Preference shift towards domestic products in Benin

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Executive summary

Against the background of the latest disruptions of international trade, policy makers may weigh cheap imports against independency from other trading partners. These considerations may appear especially relevant for staple foods, that are crucial for food security. In this study, we modeled preference shifts in favor of domestically produced rice, poultry and fish resulting in import substitution and analyzed the effects on the overall economy using a CGE model. Such preference shifts can be achieved, for example, through awareness campaigns such as "Consommons local Béninois".

- We found that the effect of a preference shift depends on the product it targets, the initial size of the imports, and the factors required to produce the product.

- The effects for households, their incomes, and their consumption differ.

- Changes in household consumption are considerably more favorable for the rural poor in the rice and poultry scenarios. In contrast, the fish scenario results in an almost universal decline in consumption.

- Domestic production of these three crops increases at the expense of cotton production and cotton ginning, which are important export products. Looking at total imports and exports, imports decrease more than exports in the rice and poultry scenario, increasing net trade and saving foreign exchange. For fish, the opposite occurs.

- GDP decreases for all scenarios, but very little.

- All scenarios succeed in reducing import dependence for the product concerned, but all are associated with additional costs.

Mutation de préférence en faveur des produits nationaux au Bénin

Résumé

Dans le contexte des dernières perturbations du commerce international, les décideurs politiques peuvent mettre en balance les importations bon marché et l'indépendance vis-à-vis de l'étranger. Ces considérations peuvent sembler particulièrement pertinentes pour les produits vivriers, qui sont cruciaux pour la sécurité alimentaire. Dans cette étude, nous avons simulé des mutations de préférences en faveur du riz, de la volaille et du poisson produits localement, par la substitution des importations. Nous avons analysé les effets de ces changements sur l'ensemble de l'économie à l'aide d'un modèle d'équilibre général calculable (EGC). De telles mutations de préférences peuvent être obtenues, par exemple, par des campagnes de sensibilisation telles que celle du "consommons local Béninois".

- Nous avons constaté que l'effet d'une mutation de préférence dépend du produit visé, de l'importance initiale des importations et des facteurs nécessaires à la production du produit.
- Les effets sur les ménages, leurs revenus et leur consommation diffèrent.
- L'évolution de la consommation des ménages est nettement plus favorable aux ruraux pauvres dans les scénarii du riz et de la volaille. En revanche, le scénario du poisson entraîne une baisse quasi généralisée de la consommation.
- La production intérieure de ces trois produits augmente au détriment de la production et de l'égrenage du coton, qui sont d'importants produits d'exportation. Si l'on considère les importations et les exportations totales, les importations diminuent plus que les exportations dans les scénarii du riz et de la volaille. Ce qui augmente le commerce international net et permet d'économiser des devises. Pour le poisson, c'est l'inverse qui se produit.
- Le Produit Intérieur Brut (PIB) diminue dans tous les scénarii, mais très peu.
- Tous les scénarii parviennent à réduire la dépendance à l'égard des importations pour le produit concerné, mais tous sont associés à des coûts supplémentaires.

1.   Background

1.1   Political and economic context

The Beninese agricultural sector represents the backbone of the economy, accounting for more than 70% of employment, 23% of GDP and about 75% of export revenue (MAEP, 2018). Commercial agriculture is essential for supplying domestic markets and for cushioning the effects of increases of global food prices (Grandval et al., 2012). Agriculture thus appears as a sector of interest that can benefit from strengthening the consumption of domestic products.

Many Beninese consumers prefer imported products compared to domestically produced ones, for example rice, chicken, fish, fruit juice, etc. According to Abiassi and Eclou (2006), the reasons for Beninese consumer preference for imported rice over domestic rice are mostly related to flavor (31% of cases), market availability, and a relatively low price (about 13% of cases). Others (about 10% of cases) cited the nutritional qualities of imported, parboiled rice over domestic rice. Other reasons for preference (between 1 and 3% of cases) mentioned by consumers are the availability in the village, swelling power (or water absorption) and ease of cooking. Houessou (2016) observes that Beninese by habit like to consume imported products generally because they think they are more interesting and of better quality. According to the World Trade Organization (WTO), Benin's imports amounted to US$6.52 billion in 2018, including US$4.07 billion for goods and US$2.45 billion for services (Tossou, 2020).

Since the summer of 2020, the global economy has entered a new phase of rising agricultural prices, with levels reminiscent of the 2008-2013 period, in the midst of the economic and financial crisis. The FAO food price index in 2022 was even slightly above its 2008 level (FAO, 2023). The Russian invasion of Ukraine is one of the main causes of the surge in prices in general and of agricultural products in particular. The outbreak of this war has caused trade interruptions, leading to price increases of fertilizers, wheat, corn, oilseeds and others. Price increases of such kind threaten food security and lead to reflecting on options to decrease import dependency. Imports of food products account for large shares of Beninese expenses. In 2021, imports were worth 34% of GDP (The World Bank, 2023). Among the top ten products imported to Benin in 2019 were rice (19.8% of the total value of imports), palm oil (4.2%), frozen and refrigerated meat (3.6%) and frozen fish (3.6%) (Direction générale du Trésor français, 2020).

1.2   Literature review on preferences for domestic products

Very little research has been done on the phenomenon of local food consumption (Merle and Piotrowski, 2012), which can in parts be applied to the phenomenon of local food consumption. In-depth understanding of consumer motivation and behavior remains rare given the "lack of empirical information regarding consumer perceptions of local foods" (Weatherell et al., 2003, p.233). Merle and Piotrowski (2012) reveal four main motivations for consuming local food: (1) the reduction of health risks, (2) the rediscovery of "true" flavors through the freshness of products, (3) the commitment to environmental and social concerns and (4) the search for a social link and interaction between the consumer, the producer and other consumers. The question of price and willingness to pay is important in this context. For certified food products, for example, consumers often accept higher prices than for their conventional counterparts (Harris and Freeman, 2008; Maguire, 2004; Gam et al., 2010). The work of Chambers et al. (2007), confirmed by Defra (2008), highlights the role of perceived standards, freshness and taste, the importance placed on supporting the local community, and

the perceived environmental benefits to consumers of local products in England. Brown et al (2009) and Thilmany et al (2008) point out that the analysis of these motivations and perceptions is not linked to the actual purchase of local products. Only the work of Birch et al. (2018) shows that increased frequency of local food purchases is positively associated with consumer motivations. Bonnal et al. (2019) emphasize the following: (1) qualitative criteria prevail over price, and all the more so if purchase frequency is high, (2) a positive perception of local food products, in terms of individual benefits (product quality, i.e., taste and freshness) and altruistic benefits (support for local employment and respect for the environment) are relevant, and (3) the impact of traditional consumption determinants (age, level of education, and location) is significant for the probability of purchasing local food products.

2. Methods

2.1 Database

We use an updated 2019 Social Accounting Matrix (SAM) based on Kinkpe et al. (2022) and national accounts published by INStaD (2022) and additional data from DSA-MAEP (2022a, 2022b, 2022c). The two labour categories (skilled and unskilled) are disaggregated according to gender. Capital is disaggregated into agricultural and non-agricultural and land is disaggregated into irrigated and non-irrigated. Households are disaggregated into rural poor and non-poor as well as urban poor and non-poor.

2.2 Model and closure rules

We use the computable general equilibrium (CGE) model STAGE (McDonald and Thierfielder 2015). A CGE model combines economic theory and numerical models to establish the impact of shocks in an economy. Real economic data is used to fit a set of equations that replicate the structure of the economy. From this framework, it is possible to simulate the effect of exogenous shocks, such as policy changes, including economy-wide interactions. The following presents a summary of the CGE model used:

- Production is structured by a three-level nest of Constant Elasticity of Substitution (CES) and Leontief production functions. At the top level, aggregate value-added, and intermediate inputs are combined using a CES function. Production factors are aggregated using CES functions at different levels, whereas the intermediate input component is aggregated using a Leontief production function (the second level). Aggregate primary factors (i.e., labour and land) are combined using CES functions (the third level).

- Producers sell their products either in the local or foreign markets, based on relative prices, as determined by a Constant Elasticity of Transformation (CET) function.

- Households supply production factors to productive activities through factor markets in exchange for wages that constitute a significant portion of their incomes. After paying taxes and making savings, households spend their income on purchasing products. Households maximise their utility subject to Stone-Geary utility functions, selecting the optimal mix of commodities and services while considering purchase prices, preferences, and income constraints.

As Benin uses a currency pegged to the Euro with a fixed parity, we apply a fixed exchange rate regime and flexible trade balance (deficit) closure. The model is savings-driven. Government

savings are fixed and the household tax rate is flexible. Therefore, any policy change implemented in the model is financed through equiproportional changes in household income tax rates.

2.3   Scenarios

The analysis examines the following scenarios:

- preference shift in favor of domestic rice (prefrice),

- preference shift in favor of domestic chicken ("poulet bicyclette" and "poulet chair") (prefpoultry),

- preference shift in favor of domestic fish (preffish),

- a combination of all of the above.

The preference shift is modelled by adjusting consumer demand. In the scenarios, consumers behave as if the domestic products were 40% cheaper than their imported counterpart. The actual prices and consumer expenditures do not change. The method we use has limitations. There are several relevant aspects that cannot be examined with this model, for example:

- Dynamic effects on domestic maize production caused by increased domestic demand, e.g. through investment in domestic production by farmers and the "good investment environment" that the government needs to provide in order for that to happen.
- The welfare effects of resilience against short-term supply chain disruptions due to crises (Covid, Ukraine, etc.).

3.   Results

The simulated preference changes have effects on all sectors and all actors in the economy. To structure the results we follow the shock through the economy according to Figure 1. We will commence with 3.1 the changes in imported quantities, then examine the effects the simulations had on 3.2 the domestic production and on production factors. In section 3.3 we examine the changes in domestic prices, continue with 3.4 the implications for the households, focusing on their income, taxation and consumption. We conclude with the effects on 3.5 the macro-economic indicators.

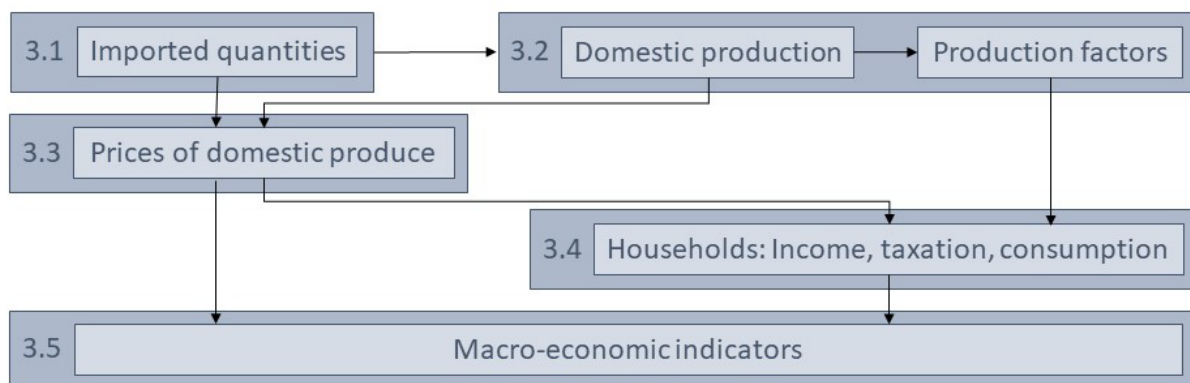We conclude with the effects on 3.5 the macro-economic indicators.

Figure 1: Mechanism of the effect of an import shock on the economy and structure for the results

Source: Authors' compilation.

3.1   Imported quantities

To explain more closely the impact pathway of a demand change from imported to domestic quantities, import prices and domestic prices need to be considered. Benin is assumed to be a "small country" in the sense that a change in import demand of Benin does not affect the world market price. Also the exchange rate for Benin is fixed. Thus, the exchange rate and therefore the import prices remain unchanged compared to the reference scenario. However, prices for domestic products are affected: imported quantities decrease, making overall available quantities more scarce, causing domestic prices to rise and therefore, acting as an incentive for domestic producers to produce more of the respective product.

Even though the relative size of the preference shift is the same for all products, the decrease in imported quantity differs between products both in absolute and percentage terms (see Figure 2 and Table 1). The decreases are larger in relative terms for the commodities that have a lower import share, i.e. poultry and fish. Their import shares in the reference scenario are almost identical (41.8% for poultry and 41.1% for fish) and so are the changes in imported quantities, which almost halve. Imported quantities of rice, for which the import share initially is more than 90%, only decrease by 8.3 %. The reductions in the scenarios prefrice, prefpoultry, preffish are almost the same as in scenario preftot, that shifts the preferences for all three products combinedly. Hence, the preference shifts do not influence each other very much. This could be different for products that are closer substitutes than the three products analyzed in this paper.

The preference shock increases the demand for domestic products. The increase in demand for domestic products is much larger in percentage terms for rice production than for poultry and fish. The demand for domestic products is very small in the reference scenario, hence the increase of 150.8% resp. 151.7% corresponds to a rather small increase in absolute terms and compared to the overall domestically available rice. Demand for domestic products shows smaller changes in percentage terms for poultry and fish. Here, the increases range from 40.8% in the singular scenario for fish to 42.9% for poultry.

The resulting import rates are therefore also similar for poultry and fish. They decrease from 41.8% resp. 41.1% to 20.8% resp. 20.6%. For the highly import-dependent commodity rice, the decrease is more modest from 93.2% to 83.5%.

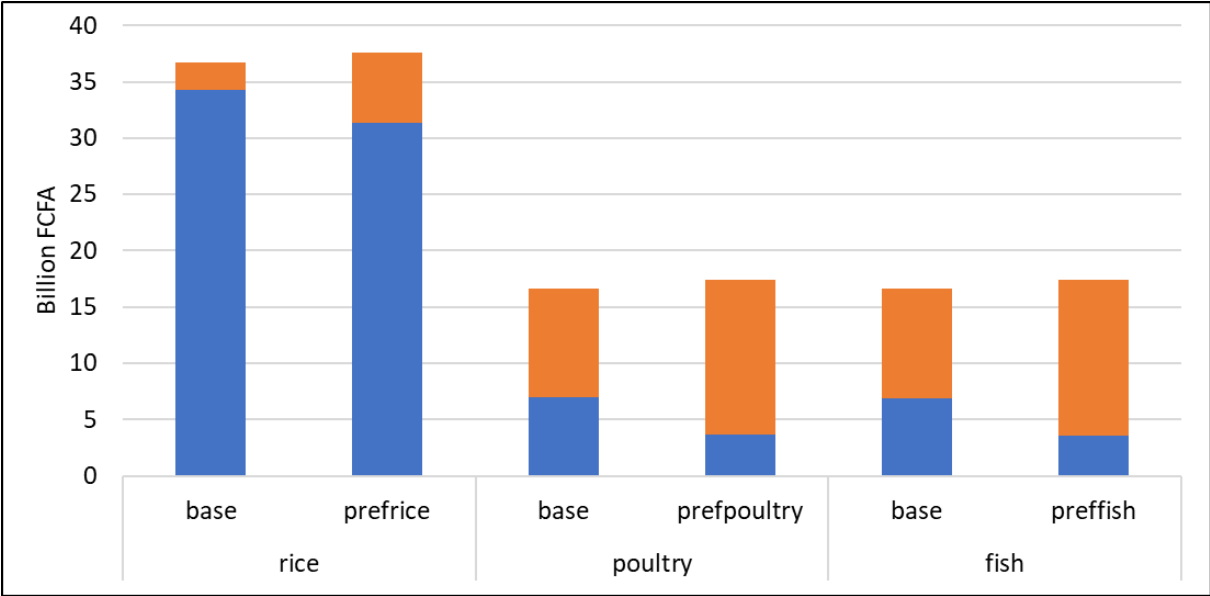Preference shift towards domestic products in Benin

Figure 2: Composition of commodities in the baseline and in the preference scenarios

Source: Authors' calculations based on simulation results.

Table 1: Composition of commodities in the baseline and in the preference scenarios (in billion FCFA) and changes

▮ Demand for domestic products	2.5	6.2	9.7	13.8	9.8	13.8
Δ Demand for domestic products		150.8%		42.9%		40.8%
▮ Imports	34.2	31.4	6.9	3.6	6.9	3.6
Δ imports		-8.3%		-47.9%		-47.5%
Import share	93.2%	83.5%	41.8%	20.8%	41.1%	20.6%
Demand for domestic products	2.5	6.2	9.7	13.8	9.8	13.8

Source: Authors' calculations based on simulation results.

3.2   Domestic production and production factors

Increasing domestic production or reallocating formerly exported quantities into domestic consumption can fulfill the increasing demand for domestic products. In our scenarios, domestic production of rice, poultry, and fish matches the simulated demand increases for these products almost perfectly, with rice production increasing by 150.4%, poultry by 42.8%, and fish by 40.8% as shown in Figure 3. This increase in domestic production requires more factors (land, labor and capital) which are drawn from other activities, mainly cotton and cotton ginning, as we assume that there are no unemployed factors (see Appendix A in the Appendices). While the production of cotton and cotton ginning consequently decreases, other agricultural activities are hardly affected. Non-agricultural activities decrease slightly, but rather due to the above-mentioned change in consumption than to factor re-allocation.

More specifically, in the rice- and poultry-scenario non-irrigated land and male labor (mainly skilled) are re-allocated away from cotton and ginning, whereas in the fish-scenario the re-allocation of labor (mainly male, mainly unskilled) and agricultural capital allows for increasing domestic production (see Appendix A in the Appendices). Interestingly, there is also re-allocation of land in the fish-scenario, even though fish production does not employ this factor.

But when labor and capital are drawn from e.g., cotton production, land can be used more efficiently in other sectors.
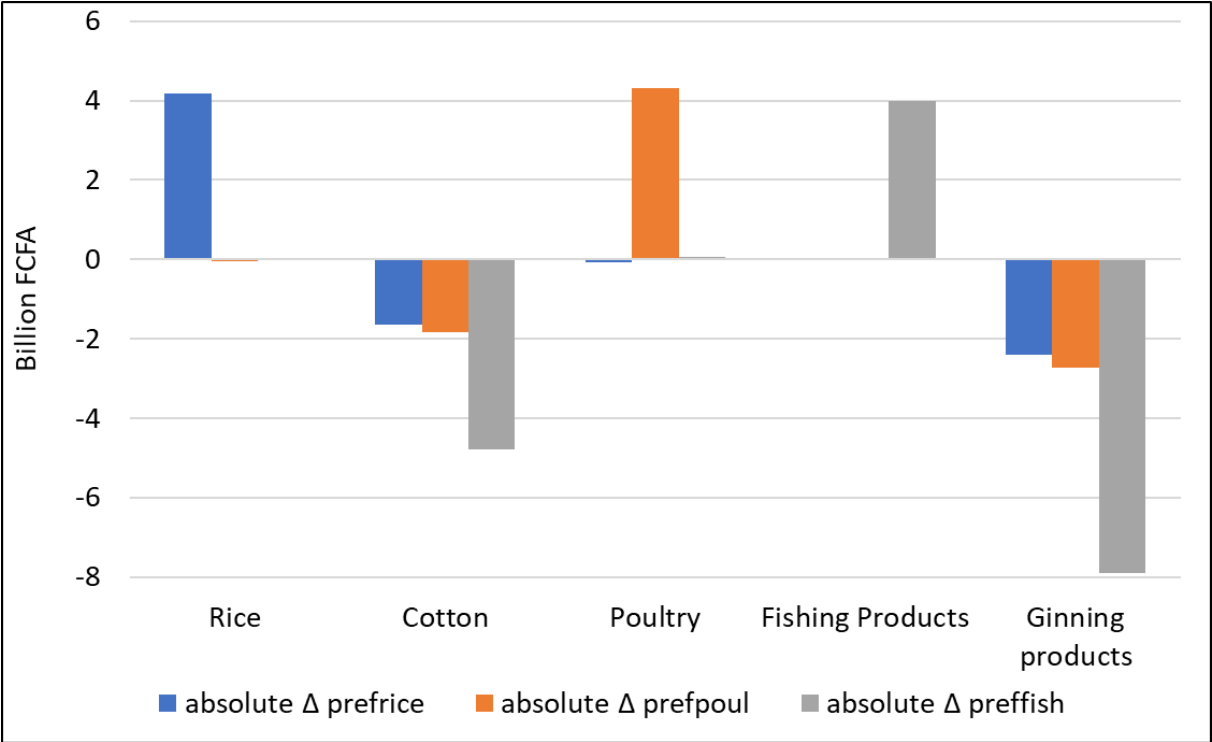

Figure 3: Real, absolute changes in domestic production (Billion FCFA)
Source: Author's calculations based on simulation results.

These changes in factor demand lead to increased wages for unskilled, male labor and land in the rice- and poultry scenario (see Appendix B in the Appendices). In the rice-scenario both irrigated and non-irrigated land are re-allocated into rice-production. Conversely, poultry production only uses non-irrigated land. However, the increased demand for non-irrigated land in the poultry-scenario makes it more expensive than in the reference situation. This change in factor wages causes other activities, that use both non-irrigated and irrigated land, to substitute some of the non-irrigated land by irrigated land. Therefore, the wages and the factor income from irrigated land increase also in the poultry-scenario, though less than in the rice-scenario. Increased fish production demands more agricultural capital, but no land. As agricultural capital is drawn away from agricultural acitvities, some activities do not have enough agricultural capital available to efficiently farm the land. Therefore, land is freed up, becomes cheaper and land owners' incomes decrease. Generally, changes in factor wages and in income for labor are more modest than for capital and land. This is because labor can be reallocated throughout all of the economy which dampens the wage effects, while capital and land are specific for the agricultural sector. Only unskilled male labor experiences a relative increase in demand across all activities and hence, a wage increase, whereas the demand for unskilled female and skilled labor decreases over all sectors.

3.3   Domestic Prices

The preference shifts increase the domestic price of the respective product. In the fish-scenario, also the closely related commodity of processed fish and meat becomes more expensive. The rice- and poultry-scenarios increase land demand and therefore make

especially commodities that use land more expensive. Accordingly, in the fish-scenario, capital-intensive commodities become more expensive and land-intensive commodities cheaper (see Appendix C in the Appendices

Cashew, manure and cotton ginning products show noteworthy price changes (see Table 2). Alongside factor wage changes, additional aspects influence the domestic commodity price changes: Cashew is highly exported, the world market price is not influenced by the Beninese market, the trade balance is flexible, so cashew production can expand easily. Cotton ginning is closely related to cotton, but more capital intensive. The price of manure increases heavily in the rice scenario as it is needed as an input in rice production, whereas it decreases in the poultry-scenario, because more poultry production increases manure supply.

Table 2: Percentage changes in domestic prices for selected commodities with esp. high changes

	Cashew nut	Processed cashew	Manure from husbandry	Ginning products
prefrice	1.3%	2.4%	21.6%	1.8%
prefpoul	1.3%	2.4%	-7.6%	2.1%
preffish	-4.2%	-3.7%	0.3%	7.0%

Source: Author's calculations based on simulation results.

Prices for non-agricultural products decrease in the rice- and poultry-scenarios, because food prices increase and consumers can spend less on other commodities. Food prices decrease in the fish-scenario and prices for non-agricultural commodities hardly change.

3.4   Households: Income, taxation and consumption

Income decreases for all household groups, except for the rural poor who profit from higher wages for land and unskilled labor as Figure 4 shows. However, in the fish-scenario land prices do not rise, so that the rural poor experience income losses, too.

The urban poor are hardly affected as they neither own land or agricultural capital nor work in agriculture. The non-poor households experience income decreases in the rice- and poultry-scenarios due to the wage drop for capital and skilled labor. In the fish-scenario, the wage increase for capital almost balances the wage drop for skilled labor and the income for non-poor households remains almost unchanged.

Decreases in income lead to decreased consumption for all households in the preffish-scenario and for all households except for the rural poor in the scenarios prefrice and prefpoultry (see Appendix D in the Appendices). Consumption of the shocked products decreases in their respective scenarios because the decrease in imports lead to higher commodity prices. Otherwise, the consumption changes in food products are comparatively small. Even at high prices, consumers need a certain minimum of food and when prices are low, additional food does not yield much utility once a certain level of food has been consumed. Therefore, consumption of non-food products changes more. The exceptionally large changes in cashew apple consumption follow the very large price changes.
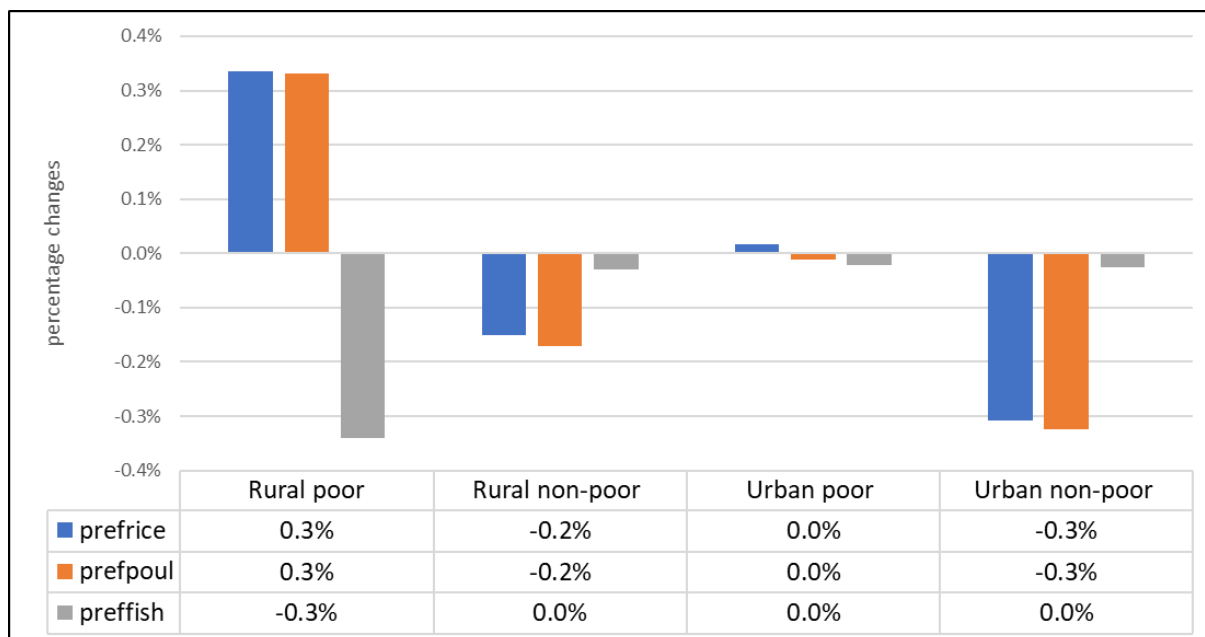
	Rural poor	Rural non-poor	Urban poor	Urban non-poor
■ prefrice	0.3%	-0.2%	0.0%	-0.3%
■ prefpoul	0.3%	-0.2%	0.0%	-0.3%
■ preffish	-0.3%	0.0%	0.0%	0.0%

Figure 4: Effects on household income, % change compared to the reference scenario

Source: Author's calculations based on simulation results.

3.5 Macroeconomic indicators

Due to the size of the simulated shocks, the effects on macro-economic indicators are rather modest as Figure 5 shows. Total domestic consumption decreases in all scenarios. Exports and imports decrease both in all scenarios. In the scenarios prefrice and prefpoul import substitution for rice respectively poultry from the simulated preference shift dominate the effect on the trade balance and imports decrease more than exports in absolute and percentage terms (absolute numbers in Appendix E in the Appendices). Because the increased fish production in scenario preffish draws factors especially from heavily exported products (i.e. cotton and ginning products), export reductions are larger in percentage and absolute terms than import reductions. GDP hardly changes (not shown).
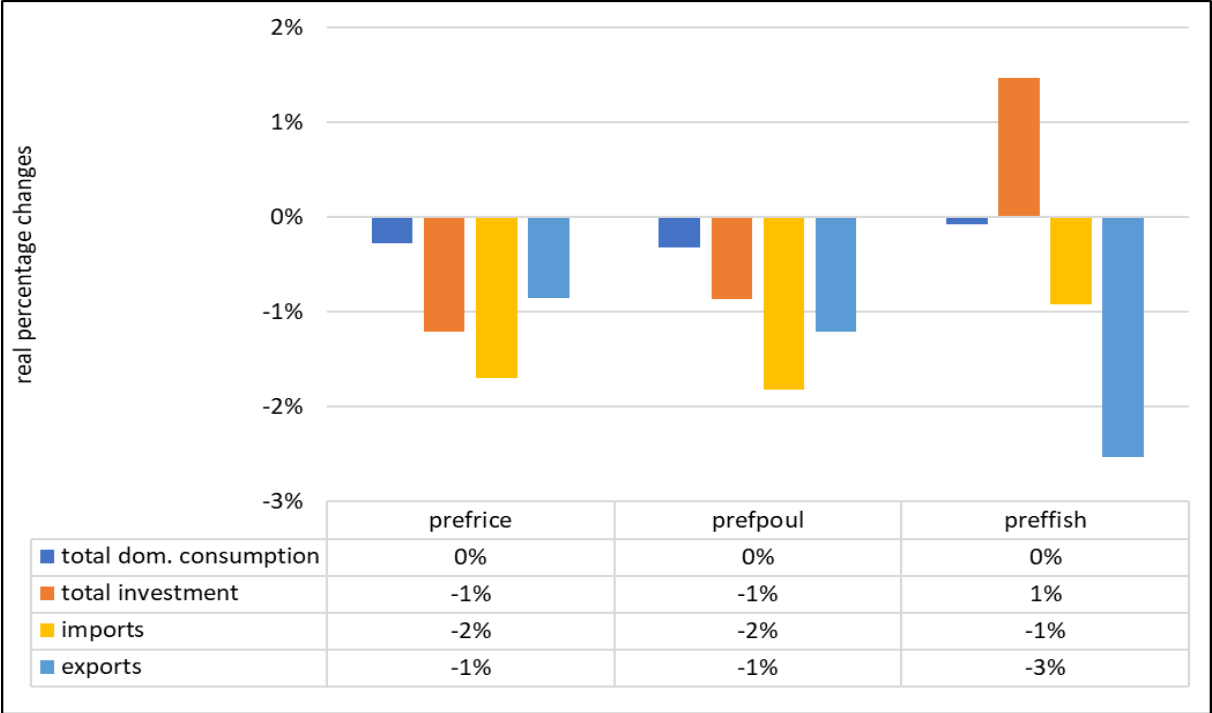
4. Conclusion

The effects of preference shifts differ depending on the product affected, its initial import share and its link to other products via factor markets and value chains. In our scenarios, the reductions in import quantities are larger in percentage terms if the import share is small in the baseline (as for poultry and fish), but are more modest when the import rate is high (rice). Under all three scenarios domestic production of the targeted product increases. The different factor intensities of the three shocked products lead to differing effects on household income: Increased domestic production of fish, which is intensive in agricultural capital, lets capital owners profit from higher capital prices. Rice and poultry, however, require comparatively more land, which allows land owners to profit in these scenarios. Among labor, only unskilled male labor experiences a slight wage increase and only in the rice- and poultry-scenario. Otherwise labor wages decrease. The effects for the household groups differ accordingly. The rural poor (earning income from land and unskilled labor) profit in the rice- and poultry-scenario but lose income in the fish-scenario. The non-poor groups (earning income from capital and skilled labor) lose in all three scenarios, but less in the fish-scenario. The changes in household consumption show the improvements the rice- and poultry-scenarios bring for

the rural-poor, whereas other household groups consume less of all products and the fish-scenario leads to almost universal consumption declines.

Domestic production of all three crops expands at the expense of the production of cotton and cotton ginning, which are both important export products. Whereas each preference shift scenario leads to a decrease in imports of the respective product, they also lead to a decrease of exports of cotton and ginning products. This leads to decreases in net imports in the rice- and poultry-scenario, hence saving foreign currency. For fish the opposite is true.

All in all, we cannot clearly state which scenario comes at the lowest costs and is most beneficial. We must conclude that though all scenarios are successful in decreasing import dependency in the respective product, they create unintended side-effects and always come at a cost.

	prefrice	prefpoul	preffish
■ total dom. consumption	0%	0%	0%
■ total investment	-1%	-1%	1%
■ imports	-2%	-2%	-1%
■ exports	-1%	-1%	-3%

Effects on household income, % change compared to the reference scenario

Source: Author's calculations based on simulation results.

5.   Policy implications

Interventions that shift preferences towards domestic products can be used to achieve import substitution. We can conclude that these instruments are fit for decreasing imports and increasing domestic production of the targeted product, but they come at costs to the economy and various actors. Such cost may comprise

  i)   decrease in household income, increase of domestic prices and therefore decrease in households' purchasing power,

  ii)   decrease of domestic production of other products and

  iii)   decrease of exports, as well as

  iv)   a decrease in GDP.

Policy-makers need to be aware of all the related costs and must decide on this basis whether the political goal of lower import dependency for the products in question is worth it. Our analysis did not account for costs of a campaign promoting domestic products. For campaigns of this sort, there are a multitude of ways for designing them, linked to different costs and efficacy. Combining several instruments into policy bundles can cushion negative side-effects of the preference shifts. For instance, including instruments that make production more efficient and cheaper, e.g., through production increases (economies of scale), or additional investments or subsidies that counteract the decrease in GDP.

We recommend a precise cost-benefit analysis for the specific instruments and campaigns before their implementation. For a campaign promoting domestic products, this would include the costs of the separate components of the campaign and the expected size of the effect it has on domestic consumers and producers demanding the products in question as intermediate goods. The analysis should also include a CGE-analysis on what these sought-after preference changes mean for the overall economy, especially if preference changes in several different products are targeted. Also, a campaign does not necessarily need to target only preference shifts from an imported commodity to its domestically grown counterpart, but could also target shifting from a predominantly imported crop to another predominantly domestically grown crop (e.g., farine de manioc, cassava, millet, sorghum).

The cost-efficiency of the campaign should then also be compared to those of other instruments, e.g. the increase of import tariffs or increasing domestic production directly by improving productivity through extension services, irrigation, soil conservation, pest and disease control etc.
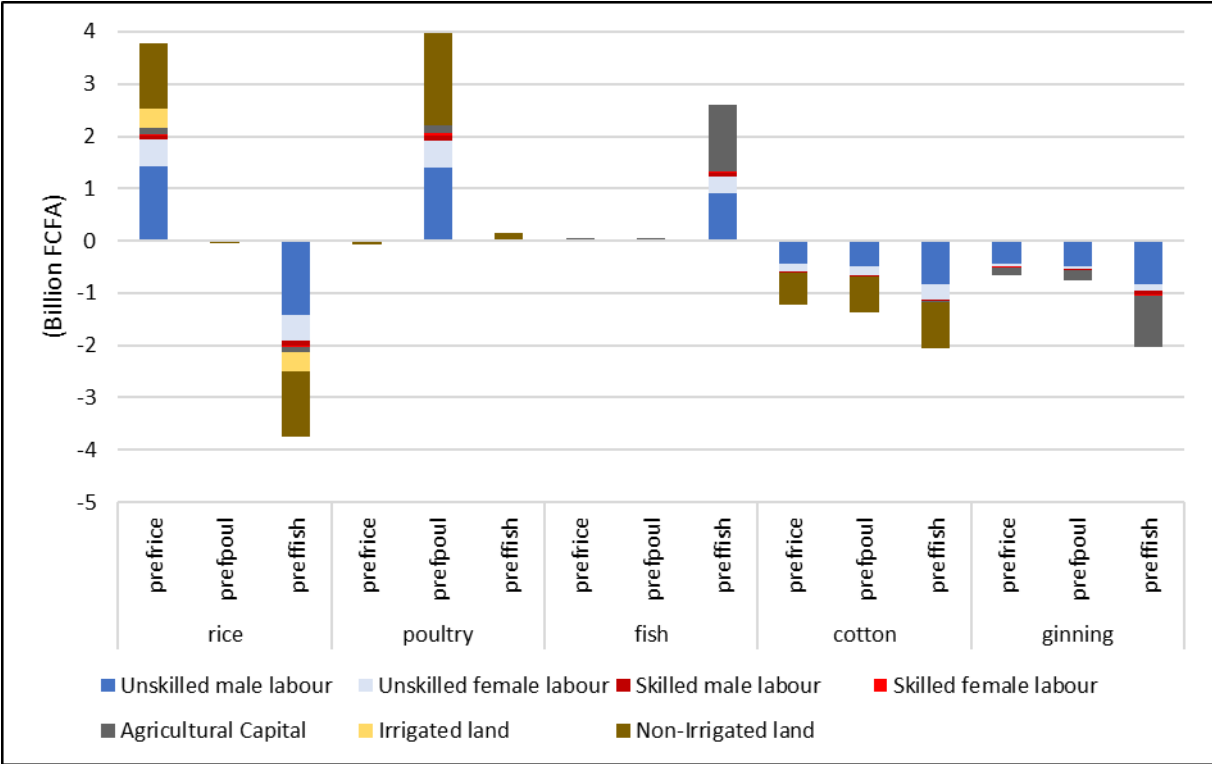
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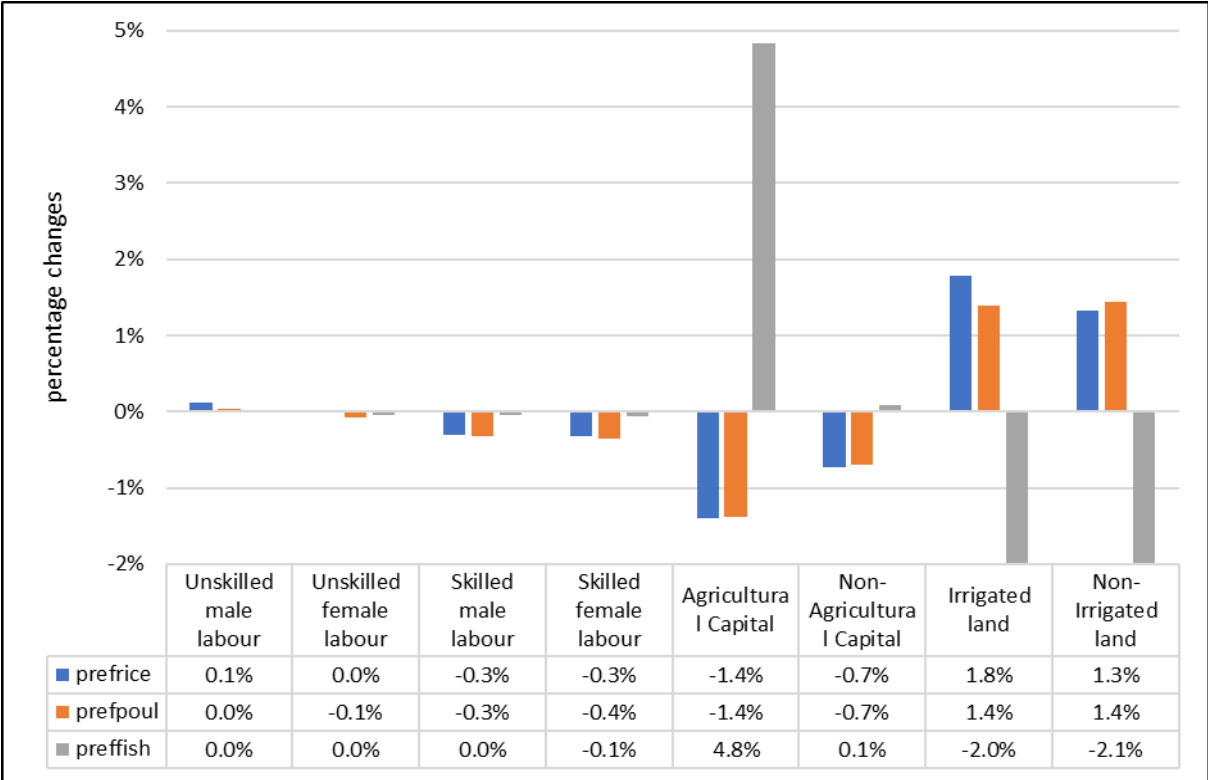
Appendix A: Real, absolute changes in factor demand (Billion FCFA)

Source: Author's calculations based on simulation results.

Preference shift towards domestic products in Benin

	Unskilled male labour	Unskilled female labour	Skilled male labour	Skilled female labour	Agricultural Capital	Non-Agricultural Capital	Irrigated land	Non-Irrigated land
■ prefrice	0.1%	0.0%	-0.3%	-0.3%	-1.4%	-0.7%	1.8%	1.3%
■ prefpoul	0.0%	-0.1%	-0.3%	-0.4%	-1.4%	-0.7%	1.4%	1.4%
■ preffish	0.0%	0.0%	0.0%	-0.1%	4.8%	0.1%	-2.0%	-2.1%

Appendix B: Percentage changes in factor income

Source: Author's calculations based on simulation results.

Appendix C: Percentage changes in domestic prices
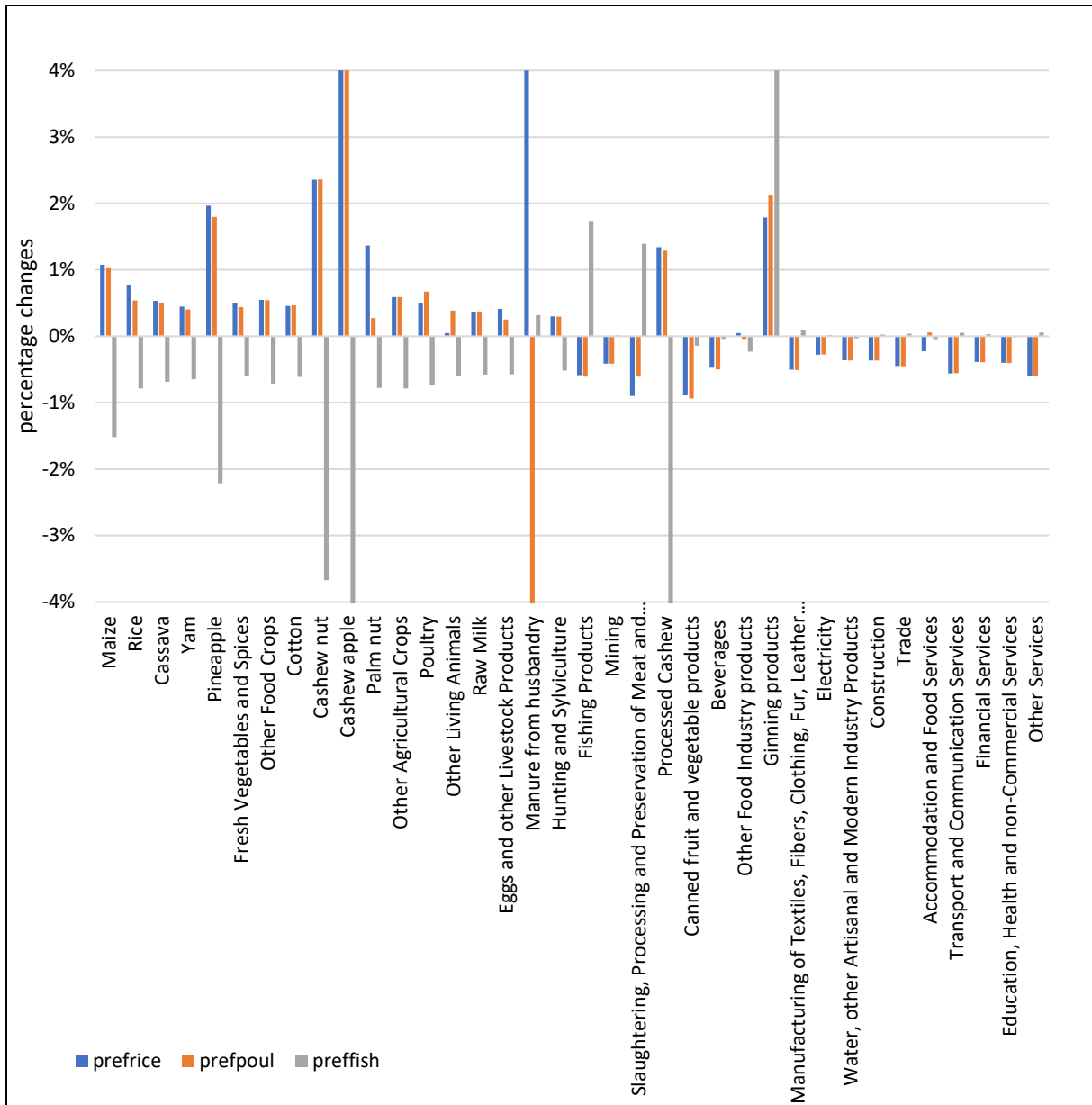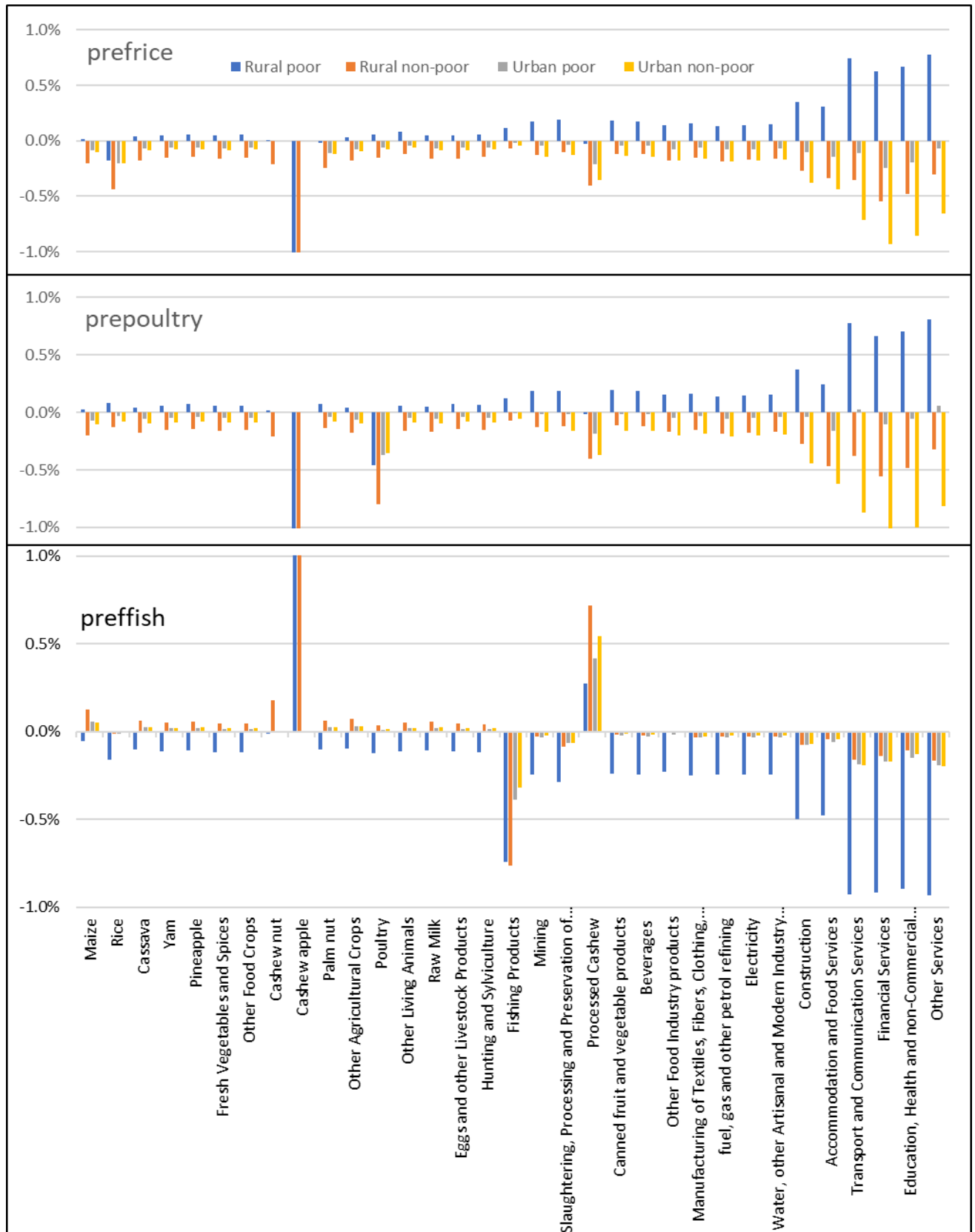
Source: Author's calculations based on simulation results.

Preference shift towards domestic products in Benin

Appendix D: Percentage changes in household consumption

Source: Author's calculations based on simulation results.

Appendix E: Real absolute changes in macro-economic indicators (Billion FCFA)

	base	prefrice	prefpoul	preffisch	preftot
imports	302	297	297	300	289
Δ imports		-5	-5	-2	-13
exports	249	246	246	242	237
Δ exports		-3	-3	-7	-12
net imports	53	51	51	58	52
Δ net imports		-2	-2	5	-1

Source: Author's calculations based on simulation results.