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The Doha Round and Food Security in the Dairy Sector in Cameroon: A Global Simulation Model (GSIM) Approach

Roland R. Leudjou

*Trade Policy Expert, Centre d'Etudes et de Recherche en Economie et Gestion
(CEREG), University of Yaoundé II, Cameroon*

In the framework of the new round of trade liberalization launched in Doha, paragraph 13 of the Development Declaration states that members will support special and differential treatment to accommodate development, including food security. This article simulates scenarios of multilateral tariff reduction from the WTO December 2008 draft modalities on agriculture for the Cameroon dairy sector. Using the Global Simulation Model, the analysis shows a substantial increase in world and domestic consumer prices, as the reduction of bound tariffs does not affect the applied tariffs given the high “binding overhang”. As a consequence, consumers’ welfare decreases.

Keywords: consumer welfare, dairy products, domestic consumer prices, global simulation model (GSIM), multilateral tariff reduction

Introduction

Dairy sectors remain among the most protected agricultural industries in the world. The average bound tariff rate (BND) in this sector is estimated at 85 percent while the agricultural world average is 63 percent (Gibson et al., 2001). The Organization for Economic Cooperation and Development (OECD) countries are those that impose the highest BND rates on dairy products, 112.3 percent on average. In Sub-Saharan Africa (SSA) the BND rates amount to 75 percent. Production support and export subsidies to dairy products are among the highest in agricultural products, but have tended to decrease over time (Leudjou, 2010). Customs barriers in this sector, as with most agricultural products, remain the major obstacles to trade (Diao, Somwaru and Roe, 2001; Anderson and Martin, 2005; Anderson and Valenzuela, 2005; Anderson, Martin and Valenzuela, 2005; Hertel and Keeney, 2006).

Cameroon has several advantages in favour of dairy development in spite of the weakness of public supports to farmers. In addition to the important livestock sector and abundant labour, the climate is favourable for breeding, and large areas are available for cattle, especially in the northwest and the north of the country. The level of border protection is as high as the global average since the tariffs are bound at 80 percent for an average applied most-favored-nation (MFN) tariff equal to 25 percent (WTO, 2010). Duty free imports are granted only to the Economic and Monetary Community of Central Africa (CEMAC) states with which Cameroon shares a common external tariff (CET). Despite these strengths, Cameroon imports on average approximately 30 million dollars of dairy products per year (COMTRADE/WITS¹). Local consumption amounting to a yearly average of 15 litres per capita remains, however, small compared to the average in SSA, which is estimated to be 35 litres per capita (Collectif Alimenterre, 2006). Production, which is estimated at 125,000 tons per year, is not sufficient to fill this gap and accounts for only 46 percent of potential production. Eighty-eight percent of production is handmade – non-commercial. With this in mind, the government initiated, in March 2006, the Smallholders Dairy Development Project to modernize the dairy sector and to promote food sovereignty in this sector. This action has come in the context of a global food crisis which has had adverse effects on developing countries (DCs). In January 2008, the United Nations Food and Agriculture Organization (FAO) food prices index increased by 47 percent, and by 69 percent for dairy products, relative to 2007 (Diouf, 2008). In Cameroon, dairy product prices nearly doubled from March 2007.²

At the World Trade Organization, negotiations on agriculture that began in early 2000 accelerated in the framework of the Doha Round. In the December 2008 draft modalities (WTO TN/AG/W/4/Rev.4), a tiered formula with four tariff bands was

proposed in terms of market access for agricultural products. This formula provides much larger cuts for higher bound rates. The implementation of these provisions would involve a redistribution of bound tariffs and might precipitate a reduction of tariff protection if the new bound tariff is less than or equal to the corresponding initial MFN³ rate.

According to Fabiosa et al. (2005), the multilateral reduction of MFN tariffs for a product increases its world price by an amount that depends on the initial level of worldwide protection of this product. The impact of this higher world price on household consumption would depend on how prices are transmitted on the local market. The domestic price could increase if the higher world price is greater than the decline in the national tariff.⁴

The objective of this study is to determine the effect of multilateral tariff reduction on food security in the Cameroon dairy sector. More specifically, it is to assess the impact of liberalization on the availability of dairy products by looking at the domestic price and the consumers' welfare effects. The analysis will be structured as follows. Section II presents the economic importance of the dairy sector in Cameroon; section III presents the extent of tariff protection in Cameroon and for most major player countries in the global dairy product market; section IV deals with the tariff protection reduction measures as proposed by the Doha round; section V presents the literature review; section VI presents the methodological framework. Finally, the last two sections analyze the results and present the conclusion.

Economic Importance of the Dairy Sector in Cameroon

Agro-industry is the most dynamic manufacturing activity in Cameroon, contributing over 30 percent of manufacturing value added. The dairy industry contributes less than 1.5 percent. The small size of the sector contrasts with the development potential of the dairy sector in Cameroon. Indeed, in Cameroon the weather conditions are favourable to animal health. The agro-ecological zones suitable for the breeding of cattle and small ruminants cover a large part of the country. The cattle herd is estimated at six million head. This places Cameroon in the second position, after Chad, in the region.

However, Cameroon produces only 125,000 tons of milk per year on average.⁵ This represents 46 percent of its potential production. Manufacturing output, which represents only 2 percent of national dairy production,⁶ is insufficient to meet the growing domestic demand. Indeed, between 2000 and 2007, import demand from a number of countries has almost doubled, while exports, mainly oriented towards the CEMAC, decline each year (COMTRADE/WITS). Imported dairy products have been

incorporated into eating habits and are available in almost all cities of Cameroon. This availability exposes consumers to the vagaries of the international market, which experienced major disruptions in 2007, and has an inflationary effect on all dairy products in Cameroon. International prices of dairy products have experienced an unprecedented rise. The FAO price index of dairy products gained 46 percent between November 2006 and April 2007 to a record of 213 dollars (base 100 in 1998-2000) (FAO, 2007). The price of milk powder, the main import and input for the dairy industry in Cameroon, rose even higher: the price of skimmed milk powder and whole milk powder increased by 56 and 61 percent respectively in 2008. The rising prices of cheese and butter were more moderate, i.e., 18 percent and 34 percent respectively. In Cameroon, these price increases have resulted in a 69 percent surge in the price of 25 kg of milk powder, with major effects on all dairy products.

Tariff Protection in the Dairy Sector

In Cameroon

Structural adjustment programs have eliminated all measures that previously awarded public supports to the agriculture sector. Only a few “green box” measures compatible with WTO rules are in place (Douya and Alpha, 2005). Cameroon provides duty free access for products originating from CEMAC countries with which it applies a CET. All agricultural tariff lines are bound at a rate of 80 percent. According to the WTO dairy products definition, the simple average rate actually applied (MFN) to imports of dairy products in 2010 is 25 percent with a maximum set at 30 percent; this makes the dairy sector one of the most protected agricultural sub-sectors in Cameroon.

Abroad

After the implementation of the Uruguay Round Agreement on Agriculture (AoA), trade in agricultural products remains distorted by subsidies measures. Subsidies to dairy products are among the highest granted to agricultural products. But these have tended to decrease over time. According to Diao, Somwaru and Roe (2001), Anderson and Martin (2005), Anderson and Valenzuela (2005), Anderson, Martin and Valenzuela (2005), Hertel and Keeney (2006), the border measures in the dairy sector, as for most agricultural products, remain the major obstacles to trade.

The European Union, Japan and Canada, within the context of the Economic Partnership Agreements with the African, Caribbean and Pacific countries (ACP-EU) and the Generalized System of Preferences, are the only countries that offer preferential access for Cameroon dairy products (WITS and MacMap databases). In

the case of Canada and Japan, however, these preferences are limited to only three and two tariff lines respectively. Only the EU offers duty free access for all Cameroon dairy products. Japan, Canada and Turkey apply the highest rates. Several MFN tariff lines exceed 100 percent. The developed countries' import regimes are also characterized by the strong presence of non-*ad valorem* customs duties and tariff rate quotas that make these markets less transparent for traders in terms of their actual border protection level. This does not facilitate trade. *Ad valorem* equivalents sometimes reveal rates amounting to over 2000 percent. In most developing countries (DCs), the differences (binding overhang) between BND and MFN rates are high, leaving a wide margin of freedom in determining the tariff rates as well as making future levels of tariff protection unpredictable for importers. In general, the high protection in global agricultural trade in general and dairy products in particular led to the launch of the negotiations in early 2000, as provided in Article 20 of the AoA.

The Doha Agenda and Tariff Reduction in Agriculture

As part of the new round of multilateral negotiations launched in November 2001 in Doha, the December 2008 draft modalities (WTO, TN/AG/W/4/Rev.4) are at the most advanced level in the negotiations.

The size of the tariff cuts will depend on the level of the current rate, the product status granted by the country and the country's development level (see table A.1 in the technical annex to this article). Higher tariffs will be subject to deeper cuts, ranging from 50 to 70 percent with a minimum average cut of 54 percent for developed countries and 33.3 to 46.66 percent for DCs – even less if they can reach an average cut of 36 percent. The less developed countries (LDCs) will be exempt from any reduction. The small and vulnerable economies (SVEs) will be allowed even lower cuts with more flexibility in implementation. They are allowed to moderate their reduction of 10 percentage points in each band relative to that of other DCs. Sensitive products (all countries) would be subject to cuts equal to only one-third, one-half or two-thirds of the reduction for non-sensitive products. Industrialized countries have the right to choose 4 percent of their tariff lines as sensitive products, and developing countries, one-third more. Special products (for developing countries) will also be subject to lesser cuts of 11 percent; also, not more than 5 percent out of 12 percent of total tariff lines chosen as special products could be exempted from any reduction. SVEs that have not chosen the option of a tiered formula (table A.1) will have an overall reduction of 24 percent for all their special products.

The main objective of the December 2008 draft modalities (WTO, TN/AG/W/4/Rev.4) is to address various AoA implementation shortcomings and new

forms of protection observed in agricultural trade. The reforms that will be implemented on the basis of these conditions could involve changes in trade relations amongst countries that will require careful study.

Literature Review

Only a few studies (Zhu, Cox and Chavas, 1998; Larivière and Meilke, 1999; Cox et al., 1999; Shaw and Love, 2001; Langley et al., 2003; Cox and Zhu, 2004; Peng and Cox, 2005; Peng and Cox, 2006; Langley, Somwaru and Normile, 2006) have undertaken an analysis of trade liberalization in the dairy sector, despite the interest in the reform of dairy policy (OECD, 2004). These studies are generally devoted to the analysis of the trade liberalization effects as envisaged by the AoA and/or complete removal of protective measures on dairy product trade on a global basis. Although the results of these studies differ because of parameter differences, data and/or the trade policy reforms analyzed, the studies have a specific common characteristic based on the structure of the models used (model UW-Madison; ERS/Penn State WTO; Aglink for OECD countries, etc.).

The models used are vertical, as they analyze the effects of liberalization on the various dairy products such as butter, cheese, skimmed milk powder and whole milk powder. Thus, they consider the various components (casein, lactose, whey, fat, etc.) of farm milk (primary products) as inputs in the production of finished or semi-finished dairy products (butter, cheese, milk powder). This implies taking into account the different technical processing coefficients that determine the quantity of each finished or semi-finished dairy product which is obtained from a unit of farm milk used in production (Premakumar and Chaudhary, 1996). The problem raised by these models for most DCs and LDCs is that statistics on the technical processing coefficients, production and consumption of most primary, semi-finished or finished dairy products are often unavailable and unreliable. These countries are consequently absent from these models, which only incorporate the major dairy products or food producers (model UW-Madison; ERS/Penn State WTO) or are limited to a specific group of countries (Aglink for OECD countries). Therefore, it becomes very difficult to assess the impact of trade policy reforms on the majority of DCs and LDCs, which are often net importers of dairy products and more concerned with the consequences of multilateral trade liberalization.

Given these limitations, this study differs from previous studies in three ways. The first is to remove the constraint of models suitable for only some countries, large producers or groups of countries/regions. Thus, the analysis here includes all Cameroon's trading partners, whether developed countries, DCs or LDCs, provided

they are involved in the multilateral agricultural tariff reduction. This allows the impacts of multilateral trade liberalization on any DCs or LDCs as expressed in the Doha Declaration to be measured, particularly in terms of food security. Second, the study takes into account the tariff reduction modalities at the 6-digit level of the Harmonized System in accordance with the current trade negotiations in the WTO. Finally, the impact analysis of liberalization here is for the entirety of dairy product manufacturing activity. The International Standard Industrial Classification (ISIC) revision 3 (code 1520) is included, comprising 24 tariff lines at the 6-digit level of the Harmonized System (WITS database).

Methodology

*The Model*⁷

The model applied in this study is the global simulation model (GSIM) for the analysis of global, regional or unilateral trade policy changes (Francois and Hall, 2003). The model is an imperfect substitute model (Armington, 1969) of world trade employing a partial equilibrium approach. The results of the GSIM allow the assessment of importer and exporter effects related to tariff revenues, producer surplus, consumer surplus and changes in overall domestic prices. The model requires the input of a bilateral trade matrix at world prices, an initial matrix of bilateral import tariffs in *ad valorem* form, a final matrix of bilateral import tariffs in *ad valorem* form, export supply elasticities, aggregate import demand elasticities and elasticities of substitution. Using additional data, domestic production effects can also be fitted into the framework.

Data Sources

The countries

For this study, 23 countries including Cameroon were considered. Eighteen of these are the top Cameroon dairy product trading partners on an import basis in 2005 that also must apply the tariff reductions of the proposed December 2008 Doha draft modalities. The source used is COMTRADE via WITS. The eighteen top trading partners are the European Union, Japan, New Zealand, the United States, South Africa, Argentina, Brazil, China, Egypt, Ghana, Indonesia, India, Lebanon, Morocco, Malaysia, Oman, Peru and Turkey. Some of the top exporters and importers of dairy products in the world (FAO, 2007) are also included in the model. These are Australia, Russia and Canada. The rest of the countries participating in trade of dairy products are included in the model as the Rest of the World (ROW).

Bilateral trade

The base trade data in 2005 are from the COMTRADE/WITS database, which provides us with the values of bilateral trade flows corresponding to the ISIC revision 3. The data on trade with self, i.e., domestic production less exports, on the diagonal of the matrix GSIM23x23 are computed from domestic consumption data from the Industrial Demand-Supply Balance Databases (IDSB) (UNIDO, 2008). In the case of Cameroon, which is missing from revision 3, trade with self is derived from the same IDSB, but revision 2 for 2002. This difference does not create a problem for the analysis since there is no difference between these two revisions⁸ in terms of Cameroon's bilateral trade with countries in the model (TRAINS/WITS).

Bilateral tariffs

The simple MFN initial bilateral average⁹ tariffs (pre-Doha) are the most recent available. They are extracted from the market access map database (MacMap) of the International Trade Centre and the *Centre d'Etudes Prospectives et d'Informations Internationales*. This database has the advantage of producing *ad valorem* equivalents for specific tariffs and tariff rate quotas. The simple MFN final bilateral average tariffs (post-Doha) are obtained by computing the average of the new MFN bilateral tariff lines obtained after application of the tiered formula proposed in the December 2008 agricultural draft modalities (WTO, TN/AG/W/4/Rev.4) given the different scenarios adopted for this study.

Elasticities

Aggregate import demand elasticities:

The database of the World Bank "Trade, Production and Protection 1976-2004" (Nicita and Olarreaga, 2006) is the source of the values of aggregate import demand elasticities (E_m) for all countries except South Africa and the EU. South Africa is taken from Kee, Nicita and Olarreaga (2004). The default value of GSIM (Francois and Hall, 2003) equal to -1.25 was adopted for the EU.

Elasticities of export supply:

For this elasticity (E_x), the value 1.5 (Francois and Hall, 2003) was adopted for the major exporters of dairy products (e.g., New Zealand, the United States, Australia, the EU and Argentina (FAO, 2007) and the ROW; for other countries, the value 0.5 was adopted. This corresponds to the assumption of "a small country against a large country" (Holzner, 2004).

Elasticities of substitution:

Regarding the elasticity of substitution (Es), the value 5 (Francois and Hall, 2003) was adopted for all countries of the model. Indeed, in the literature in general the value of 5 is often used (Fujita, Krugman and Venables, 2000).

Scenarios

Three types of scenarios were established for this study under the terms of the proposed December 2008 draft modalities (see table A.1 in the technical annex to this article). In the first scenario, none of the 24 tariff lines is considered as a sensitive product or a special product. This is the most ambitious reduction scenario. In scenario 2, the 24 tariff lines are considered as sensitive, deviating by two-thirds¹⁰ from the required reduction in the case of a simple application of the tiered formula for all countries of the model. Finally, scenario 3 incorporates the concept of SDT by considering the 24 tariff lines as part of the products listed among the special products for DCs that may be exempted from tariff reduction; the 24 tariff lines in this scenario are considered to apply to sensitive products for developed countries.

Results

Table 1 Post-Doha Tariff Protection on Dairy (%)

Countries	CAM	EU	USA	JPN	AUS	CAN	TUR	ZAF	NZL	RUS	ARG
MFN old	20	59.47	22.12	158.71	1.06	136.5	106.21	17.62	1.81	6.11	15.24
MFN new	20	24.54	8.99	45.94	0.77	30.26	73	14.46	1.81	-	15.21
Protection loss	0	58.74	59.36	71.05	27.36	77.83	31.27	17.94	0	-	0.20
Countries	GHA	EGY	IND	IDN	MYS	PER	MAR	OMN	BRA	CHN	ROW
MFN old	19.17	7.83	32.36	5.21	3.02	11.19	55.72	5	17.85	12	18.63
MFN new	19.17	7.65	29.92	5.21	2.81	11.19	34.51	4.10	17.74	8.06	17.27
Protection loss	0	22.99	7.54	0	6.95	0	38	18	0.6	32.83	7.3

Country key: CAM=Cameroon; EU=European Union; USA=United States; JPN=Japan; AUS=Australia; CAN=Canada; TUR=Turkey; ZAF=South Africa; NZL=New Zealand; RUS=Russia; ARG=Argentina; GHA=Ghana; EGY=Egypt; IND=India; IDN=Indonesia; MYS=Malaysia; PER=Peru; MAR=Morocco; OMN=Oman; BRA=Brazil; CHN=China; ROW=Rest of the World.

Source: Author's analysis based on simulations of tariff reduction.

Tariff Redistribution

After applying the scenarios to reduce tariffs, we notice that there is no reduction of MFN tariffs in Cameroon whatever the scenario, as the BND rates are well above the maximum MFN applied rates. The average BND tariff reduction is, however, 22.4 percent of “binding overhang”, that is, from 80 percent to 57.6 percent (scenario 1) (table 1).

The loss of tariff protection differs among Cameroon’s trade partners. Developed countries suffer from a sharp decline in MFN tariffs. The largest tariff reductions are recorded by Canada, Japan, the United States and the EU. Morocco, China, Turkey, Egypt and Oman are DCs where Cameroon will benefit from additional access for its dairy products. While Cameroon dairy products continue to benefit from preferred access granted by the EU, they will now face more competition in Canada’s and Japan’s markets, where liberalization leads to a loss of preferences (table 2).

Table 2 Post Doha Erosion and Loss of Preferences for Cameroon Dairy Products

	JPN	CAN	EU
PRF (preferential) tariffs (%)	158.41	131.88	0
MFN tariffs old (%)	158.71	136.50	59.47
MFN tariffs new (%)	45.94	30.26	24.54

Source: Author’s analysis.

Change in Overall Domestic Price and Consumers’ Welfare

Table 3 shows the overall results extracted from the model. Whatever the scenario of liberalization, the multilateral tariff reduction on dairy products leads to an increase in the overall domestic price of dairy products and lower consumers’ welfare.

Table 3: Summary of Liberalization Effects

Scen.	Change in overall consumer prices (%)	Base 2005 output (US\$)	Change in output (%)	Base 2005 imports (US\$)	Change in imports (US\$)	Base 2005 exports (US\$)	Change in exports (US\$)	Consumer surplus (US\$)
1	0.29	4390319	0.3	27054177	-1371534	636841	29721	-160913
2	0.13	4390319	0.1	27054177	-59968	636841	9455	-70657
3	0.06	4390319	0.1	27054177	-593	636841	-29457	-35017

Source: Extracted from GSIM.

These results are due to strong global demand for dairy products in most countries exporting to Cameroon following the lowering of the costs of imports (lower tariffs). In the EU, the demand is estimated to be \$12,989,460; in the United States, \$680,775,518; in Argentina, \$526,984; in Canada, \$455,414,909; in Australia, \$25,438,586; and in China \$211,772,864 (all figures are US\$). This situation leads to an increase in world prices (for example, 2.21 percent in New Zealand, 2.02 percent in Australia, 1.21 percent in Argentina), which decreases imports in Cameroon where there has been no MFN tariff reduction, and thus substantially increases also the domestic price. The rather small increase in local production due to the low supply elasticity is insufficient to offset the decline in imports. Cameroon increases its exports to the ROW (4.5 percent in scenario 1). The increase in consumer prices has negative consequences for consumers' welfare (consumer surplus declines in all the three scenarios).

Sensitivity Analysis

Sensitivity analyses of consumers' welfare were performed to ensure that the fundamental results are not sensitive to the choice of elasticity values. They indicate a robustness of the main simulation results obtained. Consumers' welfare remains negative after liberalization. E_m and E_s are key parameters of this analysis. When E_m are doubled to -2.141344, consumers face a less strong decrease in their welfare (US\$147,000 in scenario 1), while halving implies high welfare deterioration (US\$168,906) and an increase in overall dairy product consumer prices of 0.3 percent. The value of 5 for the E_s was adopted for all countries in the model. The simulation results show that this elasticity has a strong and negative influence on the change in consumers' welfare. Doubling its value in scenario 1 causes a sharper drop in welfare (US\$69,344). However, when the elasticity declines to the value of 1, the change in the welfare of consumers is only US\$53,574.

Conclusion

The international economic environment is characterized by an increase of food prices that has occurred while the Doha Round negotiations at the WTO are continuing. The Doha Declaration on agriculture prescribes special and differential treatment for developing countries to allow them to meet their food security needs, to guarantee livelihoods and to support rural development. The December 2008 draft modalities on agriculture prescribe procedures for tariff reforms to be implemented by some WTO members, including Cameroon. These reforms raise several questions about their impacts on food security in Cameroon, especially in the dairy sector, which has suffered the brunt of the global food crisis.

The analysis presented here shows that the multilateral tariff reduction of the December draft modalities will create export opportunities for Cameroon dairy products. Not reducing the level of local market tariff protection, it will cause a reduction of government flexibility in setting the applied tariff rates (“binding overhang” reduction), as well as an erosion of trade preferences enjoyed by Cameroon. An assessment using the Global Simulation Model, an Armington-type partial equilibrium model, shows that liberalization might worsen consumers’ welfare. The decline in consumers’ welfare is greater in scenario 1 than in the less ambitious scenarios 2 and 3. This decline will be subsequent to an increase in dairy product consumer prices in Cameroon. This increase is due to strong demand in international dairy product markets, leading to a general rise in prices. This leads to a substantial decrease in imports and an increase in exports from Cameroon. The increase in local production is insufficient to cover the reduction in availability of dairy products.

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Endnotes

1. “World Integrated Trade Solution” is a software developed by the World Bank that accesses and retrieves information on trade and tariffs which is compiled by international organizations.
<http://wits.worldbank.org/witsweb/Register/default.aspx>
2. The journal *Messenger*, August 27, 2007:
<http://fr.allafrica.com/stories/200708271342.html>
3. Applied tariff_{new} = minimum of (bound tariff_{new}; applied tariff_{old}).
4. $\Delta P / P$ (change in domestic price) = $\Delta P^* / P^* \text{ * (change in world price) + } \Delta T / T$ (change in domestic tariff).
5. For a review of the constraints to dairy production in Cameroon, see E. N. Tambi, “Dairy production in Cameroon: Growth, development, problems and solutions” <http://www.fao.org/docrep/U1200T/u1200T0g.htm>
6. The official newspaper *Cameroon Tribune* of November 29, 2007: <http://fr.allafrica.com/stories/200711290873.html>
7. See the technical annex to this article for a technical description. GSIM was developed by Joseph Francois of the Tinbergen Institute and H. Keith Hall of the U.S. International Trade Commission. The model is documented in a memo by these authors entitled “Global Simulation Analysis of Industry-Level Trade Policy”, October 2002.
8. Revision 2 (code 3112) has 26 tariff lines and Cameroon doesn’t trade in the tariff lines which make the difference in revision 3 (1520).
9. The average MFN tariffs on 24 tariff lines (dairy products).
10. All countries have the choice amongst one-third; one-half and two-thirds. The latter is the one that provides more flexibility.