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The consumer price effects of specific trade policy restrictions in South Africa*

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Abstract

This paper examines the implications for consumer prices of three consumer goods – frozen chicken, frozen chips and pasta – that have experienced rising protection from 2010 in the form of general, anti-dumping and safeguard duties. We find that tariffs and other import duties have a powerful impact on import volumes and, in the case of frozen chicken, on consumer prices. Foreign suppliers do not absorb any of the tariff increase by lowering their prices and pass the full tariff increase onto importers. However, the aggregate impact on landed import prices and volumes is reduced by the diversion of imports towards preferential trade partners, most notably, the European Union. Using disaggregated product price data at the outlet level, we estimate that tariff increases have contributed to rising domestic consumer prices, but the pass-through depends on how the different tariff measures reinforce each other in restricting imports from preferential trade partners. In the case of frozen chicken products, import-weighted average applied tariffs rose by 40% from 2012 to 2021 and are estimated to have raised consumer prices by 16.2%. The reduction in welfare of rising trade protection on the three products is calculated to be equivalent to 2.1% of food expenditure for households in the lowest consumption decile and 1.1% for households in the top consumption decile. Our results highlight the influence of preferential trade areas in mediating the impact of tariffs on prices, and illustrate how aggregate price and welfare impacts are influenced by the sequencing, targeting and ultimate combination of trade measures.

JEL classification: D1, F1, R2

Keywords: Trade policy, consumer prices, tariff pass-through, household welfare, South Africa

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1. Introduction

Since 2010, the South African government has played a more active role in using import tariffs and other trade measures to support its industrial policy goals.[1] With the introduction of the Trade Policy and Strategy Framework in 2010, tariff determinations have been "conducted on a case-by-case basis, taking into account the specific circumstances of the sector involved" (Department of Trade and Industry (DTI) 2010). This policy has resulted in both increases and decreases in the general most favoured nation (MFN) tariffs across a range of product items. However, from 2014 aggregate rates of protection appear to have risen in response to a rising incidence of tariff increases covering intermediate (e.g. steel) and consumer goods (e.g. poultry and sinks) (Stern and Ramkolowan 2021). Key considerations by the International Trade Administration Commission (ITAC) in recommending these tariff increases have covered low price imports, price disadvantages, and losses in market shares, sales, profitability, production, capacity utilisation and employment among domestic firms. Little consideration has been given to the effect of tariff increases on consumer prices.

However, in August 2022, in the face of escalating food inflation, the Minister of Trade, Industry and Competition, Ebrahim Patel, deferred anti-dumping duties on chicken imported from five countries (Brazil, Denmark, Ireland, Poland and Spain) for 12 months, citing the fight against food inflation and its effects on the poor. The view that anti-dumping duties raise domestic prices has been contested by the South African Poultry Association (SAPA), whose Chief Executive Officer, Izaak Breytenbach, stated: "We have always argued that an increase in tariffs has never led to an increase in consumer prices" (Visser 2022). SAPA further argues that the "cheap" chicken imports are absorbed by the importer in the form of higher margins, with no evidence suggesting that the imported chicken is sold at a low price to the consumer (SAPA 2022b).

[1] These trade measures cover general customs duties (Schedule No 1, Part 1 of the tariff book), anti-dumping duties, safeguards and countervailing duties (Schedule No 2), industrial rebates (Schedule No 3) and general rebates (Schedule No 4).

These views reflect the complex link between trade policies and consumer prices. While tariffs impose a tax on the price of imported goods, their overall impact on the consumer price depends on several factors, including the extent to which exporters absorb the price increase through lower markups or marginal costs (Metzler 1949a; Feenstra 1988; Goldberg and Knetter 1997), distribution costs (transport, storage, finance and insurance) (Nicita 2009; Goldberg and Campa 2010)) and the competitiveness of the wholesaling and retail industry (Hellerstein 2008; Atkin and Donaldson 2015). All of these factors may vary by region. Tariffs may also indirectly affect the price of domestic substitutes as retailers adjust relative markups to optimise profits (Cole and Eckel 2018) and local producers adjust prices in response to expenditure shifting (Nicita 2009).[2]

In this paper, we examine the impact of increases in tariffs and the imposition of safeguards and anti-dumping duties on the retail prices of selected consumer goods in South Africa. In particular, we focus on three consumer goods: frozen chicken, frozen chips and pasta. We select these goods because they are relatively important items in the household food consumption bundle (accounting for a combined 14% of the consumer price index (CPI) weight for food products (Statistics South Africa (Stats SA) 2017) and because they have faced changes in a diverse range of trade restrictions, including normal customs duties, safeguards, anti-dumping duties, and sanitary and phytosanitary (SPS) measures.

The analysis is structured in three parts. We commence with an overview of the chicken, pasta and frozen chips industries, focusing on trade flows and trade policy measures applied to these products. For the trade analysis, we draw on monthly import data from 2010 to 2020 obtained from the South African Revenue Service (SARS) that vary by origin and product (at the 8-digit level of the Harmonized System (HS)). The summary of all the applied trade measures reveals the product-level management of South African trade policy that has emerged under the post-2010 trade policy regime.

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[2] For other relevant literature, see also Feenstra (1995), Pompelli and Pick (1990), Frankel et al. (2012) and Sandkamp (2020). For studies on the price effect of the recent China-United States tariff war, see Amiti et al. (2019), Cavallo et al. (2021) and a review by Fajgelbaum and Khandelwal (2022).

We then consider how import barriers affect consumer prices at the retail level. We do so in two steps. Firstly, we use monthly trade data from 2010 to 2021 to estimate how the range of import barriers (normal duties, anti-dumping duties and safeguards) affect the volume and free-on-board price of imports of each product. Rising tariffs may be partially absorbed by foreign suppliers, implying a less-than-perfect pass-through of trade measures to the landed prices (including tariffs) of imports. The lower the pass-through, the smaller the tariff's expected impact on final consumer prices. The sensitivity of import volumes to rising trade barriers provides insight into the degree of expenditure shifting associated with the higher costs of accessing imported products. Unfortunately, we lack data on the domestic production of substitute products, but the responsiveness of imports provides a useful indicator of welfare losses to consumers associated with the trade measure. For example, highly inelastic import demand will result in relatively large losses in consumer surplus from tariff increases.

Secondly, we estimate the pass-through of the various trade measures to consumer prices at the retail level using monthly product price data at the retail outlet level from 2010 to 2021. The retail price data are obtained from Statistics South Africa and used to construct the officially published consumer price indices. The retail price data for frozen chicken, frozen chips and pasta cover a total of 911 outlets in 58 locations spread across urban and rural areas of South Africa. Monthly price data are collected for different varieties of each product within each outlet (e.g. 2 kg, 5 kg and 10 kg packets of frozen chicken). Given anonymised outlet identifiers, we are able to track the price of individual product varieties within each outlet over time. Consequently, we are able to overcome aggregation biases that may be associated with changes in the quality of products purchased by consumers in response to price changes. Further, we are able to study how the pass-through may differ by region, distance to market or port, and rural or urban status.

We find that tariffs and other import duties have a powerful impact on import volumes and, in the case of frozen chicken, on consumer prices. Import duties are borne entirely by the domestic importer and thus directly impact the price consumers pay for these goods. However, we also find that while import duties reduce import volumes from

countries directly affected, the aggregate impact on import volumes is mitigated by shifts in the sourcing of imports towards non-dutiable sources, most notably, the European Union (EU). This substitution of imports diminishes the impact of tariff increases on aggregate import volumes and consumer prices. We focus mainly on the effect of trade measures on chicken prices, given its importance as a source of protein for consumers and the extensive use of trade measures to restrict imports since 2013. We find that imports of chicken products have become increasingly restricted as anti-dumping duties and safeguards have been used to limit the substitution towards EU imports in response to rising MFN tariffs. The effect on import volumes has been considerable: total import volumes of bone-in chicken pieces, the most restricted product, in 2021 are at levels last seen in 2011/12 and are significantly down from the peak values of 2018.

Our analysis using the retail price data provides additional insights. We find that MFN tariffs, anti-dumping duties and EU safeguards have contributed to rising domestic consumer prices, but the pass-through is incomplete, suggesting the presence of non-traded input costs, changes in markup pricing and transport costs. The consumer price effects of tariff increases are potentially large. We estimate an applied tariff pass-through of 0.477 to the retail prices of frozen chicken portions. The tariff, anti-dumping duties and safeguard measures imposed on frozen chicken imports are estimated to have raised retail prices by 16.2%. Retail prices of frozen chips are estimated to have increased by 18% from anti-dumping duties. Simulations using household expenditure data show that the increased duties on chicken imports are regressive, with poor households affected most. Duties on pasta and frozen chips affect wealthier households most, but their impact on expenditure is dwarfed by that of chicken. The reduction in household welfare through higher prices of frozen chicken, frozen chips and pasta is equivalent to 2.1% of food expenditure for households in the lowest consumption decile and 1.1% for households in the top consumption decile.

Our study does not focus on the broader implications of increases in import protection on domestic production, employment and investment. Prospective gains in each of these indicators are key motivations provided by ITAC for the recommendation of increased protection. We also do not unpack all the channels through which retail

prices of domestic and imported varieties adjust in response to trade measures. For example, the retail price increases of domestic varieties may be driven by a combination of higher factory gate prices of local suppliers and/or changes in markups by domestic producers, wholesalers and retailers. A more detailed study focusing on producer and wholesaler prices would be required to isolate all these channels. Finally, we do not consider the potential important second-round effects of once-off tariff changes on wages, inflation and monetary policy. These caveats suggest far broader implications of trade measures for the economy than this paper covers.

2. Review of the theoretical and empirical literature

In general, import prices fluctuate far more than consumer prices, indicating that the pass-through of border price shocks to domestic prices is incomplete. Three broad explanations have generally been provided for this outcome. Firstly, while tariffs impose a tax on the price of imported goods, their overall impact on the landed border price of imported goods depends on whether foreign exporters bear some of the cost by lowering their export prices (Goldberg and Knetter 1997; Nicita 2009). In models of imperfect competition, foreign exporters that can segment the market find it optimal to absorb some of the tariff increase in the form of lower markups. Feenstra (1988), for example, estimates that only 57% of the tariffs imposed on Japanese imports were passed through to the landed domestic import price of United States (US) trucks, whereas the pass-through rate was 100% for motorcycles. Similar results of imperfect tariff pass-through were also found in different settings and products by Goldberg and Campa (2002) for Germany, Mallick and Marques (2008) for India, Frankel et al. (2012) for a group of developing countries, and Ludema and Yu (2016) and Irwin (2019) for the US. In contrast, estimates of the response of US import prices to the 2018 increases in tariffs on imports from China, as summarised by Fajgelbaum and Khandelwal (2022), suggest pass-through to be virtually complete.

Pass-through to landed import prices may also be incomplete in the case of perfectly competitive markets if exporter marginal costs fall with the decline in export volumes, as would be the case for large importing countries (Metzler 1949b). The tariff incidence in these cases depends on the elasticities of import demand and export supply. The more elastic export supply and less elastic import demand, the higher the pass-through

to the landed border price of the imported good. For example, estimates of these elasticities for 15 non-World Trade Organization (WTO) countries (Broda et al. 2008) indicate a low median pass-through of between 0.11 and 0.05 across products within each country. In contrast, Winkelmann and Winkelmann (1998) find complete pass-through during tariff liberalisation in New Zealand in the 1980s, consistent with a small country response to tariff changes.

Secondly, the transmission of the landed border prices to consumer prices is influenced by distribution costs that cover transport, storage, finance, insurance, wholesaling and retail margins (Nicita 2009; Goldberg and Campa 2010). These costs reduce the weight of the imported cost in the final price paid by the consumer, thus diminishing the influence of imported price changes on final prices. In remote regions with poor transport infrastructure such as roads and railways or distant from ports/borders, higher transport costs impose an additional wedge between the retail price and the landed price, thus reducing the pass-through rate. Marchand (2012), for example, finds that the tariff pass-through coefficient for 11 products (mainly food) in rural areas in India ranges from 33% to 49% compared to 64% to 69% for urban areas. Similarly, Nicita (2009) estimates a tariff pass-through effect to consumer prices of about 33% for agricultural products and about 27% for manufacturing prices in Mexico. These studies also find that pass-through rates are higher in areas close to ports or the US border (in the case of Nicita (2009)). The lower pass-through rates in remote areas may also reflect lower household expenditure on imported goods or import-competing goods (e.g. in favour of subsistence goods) in the consumption bundle (Winters et al. 2004; Nicita 2009).

Thirdly, imperfect competition in the distribution and retail market can also add a buffer between imported prices and retail prices that can vary by region as producers adjust profit margins or price markups in response to tariff changes (Hellerstein 2008; Atkin and Donaldson 2015). Hellerstein (2008) and Goldberg and Hellerstein (2013) develop models of imperfectly competitive manufacturers supplying differentiated products to retailers with market power, leading to a double markup added to marginal costs before the good reaches the consumer. They nevertheless find that in the case of the beer market in the US, local distribution costs explain the majority of incomplete pass-

through of exchange rate changes to retail prices, with variable markups by wholesalers (rather than retail outlets) playing a lesser role. Atkin and Donaldson (2015) develop a model of oligopolistic intermediation with variable markups where local consumer prices are influenced by an interrelated combination of transport costs, the competitiveness of the market (e.g. the number of competing outlets) and demand characteristics of consumers. They find that consumers in remote locations in Ethiopia and Nigeria pay higher prices due to trade costs, but intermediaries charge lower markups in these locations as demand curves are more elastic at higher prices. They also find that remote consumers see only a small part of the gains from falling international trade barriers as intermediaries capture the majority of the surplus, despite lowering markups. In China, Han et al. (2016) find that the presence of the private sector enhances pass-through rates. They find that a city in China with an average-sized private sector has about a 31% pass-through rate, but that rate increases by about 2 percentage points with each 10-percentage point increase in the size of the private sector.

Most studies look at the pass-through to the retail price of the imported product targeted by the tariff. However, two additional considerations are required when evaluating the aggregate impact on retail prices. In free trade agreements, increases in the MFN tariff do not apply to imports from preferential partners. If preferential partners are a major supplier of imported products, or there is high substitutability between import sources, then the tariff increase may have little impact on the aggregate price of imported products. The increase may merely result in the diversion of imports from dutiable to non-dutiable sources, thus leading to lower increases in import prices. This has been a key consideration by ITAC (2013a, 2019) in its assessment of the price impact of the tariff increases recommended.

On the other hand, tariff changes can indirectly raise consumer prices through their impact on the prices of other goods. Goldberg and Campa (2010) highlight the role that imported inputs used in the production of tradable goods and non-traded goods play in the pass-through of exchange rate changes to consumer prices. The greater the importance of imported inputs in the production of these goods, the stronger the effect of exchange rate changes and tariff changes on the price of the final consumption

basket. Changes in production across sectors in response to tariff changes also affect wages and, through this, the price of non-traded inputs, as has been found by Porto (2006) for Argentina. Further, as domestic producers compete with imports, trade policies influence consumer prices by affecting the prices of local varieties through changes in the local producers' markup or marginal costs (Nicita 2009). Retail outlets may also respond to higher prices of imported goods by adjusting their markups. For example, Cole and Eckel (2018) developed a model where retailers respond to tariffs by raising markups on the domestic substitute and reducing markups on the imported product. These responses can reduce the benefit of the protectionist policy for domestic producers but can also exacerbate the broader price impact of tariffs for consumers. The broad implication is that the total impact of tariff changes on consumer prices is likely to exceed the direct effect on imported products alone.

These channels are all relevant to a study on how changes in tariffs and other measures in South Africa affect consumer prices. Several studies on product market integration find evidence of large border effects that give rise to persistent price gaps within and between African countries. For example, Versailles (2012) finds persistent gaps in prices for 20 mainly food products across 39 cities in Kenya, Uganda, Rwanda and Burundi, despite their membership in the East African Community customs union. Similarly, Nchake et al. (2018, 2019) find that product markets between South Africa and Botswana and South Africa and Lesotho remain segmented despite their joint membership in a customs union. While not directly testing the effect of tariff changes on prices, large border effects raise cross-border distribution costs and thereby diminish the pass-through of tariffs to consumer prices. High transport costs within African countries also diminish pass-through. Atkin and Donaldson (2015), for example, estimate pass-through rates (from border or production location to retail outlet) using monthly CPI microdata for 15 products in Ethiopia and 18 in Nigeria from 2001 to 2010. They find that pass-through rates average around 0.58 in Ethiopia and 0.39 for Nigeria, with the rate diminishing the further the outlet is from the product's source.

There are few studies on tariff pass-through to consumer prices in South Africa and Africa. In one exception, Mudenda and Edwards (2022) directly estimate the effect of

tariff reductions on the retail prices of 34 highly disaggregated products across 38 districts in Zambia in the context of tariff reductions under the Southern African Development Community (SADC) trade protocol. They find a high average tariff pass-through rate of just over 80%, with pass-through rates higher in cities (86%) than in rural areas (64%).[3] Almost all South African studies focus on the pass-through of the exchange rate to domestic prices. Product-level estimates reveal low pass-through rates to consumer goods that tend to range between 16% (Parsley 2012) and 30%, with higher rates for food (Aron et al. 2014), in the two years following an exchange rate change. These results imply a relatively low pass-through of tariff changes to consumer prices, assuming symmetry in pass-through for exchange rates and tariffs.

Of the three products selected for this study, empirical studies have only focused on the effect of tariff increases on the prices of chicken pieces. Davids et al. (2015) use a partial equilibrium model to simulate consumer price increases of about 3.4% in response to the SAPA application for tariff increases of up to 82% in 2013. The pass-through increases almost threefold if tariffs are also imposed on imports from the EU.[4] In relation to the 2018 application by SAPA for tariff increases for boneless and bone-in imports, XA International Trade Advisors calculated a retail price increase of 4.7% for every 10% increase in tariffs, implying a 21.15% rise in price for bone-in portions and a 32.9% increase for boneless cuts if tariffs were increased to 82% (Genesis 2016). Genesis (2016) disputes this estimate, noting that if the calculations account for imports from non-dutiable sources, price reductions by exporters and competition in the retail sector, then price increase estimates for bone-in portions lie between 2.4% (thighs) and 12.3% (leg quarters). These calculations imply a price increase of between

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[3] Blignaut et al. (2006) derive the direct and indirect share of imports in the domestic CPI, and infer that a 10% rise in import prices would raise the CPI by 1.4%. Their study underestimates the overall CPI impact as they do not account for the indirect impact that rising import prices would have on the price of domestic substitutes.

[4] The paper does not provide precise measures of the tariff changes imposed, so it is not possible to calculate the exact pass-through rate. The 3.4% increase is based on Simulation 1 that imposes the SAPA-requested specific tariffs with maximum rates of up to 82% on non-EU sources. Simulation 2 assumes lower specific duties with a maximum rate of 82%, while Simulation 3 extends Simulation 2 rates to the EU. The retail price effects of Simulation 3 (around 6%) are three times that of Simulation 2 (around 2%). If we take Simulation 1 tariff increases for bone-in chicken (from 220c/kg or 18% ad valorem equivalent to 56% or 653c/kg, max 82%) and the 3.4% retail price increase for chicken, this would imply a pass-through elasticity of 0.078 to 0.12 (calculated as 3.4/[ln(1.56)-ln(1.18)] for the higher value).

0.4% and 2.7% for every 10-percentage point increase in tariffs. Finally, in response to the increase in tariffs from 37% to 62% for bone-in frozen chicken pieces in March 2020, SAPA (2020) estimated a less-than-2% price increase (or pass-through rate of 0.12)[5] given continued access to duty-free imports from the EU.

So far, we have focused primarily on the pass-through of tariffs to import and consumer prices. Also important in the literature are the distributional and welfare effects of changes in trade protection. Tariff changes influence households through consumption effects (the price-consumption channel), as well as through wages (income channel) (Artuc et al. 2021; Fajgelbaum and Khandelwal 2016; Atkin and Donaldson 2015; Nicita et al. 2014; Faber 2014). The consequences of trade liberalisation on household welfare are, therefore, highly diverse. Nicita (2009), for example, finds that richer households were larger beneficiaries of tariff liberalisation in Mexico. Marchand (2012) looks at India and finds that the total effect of tariff reductions through the consumption of traded goods dominates the wage effects and is pro-poor in both rural and urban areas. Artuc et al. (2021) construct a new cross-country household survey data set, the Household Impacts of Tariffs, and simulate the welfare impacts of the deregulation of agricultural tariffs for 54 countries. They find that for 29 of the countries in the sample, the top 20% of wealthiest households would benefit proportionately more than the poorest 20%, whereas for 25 nations, the impoverished benefit more. For South Africa, the gains amount to 1.71% of real household income (1.75% consumption effect, with -0.04% income loss), with poor households gaining more than rich households.[6] This finding corroborates the research by Daniels and Edwards (2007) and Makgetla (2021) who argue that poor households in South Africa bear the greatest tariff burden given their relatively high share of expenditure on goods, particularly food products. This is directly relevant to this study, which focuses on key food consumption goods, particularly chicken, which constitutes a primary protein source in poor households (Department of Agriculture, Land Reform and Rural Development (DALRRD) 2020).

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[5] Calculated as 2/[ln(1.62)-ln(1.37)].

[6] Faber (2014) presents an alternative approach by stressing the impact of tariffs on prices via access to imported inputs.

To conclude, the theoretical and empirical literature points to incomplete tariff pass-through to consumer prices, but with wide variation across products and countries. Pass-through rates are generally higher for urban areas than for rural ones. Within South Africa, few studies have analysed the impact of tariffs on consumer prices. In the case of poultry, frozen chips and pasta, there appear to be no rigorous empirical estimates available, despite the potentially adverse effects on household expenditure.

3. Trade measures and import flows for frozen chicken, frozen chips and pasta

As noted, this study focuses on three products – frozen chicken, frozen chips and pasta – that have faced increasingly restrictive trade measures since 2010. This section describes the industries producing these products and presents a chronology of the trade measures implemented and how these have affected import flows. This analysis sets the context for the empirical estimates of the impact of tariff changes on domestic prices.

3.1 Frozen chicken

The poultry industry is the largest subsector within the agricultural sector in South Africa in terms of production value, generating R46.2 billion of gross value. This is equivalent to 16.2% of total gross value of agricultural products or 34% of the value of animal products in South Africa in 2018/19 (DALRRD 2020). The broiler industry is also a large employer with 51 612 employees in total, distributed across the broiler, hatchery and rearing industries (15 533); the processing sector (29 565); and the broiler distribution industries (6 514) (DALRRD 2020). In addition, the industry indirectly supports employment in upstream industries (e.g. in the maize industry, where it is the second-largest consumer) and through its supply of products downstream in the value chain (SAPA 2020). The industry is dualistic, with large-scale vertically integrated commercial producers producing alongside a significant number of small-scale producers. The market is highly concentrated, with the five largest producers accounting for almost 70% of total production and the two largest (Rainbow Chicken Limited and Astral Foods), representing almost half of the market (de Klerk 2019). Small and medium enterprises are estimated to contribute 28% of broiler meat supply (DALRRD 2020). Sales are oriented almost entirely towards the domestic

market, with exports, mainly to neighbouring countries, accounting for less than 5% of domestic production.[7]

Poultry also represents the major source of meat consumption, with estimates of up to a 60% share in total meat consumption in South Africa (United States Department of Agriculture (USDA), 2019). On average, each person in South Africa consumes close to 39 kg of poultry products per year, compared to 16.8 kg of beef, and it is argued that poultry is the most affordable source of animal protein for the South African consumer (SAPA 2020). Chicken as a consumption item is disproportionately important for poor households, with the poorest 10% of households spending up to 7% of their total expenditure on chicken products, compared to 1% for the wealthiest 10% of households (Fourie 2013). Demand is predominantly for bone-in (brown meat) chicken cuts, which accounts for 60% of total chicken meat demand and is sold as "individually quick frozen" (IQF) pieces in the form of 2 kg and 5 kg mixed packs (de Klerk 2019; USDA 2019). There is relatively small demand for fresh chicken meat, which accounts for less than 10% of total chicken consumption and is usually sold at a premium over frozen and brined bone-in chicken pieces (de Klerk 2019; USDA 2019).

Over the past two and half decades, consumption growth has exceeded growth in production, leading to a rise in imports up to 2018, as seen in the annual volumes of chicken imports by subcategory presented in Figure 1. The bulk of chicken imports is frozen bone-in cuts and mechanically deboned meat, accounting for around 40% of the total monthly volume of chicken imports.[8] With their higher prices, however, bone-in cuts make up over half (56% on average) of the total monthly value of chicken imports. The implication of these trends was that chicken imports rose as a share of domestic consumption from less than 5% in the early 1990s to a peak of 25% in 2018.[9]

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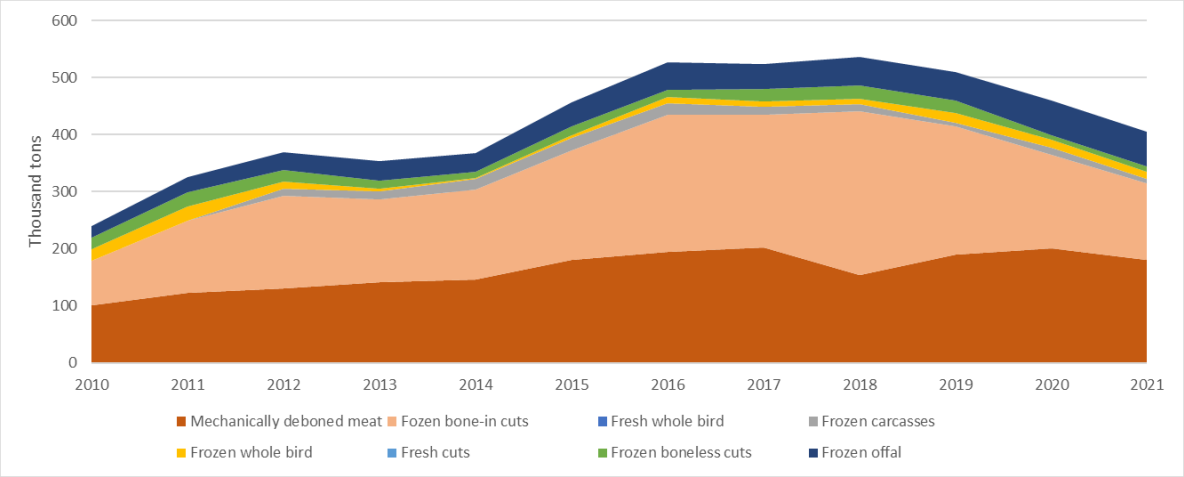
7 De Klerk (2019) points out that exports of the higher value white meat are constrained because local producers brine their chicken and most foreign countries either prohibit the import of brined meat or require it not to be sold as 'chicken'.

8 South Africa classifies imported chicken products according to several subcategories. These include HS 02071100: Fresh or chilled whole bird; HS 02071210: Mechanically deboned meat; HS 02071220: Frozen carcasses; HS 02071290: Frozen whole bird; HS 02071300: Cuts and offal, fresh or chilled; HS 02071410: Frozen boneless cuts (breasts, thighs, others); HS 02071420: Frozen: Offal (livers, feet, heads, etc.); HS 02071490: Frozen bone-in cuts (half bird, leg quarters, wings, breasts, thighs, drumsticks, other).

9 Based on trade data obtained from SARS and production data drawn from SAPA.

However, if one excludes mechanically deboned meat (MDM) that is not produced in South Africa, the import share rose to a lower value of 18% in 2018. With the decline in imports from 2018, the share of imports in consumption (excluding MDM) fell to 11% in 2021.

Figure 1: Annual volume of chicken imports, 2010–2021



Source: Own calculations using import data obtained from SARS

In response to rising import competition, SAPA applied to ITAC in March 2013 for increased tariff protection of up to 82% on frozen chicken products. They argued that dumping of bone-in portions and high domestic costs (from higher feed costs, electricity increases, high transport costs, problems with labour productivity, human immunodeficiency virus, crime, cost of disease control, and lack of economies of scale) were resulting in job losses and the closure of small and medium-sized producers (SAPA 2013).[10] The application led to an increase in customs duties from September 2013 on frozen whole chicken from 27% to 82%, with smaller increases for bone-in pieces (220c/kg or 18% ad valorem equivalent, to 37%), boneless pieces (5% to 12%), carcasses (27% to 31%) and offal (27% to 30%).[11] Tariffs on fresh chicken (whole or cuts) and frozen MDM remained at 0%. The tariff increases also did not apply to

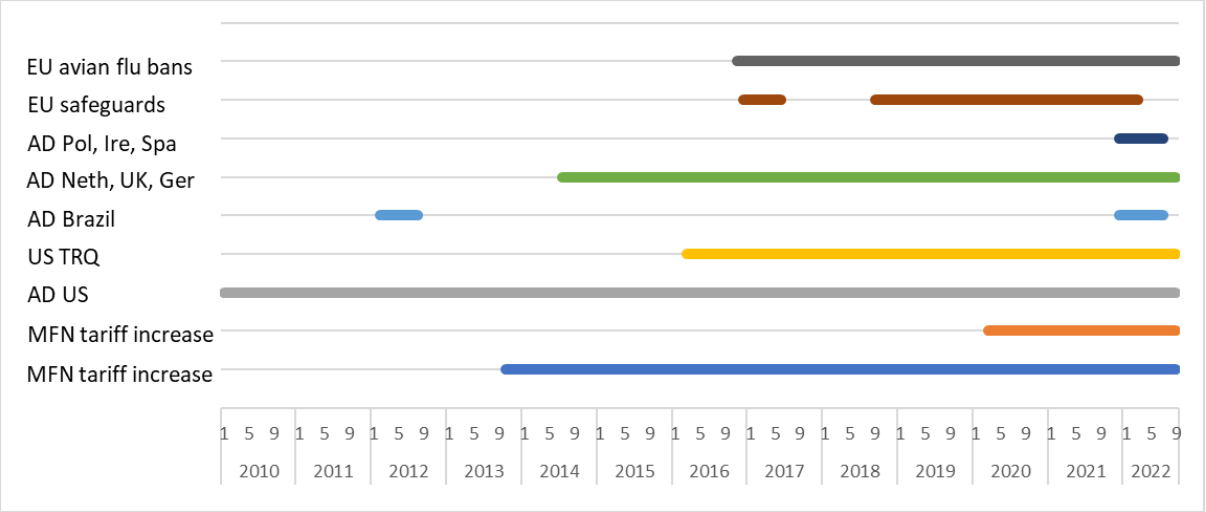
10 For a good summary of the different applications leading up to the tariff increases, see Kwaramba and Tregenna (2014).

11 A specific duty of 220c/kg was imposed on frozen bone-in chicken pieces (HS 02071490) prior to tariff increases in September 2013. The average import unit value (free-on-board) in the two years prior to this equalled R12.6/kg, implying an ad valorem equivalent of 18%.

imports from the EU and SADC, which had duty-free access under the preferential trade agreements (see Table A1 for a complete timeline of different tariff measures applied). Following a further application by SAPA in late 2018, customs duties were raised further in March 2020, but this time only for boneless cuts (12% to 42%) and bone-in cuts (37% to 62%) (ITAC 2019).

Several other trade duties have also been applied to imports of frozen chicken products (Figure 2). Anti-dumping measures of 224c/kg were first imposed on imports of frozen chicken from the US in 2001, leading to the complete exit of the US from the South African market (Cochrane et al. 2016). In April 2012, these anti-dumping duties were raised to 940c/kg. Following the application by SAPA in 2011, provisional anti-dumping duties ranging from 46.59% to 62.93% were imposed from 10 February 2012 on imports of frozen whole chicken (HS 02071290) and frozen breast meat (HS 02071410) from Brazil. Despite a final determination to impose anti-dumping duties in June 2012, the provisional duties were allowed to lapse in August 2012 following a challenge by the Brazilian government to the WTO against ITAC's investigation process (Hobbs et al. 2018). In July 2014, provisional anti-dumping duties were imposed on imports of frozen bone-in chicken pieces from the Netherlands (22.81%), the United Kingdom (UK) (22.03%) and Germany (31.3% to 73.33%). Together these sources made up 73% of total imports of bone-in chicken pieces in 2013. The provisional duties were followed by final anti-dumping duties from 27 February 2015. Finally, provisional anti-dumping duties were imposed on 17 December 2021 on selected bone-in chicken products from Poland (up to 96.9%), Brazil (up to 265.1%), Ireland (158.42%) and Spain (up to 26%) (ITAC 2021a). Despite a final determination by ITAC to impose anti-dumping duties in June 2022 (ITAC 2022a), in August 2022, the Minister of Trade, Industry and Competition deferred these anti-dumping duties for 12 months, citing concerns regarding the price implications of these restrictions for consumers.

Figure 2: Timeline of trade restrictions imposed on imports of chicken products, 2010–2021



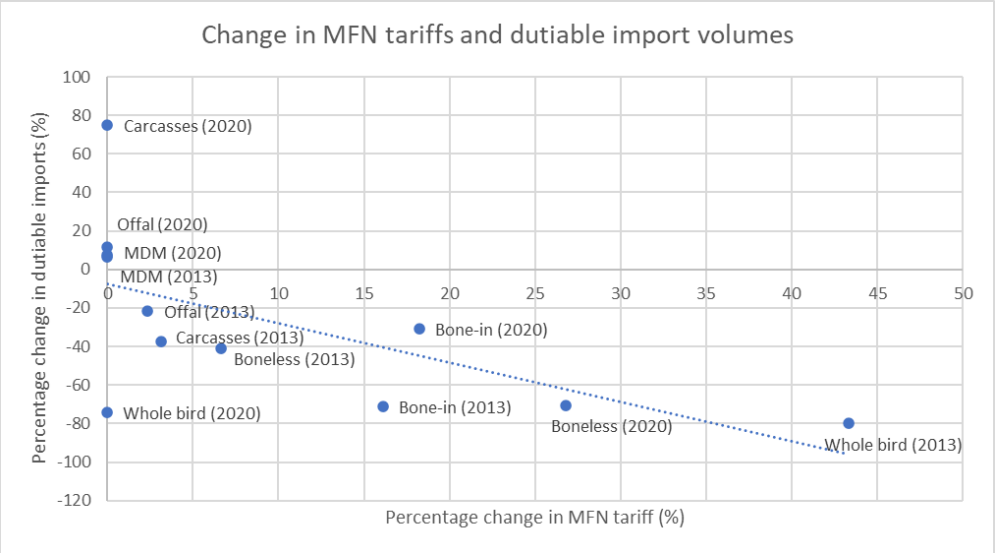
Notes: AD denotes anti-dumping duty and TRQ denotes tariff rate quota. See Table A1 for further details.

Three additional trade measures were implemented over the 2010–2022 period. Firstly, in February 2016, in response to pressure from and negotiations with the US government around the US extension of preferential access under the African Growth and Opportunities Act (AGOA) of 2000, South Africa granted access for up to 65 000 tons of US frozen chicken (bone-in) products at the MFN tariff of 37%, with exports over that quota still subject to the anti-dumping duty (Cochrane 2016; Hobbs et al. 2018). Secondly, in the face of continued imports of chicken from the EU, despite the anti-dumping duties, provisional safeguard duties of 13.9% were imposed on EU bone-in chicken from 15 December 2016 to 3 July 2017. Final safeguard duties of 35.3% were then imposed on EU frozen bone-in chicken on 28 September 2018, with a phase-down to 30% in March 2019, to 25% from March 2020, to 15% from March 2021 and with the duties falling away from March 2022. Thirdly, outbreaks of avian influenza in Europe from late 2016 led to a sequence of import bans on chicken products from different European countries from November 2016. These bans have been lifted and reimposed as avian flu outbreaks have spread across the European continent. As of March 2022, country-wide bans remained on poultry products from 14 EU member states (WTO 2022).

The various trade measures have had a marked impact on the level and geographic composition of poultry imports. In response to rising customs duties, imports from

dutiable sources (e.g. Brazil) were substituted with imports from preferential trade partners (SACU, SADC and mainly the EU) where zero duties were applicable. This is evident in Figure 3 and Figure 4, which present scatter plots of the percentage change in the 12-month volume of imports of the chicken subgroups from dutiable imports and non-dutiable imports, respectively, against the percentage change in tariffs following the tariff increases in September 2013 and March 2020. Figure 3 shows that relatively large reductions in dutiable imports occurred in chicken products experiencing higher tariff increases. For example, the largest percentage reduction in import volumes occurred in frozen whole birds (-80%) (mainly from Brazil), which also experienced the largest increases in tariff protection (27% to 82% in September 2013). In contrast, the positive slope in Figure 4 reflects a shift from dutiable to non-dutiable (mainly EU) imports in response to the tariff increases.

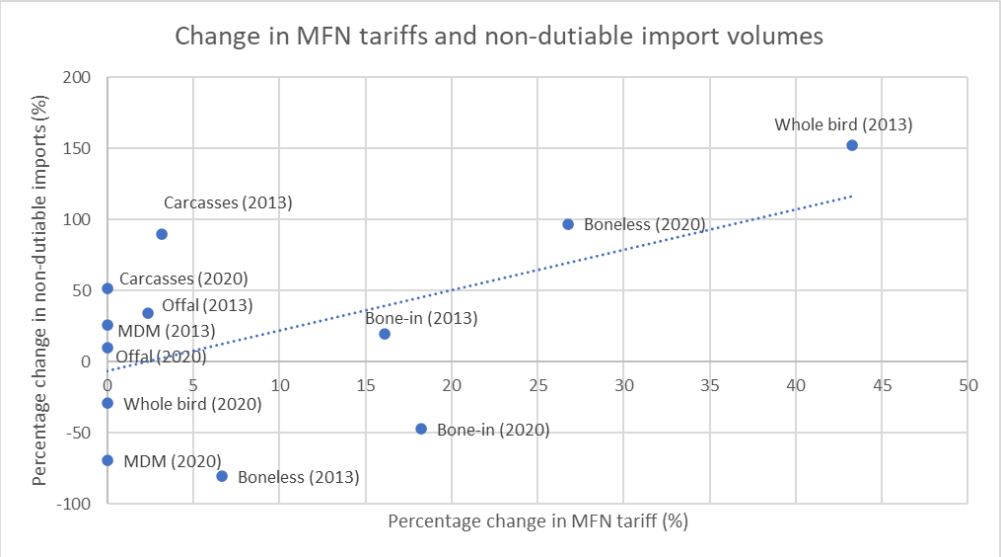
Figure 3: Change in 12-month value of imports from MFN countries after tariff increases in September 2013 and March 2020



Source: Own calculations using import data from SARS

Notes: Percentage change in imports is based on the change in the 12-month value of imports pre- and post-tariff increases: for example, percentage difference in total value of imports over the period October 2012–September 2013 to October 2013–September 2014; and March 2019–February 2020 to March 2020–February 2021. The percentage change in tariff is measured as $\Delta tariff/(1 + tariff_{initial})$.

Figure 4: Change in 12-month value of imports from preferential partners after tariff increases in September 2013 and March 2020



Source: Own calculations using import data from SARS

Notes: See notes to Figure 3 for further details.

These substitution effects are also shown in import volumes of frozen bone-in chicken (HS 020714) that have faced the widest range of restrictive trade measures (Figure 5) (see also imports of frozen whole chicken (Figure C1 in Appendix C) and frozen boneless chicken (Figure C2 in Appendix C)). Imports of frozen bone-in pieces from the EU were already rising in response to tariff reductions under the preferential trade agreement (fell to zero from the beginning of 2012) but increased further following reductions in imports from Brazil following the September 2013 tariff increases. The aggregate volume of bone-in chicken imports showed little change following the 2013 tariff increase.[12] However, the March 2020 tariff increases are associated with a much stronger decline in the aggregate volume of bone-in chicken imports.[13] One reason is that the import response from EU countries was constrained by the avian flu ban as well as the safeguard and anti-dumping duties imposed on EU imports. The customs duties had become more binding on aggregate import volumes.

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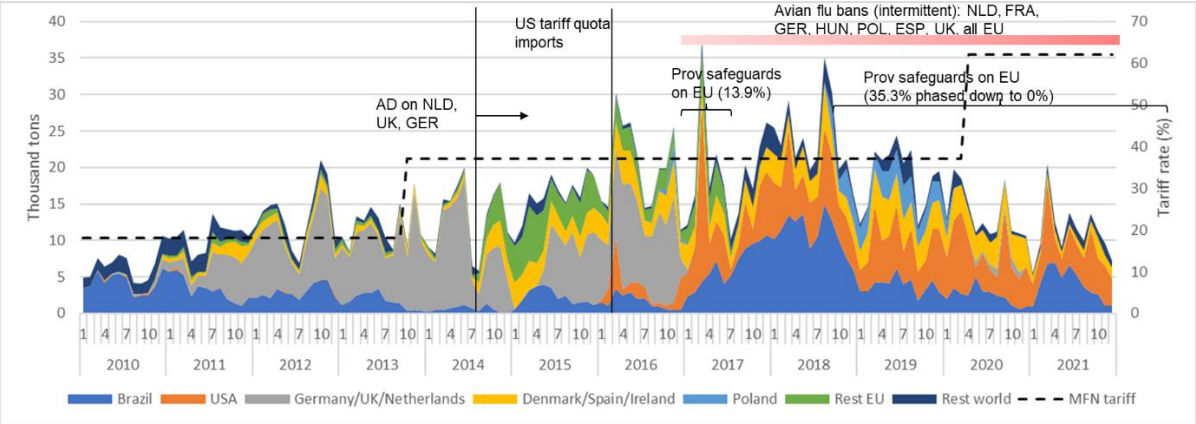
12 Contrast this with imports of frozen whole chicken, which plummeted after the increase in tariffs to 82% in September 2013 as Brazil largely exited the South African market.

13 Aggregate import volumes of frozen bone-in chicken fell by 37% in the 12 months following the March 2020 tariff increases, compared to a fall of 5% following the smaller September 2013 tariff increases.

Figure 5: Monthly import volumes of frozen bone-in chicken pieces



Source: Own calculations using SARS data

Notes: The customs tariff prior to September 2013 is the ad valorem equivalent (18%) of the specific duty of 220c/kg.

Anti-dumping duties, safeguard duties and avian flu bans also reduced import volumes, but their impact differed in some respects from custom duty increases. Anti-dumping duties and avian flu bans targeted specific countries (and firms within these countries). Their imposition often resulted in the country's exit from the South African market, as seen in 2001 and 2012 with the US. The US only re-entered the market in February 2016 following the US tariff rate quota agreement. The effect of the provisional anti-dumping duties on Brazil was an immediate sharp decline in imports of frozen boneless chicken (Figure C2 in Appendix C) from Brazil (to 4 300 tons from February to August 2012 compared to 12 400 tons over the same period in 2011), followed by a quick recovery once the duties were removed. Imports of whole chicken from Brazil also fell sharply, but only towards the latter part of 2012 (Figure C in Appendix C). Germany effectively exited as a source of bone-in chicken (Figure 5) after the imposition of provisional and then final anti-dumping duties from July 2014. Imports sourced from the Netherlands and UK also fell sharply by between 70% and 80% in response to the anti-dumping duties, but from mid-2015 imports from these countries rose again, reaching levels similar to those in months prior to their implementation. The anti-dumping duties also saw a rise in bone-in chicken imports from other EU countries, including Belgium, Denmark, France, Hungary, Ireland and Spain, as importers sourced chicken products from alternative sources (Figure 5).

From 2016, the avian flu bans had the strongest impact on chicken imports. The ban on imports from the Netherlands in November 2016 (until February 2020); France, Germany, Hungary, Israel, Poland, Spain and the UK in March 2017; and Belgium in June 2017 led to the exit of these countries, with imports from Brazil, Denmark, Ireland and the US rising in response. The effect of the avian flu bans on the composition of EU imports is clearly illustrated by the strong increase and subsequent collapse in imports from Poland as the avian flu ban was lifted in September 2018 and then re-imposed at the end of 2019. Finally, imports from most EU countries stopped from November 2020 in response to new avian flu outbreaks. From March 2022, imports from all EU sources were discontinued. While imports of bone-in chicken from Brazil rose in response to the avian flu bans (US imports were constrained by the quota cap of 71 290 tons), this source of imports was then constrained by the higher customs duties (to 62%) in March 2020 and the provisional anti-dumping duties (up to 265.1%) from December 2021.

Econometric estimates of an import demand function, using monthly bilateral import data from January 2010 to December 2021, corroborate these findings (see Table B1 of estimates in Appendix B). Customs duties, anti-dumping duties and avian flu bans are all shown to significantly reduce imports of frozen chicken products. The effects are large on imports from countries directly affected by the trade measures, suggesting very elastic responses to higher tariffs. For example, a 1% increase in customs duties is associated with a 4.7% reduction in import volumes from dutiable sources. However, the impact of these measures on aggregate import volumes is reduced by increases in imports from alternative sources. For example, the 1% increase in customs duties is associated with a 5.1% increase in imports from preferential partners. Similar substitution effects are found when anti-dumping duties are imposed.

To conclude, the full 2010 to 2021 period is characterised by an increasingly restrictive set of trade measures. These measures interacted to jointly constrain access to imported frozen chicken. The MFN tariffs constrained imports from dutiable sources, but imports from the EU limited the effect of those tariffs on aggregate imports. However, the higher customs duties became increasingly binding as anti-dumping duties and safeguard duties targeted EU sources of chicken. The avian flu bans further

compounded the degree to which the trade measures were binding. The net effect of all these restrictions was that the total volume of frozen chicken (excluding offal that has zero tariff) in 2021 was no higher than it was in 2011.

3.2 Frozen chips and pasta

The other two products focused on in this study, frozen chips and pasta, are relatively small segments of the food industry.

Frozen chips do not contribute significantly to the South African consumption bundle – only about 0.13% of food consumption according to Stats SA (2017). Nevertheless, South Africa's potato-processing industry is growing. The growth has been attributed to growth of the fast-food industry, higher average income of South Africans, the expansion of domestic production capacity, and rapid urbanisation (Ngobese and Workneh 2017). The market is dominated by McCain South Africa, which controls 75% of the market. The remaining shares belong to Lamberts Bay Foods and Nature's Choice, which have 15% and 10% stakes in the market (ITAC 2012a). Import volumes appear to account for very low shares of total sales of frozen chips in the domestic market – approximately 3% to 8% from 2014.[14] Export volumes of frozen chips are also very low at less than 6 000 tons per year and are destined largely for neighbouring countries.

Pasta is also not a particularly significant component of South African consumption. Average per capita annual consumption amounts to around 1.9 kg compared with 60 kg of maize and 56.8 kg of wheat (Who owns whom 2018). Pasta products (including noodles) only make up 0.39% of the food weights in the CPI bundle. The South African pasta manufacturing industry was estimated at approximately 100

[14] Actual volumes of domestic production of frozen chips are not readily available. It is estimated that 88% of all potatoes grown in South Africa are for consumption (the remainder is for seed), and of this, 20% is used for the production of French fries and chips (Bulbulia 2022). According to the Abstract of Agricultural Statistics (DALRRD 2021), South African domestic potato production volumes ranged between 2.3 and 2.5 million tons per year from 2014 to 2019, implying production volumes of French fries and chips of between 400 000 tons and 440 000 tons per year. According to SARS import data, import volumes of frozen chips and other processed potatoes averaged around 18 000 tons per year, implying an average import share of total consumption equal to 4%. According to ITAC Report No. 457 (ITAC 2013b), the domestic market share in 2009 was 98%.

thousand tons in 2017 (Who owns whom 2018). Import volumes of pasta over this period were approximately 36 thousand tons, implying an import share of consumption of around 26.5% (equals 36/(100+36)). Although slowing down from historical growth levels (12.1% between 2015 and 2019), South Africa's retail pasta market is expected to continue growing (5.2% between 2020 and 2024) – an important forecast for the approximately 1 000 people employed in the sector (Williams & Marshall Strategy 2021). Most of these people are employed by Tiger Brands and Pioneer Foods, which control 55% of the domestic market and are responsible for more than half of South African pasta exports.

Imports of pasta and frozen chips have faced several trade restrictions since 2010, covering tariff changes, anti-dumping duties and safeguards. Looking first at frozen chips and French fries (HS 20041020), customs duties have remained constant at 20%.[15] However, tariffs on imports from the EU were phased out from 7.6% in 2009 to 0% in 2012 in line with the EU-South Africa preferential trade agreement. There were no reductions in tariffs on frozen chips or French fries under the European Free Trade Association (EFTA) and Mercado Común del Sur (MERCOSUR) free trade agreements with SACU. Imports of frozen chips from SADC countries are also duty-free but account for less than 0.01% of monthly imports.

The main tariff measures applied to imports of frozen chips have been anti-dumping duties and safeguard duties (see Table A2 for a timeline of trade measures applied). In November 2012, a safeguard investigation was initiated, leading to provisional safeguard duties of 61.42% imposed from 5 July 2013 to 20 January 2014 (ITAC 2013a). Final safeguard duties of 40.92% were imposed from 25 July 2014, with a phase-down to 20.45% from July 2015 and zero tariffs from July 2016 (ITAC 2013b).

[15] In South Africa's tariff schedule, imports of frozen preserved or prepared potatoes are classified as Flours, meals or flakes (HS 20041010), Chips or French fries (HS 20041020) and Other (HS 20041090). Chips or French fries (HS 20041020) are further disaggregated into those prepared by blanching in water and prevented from discolouration by blanching in oil, frozen but not further prepared or processed (whether or not containing added dextrose) (HS 20041021) and Other (HS 20041029). Prior to late 2013, chips and French fries were included in HS 20041010.

Emerging economies were excluded from these safeguards, but imports from these countries accounted for very small shares of total import volumes.[16]

In addition to the safeguard duties, anti-dumping investigations were initiated against imports from Belgium and the Netherlands in mid-2016. This led to provisional anti-dumping duties imposed against Belgium (6.19% to 30.77%) and the Netherlands (18.8%) from 20 December 2013 to July 2014 (ITAC 2013c). ITAC's final recommendation to the Minister was that anti-dumping duties be imposed, but while these were technically imposed on 8 August 2014, they were suspended until 21 October 2016 to avoid concurrent implementation of safeguard and anti-dumping duties (Vinti 2017).[17] More recently, the failure to conclude the sunset investigation on frozen chips led to the suspension of anti-dumping duties on 26 January 2021.[18] However, a new investigation was shortly initiated (DALRRD 2020), this time also including Germany. On 15 July 2022, provisional anti-dumping duties were imposed up to and including 14 January 2023 on Germany (181.05%), the Netherlands (9.23% to 104.52%) and Belgium (20.44% to 23.06%).[19]

The third product focused on in this study is uncooked pasta, not stuffed or otherwise prepared. This covers products such as spaghetti, macaroni and noodles. These products are classified in the South African tariff book as either not containing eggs (HS 19021900) or containing eggs (HS 19021100). There have been three main tariff-related changes since 2010 (see Table A3 in Appendix A for details). Firstly, according to the free trade agreements, tariffs on EU and EFTA imports of pasta were phased out by the beginning of 2012 and 2014, respectively. Secondly, on 21 December 2012, MFN tariffs on pasta not containing eggs were increased from 30% to 40%, while tariffs on pasta containing eggs were retained at 30% (ITAC 2012a). Finally, following an application on 9 September 2020, provisional (1 April–16 September 2021) and final

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16 For a list of countries exempted, see South African Government Gazette No. 36633, No. R. 468 (5 July 2013).

17 See also Viljoen 2014.

18 Notification of the suspension was only gazetted on 9 July 2021, with retrospective effect from 26 January 2021 (Government Gazette No. 44820, No. R. 597, 2021-07-09).

19 Government Gazette No. 47015, No. R. 2285 on 2022-07-15.

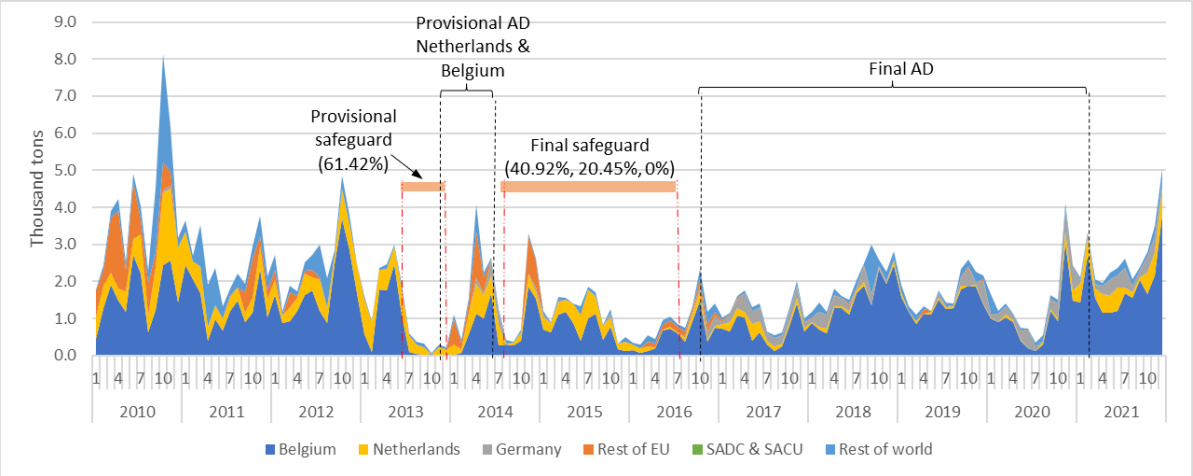
(from 17 March 2022) anti-dumping duties were imposed on imports of both kinds of pasta products from Egypt (43%), Turkey (367%), Latvia (4%) and Lithuania (12%).[20]

As with chicken imports, the different trade measures effectively reduced import volumes from countries directly affected and increased imports from alternative non-dutiable sources. Figure 6 presents monthly import volumes of frozen potato chips (HS 20041020) and other processed potatoes (HS 20041090) overlaid with the dates of implementation and removal of the anti-dumping and safeguard duties. Other processed potatoes (HS 20041090) are included in the figure before September 2013, as frozen potato chips were included in this category up to that date. However, frozen chips account for 88% of monthly total import volumes of the combined categories, and the aggregate trends follow those of frozen chips very closely.

Belgium is South Africa's primary source of imported frozen potato products, accounting for 58% of monthly import volumes, with the Netherlands making up an additional 17%. With the imposition of provisional safeguard duties in July 2013, import volumes plummeted from an average of 1 900 tons for the first six months of 2013 to 300 tons in the second half of 2013. Imports rose again from the start of 2014 as the preliminary safeguards were removed, despite the anti-dumping duties imposed on Belgium and the Netherlands. The negative effect of safeguards on import volumes is also shown from July 2014 when the final safeguard duties were imposed, as well as the increase following their removal from 5 July 2016.

[20] In the investigation, applicants against the anti-dumping duties argued that products are highly differentiated, even within the narrow HS classification system. For example, they differentiate between soft wheat pasta, durum wheat pasta and durum wholegrain pasta. ITAC (2021b) concluded that these were all "like products".

Figure 6: South African import volumes of frozen potato chips and other frozen processed potatoes



Source: Own calculations using SARS data at HS 8-digit level

Notes: Includes HS 20041020 and HS 20041090.

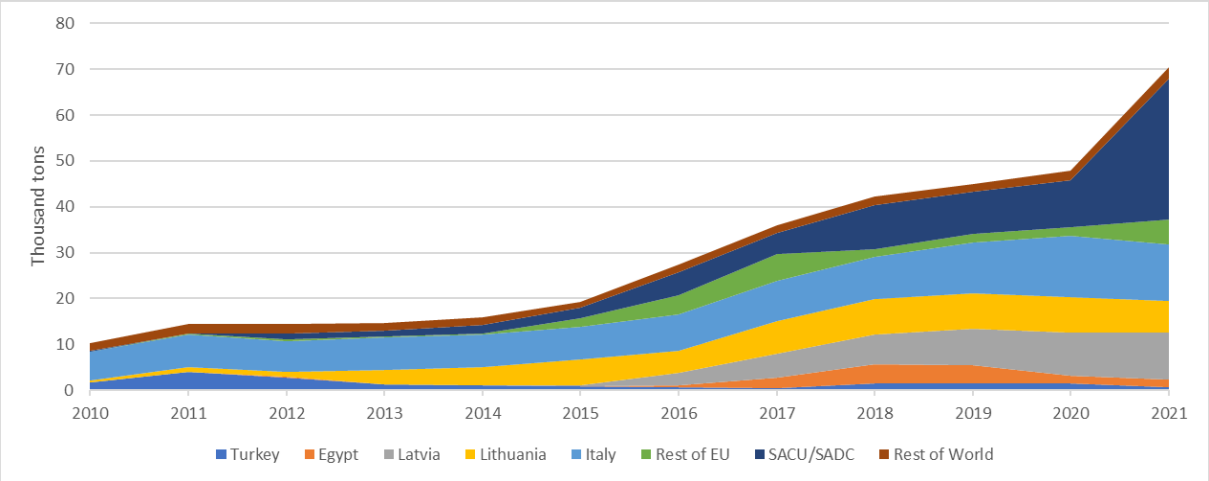
The provisional and final anti-dumping duties on imports of frozen chips from Belgium and the Netherlands have had a mixed effect. Import volumes from Belgium and the Netherlands fell in November 2016 after the implementation of final duties, but in the case of Belgium started to rise again in late 2017. In addition, imports shifted towards Germany, whose share rose from nearly zero to a monthly average of 26% in 2017. By the end of 2018, monthly import volumes had recovered to their 2011/12 values. Finally, with the suspension of the anti-dumping duties (notified in July 2021, with retrospective effect from 26 January), import volumes from Belgium and the Netherlands rose strongly, and by December 2021 had reached levels last seen in 2010.[21]

In the case of pasta imports, the increase in customs duties in December 2012 effectively reduced imports from Turkey, the primary target of these duties (ITAC 2012a) (see Figure 7). Aggregate import volumes, however, remained relatively flat as non-dutiable imports from Lithuania and SACU rose in response. From 2014, import

21 The econometric estimates corroborate these observations (Table B1 in Appendix B). A 10-percentage point increase in safeguard duties is estimated to reduce bilateral import volumes by 1.6%. Imports from Belgium and the Netherlands are estimated to have fallen by 60% in response to the anti-dumping duties. While imports from other preference partners (almost entirely in EU) rose in response (68% increase), their growth was off a lower base leading to an aggregate decline in the volume of imports.

volumes of pasta rose strongly, driven by rising imports from Lithuania, Latvia, the rest of the EU, Egypt and SACU.[22] However, with the imposition of the provisional anti-dumping duties on Egypt, Latvia, Lithuania and Turkey from April to September 2021, their imports declined, falling from a combined monthly share of total imports of 44% to 22%. With the removal of the provisional anti-dumping duties, their share of total monthly imports rose again, reaching 34% by December 2021. These results, corroborated by the econometric estimates (Table B3 in Appendix B), point to the effectiveness of anti-dumping duties and customs duties in constraining imports from targeted countries, although their impact on total import volumes is attenuated by rising imports from alternative sources.[23]

Figure 7: Annual import volumes of pasta by South Africa



Source: Own calculations using SARS data at the HS 8-digit level

Notes: Includes pasta containing eggs (HS 19021100) and not containing eggs (HS 19021900).

4. Data and empirical method

This section presents an overview of the consumer price data used in the empirical analysis, the empirical method, and a discussion of trends in import and consumer prices of frozen chicken, frozen chips and pasta products.

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22 Imports from eSwatini rose from zero to 1 400 tons in March 2021. This appears to be related to imports of noodles from the newly established Kellogg Tolaram plant in the country.

23 We don't have consistent data on domestic production volumes to calculate how imports and domestic production have changed as a share of total consumption.

4.1 Consumer price data

To study the effect of trade measures on consumer prices, we draw upon the retail-outlet-level database used by Stats SA to calculate the monthly CPI. The database covers January 2010 to April 2022 and tracks monthly product prices collected from a selection of retail outlets. The data are particularly useful because it allows us to control for outlet- and product-specific characteristics that may affect the price level and trend. For example, supermarkets may charge different prices to smaller outlets, including spaza shops. Different supermarkets target different customers, affecting the variety of products sold and prices thereof (e.g. Woolworths and Shoprite). The CPI database provides anonymised identifiers for outlets and the product varieties of each product sold within the outlet. For example, the database provides the commodity code, the commodity subcode (that is outlet specific) and the unit of measurement. With this information, we can track prices within outlets of each variety of product sold over time. This helps to ensure that we do not compare prices of different varieties within and between outlets.

Table 1 presents summary statistics of the key consumer products used in the analysis. Chicken products comprise giblets, fresh whole chicken, fresh chicken and frozen chicken portions. Prior to 2017, frozen chicken portions were aggregated into a single category, but from 2017 prices for IQF and non-IQF chicken portions are provided. IQF portions are traditionally sold in 2 kg bags and are favoured by low-income households. Pasta products are classified into instant noodles, macaroni, spaghetti and other pasta. Frozen potato chips comprise a single product item.

Table 1: Summary statistics of retail outlet price database

				Number of outlets			
	Start date	End date	Observations	Total	Metro	Other urban	Rural
Chicken							
Chicken giblets	2016m10	2022m4	6 749	94	51	43	
Fresh chicken portions	2010m1	2022m4	6 3701	309	204	66	39
Fresh whole chicken	2010m1	2022m4	13 849	112	74	38	
Frozen chicken	2010m1	2016m12	48 079	390	195	81	114
Frozen chicken, non-IQF	2016m9	2022m4	4 768	90	40	34	16
Frozen chicken, IQF	2016m10	2022m4	23 087	272	141	74	57
Pasta							
Instant noodles	2015m8	2022m4	6 165	93	52	41	
Macaroni	2010m1	2022m4	14 274	121	71	47	3
Spaghetti	2010m1	2022m4	13 849	112	74	38	
Pasta (excl. spaghetti, macaroni)	2010m1	2022m4	12 897	117	70	47	
Frozen potato chips	2010m1	2022m4	16 543	160	104	56	

Source: Own calculations using retail outlet level price data obtained Stats SA.

Notes: “2016m10” refers to month 10 (October) of 2016. Commodities for which it is impossible to construct a full-price series over the period 2010m1 to 2021m12 are excluded. A revision of the CPI in late 2016 led to the introduction of new products and the removal of old products (e.g. frozen chicken split into IQF and non-IQF). Prices for different varieties of commodities within an outlet are collected. The subcode varieties are excluded if there are fewer than 12 months of pricing data for an outlet (excludes around 3.5% of remaining observations). IQF stands for individually quick frozen and is sometimes referred to as “flash freezing”.

The database of consumer products analysed covers 235 169 price observations over the period January 2010 to April 2022. The highest share of observations is for frozen chicken, followed by fresh chicken portions. These products are also sold by the most retail outlets in the database (309 for fresh chicken, up to 390 for frozen chicken). The data are collected from a total of 911 outlets in 58 locations, with 52% (471) of outlets in metropolitan municipalities, 29% (264) in other urban areas and 19% (176) in rural areas. Price data from rural outlets only cover macaroni and fresh and frozen chicken portions, starting from March 2012 and ending in March 2020, just before the start of lockdown restrictions following the onset of the COVID-19 pandemic. Price observations during the COVID period fell off dramatically for all products as field workers could not collect prices onsite. Price data were consequently obtained from online sources.

Table 2 provides summary data on price levels for the different products for 2019. Prices vary considerably across products, outlets and regions within narrow product categories. The median price of chicken giblets was R29.99/kg compared to R59.99/kg

for fresh chicken portions. The median price for frozen IQF portions is R65 per 2 kg bag (R32.5/kg), which is substantially cheaper per kilogram than non-IQF chicken portions (R44.80/kg). However, prices vary across outlets, as can be seen by the 10th and 90th percentile prices and mean absolute deviation presented in Table 2. The variation in prices across outlets is highest for giblets, non-IQF chicken portions and pasta. The lowest variation is for instant noodles and IQF chicken. Prices also vary across locations. With the exception of fresh chicken portions, the median price of the consumer products is equal to or higher than in metropolitan and other urban areas. These gaps are consistent with the presence of transport costs raising the price of traded goods in remote areas.

Table 2: Summary statistics of product prices (in rands), 2019

		All locations				By rural-urban location		
	Unit	p10	p50	p90	Mean absolute deviation	Metro	Other urban	Rural
Chicken								
Chicken giblets	1 kg	19.99	29.99	42.99	26.37	33.99	26.99	
Fresh chicken portions	1 kg	42.99	59.99	77.99	18.30	59.99	62.99	54.99
Fresh whole chicken	1 kg	35.99	45.99	70.99	18.20	45.99	44.99	44.60
Frozen chicken, non-IQF	1 kg	32.99	44.80	68.99	24.79	42.99	42.99	51.99
Frozen chicken, IQF	2 kg	54.99	65.00	74.99	9.02	64.99	64.99	65.99
Pasta								
Instant noodles	73 g	4.99	5.29	5.69	4.25	5.29	5.29	
Macaroni	500 g	9.89	11.99	14.99	16.79	12.00	11.99	14.90
Spaghetti	500 g	9.89	11.99	14.99	18.84	11.99	11.99	
Pasta (excl. spaghetti, macaroni)	500 g	12.99	17.99	21.99	21.64	17.99	16.99	
Frozen potato chips	1 kg	22.99	31.99	36.99	15.53	31.99	31.99	

Source: Own calculations using retail outlet level price data from Stats SA.

Note: The prices are calculated using monthly data for 2019. The most common unit of measurement for each commodity is used. The mean absolute deviation is calculated as the average of the absolute value of differences in the log price from mean log price by month for each commodity.

4.2 Model specification

The CPI database provides a rich source of information to estimate the impact of trade measures on domestic consumer prices. Several considerations were taken into account to estimate the association between tariff measures and consumer prices. Tariff measures may be time-, country- and product-specific: for example, anti-dumping duties are specified by product, origin and time. Changes in MFN tariffs are also product-, country- and time-specific as they do not apply to imports from countries

with preferential access into the South African market (e.g. EU, SADC, SACU). Safeguard duties may apply to all countries (e.g. frozen potato chips) or target specific countries (e.g. frozen chicken imports from the EU). This has several important implications for identifying the effect of trade measures on import outcomes. For example, in response to anti-dumping duties imposed on particular countries, imports may shift to alternative source countries. Consumers may also shift consumption towards substitute products. Tariffs or anti-dumping duties may lead to exporters lowering their export prices, and retailers/wholesalers/trading agents may adjust their markups.[24] Finally, while we have data on consumer prices at a highly disaggregated product level, we cannot identify whether these are imported or of domestic origin.

We conduct two sets of estimates for each product to study the relationship between trade measures and consumer prices. Firstly, we use monthly bilateral import data obtained from SARS to estimate whether higher tariffs reduce the free-on-board import price – that is, whether the foreign producer (the exporter) bears some of the cost of the tariff in the form of lower prices charged. We use data covering the period January 2010 to December 2021. Secondly, we use the CPI retail outlet database over the same period to estimate the impact of trade measures on consumer prices at the outlet level.

To identify the impact of tariffs on import prices, we take into account two relationships: (i) how the price of imported products affected by the tariff changes relative to the price of other HS 8-digit products falling within the same HS 6-digit category as the product being analysed; and (ii) how the price of imports from countries affected by the tariff changes relative to the price of the *same* good imported from other countries where the tariff does not change. For example, to identify the impact of MFN tariff increases on frozen chicken products, we consider how the import price of frozen chicken changes relative to the import price of MDM (HS 02071210) imported from dutiable

[24] SAPA argues, for example, that the higher import tariffs on bone-in chicken imports are ineffective as the exporters adjust prices downwards to maintain export volumes. For example, in a press release the poultry producer Astral Foods states: “Despite the higher import tariffs on frozen bone-in portions announced in March 2020, poultry imports have continued unabated. This proves what the industry has been advocating for some time – that poultry imports into South Africa typify classic dumping, where prices are merely reduced to maintain export volumes from the producing countries.” (ITAC 2021a).

sources (e.g. Brazil) and compare this to the change in the relative import price of these products from non-dutiable sources (e.g. the EU).[25] The base specification is

$$\ln(PM_{ijt}) = \alpha_{ij} + \beta_1 \ln(1 + tar_{ijt}) + \mu_{it} + \mu_{jt} + \varepsilon_{ijt} \qquad (1)$$

where PM_{ijt} denotes import price in rands (calculated as import value divided by import quantity) for the imported product (*i*) from country *j* at time *t*, and tar_{ijt} denotes the applied import tariff. For preferential partners, the applied tariff is set to zero, while for control products, the tariff does not change. To control for the potential influence of country-specific characteristics (e.g. distance, comparative advantage) on imports, we include an intercept (α_{ij}) that varies by country for each product *i*. Changes in foreign costs and global trends in product prices may also affect import prices, which if correlated with tariff changes will lead to biased estimates of the tariff pass-through coefficient. Consequently, we add product-time fixed effects (μ_{it}) to control for global price trends and origin-time fixed effects (μ_{jt}) to control for origin-specific trends.[26]

The coefficient β_1 measures the percentage change in the free-on-board import price (excluding tariff) of the product in response to a 1% change in $1 + tar_{ijt}$. If foreign exporters bear some of the tariff cost by lowering their prices, we would expect $\beta_1 < 0$. If $\beta_1 = 0$, then the import price is not affected and the tariff-inclusive price of the imported good rises by the full tariff increase.

For the retail price estimates, we cannot identify the domestic or foreign origin of the product sold. Our approach is, therefore, to estimate a simple difference-in-differences

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[25] Note that the price of imports from the control group of countries – that is, the preferential trade partners – may be affected by the MFN tariff if exporters in these countries respond to the increased preference 'rent' (the difference between the MFN tariff and the preference tariff) by raising their prices (Olarreaga and Özden 2005; Cirera 2014). This would bias estimates of β_1 downwards – that is, towards an outcome of lower pass-through of tariffs to import prices inclusive of tariffs.

[26] This is in effect a difference-in-differences specification of the form:

$$\ln(PM_{ijt}) = \alpha_{ij} + \beta_1(DPost_t \times Dcountry_j \times Dhs_i) + \mu_{it} + \mu_{jt} + \varepsilon_{ijt}$$

where DPost is a dummy variable for the period post tariff change, Dcountry is a dummy variable for the countries on which the trade measure is imposed, and Dhs is a dummy for products affected by the tariff.

specification where we analyse how changes in trade measures affect the prices of goods targeted relative to a control product where trade measures did not change. For example, we look at how frozen chicken prices move relative to the price of pork products within outlets. The base specification in this instance is:

$$\ln(P_{ikrt}) = \alpha_{ikr} + \delta_1 \ln(1 + tar_{it}) + \delta_2 \ln(p^*_{it}) + \mu_{rt} + \mu_{kt} + \varepsilon_{ikrt} \qquad (2)$$

where P_{ikrt} is the price of good *i* in outlet *k* located in location *r*, and p^*_{it} is a measure of international prices of product *i*. Note that the sample of products includes those for which tariffs change (e.g. frozen chicken) and those that experience no tariff changes (e.g. pork).

One concern is that different outlets cater to different customer groupings. For example, Woolworths caters to higher Living Standards Measure customers, and thus stocks relatively high-quality chicken products. To control for these differences in outlets, we include product-outlet fixed effects, α_{ikr}. Inflation may also differ across regions, so we include region-by-time fixed effects (μ_{rt}). Finally, to control for retail-specific price trends, we include retail-time fixed effects (μ_{kt}). The coefficient δ_1 measures the impact of the trade measure on the consumer price of the targeted good relative to the control good within the outlets.[27] We can extend this specification further to see how the pass-through differs by region by including interactions between the tariff variable and location indicators such as distance of the outlet from ports or major cities, or urban/rural status.

4.3 Descriptive overview of trade measures and consumer prices

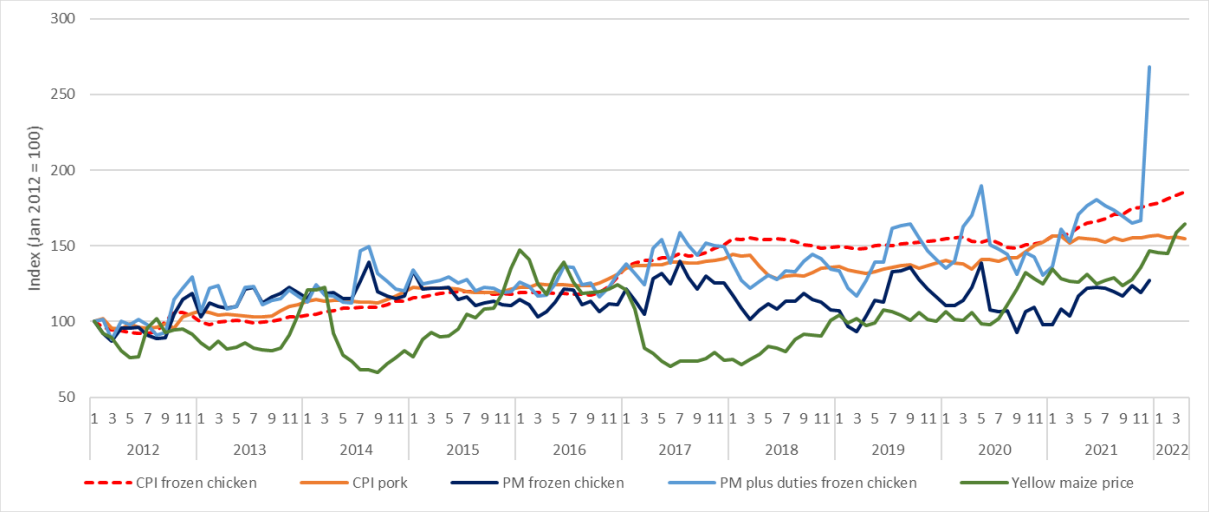
Before presenting the econometric estimates, we use diagrams to provide preliminary insights into the potential association between trade measures and consumer prices. We construct CPI indices for each product using the retail-level price data following the approach by Stats SA and plot these against price indices of control products and

[27] Note that outlets for which prices of both products are not included are thus excluded from the estimation given the inclusion of μ_{kt}.

import-weighted average applied tariffs inclusive of all trade measures applied.[28] This indicator underestimates the degree of protection as the shift in imports to alternative, less protected sources in response to higher tariffs or anti-dumping duties (e.g. from dutiable to non-dutiable sources) is not controlled for.[29] Nevertheless, the values indicate how much the combined trade measures raise the free-on-board prices of the concurrent bundle of imports.

Figure 8 presents trends in frozen chicken consumer prices against pork prices, the yellow maize price (a measure of feed costs) and the free-on-board price of imported frozen chicken (bone-in and boneless), with and without the duties.[30] The gap between the free-on-board price of imports and the free-on-board price inclusive of all duties is driven by the effect of customs duties, anti-dumping duties and safeguard duties. Several features are evident in the data.

Figure 8: Price indices of frozen chicken and selected other products



Source: Own construction using retail level price data from Stats SA and import data from SARS

Notes: The free-on-board (fob) import price inclusive of tariffs is the import-weighted average unit value of frozen bone-in portions inclusive of customs duties, anti-dumping duties and safeguard duties. The frozen chicken CPI after 2016 is constructed by combining CPI for IQF and non-IQF portions using Stats

[28] The index is constructed using the geometric average of the retail product level ratio of current to lagged prices, and then weighted up to the group level using the Stats SA 2017 weights.

[29] Note that in South Africa import duties are applied to the free-on-board price (i.e. exclusive of insurance and freight).

[30] The import prices are import weighted average unit values of frozen bone-in and boneless chicken.

SA CPI weights (Stats SA 2017). The yellow maize price is the South African Futures Exchange (SAFEX) yellow maize price sourced from www.grainsa.co.za.

Firstly, the figure reveals a widening divergence from mid-2014 between the free-on-board import price of frozen chicken and the import price inclusive of all import duties. This divergence reflects the increasing restrictiveness of the trade barriers as the MFN tariff increases were supplemented with anti-dumping duties and safeguard duties. By 2021, the import-weighted aggregate duty on frozen chicken had reached 53%: that is, import unit values including duties were 53% higher than import unit values excluding duties. The sharp spike in the import price inclusive of duties in late 2021 reflects the impact of the provisional dumping duties imposed on Brazil, Denmark, Ireland, Poland and Spain. For further details, see Figure C3 in Appendix C, which presents the import-weighted average applied duty for frozen chicken products separated into whole chicken, bone-in, boneless and offal. In all cases, trade restrictions have become more binding, with rising weighted average applied tariffs from 2014, with restrictions on bone-in and boneless chicken the most severe.[31]

Secondly, increases in consumer prices of frozen chicken pieces and pork followed each other relatively closely from 2012 to 2016, except for 2019 and 2020, when the African swine fever outbreak in China led to record-level pork prices, and frozen chicken prices rose more rapidly.[32] Consumer prices of frozen chicken pieces have also risen faster than maize prices (SAFEX yellow maize price), although the latter are more volatile and are strongly influenced by whether a surplus of maize relative to consumption is produced. For example, maize prices rose to import parity levels

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31 Figure C4 in Appendix C decomposes the effectively applied tariff on frozen chicken (bone-in and boneless) into the contribution from customs tariffs and temporary trade measures. Protection on frozen chicken fell on aggregate from 2010 to 2012 in response to falling tariffs on EU imports, and shifts in consumption towards this source. The September 2013 tariff increases had little effect on the weighted average protection level, but this is attributable to the shift in imports from Brazil towards non-dutiable imports from the EU. From mid-2014, protection rose as anti-dumping duties were imposed on Germany, the Netherlands and the UK. Further increases in net protection (to around 30%) occur after the imposition of EU surcharges from December 2016, and the increase in MFN rates in March 2020 (49%), and then to 116% in December 2021 in response to the provisional anti-dumping duties on Brazil, Denmark Ireland, Poland and Spain. Similarly, tariff increases and anti-dumping duties (on Brazil in 2012) raised the price of imported boneless cuts from 5% in 2010 to around 42% from March 2020.

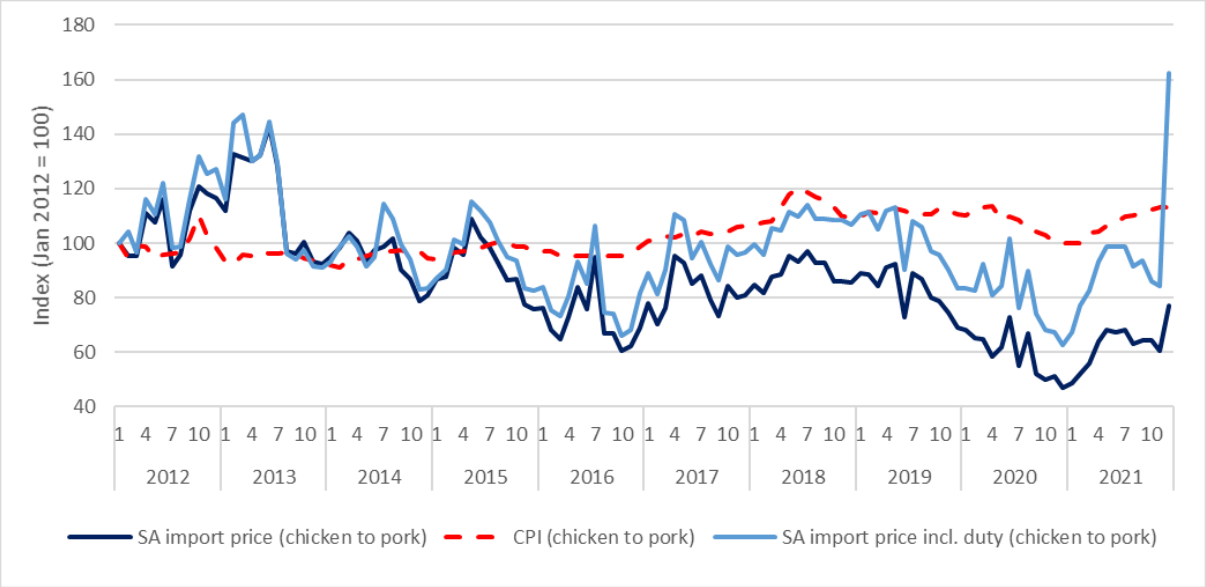
32 Although pork prices have subsequently collapsed in China following an expansion in production in response to high prices and government support (Cheng 2021).

following the decline in domestic production during the 2016 drought. However, surplus production in the 2017/18 season saw maize prices fall to the export parity price. Nevertheless, a persistent gap between the series is evident from 2017, with the frozen chicken CPI systematically exceeding the maize price index.

Thirdly, the widening divergence between consumer prices of frozen chicken and pork, and frozen chicken and maize, occurred from 2017 as the trade restrictions became more binding. This suggests that the combination of rising import duties and temporary trade barriers (in the form of anti-dumping and safeguard measures) contributed to stronger increases in the consumer price of frozen chicken relative to pork and maize.

To further examine how consumer prices of frozen chicken may relate to international prices, Figure 9 plots the ratio of the consumer price of chicken to pork against the ratio of the South African import price of frozen chicken to pork (all indexed to January = 1). Domestic prices appear to be linked to international prices, as shown by the coinciding fluctuation of the two series (see the increase, followed by a decrease from 2016 to the end of 2020), although international prices are more volatile than consumer prices. However, the relative consumer price of frozen chicken has diverged from international prices in recent years. Internationally, frozen chicken prices fell relative to frozen pork between 2012 and 2020, with relatively strong declines from 2018 in response to global shortages following China’s African swine fever outbreak. The decline in the tariff-inclusive import prices is less severe, reflecting the influence of South African trade measures. In contrast, domestic consumer prices of chicken rose by 13% relative to pork over the entire period. The divergence is particularly strong in 2019 and 2020, possibly due to the rising incidence of Avian flu outbreaks in Europe.

Figure 9: Import and consumer price of chicken relative to pork

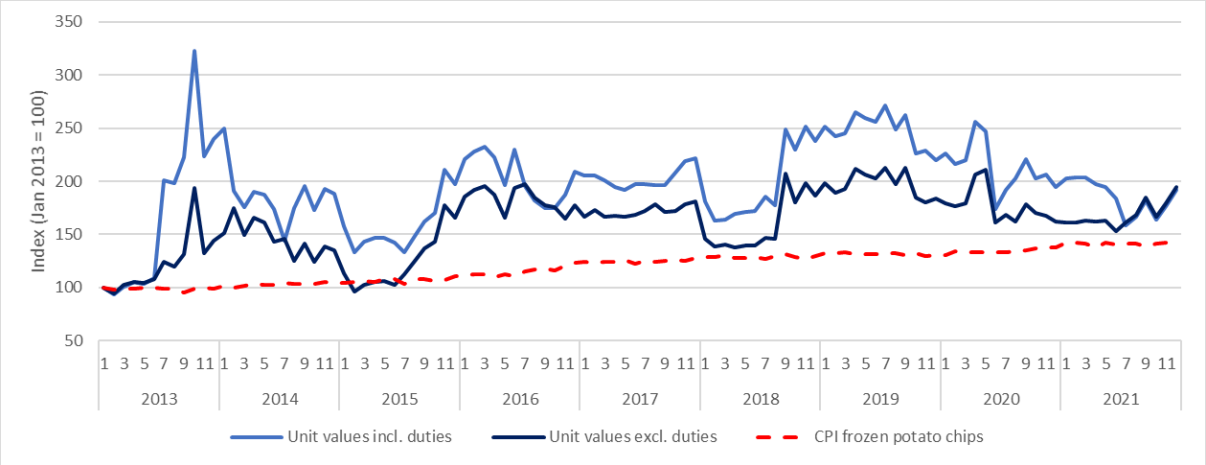


Source: Own construction using retail-level price data from Stats SA and import data from SARS

Notes: Imported chicken covers HS 02071410: Frozen boneless cuts (breasts, thighs, others) and HS 02071490: Frozen bone-in cuts (half bird, leg quarters, wings, breasts, thighs, drumsticks, other). Imported pork covers HS 020329: Frozen meat of swine (excluding carcases and half-carcases, and hams, shoulders and cuts thereof, with bone in). Consumer prices of chicken include frozen chicken pieces (IQF and non-IQF), while pork products include pork fillet, pork spare ribs and fresh pork chops.

We turn now to frozen chips and pasta. Figure 10 plots indices of consumer prices, free-on-board import unit values and unit values inclusive of duties of frozen chips. Import unit values are far more volatile than consumer prices of frozen chips. The imposition of surcharges (July 2013 to January 2014 and July 2014 to July 2016) leads to a jump in import unit values inclusive of duties, but it is difficult, based on the diagram, to draw any association with consumer prices, which are far less volatile. The same holds for the anti-dumping duties (end December 2013 to June 2014 and August 2016 to July 2021).

Figure 10: Price indices of frozen chips

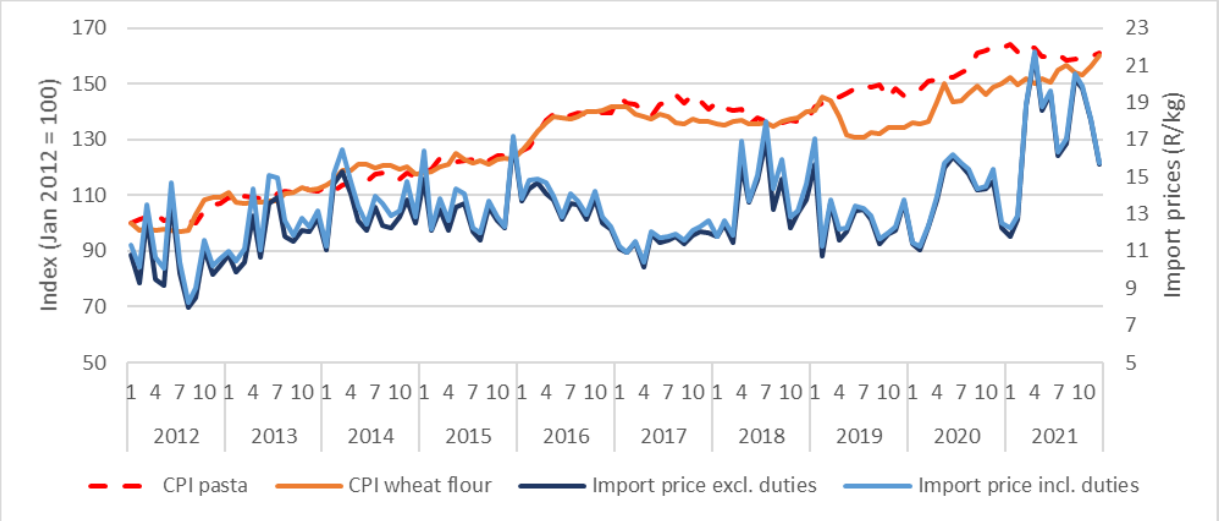


Source: Own construction using retail-level price data from Stats SA and import data from SARS

Figure 11 presents the CPI index for pasta products (composite index for macaroni, spaghetti and other pasta) and import unit values. As with the other consumer products, import unit values are more volatile than consumer prices. We find no divergence between imports, inclusive or exclusive of duties – see, for example, the lack of a jump in the import unit values inclusive of duties after the increase in MFN duties in December 2012. The explanation, as provided earlier, is that imports shifted sharply from duty-paying origins to preferential partners (EU and SACU).

Trends in pasta consumer prices track import unit values from 2012 to 2015, but a divergence emerged from the beginning of 2016 as import unit values fell and consumer prices of pasta rose. This period also coincides with an uptick in the import of pasta products. Pasta prices did fall from late 2017, perhaps a delayed reaction to the lower import prices. Consumer prices of pasta also diverged from flour prices (a proxy for pasta input costs) from 2019. There is no clear impact from the anti-dumping duties on pasta prices – pasta prices actually fell over the 2021 period, despite rising flour prices.

Figure 11: Price indices of pasta and selected other products



Source: Own construction using retail-level price data from Stats SA and import data from SARS

Notes: The consumer price of wheat flour covers the retail price of bread flour and cake flour. The consumer price of pasta covers macaroni, spaghetti and other pasta.

5. Empirical results

In this section, we present the empirical estimates of the pass-through of trade measures to domestic prices. We look at how trade measures affect the free-on-board import price of goods to see whether foreign exporters absorb some of the cost of rising import duties. If foreign exporters absorb some of the increase in duties, the pass-through to domestic consumers will be diminished, implying a lesser impact on consumer prices. Using the retail price data, we also estimate how trade measures affect consumer prices. In these estimates, we do not distinguish between the price of foreign and domestic goods. We also do not estimate whether price effects are due to changes in factory gate prices of domestic processors and/or changes in markups by wholesalers, transporters and retail outlets. Nevertheless, the estimates provide an indication of the extent to which tariffs affect the final price that consumers pay.

5.1 Frozen chicken

In September 2013, customs duties on imports of frozen bone-in and boneless chicken products increased by 19 percentage points and 7 percentage points, respectively. However, as shown in Figure 8, the price of imports including duties did not diverge from the import price excluding duties. One reason is that imports shifted from Brazil

to non-dutiable EU sources. Another possible explanation is that exporters from dutiable sources absorbed the tariff increases through lower export prices. To test this, Table 3 presents estimates of a regression of the free-on-board import price on the various trade measures affecting chicken imports. The import price, or unit value, data are calculated using monthly bilateral import value and quantity data obtained from SARS.[33] The sample covers all chicken products, including those with no tariff changes (e.g. MDM and fresh chicken), from January 2012 to December 2021. All the estimates include origin-product fixed effects to control for origin-specific effects for each product (e.g. quality differences), product-time fixed effects to account for global product price trends, and origin-time fixed effects to control for origin-specific supply trends. The second regression (column (2)) includes interactions between each trade measure and a dummy variable for whether the origin is a duty-free preferential trade partner (EU and SADC) to assess the spillover effects of trade measures on the prices of exports from preferential partners. Note that the impact of the avian flu ban is not captured as this is assumed to apply to imports of all chicken products and is captured by the origin-time fixed effects.

[33] Unit values are affected by changes in the composition of imports. Shifts in consumption towards higher priced varieties, for example, will raise unit values, even if the price of each variety does not change. To reduce this distortion, we make use of bilateral import data at the most disaggregated HS 8-digit level. We also include country-product fixed effects to avoid the potential biases that changes in the origin of imported goods in response to changes in duty may have on the pass-through estimates.

Table 3: Regression results on the impact of trade measures on import prices of chicken products

	(1)	(2)
VARIABLES	Ln(unit value)	Ln(unit value)
ln(1+tariff)(ijt)	-0.404	-0.194
	(0.319)	(0.426)
Dummy AD(ijt)	-0.190	-0.247+
	(0.131)	(0.138)
Dummy AD(ijt) x PTA		0.231+
		(0.126)
Dummy US Quota(it)	-0.436**	-0.390**
	(0.097)	(0.081)
Dummy US Quota(it) x PTA		-0.077
		(0.128)
ln(1+EU safeguard)(ijt)	-0.665+	-0.184
	(0.320)	(1.061)
ln(1+EU safeguard)(ijt) x PTA		-0.505
		(1.075)
Constant	2.328**	2.290**
	(0.034)	(0.052)
Observations	3 637	3 637
F	9.733	6.054
Adj R-squared	0.739	0.740
Fixed effects		
Origin by time	Y	Y
Origin by HS	Y	Y
Product by time	Y	Y

Notes: Sample covers all imported chicken products over the period Jan 2010 to Dec 2021. The chicken products include HS 02071100: Fresh or chilled whole bird; HS 02071210: Mechanically deboned meat; HS 02071220: Frozen carcasses; HS 02071290: Frozen whole bird; HS 02071300: Cuts and offal, fresh or chilled; HS 02071410: Frozen boneless cuts (breasts, thighs, others); HS 02071420: Frozen: Offal (livers, feet, heads, etc.); and HS 02071490: Frozen bone-in cuts (half bird, leg quarters, wings, breasts, thighs, drumsticks, other). PTA is a dummy variable equal to one (zero otherwise) for the preferential trade partners in the EU and SADC. Tariff(ijt) is the applied tariff including preferential tariff rates. Dummy AD(ijt) denotes a dummy variable equal to one (zero otherwise) if anti-dumping duty is imposed on imports of frozen bone-in chicken portions. Dummy US Quota(it) is a dummy variable equal to one (zero otherwise) for period from 1 April 2018 for anti-dumping tariff free quota imports from the US (65 417 tons) on frozen bone-in chicken portions. EU safeguard (ijt) denotes the safeguard duty applied to EU imports of frozen bone-in chicken portions (13.9% from 15 Dec 2016 to June 2017; 35.3% from 28 Sep 2018; 30% from 12 Mar 2019; 25% from 12 Mar 2020; 15% from 12 Mar 2021 to end of sample period). Dummy avian flu (jt) is a dummy variable equal to one (zero otherwise) if an avian flu ban on imports from the country is imposed.

The overall finding is that exporters do not bear any of the cost of higher tariffs or other import duties by reducing their export price. South Africa behaves like a small country when importing chicken from the rest of the world. In all estimates, the coefficient on the statutory applied tariff is insignificant, implying that tariffs are passed fully on to the

landed price of imported chicken products.[34] The results in column (1) suggest that exporters may respond to EU safeguards by reducing their export price to South Africa, but this result is only weakly significant. In contrast, the US tariff rate quota arrangement is associated with lower unit values in all estimates. This may arise because specific anti-dumping duties are applied to US imports (R9.30/kg), which distort imports away from lower-priced varieties. Therefore, the negative coefficient likely reflects the entry of lower-priced varieties from the US following the removal of these specific duties on the within-quota imports. Finally, as shown in column (2), import prices from preferential countries not targeted by the trade measure do not increase in response to higher duties on competing sources.

These results have several implications for the potential impact of trade measures on consumer prices. The results show that the importer of the product fully bears the cost of the tariffs and other import duties. Consequently, the import duties applied will directly affect the consumer price of imported products. However, because duties are levied on the free-on-board price of imports, the increase in the landed price that is inclusive of freight, insurance and other customs clearance costs may be lower in percentage terms. Further, the final impact of the tariff on consumer prices also depends on internal transport costs, changes in the margins charged by wholesalers and retailers, and the price responses by domestic producers to reduced import competition in the local market.

To study the impact on consumer prices, we use the CPI retail outlet database to regress consumer prices of frozen chicken products on different indicators of trade measures. One challenge we face is that the trade measures reflect restrictions at the border and vary by time, but not by location and outlet. We therefore present several estimates where we incorporate different controls for outlet, time and product characteristics. Table 4 presents the regression results using the panel of outlet consumer price data. The regression results strongly support the conclusion that

[34] This contrasts, for example, with Genesis (undated) who argue that exporters reduce their price by 6.3% for every 10-percentage point increase in tariffs on bone-in portions. This is based on a 12-month pre-post comparison of price trends of non-Free Trade Area partners following the September 2013 tariff increases.

restrictive trade policies have contributed to higher consumer prices of frozen chicken products, although the pass-through is incomplete.

Column (1) restricts the sample to frozen chicken products and includes a time trend, monthly fixed effects to deal with seasonality and outlet, and commodity-unit fixed effects to control for differences in product quality across varieties and outlets. The coefficient on MFN tariffs is significant and positive, indicating that rising customs tariffs in 2013 and 2020 are associated with higher consumer prices of frozen chicken. However, the coefficient is small and suggests a price increase for frozen bone-in chicken of 1.7% after the first round of tariff increases (from 18% to 37% from September 2013) and 1.9% after the second round (37% to 62% from 12 March 2020). Looking at the other trade measures, the avian flu bans and anti-dumping duties are associated with higher consumer prices while the US tariff quota agreement lowered frozen chicken prices. However, EU surcharges are associated with lower consumer prices of frozen chicken, which is contrary to expectations, as is the negatively signed coefficient on international prices.

In column (2), the individual variables for MFN tariff and temporary trade measures are replaced by a single import-weighted average applied duty inclusive of customs duties, surcharges and anti-dumping duties applied on imports of frozen bone-in and boneless chicken from all origins (see Figure C4 in Appendix C). The advantage of this variable is that it is based on the actual geographical origin of imports and therefore accounts for the substitution between sources in response to targeted trade measures.

The coefficient on this variable is insignificantly different from zero, while the coefficients on the other variables do not change much. If, however, we use South African import unit values as the measure of international prices, the coefficient on the applied duty and international prices becomes significant and positive at 0.11, which is similar to the coefficient on MFN tariffs in column (1). Overall, these results suggest a pass-through of around 0.11 for every 1% change in applied tariffs.

Table 4: Regression results on impact of trade measures on frozen chicken consumer prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Frozen chicken only		Pork control		Fresh control	Maize control	Pork control		Maize control
ln(1+MFN tariff)(it)	0.116*								
	(0.056)								
ln(1+anti dumping duty)(it)	0.023*								
	(0.012)								
ln(1+EU safeguard)(it)	-0.147**								
	(0.032)								
Count avian flu ban(it)	0.013**	0.016**	0.011**	0.016**	0.014**	0.030**	0.012**	0.012**	0.031**
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Dummy US Quota(it)	-0.080**	-0.080**	-0.107**	-0.115**	-0.106**	-0.361**	-0.100**	-0.100**	-0.347**
	(0.019)	(0.018)	(0.031)	(0.030)	(0.030)	(0.031)	(0.030)	(0.031)	(0.032)
ln(P international)(it)	-0.126**	-0.151**	0.064+	0.094*		0.058**	0.035	0.037	0.057**
	(0.019)	(0.021)	(0.037)	(0.041)		(0.012)	(0.036)	(0.036)	(0.012)
trend	0.004**	0.004**							
	(0.000)	(0.000)							
ln(1+applied duty)(it)		-0.071	0.477**		0.148*	0.521**	0.161	0.349**	0.310**
		(0.055)	(0.069)		(0.061)	(0.063)	(0.168)	(0.081)	(0.058)
ln(1+applied customs tariff)(it)				0.320**					
				(0.102)					
ln(1+applied temporary duty)(it)				0.598**					
				(0.109)					
ln(1+applied duty)(it) x ln(dist to port)(r)							0.035		
							(0.031)		
ln(1+applied duty)(it) x ln(dist to metro)(r)								-0.000	
								(0.023)	
ln(1+applied duty)(it) x Rural(r)									0.039
									(0.119)
Constant	1.715**	1.851**	3.687**	3.563**	3.803**	3.157**	3.820**	3.810**	3.176**
	(0.271)	(0.232)	(0.161)	(0.178)	(0.007)	(0.071)	(0.155)	(0.155)	(0.071)
Observations	73 878	73 878	91 527	91 527	145 377	104 400	91 756	91 756	104 629

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Frozen chicken only		Pork control		Fresh control	Maize control	Pork control		Maize control
Adj R-squared	0.704	0.704	0.686	0.686	0.613	0.838	0.687	0.687	0.838
Fixed effects									
Region by time			Y	Y	Y	Y	Y	Y	Y
Outlet	Y	Y							
Outlet by time			Y	Y	Y	Y	Y	Y	Y
Month	Y	Y							
Commodity by unit	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Estimates are based on retail-outlet-level data for the period January 2010 to December 2021. CPI data comprises frozen chicken portions up to end of 2016 and frozen IQF and non-IQF chicken in subsequent periods. Consumer prices for pork covers fillets, ribs and chops, while maize prices cover fresh mealies and mealie meal. The variable applied duty denotes the monthly bilateral import-weighted average duty inclusive of customs duties, surcharges and anti-dumping duties applied on imports of frozen bone-in and boneless chicken from all origins. The measure is constructed using import data obtained from SARS and the gazetted duties. Applied temporary duty denotes the import-weighted average applied custom duty, while applied temporary duty denotes the import-weighted average temporary trade duties (anti-dumping and safeguard duties). MFN tariff refers to the MFN tariff applied to bone-in chicken. Anti-dumping duty is the simple average of the maximum anti-dumping duty applied to the targeted countries.[42] EU safeguard denotes the safeguard duty applied to EU imports of frozen bone-in chicken. Count avian flu ban denotes the number of import origins affected by avian flu bans. Dummy US Quota is a dummy variable equal to one (zero otherwise) for tariff free quota agreement from 1 April 2018. P international is the monthly international price index calculated using monthly export unit values obtained from TradeMap for 32 major exporters of frozen chicken (020714 Frozen cuts and edible offal of fowls of the species *gallus domesticus*) and 27 exporters of frozen pork (020329 Frozen meat of swine). The indices are calculated using geometric average monthly unit value ratios (uv(t)/uv(t-1)) for the exporting countries. The international price for maize is the SAFEX yellow maize price sourced from www.grainsa.co.za. Robust standard errors clustered at the outlet level in parentheses. ** p<0.01, * p<0.05, + p<0.1

[42] Anti-dumping duties are both firm and destination specific. Firms that submit relevant information on pricing are able to secure lower anti-dumping duties than other firms.

One concern with these estimates is that we cannot control for region- or outlet-specific trends in the data. The results may also be distorted by confounding trends in chicken prices that overlap with changes in trade measures. Consequently, in column (3) we include the consumer price of pork products as a control, as well as region by time and outlet-by-time fixed effects. In essence, we now identify the impact of trade measures on frozen chicken prices by studying how they move relative to pork prices within the same outlet over time. Four points govern our choice of pork as a control. Firstly, the price of pork is generally used in the industry as a reference to evaluate trends in chicken per capita consumption and prices (see SAPA 2020). Secondly, unlike for poultry products, there were also no changes in import duties on pork products over the period. Thirdly, the cross-price elasticity between pork and frozen chicken appears to be low (0.02 to 0.08) (Delport et al. 2017). Finally, we find no significant differences in trends in consumer prices of these products within outlets prior to September 2013 when tariffs on chicken products were first raised.[43]

The estimates in column (3) reveal a substantially higher pass-through of import duties to consumer prices of frozen chicken products. A 10% increase in weighted average applied import duties is associated with a 4.8% increase in consumer prices. In other words, close to half of the applied tariff increase is passed on to consumers through higher retail prices. The remaining variables behave as expected, with international prices now weakly (10% level) significant and positive, the US tariff quota agreement reducing prices by 10% and an avian flu ban raising prices by 1.1% for each additional import origin affected.

In column (4), we split the imported weighted average applied duties into those attributable to normal customs duties and those attributable to safeguards and anti-dumping measures. Both are positive and significant, with the pass-through of

[43] To test for significant differences in trends of frozen chicken and pork prices prior to September 2013, we regress consumer prices of frozen chicken and pork products on a trend variable and an interaction of the trend variable with a dummy variable for chicken products (to capture any marginal differences in trend for chicken prices relative to pork) over the period January 2010 to August 2013. We find no significant difference in consumer price trends between pork and frozen chicken within outlets. We do, however, find that frozen chicken prices fell relative to maize prices within outlets over this period, in part arising from the relatively sharp rise in domestic maize prices in 2012–2013. Our preference is therefore to use pork prices as our control.

temporary trade measures slightly higher (but not statistically significant) than customs duties. In column (5), we use the retail price of fresh chicken (whole and portions) as a control. The pass-through of applied duties to frozen chicken prices falls to 0.148. However, fresh chicken prices are also expected to rise in response to the reduced supply of frozen chicken due to higher duties. The difference between the pass-through in column (5) and column (4) (0.32), therefore, reflects the potential indirect impact of frozen chicken duties on the consumer price of fresh chicken. For example, estimates using fresh chicken prices as the dependent variable and pork prices as a control reveal a pass-through coefficient from frozen chicken duties to fresh chicken prices of 0.29. In column (6), we use the retail price of maize products, a key source of feed for chicken, as a control. The estimated pass-through rises to 0.52. The broad implication is that the positive association between trade measures and consumer prices of chicken products is robust to alternative specifications and indicators of protection.

In the remaining estimates, we test whether the pass-through differs by the distance of the region to the nearest port (column (7)), distance to a major metropolitan municipality (column (8)) and location in a rural area (column (9)). We use maize prices as the control in the final estimate as no price data on pork products is collected from rural outlets. Data for rural outlets is only collected from March 2012 to March 2020, thus excluding the period subsequent to the second phase of tariff increases. We find no significant differences in pass-through in any of these estimates. If anything, the results suggest that the pass-through is higher in remote and rural areas than in urban cities, but no conclusive findings can be drawn from the estimates.

5.2 Frozen chips and pasta

We now briefly look at the price impacts of trade restrictions on frozen chips and pasta. Identifying the price impact on these products is more complicated than in the case of chicken, given fewer products and trade interventions. Econometric estimates of import price equations for frozen chips and pasta are presented in Appendix B. In no cases do we find significant effects of tariffs or anti-dumping measures on exporter prices.[44]

[44] We do find a large significant negative coefficient for surcharges in the frozen chips regressions. However, the coefficient on this reflects the association relative to import prices from SACU

As was found for frozen chicken, the full cost of the tariff is passed on to the domestic importer.

Table 5 presents the regression results analysing the consumer price impact of the anti-dumping duties (on the Netherlands and Belgium), and the safeguard duties (all countries except SACU) applied on imports of frozen chips. We account for the anti-dumping duties by including a dummy variable equal to one (zero otherwise) for the period January 2014 to June 2014 and November 2015 to June 2021. We also include the value of safeguard duties applied from July 2014 to January 2015 and from July 2014 to June 2016. These are 'crude' measures of protection as there is limited variation in the indicators over time. All estimates include outlet and product-unit fixed effects.

In column (1), the sample is restricted to frozen chips. No significant relationship is found for safeguard duties, but prices during the anti-dumping periods are estimated to rise by 1.6% relative to the trend. In column (2), we add fresh potatoes sold by the outlet as a control. Fresh potato prices are more volatile than frozen chips as supply is strongly influenced by weather conditions. Nevertheless, fresh potatoes are the key ingredient for the production of frozen chips, and their inclusion serves as a control for input costs. We also include outlet by time and region-by-time fixed effects to account for outlet-specific or region-specific trends in relative prices. The results suggest that frozen chips prices rose by 18.6% relative to fresh potato prices during periods in which anti-dumping duties were applied. Columns (3) and (4) show this effect in metropolitan areas and other urban areas (there is no rural data on frozen chips). The estimated effect of safeguards on prices remains insignificant. Broadly, the data shows that trade restrictions raised the price of imported frozen goods, with anti-dumping duties the most strongly associated with consumer price increases.

countries. Hardly any frozen chips are imported from SACU.

Table 5: Regression results on impact of trade measures on outlet pricing of frozen chips

	(1)	(2)	(3)	(4)
VARIABLES	Frozen chips only	Fresh potato control		
		All	Metro	Other urban
Dummy Anti-dumping duty(it)	0.016*	0.171**	0.158**	0.182**
	(0.008)	(0.026)	(0.036)	(0.039)
Ln(1+Safeguard duty) (it)	-0.025	0.023	0.029	0.047
	(0.018)	(0.076)	(0.077)	(0.142)
Trend	0.004**			
	(0.001)			
Constant	0.486**	2.778**	2.750**	2.837**
	(0.096)	(0.002)	(0.002)	(0.005)
Observations	16 537	78 370	49 511	27 172
Adj R-squared	0.771	0.566	0.555	0.589
Fixed effects				
Outlet and month	Y			
Outlet by time		Y	Y	Y
Region by time		Y	Y	Y
Commodity-unit	Y	Y	Y	Y

Notes: The effect of anti-dumping duties is captured by the inclusion of a dummy variable equal to one (zero otherwise) for the periods January 2014 to June 2014 and November 2015 to June 2021. The variable safeguards is equal to the safeguard duties applied over the period July 2014 to January 2015, and from July 2014 to June 2016. Robust standard errors clustered at the outlet level in parentheses. ** p<0.01, * p<0.05, + p<0.1

The regression results for consumer prices of pasta products are presented in Table 6. We do not find consistent relationships between trade measures and retail prices of pasta. When looking at pasta alone (column (1)), we find no significant associations between retail prices and tariffs or the anti-dumping period. In column (2), we include the price of flour sold by the outlet as a proxy for input costs to produce pasta. The coefficient on MFN tariffs now becomes significant and negative, contrary to what we would expect. The coefficient on the anti-dumping variable is now significant and positive and points to a 4% price effect. The metro areas appear to account for the anti-dumping effect (column (3)), whereas the negative MFN tariff association is driven by other urban areas.

Table 6: Regression results on impact of trade measures on outlet pricing of pasta

	(1)	(2)	(3)	(4)
VARIABLES	Pasta only	Wheat flour control		
		All	Metro	Other urban
ln(1+MFN tariff)(it)	0.219	-0.852**	0.160	-1.096+
	(0.269)	(0.293)	(0.393)	(0.584)
Dummy Anti-dumping duty(it)	0.004	0.039**	0.057+	0.041
	(0.014)	(0.014)	(0.030)	(0.033)
Trend	0.004**			
	(0.000)			
Constant	-0.578**	3.039**	2.726**	3.121**
	(0.139)	(0.086)	(0.115)	(0.172)
Observations	47 185	99 909	63 081	40 191
Adj R-squared	0.829	0.913	0.862	0.875
Fixed effects				
Outlet and month	Y			
Outlet by time		Y	Y	Y
Region by time		Y	Y	Y
Commodity-unit	Y	Y	Y	Y

Notes: The effect of anti-dumping duties is captured by the inclusion of a dummy variable equal to one (zero otherwise) for the period April to September 2021. MFN tariff rose from 30% to 40% in December 2012 (assumed effective from January 2013 in estimates). The sample of pasta products includes instant noodles, macaroni, spaghetti and other pasta. Wheat flour covers bread flour, cake flour and ready-mix flour. Robust standard errors clustered at the outlet level in parentheses. ** p<0.01, * p<0.05, + p<0.1

5.3 Implications for consumers

The econometric estimates support the argument that trade protection measures raised the consumer prices of the selected products in South Africa. The most consistent results are found for chicken products – which are also the consumer products that have faced the widest range of trade of restrictive trade measures since 2010. In this section, we draw upon the estimates, focusing on chicken, to unpack the potential implications of the trade measures for consumers, producers and food inflation.

We look at the implications of the increases in customs duty, anti-dumping duties and safeguard measures on consumer prices of frozen chicken. Over the period 2012 (after EU tariffs had fallen to zero) to 2021 (excluding December 2021), the import-weighted average applied duty rose from a monthly average of 1.09 to 1.53 (i.e. 40%). Pass-through rates of 0.447 for frozen chicken and 0.29 for fresh chicken imply that these trade measures jointly raised consumer prices of frozen chicken by an estimated

16.2% and fresh chicken by 9.8%.[45] Using the CPI consumption weights for fresh (0.52) and frozen chicken (1.6), this implies a 14% average increase in consumer prices of chicken.

The impact of tariff-induced price increases, however, will vary considerably across households (Makgetla 2021). To study this further, we draw upon the 2010/11 Income and Expenditure Survey for South Africa, obtained from Stats SA. Although the survey is old, it captures household expenditure prior to the tariff increases. Further, relative expenditure shares on food products across expenditure deciles are expected to be relatively stable.[46] The data show that poorer households spend a disproportionate share of their income on chicken products (see Table A4 in Appendix A). For example, households in the lowest consumption decile spend 0.65% of their total expenditure on poultry products, whereas the share for top decile households is 0.07%. This arises because poorer households spend a higher share of their expenditure on food and a higher share of their food expenditure on poultry (e.g. the lowest decile households spend 14.7% of their food expenditure on poultry compared to 7.6% for the top decile households). The expenditure shares of pasta and frozen chips are much lower (0.32% and 0.03% of food expenditure on average) and rise as household expenditure levels increase.

To calculate the welfare implications, we follow Deaton (1989) and use the household expenditure shares to approximate the compensating variation that originated in the changes in the prices of consumer goods.[47] Consequently, we measure the welfare impact as the share of household expenditure on the product multiplied by the tariff-induced change in consumer prices. The result reflects the amount a household would need to maintain previous levels of welfare.

Several caveats regarding the welfare calculations need to be noted. Firstly, only the direct first-order effects of price changes are accounted for. Potential wage effects for

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45 Calculated as ln(1.53/1.06)*0.477.

46 We find qualitatively consistent results using the National Income Dynamics Survey for 2017.

47 For similar applications to tariff changes, see Porto (2006), Ncita (2009) and Marchand (2012).

workers in the poultry industry and indirect effects arising from consumption changes, including the substitution of products, are excluded. Secondly, we only account for expenditure for home use and exclude restaurant or fast-food purchases (e.g. fried chicken and French fries purchased from a KFC outlet). Thirdly, according to the data, many households, particularly poor households, do not purchase poultry, frozen chips and/or pasta products. For example, of the households in the first consumption decile, only 58% report expenditure on poultry (versus 61% for top decile and 77.5% for median decile), 2.2% on pasta (versus 29.7% of top decile households) and 0.2% on frozen chips (4.1% top decile). Many households are therefore insulated from the price changes of these products. The implication is that the welfare estimates will underestimate the total impact on households that (a) consume these products and (b) purchase products based on these goods outside of the home.

Table 7 presents the estimated impact of the increase in household import duties by consumption decile. The values reflect the increased expenditure that would be required to retain their existing consumption bundle. The impact of chicken duties dominates, given the relatively high increase in trade protection plus the importance of the product in household consumption. The overall impact of the trade measures is highly regressive, with poor households disproportionately affected. The chicken duties, for example, raise the household's average expenditure in the first consumption decile by 0.65% compared to 0.07% for households in the top decile.[48] Regarding food consumption, the duties raise expenditure by between 2.1% (first decile) and 1.1% (top decile).

[48] Note that the increase in cost in rand terms is much higher for higher expenditure households given their substantially higher expenditure levels on these products.

Table 7: Percentage change from trade measures in household total expenditure and food expenditure by consumption decile, 2010/11

	Percentage increase total expenditure				Percentage increase food expenditure			
Decile	Chicken	Frozen chips	Pasta	All	Chicken	Frozen chips	Pasta	All
1	0.649	0.000	0.000	0.649	2.057	0.001	0.000	2.058
2	0.646	0.000	0.001	0.647	2.050	0.001	0.004	2.055
3	0.636	0.001	0.002	0.639	2.084	0.002	0.006	2.091
4	0.579	0.000	0.002	0.581	1.989	0.001	0.007	1.998
5	0.545	0.000	0.002	0.548	2.016	0.001	0.009	2.026
6	0.454	0.001	0.003	0.458	1.897	0.003	0.012	1.912
7	0.371	0.001	0.003	0.375	1.828	0.011	0.016	1.854
8	0.249	0.001	0.003	0.253	1.581	0.009	0.021	1.611
9	0.144	0.002	0.003	0.149	1.329	0.019	0.030	1.378
10	0.069	0.001	0.002	0.073	1.067	0.024	0.033	1.123
Total	0.456	0.001	0.002	0.459	1.831	0.006	0.013	1.850

Source: Own calculations using Income and Expenditure survey of 2010/11 obtained from Stats SA

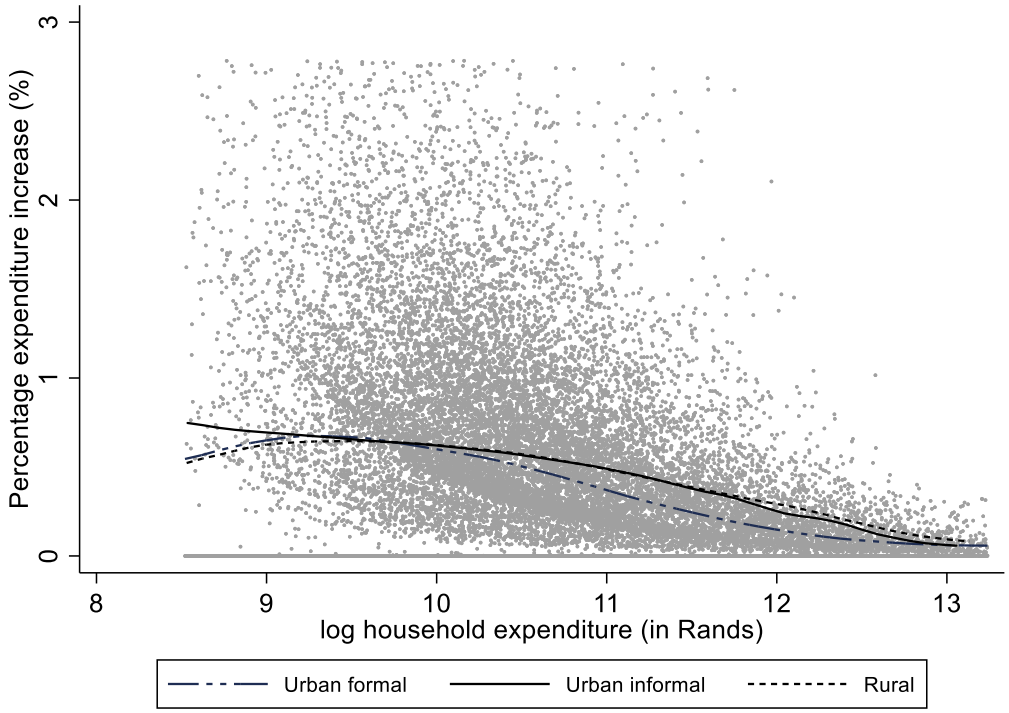
Notes: Excludes consumption of home production (makes up 0.3% of total consumption of poultry). Poultry consumption includes chicken, duck, goose, turkey and guinea fowl. The top and bottom 1% of households by expenditure level are dropped from the sample. The top 1% of household expenditure shares are also dropped for each product. The simple average share consumption expenditure is presented using the unweighted data. The table reflects the following price changes from trade measures: 14% for chicken arising from customs duties and temporary safeguard measures, 18.6% for frozen chips from the anti-dumping duties, and 4% for pasta from the anti-dumping duties. The US tariff quota change and avian flu bans are excluded.

There is enormous variation in the impact across households, even within the consumption deciles. Figure 12 presents a scatter plot of the total expenditure change from increased chicken duties against household expenditure levels for all households. Also included are smoothed local polynomial estimates for urban formal, urban informal and rural households.[49] As shown in the scatter plot, the effects vary considerably across households, but in general, the effect is lower for higher consumption households as they spend lower shares of their expenditure on poultry products. The expenditure effects of increases in chicken duties are regressive in all regions. Poor households are similarly affected by the increase in chicken prices in all regions (the difference is not significant) but middle-income households in urban informal areas and rural areas are more adversely affected than households in urban formal areas. Regression estimates of the welfare effect on household characteristics

[49] The Income and Expenditure survey of 2010/11 classified households as urban formal, urban informal, rural formal and traditional area. For the analysis in this paper, rural formal and traditional areas are combined into the category 'Rural'.

(see Table A4 in Appendix A) also show that large households, which are more likely to be headed by females and Africans, are more adversely affected than other households in response to the tariff-induced chicken price increases. Wealthier and white-headed households are relatively disadvantaged by the pasta and frozen chip prices.

Figure 12: Scatter plot and local polynomial estimates of percentage total expenditure changes from increased chicken duties against household expenditure level



Source: Own calculations using Income and Expenditure survey of 2010/11 obtained from Stats SA.

Notes: See Table 7 for details. The local polynomial is estimated using the *lpoly* command in Stata.

6. Conclusion

In 2010, the South African government adopted a new approach to tariff setting. Rather than a blanket liberalisation policy, as was the case during multilateral liberalisation in the 1990s, tariff adjustments would be considered on a case-by-case basis, taking into account the characteristics of the industry and how changes in tariffs would contribute to the country's industrial policy goals. In this paper, we focused on three consumer goods – frozen chicken, frozen chips and pasta – that have experienced rising protection post-2010, and examined the implications for consumer prices.

We found that imports of chicken, frozen chips and pasta products have faced an array of increasingly restrictive trade measures covering customs duties, anti-dumping duties, safeguard measures and SPS measures. Increases in the general tariff applied to pasta and chicken have reduced import volumes from countries affected by the duty increases, but the impact on aggregate imports is initially attenuated by the diversion of imports from dutiable sources to non-dutiable sources, most notably the EU.

In the case of chicken, this has led to further bids to reduce frozen chicken imports from the EU through safeguards and anti-dumping duties. With the outbreak of avian flu in Europe and the subsequent import bans, the new trade measures on chicken have become increasingly binding as access to alternative import sources has become constrained. The net effect has been a rise in the import-weighted average applied tariff on frozen boneless and bone-in chicken from around 9% in 2012 to 53% in 2021. The combined effect on import volumes has been considerable – total import volumes of bone-in chicken pieces, the most restricted product, in 2021 are at levels last seen in 2011/12 and are significantly down from the peak values of 2018.

The implementation of trade measures on these three products, and the resulting import response, raises a number of broader economic issues:

- **South Africa's participation in a free trade agreement with a large industrial region such as the EU diminishes the effectiveness of tariffs as an instrument for industrial policy purposes.** While higher general tariffs protect domestic industries against dutiable sources, they also raise the preference margin in the domestic market for exporters from preferential trade partners. The outcome of the higher tariffs is an increase in trade diversion from relatively efficient global suppliers to alternative and possibly higher-cost suppliers in preferential partner countries. Trade diversion can reduce national welfare. The government loses customs revenue, and the price of imported goods rises, thus reducing the country's terms of trade.
- **Exporters do not lower their prices in response to the implementation of trade protection measures; instead, the full cost of the duty is carried by**

South African importers and consumers. If foreign exporters lowered their prices in response to tariff increases, then South Africa would be able to purchase the imported goods at a lower international price than before, thus improving the country's terms of trade. However, econometric estimates of the pass-through of tariffs to foreign exporter prices show that South Africa behaves like a small country regarding tariff increases for all the products studied. This also raises the pass-through of the tariff to the final price consumers pay for the imported product.

- **Increases in trade duties can have a substantial impact on retail prices.** Our estimates for frozen chicken indicate an applied tariff pass-through rate of 0.477 to retail prices – in other words, close to half of the applied tariff increase is passed on to consumers through higher retail prices. The MFN tariff increases, anti-dumping duties and the EU safeguards are estimated to have raised consumer prices of frozen chicken products by around 16% over and above what they would otherwise be over the 2012 to 2021 period. If fresh chicken is included, the price impact is estimated at 14%. Anti-dumping duties are also estimated to have raised frozen chips prices by 18.6% and pasta prices by 4%.
- **The impact of increases in retail prices of these food products are not distributed equally across all households.** Poor households spend a disproportionate share of their total expenditure on chicken relative to wealthier households. In the case of pasta and frozen chips, direct consumption is very low, with higher shares of expenditure on these products by wealthier households compared to poor households. Simulations using expenditure data show that the increase in prices from trade duties on chicken products affected the poorest households most. The additional amount a household would need to spend in order to maintain previous levels of welfare is equivalent to 0.65% of total expenditure or 2.1% of food expenditure. The reduction in welfare for households in the top consumption decile was lower at 0.07% of total expenditure (1.1% food expenditure).
- **The aggregate price and welfare impacts are influenced by the sequencing, targeting and ultimate combination of trade measures.** For

example, the initial 2013 increase in MFN duties did not substantially impact retail prices, given the diversion of imports from Brazil to the EU. However, the additional restrictive safeguard and anti-dumping measures targeting EU imports, together with the avian flu bans, have raised the degree to which the MFN tariffs are binding. From March 2022, chicken imports from all EU countries were restricted. All chicken imports, with the exception of very low values of imports from SADC, have subsequently been subject to the MFN rates, and in the case of Brazil, from December 2021been subject to anti-dumping duties of up to 265.1%. This is one reason why the monthly import weighted average applied tariff rose to 53% in 2021 (excluding the very high rate in December).

These findings have important implications for the implementation of trade and industrial policy in South Africa. By increasing tariffs or imposing new duties, ITAC aims to assist domestic producers by raising the demand and price they receive for their product. If, however, the tariff or duty merely leads to trade diversion to exporters located in preferential trading partners, then these foreign exporters will be the primary beneficiaries. The less efficient domestic producers, the less likely they will be able to respond with increases in supply, and the more likely the foreign partners will be the main beneficiaries of the tariff increase. This is an important consideration, as domestic supply constraints including high input costs, labour productivity, municipal infrastructure failures, and electricity and water supply, are cited by producers and SAPA as key challenges faced by poultry producers, and were part of the motivation for requested tariff increases (ITAC 2012b, 2019; Astral Foods 2021).[50] Seasonal shortages of fresh potatoes and inadequate supply of potato varieties required for fried chips have also been cited as a major constraint to domestic production of frozen chips (Schoeman 2022).

Further, this analysis provides some justification for the government's recently expressed concerns regarding the potential impact of the December 2021 anti-dumping duties on consumer prices. In considering tariff applications, much emphasis is placed by ITAC on the domestic firm's competitiveness with respect to imported

[50] In its justification for tariff increases for chicken products in 2012, ITAC noted that South African producers faced relatively high input costs (ITAC 2012b).

products, including input costs, profit margins, market share, job losses and price suppression. Tariffs are set to offset the price disadvantage, which carries the danger of rewarding inefficiencies. While consideration is placed on the impact of tariff increases on consumers, no rigorous analysis is undertaken in the application or assessment process of how tariffs are likely to affect consumer prices.[51] Likewise, insufficient consideration is given to the economy-wide impacts of tariff decisions on one product, and on the many and more diverse downstream users of this product, such as in food processing and restaurant services, where employment is generally much higher.

Finally, this paper highlighted a worrying trend, whereby domestic producers first look to ITAC to raise the MFN duty on global imports, and then follow up with requests for more targeted protection on those remaining exporters that benefit from existing preferential trading agreements, through anti-dumping duties and safeguard measures. These latter measures are generally more severe than the initial protection which was sought through the MFN tariff hike or the tariff that was in place prior to the phase-down of tariffs through these agreements. That net effect of these interventions is to severely curtail all trade and to increase domestic prices – well beyond what would have been considered or projected when each of these applications was considered on its own. Given the interplay between these different trading measures and arrangements, ITAC should pursue a holistic approach in assessing (or at least reviewing) the combined impacts of all applications and past decisions on a single product or industry, rather than adjudicating each application on its own. This can be achieved through a more rigorous and publicised quantification of costs and benefits for all groups (Makgetla 2021).[52] Such an approach will also help insulate ITAC from potential lobbying, particularly in industries where economic power remains

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[51] The tariff amendment application form requires applicants to answer the question "To what extent will your firm's selling price for the product be influenced should the application for amendment in the duty be successful?" (p 7) (http://www.itac.org.za/pages/services/tariff-investigations/application-forms). This can be expanded to include the costs (not just benefits) to downstream users of price increases, the impact on retail prices and how households at different income levels will be affected.

[52] Makgetla (2021) argues that, while the ITAC process aimed to give voice to stakeholders in the case of poultry tariffs, it effectively included only relatively well-resourced and -capacitated formal business groups. Lower-income households were effectively excluded from the deliberations, despite the disproportionate impact on their cost of consumption.

concentrated. Further, it would make explicit the importance of considering the costs to consumers, in addition to the benefits to producers, when making decisions on tariff changes.

Appendix A – Additional tables

Table A1: Timeline of trade measures imposed on frozen chicken products

HS	02071220	02071290	02071410	02071420	02071490
Product	**Frozen carcasses**	**Frozen whole bird**	**Frozen boneless cuts**	**Frozen offal**	**Frozen bone-in cuts**
Tariff measure and date of implementation					
5 Jul 2000			AD on US imports (224c/kg to 725c/kg)	AD on US imports (224c/kg to 725c/kg)	AD on US imports (224c/kg to 725c/kg)
10 Feb 2012		Provisional AD Brazil (62.93%)	Provisional AD Brazil (6.26%-46.59)		
5 Apr 2012			AD on US raised from 224c/kg to 940c/kg	AD on US raised from 224c/kg to 940c/kg	AD on US raised from 224c/kg to 940c/kg
10 Aug 2012		Provisional AD on Brazil lapses	Provisional AD on Brazil lapses		Provisional AD Brazil lapses
30 Sep 2013	MFN tariff increase (27% to 31%)	MFN tariff increase (27% to 82%)	MFN tariff increase (5% to 12%)	MFN tariff increase (27% to 30%)	MFN tariff increase (220c/kg (18%) to 37%)
4 July 2014 - 2 Jan 2015					Provisional anti-dumping duties on Netherlands (22.81%), UK (22.03%) and Germany (31.3% to 73.33%)
27 Feb 2015					Final anti-dumping duties on Netherlands (3.86% to 22.81%), UK (12.07% to 30.99%) and Germany (31.3% to 73.33%)
End Feb 2016					US tariff rate quota arrangement: Rebate of US AD on 65 000 tons
Nov 2016	Avian flu ban, Netherlands				
15 Dec 2016					Provisional safeguard on EU (13.9%)
3 Jul 2017					Provisional safeguard removed
Mar 2017	Avian flu ban, France, Germany, Hungary, Israel, Netherlands, Poland, Spain, UK				
20 Jun 2017	Avian flu ban, Belgium				

HS	02071220	02071290	02071410	02071420	02071490
2 Jun 2017	Avian flu ban, Zimbabwe				
28 Sep 2018					Final safeguard on EU (35.3%)
Sep 2018	Avian flu ban lifted on Poland and Spain				
12 Mar 2019					Safeguard reduced (30%)
11 Feb 2020	Avian flu ban lifted, Netherlands				
Late 2019	Avan flu ban reimposed, Poland				
12 Mar 2020					Safeguard reduced (25%)
As of Oct 2020	Four member states pending re-instatement for export of poultry meat to South Africa (Belgium, France, Hungary and Poland)				
13 Mar 2020			Tariff increase from 12% to 42%		Tariff increase from 37% to 62%)
2 Nov 2020	Avian flu ban, Netherlands (SPS)				
18 Nov 2020	Avian flu ban, Denmark (SPS)				
3 Dec 2020	Avian flu ban Sweden				
As of Jan 2021	All EU member states banned				
12 Mar 201					Safeguard reduced (15%)
Apr 2021					Increase US quota to 71 290 tons
Sep 2021, autumn 2021	September 2021 highly pathogenic avian influenza (HPAI) free status restored for Finland, Belgium, France, Hungary, Ireland and Poland but again lost by autumn 2021 new outbreaks of HPAI				
17 Dec 2021					Provisional anti-dumping duties on selected bone-in chicken products from Brazil (up to 265.1%), Denmark (up to 67.4%), Ireland (158.42%), Poland (up to 96.9%), and Spain (up to 26%).
Mar 2022	Country-wide avian flu bans on 14 EU members maintained				
Aug 2022					Delay in implementation of final anti-dumping duties on Brazil, Denmark, Ireland, Poland and Spain.

Source: South African government gazettes, ITAC reports, WTO notifications, DALRRD notifications, trade.ec.europa.eu.

Table A2: Timeline of changes in trade measures for frozen chips and French fries, 2010–2022

Date	Detail	Product (HS code)
Jan 2010	EU preferential tariffs lowered to 5% (from 7.6%)	20041090 and 20041010
Jan 2011	EU preferential tariffs lowered to 2.6%	20041090 and 20041010
Jan 2012	EU preferential tariffs lowered to 0%	20041090 and 20041010
Anti-dumping duties		
21 Jun 2013	Initiation AD	20041090
20 Dec 2013	Provisional duties against Belgium (6.19% to 30.77%) and Netherlands (18.8%)	20041090
20 Jun 2014	Provisional AD ends	20041090
8 Aug 2014	Final injury, but AD delayed to 2016/10/21	20041020
21 Oct 2016	AD imposed on Netherlands (16.42%) and Belgium (6.19% to 30.77%)	20041020
26 Jan 2021	AD suspended (sunset not concluded)	20041020
15 Jul 2022	Provisional AD on Germany (181.05%), Netherlands (9.23% to 104.52%) and Belgium (20.44% to 23.06%)	20041021 and 20041029
Safeguards		
23 Nov 2012	Initiation	20041090
5 Jul 2013	Provisional safeguard imposed (61.42%)	20041090 (to 15 Aug 2013, 20041020 afterwards)
20 Jan 2014	Provisional safeguard ends	20041020
25 Jul 2014	40.92% final safeguard imposed (excl. selected emerging countries)	20041020
5 Jul 2015	20.45% safeguard	20041020
5 Jul 2016	0% safeguard	20041020

Source: Government Gazette No. 36633, R. 468 (5 July 2013), No. 36824 R.667 (6 September 2013), No. 7889, R. 634 (8 August 2014) and No. 45500, R. 674 (19 November 2021). Tariffs on imports from SACU and SADC countries are zero over entire period. For ITAC investigations and determinations see Report No. 436 (2013a), Report No. 457 (2013b), Report No. 458 (2013b) and Report No. 696 (2022). EFTA tariffs on 20041010 fell from 15% in 2009 to 12.6% (2010), 10% (2011), 7.6% (2012), 5% (2013), 2.6% (2014), 0% (2015).

Table A3: Timescale of tariffs and anti-dumping duties imposed on pasta imports

	HS 19021900 (pasta not containing eggs)	HS 19021900 (pasta containing eggs)
2010–2012	Linear reduction in tariffs on EU from 5% (2010) to 0% (2012)	Linear reduction in tariffs on EU from 5% (2010) to 0% (2012)
2010–2015	Linear reduction in tariffs on EFTA from 18.9% (2010) to 0% (2015)	Linear reduction in tariffs on EFTA from 18.9% (2010) to 0% (2015)
21 Dec 2012	Tariff increase from 30% to 40%	No change in tariff at 30%
1 Apr–16 Sep 2021	Provisional AD imposed on Egypt (43.27%), Turkey (367.25%), Latvia (4%), Lithuania (12%)	Provisional AD imposed on Egypt (43.27%), Turkey (367.25%), Latvia (4%), Lithuania (12%)
17 Mar 2022	AD imposed on Egypt (43%), Turkey (367%), Latvia (4%), Lithuania (12%)	AD imposed on Egypt (43%), Turkey (367%), Latvia (4%), Lithuania (12%)

Source: Government Gazette No. 35989 (21 December 2012), ITAC (2021b) Report No. 655; ITAC (2012) Report No. 410.

Table A4: Share of household total expenditure and food expenditure by consumption decile, 2010–2011

	Share total expenditure				Share food expenditure			
Decile	**Chicken**	**Frozen chips**	**Pasta**	**All**	**Chicken**	**Frozen chips**	**Pasta**	**All**
1	4.64	0.00	0.00	5.42	14.69	0.01	0.00	15.47
2	4.61	0.03	0.00	4.98	14.65	0.09	0.00	15.14
3	4.55	0.04	0.00	4.96	14.88	0.14	0.01	15.58
4	4.13	0.05	0.00	4.45	14.21	0.19	0.01	14.76
5	3.89	0.06	0.00	4.13	14.40	0.23	0.01	14.80
6	3.24	0.07	0.00	3.41	13.55	0.31	0.02	13.94
7	2.65	0.07	0.01	2.78	13.05	0.39	0.06	13.52
8	1.78	0.07	0.01	1.89	11.29	0.53	0.05	11.80
9	1.03	0.07	0.01	1.12	9.50	0.74	0.10	10.20
10	0.49	0.06	0.01	0.57	7.62	0.83	0.13	8.50
Total	3.26	0.05	0.00	3.55	13.08	0.32	0.03	13.67

Source: Own calculations using Income and Expenditure survey of 2010/11 obtained from Stats SA

Notes: Excludes consumption of home production (makes up 0.3% of total consumption of poultry). Poultry consumption includes chicken, duck, goose, turkey and guinea fowl. The top and bottom 1% of households by expenditure level are dropped from the sample. The simple average share consumption expenditure is presented using the unweighted data.

Table A4: Estimates of percentage increase in total expenditure from trade increases on household characteristics

	(1)	(2)	(3)	(4)
	Poultry	**Pasta**	**Frozen chips**	**All products**
ln(household expenditure)	-0.187**	0.0003**	0.0002*	-0.180**
	(0.004)	(0.000)	(0.000)	(0.004)
Female head	0.003	0.0002*	0.000	0.004
	(0.007)	(0.000)	(0.000)	(0.007)
Coloured	0.062**	0.003**	0.000	0.063**
	(0.010)	(0.000)	(0.000)	(0.010)
Indian/Asian	-0.103**	0.000	0.000	-0.106**
	(0.014)	(0.000)	(0.001)	(0.014)
White	-0.072**	0.001**	0.002**	-0.074**
	(0.007)	(0.000)	(0.000)	(0.007)
Urban informal	0.053**	-0.000	-0.000	0.051**
	(0.015)	(0.000)	(0.000)	(0.014)
Traditional area	0.030**	-0.001**	-0.000*	0.026**
	(0.009)	(0.000)	(0.000)	(0.009)
Rural formal	0.049*	-0.001*	-0.000	0.043*
	(0.021)	(0.000)	(0.000)	(0.021)
ln(household size)	0.090**	0.0002*	0.000+	0.089**
	(0.005)	(0.000)	(0.000)	(0.005)
Constant	2.340**	-0.002**	-0.001+	2.260**
	(0.046)	(0.001)	(0.001)	(0.046)
Observations	24 586	24 571	24 814	24 822
R-squared	0.135	0.034	0.004	0.126
Adjusted R-squared	0.134	0.0338	0.00389	0.126

Notes: Estimates of percentage increase in expenditure from increases in trade duties using Income and Expenditure survey of 2010/11 obtained from Stats SA. Base category is male African-headed household located in an urban area. Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1

Appendix B – Regressions of import demand

This appendix presents estimates of import equations for frozen chicken, frozen chips and pasta, using monthly bilateral import data over the period January 2010 to December 2021. The import volumes from each partner country are obtained at the HS 8-digit level from SARS. A more detailed discussion of each of the estimates is presented below

B.1 Frozen chicken

Table B1 presents several regressions estimates of the effect of the MFN tariffs, anti-dumping duties and safeguard duties on the volume and value of chicken imports. The sample covers bilateral import data for all chicken products, including those with no tariff changes (e.g. MDM and fresh chicken), over the period January 2012 to December 2021. Consequently, the coefficient estimates reveal the impact of trade measures on frozen chicken imports relative to other chicken products not targeted by increases in protection. Each regression also includes an interaction between the trade measure and a dummy variable for an origin's preferential status (equal to one if imports are duty-free). This interaction is included to account for potential import substitution responses to the trade measures.

Column (1) presents estimates for bilateral import quantities. MFN import tariffs are found to have a large negative impact on import volumes from non-preferential partners, with a 1% increase in the MFN tariff associated with a 2.3% reduction in import volumes. Anti-dumping duties reduce imports from targeted countries (by an estimated 49% (=exp(-0.669)-1)). Finally, the US tariff quota agreement had a strong positive impact on import volumes of frozen bone-in chicken, with some of this increase attributed to reductions in imports from preferential partners.

One problem with these estimates is that tariffs (including safeguards) and anti-dumping duties can lead to the exit of targeted firms and countries from the market, as well as the entry of alternative suppliers. Anti-dumping duties, for example, led to the exit of Germany as a source of frozen chicken. The US also entered the South African market for bone-in cuts in a substantial capacity after an anti-dumping free quota was

agreed upon in February 2016. These extensive margin adjustments also contribute towards changes in the aggregate value of imports. We, therefore, follow Amiti et al. (2019) and in column (2) replace the log of the import quantity with the inverse hyperbolic sine, which has a defined value for cases in which import quantities are zero.[53] The significant negative impact of tariffs remains, although the coefficient is smaller, but the impact of the anti-dumping duties, now that zero trade is accounted for, rises significantly with imports falling by 99% after implementation (equals exp(-4.45)-1). The estimated impact of the US tariff rate quota arrangement also rises. The EU safeguards are also found to reduce import volumes, with some of this decrease offset by increased imports (off a very low base) from SACU and SADC. Columns (3) and (4) present estimates for import values, with the results following those of quantity relatively closely.

The overall finding is that tariff increases and other restrictive trade measures have a significant negative impact on import volumes from targeted countries, but the impact on aggregated imports is attenuated by the shift to alternative sources.

[53] The inverse of the hyperbolic sine transformation of x is given by $\log[x + (x^2 + 1)^{0.5}]$, and is equal to zero if x equals zero.

Table B1: Spillover effects of trade measures on imports of chicken from preferential trade partners

	(1)	(2)	(3)	(4)
VARIABLES	Ln(Quantity)	Ln(Quantity) (sine)	Ln(Value)	Ln(Value) (sine)
ln(1+tariff)(ijt)	-2.304+	-1.540**	-2.498+	-1.823**
	(1.219)	(0.576)	(1.225)	(0.689)
Dummy AD(ijt)	-0.669+	-4.449**	-0.916*	-5.174**
	(0.352)	(1.649)	(0.356)	(1.848)
Dummy AD(ijt) x PTA	0.198	-0.307	0.429	-0.380
	(0.346)	(0.238)	(0.364)	(0.278)
Dummy US Quota(it)	5.178**	13.085**	4.788**	14.678**
	(0.321)	(0.082)	(0.301)	(0.098)
Dummy US Quota(it) x PTA	-0.929*	-1.205*	-1.006*	-1.378*
	(0.414)	(0.479)	(0.429)	(0.576)
ln(1+EU safeguard)(ijt)	-1.773	-5.736+	-1.957*	-7.029+
	(1.488)	(2.990)	(0.823)	(3.572)
ln(1+EU safeguard)(ijt) x PTA	2.561	4.739**	2.056	5.583**
	(1.628)	(1.736)	(1.349)	(2.100)
Constant	12.697**	0.783**	14.987**	0.925**
	(0.095)	(0.074)	(0.100)	(0.089)
Observations	3 637	99 840	3 637	99 840
F	232.8	5 747	209.3	5 118
Adj R-squared	0.787	0.719	0.809	0.710
Fixed effects				
Origin by time	Y	Y	Y	Y
Origin by HS	Y	Y	Y	Y
Product by time	Y	Y	Y	Y

Notes: Sample covers all imported chicken products over the period Jan 2010 to Dec 2021. The chicken products include HS 02071100: Fresh or chilled whole bird; HS 02071210: Mechanically deboned meat; HS 02071220: Frozen carcasses; HS 02071290: Frozen whole bird; HS 02071300: Cuts and offal, fresh or chilled; HS 02071410: Frozen boneless cuts (breasts, thighs, others); HS 02071420: Frozen: Offal (livers, feet, heads, etc.); HS 02071490: Frozen bone-in cuts (half bird, leg quarters, wings, breasts, thighs, drumsticks, other). PTA is a dummy variable equal to one (zero otherwise) for the preferential trade partners in the EU and SADC. MFN tariff(ijt) is the statutory general import duty. Dummy AD(ijt) denotes a dummy variable equal to one (zero otherwise) if anti-dumping duty imposed on imports of Frozen bone-in chicken portions. Dummy US Quota(it) is a dummy variable equal to one (zero otherwise) for period from 1 April 2018 for anti-dumping tariff free quota imports from US (65 417 tons) on frozen bone-in chicken portions. EU safeguard (ijt) denotes the safeguard duty applied to EU imports of frozen bone-in chicken portions (13.9% from 15 December 2016 to June 2017; 35.3% from 28 September 2018; 30% from 12 March 2019; 25% from 12 March 2020; 15% from 12 March 2021 to end of sample period). Dummy avian flu (jt) is a dummy variable equal to one (zero otherwise) if an avian flu ban on imports from the country is imposed. Robust standard errors clustered by origin in parentheses. ** p<0.01, * p<0.05, + p<0.1

B.2 Frozen chips and French fries

Table B2 presents regression estimates of the effect of the anti-dumping duties and safeguard duties on import volumes and quantities of frozen chips and French fries (HS 20041020) over the period from January 2014 to December 2021. Unfortunately, the estimates can only be made from January 2014 given that frozen chips were only separated out from HS 20041090 from late 2013. The implication is that the regressions do not account for the effects associated with the implementation of the preliminary safeguards and anti-dumping duties. The estimates include the log of (1+safeguard duties) plus a dummy variable for Belgium and the Netherlands over the period of implementation of provisional and final anti-dumping duties against these countries (January 2014 to June 2014 and November 2015 to June 2021). Also included is a dummy variable for preferential partners over these periods. The coefficient on the interaction with Belgium and the Netherlands captures the impact of the anti-dumping duties on imports from these countries *relative* to imports from preferential partners. The coefficient on the preferential partner interaction measures the change in imports from these countries relative to other countries. The regressions include time and country fixed effects.

Table B2: Regression analysis of trade measures on import volumes and value of frozen chips

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln(Unit value)	Ln(Quantity)	Ln(Quantity) (sine)	Ln(Value)	Ln(Value) (sine)
Post AD(t) x Belgium/Netherlands(j)	0.201	-0.357	-0.933*	-0.156	-0.797
	(0.131)	(0.508)	(0.449)	(0.479)	(0.519)
Post AD(t) x PTA(j)	-0.432	0.345	0.531*	-0.087	0.531+
	(0.404)	(0.974)	(0.227)	(0.761)	(0.278)
Ln(1+Safeguard duties)(t)	-8.937**	27.370**	-1.926**	18.433**	-2.276**
	(1.424)	(6.929)	(0.684)	(5.840)	(0.872)
Constant	3.178**	8.631**	1.306**	11.809**	1.620**
	(0.225)	(0.617)	(0.046)	(0.478)	(0.060)
Observations	400	400	3,456	400	3,456
F-stat	17.16	6.018	2.962	3.804	2.368
Adj R-squared	0.448	0.775	0.724	0.795	0.695
Fixed effects					
Time	Y	Y	Y	Y	Y
Origin	Y	Y	Y	Y	Y

Notes: The dependent variables are all in logs. Sample covers bilateral imports of chips and French fries (HS 20041020) over period January 2014 to December 2021. The dummy variable Post AD(t) equals one (zero otherwise) for the period January 2014 to June 2014 and November 2015 to June 2021. Belgium/Netherlands is a dummy variable for Belgium and the Netherlands. Import unit values are

calculated by dividing the free-on-board import value by the import quantity (in kilogrammes). In the sine transformed regressions (columns (2) and (4)), the sample excludes countries for which no imports took place over the sample period. If these countries are included the coefficients fall, but remain significantly different from zero. Robust standard errors clustered by origin in parentheses. ** p<0.01, * p<0.05, + p<0.1.

The imposition of anti-dumping duties is not found to reduce import volumes from the Netherlands and Belgium in column (2), but once we allow for zero trade value using the inverse hyperbolic sine transformation in column (3), we find a significant negative effect relative to imports from other preferential partners (mainly the EU).[54] Imports of frozen chips from preferential partners actually rose relative to other countries, indicating strong substitution effects between Belgium/Netherlands and these countries. In columns (4) and (5), the estimates study the effect on import values, but while the signs are consistent with the quantity regressions, the coefficients are at most weakly significant.

The coefficient on safeguards is negative, large and significant. This coefficient measures the impact of the safeguards on imports from SACU members where the safeguards did not apply (the time fixed effects control for the impact of safeguards on imports from other countries). There is no consistent sign to this coefficient across the estimates. This inconsistency reflects the very low and highly irregular imports from SACU countries.[55]

B.3 Pasta

To study the impact of the tariff, increase on import quantity and values, Table B3 presents regression estimates for bilateral imports of pasta products (HS 190219 and HS 190211) over the period January 2010 to December 2015 (three years on either side of the tariff increase). The MFN tariff on pasta without eggs (HS 190219) increased from 30% to 40% on 21 December 2012, whereas tariffs on pasta with eggs

[54] There are only a few months of zero imports from either Belgium or the Netherlands, but we see much more entry and exit into the South African market by other countries, such as Germany.

[55] In estimates replacing the time fixed effects with a time trend and monthly fixed effects, we estimate an elasticity of -1.9 on safeguard duties. When including other frozen processed potatoes (HS 20041090) as a control, the safeguard elasticity equals -0.66 (significant at 10% level).

(HS 190211) remained constant at 30%. The impact of tariff changes on imports of pasta without eggs is therefore identified relative to import trends of pasta with eggs. The estimates include MFN tariffs as well as an interaction between MFN tariffs and preferential trade partners to capture any spillover effects of the tariffs. Import volumes and values are transformed using the inverse hyperbolic sine transformation to account for zero bilateral trade values. The bilateral exchange rate (R/foreign) is also included. The pass-through of the exchange rate to foreign prices is expected to be symmetrical to that of tariffs.

The coefficient on MFN tariffs is negative for estimates of import volumes (columns (2) and (3)), but is only significant for the sine transformed estimate. The results suggest a 1% increase in (1+MFN tariffs) reduces imports from dutiable sources by 2%. However, we find very high positive effects on imports from preferential partners in response to the tariffs (an elasticity of 15.6). A depreciation of the currency is also found to have a significant negative impact on import volumes, but the elasticity is relatively low at 0.195 in the preferred estimate in column (3). The results for import values are qualitatively similar to those of import quantities (column (2)).

Table B3: Impact of applied tariffs on import quantities and values of pasta not containing eggs

	(1)	(2)	(3)	(4)	(5)
VARIABLES	ln(unit value)	ln(Quantity)	ln(Quantity) (sine)	ln(Value)	ln(Value) (sine)
ln(1+MFN tariff)(ijt)	0.135	-3.830	-2.002*	-3.696	-1.886
	(1.360)	(2.635)	(0.946)	(2.388)	(1.190)
ln(1+MFN tariff)(ijt) x PTA(j)	1.672	7.746**	15.623**	9.418**	19.978**
	(1.347)	(2.820)	(1.664)	(2.443)	(2.094)
ln(R/Foreign exchange rate)(jt)	0.285	-2.255**	-0.195*	-1.969**	-0.168
	(0.292)	(0.633)	(0.087)	(0.583)	(0.106)
Constant	2.152**	8.449**	0.077	10.601**	-0.034
	(0.395)	(0.772)	(0.241)	(0.697)	(0.305)
Observations	1 888	1 888	14 112	1 888	14 112
Adjusted R-squared	0.569	0.742	0.642	0.724	0.622
Fixed effects					
Time	Y	Y	Y	Y	Y
Origin-product	Y	Y	Y	Y	Y

Notes: Sample covers the period January 2011 to January 2015. All dependent variables are in logs. Unit values are measured in rands and are calculated as free-on-board import values divided by quantity (kg). The MFN tariff on pasta without eggs (HS 190219) increased from 30% to 40% on 21 December 2021. PTA(j) is a dummy variable equal to one (zero otherwise) for the preferential trade partners in the EU and SADC. The control product is pasta with eggs (HS 190211) for which tariffs remained at 30%

throughout the period. Import volumes and values are transformed using the inverse of the hyperbolic sine transformation, log[x + (x2 + 1)0.5]. Robust standard errors clustered by origin in parentheses. ** p<0.01, * p<0.05, + p<0.1

Table B4 presents regression results of the impact of the provisional anti-dumping duties on pasta imports from Egypt, Latvia, Lithuania and Turkey in April 2021. The sample period covers January 2020 to December 2021. The anti-dumping duties were applied to imports of pasta with and without eggs. To identify the impact on imports from these countries, we include a dummy variable equal to one for the post-April 2021 period (Post(t)) and an interaction of this variable with a dummy variable for Latvia, Egypt, Lithuania and Turkey (AD countries(j)). We also include an interaction between Post(t) and a dummy variable for preferential partners (PTA(j)) to capture substitution effects. The coefficients on the interaction terms capture the impact of the dumping duties on bilateral imports from the interacted countries *relative* to all other countries.

As shown in columns (3) to (6) of Table B4, the imposition of anti-dumping duties is associated with declines in imports from targeted countries (58% to 68%), but increases in imports from preferential partners (relative to other countries). Similarly, import values fall from countries targeted by the anti-dumping measures, but rise from preferential partners.

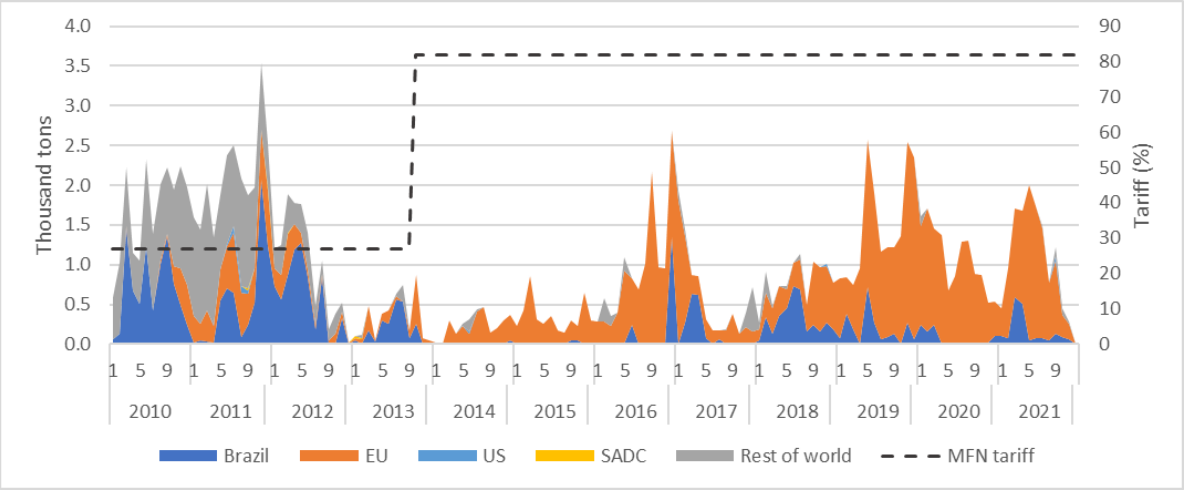
Table B4: Trade impact of provisional anti-dumping duties on Egypt, Latvia, Lithuania and Turkey

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Ln(unit value)	Ln(unit value)	ln(Quantity)	ln(Quantity) (sine)	ln(Value)	ln(Value) (sine)
Post(t) x AD countries(j)		0.106	-0.858*	-1.135+	-0.752*	-1.241+
		(0.133)	(0.381)	(0.638)	(0.357)	(0.712)
Post(t) x PTA(j)		-0.145	0.841**	0.355*	0.695**	0.388*
		(0.132)	(0.311)	(0.144)	(0.249)	(0.187)
Post(t)	0.032					
	(0.144)					
Time trend	-0.011					
	(0.008)					
Constant	9.557	2.969**	7.791**	1.281**	10.761**	1.732**
	(6.141)	(0.034)	(0.079)	(0.028)	(0.065)	(0.037)
Observations	82	741	741	4 992	741	4 992
F-stat	1.245	0.785	4.800	3.691	4.623	2.957
Adj R-squared	0.735	0.706	0.777	0.712	0.770	0.690
Fixed effects						
Month	Y					
Origin by HS	Y	Y	Y	Y	Y	Y
Time		Y	Y	Y	Y	Y

Notes: Sample covers the period January 2020 to December 2021. The sample includes pasta without eggs (HS 190219) and pasta with eggs (HS 190211). The estimates in column (1) only include Egypt, Turkey, Lithuania and Latvia. All other columns include all import origins. All dependent variables in logs. Post(t) denotes a dummy variable equal to one for the period from April 2021. Robust standard errors clustered by origin in parentheses. ** p<0.01, * p<0.05, + p<0.1

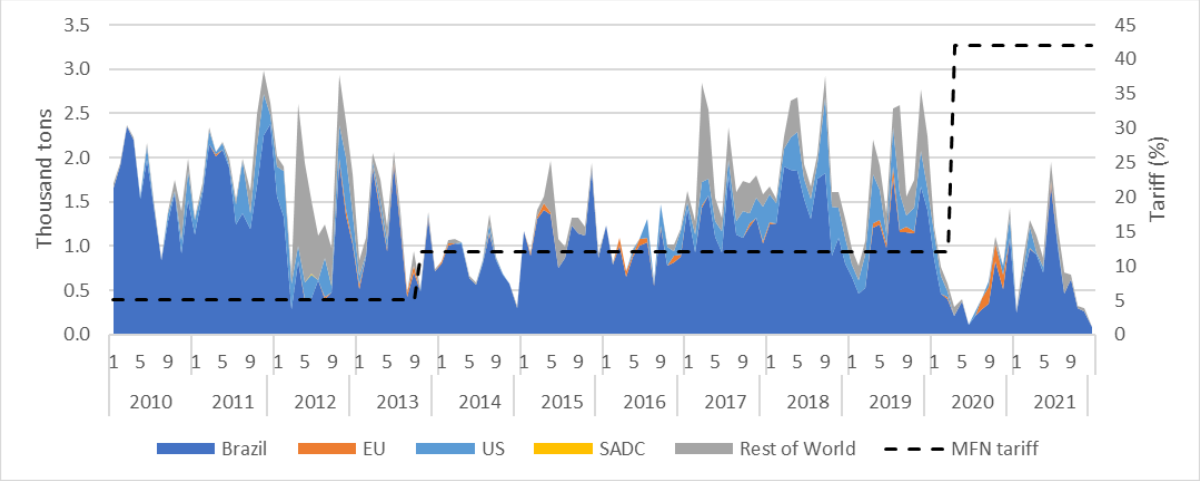
Appendix C – Additional figures

Figure C1: Monthly import volumes of frozen whole chicken



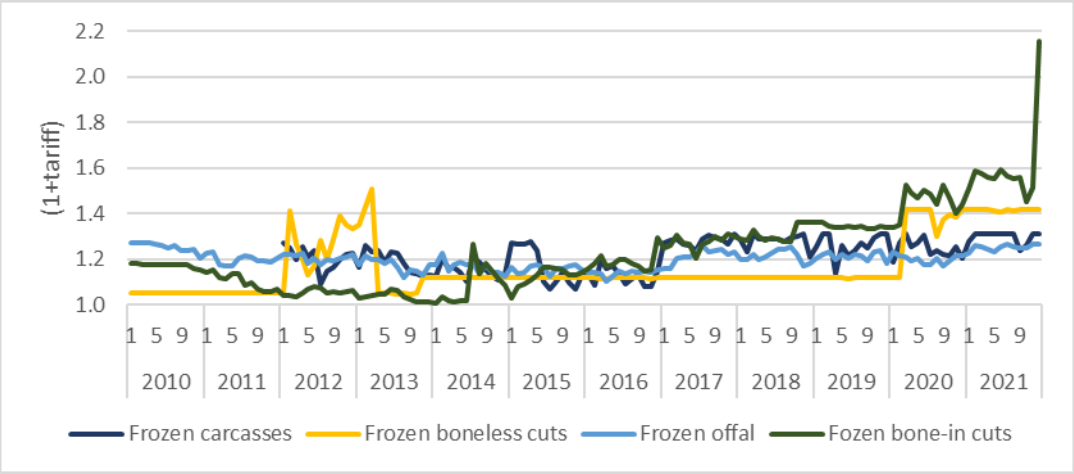
Source: Own calculations using bilateral import data obtained from SARS

Figure C2: Monthly import volumes of frozen boneless chicken



Source: Own calculations using bilateral import data obtained from SARS

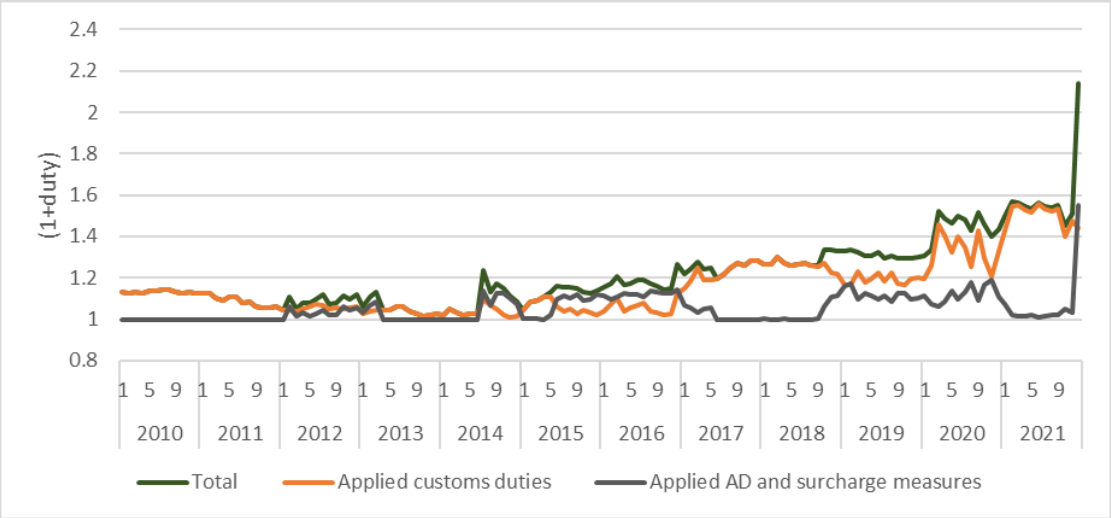
Figure C3: Import weighted average applied customs duties and temporary trade measures on frozen chicken



Source: Own calculations using bilateral import data obtained from SARS

Notes: Import weighted applied duties, inclusive of customs duties and temporary trade barriers, are calculated using current bilateral import values as weights. Frozen whole chicken is not included as imports of this product are highly irregular.

Figure C4: Import weighted average applied customs duties and temporary trade measures on frozen bone-in and boneless chicken



Source: Own calculations using bilateral import data obtained from SARS

Notes: Applied customs duties refer to the statutory applied MFN or preferential rate applied. The AD and surcharge measures are constructed by applying the relevant duties to imports from targeted countries. Current bilateral import values are used as weights.

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