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HUMBOLDT-UNIVERSITÄT ZU BERLIN

IMPROVING LIVELIHOODS IN AGRICULTURE-BASED ECONOMIES THROUGH PROCESSING SECTOR DEVELOPMENT A CGE ANALYSIS ON BENIN

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Background (1/2)

- Most African countries: agriculture-based economies with a high share of GDP and employment provided by agriculture (OCED-FAO, 2016)
- Agriculture in these countries: Exporting raw materials to developed economies while importing large share of processed food
- Low investment level in agriculture
- To change, African Union (AU): Comprehensive African Agricultural Development Programme (CAADP) ➔ Zero hunger and less poverty
- Based on that: African countries set up agricultural development programs
- Benin: PNIASAN➔ enhance productivity and value chain development (How?)

Background (2/2)

- Agricultural development without suitable value chain development ➔ possibly negative effect on farmers (Johnson & Islam, 2004; Gunawardena, 2012; Cazcarro et al., 2016; Gupta et al., 2018)
- Increasing productivity ➔ lower agricultural prices and income loss for poor rural households in Benin (Grethe et al., 2020)
- Processing not developed
- Research Question: to which extent can developing the food processing sector along with agricultural productivity gains contribute to sustained agricultural prices and how would this affect income distribution?

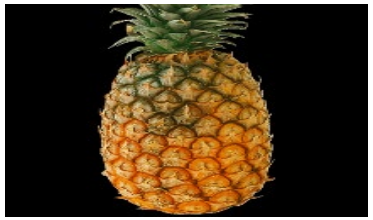
Cashew, Pineapple and PNIASAN (1/1)

- **Cashew in Benin in 2019**
  - 130,220 t raw cashew nut (RCN)
  - Processing 25,100 t RCN in cashew nut kernel (CNK), 81% exported as RCN
- **Pineapple in Benin in 2019**
  - 400,000 t raw fruit
  - Processing 29%, export 56% (1% to the EU and 55% to West-Africa)
- **PNIASAN**
  - Reach 200,034 t RCN per year and 502,413 t pineapple per year
  - Process at least 50% of RCN ➔ 100,017 t : 300% increase in CNK (how?)
  - No specific target for pineapple processing in PNIASAN,
  - We target also 50% of production ➔251,206.5 t pineapple: 120% in juice (how?)

Cashew on tree

Cashew nut kernel

Pineapple



Data base (1/1)

- **2019 Social Accounting Matrix (SAM) for Benin**
  - 41 activities (19 agricultural and 10 agricultural processing)
    - Creation of agricultural sectors based on secondary data
    - Creation of agricultural processing sectors (e.g.: pineapple juice, cashew kernel, poultry slaughtering, etc.) based on empirical data collected for this research and available data from previews studies
  - 10 household groups (5 rural, 5 urban: Q1-Q5)
  - 4 production factors (unskilled and skilled labor, capital and land)

Benin's economy as depicted in the 2019 SAM (1/3)

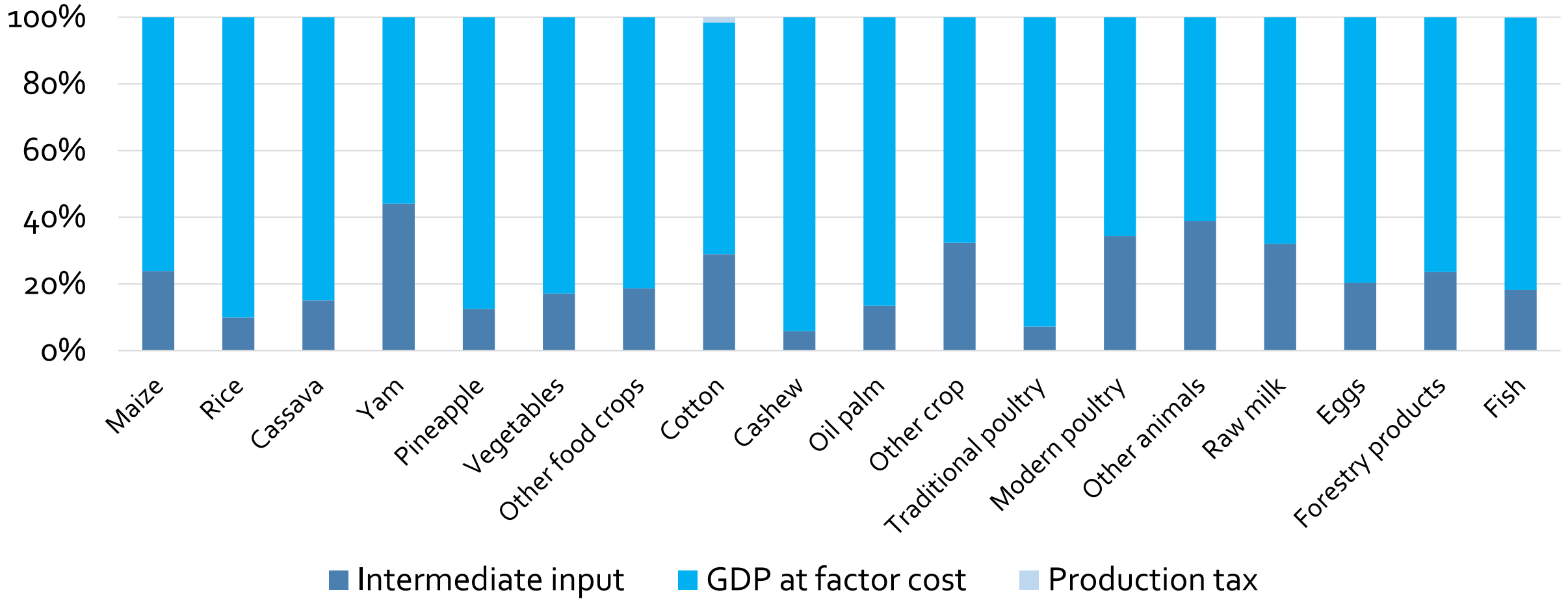


Fig. 1 Composition of of agricultural output

Benin's economy as depicted in the 2019 SAM (2/3)

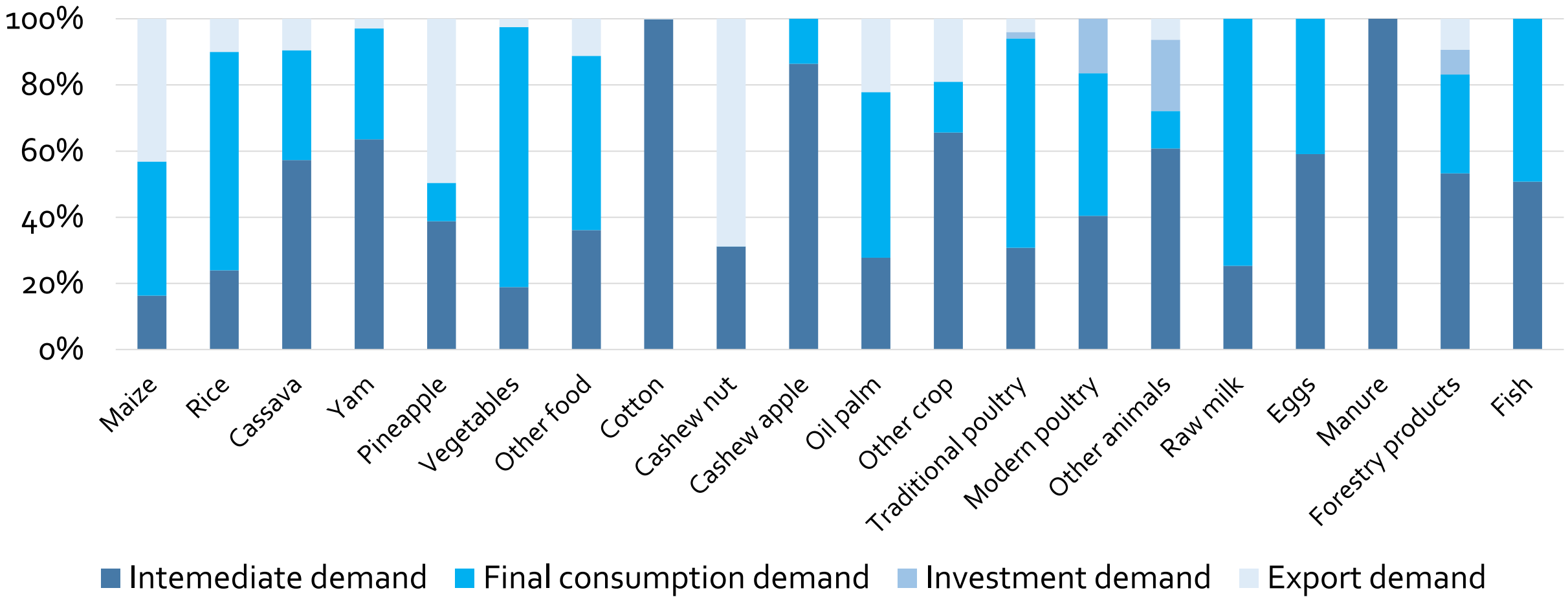


Fig. 2 Composition of demand for agricultural products

Benin's economy as depicted in the 2019 SAM (3/3)

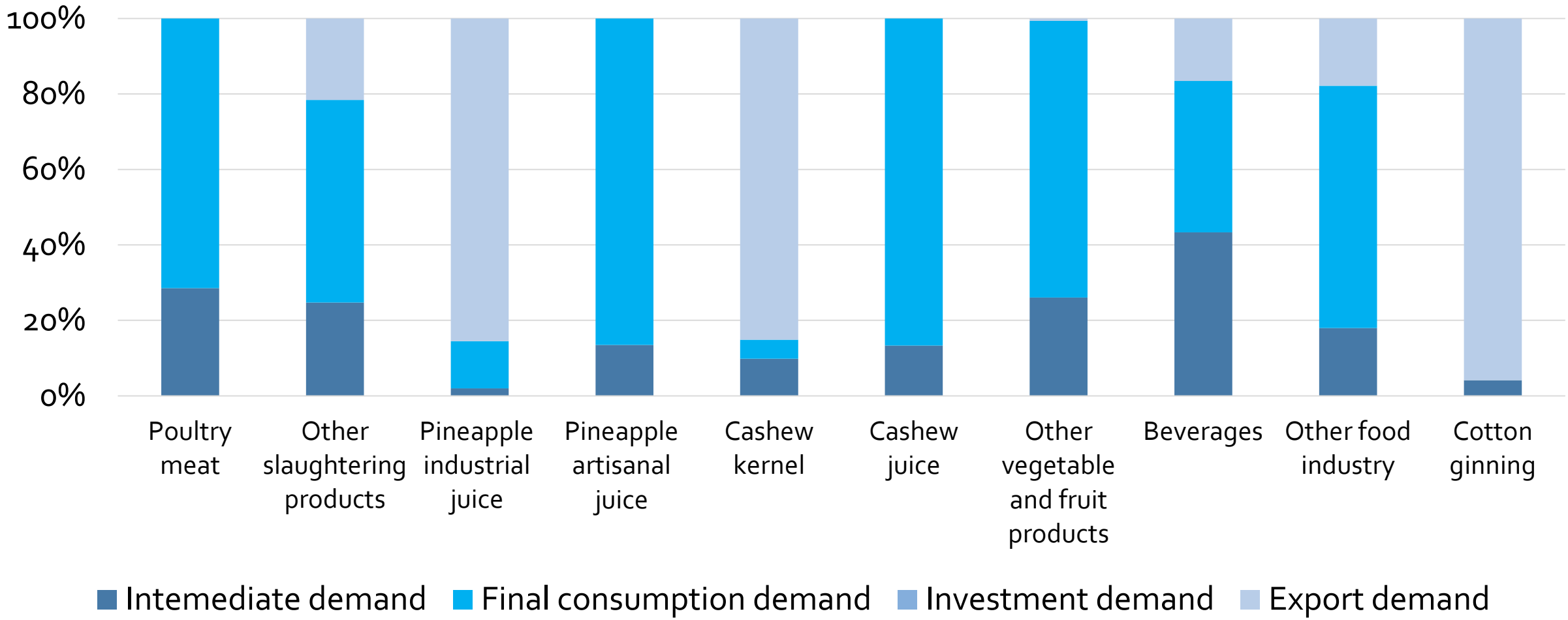


Fig. 3 Composition of demand for agricultural processed products

Modelling approach: Model setup (1/1)

- **Model**
  - Second version of Static Applied General Equilibrium (STAGE2) model (McDonald, 2015)
- **Closure rules**
  - Flexible exchange rate (ER) regime, fixed foreign savings and fixed CPI ;
  - Savings-driven investment;
  - Fixed government saving and flexible household income tax rate (finance or distribute);
  - Fixed world market prices (small country assumption)
- **Simulations**
  - Scenario to increase agricultural productivity
  - Scenarios to develop processing for cashew and pineapple in order to reach at least 50% of production being processed (how?)

Modelling approach: Scenarios (1/1)

Scenarios	Factor productivity Agriculture (%)	Processed product export tax reduction (%)	Subsidy to pineapple processing (%)	Subsidy to cashew processing (%)
BASE				
PA	+5			
PAPET	+5	-100		
PAPET_SP	+5	-100	Flexible (-4.1)	Flexible (-2.4)

Description

BASE: Status quo scenario showing Benin economy in 2019

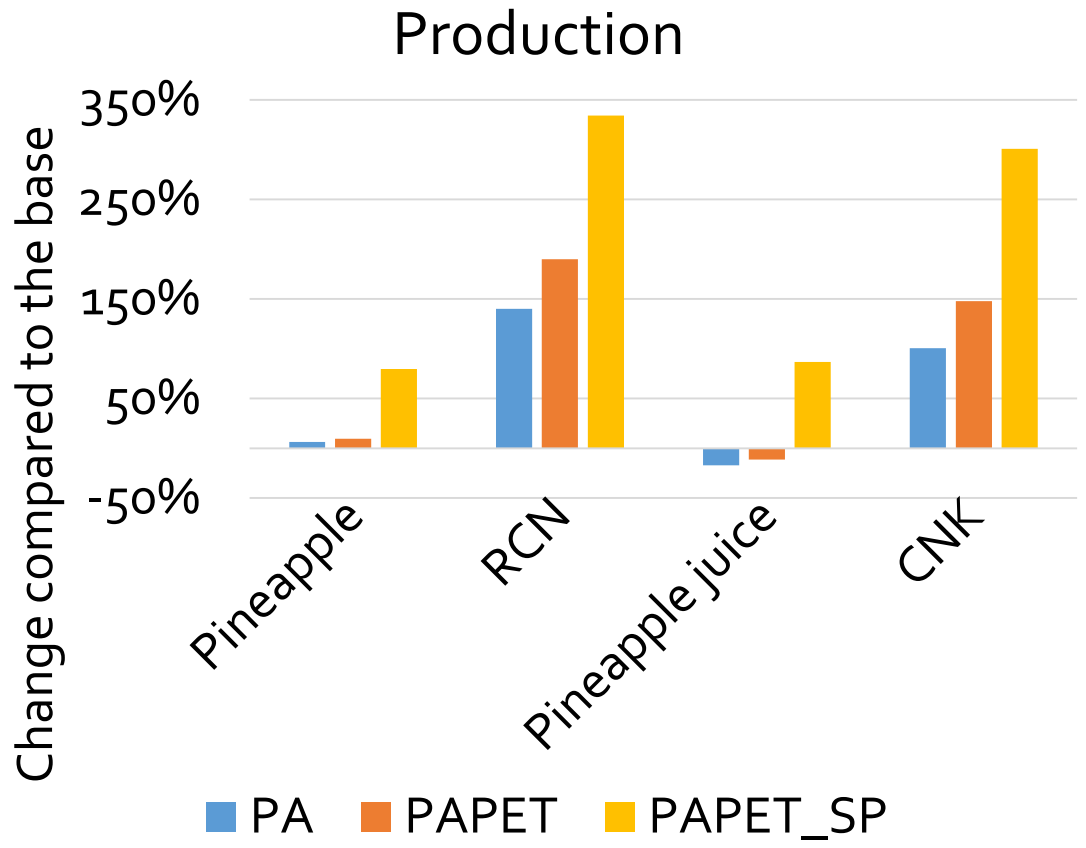
PA: Productivity increase in Agriculture

PAPET: Abolishment of export tax for cashew nut kernel (0.7%) and pineapple juice (0.7%) on top of the **PA** scenario

PAPET_SP: Subsidy on processing of cashew and pineapple on top of the **PAPET** scenario

- Reach **PNIASAN** target for cashew (50% of production being processed ➔100,017 t RCN: 300% increase in cashew kernel)
- No specific target for pineapple processing in **PNIASAN**, we use the same target as cashew **(**50% of production being processed ➔251,206.5 t pineapple: 120% increase in industrial pineapple juice**)**

Effects on productions and prices (1/3)



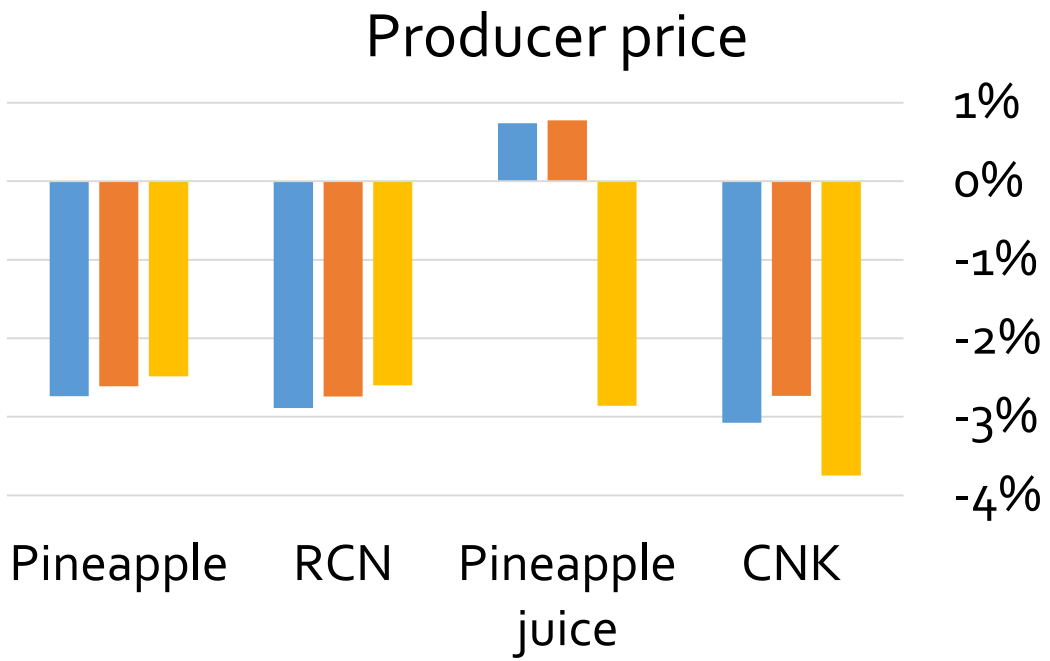


Fig. 4 Production and price change for RNC and CNK; pineapple and its juice commodity relatively to the base

Effects on productions and prices (2/3)

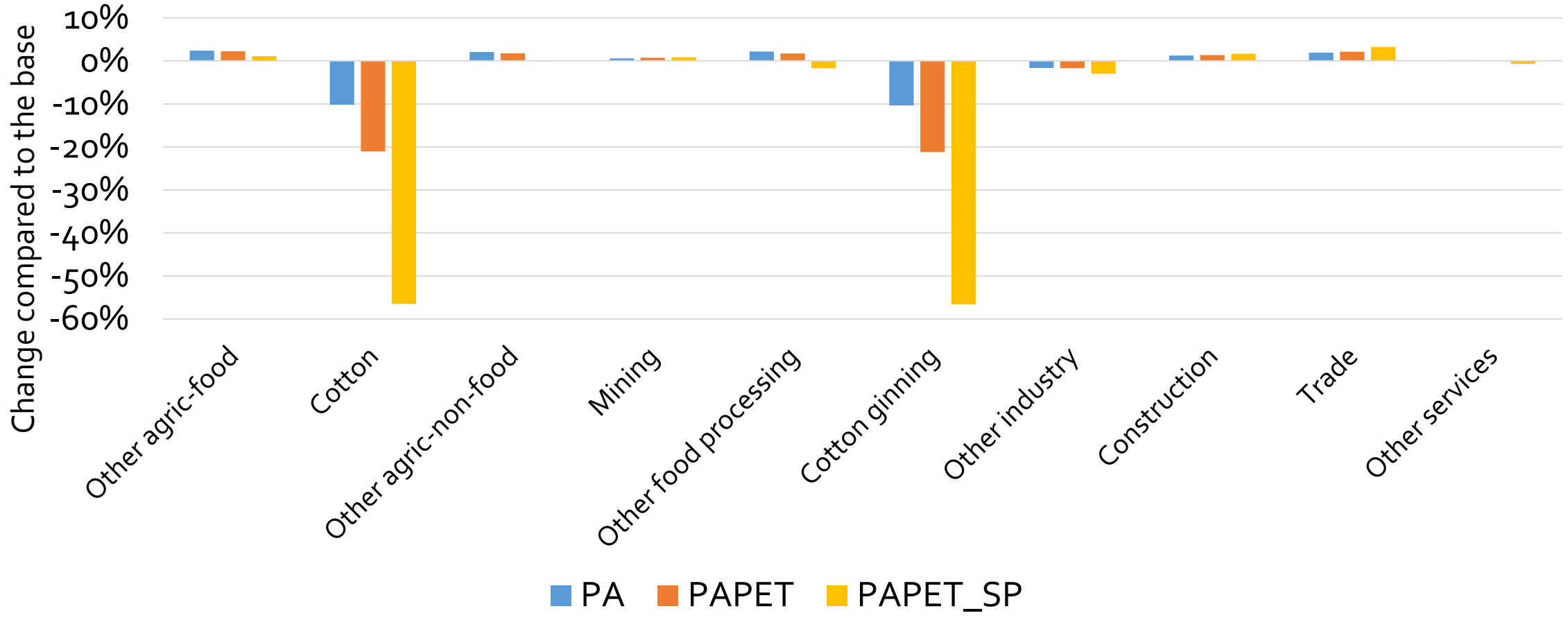


Fig. 5 Production change of other commodities relatively to the base

Effects on productions and prices (3/3)

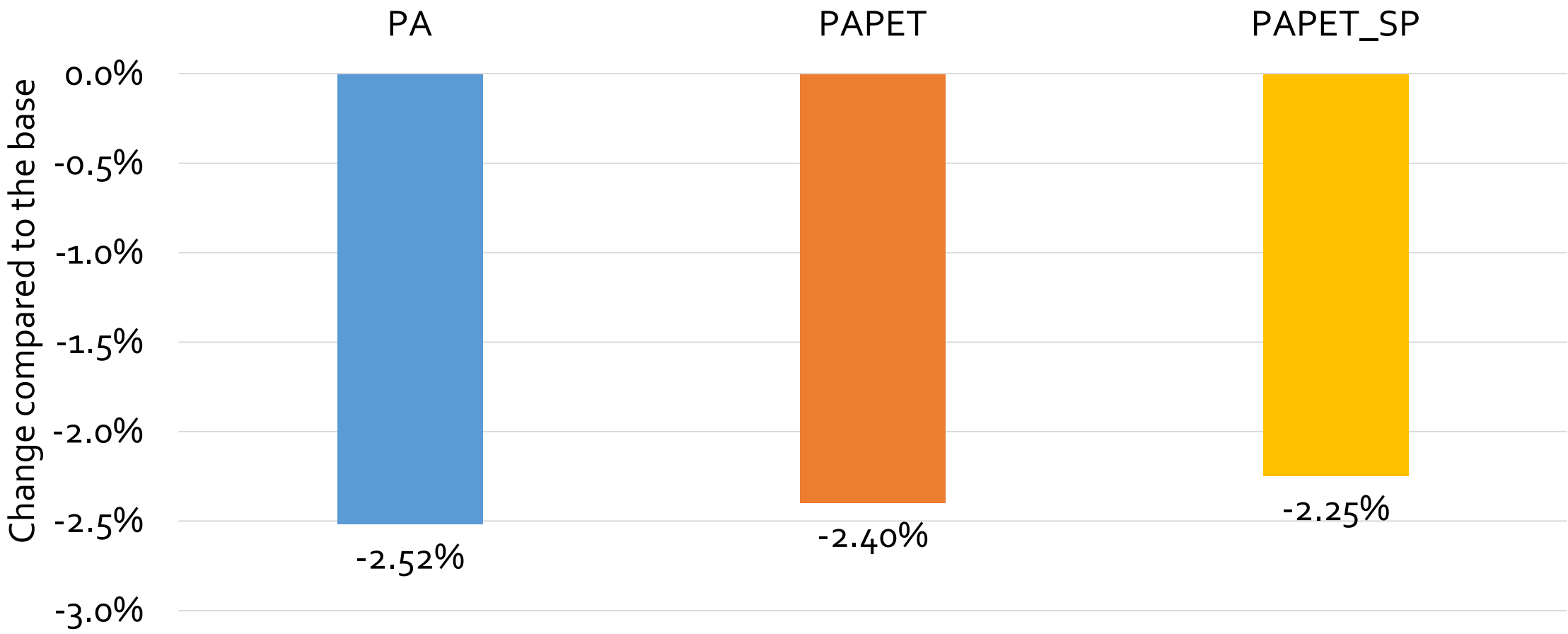


Fig. 6 Average agricultural price change relatively to the base

Effects on price change intensity (1/1)

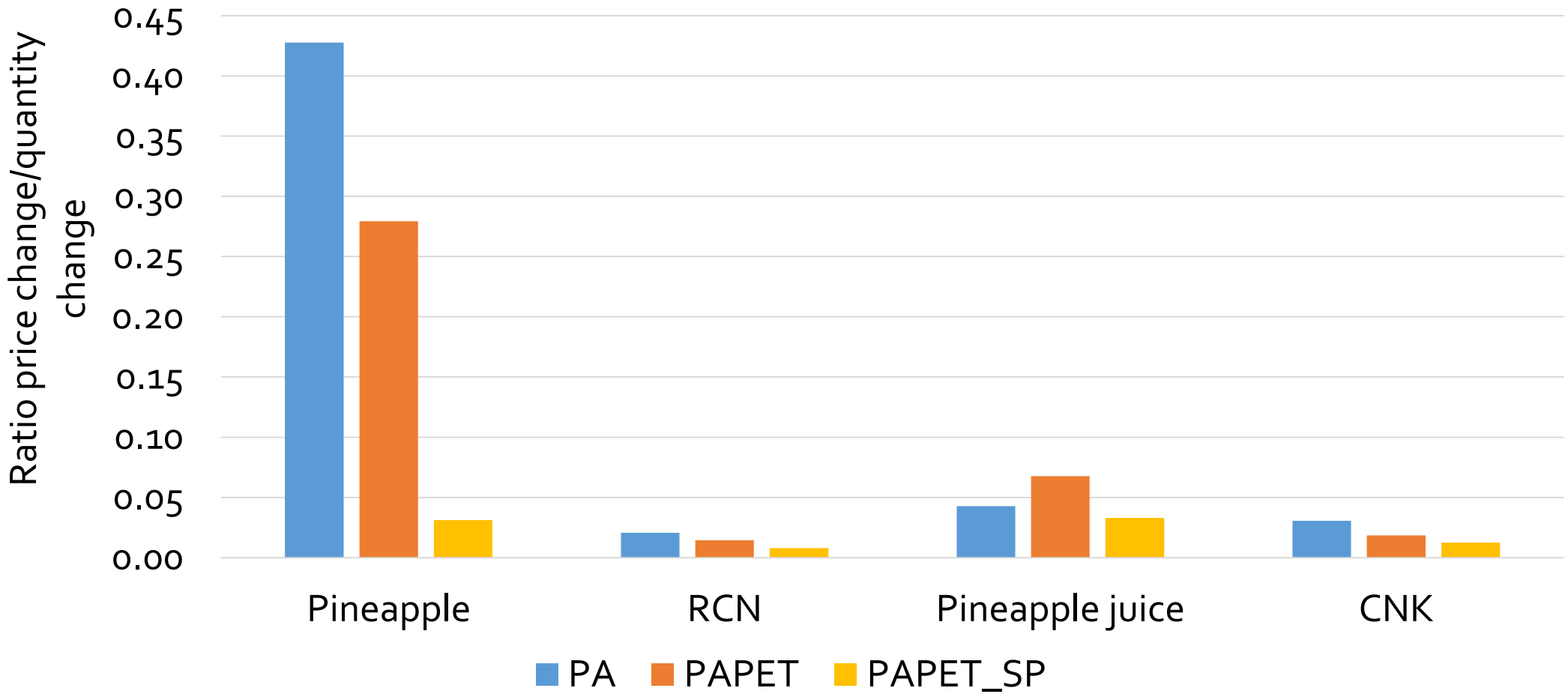


Fig. 7 Price change relatively to the quantity change for RNC and CNK; pineapple and pineapple juice

Macroeconomic effects (1/1)

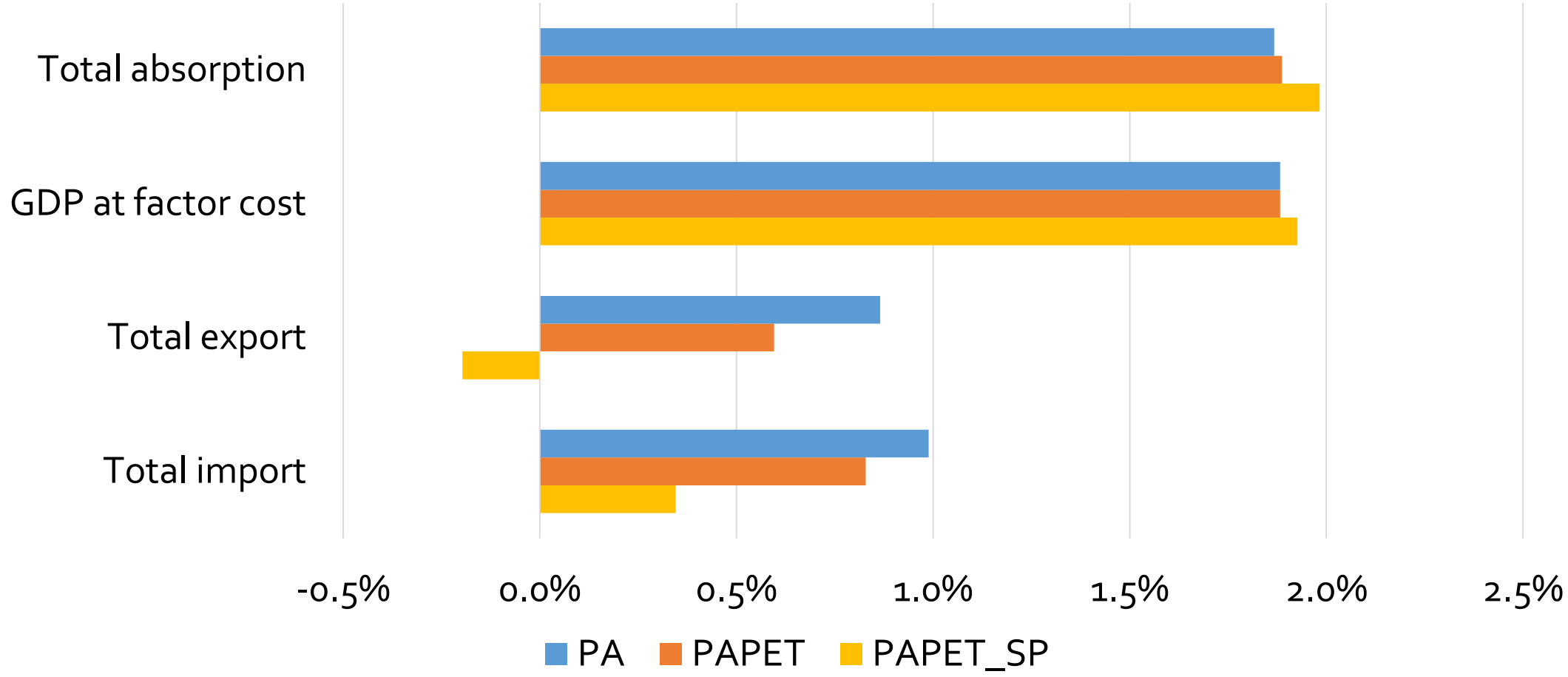


Fig. 8 Change in macro indicators relatively to the base

Effects on factors‘ prices (1/1)

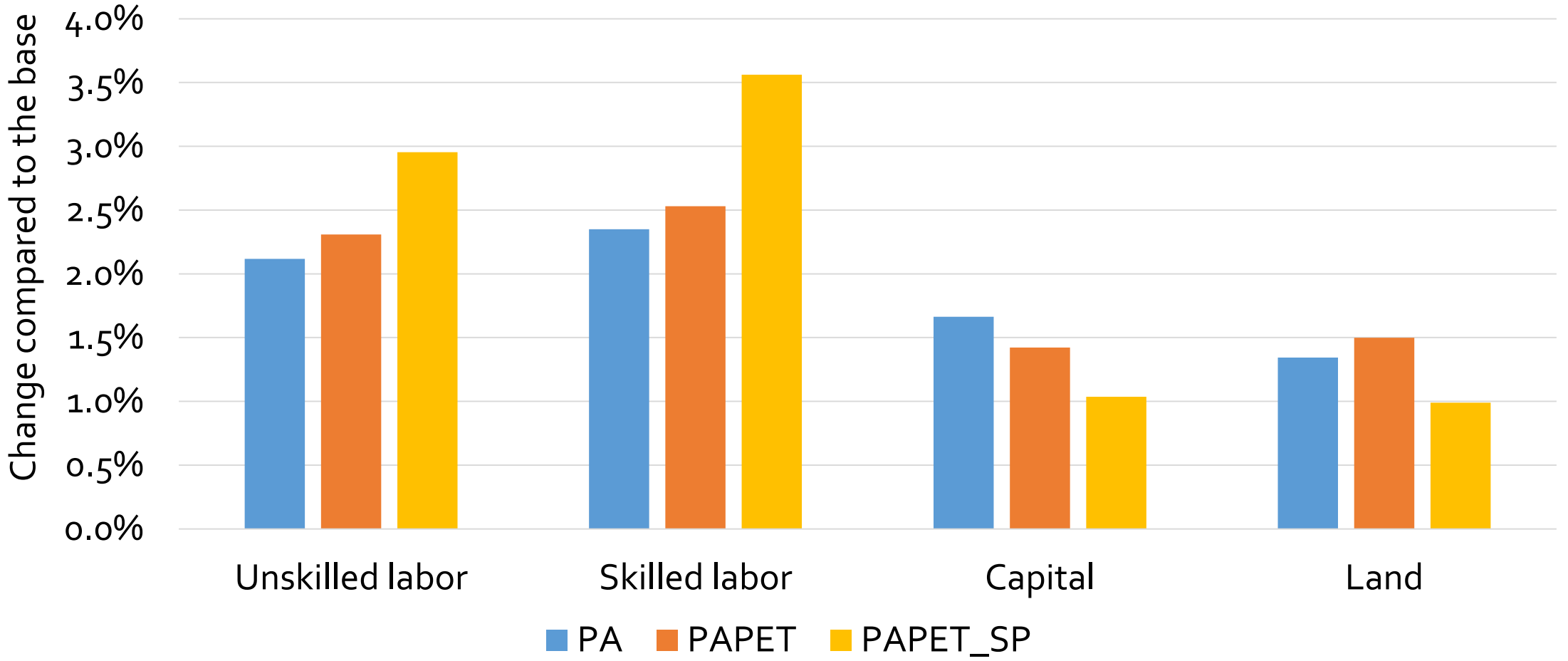


Fig. 9 Change in factor price relatively to the base

Effects on household income tax rate (1/1)

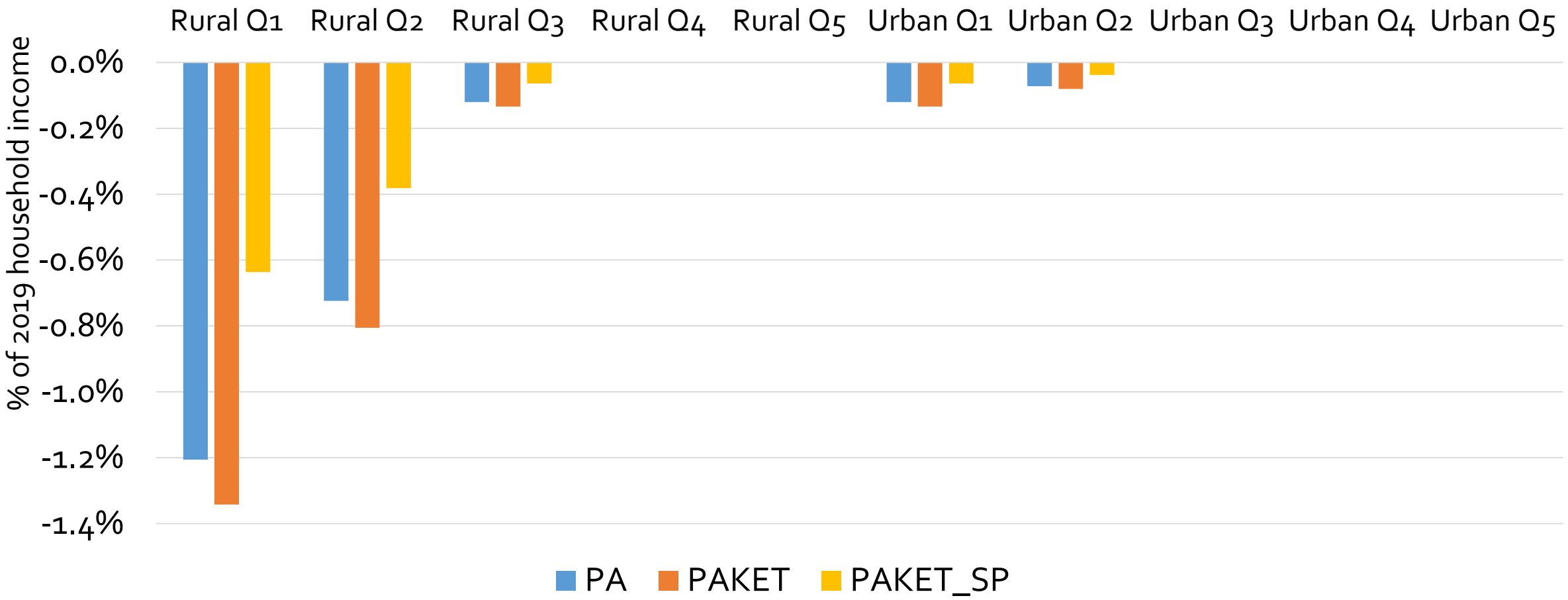


Fig. 10 Change in income tax rate relatively to the base household income

Effects on Household welfare (1/1)

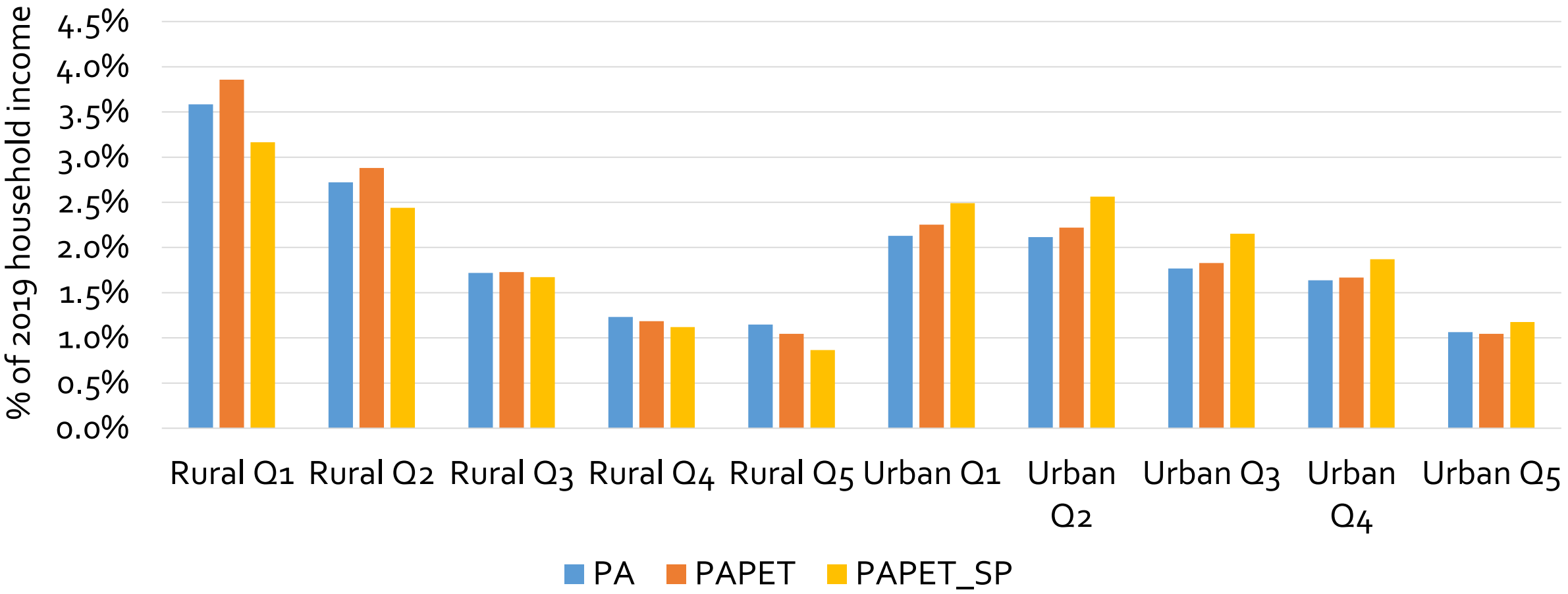


Fig. 11 Change in Household welfare relatively to the base household income (EV)

Conclusion and implications (1/2)

- Processing development on top of the productivity increase ➔ prices fall less (ratio price change/quantity change for agricultural products: 3-14 times lower than in case of only agricultural productivity increase)
- Benin‘s economy better off with expanding food-processing
- The processing development in the PAPET scenario contributes to improved livelihood of rural and urban poor households➔ poverty reduction
- Subsidizing the processing sector may decrease the pro-poorness of the processing development depending on financing

Conclusion and implications (2/2)

- **Policy implication for sustained agricultural development**
  - Invest in processing development to better sustain agricultural raw product prices
- **Limitations**
  - Financing the productivity increase not modelled
  - Influence on other crops not controlled (fully mobile production factors)

THANKS FOR YOUR ATTENTION

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Sources (1/1)

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Annex: Effects on other price change intensity (1/1)

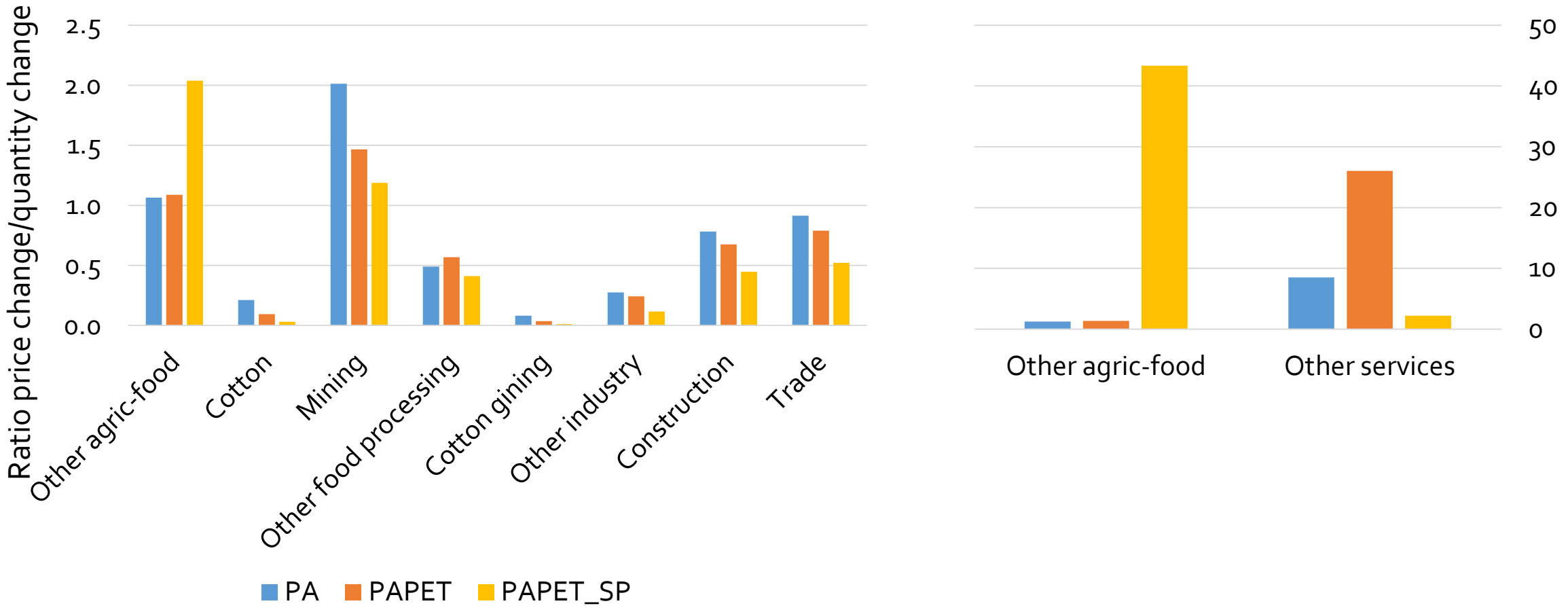

Fig. A1 Price change relatively to the quantity change for other commodities