Index (OTRI) provided by the World Bank, Pakistan is the 7th most protected economy globally.

Tariffs play an essential role, which explains the difficulty of reducing them. They are a vital source of revenues for the government; in FY 19, customs duties and trade-related regulatory taxes contributed 16 percent to tax revenues. This is above the average for countries with a similar per capita income.

Tariffs also play a second important role, namely protection, which allows the government to use tariffs to allocate resources and impact export competitiveness. Tariffs create a gap between the world price of a product and its domestic price and that of local substitutes, affecting resource allocation in both production and consumption by raising the price of imported goods relative to those produced locally. This distortion creates incentives to allocate resources into the domestic economy rather than for production for export markets where they would get world prices that are lower than in local markets. Hence, creating a bias against exports with the duty on imports becomes a tax on exports.[4]

Pakistan also has a high differential between tariffs on consumer goods and raw materials and between intermediate goods and raw materials relative to more open economies in the East Asia Region, which participate successfully in global value Chains. This creates the well-known cascading effect and, with it, high effective rates of protection in many of Pakistan's manufacturing sectors. (see Figure 4b).[5]

What is important to note in Figure 4b is that even after cascading, the maximum tariff on consumer goods averages about 13 percent. This becomes relevant in our subsequent discussions and the importance of Non-tariff Measures (NTMs).

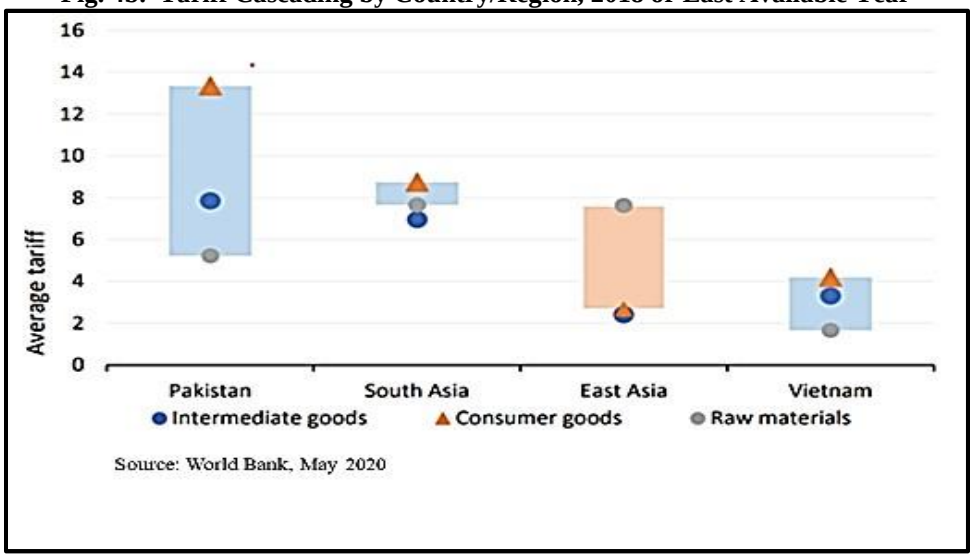
[2]Overvalued real and nominal exchange rate, an outdated trade policy, regulatory policies affecting the business environment, policy on trade services, and trade facilitation, logistics, and weakness in infrastructure.

[3]See Pakistan Economic Survey (2019) and "Pakistan Trade Strategy Development and Modernising Trade in Pakistan: A Policy Reform Handbook" World Bank, September 2019 (pages 18-19). The Handbook also argues (Pg. 19) that stagnant exports were due to an overvalued real exchange rate. This is questionable, at least in the short run, as Pakistan's exports in the first eight months of the fiscal year ending June 2020, before the onset of Covid-19, increased only 1.1 percent despite a significant devaluation (Figure 4).

[4]"Economic Policy for Competitiveness Import Duties and Performance—Some Stylised Facts for Pakistan", Varela, G. J., Gambetta, J. P., Ganz, F., Eberhard, A., Franco Bedoya, S., & Lovo, S. (2020). World Bank.

[5]Op cit.

Fig. 4b. Tariff Cascading by Country/Region, 2018 or Last Available Year



1.2. The Role and Importance of Non-tariff Measures for Trade

The internationally accepted definition of NTMs is that they are "policy measures other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, change in quantities traded, or prices or both (UNCTAD 2016)".

The following note taken from World Bank and UNCTAD provides a clear explanation about the measures included under the definition of NTMs, implications of introducing these essentially regulatory measures on trade and our daily lives, the difference between NTMs and traditional trade measures such as quotas, and the role of NTMs in sustainable development.

The definition of NTMS covers "a broad range of policy instruments including traditional trade policy instruments, such as quotas or price controls, as well as regulatory and technical measures that stem from important non-trade objectives related to health and environmental protection (Sanitary and Phytosanitary (SPS) measures and Technical Barriers to Trade (TBT)).

The concept of NTMs is neutral and does not necessarily imply a negative impact on trade. Some NTMs might even have a positive effect on trade. However, many NTMs are thought to have a significant restrictive or distortionary impact on international trade regardless of whether they are applied with protectionist intent or to address legitimate objectives, such as protecting health, safety, or the environment.

Most traded goods are affected by non-tariff measures. Most NTMs are regulatory measures, while traditional trade measures such as quotas and non-automatic licensing are less common. Since most regulations apply equally to domestic products, NTMs affect most of the products that we encounter in our daily lives: packaging requirements and limits on the use of pesticides ensure safe food; restrictions on toxins in toys protect our children; mandatory voltage standards for household plugs enable regional mobility, and emission standards for cars limit climate change.

While tariffs are transparent in their intent, the role of NTMs is less straightforward. On the one hand, many regulatory NTMs are indispensable for sustainable development. They aim to protect human, animal, or plant health and the environment. These objectives are at the core of social and environmental sustainability policies, and the measures are legitimate tools in the countries' efforts to achieve the Sustainable Development Goals. On the other hand, NTMs can also raise costs and create hurdles for trade and economic development. Private sector surveys indicate that technical regulations and related processes pose a significant challenge for trade. (World Bank, UNCTAD (2018): The unseen impact of non-tariff measures: Insights from a new database.)"

Annex-1 provides the standard definition and classification of NTMs provided by UNCTAD.

A robust regulatory framework at the national and international levels can reduce the adverse effect of NTMs on trade. For example, regulatory bodies can harmonise protection policies in all countries. The cost of compliance is higher for developing countries as compared to high-income countries. Reduction in the cost of processing the regulatory requirements may reduce the adverse effect of NTMs.

An import tax is implicitly an export duty, as discussed earlier. Import restrictions (both tariffs and NTMs) by a country affect its exports through different channels, as identified in earlier studies[6]. This paper examines the export statistics and the pattern of import protection (AVEs of NTMs) in Pakistan. We find that the imports of Pakistan are highly protected, and we suggest easing the import restrictions to expand exports.

The important point to note is that NTMs inhibit imports of the home country, which obviously, also reduce the exports of the trading partner. In the same spirit, when countries to which Pakistan exports its products introduce NTMs on imports, that also reduces exports of Pakistan. The impact of NTMs on trading partners' exports has been widely discussed in the literature as discussed in the next section[7]. However, we have not looked explicitly at that issue. We are looking particularly at the effect of NTMs imposed by Pakistan, on its trade, both its imports and exports.

2. LITERATURE REVIEW

This section discusses the recent development in research related to NTMs as one of the indicators of trade protection. NTMs provide a significant measure of trade restrictiveness. The assessment of NTMs has been limited because of identification and measurement problems. Much of the past research on NTMs has been done in the form of simple indicators, which lack theoretical underpinning, or aggregate measures that fail to capture actual trade protection policies (Niu, et al., 2018, p. 676). One of the first studies to develop a quantitative methodology for defining and measuring the AVEs of NTMs (or Tariff equivalent of NTMs) based on the theoretical concept that allows an

[6]Tokarick (2006) concludes that exports expand due to elimination of NTMs on imports. Varela et.al, (2020) conclude that the aggregate export of Pakistan increased between 2005 and 2016 due to access to high quality imported inputs as a result of removal of import restrictions under free trade agreement between China and Pakistan. Another study by Amiti and Konings (2007) concludes that easing import restrictions enhances the productivity of firms, which can increase exports.

[7]For example, see Ghodsi,2020; Gourdon et al.,2020; Bao and Qiu,2012; Bratt,2017; Jordaan,2017; Ali, 2017.

assessment of overall protection and comparison with the tariff is that of Looi Kee, et al. (2009). In Pakistan's case, there is a dearth of studies discussing the AVEs of NTMs as a measure of trade protection in general, especially using the trade theory-based methodology outlined in Looi Kee, et al. (2009). Our paper intends to fill this gap.

The effect of NTM on trade depends on multiple factors. The results vary based on the types of NTMs under discussion (as some NTMs are viewed as more trade-restrictive than others), the type of product (final good or intermediate good), and the type of firm (exporter or importer). Certain kinds of NTMs, when applied on imports of final goods, may reduce imports by a more significant percentage than when applied on intermediate goods.[8] At the same time, the difference in model specification yields different results, as studied by Fugazaa and Maur (2008). Researchers have also examined the effect of specific types of NTMs on other sectors and found mixed results (Ghodsi, 2020; Webb, et al. 2020; Jafari and Britz, 2018; Yousefi and Liu, 2013; Li and Beghin, 2010; Bao and Qiu, 2012; Disdier, et al. 2008).

Kee, et al. (2009) estimate AVEs of NTMs, as a measure of trade restrictiveness indices. They were the first to develop an empirical model based on the theoretical work of Anderson and Neary (1992; 1994; 1996; 2003; 2007). Looi Kee, et al. (2009) measure the restrictiveness indices using AVEs of NTBs for 87 countries.[9] The main finding of this study is that contribution of NTBs to trade restrictiveness, in most countries, is more than that of the tariff. Their results also show that low-income countries have a more restrictive trade regime and face a higher export barrier than developed countries. Looi Kee, et al. (2009) also investigate whether the NTBs and tariffs are substitutes for each other. They conclude that after they control for country and product fixed effects, tariffs and AVEs of core NTBs were substitutes to each other.[10] Kee and Nicita (2016) also conclude that AVEs of NTMs and tariffs are substitutes. They highlight the importance of considering the AVEs of NTMs in multilateral trade negotiations.

A shortcoming of the study by Looi Kee, et al. (2009) is that it uses data from a single period of 2002, covering 87 countries that do not include Pakistan. Therefore, this study could not explain the evolution of protection from NTMs over time and the outcome for Pakistan. The study by Niu, et al. (2018) overcomes these shortcomings.

Niu, et al. (2018) build on the work of Kee, et al. (2009) and estimate the AVEs of NTM using discrete data at three years intervals from 1997-2015. Niu, et al. (2018) use a newly constructed database, UNCTAD-TRAINS, and consistently estimate the NTMs over time for 97 countries, including Pakistan.[11] Like Kee, et al. (2009), they also conclude that the evolution of overall protection is dominated by NTM protection and not by tariffs. Niu et al. (2018) also looked at the aftermath of the financial crisis in 2008 and found that AVEs and overall protection increased in the wake of the 2008 financial crisis. Although Looi Kee, et al. (2009) and Niu, et al. (2018) both conclude that low-income

[8] See Webb, et al. 2020

[9] At the time of writing of Looi Kee, et al. (2009), the UNCTAD -MAST definition and classification of NTMs didn't exist, which came in 2010.

[10] Looi Kee, et al. (2009) mention, that as anecdotally reported, constraints imposed by international or bilateral trade agreements on government ability to set tariffs may induce some countries to replace tariff with more restrictive NTBs (and vice versa) P.186

[11] Looi Kee, et al. (2009) use UNCTAD's old system of classification of NTM, called TCMS, while Niu et al. (2018) use a new system of classification, i.e., UNCTAD-MAST (see Annex-i for details).

countries generally have the highest level of NTMs protection, they do not provide details of individual countries' overall protection.

Niu, et al. (2009) also addressed how the AVE of NTMs changed in the wake of the trend towards global liberalisation and the gradual reduction in tariff, especially after the Global Financial Crisis 2008. Using frequency indices, they find that the overall incidence of core NTMs increased over the period, and technical measures were the most widely applied NTMs each year, followed by quantitative restrictions. The incidence of price control and monopolistic measures were relatively low. They conclude that overall protection was rising despite the gradual trade liberalisation associated with reducing tariffs.

Looi Kee, et al. (2009) and Niu, et al. (2018) constraint the co-efficient of core NTMs to be negative. However, some empirical studies relax this restriction and find that NTMs also have a trade-facilitating effect (Godshi, et al. 2016; Beghin, et al. 2015; Bratt, 2017; Timini and Conesa, 2018; Ali, 2019). Beghin, et al. (2015) estimate AVEs with market imperfections (externalities) in the model and find the trade-facilitating effect of NTM. They explain that the impact of NTMs is asymmetric: The same NTMs can have positive or negative impacts on different trading partners. Also, Bratt (2017) finds that NTMs imposed by importing countries tend to effect low-income exporters more than high-income exporters.

Researchers use different data and econometric methods to estimate AVEs of NTMs. Looi Kee, et al. (2009) and Niu, et al. (2018) estimate the AVEs using import values evaluated at exogeneous world prices, normalised to unity, making import quantities equal import value.[12] Kee and Nicita (2016) use bilateral trade data, using a gravity model with the quantity of imports as the dependent variable. Cadot, et al. (2018) estimate trade effects of NTMs, separating price effects from volume effects, and assert that price-based effects can facilitate trade, but the trade cost of NTMs often reduces trade volume. The price-based estimation results show that NTMs reduce information asymmetries and enhance consumers' confidence in imported products. The volume-based estimates show that trade costs from NTMs often reduce trade volume, except for the sanitary and phytosanitary areas.[13]

Cadot and Gourdon (2016) and Cadot, et al. (2018) address what they see as the limitation of Looi Kee, et al. (2009) and use unit values (equivalent to price) to estimate AVEs, without using import elasticity directly.[14] However, these two papers have significant limitations as Cadot and Guordon (2016) do not logically explain using a monopolistic competition framework for empirical analysis instead of trade theory. Also, Cadot et al. (2018) use OLS regressions without defining the theoretical framework.

A vital shortcoming of the papers by Kee, et al. (2009), Kee and Nicita (2016), and Niu, et al. (2018) is that they do not focus on streamlining the regulatory environment, an option available to countries to reduce the impact of NTMs. More recent work by Cadot,

[12]We interpret the objective of normalisation as to render the results more interpretable. Estimation is unaffected. The normalisation has the impact of changing the units in which output is measured. Doing that, quantities and values become equal in terms of numerical values.

[13]Unlike Looi Kee, et al. (2009) method of measuring AVEs using import elasticities, Cadot, et al. (2018) build on the approaches of Gruber, et al. (2016) on volumes and Cadot and Gourdon (2016) on prices in two separate sets of equations.

[14]Cadot, et al. (2018); note that one of the limitations of using trade values in the paper by Kee et al. (2009) is that trade value will not change with change in restrictiveness when import elasticity is unity. P.6.

et al. (2018) estimates the trade effects of NTMs both on trade volume and value captured in AVEs, considering the regulatory distance. One of their essential conclusions is that the regulatory differences are the key contributor to NTM-related trade costs.[15] However, they did not mention streamlining and harmonising regulations.

Other studies discussing the effect of NTMs on trade without measuring AVEs include Liu, et al. (2019. They compare the estimated export values without NTMs, with the actual export values after NTMs implementation for agri-food in African countries for 1996-2013. They conclude the actual export values after the impact of NTMs is less than the estimated values without NTMs, for developing countries. They assume that the difference between actual export values and estimated ones captures the effect of NTM on export volume. They did not calculate the AVEs of NTMs.

There has been limited research done on NTMs and their impact on trade in Pakistan. Kiyani and Shah (2014) report that Pakistan's NTBs have no significant effect on imports. They use data from 2010/2011 and therefore are unable to compare with the pre-2006 situation. Another study by Yeo and Deng (2019) finds that NTBs negatively affect Pakistan's trade with its dominant partners. However, this study uses a subjective assessment of NTBs existing in 2015, ranging from 1 (tolerant) to 7 (strict), and they also ignore the incidence of NTMs before 2006.

Some researchers discuss the relevance of NTMs in Pakistan using bilateral trade data. Pasha and Pasha (in an undated paper) discuss the trade restrictions imposed by India on Pakistan and conclude that exports of Pakistan may increase if India relaxed NTMs. However, this study is also based on outdated data and compares NTMs from 1994 to 2004, while most of the NTMs, as we explain in this paper, evolved in Pakistan after 2013. Mustafa and Qayyum (2016) assess Pakistan's export to China, evaluate the impact of TBT and conclude that TBT enforcement increases exports of Pakistan to China. However, this assessment is narrow because they consider only TBT and again do not estimate AVEs of NTMS.[16]

Another significant limitation of the above studies is that none looked at the impact of restriction posed by NTMs on services. Significant improvement in this respect is provided by Fontagne, et al. (2016), which calculates the impact of NTMs on services. They do so by comparing the cost of eight critical services in 117 countries with the most competitive cost in global markets.[17] In Pakistan's case, they estimate that the average cost of these eight critical services is increased by around 88.3 percent due to NTMs compared with 54.5 percent for Vietnam, 72.8 percent for India, and 86.6 percent for Sri Lanka. This introduces an immediate cost to the exporters of goods and services that use these services. In Pakistan's case, services account for 59.8 percent of Pakistan's overall exports when measured in value-added.[18] In this research, we focus on the tariff equivalent of NTMs of goods only. In a subsequent paper, we will study the protection given by NTMs in the service sector.

[15]The detailed methodology of measuring regulatory distance is given in Cadot, et al. (2018), Annex 6; P.29.

[16]The study uses the Tobit model and data set for the years 2002-2015.

[17]The eight services sectors are communication, construction, other business services, trade, insurance, other financial intermediation, other government services, and transport. See "Estimated Tariff Equivalents of Services NTMs", Lionel Fontagné, Cristina Mitaritonna & José Signoret; CEPII Working Paper (2016) and Website http://www.cepii.fr/CEPII/fr/bdd_modele/presentation.asp?id=33 .

[18]See "Pakistan Trade Strategy Development and Modernising Trade in Pakistan: A Policy Reform Handbook" World Bank, September 2019; P 105.

3. ESTIMATING AVES OF NTMS (TARIFF EQUIVALENT OF NTMS) AND THEIR RELEVANCE

To obtain the AVEs of NTMs, the quantity impact of NTMs and tariffs on imports is first estimated. As a second step, we transform the quantity impact into price effects, using import demand elasticities. The paper follows the methodology that Niu, et al. (2018) adopted from Looi Kee, et al. (2009).

3.1. Estimating Impact of Tariffs, NTMs, and other Protective Measures on Imports

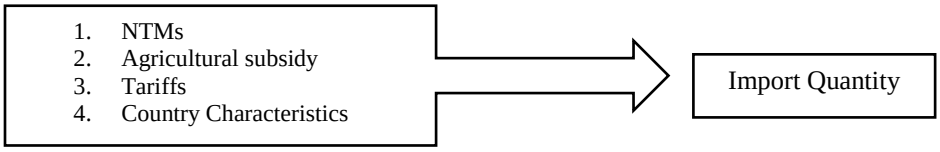
The basic equation is based on trade theory and accommodates both tariffs and NTMs in an n-good n-factor general equilibrium model.

$$\ln m_{nc} = \alpha_n + \sum \alpha_{nk} \; C_c^k + \beta_{nc}^{Core} Core_{nc} + \beta_{n,c}^{DS} \ln DS_{nc} + \epsilon_{nc} \ln(1 + t_{nc}) + k_{nc} \quad \dots \quad (1)$$

where;

- $m_{n,c}$ is the import value of good n in country c evaluated at exogenous world prices, which are all normalised to unity. As discussed in the previous section, imported quantities equal $m_{n,c}$.
- α_n is the product line intercept, which captures factors related to product n that do not change across countries;
- C_c^k are k variables that represent country characteristics
- $\alpha_{n,k}$ is the coefficient to measure the impact of country-specific characteristics
- $Core_{n,c}$ is a dummy variable for each category of core NTMs for product n in country c; it takes value 1 in the presence of the core NTMs; otherwise, it is 0.[19]
- $\beta_{n,c}^{Core}$ is a coefficient that captures the impact of the presence of core NTMs by country c and product n.
- $DS_{n,c}$ is the domestic agricultural support (subsidies) provided in dollars
- $\beta_{n,c}^{DS}$ is the coefficient that captures the effect of agricultural support by country c and product n.
- $\epsilon_{n,c}$ is the import demand elasticity, which is assumed to be constant over time
- $t_{n,c}$ is an ad-valorem tariff on good n in country c
- $k_{n,c}$ is an error term

Equation (1) represents imports as a function of NTMs, tariffs, subsidies, country characteristics, and an error term. It can be expressed in a simple, functional form as follows:



[19] NTMs are divided into core and non-core (see section 4). In this assessment, by convention, we use a limited category of core NTMs namely technical measures, quantity control measures, price measures, and monopolistic measures.

Equation (1) is modified by imposing structures on the coefficients $\beta_{n,c}^{Core}$ and $\beta_{n,c}^{DS}$ by decomposing each one into country-specific factors and product (tariff line) specific factors. This decomposition captures product and country variation and improves econometric estimation. The modified equation, shifting tariff to the left-hand side, takes the following form:

$$\ln m_{nc} - \epsilon_{nc} \ln(1 + t_{nc}) = \alpha_n + \sum_k \alpha_{nkt} C_C^k + \left(\beta_n^{Core} + \sum_k \beta_{nk}^{Core} C_c^k\right) Core_{nc} + \left(\beta_n^{DS} + \sum_k \beta_{nk}^{DS} C_c^k\right) \ln DS_{nc} + k_{n,c} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

In Equation (2) β_n^{Core} and β_n^{DS} give the product-specific factors and $\beta_{nk}^{Core} C_c^k$ and $\beta_{nk}^{DS} C_c^k$ give country-specific factors. β_{nk}^{Core} estimates the effect of *k*th country-specific endowment on the import volume for product n in country c in the presence of a core NTM category. The co-efficient β_{nk}^{DS} measures the effect of *k*th country-specific endowment on the import volume for product n in country c with 1 percent increase in $\beta_{n,c}^{DS}$ (the coefficient for agriculture support).

An important assumption underlying the model is that theoretically, the coefficients β_n^{Core} and β_n^{DS} are expected to be negative. They can be zero if the NTM measure is not restrictive when the tariff is binding, but the unrestricted positive estimates are economically meaningless. Hence β_n^{Core} and β_n^{DS} are constrained to be non-positive. To apply this restriction in the model, exponential functions are applied to the coefficient for core NTM and domestic support. The modified equation then takes the following non-linear form:

$$\ln m_{nc} - \epsilon_{nc} \ln(1 + t_{nc}) = \alpha_n + \sum_k \alpha_{nk} C_C^k + \left(-e^{(\beta_n^{Core} + \sum_k \beta_{nk}^{Core} C_c^k)}\right) Core_{nc} + \left(-e^{(\beta_n^{DS} + \sum_k \beta_{nk}^{DS} C_c^k)}\right) ln DS_{nc} + k_{nc} \quad \ldots \quad \ldots \quad (3)$$

Thus, the estimate of the impact of core NTNs and agricultural domestic subsidies on imported volumes (β_n^{Core} and β_n^{DS}) is obtained by estimating (3) using non-linear least squares regression.

3.2. Estimating AVEs of NTMs and Overall Protection

We now need to obtain the tariff equivalents of NTMs, the AVEs of NTMs, to allow comparison with tariffs. This is obtained in a second step using equation (1) to transform the quantity impact of core NTMs into the impact of the core NTMs on domestic prices.

We start by partially differentiating equation 1 with respect to core NTMs, noting that p^d is the domestic price

$$\frac{\partial \ln m_{nc}}{\partial Core_{nc}} = \frac{\partial \ln m_{nc}}{\partial \ln p_{n,c}^d} * \frac{\partial \ln p_{n,c}^d}{\partial Core_{nc}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Re-writing Equation (4), noting that $\frac{\partial \ln m_{nc}}{\partial \ln p_{n,c}^d}$ is the elasticity of imports with respect to domestic prices, $\epsilon_{n,c}$, and $\frac{\partial \ln p_{n,c}^d}{\partial Core_{nc}}$ is the tariff equivalent of NTMs, $Ave_{n,c}^{Core}$, measuring the impact of core NTMs on domestic prices.

$$\frac{\partial \ln m_{nc}}{\partial Core_{nc}} = \epsilon_{n,c} * Ave^{Core}_{n,c}$$

Or,

$$Ave^{Core}_{n,c} = \frac{1}{\epsilon_{n,c}} \frac{\partial \ln m_{nc}}{\partial Core_{nc}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Since the $Core_{n,c}$ is a dummy binary variable, and therefore not subject to differentiation, we obtain $\frac{\partial \ln m_{nc}}{\partial Core_{nc}}$ by taking the difference of equation 1 evaluated at $Core_{n,c} = 0$ and at $Core_{n,c} = 1$. This gives the percentage change in imports due to core NTMs (See Annex-III for mathematical proof)

$$\frac{\Delta m_{nc}}{m} = e^{\beta^{Core}_{nc}} - 1 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

Where $\frac{\Delta m_{nc}}{m}$ is approximately equal to $\frac{\partial \ln m_{nc}}{\partial Core_{nc}}$.

Substituting equation (6) in equation (5), we get the following equation:

$$Ave^{Core}_{n,c} = \frac{e^{\beta^{Core}_{n,c}} - 1}{\epsilon_{n,c}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

Equation (7) gives the instantaneous percentage change in domestic prices due to core NTMs. To estimate AVEs, we need estimates of demand elasticities of imports and $\beta^{Core}_{n,c}$. As noted above, non-linear regression estimates of Equation (3) give the estimates of $\beta^{Core}_{n,c}$.

Finally, overall protection T_{nc}, is the sum of tariffs imposed by country c on product n, t_{nc} And AVEs of NTMs imposed by country c on product n, Ave_{nc}, given as:

$$T_{nc} = t_{nc} + Ave_{nc} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

3.3. Estimating the Relevance of AVEs through the Frequency Index and Coverage Ratios

Following Nicita and Gourdon (2013), the frequency index of NTMs imposed by country j is calculated using the following equation:

$$F_{ijk} = \left[\frac{\sum D_{ijk} M_{ij}}{\sum M_{ij}}\right] * 100 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

where F_{ijk} is the frequency index for a group of products, i, in country j for a particular category of the core NTMs, k; M_{ij} is a dummy variable that indicates whether there are imports of those products, i, into country j, and D_{ijk} is a dummy variable reflecting the presence of at least one of the core NTMs in the category being considered, k, for the product group, i in country j. *The frequency index (FI) summarises the percentage of the number of imported products in the group affected by at least one category of core NTMs being considered.* The measured frequency lies between 0 and 1, and the greater the value, the higher frequency of core NTMs; in this paper, we represent the frequency index as lying between 0 and 100 percent.

The importance of NTMs on overall imports is measured using the coverage ratio. *The coverage ratio (CR) measures the share of the value of imports subject to at least one category of core NTMs being considered for a country*, with a higher value indicating greater coverage by core NTMs.

The coverage ratio formula, also adopted from Nicita and Gourdon (2013), is given as:

$$C_{ijk} = \left[\frac{\sum D_{ijk} V_{ij}}{\sum V_{ij}}\right] * 100 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

where C_{ijk} is the coverage ratio for a group of products, i, for a particular category of the core NTMs, k, in country j; V_{ij} is the import value of these products i in country j, and D_{ijk} is a dummy variable reflecting the presence or absence of at least one category of the core NTMs in the category being considered, k, for the product group, i. in country j.

4. DATA

According to the MAST classification of NTMs, prepared by UNCTAD in 2012, there are 22 main categories of NTMs, of which 16 are related to imports.[20] If we include subcategories, there are a total of 150 NTMs. By international convention, we are focusing on core NTMs which fall under four categories: Price control measures (TRAINS M3 code F1-F3), Quantity Restrictions (TRAINS M3 code A1, B1, E1-E3, G33), Technical measures (TRAINS M3 code A, B, C), and Monopolistic measures (TRAINS M3 code H). We use the classification of NTMs developed by UNCTAD under the MAST framework outlined in Annex-1.

We are using the latest data on NTMs from the World Integrated Trade Solution database (WITS) for Pakistan for 96 product groups.[21] The latest NTM data available for Pakistan at detailed 6-digit HS product level covers NTMS introduced from 1967 to 2015. The data for 2016 is available but shows that there has been no change in 2016, and our estimates were carried out for 2015 to allow international comparison and estimates of AVEs of NTMs. It is also to be noted that there is no data available for core NTMs related to Pakistan's monopolistic measures and price controls. Therefore, our estimation is limited to only two core NTMs: technical measures and quantity control measures. The top ten most applied NTMs to imports in Pakistan in 2015 are listed in Table 1. Note that the E322 measure applied to 100 percent of all imports and was introduced in 2013 (Annex VI). The significance of this in estimating FI and CR is discussed later.

Tariff data is taken from the WITS database. The import data for Pakistan is also taken from the WITS database. Estimates of AVEs for Pakistan have been extracted from the public database created by Niu, et al. 2018.[22]

[20]See Annex IV.

[21]WITS software offers an interface that provide access to UNCTAD Trade Analysis Information System (UNCTAD-TRAIN data) and United Nations Commodity Trade Statistics (COMTRADE) at https://wits.worldbank.org/

[22]The data is available at https://www.nottingham.ac.uk/gep/links/index.aspx

Table 1

Top 10 Most Applied Non-tariff Measures on Imports in Pakistan in 2015 Listed According to Frequency Index Measured as a Percentage

	Core NTM type	FI	CR
1	**E322**. Prohibition for political reasons (embargo)	100	100
2	**B7.** Product quality, safety, or performance requirements	24.32	17.20
3	**E316**. Prohibition of used, repaired, or remanufactured goods	13.15	16.19
4	**B31**. Labeling requirements	10.49	12.15
5	**A83**. Certification requirements	9.86	4.81
6	**E129**. Licensing for non-economic reasons not elsewhere specified	7.83	25.41
7	**B33**. Packaging requirements	7.29	6.13
8	**B42**. Technical barriers to trade regulations on transport and storage	6.65	4.59
9	**B32**. Marking requirements	6.52	4.24
10	**C3**. The requirement to pass through a specified port of customs	5.50	8.46

Source: Author's calculation using WITS data (Annex V).

5. RESULTS AND DISCUSSION

5.1. Incidence of NTMs

To investigate the evolution and intensity of NTMs, we use the two measures outlined in the previous section. We start with the frequency index, which estimates the percentage of imported products in the group affected by at least one category of core NTMs.

The frequency index of quantity control measures and technical measures was estimated for 2003, 2006, and 2015 for 18 product groups as shown in Table 2. No data is available on price control and monopolistic measures for Pakistan. Also, the data shows that no new core NTMs were introduced between 2004 and 2012, and the coverage of existing NTMs in terms of products to which they apply also remained unchanged except for minor changes in 2005 and 2006 (see Annex VI and Table 4). Thus, there was no significant change in the frequency index in 2009 and 2012. Table 2 gives unweighted means for agricultural and manufacturing sectors and all sectors.

Table 2 explains important points. First, the frequency index increased substantially between 2003 and 2015, indicating an increasing number of NTMs and their coverage in terms of products they apply. The evidence shows that the increase in coverage in terms of products to which the new or existing NTMs apply was much higher than the number of new NTMs introduced each year (see Table 4 and Annex VI).

The total mean of the frequency index for quantity control measures for all products jumped from 7.6 percent in 2003 to 30 percent in 2015 on an unweighted basis. The equivalent index for technical measures also increased from 9.2 percent in 2003 to 46.9 percent in 2015 on an unweighted basis.

Second, on average, more agriculture products are subject to at least one NTM than manufacturing products. Looking at Figure 5, which gives the estimated frequency index in 2015 combining both Quantity Control and Technical Measures, on average, 85.7 percent of agriculture products are subject to at least one core NTM compared to 56.4 percent in the manufacturing sector. Within the manufacturing sector, the footwear sector has the highest frequency index of 100 percent, while the textiles sector is exposed to the second-highest level of NTM measures at 93.7 percent. Live animals have the highest frequency index of 100 percent in the agriculture sector.

Table 2

Frequency Index of Types of Core NTM Types across Economic Sectors (Percentages) (QC is Quantitative Restriction and TM Refers to Technical Measures)

	2003		2006		2015	
Industry Name	QC	TM	QC	TM	QC	TM
Agricultural Products (HS0 Industry 1-24)						
Live Animals (1-5)	9.26	74.07	16.22	77.03	81.44	100
Vegetable Products (6-14)	7.19	24.18	5.53	19.60	10.34	94.40
Fats and Oils (15)	0.00	2.70	2.86	5.71	61.76	69.70
Prepared food stuffs (16-24)	9.92	19.01	9.72	20.14	24.85	73.94
Agricultural mean	6.59	29.99	8.58	30.62	44.60	84.51
Manufacturing products (HS0 Ind. 25-97)						
Mineral products (25-27)	1.06	0.00	1.12	0.00	16.51	8.26
Chemical Products (28-38)	36.19	36.88	37.05	37.88	51.30	51.01
Rubber and Plastics (39-40)	0.00	0.00	0.00	0.00	54.37	49.51
Raw hide and skins (41-43)	0.00	0.00	0.00	0.00	0.00	0.60
Wood (44-46)	0.00	0.00	0.00	0.00	0.00	15.58
Paper (47-49)	0.00	0.00	0.00	0.00	13.33	61.48
Textile (50-63)	0.58	0.19	0.30	0.15	0.43	93.56
Footwear (64-67)	0.00	0.00	0.00	0.00	0.00	100
Stone and cement (68-70)	0.00	0.00	0.00	0.00	7.25	78.26
Base metals (71-83)	0.20	0.00	0.19	0.00	19.23	13.92
Machinery and electrical equipment (84-85)	0.00	0.00	0.00	0.26	49.27	6.09
Motor vehicles (86-89)	0.00	0.00	0.00	0.00	74.34	12.39
Optical and medical instruments (90-92)	0.00	0.00	0.00	0.00	34.00	17.00
Miscellaneous goods (93-97)	6.15	0.00	6.47	0.00	13.18	36.43
Manufacturing Mean	3.16	2.65	3.22	2.73	23.80	38.86
Mean for all Products	7.55	9.20	7.36	9.31	29.96	46.85

Source: Author's calculation based on WITS data.

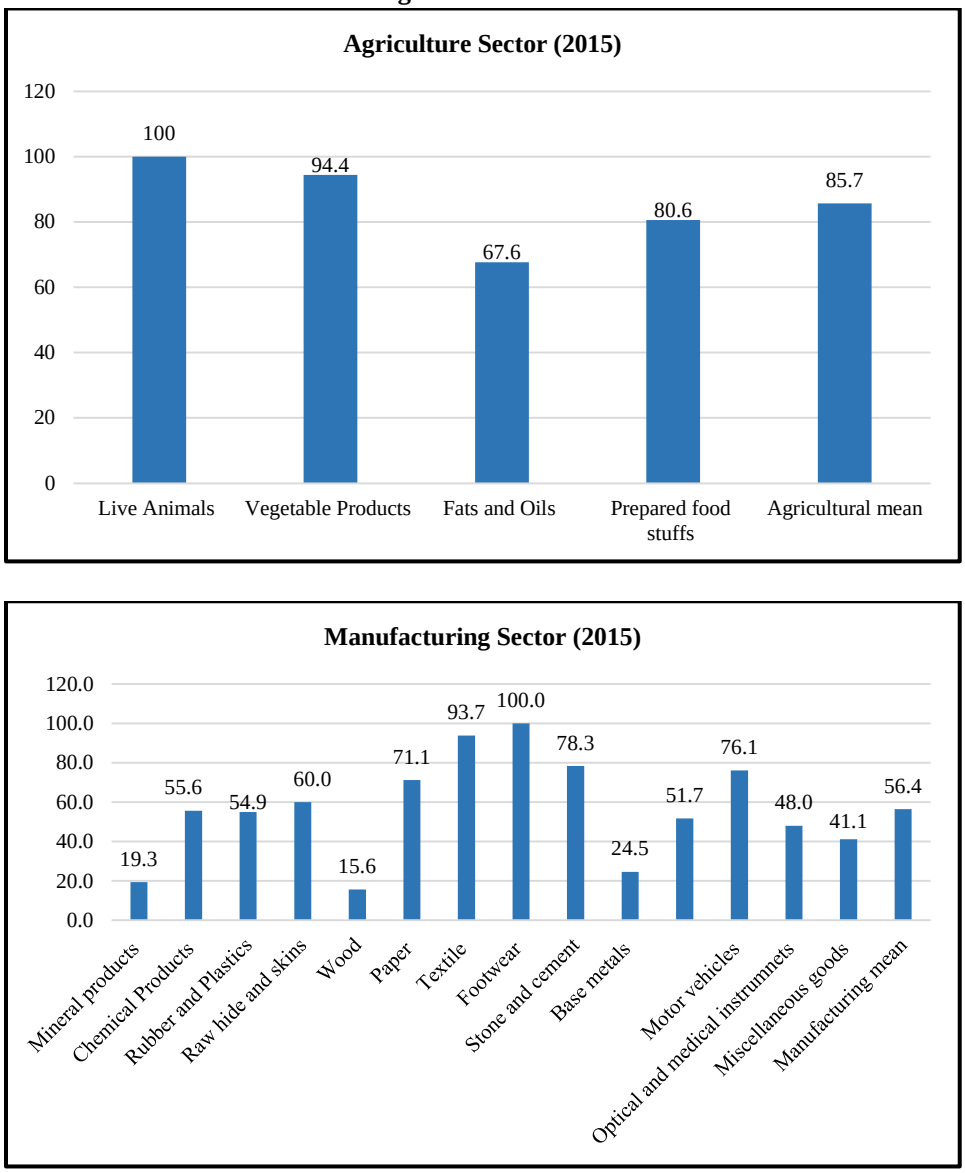
The third point is that the most widely applied NTMs across Pakistan's sectors were the technical measures. The average frequency index for all products (HS code 1-96) of technical measures is greater than quantity control measures in 2003, 2006, and 2015.

Finally, the frequency index for both quantity control and technical measures is about the same in 2003 and 2006 before increasing substantially in 2015. One major explanation is that the WITS database shows that no new NTMs were introduced between 2004 and 2012, and almost half of all NTMs (17 out of 42) were introduced between 2013 and 2015. Simultaneously, the increase in coverage in terms of products they apply in 2013-2015 accounts for about two-thirds of those in the entire period from 1967 to 2015 (12,534 out of 18,206).[23]

An important technical point is worth noting in estimating the frequency index and coverage ratio. For 2015, estimates for FI and CR exclude the E322 NTM as they apply to 100 percent of products - as noted in the data section, this NTM was first introduced by Pakistan in 2013, as shown in Annex VI. This approach is consistent with the process used by UNCTAD. If we include E322, all estimates for the frequency index and coverage ratio in 2015 would be 100 percent.

[23]See Table 4 and Annex VI.

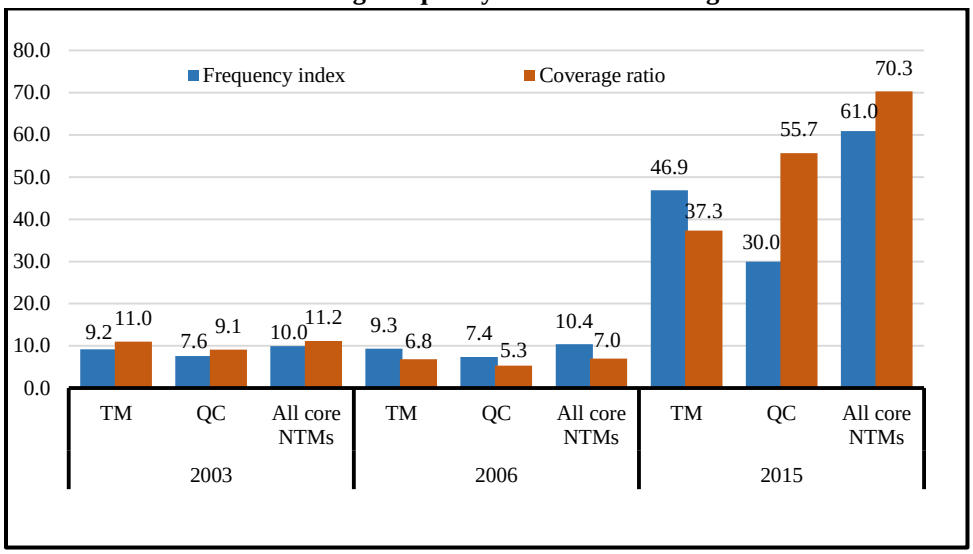
Fig. 5. Frequency Index of All Core NTMs Applied to Agriculture and Manufacturing Sector



Source: Author's calculation based on WITS data.

Figure 6 compares the incidence of different core NTMS over time using the frequency index and the coverage ratio. It clearly shows that the incidence of different types of NTMs increased substantially between 2003 and 2015 but remained relatively unchanged between 2003 and 2006. The coverage ratio, which measures the share of imports covered by different types of NTMs, is about the same level as the frequency index. It tends to be higher than the frequency index if the value of imports of the products with the NTMs being considered is higher and vice versa.

Fig. 6. Incidence of Different Types of Core NTMs Overtime for Pakistan using Frequency Index and Coverage Ratio



Source: Author's calculation using WITS data.

5.2. AVEs of NTMs (The Tariff Equivalent of NTMs)

Table 3 summarises the estimates of AVEs (tariff equivalent of NTMs) and their distribution across the sectors for the years 2003, 2006, and 2015. As can be seen, the average protection by NTMs as represented by AVEs in total jumped from about 1 percent in 2003 to 55 percent in 2015. This can also be seen clearly in Figure 7. If we compare agriculture with manufacturing sectors in Table 3, both were equally protected at about 1 percent in 2003, and this remained true in 2015: the protection provided by NTMs in the manufacturing sector (55.8 percent) is of the same order although a little higher than in the agriculture sector (45.2 percent). We arrive at a similar conclusion by comparing 2006 and 2015: NTM protection increased substantially in both sectors when looking at the average AVEs of NTMs in the two sectors and the overall mean.

Within the agricultural sector, the sectoral distribution of AVEs of NTMs indicates that fats and oils were the most protected product groups in 2003 and 2006 (10.7 percent), while in 2015 there is a substantial increase in AVEs across the board with vegetable products having the highest protection by NTMs (64.2 percent) as measured by AVEs and with live animals, the second highest at 51.5 percent.

Within the manufacturing sector, the sectoral distribution of AVEs of NTMs indicates that chemical products had the highest AVEs in 2003 at 5 percent. The picture changed substantially in 2015. AVEs increased across the board with the highest protection afforded to optical and medical instruments of 102 percent, with machinery and electrical equipment in second place with AVEs of 73 percent and rubber and plastics third at 72 percent. The textile sector, which contributes the most to Pakistan's exports, also had a high AVE of 41 percent, representing substantially increased protection compared with 2003 when the AVE was zero.

Table 3

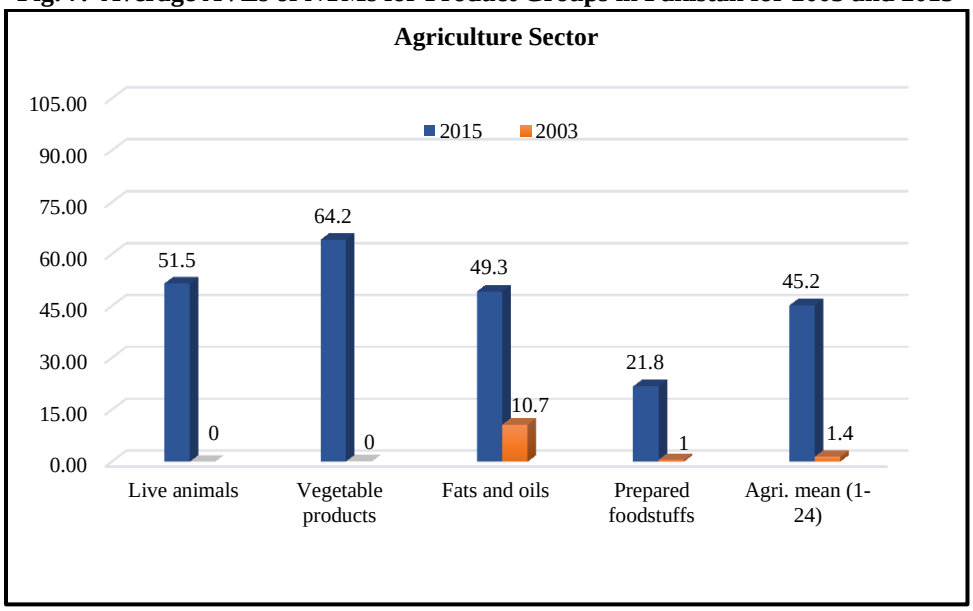
Average AVEs of NTMs (Expressed in Percentages) for Product Groups for Pakistan

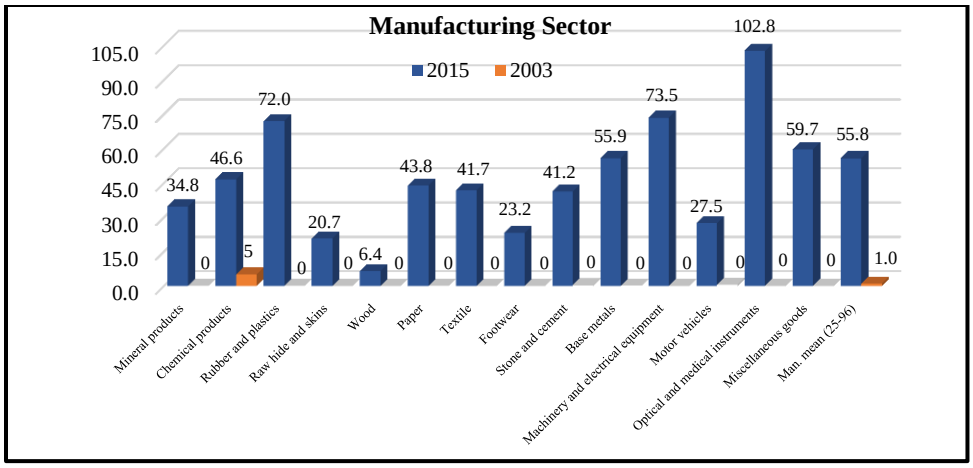
Industry Code	Industry Name	2003	2006	2015
1-5	Live animals; animal products	0.01	0.13	51.54
6-14	Vegetable products	0.08	0.10	64.21
15	Fats and oils	10.71	18.08	49.25
16-24	Prepared foodstuffs	0.54	0.39	21.78
Agricultural mean (1-24)		**1.43**	**2.20**	**45.21**
25-27	Mineral products	0.04	0.00	34.77
28-38	Chemical products	5.03	1.86	46.61
39-40	Rubber and plastics	0.02	0.00	71.95
41-43	Raw hide and skins	0.00	0.00	20.65
44-46	Wood	0.00	0.00	6.41
47-49	Paper	0.02	0.53	43.83
50-63	Textile	0.00	0.14	41.73
64-67	Footwear	0.00	0.00	23.15
68-70	Stone and cement	0.32	0.10	41.20
71-83	Base metals	0.16	0.00	55.85
84-85	Machinery and electrical equipment	0.00	0.19	73.50
86-89	Motor vehicles	0.45	0.03	27.47
90-92	Optical and medical instruments	0.00	0.00	102.76
93-96	Miscellaneous goods	0.00	0.00	59.67
Manufacturing Mean (25-96)		**1.03**	**0.44**	**55.80**
Total Mean – All Products (1-96)		**1.06**	**0.58**	**55.18**

Source: Author's estimation using data from Niu, et al. (2018).

Note: The estimated mean for the agriculture sector is the average of AVEs of all products in groups 1 to 24. This is not equal to the mean of the four product groups in the agriculture sector as they have a different number of products in each group. The same is the case for manufacturing AVEs and for the Total Mean.

Fig. 7. Average AVEs of NTMs for Product Groups in Pakistan for 2003 and 2015





Source: Author's estimation using data from Niu, et al. (2018).

If we consider the NTMs data for Pakistan in Table 4, we better understand why the AVEs increased so substantially between 2003 and 2015. First, there were no new NTMs introduced from 2004 to 2012. Subsequently, a substantial number, 17, was introduced in 2013 and 2014, representing a little less than half of 42 NTMs covering imports in Pakistan introduced from 1967 to 2015.

Second, the number of NTMs introduced each year is dominated by the coverage of products affected by NTMs. As noted above, two-thirds of the products affected by these NTMS were introduced after 2013.

Third, there is a possibility that the regulatory process was intensified with the increase in coverage and led to a higher impact on domestic prices. This is also likely, especially given that 100 percent of imports were subject to at least one NTM (E322) and thus examination by customs compared with 11.2 percent in 2003. However, we do not have any data on the regulatory process.

Table 4

*Number of New (Core) NTMs and Coverage in Pakistan (1967-2015)**

Year	Number of New (Core) NTMs	Coverage
1967	17	1875
1973	4	36
1976	1	46
1979	1	23
1980	0	1680
1986	0	150
1991	0	41
1997	1	134
2003	1	1680
2005	0	2
2006	0	5
2013	16	10953
2014	1	1144
2015	0	437
Total	**42**	**18206**

Source: Author's calculation based on WITS data.

*Coverage represents new products subject to existing or new core NTMs introduced that year.

Table 5 outlines the relative increase in AVEs between 2003 and 2015 in the case of Pakistan and comparator countries for which estimates of AVEs are available from Niu, et al. (2018). As can be seen, the relative increase in the AVEs for imported goods between 2003 and 2015 in Pakistan dwarfs the rise in India, Sri Lanka, and Vietnam. On average, for all sectors in Pakistan, the estimated AVEs in 2015 were 52 times higher than in 2003 than six times in India and 1.53 times in Vietnam and declined by 2 percent in Sri Lanka. In the case of manufacturing, AVEs in Pakistan were over 54 times the level in 2003 during this period compared with 8.6 times in India, 1.7 times in Vietnam, and unchanged in Sri Lanka.

At a minimum, this suggests that comparator countries had introduced NTMs earlier and had more time to adjust to them by streamlining the regulatory process and harmonising NTMs with trading partners, especially for exports. Pakistan is now recognising the impact of these essentially non-tariff barriers and playing catch-up late in the day.

Despite this increase or catch-up, AVEs in Pakistan were still lower than in the other three countries by 2015, representing a potential for further increases post-2015. However, suppose AVEs in Pakistan were by 2015 lower than comparator countries. In that case, it still raises the question of why Pakistan's exports were stagnating while those in comparator countries with higher protection, as measured by AVEs, flourishing?

One possible answer may lie in the enormous impact of the NTMs on services on exporters' costs. As noted above, in Pakistan's case, services account for 59.8 percent of Pakistan's overall cost of exports, and the average cost of critical services is estimated to have increased by around 88.3 percent because of NTMs. This compares with 54.5 percent for Vietnam, 72.8 percent for India, and 86.6 percent for Sri Lanka.[24]

Table 5

AVEs of NTMs between 2003 and 2015 in Comparator Countries

Country	Sectors	2003	2006	2015	2015 as a Ratio of 2003 22003*
India	Agriculture (1-24)	0.4508	0.3686	0.6807	1.51
	Manufactg. (25-96)	0.0872	0.1006	0.7458	8.55
	All Sectors (1-96)	0.1185	0.1225	0.7412	6.25
Sri Lanka	Agriculture (1-24)	0.8086	0.6527	0.5304	0.66
	Manufactg. (25-96)	0.7489	0.4526	0.7558	1.01
	All Sectors (1-96)	0.7544	0.4696	0.7405	0.98
Pakistan	Agriculture (1-24)	0.0143	0.0220	0.4521	31.62
	Manufactg. (25-96)	0.0103	0.0044	0.5580	54.17
	All Sectors (1-96)	0.0106	0.0058	0.5518	52.06
Vietnam*	Agriculture (1-24)	–	0.7195	0.6260	0.87
	Manufactg. (25-96)	–	0.4868	0.8022	1.65
	All Sectors (1-96)	–	0.5126	0.7849	1.53

Source: Author's calculation using data from Niu, et al. (2018).

*For Vietnam, we are using 2006 as the base year instead of 2003.

[24]These estimates were for 2011, and we hope to update them in a forthcoming paper.

5.3. Overall Protection

To measure overall protection, using Equation (5), we combine the data on tariffs and AVEs of NTMs. Table 6 summarises the average estimated AVEs of NTMs, average tariffs, and overall protection for 2003, 2006, and 2015. The evolution of NTMs increased significantly from 2013 to 2015. NTMs evolved as a dominant source of protection compared to the tariff for Pakistan when average tariffs were declining. In 2003 average AVEs were lower than average tariffs, but the opposite was confirmed in 2015.

Table 6

Average AVE Estimates, Tariffs, and Overall Protection (in Percentages)

	Simple Average			Import-weighted Average			
Years	AVEs	Tariffs	Overall	AVEs	Tariff	Overall	Imports (US $ Billion)
2003	1.06	16.98	18.04	1.44	16.71	18.15	13.0
2006	0.58	14.86	15.44	0.79	12.71	13.50	29.8
2015	55.18	12.73	67.91	50.83	9.58	60.41	43.9

Source: Author's calculation using import data and tariff data from WITS.

Average tariffs have been declining only slightly over the years, while the AVEs have increased several-fold in the same period. The unweighted average tariff rate fell from 17 percent in 2003 to 13 percent in 2015, but the overall protection level has been increasing. The average AVEs of NTMs increased from 1 percent in 2003 to 55 percent in 2015 and 51 percent in import weighted terms. The tremendous surge in NTMs and their coverage contributed to the increase in overall protection from 18 percent in 2003 to 68 percent in 2015. NTMs have evolved as a more important source of protection than tariffs over the years.

Thus, tariffs contributed more to overall protection in 2003 and 2006, while the opposite was in 2015. Trade liberalisation policies addressing tariffs alone may not help boost exports in Pakistan; NTMs need to be addressed. The overall level of protection is exceptionally high. It is underestimated by looking only at declining tariffs, which do not measure overall protection.

5.4. Impact of NTMs on Domestic Prices and Policy Options to Enhance Export Competitiveness—NTM Simplification

The paper confirms the price-raising effect of NTMs in Pakistan. Our analysis suggests that NTMs raise the domestic price of affected products, on average, by a considerable 55 percent. The streamlining of non-tariff measures provides the best entry door to that process by reassessing their necessity and coverage, streamlining the regulatory process, and harmonising it with trading partners. We have not looked at the NTMs imposed by the importers of Pakistan's products. Available data on five major markets to which Pakistan exports its products suggests that their AVEs also increased in

our sample period (2003-2015), which gives additional reason for export stagnation in Pakistan. For example, if we look at the AVEs of those five major export markets, based on Niu et al. (2018), we see that the AVEs of the US increased from 27 percent to 74 percent from 2003 to 2015, AVEs of Germany and the UK rose from 2 percent in 2003 to 67 percent in 2015. Similarly, the AVEs for Afghanistan and China were 57 percent and 75 percent, respectively as of 2015.[25]

This will help enhance export competitiveness, reduce the impact on domestic prices and help ease inflationary pressures, a significant concern of policy-makers.

Streamlining NTMs should not be thought of as a search for quick wins to reduce trade costs by a few percentage points, but more ambitiously in the context of a wide-ranging regulatory improvement agenda.

Consistent with Cadot's recommendations for Morocco, two crucial actions will help streamline NTMs in Pakistan.[26]

(a) A comprehensive review of existing NTM measures to eliminate the inefficient NTMs based on cost-benefit analysis.
(b) Build an effective regulatory and governance structure for the new and updated NTMs.

The government should collaborate with the private sector to conduct such reviews to gain efficiency and transparency in the system. This will reduce trade costs arising from NTMs and open doors to improving the ease of doing business. Ideally, the streamlining of NTMs should be based on "regulatory impact assessment" (RIA).

The government of Pakistan should devise policies for easing and simplification of NTMs. The benefit of doing so is well articulated by a recent World Bank blog post that emphasises the challenges faced by developing countries regarding trade costs stemming from compliance with NTMs. They report that developed countries are better able to manage NTM simplification.[27]

> *"Beyond tariffs, many goods that go through customs face myriad inspections and certifications to confirm they satisfy various safety requirements, health standards, and technical regulations…. Complying with NTMs is costly and time-consuming for both importing and exporting firms. Tariff reductions and NTM simplification are not likely to impose high costs on high and upper-middle-income countries, which account for over 90 percent of world trade.* (Looi Kee, et al. 2020)".

6. CONCLUSIONS

We explain in the paper the poor performance of exports in Pakistan and the pattern of import protection in the form of increasing core NTMs. The results help provide an alternative and convincing explanation for why Pakistan's exports have stagnated since around 2013 after growing substantially during the previous decade. While many other factors have undoubtedly contributed, as discussed in the introduction, the evidence outlined in this

[25]According to WITS data and Pakistan Economic Survey 2015, the top five countries to which Pakistan exported in 2015 are: US, China, Afghanistan, UK, and Germany.

[26]See chapter on Trade Competitiveness (by Oliver Cadot) in Country Economic Memorandum of the IDB Group for Morocco (2012) Edited by Irfan Aleem.

[27]https://blogs.worldbank.org/developmenttalk/free-trade-now-case-tariff-reductions-and-non-tariff-measures-simplifications-fight

paper indicates that the substantial increase in overall protection driven by the incidence of non-tariff measures has had a major and decisive impact. Policymakers need to focus on the rise in overall protection caused by NTMs rather than tariffs alone.

To enhance the competitiveness of Pakistan's exports, reducing tariffs, which are among the highest in the world, will undoubtedly help. However, this paper presents the urgent need to manage and reduce the impact of NTMs, which dominate overall protection, by reassessing their necessity and coverage and streamlining and harmonising the regulatory process with trading partners. This will also help reduce the impact on domestic prices and help ease inflation, a major concern of policymakers. Also, the data provided by Niu, et al. (2018) suggests that the AVEs of NTMs in Pakistan's major export markets increased significantly from 2003 to 2015. Hence, there is an urgent need to harmonise the regulatory process with these partners and improve the infrastructure to comply with international standards.

This paper investigates the evolution and intensity of NTMs in the goods sector at specific points over the period 2003-2015 for Pakistan and their impact on domestic prices. Our results show that the increasing proportion of products was subject to quantity control measures and technical measures in Pakistan from 2003 to 2015. Technical measures are the most widely applied NTMs across the sectors. The agricultural sector has a higher frequency index than the manufacturing sector; on average, 85.7 percent of agriculture products are subject to at least one core NTM compared to 56.4 percent in the manufacturing sector as of 2015.

The protection provided by NTMs as measured by AVEs significantly increased from 1 percent in 2003 to 55 percent in 2015. Within the agricultural sector, the sectoral distribution of AVEs of NTMs indicates that fats and oils were the most protected product groups in 2003 and 2006 (10.7 percent). In 2015, there was a substantial increase in AVEs across the board, with vegetable products having the highest protection by NTMs (64.2 percent) as measured by AVEs and live animals, the second highest at 51.5 percent.

Within the manufacturing sector, the sectoral distribution of AVEs of NTMs indicates that chemical products had the highest AVEs in 2003 at 5.3 percent. The picture changed dramatically in 2015. AVEs increased across the board with the highest protection afforded to optical and medical instruments of 102 percent, with machinery and electrical equipment in second place with AVEs of 73 percent and rubber and plastics third at 72 percent. The textile sector, which contributes the most to Pakistan's exports, also had a high AVE of 41 percent, representing substantially increased protection compared with 2003 when the AVE was zero.

The increased incidence of NTMs has been driving overall protection in comparison to tariffs since 2003. While average tariffs have been declining since 2003, there has been an increase in overall protection driven by NTMs. Overall protection increased from 18 percent in 2003 to 68 percent in 2015. Hence. We conclude that NTMs, a large number of which were introduced between 2013 and 2015, have evolved into a more important protection source than tariffs over the years since 2003.

The average AVEs of NTMs for Pakistan increased from 1 percent in 2003 to 55 percent in 2015. This increase is ten to thirtyfold higher than regional comparator countries and puts it at a disadvantage. At a minimum, this suggests that comparator countries had introduced NTMs earlier and had more time to adjust to them by

streamlining the regulatory processes and harmonising NTMs with trading partners, especially for exports. Pakistan is now recognising the impact of these essentially non-tariff barriers and playing catch-up late in the day.

Another exacerbating factor in Pakistan's case is the significant impact of the NTMs on services on exporters' costs. As noted above, in Pakistan's case, services account for almost 60 percent of Pakistan's overall cost of exports. The available data suggests that the average cost of key services is increased by around 88 percent because of NTMs. This estimated cost increase is much higher than for comparator countries, but these figures need updating and more investigation.

Our results are consistent with Niu, et al. (2018) that NTMs dominate the increase in overall protection compared to the tariff. A limitation of our study, perhaps more than that of Niu, et al. (2018), given our emphasis on export competitiveness, is that we have not adequately investigated the impact of NTMs on services and have only tangentially taken it into account by considering the results of other studies. This is a priority for future research, given that services account for most of the estimated costs of Pakistan's overall exports when measured in value-added.

ANNEX-I

The MAST (Multi-agency Support Team) Classification System 2012 for Non-tariff Measures

Imports	Technical Measures	A	Sanitary and phytosanitary measures (SPS)
		B	Technical barriers to trade (TBT)
		C	Pre-shipment inspection and other formalities
	Non-Technical Measures	D	Price control measures
		E	Licenses, quotas, prohibition and other quantity control measures Nontechnical measures
		F	Charges, taxes and other para-tariff measures
		G	Finance measures
		H	Anti-competitive measures
		I	Trade-related investment measures
		J	Distribution restrictions
		K	Restrictions on post-sales services
		L	Subsidies (excluding export subsidies)
		M	Government procurement restrictions
		N	Intellectual property
		O	Rules of origin Export measures
Exports		P	Export-related measures (including export subsidies)

Source: UNCTAD (2016).

Explanation: Measures are divided into two broad categories: import measures and export measures. All chapters from A to O reflect the importing country's requirements on its imports. Only chapter P comprises export measures, which refer to requirements imposed by the exporting country on its exports. Import measures can be executed or verified in either the exporting or the importing country but always relate to a condition for importing the product.

Import measures are further subdivided into technical measures and non-technical measures.

The first group is comprised of three chapters (A to C): SPS, TBT, and pre-shipment inspection, and other formalities. Non-technical measures are subdivided into twelve chapters (D to O). Export measures comprise only one chapter (P). Currently, measures falling within chapters J through O are not collected. So, the data are available on Chapters from A to I and Chapter P.

Note: Difference between regulations and measures: A regulation is a legal document issued officially by a government, such as a law, decree, or directive. An official regulation could bear several measures (or NTMs). In the classification, a measure is a mandatory trade control requirement enacted by an official regulation. Each regulation must be read to distinguish all measures within its text. All identified measures should be registered separately. In the database of Non-tariff Measures, both regulations and measures must be recorded and fully to reflect the information embedded within the legal document which is relevant to the trade requirements.

(UNCTAD, 2016, Guidelines to collect data on official non-tariff measures).

Brief Description of NTM Chapters

Chapter A, on SPS measures, refers to measures affecting areas such as restriction of substances and measures for preventing the dissemination of disease. Chapter A also includes all conformity assessment measures related to food safety, such as certification, testing and inspection, and quarantine.

Chapter B, on technical measures, refers to measures such as labeling, other measures protecting the environment, standards on technical specifications, and quality requirements.

Chapter C, classifies the measures related to pre-shipment inspections and other customs formalities.

Chapter D, price-control measures, includes measures that are intended to change the prices of imports, such as minimum prices, reference prices, anti-dumping or countervailing duties.

Chapter E, licensing, quotas, and other quantity control measures, groups the measures that have the intention to limit the quantity traded, such as quotas. Chapter E also covers licenses and import prohibitions that are not SPS or TBT related.

Chapter F, on charges, taxes, and other para-tariff measures, refers to taxes other than custom tariffs. Chapter F also groups additional charges such as stamp taxes, license fees, statistical taxes, and also decreed customs valuation.

Chapter G, on finance measures, refers to measures restricting the payments of imports, for example, when the access and cost of foreign exchange are regulated. The chapter also includes measures imposing restrictions on the terms of payment.

Chapter H, on anticompetitive measures, refers mainly to monopolistic measures, such as state trading, sole importing agencies, or compulsory national insurance or transport.

Chapter I, on trade-related investment measures, groups the measures that restrict investment by requiring local content or requesting that investment should be related to export in order to balance imports.

Chapter J, on distribution restrictions, refers to restrictive measures related to the internal distribution of imported products.

Chapter K, on the restriction on post-sales services, refers to difficulties in allowing technical staff to enter the importing country to provide accessory services (for example, the repair or maintenance of imported technological goods).

Chapter L, contains measures that relate to the subsidies that affect trade.

Chapter M, on government procurement restriction measures, refers to the restrictions bidders may find when trying to sell their products to a foreign government.

Chapter N, on intellectual property measures, refers to problems arising from intellectual property rights.

Chapter O, on rules of origin, groups the measures that restrict the origins of products or their inputs.

Chapter P, on export measures, groups the measures a country applies to its exports. It includes export taxes, quotas or prohibitions, and the like.

Source: (UNCTAD, 2016, Guidelines to collect data on official non-tariff measures).

ANNEX-II

Interpreting AVEs of NTMs

"The ad valorem equivalent (AVE) of an NTM is the proportional rise in the domestic price of the goods to which it is applied, relative to a counterfactual where it is not applied. It is often interpreted as measuring the distortion imposed by the NTM to the domestic economy. While this would be true in an economy characterised by pure and perfect competition and the absence of externalities or public goods, it is not true in more general – and realistic – settings.

While the term "non-tariff measures" suggests a simple parallel with tariffs, NTMs take many forms and fulfil in reality a broad range of objectives, trade and non-trade. In order to disentangle these different forms and objectives and how they map into one another, at the broadest level, two different types are usually distinguished. The first type of measures, called "non-technical", includes quantitative restrictions (QRs), price measures, forced logistics or distribution channels, and so on. The second type of measures, called "technical", includes primarily sanitary and phytosanitary (SPS) and technical barriers to trade (TBT) measures.

Technical measures are generally imposed to address market failures such as information asymmetries or negative externalities. For instance, the distribution of counterfeit drugs has a large negative impact on public health. Inspection and testing requirements on imported drugs are NTMs, and depending on how heavy the requirements are, they can have high AVEs on all drugs, including legal ones. Similarly, two-wheelers with two-stroke engines generate toxic smoke with adverse health effects in urban areas.

Restrictions on the importation of such products are NTMs; they can be considered, de facto, as trade restrictions when the products are not produced locally. However, the measures can be justified as correcting negative externalities, and simply interpreting AVEs as measuring distortions would be severely misleading.

Even if externalities are left aside, interpreting the AVE of a technical measure as a pure trade cost, a tradition that goes back to the work of Otsuki, Wilson and Sewadeh (2001), can be misleading. First, NTMs can alter fixed costs and can thus have different effects on small compared to large firms. For example, a non-discriminatory regulation that induces the exit of small firms, domestic and foreign alike, will alter the market structure. The induced change in market structure may leave non-exiting large firms with more market power than before, and this may apply to foreign as well as domestic firms (Asprilla et al., 2016). In that case, a rise in trade unit values may compound the effects of increased market concentration with NTM compliance costs.

Moreover, an alternative strand of work suggests that NTMs related to standards can work as market-creating "catalysts" in situations of asymmetric information (see e.g. Henson and Jaffee, 2007; Maertens and Swinnen, 2007; Xiong and Beghin, 2014). When the quality of suppliers is heterogeneous and unknown to buyers, regulations can overcome the information deficit and convey a signal that all producers conform to a certain standard, encouraging demand.2 Good regulations can facilitate trade. In such cases, NTMs affect both the product supply curve through the various costs associated with compliance and the

demand curve through signaling or "catalyst" effects. (Cadot, et al. 2018)."

ANNEX-III

Derivation of Equation (4) from Equation (1) to estimate AVEs

$$\ln m_{nc} - \epsilon_{n,c} \ln(1 + t_{nc}) = \alpha_n + \sum \alpha_{nk} C_c^k + \beta_{nc}^{Core} Core_{nc} + \beta_{n,c}^{DS} \ln DS_{nc} + k_{nc} \quad \dots \quad (1)$$

$$\ln m_{nc}|_{Core=1} - \epsilon_{n,c} \ln(1 + t_{nc}) = \alpha_n + \sum \alpha_{nk} C_c^k + \beta_{nc}^{Core} + \beta_{n,c}^{DS} \ln DS_{nc} + k_{nc} \quad \dots \quad (2)$$

$$\ln m_{nc}|_{Core=0} - \epsilon_{n,c} \ln(1 + t_{nc}) = \alpha_n + \sum \alpha_{nk} C_c^k + \beta_{n,c}^{DS} \ln DS_{nc} + k_{nc} \quad \dots \quad (3)$$

Difference of Equation 2 and Equation 3 gives:

$$\ln m_{nc}|_{Core=1} - \ln m_{nc}|_{Core=0} = \beta_{nc}^{Core}$$

Given that difference in log equals to log of the ratio:

$$\frac{\ln m_{nc}|_{Core=1}}{\ln m_{nc}|_{Core=0}} = \beta_{nc}^{Core}$$

Taking exponents on both sides gives:

$$\frac{m_{nc}|_{Core=1}}{m_{nc}|_{Core=0}} = e^{\beta_{nc}^{Core}}$$

Subtracting 1 from both sides gives:

$$\frac{m_{nc}|_{Core=1}}{m_{nc}|_{Core=0}} - 1 = e^{\beta_{nc}^{Core}} - 1$$

$$\frac{\Delta m_{nc}}{m} \simeq e^{\beta_{nc}^{Core}} - 1 \quad \dots \quad (4)$$

Equation (4) states that the coefficient of core NTMs minus 1 gives the percentage change in imports due to core NTMs.

This implies that the exponential of the coefficient on Core NTBs, β_{nc}^{Core}, minus 1 will give us the instantaneous percentage change in imports due to Core NTBs.

Note that the above mathematical proof is not provided in Looi Kee, et al. (2009) and Niu et al. (2018).

ANNEX-IV

Box- 1

Categories of NTMS by UNCTAD-MAST Classification and Available at WITS

A - Sanitary and Phytosanitary Measures

(1) A1 - Prohibitions/restrictions of imports for SPS reasons
(2) A3 - Labelling, marking, and packaging requirements
(3) A8 - Conformity assessment related to SPS

B - Technical Barriers to Trade

(4) B1 - Import authorisation/licensing related to TBT
(5) B3 - Labelling, marking, and packaging requirements
(6) B4 - Production or post-production requirements
(7) B8 - Conformity assessment related to TBT

C - Pre-shipment Inspection and other Formalities

(8) C3 - Requirement to pass through the specified port of customs

E - Non-automatic Import Licensing, Quotas, Prohibitions, Quantity-control Measures, and other Restrictions other than SPS or TBT Measures

(9) E1 - Non-automatic import-licensing procedures other than authorisations covered under SPS and TBT chapters
(10) E2 - Quotas
(11) E21 - Permanent
(12) E3 - Prohibitions
(13) E31 - Prohibition for economic reasons
(14) E32 - Prohibition for non-economic reasons

F - Price Control Measures including Additional Taxes and Charges

(15) F8 - Decreed customs valuations

J - Distribution Restrictions

(16) J2 - Restrictions on distribution channels

P - Export Related Measures

(17) P1 - SPS and TBT related export measures
(18) P16 - Conformity Assessment
(19) P162 - Inspection requirement
(20) P3 - Export-license, -quota, -prohibition and other restrictions other than SPS or TBT measures
(21) P31 - Export prohibition
(22) P33 - Licensing, permit, or registration requirements to export.

Source: WITS.

ANNEX-V

Core Non-tariff Measures Introduced in Pakistan and Coverage by Products (2015)

NTM- Description	NTM Code	Core NTM Coverage
Prohibitions for sanitary and phytosanitary reasons	A11	1,378
Geographical restrictions on eligibility	A12	12
Authorisation requirement for sanitary and phytosanitary reasons for importing certain products	A14	443
Prohibitions or restrictions of imports for sanitary and phytosanitary reasons, not elsewhere specified	A19	7
Labeling requirements	A31	540
Packaging requirements	A33	1
Microbiological criteria of the final product	A41	1
Hygienic requirements not elsewhere specified	A49	1
Cold or heat treatment	A51	2
Fumigation	A53	209
Storage and transport conditions	A64	1
Testing requirements	A82	358
Certification requirements	A83	2,102
Inspection requirements	A84	471
Origin of materials and parts	A851	41
Distribution and location of products after delivery	A853	41
Quarantine requirements	A86	684
Tolerance limits for residues of or contamination by certain substances	B21	2
Labeling requirements	B31	621
Marking requirements	B32	336
Packaging requirements	B33	417
Technical barriers to trade regulations on transport and storage	B42	342
Product quality, safety or performance requirements	B7	1,185
Product registration/approval requirements	B81	111
Certification requirements	B83	221
Inspection requirements	B84	48
Pre-shipment inspection	C1	19
The requirement to pass through a specified port of customs	C3	368
Other formalities not elsewhere specified	C9	520
Non-automatic import-licensing procedures other than authorisations covered under A11 and technical barriers to trade	E1	254
Licensing for non-economic reasons	E12	8
Licensing for religious, moral, or cultural reasons	E121	23
Licensing for non-economic reasons not elsewhere specified	E129	478
Quotas Permanent	E21	9
Full prohibition (import ban)	E311	28
Prohibition of used, repaired, or remanufactured goods	E316	590
Prohibition for economic reasons not elsewhere specified	E319	6
Prohibition for non-economic reasons	E32	214
Prohibition for religious, moral, or cultural reasons	E321	65
Prohibition for political reasons (embargo)	E322	5,992
Prohibition for non-economic reasons not elsewhere specified	E329	54
Authorisation linked with non-official foreign exchange	G33	3
Total	-	18,206

Source: Author's calculation based on data from World Integrated Trade Solution (WITS).

ANNEX VI

Core NTMs Introduced Each Year, and the Coverage in Terms of New Products Subject to Existing and New Core NTM

NTMCode	1967	1973	1976	1979	1980	1986	1991	1997	2003	2005	2006	2013	2014	2015	Total
A11	42	0	0	0	0	0	0	0	0	0	0	1,120	216	0	1,378
A12	0	0	0	0	0	0	0	0	0	0	0	12	0	0	12
A14	436	0	1	0	0	0	0	0	0	1	0	5	0	0	443
A19	7	0	0	0	0	0	0	0	0	0	0	0	0	0	7
A31	0	0	0	0	0	0	0	0	0	0	0	540	0	0	540
A33	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
A41	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
A49	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
A51	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
A53	209	0	0	0	0	0	0	0	0	0	0	0	0	0	209
A64	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
A82	0	0	22	0	336	0	0	0	0	0	0	0	0	0	358
A83	353	0	22	0	336	0	0	0	0	0	0	503	888	0	2,102
A84	135	0	0	0	336	0	0	0	0	0	0	0	0	0	471
A851	41	0	0	0	0	0	0	0	0	0	0	0	0	0	41
A853	41	0	0	0	0	0	0	0	0	0	0	0	0	0	41
A86	208	0	1	0	336	0	0	0	0	0	0	28	0	111	684
B21	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
B31	41	6	0	0	0	75	41	0	336	0	0	122	0	0	621
B32	0	0	0	0	0	0	0	0	336	0	0	0	0	0	336
B33	0	6	0	0	0	75	0	0	336	0	0	0	0	0	417
B42	0	6	0	0	0	0	0	0	336	0	0	0	0	0	342
B7	0	0	0	0	0	0	0	0	0	0	0	1,079	0	106	1,185
B81	0	6	0	0	0	0	0	0	0	0	0	105	0	0	111
B83	0	0	0	0	0	0	0	0	0	0	5	101	9	106	221
B84	0	0	0	0	0	0	0	0	0	0	0	48	0	0	48
C1	0	6	0	0	0	0	0	0	0	0	0	0	9	4	19
C3	177	0	0	0	0	0	0	0	0	0	0	191	0	0	368
C9	136	0	0	0	336	0	0	0	0	0	0	48	0	0	520
E1	0	6	0	0	0	0	0	0	0	0	0	129	9	110	254
E12	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8
E121	0	0	0	23	0	0	0	0	0	0	0	0	0	0	23
E129	0	0	0	0	0	0	0	134	336	1	0	7	0	0	478
E21	0	0	0	0	0	0	0	0	0	0	0	0	9	0	9
E311	0	0	0	0	0	0	0	0	0	0	0	28	0	0	28
E316	0	0	0	0	0	0	0	0	0	0	0	590	0	0	590
E319	0	0	0	0	0	0	0	0	0	0	0	2	4	0	6
E32	0	0	0	0	0	0	0	0	0	0	0	214	0	0	214
E321	0	0	0	0	0	0	0	0	0	0	0	65	0	0	65
E322	0	0	0	0	0	0	0	0	0	0	0	5,992	0	0	5,992
E329	44	0	0	0	0	0	0	0	0	0	0	10	0	0	54
G33	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
Total	1,875	36	46	23	1,680	150	41	134	1,680	2	5	10,953	1,144	437	18,206

Source: Author's calculation based on data from World Integrated Trade Solution (WITS).

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