3 Trade policy without trade facilitation: Lessons from tariff pass-through in Tunisia

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Abstract

This chapter evaluates the extent to which changes in tariffs and in international prices were transmitted into consumer prices in Tunisia over the period 2000–2008. A pass-through equation is estimated using sectoral panel data at the retail product level and controlling for unobserved sectoral heterogeneity. The main results show that, on average, tariff pass-through (TPT) is 10 per cent and it varies across sectors. In particular, agricultural products seem to be driving the results. In summary, the change in Tunisian tariffs has affected local prices, but the effect is lower in magnitude than that found for other developing countries. This is in part due to imperfect competition and state interventions by means of subsidies and price controls that prevent the full transmission of changes in international prices. This research suggests that, for Tunisia, trade facilitation measures and sectoral actions to facilitate the business environment could positively impact on the pass-through effect and that reductions in border prices could have higher effects on retail prices, which, in turn, contribute to increase domestic welfare and generate inclusive development.

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3.1 Introduction

In the past two decades, an increasing number of developing countries have started unilateral or regional trade liberalization processes in most regions of the world. In particular, many countries in the North African region have intensified their participation in regional trade agreements, such as the pan-Arab Greater Arab Free Trade Area (GAFTA) and the Euro-Mediterranean Agreements (EUROMED), and have also engaged in unilateral trade liberalization policies. Recently, Tunisia adopted the Agreement on Trade Facilitation (TFA) at the 2013 WTO Bali Ministerial Conference. The main aim of the TFA is to reduce trade costs in general and to tackle "red tape" that is hampering trade across borders in particular. As underlined in the World Trade Report 2015 (WTO, 2015), full implementation of the TFA will decrease trade costs by 14.3 per cent and developing countries will benefit the most. To date, Tunisia has notified provisions under Category A of the TFA.

The main underlying goal of these trade policies is improving market access and paving the way towards increasing trade, as well as entering into or increasing WTO members' participation in global production networks. An important question for economic development is whether these policies help to reduce poverty and to increase the welfare of citizens. It could be that, in reducing trade costs, national producers would be displaced by more productive foreign firms that are able to export to the region and this could eventually translate into losses for domestic producers and overall welfare losses. It could also be possible that increasing international competition would reduce domestic prices and this could translate into increasing consumption and welfare for most consumers. For this reason, it is important to evaluate the net welfare effects of such policies in specific countries. A first step to accomplish this task is to analyse the extent to which changes in international prices and in trade and non-trade barriers are transmitted to changes in domestic prices.

This chapter focuses on the Tunisian case for two reasons. First, this is the first attempt to evaluate the pass-through of international prices into domestic prices in this country using data from the 2000s, a period in which Tunisia witnessed important economic and institutional changes. Second, Tunisia still has relatively high tariffs and a large number of non-tariff barriers,[1] despite the fact that the average tariff rate has been reduced in recent years. For instance, the average MFN tariff for manufactured products was reduced from 19 per cent in 2006 to 12 per cent in 2013 (the corresponding tariffs for agricultural goods were 54 per cent and 19 per cent respectively).

The main results of the present study show that, on average, tariff pass-through (TPT) is 10 per cent, which is lower than the impact found for other developing countries. TPT varies across sectors and agricultural products in particular seem to be driving the results. The study finds that the low pass-through is largely due to market concentration. Moreover, without market concentration,[2] the pass-through would more than double. To investigate the effect of other non-tariff measures (NTMs), *ad valorem* equivalents are estimated and their effect on retail prices is also presented. The study finds that only pre-shipment inspection and other formalities have a negative impact on import values and that, conversely, other NTMs have a positive effect. The effect of NTMs on retail prices is found to be positive and significant, but small in magnitude.

The chapter is structured as follows. Section 2 outlines the trade and exchange rate policies in Tunisia in recent years and presents some stylized facts. Section 3 reviews the related literature. Section 4 presents the methodology, describes the main data and variables and presents the results, and Section 5 concludes.

3.2 Tunisian economic policy

Trade policy

In the last two decades, Tunisia has increasingly diversified its economy, focusing on specific agricultural products – olive oil, dates and several organic fruits and vegetables – as well as on manufacturing industries, tourism and the mining and energy sector. Table 3.1 reports import shares over time for different product categories. Note that only the product categories for which domestic price data were available are covered. Transport – which comprises cars, premium gasoline and gasoil – together with housing play the largest roles. The importance of clothing and footwear has constantly declined since 2002. On the other hand, the housing, water, gas, electricity category has gained importance.

Despite Tunisia's maintenance of relatively high tariff barriers, some trade liberalization has taken place in the last three decades, with average tariffs decreasing from about 24 per cent in 2006 to 13 per cent in 2013 (Table 3.2).

Table 3.1 Import shares by category of goods, 2002–2008

	Year						
Category of goods	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)
Bread and cereals	4.87	3.14	2.77	2.9	2.77	4.97	4.97
Clothing and footwear	14.53	14.67	12.35	11.29	9.55	9.2	7.29
Fish and seafood	0.19	0.28	0.22	0.28	0.3	0.26	0.27
Fresh and dried fruits	0.11	0.08	0.17	0.08	0.07	0.07	0.05
Furniture, household articles	3.99	3.81	3.78	4.17	4.18	3.76	3.57
Housing, water, gas, electricity	9.49	10.55	9.92	13.14	14.08	12.32	16.06
Meat and poultry	0	0.04	0.22	0.21	0.14	0.11	0.1
Milk, cheese and eggs	0.28	0.32	0.36	0.28	0.2	0.22	0.27
Oil and fats	1.12	1.47	1.37	1.48	1.57	1.24	1.91
Salt and condiments	0.03	0.03	0.03	0.04	0.03	0.02	0.03
Sugar, jam, tea, coffee and chocolate	1.33	1.05	1.08	1.12	1.46	1.09	0.99
Tobacco	0.45	0.47	0.47	0.52	0.47	0.43	0.34
Vegetables	0.29	0.25	0.26	0.25	0.19	0.39	0.13
Drinks	0.12	0.13	0.09	0.1	0.08	0.09	0.07
Health	2.03	1.96	1.97	2.01	1.78	1.69	1.54
Transport	12.29	13.13	13.67	14.79	15.2	13.58	15.22

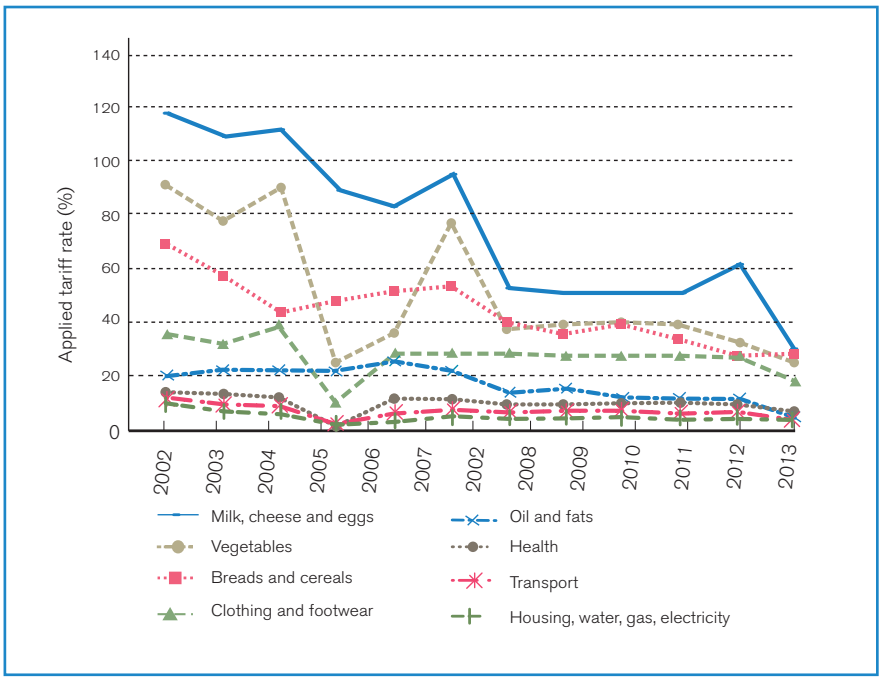
Source: Authors' calculations using data from the United Nations Commodity Trade Statistics (UN-Comtrade) database

Table 3.2 Average applied tariffs by sector and tariff type, 2006 and 2013

Sector	Tariff type	2006 (%)	2013 (%)
All products	Average of MFN tariffs	23.87	12.80
	Average of preferential tariffs	22.19	10.62
Agricultural	Average of MFN tariffs	58.32	21.23
	Average of preferential tariffs	54.24	19.45
Non-agricultural	Average of MFN tariffs	18.93	11.68
	Average of preferential tariffs	17.60	9.36

Source: International Trade Centre (ITC) Market Access Map: http://www.macmap.org/.

Figure 3.1 Weighted average applied tariffs by category of goods, 2002–2013



Source: Author's elaboration of data from the World Bank's World Integrated Trade Solution (WITS) and ITC databases.

Figure 3.1 illustrates some of those developments. There were exceptionally low tariffs in 2005, coinciding with the complete phasing out of the tariffs remaining in the GAFTA and the entry into force of Tunisia's free trade agreement (FTA) with Turkey. However, a temporary increase in the tariff burden, especially in vegetables, and clothing and footwear, is observed in 2006 and 2007, perhaps as a reaction to increasing competition from abroad. Note that, in many cases, applied tariffs had been lower than bound tariffs, so that these changes were possible in accordance with WTO provisions.

Table 3.3 presents the evolution of simple average tariffs for different categories of goods. The categorization is the same as is used for Tunisian retail price data. Evidently, average tariffs are higher for food products. The highest tariffs were imposed on fresh and dried fruits, and milk, cheese and eggs. While tariffs have declined for most food products (with the exception of drinks), tariffs on clothing and footwear; housing, water, gas and electricity; health; and meat and poultry have largely been retained.

Table 3.3 Simple average effectively applied tariff rate by category of goods, 2002–2008

	Year						
Category of goods	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)
Bread and cereals	19.37	18.8	18.4	17.03	16.99	16.99	15.63
Clothing and footwear	15.78	15.67	16.06	12.35	14.42	14.42	15.39
Fish and seafood	7.88	7.88	7.85	6.7	6.69	6.69	7.95
Fresh and dried fruits	23.4	22.92	22.55	19.84	19.78	19.78	18.22
Furniture, household articles	13.15	12.92	12.83	8.86	11.42	11.42	12.53
Housing, water, gas, electricity	7.89	7.4	7.28	4.63	6.68	6.68	6.94
Meat and poultry	5.17	5.13	5.07	4.96	4.96	4.96	4.77
Milk, cheese and eggs	16.12	15.48	15.68	15.92	15.96	15.96	13.83
Oil and fats	8.24	8.15	7.97	6.82	7.53	7.53	6.8
Salt and condiments	15.87	15.75	15.66	11.71	12.11	12.11	13.43
Sugar, jam, tea, coffee and chocolate	12.84	12.38	12.28	10.64	11.23	11.23	11.56
Tobacco	9.2	9.07	8.73	7.43	7.57	7.57	7.45
Vegetables	19.35	18.97	18.63	13.61	13.61	13.61	13.62
Drinks	17.01	16.97	16.93	15.44	17.37	17.37	16.87
Health	6.77	5.57	5.41	3.16	4.73	4.73	4.98
Transport	11.08	11.14	10.98	7.95	10.02	10.02	10.57

Source: Authors' calculations using trade statistics from the UN-Comtrade database.

Weighted averages, reported in Table 3.4, show an average decrease, from about 52 per cent in 2000 to 31 per cent in 2008. The values are, in many cases, considerably higher than those in Table 3.3, indicating that tariffs on goods in categories with a high import share are relatively large. For many products, the evolution of weighted averages over time is more pronounced, which indicates that higher tariffs have been subject to greater reductions.

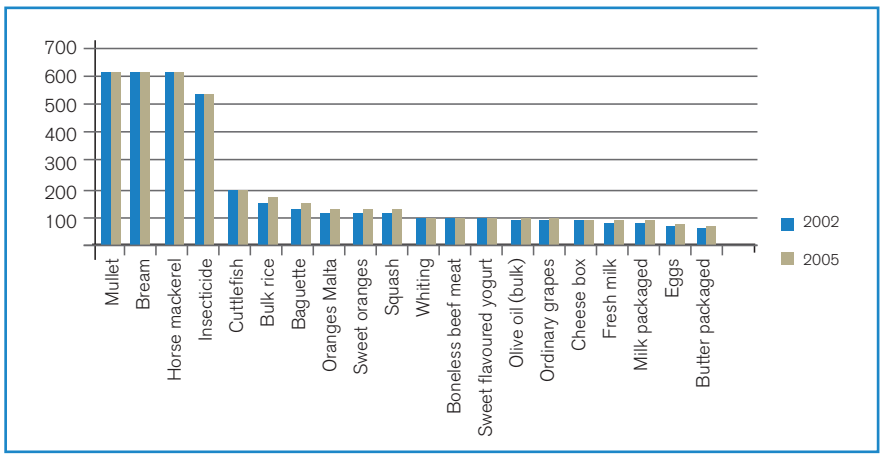
Table 3.4 Weighted average effectively applied tariff rate by category of goods, 2002–2008

	Year						
Category of goods	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)
Bread and cereals	68.51	56.57	43.23	47.1	50.88	53.71	40.37
Clothing and footwear	35.68	32.15	38.87	10.44	29.21	28.5	28.26
Fish and seafood	36.17	37.34	36.39	24.55	24.43	25.98	38.01
Fresh and dried fruits	110.88	103.83	91.27	89.06	84.82	69.58	51.02
Furniture, household articles	33.73	32.47	31.74	9.62	29.85	29.62	29.93
Housing, water, gas, electricity	9.64	5.92	6.56	1.25	3.52	3.64	4.36
Meat and poultry	104.28	94.98	81.45	79.57	83.75	88.5	59.7
Milk, cheese and eggs	117.91	108.93	111.47	89.07	82.42	94.78	52.51
Oil and fats	20.15	21.93	22.21	22.21	25.61	21.9	14.32
Salt and condiments	72.84	51.95	46.92	18.14	15.82	12.68	36.99
Sugar, jam, tea, coffee and chocolate	19.49	19.59	18.91	17.22	16.95	16.9	15.17
Tobacco	30.77	26.93	22.32	10.36	24.14	23.97	17.97
Vegetables	90.87	77.34	89.49	24.71	36.09	76.47	37.41
Drinks	49.58	49.4	50.89	39.73	58.2	50.29	46.59
Health	13.72	13.01	11.69	0.54	11.21	11.11	9.26
Transport	11.72	9.05	9.38	3.15	7.11	7.54	6.93

Source: Authors' calculations using trade statistics from UN-Comtrade database.

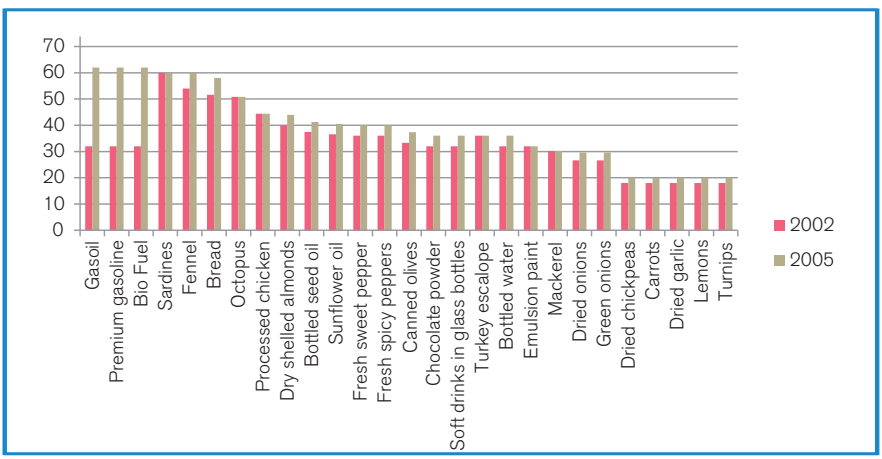
Turning to NTMs, as reported by Tunisia as an importer, Figures 3.2 and 3.3 show the products which incur the highest number of NTMs. Figure 3.2 shows products affected by more than 50 different NTMs – most are agricultural goods. Figure 3.3 shows products for which, in 2002, the number of NTMs was higher than 20 and lower than 50; these comprise food and vegetable products and energy goods (gasoil and gasoline). Both figures compare the number of NTMs in the two years for which the data are available. For most products, an increase can be observed in 2005 relative to 2002.[3]

Figure 3.2 Products affected by more than 50 NTMs, 2002 and 2005 (number)



Source: Authors' calculations using WITS Database, World Bank.

Figure 3.3 Products affected by more than 20 NTMs, 2002 and 2005 (number)



Source: Authors' calculations using WITS Database, World Bank.

Most of these NTMs correspond to sanitary and phytosanitary (SPS) regulations (Type A – 54 per cent) followed by technical barriers to trade (TBT) (Type B – 16 per cent) and pre-shipment inspections and other formalities (Type C – 14 per cent), as reported in Ghali et al. (2013).

Other measures used by Tunisian authorities include: Type D, contingent trade-protective measures; Type E, non-automatic licensing, quotas, prohibitions and quantity-control measures other than for SPS or TBT reasons; Type F, price-control measures, including additional taxes and charges; and Type H, measures affecting competition (UNCTAD, 2013).

In many sectors, NTM coverage ratios[4] amount to 100 per cent (Table 3.5). They are, however, quite low for clothing and footwear, and furniture and household articles. In general, there is no clear inter-temporal pattern. For some products (housing; salt and condiments; drinks), the coverage ratios are significantly reduced over time, whereas others (clothing and footwear; furniture and household articles) show increasing coverage ratios over time.

Table 3.5 NTM coverage ratios, 2002–2008

	Year						
Category of goods	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)
Bread and cereals	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Clothing and footwear	0.11	0.12	0.09	3.15	2.14	2.85	2.04
Fish and seafood	90.20	95.15	97.10	98.03	97.93	98.57	98.45
Fresh and dried fruits	100.00	100.00	100.00	99.96	99.86	100.00	100.00
Furniture, household articles	22.38	27.02	28.05	32.61	33.93	33.45	34.84
Housing, water, gas, electricity	54.69	57.22	62.88	58.87	57.05	52.25	50.45
Meat and poultry	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Milk, cheese and eggs	100.00	99.63	100.00	100.00	100.00	100.00	100.00
Oil and fats	92.80	93.40	93.97	94.83	93.79	89.98	92.49
Salt and condiments	78.37	81.87	70.04	69.30	69.39	67.66	61.75
Sugar, jam, tea, coffee and chocolate	97.79	97.09	97.21	98.25	97.88	97.59	97.80
Tobacco	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Vegetables	99.94	99.95	99.35	99.82	99.70	99.93	99.76
Drinks	73.18	73.99	65.37	69.72	71.41	67.42	72.34
Health	99.05	99.13	99.31	98.99	98.99	98.89	99.03
Transport	61.15	65.21	62.62	93.55	94.40	92.78	94.43

Source: Authors' calculations using trade statistics from UN-Comtrade database and World Bank.

Table 3.6 presents pairwise correlation coefficients of the variables in natural logs. Most of the crude correlations are significant at the 1 per cent level. In relation to consumer prices, the coefficients bear almost always the expected sign, with the exception of weighted average tariffs, which are insignificant. Note that there is a significant positive relationship between tariffs and NTMs, indicating that tariffs and NTMs could be used as complements. This appears to be the case, especially when importing products have a relatively low unit value.

Tunisia entered the GATT in 1990 and has therefore been a member of the WTO since its formation in 1995. Tunisia's commitments under the WTO included the reduction of tariffs in the agricultural sector by 24 per cent over 10 years (1995–2004), as well as the opening up of quotas for the importation of agricultural and food processing products (World Bank, 2014a). The country also participates in a number of FTAs. In particular, Tunisia entered both the GAFTA and the FTA with the European Union in 1998, and signed an FTA with certain states of the European Free Trade Association (EFTA) and another with Turkey in 2005. It is worth noting that tariffs on industrial imports from the European Union dropped from about 100 per cent in the 1990s to zero by 2008. In contrast, agricultural imports continued to be subject to high levels of tariffs and NTMs.

According to the World Bank (2010), Tunisia's tariff policy is still very distortive and has become even more so with the EU liberalization process, with imports from third countries entering at duties of more than 40 per cent while the same product

Table 3.6 Pairwise correlations of variables in natural logs

	Consumer prices	Weighted average tariff	NTM coverage ratio	Weighted unit values	Industrial prices
1.	2.	3.	4.	5.	6.
Consumer prices	1				
Weighted average tariffs	-0.0141	1			
NTM coverage ratio	0.1007*	0.2859*	1		
Weighted unit values	-0.0929*	-0.4733*	-0.3341*	1	
Industrial prices	0.0608*	-0.1476*	0.0264	0.2897*	1
Exchange rate	0.0572*	-0.1586*	0.0202	0.0805*	0.4731*

Note: * indicates significance at 1 per cent level.

Table 3.7 Trading across borders in Tunisia, 2015

Indicator	Tunisia	Middle East and North Africa	OECD
Documents to export (number)	4	6	4
Time to export (days)	16.0	19.4	10.5
Cost to export (deflated US$ per container)	805.0	1,166.3	1,080.3
Documents to import (number)	6	8	4
Time to import (days)	20.0	23.8	9.6
Cost to import (deflated US$ per container)	910.0	1,307.0	1,100.4

Source: World Bank (2016)
http://www.doingbusiness.org/data/exploreeconomies/tunisia/#trading-across-borders.

enters duty free from the EU. Consequently, it was of crucial importance to use weighted tariffs in the following analysis.

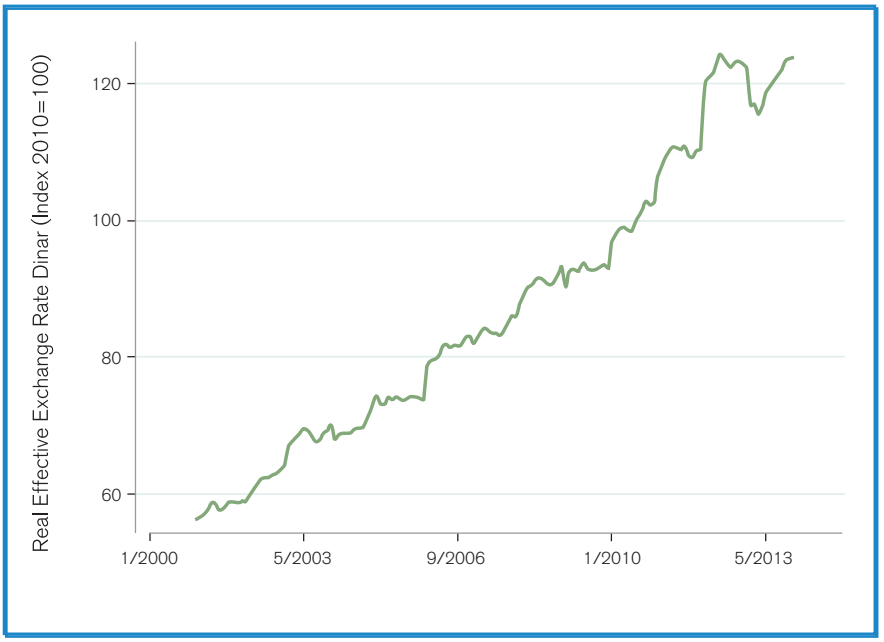
Despite the important reductions in tariffs observed in the data, however, there has been little progress in reducing NTMs. Tunisia uses NTMs, such as technical norms and costly rule-of-origin requirements, to restrict trade with GAFTA members. Indeed, importers often select to pay the MFN tariff instead of incurring the cost of obtaining preferential treatment (World Bank, 2009).

It is also worth noting that the investment climate improved in the 2000s, mainly due to the economic reforms and the reduction of behind-the-border trade costs (World Bank, 2009). In particular, according to the World Bank (2016) the number of documents needed to export from Tunisia was lower than the average in the Middle East and North Africa (MENA) region and the same as the OECD high-income average. However, in 2015, the time needed to export was still six days higher than the OECD high-income average but four days less than in the MENA region (Table 3.7). There is scope for improvements in the time needed to export and import, which could be achieved by reducing the time needed to prepare the necessary documents, which still exceed average OECD levels quite substantially.

Monetary policy

During the 1990s, in order to maintain a fairly constant real effective exchange rate (REER), Tunisia adopted an REER targeting policy, which helped preserve the country's competitiveness. However, since 2000, a more flexible exchange rate policy has been adopted, and from 2000 until 2008 the REER shows substantial

Figure 3.4 Evolution of Tunisian monthly effective exchange rate, 2000–2013



Source: Central Bank of Tunisia (exchange rate); International Monetary Fund (IMF) (CPI); UNCTAD (import share).

depreciation (Figure 3.4).[5] The depreciation was the consequence of a number of shocks affecting the country, namely, the events of September 2001 and several severe droughts that affected agriculture production.

With respect to other policies that also influence consumer prices, the use of administered prices and consumer food subsidies must be mentioned. There are fixed producer buying prices for wheat and other domestic support for barley, milk, olive oil and sugar beet. Tunisia had used price controls since 1986 on agricultural inputs and producer prices, although the former have since been completely removed; there are still guaranteed public prices for grain and milk. With respect to consumer subsidies, since 2000, grain, vegetable oil and milk are covered by subsidies (Minot et al., 2010).

3.3 Literature review

The standard model used to estimate the effect of trade policies or exchange rate movements on retail prices is a pass-through model that distinguishes between domestic and imported varieties (Goldberg and Knetter, 1997).

There is a rich literature estimating the exchange rate pass-through (ERPT), as surveyed by Menon (1995). Those empirical studies mainly find evidence of incomplete pass-through, especially in countries with low inflation. For the Tunisian case, the authors are only aware of one study (Senhadji, Sedik and Kpodar, 2007), which evaluates the degree of ERPT to consumer prices in Tunisia[6] using quarterly data for 43 consumption products (goods and services) over the period 1995–2006. The main results of that study indicate that a 10 per cent nominal depreciation of the dinar increases inflation in the range of 0.7–0.9 percentage points. Some studies extended the pass-through model with trade policy variables to separately estimate ERPT and TPT. To the authors' knowledge, there are only three papers that have estimated ERPT and TPT simultaneously (Feenstra, 1989; Mallick and Marques, 2008; Menon, 1996). However, these studies are (mostly) concerned with the import price at the border of the importing country.

More recently, based on Nicita (2009), a bulk of literature has emerged studying the effect of trade policy on local consumer prices. Since the present study is interested in the distributional effects of trade policy, this is the approach it follows. Recent studies following this approach are Nicita (2009) for the Mexican case, Ural Marchand (2012) for India, and Borraz, Ferrés and Rossi (2013) for Brazil. To the authors' knowledge, the Tunisian case has not been studied separately.

Nicita (2009) evaluates the effect of the formation of Mercosur on household income and expenditure over the period 1990–2000. He assumes that consumer goods cannot be differentiated by origin and that the price of these goods can be expressed as an average price of importer and local substitutes. The estimated TPT differs for agricultural products and manufacturing and is estimated at around 33 per cent and 27 per cent, respectively. The study does not find regional differences in the TPT on agricultural prices, but finds that those differences are significant for manufacturing activities, with regions closer to the United States having a TPT of about 70 per cent, which declines to 40 per cent at 1,000 kilometres' distance from the United States.

For the case of India, Ural Marchand (2012) estimates how price changes are transmitted from the border to the consumers, using a slightly different model to that of Nicita (2009). She is able to estimate different TPT for rural and urban areas and finds that it is significantly lower in rural areas (around 44 per cent) than in

urban areas (64 per cent). Borraz, Ferrés and Rossi (2013) estimate a similar model to that of Nicita (2009) for the Brazilian case over the period 1990–1999. They find that the TPT is around 44 per cent and that trade costs do not have differential effect across geographical areas; hence, the interaction term between transport costs and tariffs is excluded from the estimation results. The present study follows a similar approach to that of Nicita (2009) and Borraz Ferrés and Rossi (2013) and, since Tunisia is a small country in terms of area, does not differentiate between geographical regions.

3.4 Methodology

To evaluate the impact of trade liberalization in Tunisia on domestic prices, retail price data of domestic goods are used in combination with producer price data and international prices to estimate a pass-through equation.

Retail prices can react only partially to changes in international prices, and the extent to which the transmission is complete depends not only on the changes in trade policies, such as tariff reductions or NTMs, or on given domestic policies, such as price support and exchange rate policies, but also on exchange rate policies and on the specific institutional and economic environment and competition policies. It could happen that retail prices do not fully incorporate changes in border prices if the circumstances in the given country impede or complicate the transmission of the changes. In particular, the lack of substitutes, impact of transport costs, influence of competitor prices and rigid margins of intermediaries could affect the extent to which reductions in border prices are passed to retail prices.

Prices are also affected by competitive conditions in the country. If there are barriers to entry into a market, trade liberalization will only benefit those who are already operating within it. Such enterprises, benefiting from having significant market power, are in a position to set high prices while enjoying import tariff cuts. Thus, tariff reform will not impact upon consumer prices. Evidence of barriers to entry is given by Rijkers, Freund and Nucifora (2014). They show a correlation between connected firms, entry restrictions and protectionism in the original code, which was enacted in 1993. These connected firms outperform their competitors on all levels. In addition, they are active in sectors disproportionately subject to authorization requirements and foreign direct investment restrictions, giving them greater market power. These firms are sole players in several sectors.

It is also important to note that price transmission also depends on the market shares of production and consumption of the goods. For example, if a country is a

large producer or consumer of a given product, this could impact upon the product's international price. In the case of Tunisia, which could be considered a small country in economic terms, this should not be an issue for the majority of goods.

The empirical strategy of the present study consists of adapting the framework developed by Goldberg and Knetter (1997) and Campa and Goldberg (2008) and used by Nicita (2009)[7] and Borraz, Ferrés and Rossi (2013) to the Tunisian case. Prices are expressed as follows:

$$P_{kt}=PP^{\alpha}_{kt}(PI_{kt}(1+\tau_{kt}))^{1-\alpha} \qquad (1)$$

where:

P_{kt} is the local price faced by households for good k at time t; PI_{kt} denotes the international price in local currency; τkt denotes the tariff of good k at period t; PP_{kt} is the production price; α indicates the domination of local varieties over imported varieties; $(1-\alpha)$ indicates the importance of international prices, trade policies and trade costs on local prices. The degree of pass-through is given by $(1-\alpha)$. The pass-through is complete when α takes the value of zero and changes in border prices are 100 per cent passed to retail prices, whereas if $\alpha=1$ the pass-through changes in border prices do not affect retail prices. Note that, while the exposition here is in terms of tariffs, the same line of reasoning applies to other trade costs.

Taking logs of equation (1) obtains:

$$\ln P_{kt} = \alpha \ln PP_{kt}+(1-\alpha)\ \ln PI_{kt}\ + (1-\alpha)\ \ln(1+\tau_{kt}) \qquad (2)$$

Loosening the restrictions imposed on coefficients in (2) and adding sectoral λ_k and time π_t, dummies, the following model is estimated in accordance with Nicita (2009):

$$\ln P_{kt} = \beta_0+\beta_1\ \ln PP_{kt}+\beta_2\ \ln PI_{kt}+\beta_3\ \ln(1+\tau_{kt})+\lambda_k+\pi_t+\varepsilon_{kt} \quad (3)$$

where ε_{kt} denotes the error term that is assumed to be independent and identically distributed variables and the rest of variables are the same as in equation (1).

In some regressions, the *ad valorem* tariff equivalents (AVEs) of NTMs are included in the regression. They are obtained estimating a gravity model of Tunisian imports:

$$\ln imp_{jpt} =\gamma_0+\gamma_1\ \ln GDPjt +\gamma_2\ \ln(1+\tau_{jpt})+\gamma^{h}_{NTM}\,NTM^{h}_{jpt}+\varphi_j+\delta_t+\in_{jpt} \quad (4)$$

where:

imp_{jpt} are Tunisian import values of product *p* (combined harmonized system HS-6 digit disaggregation level) from exporter *j* at time *t*; GDP_{jt} is exporter GDP; τ_{jpt} are bilateral weighted tariff rates; NTM^{h}_{jpt} is a vector of NTM dummies; γ^{h}_{NTM} is the corresponding vector of coefficients, both of 7 dimensions – one for each type of NTM (Types A to F);[8] φ_j are exporter fixed effects that capture all the other trade cost and gravity variables, such as distance and all other time-invariant bilateral dummies; δt are year fixed effects that proxy for all time-varying factors common for all exporters and products (Tunisian GDP, business cycle); and $\in_{jpt}$ is an *iid* error term.

Note that γ_2 is interpreted as $(1-\sigma)$, where σ is the elasticity of substitution (Anderson and van Wincoop, 2004). In accordance with Bacchetta et al. (2012), the tariff equivalent by type of NTM can be calculated as follows:

$$\tilde{\tau}^{h}_{NTM}=\exp(\gamma^{h}_{NTM}/\gamma_2)-1 \qquad (5)$$

Similarly, the compound AVE for all types of NTMs is calculated for each product *k* and year *t*:

$$\tilde{\tau}_{kt}=\sum_{p\in k} s_{pkt} \sum_{j} s_{jpt} [\exp(\gamma^{h}_{NTM} NTM^{h}_{jpt} /\gamma_2)-1] \qquad (6)$$

where:

s_{jpt} is the share of imports of HS-6 product *p* imported from country *j*, and s_{pkt} is the share of imports of good *k* due to import of HS-6 product *p*. Note that $\gamma^{h}_{NTM} NTM^{h}_{jp}$ is a scalar product.

Including NTMs, equation (3) becomes:

$$\ln P_{kt}=\beta_0+\beta_1 \ln PP_{kt}+ \beta_2 \ln PI_{kt}+\beta_3 \ln(1+\tau_{kt})+\beta_4 NTM_{kt}+\varphi_j+\delta_t+\varepsilon_{kt} \quad (7)$$

where NTM_{kt} is either the coverage ratio or $\ln(1+\tilde{\tau}_{kt})$, i.e. the log-transformed *ad valorem* tariff factor equivalent (AVE) of the NTMs.

3.5 Data, variables and empirical model

Data and variables

Bilateral tariff data are taken from the World Bank's TRAINS database, which covers the period 2002–2008.[9] Because tariff data for 2007 are missing, it is

assumed that 2006 tariffs were retained in 2007. Additionally, for tariffs missing at the beginning of the period, it is assumed that they are at least as high as the earliest available tariff, and therefore a conservative estimate is applied. Effectively applied tariffs (AHS) are used in the analyses. Additionally, in some regressions there is control for the coverage ratio of NTMs, and the corresponding data are from the World Bank.[10]

The study uses unilateral NTMs applied by Tunisia on its imports from the world and from the European Union. Coverage ratios are calculated as the share of import of the HS-6 products that are subject to NTMs with respect to total imports in each price category, to reflect the incidence of this factor on imports at the more aggregated level. It is important to note that it is a crude proxy, given the wide variety of measures (import quotas, security standards, phytosanitary standards, etc.) that exist. For that reason, as an alternative, the study also considered AVEs, which were also constructed using the supplied World Bank data. Weighted average tariffs were constructed using import shares from the UN-Comtrade database, considering only those products with positive imports.[11]

International prices are approximated using import unit values, i.e. expenditure per unit, based on UN-Comtrade. Unit values were calculated in United States dollars per kilogram. Note that, since import values are collected, including cost, insurance and freight (CIF), trade cost does not need to be controlled for in the regression analysis. As in the case of tariffs, weighted unit values were calculated based on the respective commodity's import share. Unit values were converted to Tunisian dinars using exchange rates obtained from the Central Bank of Tunisia.

Retail prices and industrial price indices were kindly provided by the Tunisian National Statistics Institute. Retail prices are available for more than 140 products or product groups. Unfortunately, for lack of recording in the years for which tariff data are available, and lack of concordance in the trade data, only 75 items could be used. Industrial prices are available for 70 product groups. Those that could be linked to retail price categories are employed.

Since no official conversion table was available that allowed the merging of industrial prices, trade and tariff data, and retail prices, the authors manually constructed such tables as can be found in the working paper for this chapter (Baghdadi, Ben Kheder and Arouri, 2016). Note that tariff data were retrieved in HS nomenclature and converted to HS 1996 before they could be merged with the trade and NTMs data.

Main results

The gravity model in equation (4) is estimated using simple ordinary least squares (OLS). Results are presented in the first two columns of Table 3.8.

The coefficient in row 5 (type C NTM) shows that only type C measures (pre-shipment inspections and other formalities) inhibit trade for Tunisia. Therefore, the AVEs – the respective elements of $\tilde{\tau}^{h}_{NTM}$ calculated according to equation (5) – are negative in the other categories, as can be seen in column 3. By and large, these results are in accordance with Ghali et al. (2013) and Baghdadi, Ben Kheder and Arouri (2016), even though, curiously, they find a negative coefficient for type B measures but a positive coefficient for type C measures. This gives rise to a pattern of compound AVEs ($\tilde{\tau}_{kt}$) per product category, which is reported in Appendix Table 3.1. Note that the reported figures are negative for all product groups, indicating that, on average, the presence of NTMs actually increases trade. While this is quite surprising, a potential explanation could be that NTMs effectively apply standards, thereby improving transparency and credibility. In that respect, they would foster trade, and are equivalent to a negative tariff.

Table 3.8 Gravity estimation and *ad valorem* equivalents

Variable	OLS	Standard Error	AVE (%)
Exporter GDP	0.0788	[0.0547]	
Weighted tariff	-1.493***	[0.0405]	
Type A NTM	1.065***	[0.0778]	-50.9952
Type B NTM	0.526***	[0.0239]	-29.6867
Type C NTM	-0.448***	[0.0825]	34.96706
Type D NTM	0.382***	[0.107]	-22.5908
Type E NTM	3.008***	[0.308]	-86.6599
Type F NTM	0.118***	[0.0406]	-7.60489
Type H NTM	1.256***	[0.0405]	-56.8838
Constant	6.014***	[1.219]	
Observations	261,245		
R-squared	0.122		
Year FE	Yes		
Exporter FE	Yes		

Note: Standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' calculations using data from UN-Comtrade database and World Bank.

That means that, below the point at which there is a negative coefficient for the AVE, this measures the effect of an increase in NTMs.

Equations (3) and (7) are estimated for all goods and for broad categories for the period 2002–2008 using monthly data for industrial prices and international prices (proxy with weighted import unit values) and for yearly weighted tariffs. The main results for all goods are presented in Table 3.9.

The model is estimated by generalized least squares (GLS).[12] Column 1 in Table 3.9 presents the results for a model with time dummies and column 2 also includes product dummies.

Table 3.9 Tariff pass-through for all goods

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	All goods	All goods	All goods	All goods	All goods	All goods
Industrial price	0.259**	0.163**	0.254**	0.165**	0.256**	0.160**
	[0.109]	[0.0727]	[0.109]	[0.0729]	[0.109]	[0.0726]
Weighted unit value per kg	-0.00590	0.00297	-0.00539	0.00296	-0.00482	0.00308
	[0.00444]	[0.00414]	[0.00444]	[0.00414]	[0.00443]	[0.00410]
Weighted tariff	0.0941**	0.0642*	0.0921**	0.0634*	0.0984**	0.0620*
	[0.0443]	[0.0350]	[0.0441]	[0.0351]	[0.0442]	[0.0352]
Coverage ratio			4.82e-05	0.000168		
			[0.000631]	[0.000513]		
AVE of NTM					0.212**	-0.0453
					[0.0890]	[0.0931]
Constant	-1.256**	-2.198***	-1.245**	-2.223***	-1.152**	-2.237***
	[0.525]	[0.389]	[0.531]	[0.397]	[0.525]	[0.395]
Product dummies	No	Yes	No	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,656	4,656	4,656	4,656	4,656	4,656
Number of products	74	74	74	74	74	74

Note: Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Industrial price, weighted unit value per kg, weight tariff, AVE of NTM in logs

The TPT is 9 per cent in column 1 (without product dummies) and 6.4 per cent with both sets of dummies; the international and production prices coefficients present the expected positive sign and are statistically significant, whereas import unit values are not statistically significant. The degree of TPT is considerably lower in comparison with that found in studies for other developing countries. Including the coverage ratio in columns 3 and 4 leaves results practically unchanged. Unlike the coverage ratio, the inclusion of AVE shows a significant positive impact on prices, but only in column 5. However, including product dummies in column 6, the coefficient becomes less significant. The inclusion of AVE induces only minor changes in the other coefficients.[13] The TPT is now 6.2 per cent.

The model was also estimated including a dummy that takes the value of 1 for the goods subject to subsides and price controls. The results concerning the TPT remain the same and the dummy coefficient is negative and significant, indicating that retail prices are, in general, lower for these products.

In Table 3.10, the model is augmented with a proxy for market power. In particular, use is made of the Herfindahl Index of concentration, which measures the average market shares that firms have in a given industry.

The new variable is also interacted with the weighted tariff to see whether the TPT varies with market power. Indeed, the results show that the tariff elasticity is statistically significant and of higher magnitude in Table 3.10 than in Table 3.9. Calculation of the marginal effects of the combined effect of the level and the interaction factors indicates that the average effects are similar to those in Table 3.9.

Table 3.10 shows that imperfections in the market mechanism reduce TPT substantially. Indeed, the interaction between tariffs and weighted Herfindahl Index shows that, for industries in which firms have sizeable market power, prices are not decreasing in response to tariff cuts: quite the contrary, in some cases – in high concentration sectors – where the effect goes in the opposite direction. Thus, one potential reason for the low TPT in Tunisia is low competition: firms with strong market power are capturing a part of the tariff. Therefore, tariff changes could not possibly translate into price reductions and improvement in consumer welfare.

GLS estimations with product dummies and with time dummies are also presented for broad categories (Table 3.11) and for more disaggregated categories (Table 3.12).

Table 3.10 Tariff pass-through interacted with market power

	(1)	(2)	(3)	(4)
Variable	All goods	All goods	All goods	All goods
Industrial price	0.207*	0.161**	0.211*	0.157**
	[0.107]	[0.0724]	[0.108]	[0.0722]
Weighted unit value per kg	-0.00341	0.00365	-0.00290	0.00341
	[0.00492]	[0.00470]	[0.00495]	[0.00470]
Weighted tariff	0.248***	0.195***	0.265***	0.192***
	[0.0669]	[0.0535]	[0.0680]	[0.0536]
Weighted Herfindahl Index*Weighted tariff	-0.400***	-0.342***	-0.413***	-0.349***
	[0.117]	[0.0963]	[0.118]	[0.0964]
Weighted Herfindahl Index	0.271***	0.189***	0.292***	0.190***
	[0.0704]	[0.0586]	[0.0713]	[0.0585]
AVE of NTM			0.217**	-0.0812
			[0.0906]	[0.0931]
Constant	-1.190**	-2.345***	-1.119**	-2.407***
	[0.517]	[0.397]	[0.523]	[0.402]
Observations	4,522	4,522	4,522	4,522
Number of price_code	73	73	73	73
Product dummies	No	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes

Note: Standard errors in brackets.*** p<0.01, ** p<0.05, * p<0.1.
Industrial price; weighted unit value per kg, weighted tariff, AVE of NTM in logs

According to the results in Table 3.11, the coefficient of weighted tariffs is positive for agricultural products and statistically significant in columns 1 to 4, and its interaction with the Herfindahl Index is negative and significant, as in Table 3.10. For manufactured goods, the pass-through coefficient is not significantly different from zero in any of the specifications (with and without NTMs).

Table 3.11 Tariff pass-through for broad categories (addition of Herfindahl Index)

	(1)	(2)	(3)	(4)	(5)	(6)
Variable		Agriculture			Manufactures	
Industrial price	0.179	-0.0996	0.166	0.245***	0.627***	0.238***
	[0.143]	[0.166]	[0.142]	[0.0577]	[0.194]	[0.0573]
Weighted unit value per kg	0.00250	0.00794	0.00167	0.00546	-0.00369	0.00523
	[0.00700]	[0.00725]	[0.00696]	[0.00401]	[0.0120]	[0.00398]
Weighted tariff	0.253***	0.155*	0.221***	0.0218	0.0990	0.0272
	[0.0688]	[0.0832]	[0.0692]	[0.0822]	[0.269]	[0.0813]
Weighted Herfindahl Index*Weighted tariff	-0.473***	-0.263*	-0.466***	0.0228	0.276	0.0622
	[0.132]	[0.156]	[0.131]	[0.143]	[0.467]	[0.142]
Weighted Herfindahl Index	0.293***	0.184*	0.265***	-0.0328	0.0166	-0.0330
	[0.0873]	[0.103]	[0.0872]	[0.0492]	[0.159]	[0.0486]
AVE of NTM			-0.649***			0.122***
			[0.193]			[0.0454]
Observations	2,760	2,760	2,760	822	822	822
Number of price_code	49	49	49	12	12	12
Product dummies	Yes	No	Yes	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Industrial price, weighted unit value per kg, weighted tariff, AVE of NTM in logs.

Table 3.12 presents the results for broad consumption categories, which show positive and significant tariff effects (reductions in tariffs are associated to reductions in domestic prices) for three items: bread and cereals; milk, cheese and eggs; and tobacco. The AVEs[14] present mostly non-significant coefficients and, in a few cases, are negative. Finally, results for single products are presented in Appendix Table 3.2. Positive and significant TPT is found for 16 of 67 products. In particular, full pass-through is found for chocolate powder, seed oil, and bottled and fresh milk, and partial pass-through for the other 13 products. The coverage ratio presents positive and significant estimates for fresh milk in bulk, synthetic carpet mats, cement and bio fuel. However, the information is missing for many products.

Table 3.12 Tariff pass-through for specific categories

Category of goods	Unit values	Industrial prices	Weighted tariffs	Constant	Observations Observations	Products
Bread and cereals	-0.0229	0.487	0.472***	-113.9***	456	6
Clothing and footwear	0.122	2.127***	-12.44	-235.2***	44	2
Fish and seafood	0.0126	-0.156	0.126	-9.595	574	8
Fresh and dried fruits	-0.0126	3.865***	-0.0507	66.16	290	7
Furniture, household articles	0.00320	0.184***	0.0123	-40.38***	526	7
Housing, water, gas, electricity	0.00395	0.355***	0.0615	-48.65***	520	7
Meat and poultry	0.0194	0.531**	0.346	-48.59	119	2
Milk, cheese and eggs	-0.0175**	0.391**	0.242***	-219.4***	324	5
Oil and fats	-0.00328	-0.0594	-0.0176	-77.01***	168	2
Salt and condiments	0.000150	0.00742	0.00148	-5.695**	252	3
Sugar, jam, tea, coffee and chocolate	-0.00850	-0.133	0.0830	0	181	3
Tobacco	-0.00456	0.487***	0.134***	-96.13***	252	3
Vegetables	-0.00430	-0.753	0.0226	-115.8***	530	14
Health	0.231**	-0.0855	-1.912***	234.8***	168	2
Transport	0.00523	0.0363**	-0.0555	-5.468	252	3

Note: All models estimated with robust standard error (SE) with a time trend and product fixed effects. All models include a constant and were estimated in logs. Tariffs and unit values are weighted by import shares.

Robustness

This section presents the results of a number of robustness tests done to validate the results obtained and reported above. First, a variable used as a proxy of other trade costs, including those different from tariffs, was included. Trade cost data were sourced from the United Nations Economic Commission for Asia and the Pacific (ESCAP) database, and used based on an inverse gravity model of trade. ESCAP provides data on (symmetric) bilateral trade cost for the agricultural and manufacturing sectors across time.

Table 3.13 present the results, without interaction in columns 1 and 2, and with interaction with the Herfindahl Index in columns 3 and 4. Column 1 shows that reductions in trade costs decrease local prices substantially. However, the effect is lower in industries in which firms enjoy important market power (column 3). In any case, the pass-through is much higher than for tariffs, indicating that other trade costs translate more directly into local prices.

Table 3.14 adds the real effective exchange rate (the simple mean _t and the geometric mean _tg) to the model. Addition of the exchange rate does not change the results.

Table 3.13 Trade costs pass-through

	(1)	(2)	(3)	(4)
Variable	All goods	All goods	All goods	All goods
Industrial price	0.364***	0.168**	0.314***	0.161**
	[0.111]	[0.0729]	[0.108]	[0.0734]
Weighted unit value per kg	0.0113**	0.00426	0.0132**	0.00189
	[0.00478]	[0.00405]	[0.00532]	[0.00468]
Weighted trade costs	1.057***	0.182	1.487***	0.157
	[0.108]	[0.255]	[0.136]	[0.258]
Weighted Herfindahl Index*Weighted trade costs			-0.643***	-0.0207
			[0.117]	[0.0960]
Weighted Herfindahl Index			0.730***	0.0355
			[0.116]	[0.0958]
Constant	-2.902***	-2.262***	-3.176***	-2.190***
	[0.556]	[0.389]	[0.554]	[0.408]
Observations	4,656	4,656	4,522	4,522
Number of price_code	74	74	73	73
Product dummies	No	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes

Note: Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Industrial price, weighted unit value per kg, weighted trade costs in logs.

Source: Data derived from ESCAP: http://www.unescap.org/stat/data/statdb/DataExplorer.aspx

Table 3.14 Addition of the real effective exchange rate (REER)

	(1)	(2)	(3)	(4)
Variable	All goods	All goods	All goods	All goods
Weighted unit value per kg	-0.00557	-0.00554	-0.00488	-0.00488
	[0.00442]	[0.00443]	[0.00443]	[0.00443]
Weighted tariff	0.0940**	0.0946**	0.0989**	0.0995**
	[0.0443]	[0.0443]	[0.0443]	[0.0444]
Industrial price	0.254**	0.247**	0.254**	0.247**
	[0.110]	[0.110]	[0.110]	[0.110]
REER_t	0.000746		0.000643	
	[0.00240]		[0.00240]	
REER_tg		0.00179		0.00169
		[0.00203]		[0.00203]
AVE of NTM			0.213**	0.214**
			[0.0889]	[0.0887]
Constant	-1.300**	-1.349**	-1.193**	-1.244**
	[0.542]	[0.535]	[0.544]	[0.536]
Observations	4,656	4,656	4,656	4,656
Number of price_code	74	74	74	74
Product dummies	No	No	No	No
Year dummies	Yes	Yes	Yes	Yes

Note: Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Industrial price, weighted unit value per kg, weighted tariff, AVE of NTM in logs.

Using instrumental variables for production prices, the results on TPT remain the same (Table 3.15).

Table 3.15 Without industrial prices/instruments for industrial prices

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	No production price	No production price	IV 1 lag	IV 1 lag	IV 2 lags	IV 2 lags
Weighted unit value per kg	-0.00467	-0.00417	-0.00314	-0.00273	-0.00314	-0.00273
	[0.00441]	[0.00442]	[0.00327]	[0.00327]	[0.00327]	[0.00327]
Weighted tariff	0.0870**	0.0926**	0.0670***	0.0533**	0.0670***	0.0533**
	[0.0442]	[0.0444]	[0.0255]	[0.0258]	[0.0255]	[0.0258]
AVE of NTM		0.217**		-0.185***		-0.185***
		[0.0886]		[0.0544]		[0.0544]
Industrial price			0.114***	0.0800*	0.114***	0.0800*
			[0.0412]	[0.0424]	[0.0412]	[0.0424]
Constant	-0.0360	0.0645	-0.640***	-0.578***	-0.640***	-0.579***
	[0.0949]	[0.103]	[0.203]	[0.203]	[0.203]	[0.203]
Observations	4,656	4,656	4,656	4,656	4,656	4,656
Number of price_code	74	74	74	74	74	74
Product dummies	No	No	No	No	No	No
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Industrial price, weighted unit value per kg, weighted tariff, AVE of NTM in logs.

Table 3.16 demonstrates inclusion of an interaction between tariffs and NTMs. It does not affect the results, and is usually insignificant. The only exception is shown in column 5, where there is positive effect of the interaction. As mentioned above, higher AVE is equivalent to lower NTM. The positive interaction could thus mean that, while NTMs foster trade, they still entail a cost, and thereby limit pass-through. The effect, again, is lower in sectors with high market power.

Table 3.16 Interaction of tariffs and NTMs

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	All goods	All goods	All goods	All goods	All goods	All goods
Weighted unit value per kg	-0.00275	0.00285	-0.00140	0.00341	-0.00151	0.00329
	[0.00439]	[0.00410]	[0.00492]	[0.00470]	[0.00495]	[0.00471]
Weighted tariff	0.0769	0.152*	0.210	0.353***	0.650***	0.293
	[0.108]	[0.0875]	[0.142]	[0.119]	[0.232]	[0.182]
Industrial price	0.229**	0.163**	0.206*	0.155**	0.236**	0.152**
	[0.105]	[0.0725]	[0.105]	[0.0720]	[0.107]	[0.0722]
AVE of NTM	0.187*	-0.0949	-0.0237	-0.139	-0.304*	-0.105
	[0.105]	[0.103]	[0.132]	[0.117]	[0.176]	[0.141]
Weighted Herfindahl Index			0.412***	0.183**	0.702***	0.148
			[0.0869]	[0.0723]	[0.132]	[0.109]
AVE*Weighted tariff	-0.0300	0.204	-0.0674	0.347	0.838*	0.222
	[0.224]	[0.181]	[0.275]	[0.231]	[0.476]	[0.369]
Weighted Herfindahl Index*AVE			0.344***	-0.0340	0.919***	-0.109
			[0.119]	[0.0908]	[0.241]	[0.195]
Weighted Herfindahl Index*Weighted tariff			-0.372***	-0.363***	-1.263***	-0.244
			[0.115]	[0.0967]	[0.352]	[0.287]
Weighted Herfindahl Index*Weighted tariff*AVE					-1.867***	0.253
					[0.710]	[0.579]
Constant	-1.069**	-2.290***	-1.202**	-2.467***	-1.486***	-2.446***
	[0.512]	[0.397]	[0.516]	[0.403]	[0.530]	[0.407]
Observations	4,656	4,656	4,522	4,522	4,522	4,522
Number of price_code	74	74	73	73	73	73
Product dummies	No	Yes	No	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Industrial price, weighted unit value per kg, weighted tariff, AVE of NTM in logs.

3.6 Conclusions

This study estimated the TPT for the Tunisian economy using data from 2000 to 2008. The main results indicate that changes in tariffs are only partially transmitted to changes in retail prices, with an average pass-through of 10 per cent. This partial pass-through effect is lower in magnitude than that found in other developing-country studies. The model was also estimated for specific sectors, with results indicating that the TPT for agricultural products is around 22 per cent, whereas for the manufacturing sector the pass-through coefficient is not statistically significant. This result confirms that a trade liberalization scenario that is not strengthened by trade-related institutions and policies, such as a stable macroeconomic environment, a competitive exchange rate and competitive policies, fails to contribute to an efficient allocation of resources. As a consequence, consumer prices will not decrease as expected following tariff reduction. Consumers will not profit from trade liberalization. As the markets are distorted by government interventions via price controls, subsidies, taxes and barriers to entry, tariff cuts will benefit the few firms operating in liberalized markets.

Finally, this research suggests that addressing the distortions discussed above along with trade facilitation measures and sectoral actions to facilitate the business environment could positively impact upon the pass-through effect, so that reductions in border prices could affect retail prices more significantly, which, in turn, could contribute to increased domestic welfare and generate inclusive development.

The results concerning the transmission of NTMs to domestic prices are not very informative. This could be due to errors in the data and to the lack of a sufficiently accurate measure of NTMs for Tunisian imports. More work is needed to refine the measure used and to obtain more clear-cut results. An important aspect that should be mentioned is that a high share of the imported goods (around 40–50 per cent of imports) corresponds to intermediate goods and parts and components, which are also subject to protection but which cannot be directly linked to retail prices. An interesting aspect to be investigated is how changes in protection concerning these products will affect the prices of the final goods produced in Tunisia using these imported inputs. This enquiry remains for further research.

Endnotes

1. Henceforth, this chapter uses the term “non-tariff measures” (NTMs) instead of “non-tariff barriers”, since some of them are not necessarily barriers to trade.

2. In addition, there are a number of subsidies on consumer goods and fixed producer prices for products such as grain, milk, meat, oil and some vegetables.

3. This could be due to the data construction, since the information available indicates the number of NTMs in the year in which the corresponding regulation applied but the duration of the measures is not provided. Note that some NTMs deal with product standards and do not necessarily have a protectionist effect.

4. Coverage ratios are calculated as the percentage of imported sub-products subject to NTMs in a given price category.

5. The nominal effective exchange rate is calculated as the trade weighted arithmetic mean of exchange rates with the most important partner currencies – insofar as data were available from the Central Bank of Tunisia.

6. See Fanizza et al. (2002) for a description of Tunisia's monetary policy in the 1990s.

7. The present study does not differentiate by regions due to a lack of data on regional retail prices.

8. Types are defined as (A) phytosanitary regulations, (B) technical barriers to trade, (C) pre-shipment inspections and other formalities, (D) contingent trade-protective measures, (E) non-automatic licensing, quotas, prohibitions and quantity-control measures other than in A and B, (F) price-control measures, including additional taxes and charges, and (H) Measures affecting competition.

9. While tariff data for 2013 were available from the ITC's Investment map, these data were not bilateral, which made the calculation of weighted average difficult. Also, since data from 2009 to 2012 was missing, it was not possible to exploit these data without strong assumptions.

10. Compiled and kindly shared by Mariem Malouche, Trade and Competitiveness Global Practice, World Bank.

11. Note that UN-COMTRADE does not report data for Taiwan. It was assumed that the COMTRADE partner designated "Other Asia, nes" largely coincides with Taiwan, in accordance with the UN International Trade Statistics knowledge base: http://unstats.un.org/unsd/tradekb/Knowledgebase/Taiwan-Province-of-China-Trade-data.

12. Models (3) and (7) were also estimated in first differences to control for unobserved heterogeneity. However, due to missing values, the number of observations was considerably reduced and the estimated effects lost statistical significance. For this reason, the preferred estimation is GLS applied to the equations in levels and with different fixed effects.

13. Note that, similarly to Ghali et al. (2013), this study finds that most of the NTMs actually increase trade in the case of Tunisia. In some cases, the effect was so strong that the AVE was smaller than -1. Due to the logarithmic structure of the model, those observations had to be dropped in columns 5 and 6.

14. Results are not reported here, in order to save space. They are available upon request from the authors.

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