Research article

Macroeconomic and distributional impacts of exchange rate devaluation in Ethiopia: A computable general equilibrium approach

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ARTICLE INFO

ABSTRACT

In this paper, we simulate the macroeconomic and distributional impacts of exchange rate devaluation in Ethiopia using a dynamic single country Computable General Equilibrium model. We find that although devaluation helps exports to be more competitive in the short term, thereby increasing export earnings, over the long term the policy is found to have a contractionary and inflationary impact in a developing country like Ethiopia. It also comes at the cost of a reduction in household welfare and investment. In terms of distributional impact, the policy simulation result suggests that devaluation disproportionately affects urban households than rural households in Ethiopia given the nature of their consumption basket.

1. Introduction

In this paper, we seek to contribute to the current debate around currency devaluation in Ethiopia by employing a recursive dynamic Computable General Equilibrium (CGE) model and simulating the impacts of exchange rate devaluation and an increase in key interest rate. Ethiopia's exchange rate devaluation of October 2017 was accompanied by an increase in interest rate which the central bank suggested will tackle the inflationary pressure of the devaluation. The insights from this exercise could inform policymakers and economists in developing countries on potential implications of exchange rate devaluation and related monetary policy decisions.

According to the latest World Development Indicators (World Bank Group, 2019), Ethiopia's economy has been growing at an average rate of 9.8% between 2000 and 2018, thanks to massive public expenditure in infrastructure. International Monetary Fund (IMF) projects that the economy will continue to grow at an average annual rate of 7.2% between 2019 and 2024 (IMF-WEO, 2019). However, the economy still faces risks related to financing constraints on private sector development, sluggish export growth, slow implementation of revenue mobilization reforms, potential deterioration of quality of bank assets amid rapid credit growth and higher pace in acquisition of external liabilities (IMF, 2016).

The IMF's 2016 country report, highlighted that Ethiopia's currency is overvalued by 20–40%, posing risks on competitiveness and export promotion. It has been advocating for reducing the significant real exchange rate misalignment that is key to entry into new products and markets (IMF, 2016). The World Bank has also been calling for similar measures, arguing that Ethiopia's real exchange rate is overvalued by about 31% (World Bank Group, 2014). In its 2018 country report, the IMF also estimates that the level of overvaluation remains around 12–18%, due to recent developments since 2017 that includes devaluation (IMF, 2018). IMF is strengthening its call for the central bank to adopt a more flexible exchange rate that will reduce misalignments and foreign exchange shortages, enhance competitiveness, and allow the central bank to rebuild international reserves.

Trade statistics shows that the share of export of goods and services in total GDP in Ethiopia has been on a downward trend since 2013, declining to 8% in 2016 from 12.5% (World Bank Group, 2017b), indicating the falling export earnings of the country. In its economic update on Ethiopia, the World Bank indicated that goods and services exports are exhibiting their poorest performance in a decade due to declining international prices (World Bank Group, 2014). For the World Bank, maintaining a competitive exchange rate is a key factor for external competitiveness, especially since Ethiopia's major exports are mainly primary products that compete more on their price than their quality.

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Despite an impressive GDP growth performance in the past decade that surpassed the Sub-Saharan average and other economies in the region, data shows that Ethiopia's current account deficit as a share of GDP remains high. For example, the economy has recorded an average growth rate of 10% between 2009 and 2018 while the current account deficit as a share of GDP has deteriorated (see Table 1). Compared to neighboring countries such as Sudan and Kenya, Ethiopia's current account deficit relative to its GDP remains high, although there was a sign of improvement in 2017. As Table 1 shows, Ethiopia's share of exports to GDP remains smaller relative to its peers, while the size of imports is relatively larger.

In late 2017, Ethiopia's National Bank announced a devaluation in the country's currency (birr) by 15% amid sluggish export earnings. The Central bank also raised its key saving interest rate from 5% to 7% as part of the policy changes. The latter was aimed at tackling inflation and encouraging domestic savings.

The central bank's 2017 move to devalue the local currency against the US Dollar could indicate that central bank policy makers believe Ethiopia's currency is overvalued and the only way to boost exports is through devaluation. The policy measure, however, did not receive positive reaction from local economists and the public, suggesting that devaluation at this time is simply "the cart before the horse" and will have adverse consequences on the economy, benefiting a few domestic and foreign firms that have commanding control on the economy (see, for example, Bonsa, 2017; Geda, 2017).

The argument is that devaluation is not likely to reduce Ethiopia's external deficit, rather leads to economic contraction and inflation (Geda, 2017). Theoretically, devaluation is expected to address the problem of external deficits as it raises the price of tradeable goods (exports, imports, and close substitutes), thereby encouraging production of these goods, while reducing the demand for them (Minot, 1998).

There are several empirical studies on the sources of inflation in Ethiopia. For instance, Ayalew (2007) indicated that inflation in Ethiopia is explained by real GDP growth, money stock, foreign prices and exchange rates. Biresaw (2013) also found causality between inflation and exchange rate devaluation. Durevall et al. (2013) also asserted that movements in international prices determined the long-run evolution of domestic prices in Ethiopia. This may be the rationale behind the central bank's decision to simultaneously devalue the currency and increase the saving interest rate so that it can mitigate any potential inflationary pressure due to the exchange rate policy.

In terms of export and exchange rate polices in developing countries, previous empirical studies have also indicated a strong relationship between exchange rate policy changes and export performance. Wondimu and Potts (2016), in their study on impact of exchange rate changes on export performance in Ethiopia and Tanzania, showed that the difference

in real exchange rate policies is the key factor that explains why Ethiopia and Tanzania have different export performances. The authors argued that Tanzania has maintained an undervalued real exchange rate for an extended period and, as a result, performs better in terms of export supply and diversification compared to Ethiopia. A study by the World Bank also indicated that a 10% decrease in real exchange rate could result in an increase in export growth by more than 5 percentage points per year, which translates into 2-percentage point increase in economic growth in Ethiopia (World Bank Group, 2014). The World Bank, however, suggested that any changes in the exchange rate might need to be accompanied by additional macroeconomic policy changes to minimize its pressure on inflation, which again signals why Ethiopia's central bank raised the saving interest rate in conjunction with the devaluation.

Empirical studies have also shown a significant positive impact of devaluation on real output growth (see for instance World Bank Group, 2014). Some argue that devaluation could have a contractionary effect, depending on the size of the amount of debt denominated in foreign currency. For instance, Sicouri and Saibene (2012) found that devaluation could be contractionary for countries with a large amount of debt denominated in foreign currency, while devaluations are expansionary for those countries whose debt is denominated in their own currency, other determinants being equal. The authors also highlighted that devaluation could lead to a contractionary effect for developing countries through an increase in costs, because most of their intermediate goods are denominated in foreign currency.

Cognizant of the above facts, this paper seeks to provide insights on key macroeconomic questions and potential impacts of devaluation in Ethiopia.

The remainder of the paper is organized as follows. Section two provides a brief overview of the model and methodology. In section three, we present results on key macroeconomic and distributional impacts. Section four is devoted to the conclusion and policy implications.

2. Data and modelling approach

2.1. Description of the model

Changes in the exchange rate affects the entire economy including the profitability of businesses and the purchasing power of consumers. It therefore changes the wellbeing of the people in rural and urban areas and those who earn high income as well as poor households. Hence, to capture the macroeconomic, sectoral and distributional effects of currency devaluation in Ethiopia, an analytical framework that captures the different interlinkages between the agents of the economy is required. An economy-wide Computable General Equilibrium (CGE) model provides these features. It depicts the detailed structure of an economy (depending

Table 1. Key macroeconomic characteristics of Ethiopia compared to selected neighboring countries.

Series Name	2015				2016				2017				2018			
	ETH	SDN	EGY	KEN	ETH	SDN	EGY	KEN	ETH	SDN	EGY	KEN	ETH	SDN	EGY	KEN
GDP growth (annual %)	10.4	4.9	4.4	5.7	9.4	4.7	4.3	5.9	9.5	4.3	4.2	4.9	6.8	-2.3	5.3	6.3
GDP per capita growth (annual %)	7.4	2.4	2.1	3.1	6.5	2.2	2.1	3.3	6.6	1.8	2.0	2.4	4.0	-4.6	3.2	3.9
Current account balance (% of GDP)	-11.7	-5.6	-5.2	-6.7	-11.1	-4.4	-6.2	-5.3	-6.8	-3.7	-3.4	-6.4	..	-11.5	..	..
Trade (% of GDP)	39.7	19.1	34.8	44.2	34.9	22.4	30.2	37.6	31.1	21.5	45.1	37.5	31.2	22.6	48.3	36.2
Official exchange rate (LCU per US$, period average)	20.6	6.0	7.7	98.2	21.7	6.2	10.0	101.5	23.9	6.7	17.8	103.4	27.4	..	17.8	101.3
Price level ratio of PPP conversion factor (GDP) to market exchange rate	0.4	0.5	0.3	0.4	0.4	0.5	0.3	0.5	0.4	0.6	0.2	0.5	0.4	0.2	0.2	0.5
Agriculture, forestry, and fishing, value added (% of GDP)	36.1	31.4	11.4	30.2	34.6	31.2	11.8	31.1	33.7	30.5	11.5	34.8	31.1	31.5	11.2	34.2
Services, value added (% of GDP)	39.5	46.4	53.2	46.2	36.7	46.5	54.5	45.2	36.6	46.8	53.0	42.0	36.5	49.5	51.4	42.7
Industry (including construction), value added (% of GDP)	16.3	2.1	36.6	17.3	21.9	2.3	32.5	17.9	23.6	2.3	33.8	16.8	27.3	2.4	35.1	16.4
Exports of goods and services (% of GDP)	9.4	8.2	13.2	16.6	7.8	9.8	10.3	14.3	7.6	9.7	15.8	13.3	8.4	10.2	18.9	13.2
Imports of goods and services (% of GDP)	30.3	10.9	21.7	27.6	27.1	12.5	19.9	23.3	23.5	11.8	29.3	24.2	22.8	12.3	29.4	23.0

Source: World Bank Group (2019).
Note: ".." indicates missing data.

on how detailed the available data are) including all the commodities' production and demand (domestic and foreign; private and public) and their producers and consumers in the economy. It also includes the different institutions in an economy, such as government, households, firms, the world economy, as well as the transactions taking place between those economic agents.

Another feature that is required for such analysis is the ability to track the impact of exchange rate policy changes over time. Accordingly, a recursive dynamic CGE model is used in this study (Diao and Thurlow, 2012). The dynamic modelling framework captures the evolution of the economy by connecting several solutions of a standard static CGE model solving to achieve the equilibrium of the economy in one period (a year). The number of these solutions applied in this study are 15, starting in 2010 (the year for which the SAM is developed) and ending in 2025. This "between-period component" reflects the evolution of the economy through time by updating selected variables in the model, such as accumulation of capital, supply of labour, availability of agricultural land and livestock, and the technical progress of each sector. This would help imitate the likeliest trend of economic development and sectoral growth.

Similar to standard static CGE models, the dynamic CGE model specifies production by sector that — after deduction of commodity exports and the addition of commodity imports — makes up the supply of goods and services within the domestic economy. The decision of the producer to sell in the domestic or export markets depends on the relative prices of each commodity domestically and abroad. The transformation between these two markets is depicted using a Constant Elasticity of Transformation (CET) function.

Ethiopian producers are assumed to be free in choosing whether to sell domestically or abroad, however, they are also assumed to be price takers in output and input markets and that their profit maximization is subject to constant returns to scale technologies. Producers seek to maximize their profits by minimizing the cost of production. They determine their demand for aggregate primary factors (labor, land and capital) against the demand for aggregate intermediate input mix following a Constant Elasticity of Substitution (CES) function. Within the value-added nest (primary factors aggregate), they employ different primary factors based on a CES function, while determining intermediate input demand by commodity using a Leontief function.

Non-agricultural labour, land and livestock factors are assumed fully employed and mobile, while agricultural labour is assumed fully employed, but activity-specific to depict the prevailing rigidity in their movement out of agriculture. Capital accumulation is modelled assuming a "putty-clay" formulation. This implies that new investment is allocated across sectors according to rate of return differentials. However as soon as it is installed, equipment remains immobile (Diao and Thurlow, 2012). Income from production factors is the main source of household income. After receiving their factor and transfer incomes, households pay for consumption of goods and services, which is distributed across commodities according to a linear expenditure system (LES) specification, and they pay taxes and save according to their respective saving propensities.

Since Ethiopia is a small open economy, it faces perfectly elastic world demand curves for its exports at fixed world prices and an infinitely elastic world supply at fixed world prices for its imports. Imported goods are considered imperfect substitutes to domestically produced goods in both final and intermediate demand. The amount demanded from each is therefore determined by the utility and profit-maximizing decisions of domestic agents (consumers and producers, respectively), based on the relative tax-inclusive prices of imports and domestic goods.

The economic environment chosen in the model consists of three major balances, namely, the internal balance, the saving-investment balance and the external balance. For the internal balance, government savings are assumed flexible while the direct tax rates are fixed to avoid increasing taxes on domestic institutions. A fixed absolute share of investment in total absorption and uniform changes in the saving rates, as depicted by marginal propensity to save, characterize the saving-

investment balance. Savings rates, therefore, adjust to assure financing investments. To simulate currency devaluation in Ethiopia, the model assumes that the exchange rate is fixed while the foreign savings are flexible. The model also assumes that primary factors of production are fully employed and mobile across sectors except agricultural labour and capital which (although fully employed), are activity-specific. For agricultural labour, this assuption depicts the prevailing rigidity in their movement out of agriculture, while for capital it is to limit the possibility of moving activity specific capital (e.g. machinery) to other sectors.

2.2. Description of the database

The recursive dynamic CGE model of the study is calibrated to a 2010 Social Accounting Matrix (SAM) for Ethiopia (EDRI, 2010; Ahmed et al., 2017a,b). The SAM for Ethiopia, which injects Ethiopia's data in the model, contains 16 primary factors including capital, four agricultural lands representing land in four different regions (highlands cereals, humid lowlands, drought prone, and pasture), four livestock factors representing the same regions of land, and seven labour categories. The labour categories include three non-agricultural labour classified by skills (skilled, semi-skilled and unskilled) and four agricultural labour categories reflecting the previously mentioned regions (see Figure 1).

The 2010 SAM for Ethiopia (EDRI, 2010) includes 12 household groups comprising households residing in rural and urban areas. Urban households are either poor or non-poor; rural households are classified as farming and non-farming households, with each group divided to poor and non-poor (Figure 2).

The farming households are additionally classified according to the previously mentioned regions (highlands cereals, humid lowlands, drought prone, and pasture). The initial income of the different household groups as reported in the SAM (EDRI, 2010) is provided in Table 2 below.

Government income consists of revenue from taxes (direct and indirect) and net transfers from the rest of the world. This income is spent on government consumption expenditure and transfers to households, which together leave the Ethiopian government in a surplus (government savings). National savings in the model consist of savings from the three different institutions, namely, households, government, and the rest of the world. These total savings are used to finance investment in the model.

2.3. Description of data for the dynamics

Prior to the implementation of the devaluation scenarios on the CGE model, we established a baseline for the model that reflects the development of the Ethiopian economy until 2025. We applied the likeliest paths of growth for the external variables with data from different sources including GDP, population, labour force and government consumption spending.

We obtained data on GDP growth rates until 2022 from the International Monetary Fund's World Economic Outlook Database (IMF-WEO, 2019). From 2022 onwards, we assumed that GDP would remain flat to its 2022 growth rate. We depicted national GDP growth rates in the CGE model using total factor productivity (TFP) of the individual sectors included in the SAM, while preserving the structure of the economy with respect to aggregated shares of agriculture, industry and services in the national GDP until 2016, as reported by the World Bank Group (2017b). From 2016 to the end of the simulation period (2025), we sustained 2016's sectoral (agriculture, industry and services) contribution to the GDP.

For population and labour force growth, we used the World Bank Group (2017a) data, which shows the population of Ethiopia growing by an average of 2.5% between 2010 and 2025. For government consumption spending, we used data from IMF-WEO (2019), which suggest an average growth rate of 9.3% between 2011 and 2022. Afterwards, we preserved a 10% growth rate until 2025.
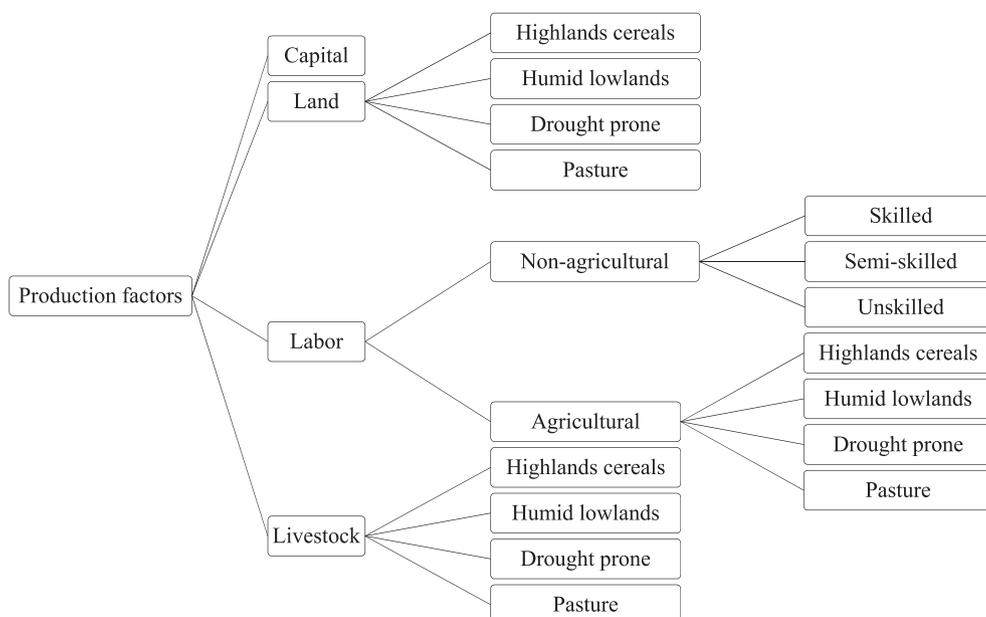
Figure 1. Production factors included in the SAM and model for Ethiopia. Source: Authors' compilation.
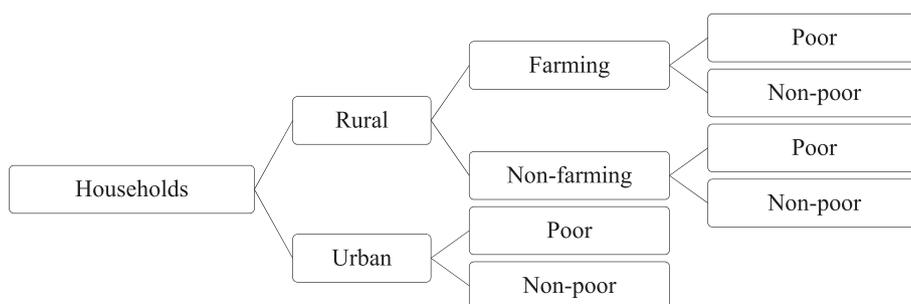

Figure 2. Households included in the SAM and model for Ethiopia. Source: Authors' compilation.

Table 2. Classification of household groups in the SAM and their initial income (billion Birr and percentage).

Household groups				Individual household income (billion Birr)	Share in total household income (%)
Rural	Farming	Highlands cereals	Poor	32.9	7.9
			Non-poor	122.4	29.4
		Humid lowlands	Poor	17.5	4.2
			Non-poor	47.7	11.4
		Drought prone	Poor	20.1	4.8
			Non-poor	45.7	11.0
		Pasture	Poor	4.2	1.0
			Non-poor	21.8	5.2
	Non-farming		Poor	7.7	1.9
			Non-poor	53.3	12.8
Urban			Poor	4.3	1.0
			Non-poor	39.6	9.5
All households aggregated				417.0	100.0

Source: EDRI (2010).

2.4. Implementation of the policy simulation

After establishing the baseline from 2011 to 2025, the devaluation scenario is implemented, and results are compared against the baseline. As the Ethiopian central bank devalued the currency by 15% in late 2017, we implemented this shock at once in 2017 together with a 2% increase in the rate of savings to reflect the government intervention in the saving interest rate.[1] The following section reports the results of this scenario in comparison to the baseline and describes the national and sectoral development of the economy under this scenario.

3. Results and discussion

In this section, we present results on trade, key macroeconomic indicators and income distribution caused by the simulated policy changes.

3.1. Impact on export and import

As discussed earlier, the overall objective of the devaluation is to encourage exports and thereby enhance the sluggish growth in export earnings. Figure 3 depicts the impacts on export earnings and import spending.

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[1] A brief technical description of the model equations and the exchange rate variable is provided in the supplementary material.
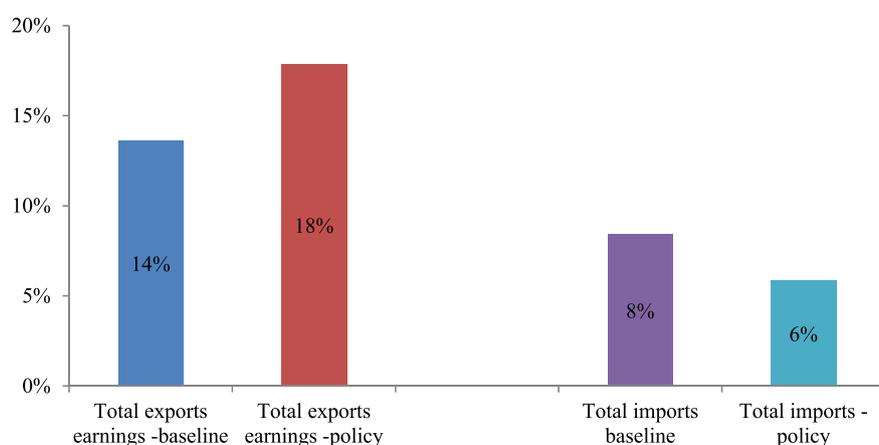
Figure 3. Average Annual Growth in Value of Total Exports and Imports (2017–2025). Source: CGE model for Ethiopia.

Under the status quo (with no exchange rate and monetary policy changes), export earnings continue to grow at an annual average rate of 14%. Following the policy changes, the modelling result shows that export earnings grow at annual rate of 18%. Therefore, the policy impact on export earnings is around 4% per year. Growth in imports, as expected, declines under the policy changes. Value of total imports grows at 6% annual rate with the devaluation, which is 2% lower than what it would have been under no policy change scenario. For context, we also present the annual evolution of real exports and imports under the base case and policy scenarios and presented in Figure 4 below.

The results show that Ethiopia's trade balance does not improve following the devaluation. While export earnings increase, import prices also increase. This means that due to the high dependence on imports, the increase in export earnings will not offset the reduction in the demand for imports resulting from the import price increases. The net impact would likely rest on the famous Marshal-Lerner condition, which stipulates that impact of exchange rate devaluation depends on export and import elasticities of demand. In an import dependent developing country like Ethiopia, which has no ability for a domestic substitute to many goods and whose exports are mainly non-processed primary agricultural goods, the Marshal-Lerner condition may not hold true at least in the short run. Empirical evidence supports this assertion. For instance, Mengistu and Jin-Sang (2014) in their study in Asia found no strong evidence on positive impact of devaluation on trade balance especially for those small countries with very strong demand for imported necessities and inelastic foreign demand for most of their exports. They concluded that with relatively inelastic demand for exports and imports, currency devaluation

has little or no impact in improving trade balance. Similarly, Geda (2017) argues that about 70% of Ethiopia's imports are capital, intermediate goods and petroleum products, which have to be imported regardless of their price. This may explain why devaluation does not improve trade balance but rather leads to inflation.

Although Ethiopia's participation to the global-value chain is very limited (as the bulk of exports are primary agricultural product without significant volume of imported input), it is important to recognize the role of the growing complex global value chain in export elasticities. This is particularly important given the growing manufacturing sector in Ethiopia. The implications of global value chain on export performance is well documented in the literature (see for instance, Amiti et al., 2014; Ahmed et al., 2017a,b; Leigh et al., 2017; de Soyres et al., 2018). de Soyres et al. (2018) analyzed the impacts of global value-chain on export elasticities and provided evidence showing how global value-chain participation can affect the exchange rate pass-through to export prices and export volumes. Ahmed et al. (2017a,b) also asserted the elasticity of real manufacturing exports to the real effective exchange rate has decreased over time due to the formation of global value-chain. However, Leigh et al. (2017) argues that since the bulk of world trade is still comprised of conventional trade, there is no strong evidence to suggest a disconnect between exchange rates and exports and imports.

Although the magnitude of the annual growth rate could change under different assumptions, the directions found in this study are consistent with past studies on exchange rate policy changes and export performance. For example, World Bank Group (2014) found that a 10% decrease in real exchange rate could boost export growth by 5% per year.
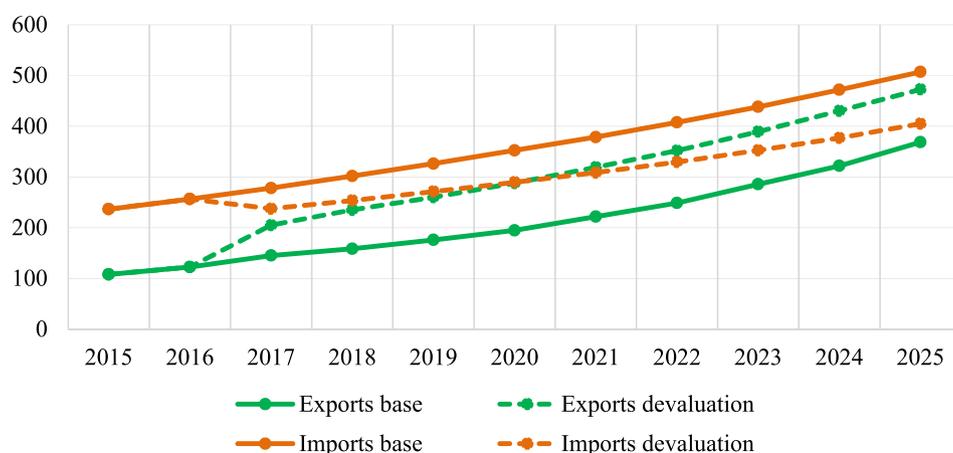

Figure 4. Real values (discounted by 5% annually) of exports and imports under the base and devaluation scenarios (2015–2025). Source: CGE model for Ethiopia.

Table 3. Changes in export quantity of selected commodities (percentage) (2017–2025).

Commodity	Baseline	Policy	Difference
Pulses	4.8	11.8	7.0
Oil seeds	4.2	11.5	7.4
Vegetables	4.3	15.7	11.5
Fruits	4.3	11.6	7.3
Khat	3.0	13.3	10.3
Coffee	2.3	14.4	12.1
Flowers	4.2	10.8	6.6
Cattles	4.7	10.3	5.6
Poultry	4.9	10.5	5.6
Tea	8.3	12.3	4.1
Textile	16.5	20.3	3.8
Leather products	8.3	21.0	12.7
Clothing	17.4	18.2	0.8

Source: CGE model for Ethiopia.

In terms of impact on the actual quantity of exports, the policy has a relatively more positive impact on traditional export goods such as coffee, khat, and leather products (see Table 3). Cut flower, which is an emerging export commodity, sees an increase in exports under the policy although at a lower rate compared to the traditional exports. This may reflect the current dynamics of the sector. A World Bank Group assessment of the sector indicated that entry rates to the main export destinations of Ethiopian cut flowers is declining while at the same time exit rates are increasing (World Bank Group, 2014). The study also highlighted key structural constraints related to packaging, standardization and logistics that may hinder export growth despite having a competitive exchange rate.

3.2. Impact on prices

One of the arguments against devaluation in Ethiopia at this point is the tendency of the policy to increase domestic prices of imports and thus aggravating inflation problem the country is facing (see, Geda, 2017). For context, the inflation rate before the devaluation in September 2017 was around 10.8%, according to a report from the country's Statistics Agency (Central Statistical Agency, 2019). In this paper, we attempted to look at the magnitude of the increase in import prices by commodity. The results are shown in Figure 5 for selected commodities.
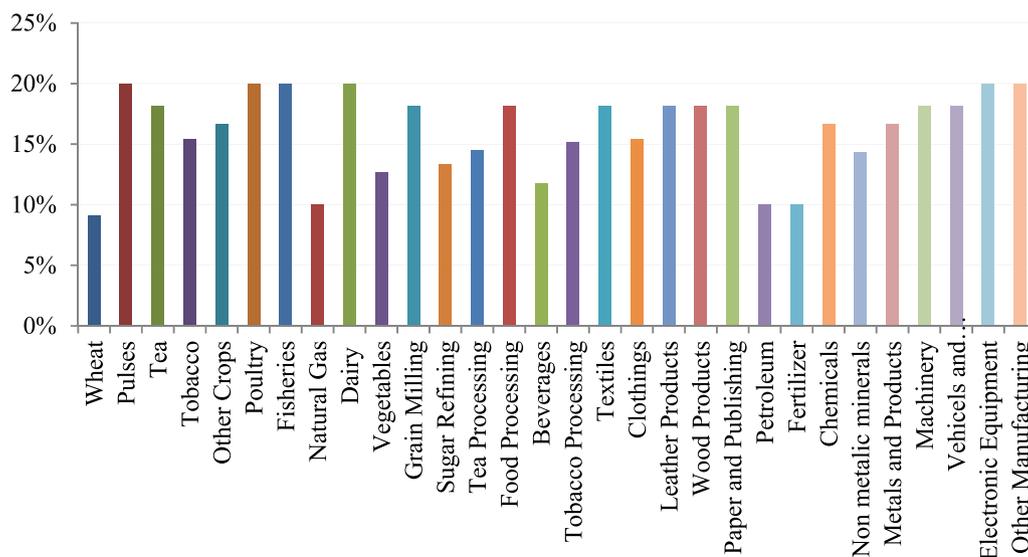
As expected, the exchange rate devaluation has an upward pressure on import prices, ranging from an average annual increase of 10%–20%. For example, prices for metals and related products, which support the booming construction industry in the country and are primarily imported, exhibit a 14%–20% increase in prices.

Although it is too early to evaluate inflationary impacts of the policy, published data supports the finding that there are signs of post policy inflationary pressure in the country. Compared to November 2016, the country-level overall inflation rate (annual change based on a 12-month moving average) increased by 9.4% in November 2017 (Central Statistical Agency, 2019). The inflation rate in November 2018 was around 14.4% compared to a similar month a year ago. Inflation strengthened further in November 2019 reaching 20.8% year over year.

3.3. Overall economic impact

The overall objective of the 2017 exchange rate announcement was to boost exports and thereby enhance output growth and prosperity. As discussed at the beginning of this paper, economic theory suggests that devaluation has a positive effect on current account and expansionary effect on GDP. Figure 6 shows the impact of devaluation on selected macroeconomic indicators between 2017 and 2025. The simulation results show that devaluation likely has contractionary effects on real GDP, investment, government and private consumptions as well as total absorptions.

In Figures 7 and 8 below, the evolution of real GDP, private consumption, and total absorption on a year by year basis are presented. The results indicate that the size of the macroeconomic variables continue to grow but their size is smaller under devaluation compared to the business as usual case.

The macro-level results are not surprising given most of Ethiopia's external debt is denominated in foreign currency and is also consistent with earlier findings on developing countries with similar external debt portfolios and current account situations. For instance, Sicouri and Saibene (2012) documented that contractionary effects are visible if the country experiences a trade deficit initially, which is the case for Ethiopia. Siddig (2012) reports similar findings on their assessment of the implications of currency devaluation on the Sudanese economy. The domestic currency cost of imported intermediate and final goods, which are denominated in foreign currency could also explain the contractionary effects of the policy. Ethiopia's dependence on imports and lack of domestic substitution at least over the short run would likely lead to an increase in costs to businesses and increased prices to consumers.
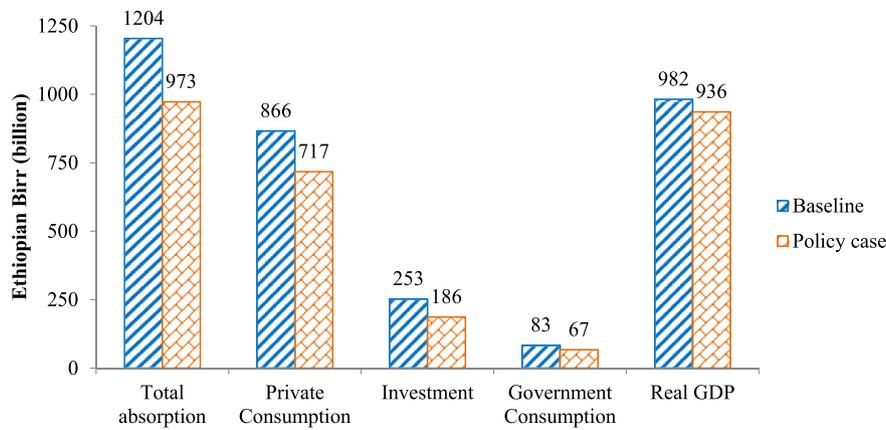

Figure 5. Import Price Changes by Commodity (average annual growth, 2017–2025). Source: CGE model for Ethiopia.

Figure 6. Impact on Real Macroeconomic Indicators discounted by 5% annually (average 2017–2025). Source: CGE model for Ethiopia.
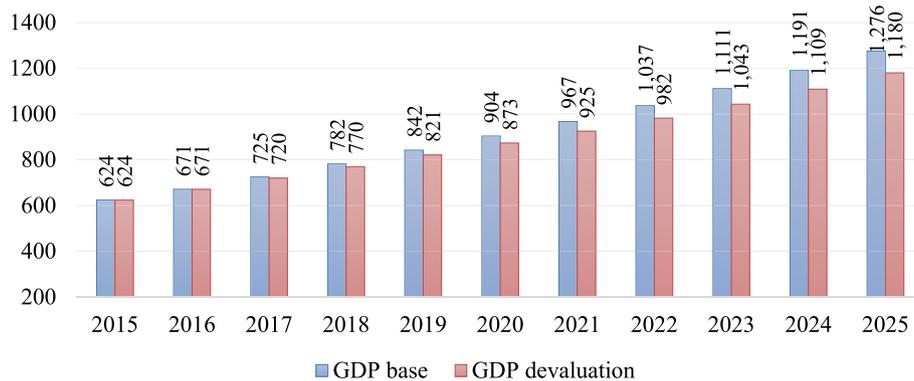

Figure 7. Real GDP values (discounted by 5% annually) under the base and devaluation scenarios (2015–2025). Source: CGE model for Ethiopia.
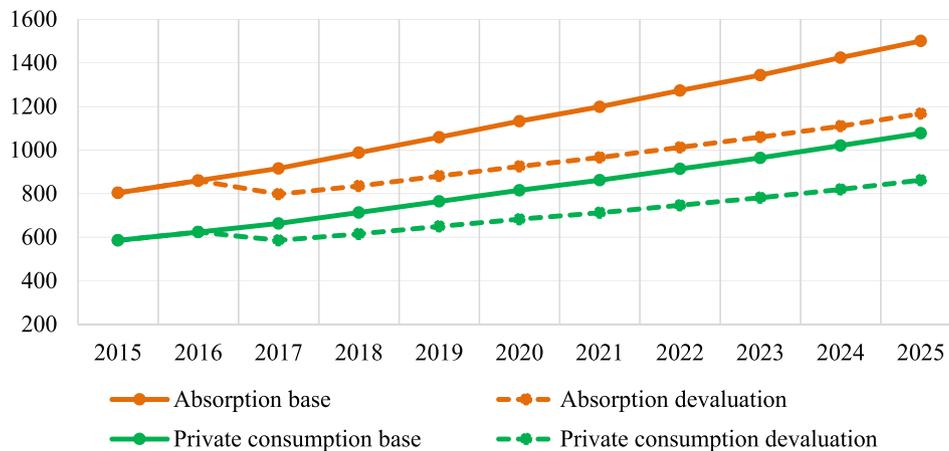

Figure 8. Real values (discounted by 5% annually) of absorption and private consumption under the base and devaluation scenarios (2015–2025). Source: CGE model for Ethiopia.

3.4. Distributional impacts

In addition to the overall macroeconomic impacts, a key question in policy analysis is who would bear the cost of the policy the most and who would gain the most from the policy change? The macroeconomic impact indicates that household consumption is likely to contract under the currency devaluation and interest rate policies. The CGE model provides impacts across different household groups and geography. Figure 9 below depicts average annual growth in household real consumption for different household groups during the period between 2017 and 2025.

As the simulation results show, under the baseline scenario, household consumption grows by an annual average rate of 5.3% between 2017 and 2025. The introduction of the policy lowers household consumption by 1.8% relative to the baseline. The largest decline in household consumption is observed among urban households relative to rural households. This reinforces the fact that imported goods constitute larger share of urban households' consumption basket and the lack of cheaper alternatives of domestically produced goods. Among the urban households, the policy hits non-poor households the hardest in terms of welfare. This may be because there is a tendency for urban non-poor
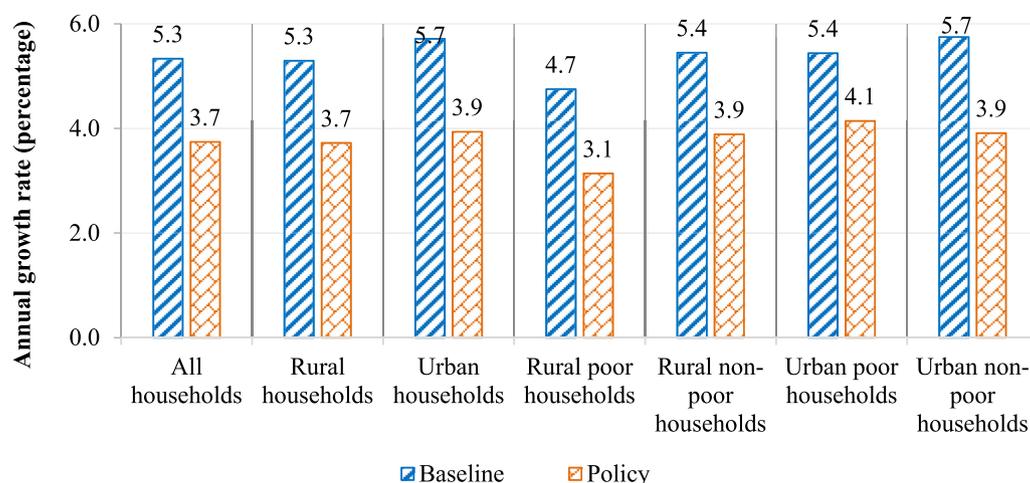
Figure 9. Average Annual Growth in Household Real Consumption (2017–2025). Source: CGE model for Ethiopia.

households to spend relatively more on tradeable and imported non-food products whose price is significantly affected by devaluation. Rural households that are mainly engaged in farming activities are less affected given the nature of their consumption basket. They are also likely the ones who earn income from agricultural exports offsetting adverse impacts of increase in import prices.

The research findings are also consistent with other studies on devaluation and household impacts. For instance, Kelly et al. (1995) investigated the impact of devaluation on Senegalese households and concluded that devaluations disproportionately affect urban households the most because they consume large quantities of imported goods while not benefitting from export earnings.

Minot (1998) also examined distributional impacts of devaluation on Rwandan households using a non-CGE framework. The author found that devaluation has an adverse welfare impact for urban households, more than three times than for rural households. To put this into context, the author estimates showed that the price impact of devaluation is equivalent to a 3% reduction in the income of rural households and a 10% decline in the income of urban households. In terms of households' poverty status, the reduction in income is two times higher for the richest 20% of households relative to the poorest 20%. The study also found that households that are primarily engaged in farming are least impacted by devaluation, which is consistent with our findings for Ethiopia.

Some other researchers found a contrasting result on the distributional effect of exchange rate polices. For example, Kraay (2007) examined the welfare effects of a large depreciation in Egypt and found that exchange rate-induced changes in consumer prices disproportionately affect the welfare of poor households. This is because the estimated pass-through was significantly greater for food items relative to non-food items.

4. Conclusion and policy implications

This paper attempts to contribute to the current debate on the effectiveness of exchange rate devaluation in Ethiopia. The CGE simulation of the latest exchange rate devaluation and accompanying interest rate hike shows that although exports of certain commodities increase, the policy raises prices of imported goods and will likely have a contractionary effect on key macroeconomic indicators. In terms of distributional impacts, the analysis reinforces the conventional wisdom that households that spend most of their budget share on tradeable and imported goods would bear the policy cost the most. The policy especially hits the urban non-poor group harder than those living in rural areas. Although the model results may not be taken as definitive estimates, they should at least indicate the overall magnitude of the effects of recent policy changes taken by the National Bank of Ethiopia.

The results may imply that for Ethiopia's economy to respond to exchange rate policy changes and achieve the intended outcome, policy makers should at the same time focus on vital structural and institutional reforms including improving economic freedom.[2] The country is considered as one of the least free countries on the economic freedom index, which measures the size of government, regulation, legal system and property rights, sound money and freedom to trade internationally (The Fraser Institute, 2017). Hence, donor agencies including the World Bank (see World Bank Group, 2014) have been recommending that a competitive real exchange rate must be accompanied by easing of regulatory burdens and institutional reforms. Suggested reforms include focusing on value-addition, quality, and branding of exports, depending on reliable power supply, credit, and foreign exchange, addressing bottlenecks involving trade logistics, and establishing industrial zones that follow international best practices. They also include ensuring that business rules do not obstruct firm entry, especially those with high start-up capital requirements and preregistration bank deposits. Geda (2017) also argues that Ethiopia's macroeconomic problem is structural than financial and hence policy makers need to tackle fundamental obstacles to supply, production and exporting before resorting to currency devaluation. IMF (2016) on the other hand argues that macroeconomic policies in the country should focus on reducing the current account deficit and mobilizing internal resources. It added that although raising exports is Ethiopia's preference and the first best option, imports and public projects that have large borrowing requirements to be implemented according to the country's export performance.

Results also suggest that the devaluation policy has important equity implications as urban households or households who spend most of their income on tradeable goods ultimately bearing the cost of the policy. Therefore, policy makers should take the differential impacts of macroeconomic and exchange rate polices into account when designing policy intervention strategies.

It is also evident that increasing the interest rate for savings, as part of containing the inflationary pressure of devaluation as designed, is not effective. With an inflation rate of around 10%, a saving rate of 7% would still mean real interest rate is negative. Encouraging savings and mobilizing financial resources requires a sound and positive interest rate and

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[2] Although the findings of this study are consistent with other several studies on the impact of exchange rate devaluation, our study does not claim that these results are applicable to all other countries. The outcome of such policies depends solely on the economic structure and the interaction between the different economic actors in a given country. Hence, simulation results of this study should be interpreted carefully, while considering them country-specific.

hence, the central bank will need to focus on combatting inflation through an appropriate target of an optimal level of inflation, if they want to encourage national savings. Empirical studies have previously shown that there is a positive relationship between inflation and gross national savings in Ethiopia (see for instance Taye, 2017; Haile, 2013; Girma, 2017).

Declarations

Author contribution statement

Getachew A. Woldie, Khalid Siddig: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

Competing interest statement

The authors declare no conflict of interest.

Additional information

Supplementary content related to this article has been published online at https://doi.org/10.1016/j.heliyon.2019.e02984.

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