



Trade liberalisation, institutions and persistent habits – a CGE model analysis for developing countries

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2. Building blocks (models and theories)
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1. Research questions / Motivation

- **Questions:**
 - Imperfect substitution between goods from different sources (domestic, imported from different countries)
 - If the Armington elasticities change in time, what are the effects on expected outcomes?
 - International trade CGE modelling: Generalise taste change in long-run (recursive dynamic) simulations?

- **Underlying motivation:**
 - Implications to welfare gains from trade?
 - Food, trade and development

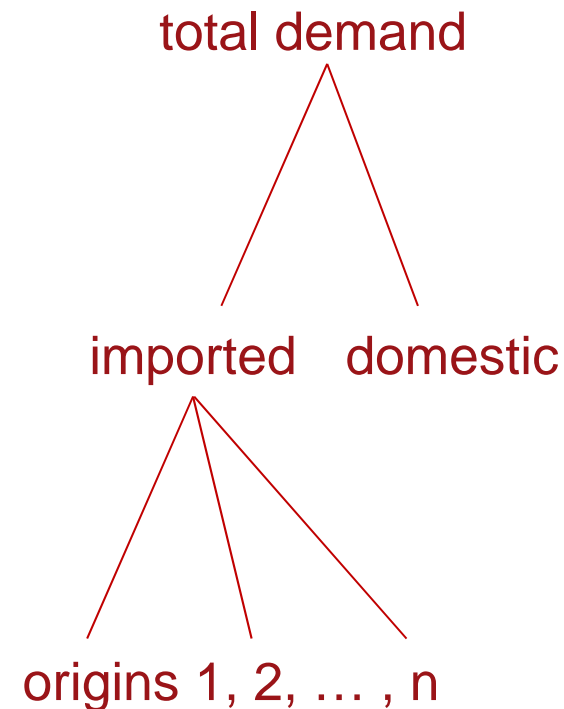
2. Building blocks (models and theories)

- Armington model of international trade
- Habit persistence / habit formation
- Interdependent preferences
- Linear Expenditure System (LES)

2. Building blocks (models and theories)

“Armington” model of trade

- Imperfect substitution in international trade (Armington 1969)
 - Real or perceived heterogeneity (especially in aggregate data)
 - Consumer behaviour (individual)
 - Trading practises, institutions (especially NTMs)
- Two-level nested structure common in CGE trade models:
 - (1) domestic/imported;
 - (2) imported/imported
- This study concerned with (2)



2. Building blocks (models and theories)

Habit persistence

- Current consumption depends on past consumption: “The more the consumer eats today, the hungrier he wakes up tomorrow.”
- First suggested by Duesenberry (1949): Savings data inconsistent with standard theory.
- “Gap” in the literature 1985-2010

2. Building blocks (models and theories)

Habit persistence

- Pollak (1976, 1978): habit formation system incorporating interdependent preferences into the model.
 - Future consumption depends on the “habit stock” of not only the individual, but of all other individuals as well.
 - Habits treated as external to the consumer.
- Trade context:
 - Consider broader definition of ‘habits’: Institutional constraints, Non-tariff barriers, long-term contracts, delivery reliability etc.

3. Implementing the model: expenditure system

- Expenditure shares in an AIDS

$$s_{it} = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \ln (m/P)$$

- (Re)pecify α to reflect habit persistence

$$\alpha_i = \alpha_i^* + \lambda_i q_{i,t-1}$$

- → Expenditure system

$$s_{it} = \alpha_i + \lambda_i b_{it} + \sum_j \gamma_{ij} \ln \frac{p_j}{p_M}$$

where $b_{it} = \frac{p_{it} q_{i,t-1}}{m_t}$

3. Implementing the model: code

- *!The long-run import demand qxs_{lr} is identical to the standard GTAP model import demand qxs !*

Equation LR_IMPORTDEMAND

regional long-run demand for disaggregated imported commodities by source (HT 29)

```
(all,i,TRAD_COMM)(all,r,REG)(all,s,REG)
  qxs_lr(i,r,s)
    = qim(i,s) - ESUBML(i,s) * [pms(i,r,s) - pim(i,s)];
```

!The short-run import demand qxs is now dependent on parameter LAMB DAM, which defines the "base demand" and adjustment speed towards the long-run demand !

Equation IMPORTDEMAND

regional short-run demand for disaggregated imported commodities by source

```
(all,i,TRAD_COMM)(all,r,REG)(all,s,REG)
  VIMS(i,r,s) * [p100 + qxs(i,r,s) + pms(i,r,s)]
    = LAMB DAM(i,s) * VIMS_B(i,r,s) * [p100 + pms(i,r,s)]
    + [1-LAMB DAM(i,s)] * VIMS_LR(i,r,s) * [p100 + pms(i,r,s) + qxs_lr(i,r,s)];
```

4. Data and Scenarios

- GTAP 9a database
- Rice, wheat, coarse grains
 - Large trade volumes
 - Somewhat (but not entirely) homogeneous
 - Relevant for trade and development considerations
- Stylised trade policy scenario simulated with (modified) dynamic GTAP model with different elasticity and habit persistence options.

4. Data and Scenarios: Regional aggregation

1	China	13	Rest of Europe and Centaral Asia
2	Indonesia	14	North Africa
3	Thailand	15	Ghana
4	Viet Nam	16	Nigeria
5	Bangladesh	17	Ethiopia
6	India	18	Kenya
7	Rest of Asia (excl high inc)	19	Mozambique
8	High income Asia and Oceania	20	Tanzania
9	North America	21	South Africa
10	Latin America (excl NAFTA)	22	Rest of Sub-Saharan Africa
11	European Union 28	23	Rest of the World
12	Black Sea Producers		

4. Data and Scenarios: Commodity / sector aggregation

Aggregated sectors	Included sectors and commodities
1 Rice	Paddy rice, Processed rice
2 Wheat	Wheat
3 Other grains	Cereal grains nec
4 Other food	Other primary agriculture, and processed food
5 Manufacture	All manufactured products, excl. food
6 Services	All services

Policy scenarios

33% Reduction in “hidden” trading costs (e.g. NTMs) for rice, wheat and coarse grains.

	Multilateral	Unilateral	Unilateral & Capital
Treated commodities	Rice, Wheat, Other grains		
Treated importing regions	All	EU28	
Treated exporting regions	All	Low-income Sub-Saharan Africa	
Capital accumulation	No		Yes

4. Data and Scenarios: Scenario options

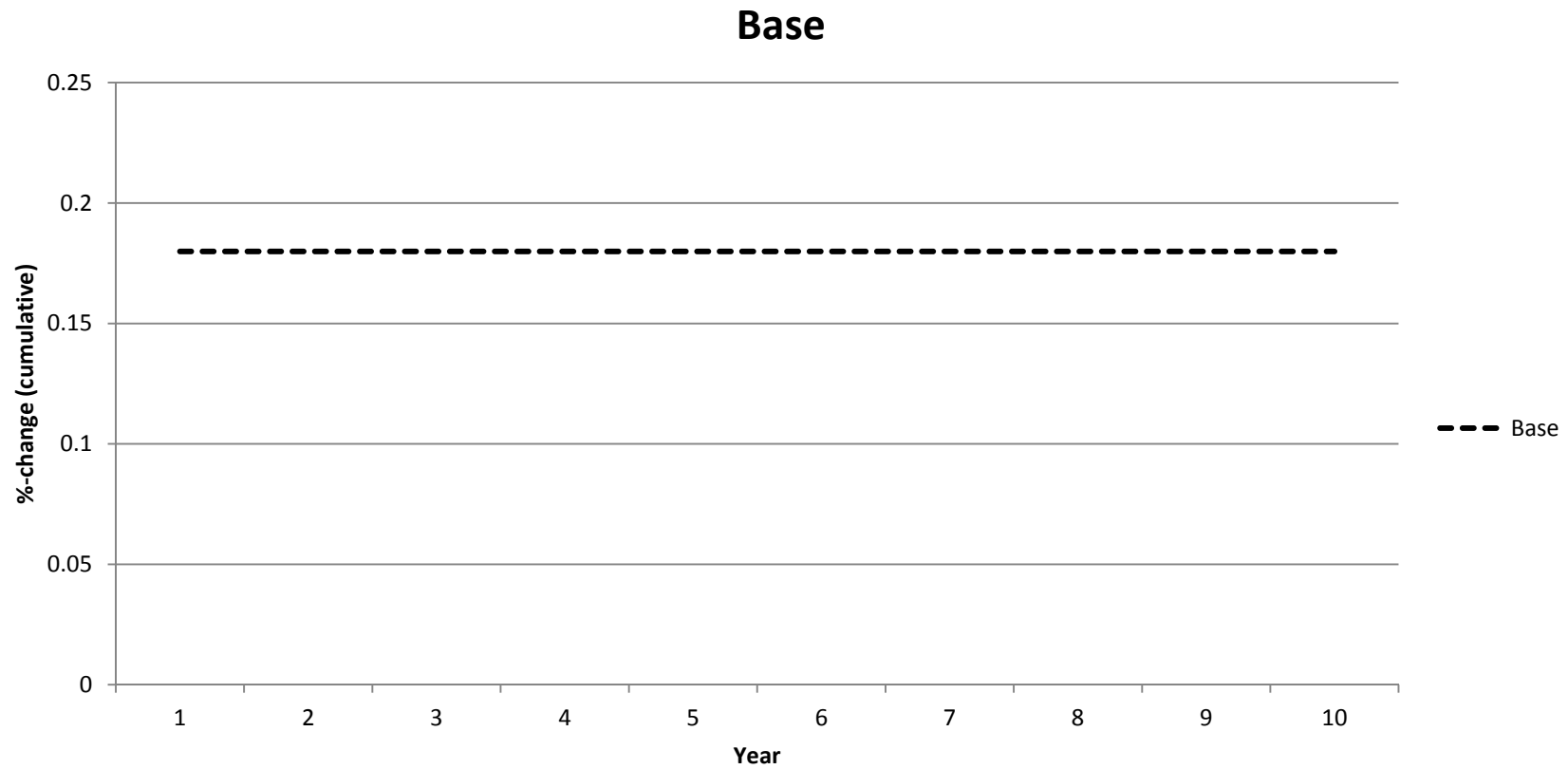
Substitution between	Scenario options					
	Base	M	D	M+D	D2	M+D2
different sources of imports						
Habit persistence λ_M	0	.5	0	.5	0	.5
Long-run elasticity σ_M	2S	2S	2S	2S	2S	2S
Short-run elasticity γ_M	2S	S	2S	S	2S	S
domestic and imported goods						
Habit persistence λ_D	0	0	.5	.5	.75	.75
Long-run elasticity σ_D	S	S	S	S	2S	2S
Short-run elasticity γ_D	S	S	.5 S	.5 S	.5 S	.5 S

s = GTAP 9 database substitution elasticity between domestic and imported (ESUBD); elasticity between sources of imports $ESUBM = 2 \times ESUBD$ for all commodities.

5. Simulation results

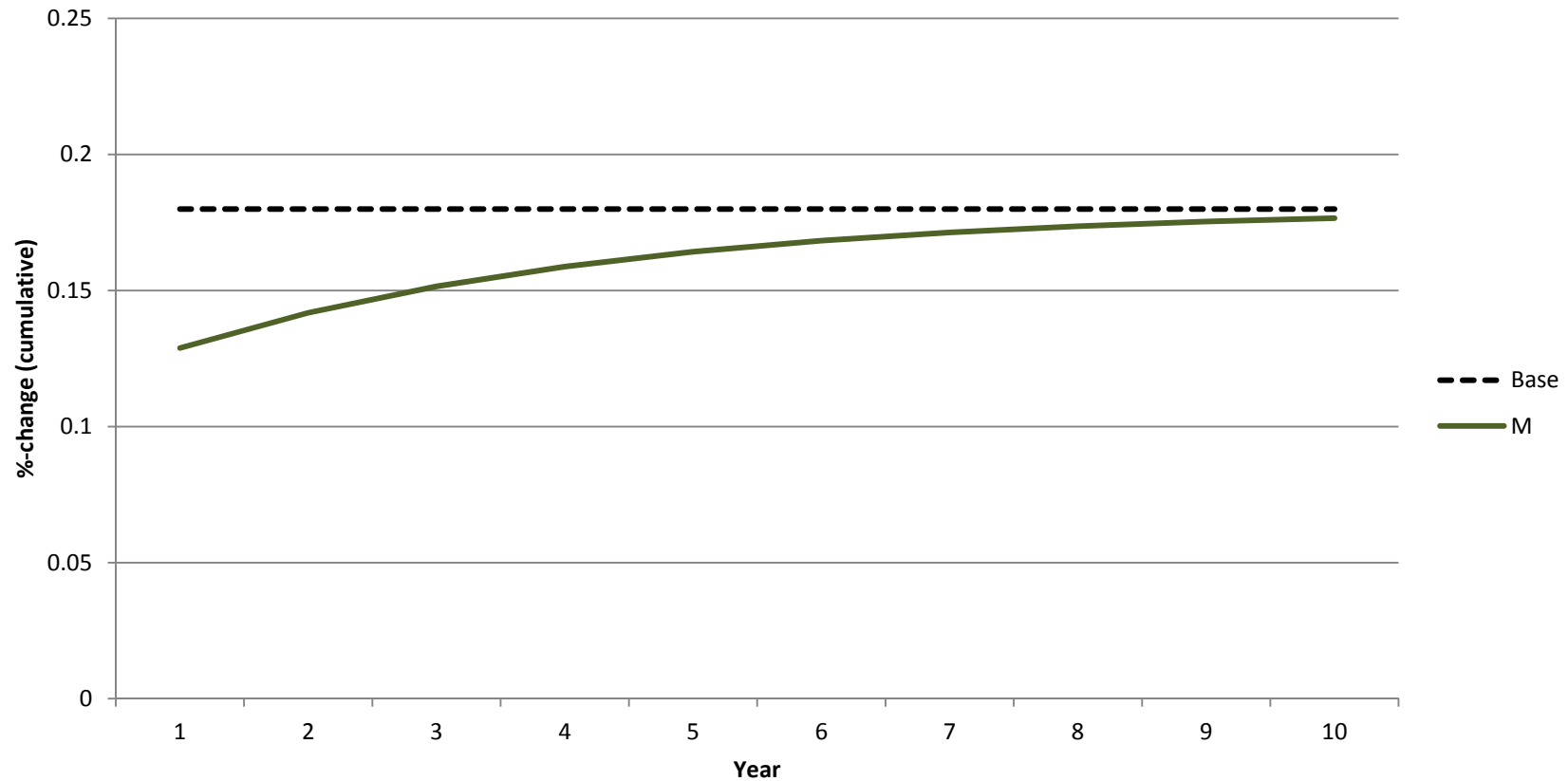
Trade

Multilateral (base): world trade volume index



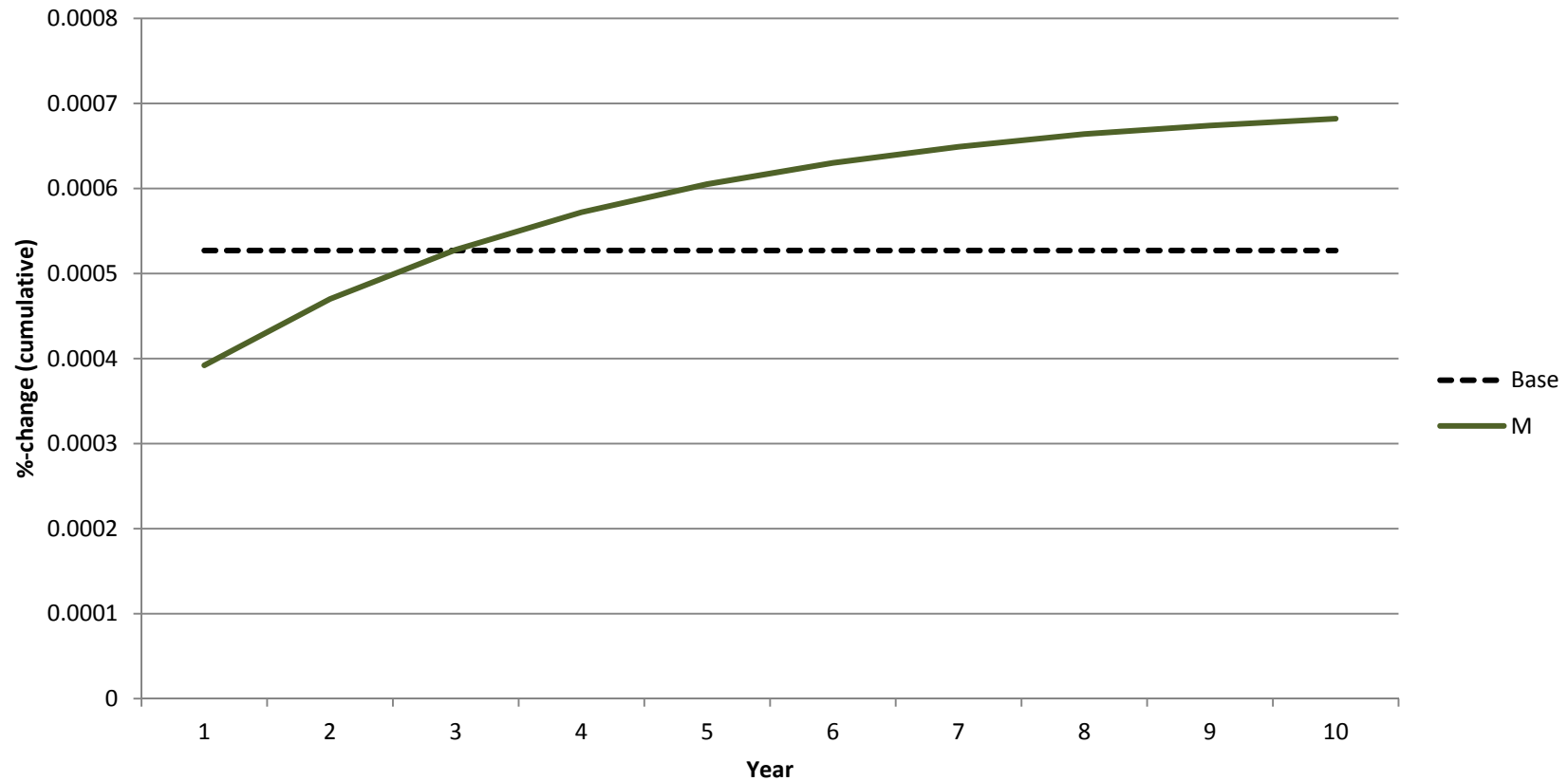
Everything happens in $t=1$

Multilateral (M): world trade volume index



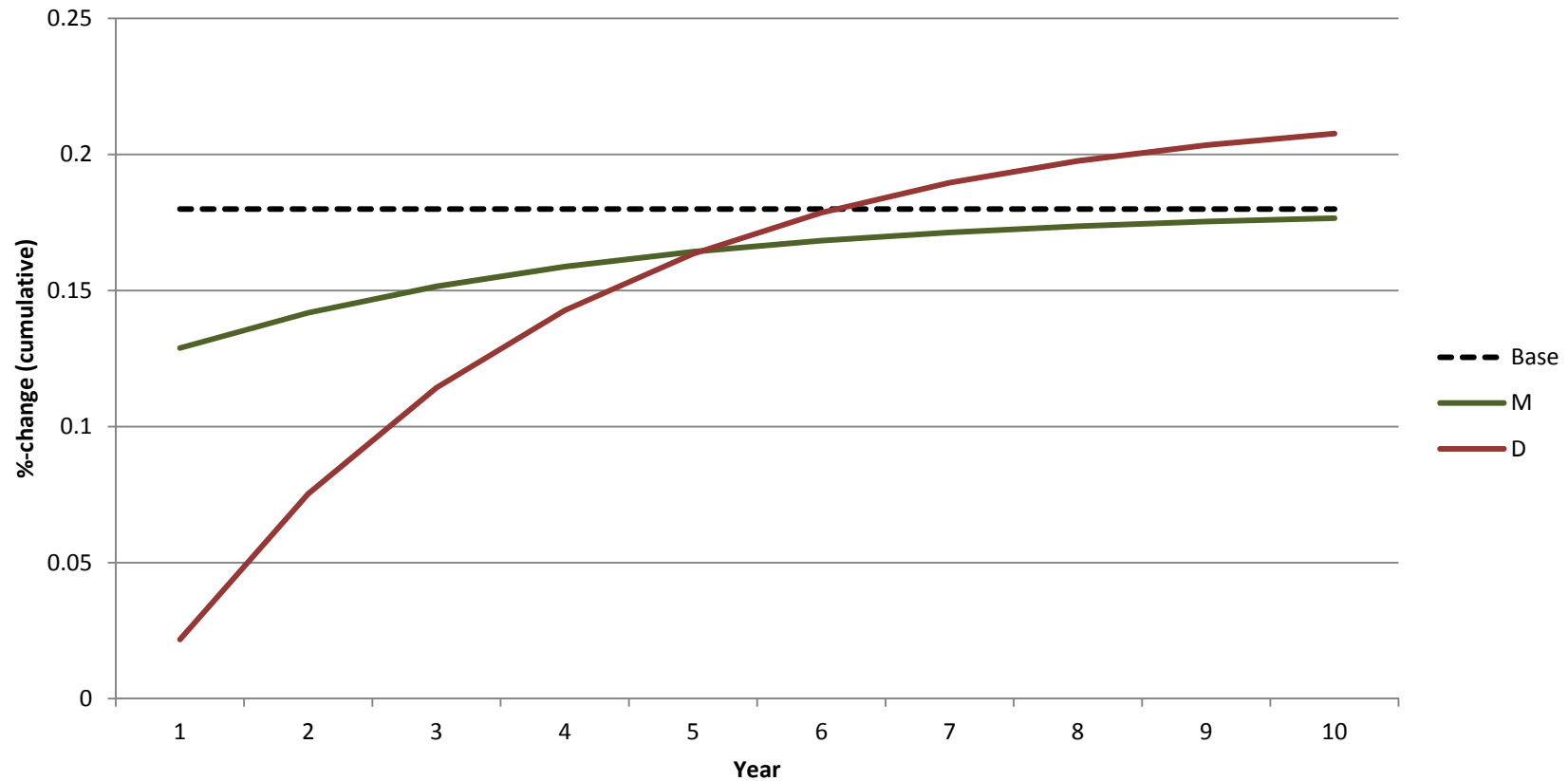
Smaller initial response, converges to base as expected...

Unilateral (M): world trade volume index



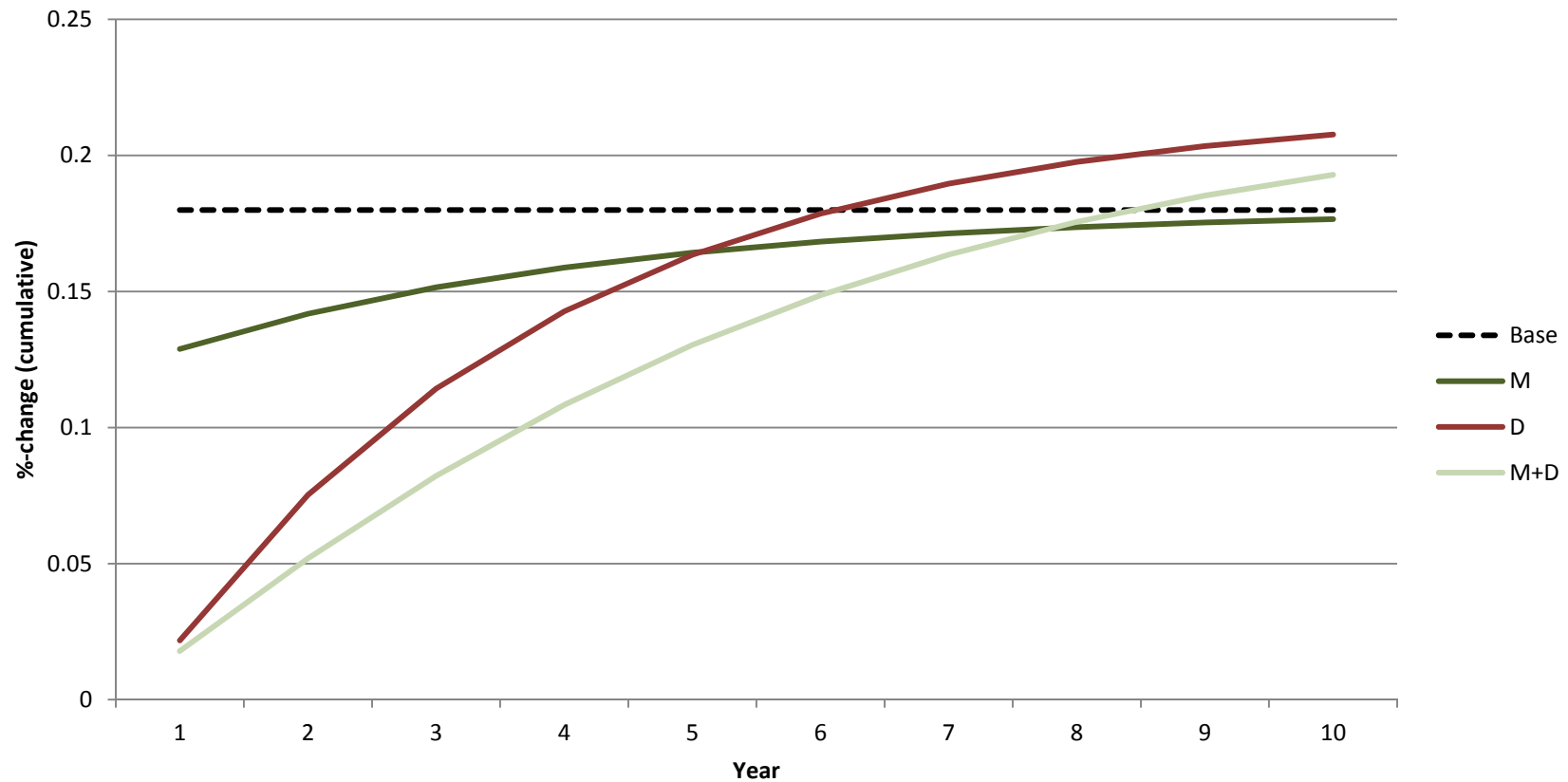
... but exceeds base in the Unilateral scenario

Multilateral (D): world trade volume index



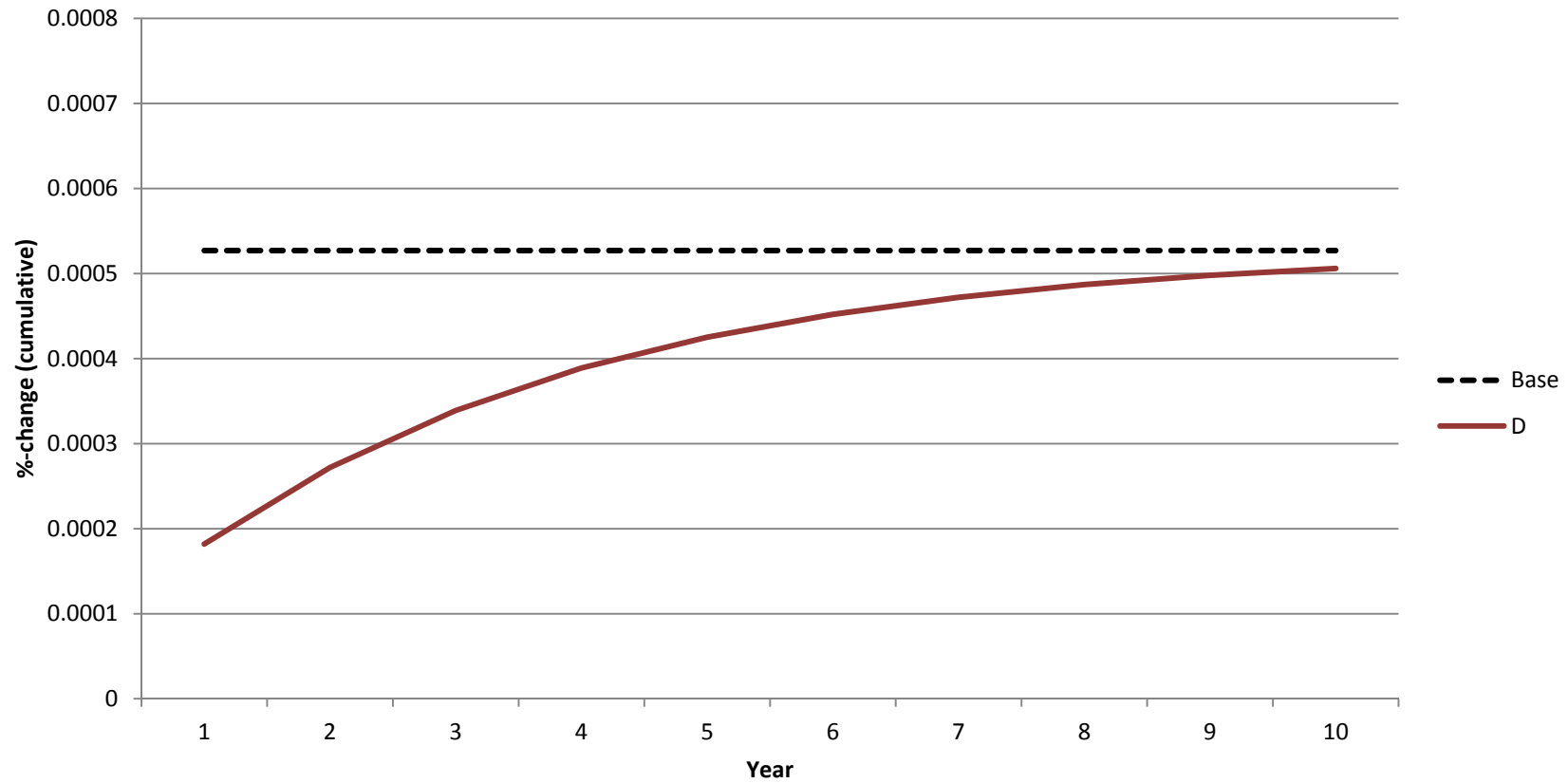
In Multilateral, this happens with domestic-imported HP

Multilateral (M+D): world trade volume index



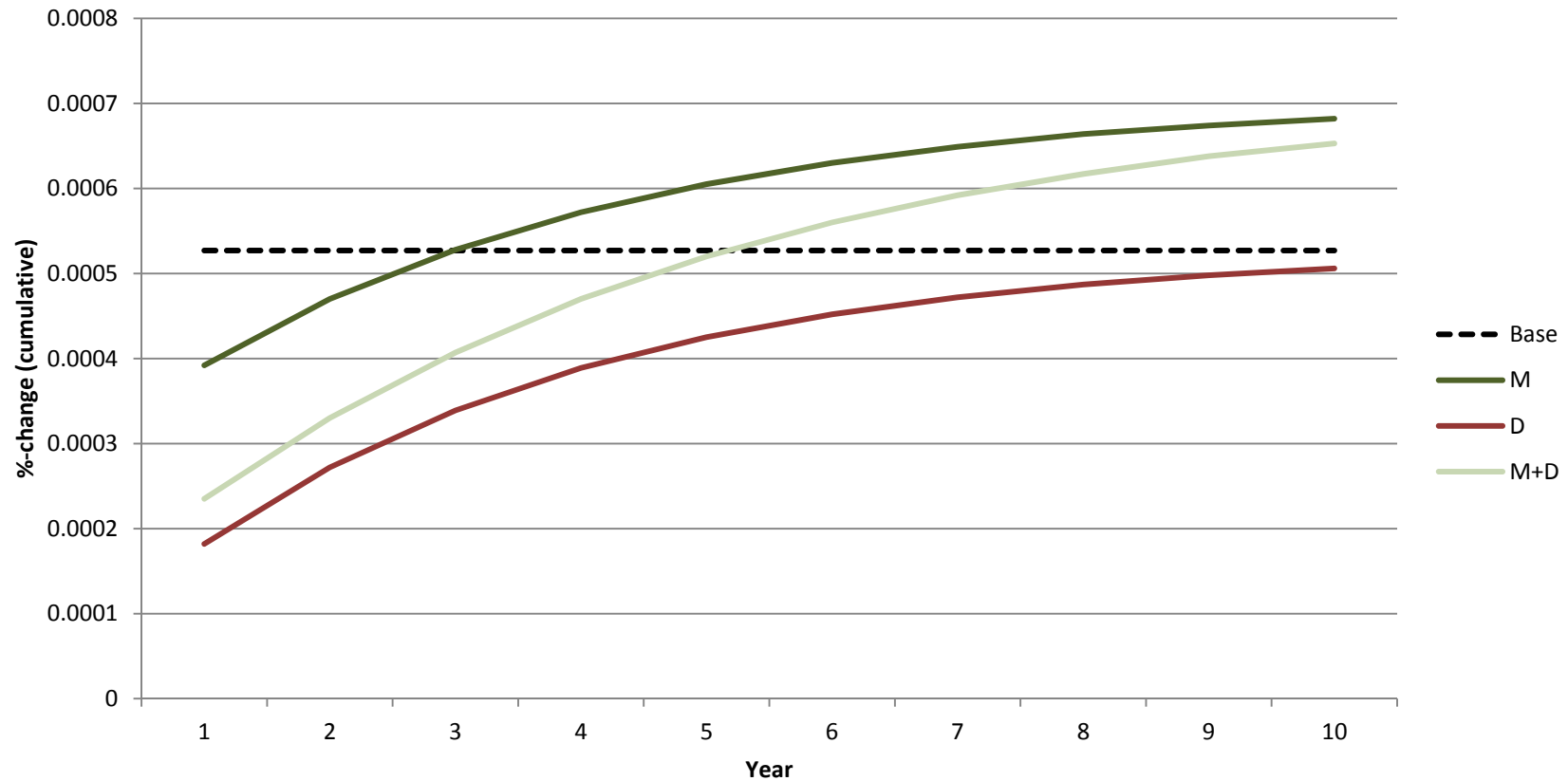
Impacts of the 2 nests HP are not separable / additive!

Unilateral (D): world trade volume index



D option converges in Unilateral

Unilateral (M+D): world trade volume index

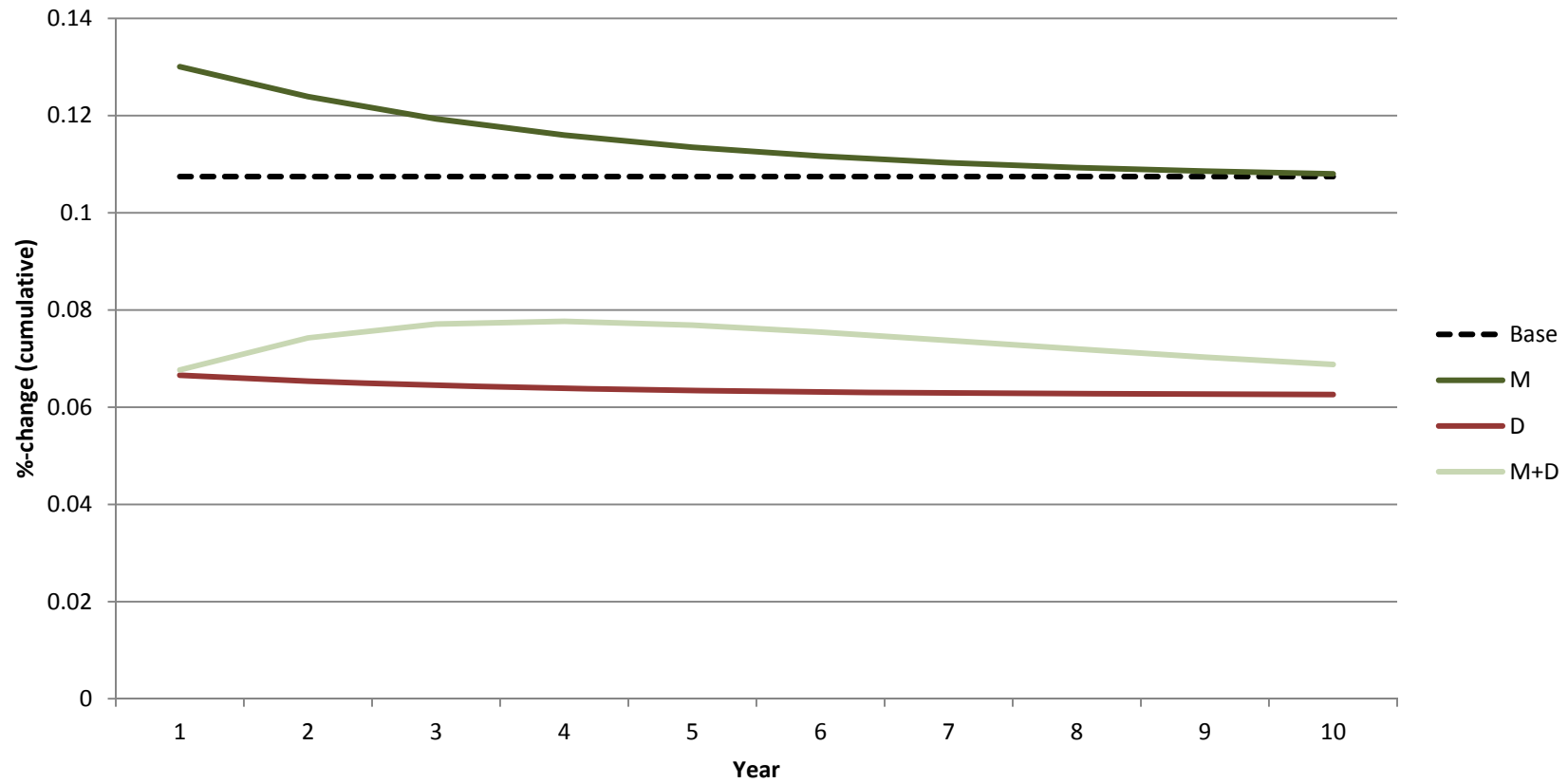


Combined effect moves from D to M

5. Simulation results

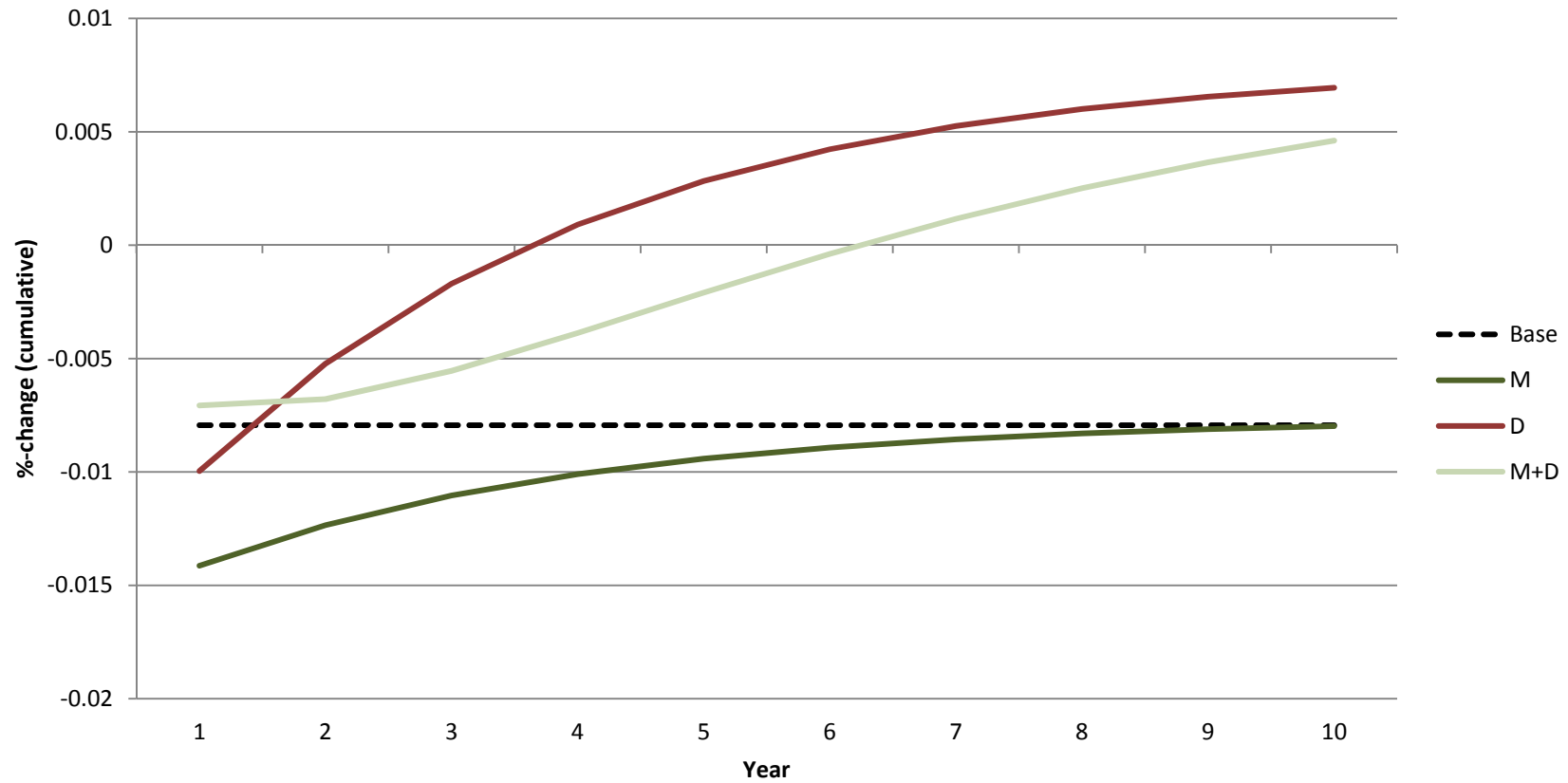
Other macro variables

Multilateral: world aggregate GDP



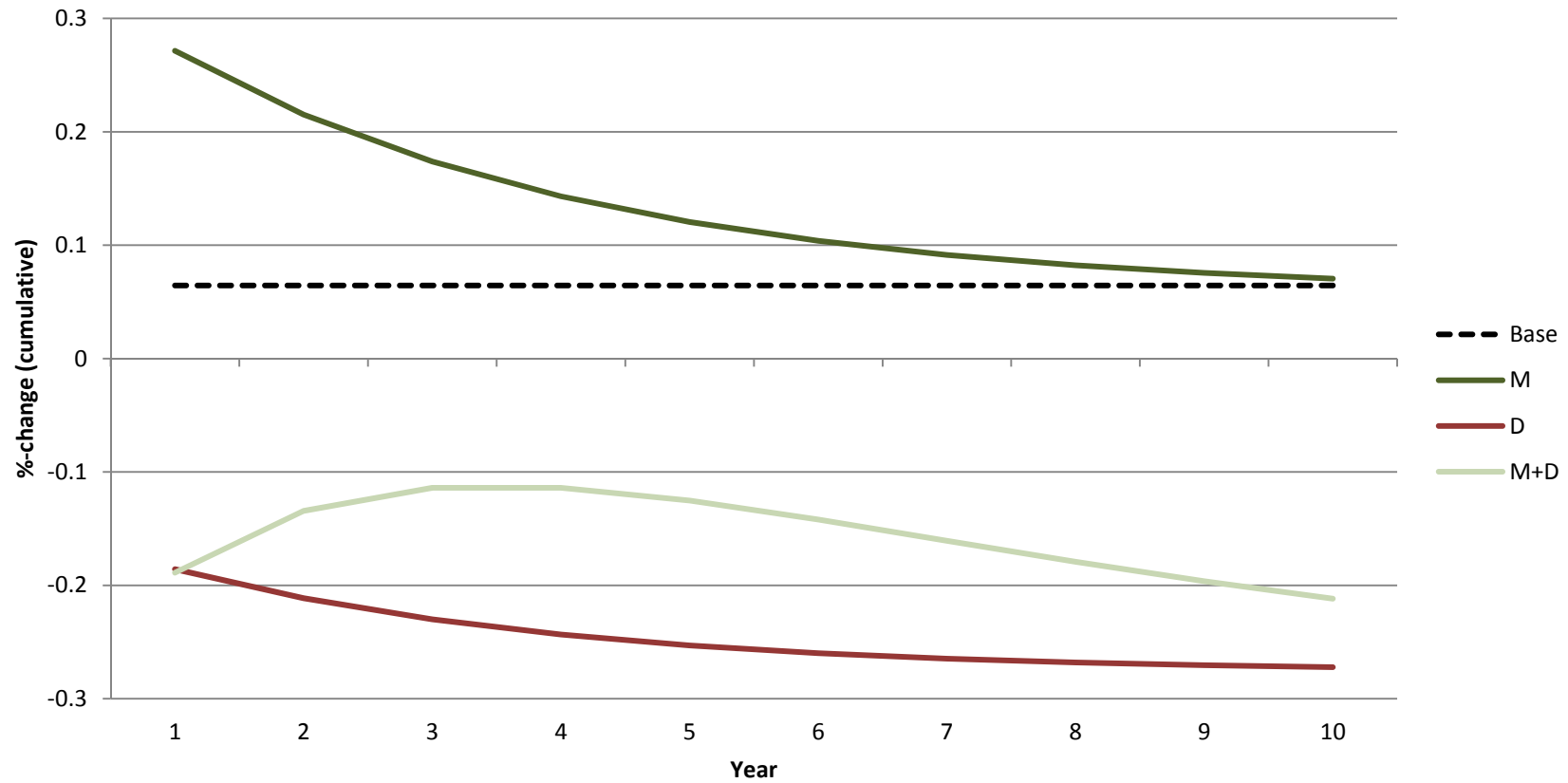
Differences to both directions.

Multilateral: private consumption



Mirror image of the GDP?

Multilateral: global investments

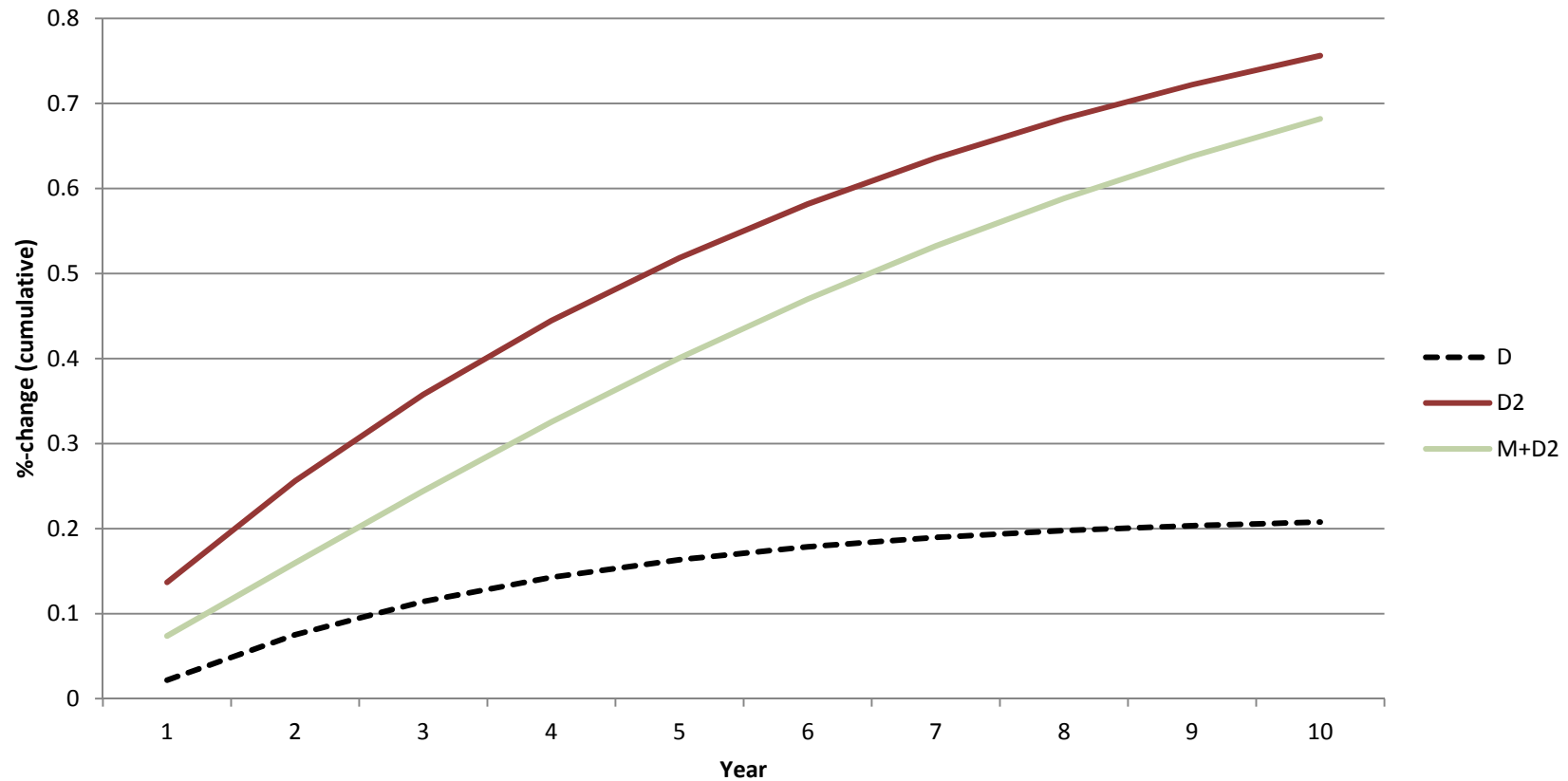


Drive the GDP

5. Simulation results

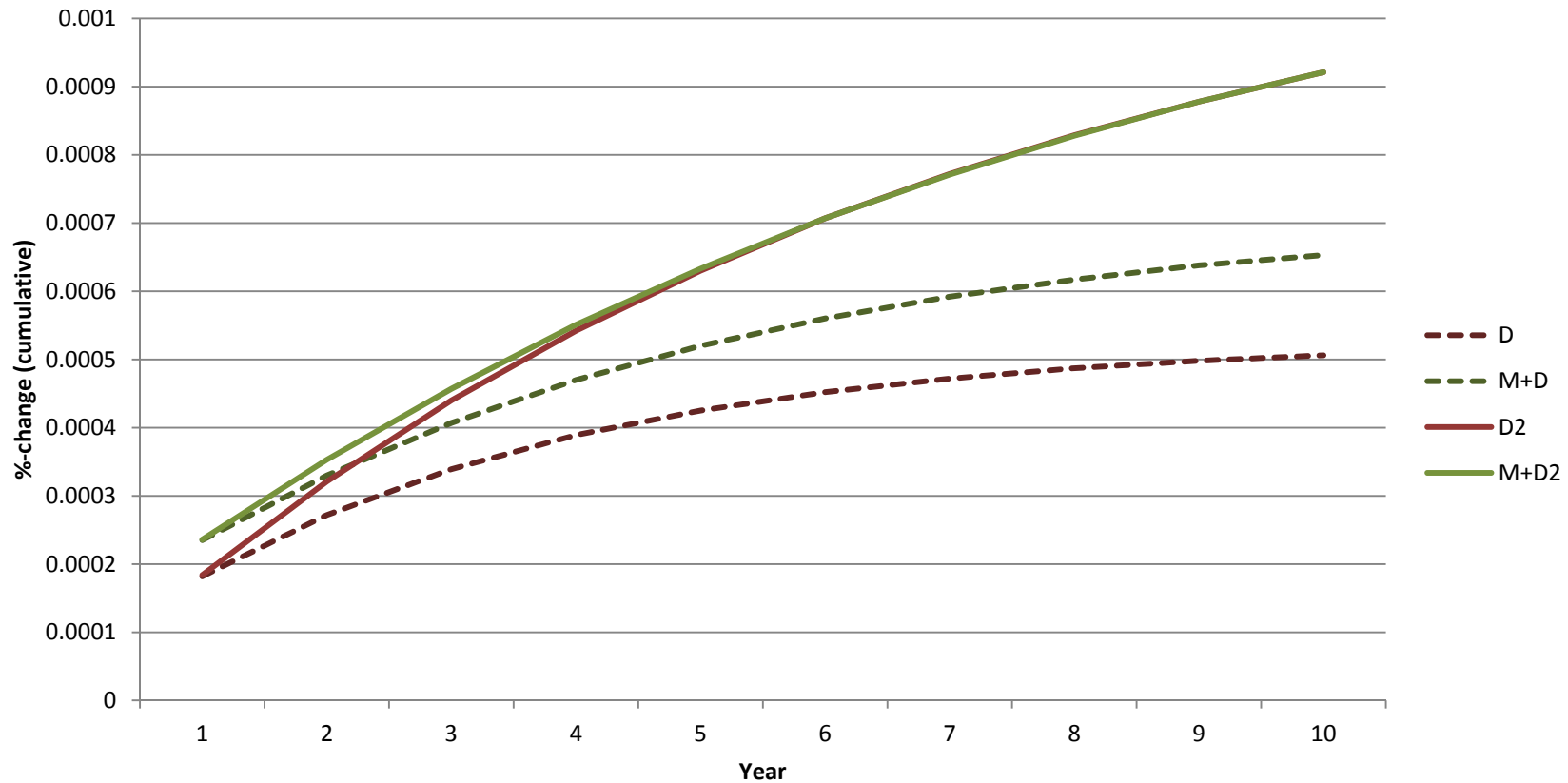
Changing the domestic-imported long-run elasticity

Multilateral (base): world trade volume index



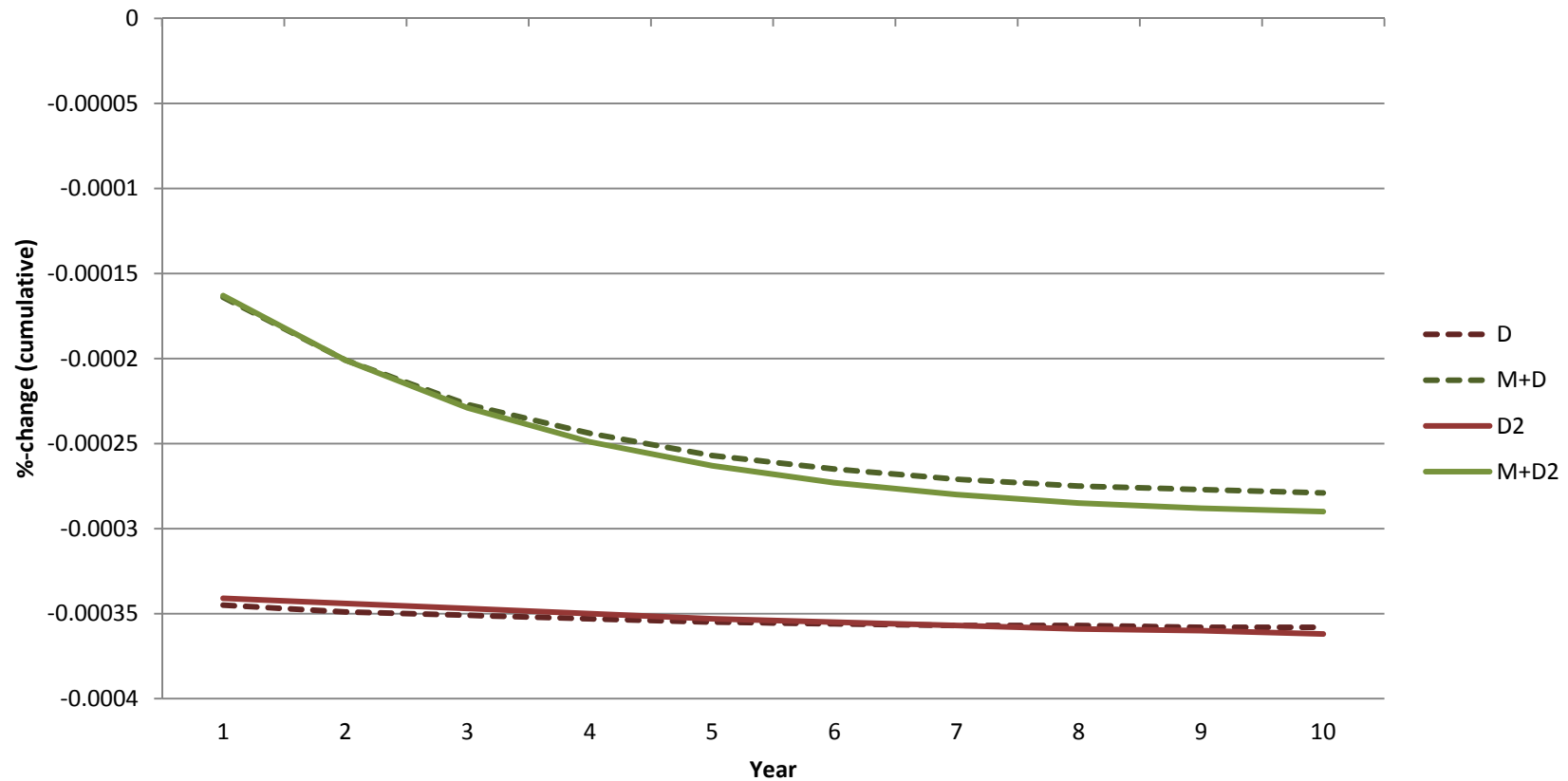
Impact on trade already in $t=1$, and increases

Unilateral (base): world trade volume index



In unilateral case impact more as expected

Unilateral (base): world aggregate GDP

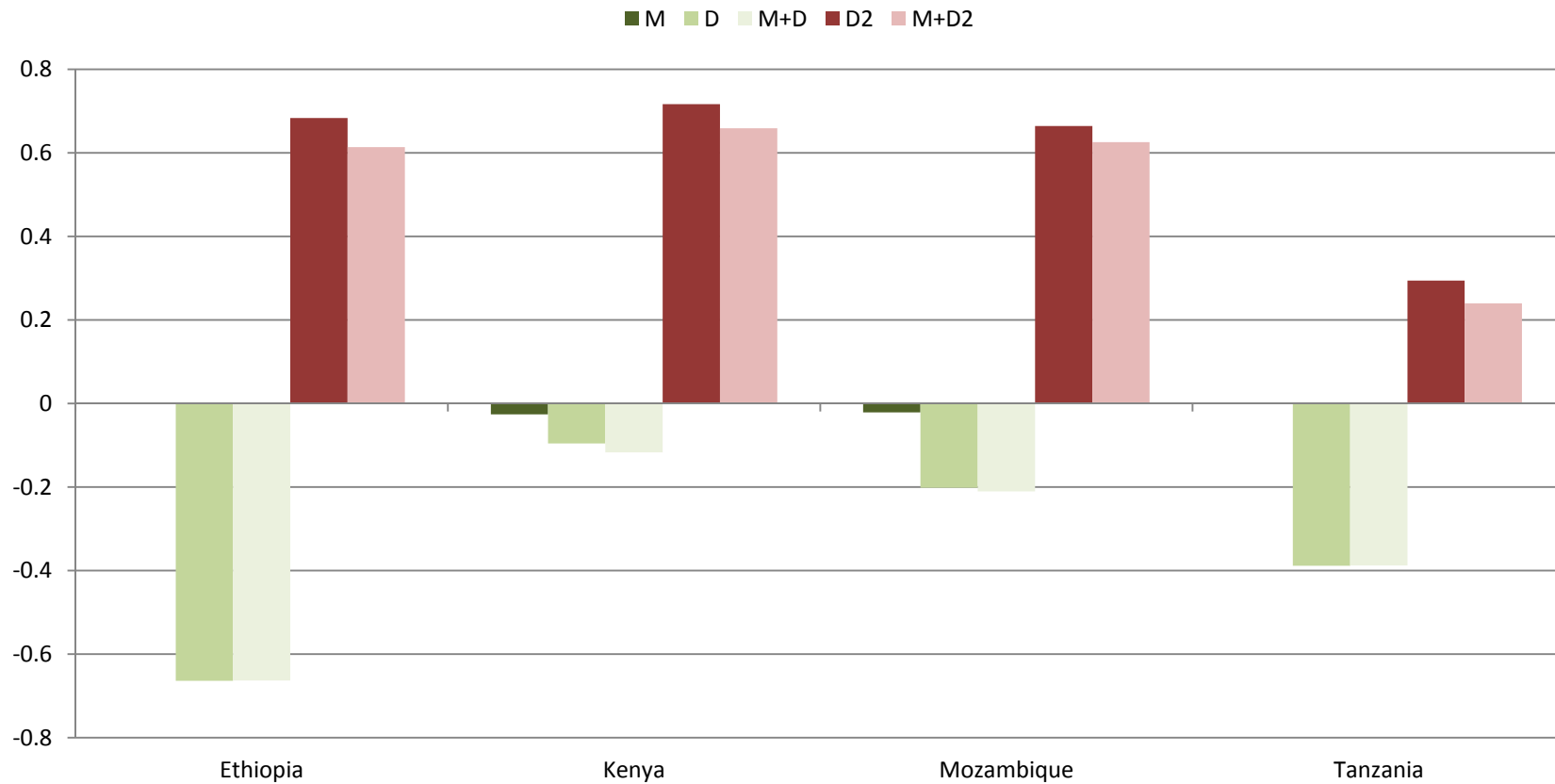


Makes little difference for other macros in unilateral

5. Simulation results

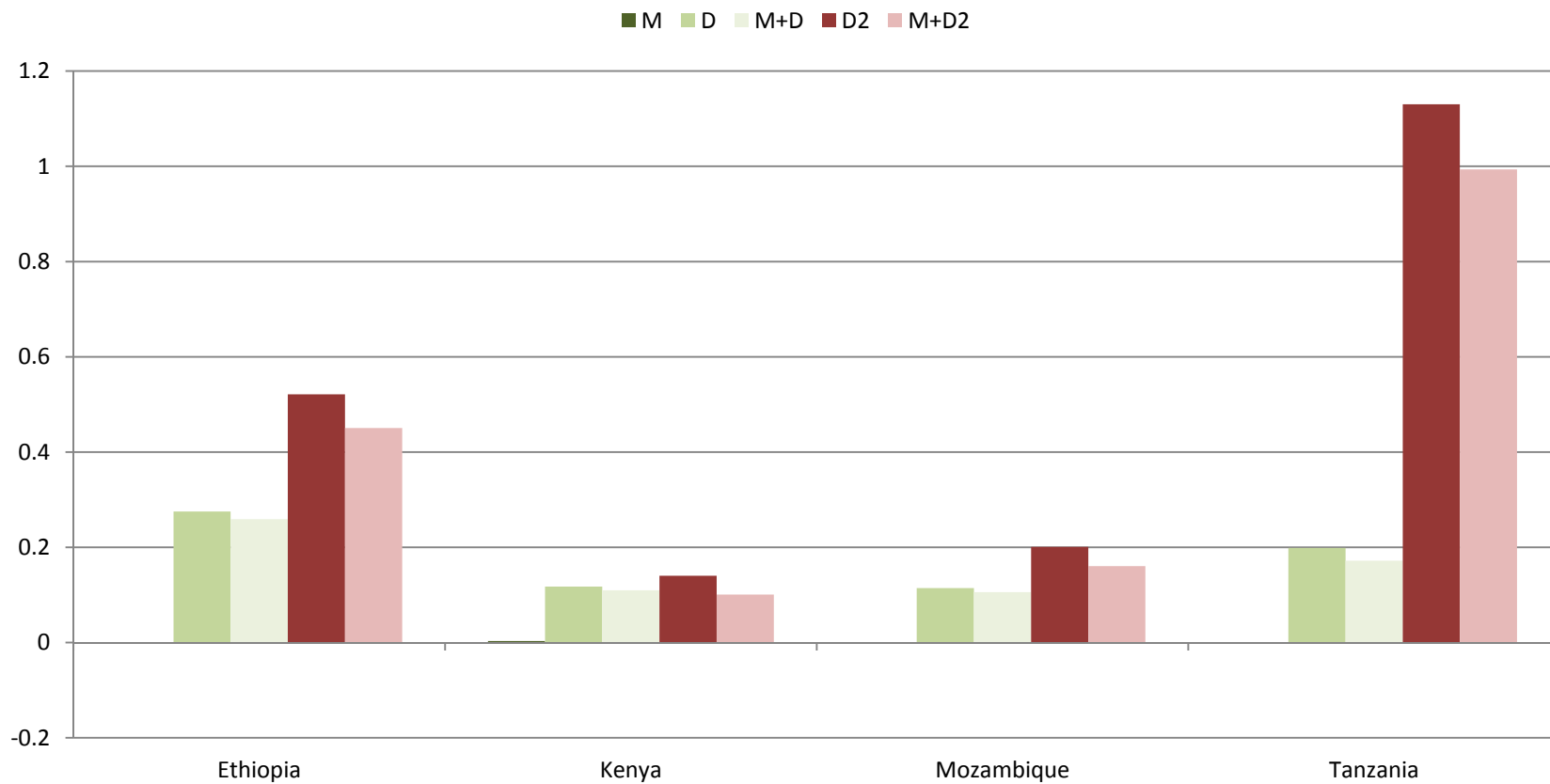
Regional effects

Multilateral: Exports (difference to base)



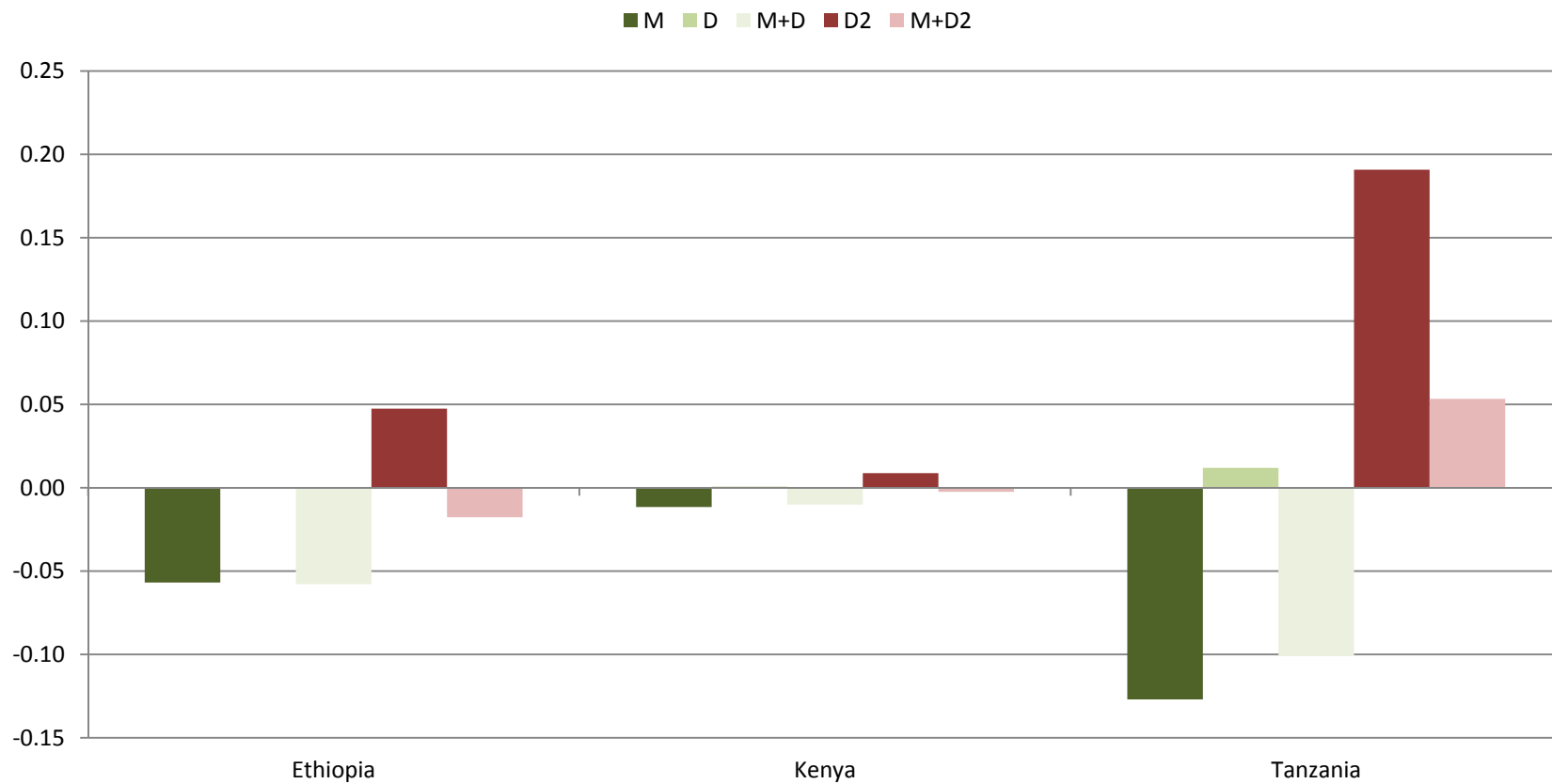
Foreign-foreign has zero impact alone. Country differences

Multilateral: Consumption (difference to base)



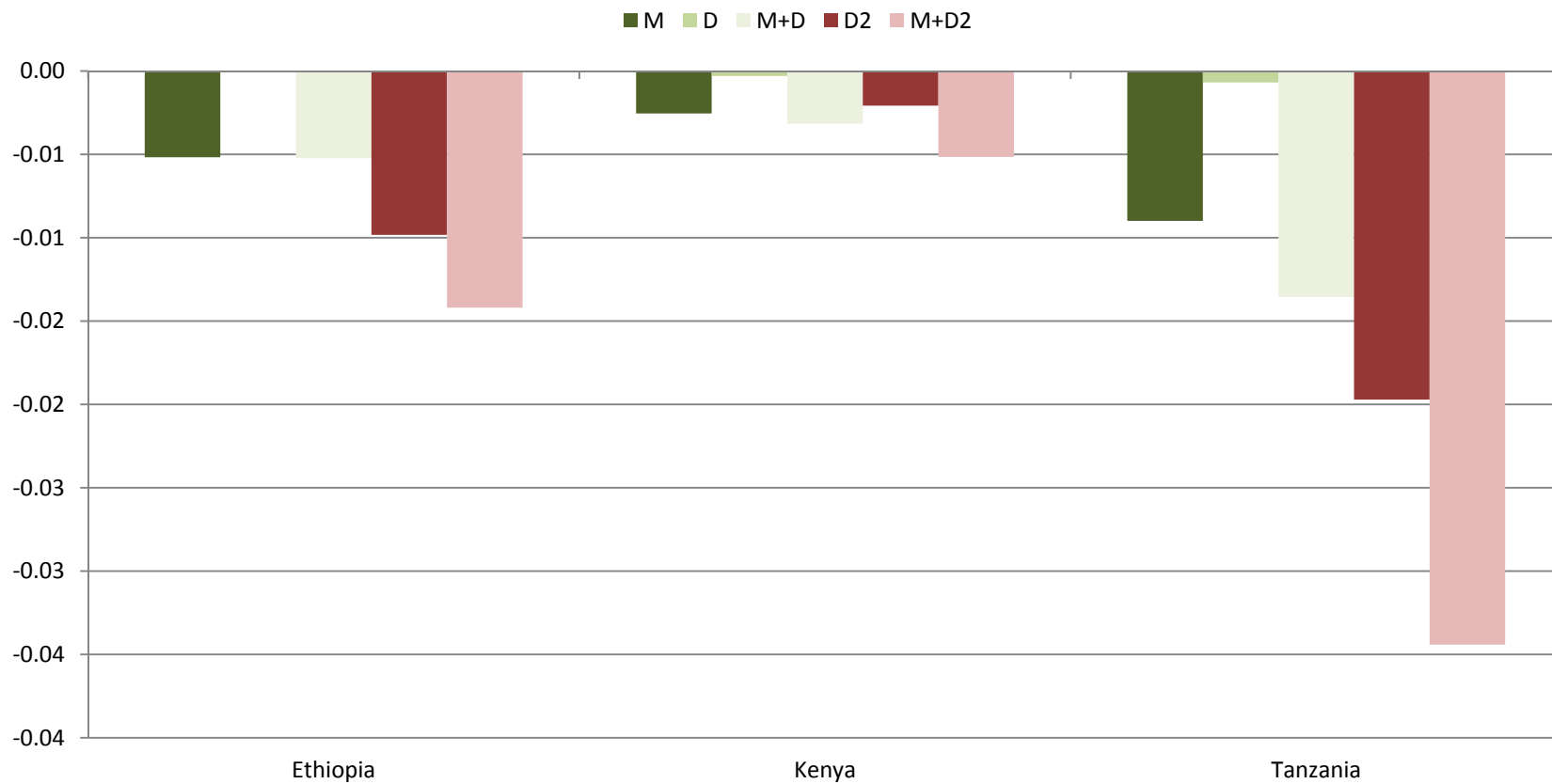
Foreign-foreign has zero impact alone. Country differences

Unilateral: Exports (difference to base)



Changes to same direction in different countries, domestic-imported has little effect alone

Unilateral: Consumption (difference to base)



Negative impact on consumption, increases with more habit persitence ³⁵

Conclusions

- Specification of imports demand does matter
 - Does potentially produce a “better fit” to actual data
 - Options have different effects depending on policy scope
 - Options affect countries differently
 - Big differences, but no changes of sign (detected so far)
-
- What are the mechanisms behind the results?
 - Welfare implications? Can trade persistence compensate welfare loss from domestic price rise with habit persistence of domestic consumption?