Anticipation, Habits, and Dynamic Welfare Gains From Trade

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Outline

Outline

"Trade isn't about goods. Trade is about information. Goods sit in the warehouse until information moves them." C. J. Cherryh

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- Striking new trade agreements is far from an easy walk in the park.
- Moser and Rose (2012) analyse 88 regional trade agreements between 1988 and 2009 and find an average of about two years.
  - They find that negotiations take less time if countries are already open and import competition has already been active.
- The opposite of trade liberalisation, trade sanctions and embargoes, are usually implemented very rapidly.

- Anticipation, timing, and uncertainty about the economic environment are crucial elements of dynamic welfare measurements.
  - They are largely missing in the standard trade models, in which trade barriers are almost unrelated to the well-being of households — so much so that a hypothetical movement to autarky costs very little (ACR (2012): "New trade models, same old gains?").
  - Such models purport that trade is balanced at all times and temporal considerations play little if any role.
- Three-fold objective: how to introduce dynamics? what is the role of anticipation? how do gains from trade change?

- Welfare gains from trade: Arkolakis et al. (2012) (ACR). Gains recovered from import penetration ratio and trade elasticity. The resulting welfare gains turn out to be surprisingly low.
- Costinot and Rodríguez-Clare (2018) stress that the current trade flows can be informative only about the contemporaneous welfare cost of autarky.
- Feenstra (2018a) stresses three sources of conditional gains from trade, namely, *new import varieties*, *firm selection*, and the decline in *mark-ups due to import competition*.
- Industry-level transformations captured in static models, such as Melitz and Trefler (2012), Ramondo and Rodríguez-Clare (2013), Simonovska and Waugh (2014), and Melitz and Redding (2014).

- Connolly and Valderrama (2005) and Alessandria et al. (2018) admit dynamic responses but mechanisms very different, respectively: protection of Intellectual Property Rights (IPRs) and trade liberalisation, and substitutability between the creation of new firms and export capacity.
- Sampson (2016): the traditional static resource reallocation channel overlooks a dynamic complementarity between selection-induced reallocation and technology diffusion.
- The interplay between trade imbalances and gains from trade is examined by Ravikumar et al. (2017) using a multi-country model, though, unlike our model, their transition path is driven primarily by capital accumulation.
- Traditionally, dynamic aspects of trade are covered in the context of long-run economic growth (Baldwin (1992), Mazumdar (1996), Brooks and Pujolas (2018), Young (1991), Taylor (1994), Eicher (1999), etc.) rather than a business cycle environment such as ours.

- Our framework *relaxes the assumption of balanced trade at all times* and *predicts counter-cyclical movements in the trade elasticity* that smooth consumption over time thanks to the counter-cyclical variability in the price mark-ups.
- This *smoothing component* that works through the shift in the **terms of trade** generates substantially greater non-zero sum welfare gains from trade than would otherwise be predicted by a static model where, by construction, the *dynamic path of consumption* plays no role.
- Introduce the role of expectations and sequencing of trade reforms while preserving the empirical tractability of the ubiquitous gravity equation.

- We extend the gravity model by including the deep relative habits as in Ravn et al. (2006).
- Predictive inter-temporal patterns of consumption make *expectations about the future* critically important.
- The price mark-ups are no longer constant and instead amplify, in a non-linear way, the shift in the terms of trade due to trade reforms.
  - The magnitude of the indirect price mark-up effect depends on the *state of the business cycle* — it is enhanced in the expansionary period and dampened in the recession.
- *The long-run trade elasticity remains significantly greater in a dynamic model*, aggravating the welfare consequences of trade reforms when compared to the static environment.

Findings I

- A static measure of gains from trade is biased downwards **by more than 70%** *regardless* of whether trade distortions were *anticipated* or *unanticipated*.
- Anticipated trade reforms take around **25% greater toll on trade imbalances**.
  - When the decrease in trade costs is anticipated, the consumption of foreign varieties would increase less rapidly than when changes in trade costs come as a surprise.
  - Aggregate income starts to decline in anticipation of opening up, while aggregate consumption remains intact until after the trade reform is implemented.

Findings II

- Unanticipated policy measures aimed at increasing the trade costs run the risk of *front-loading the detrimental welfare effects* if consumers do not have enough time to adjust their habits.
- The concerns over the distribution of income thus explain why, in practice, it takes so much time to enforce FTAs: domestic consumers gain at the expense of domestic producers, whose interest is to prolong the transition period in order to *exploit the market power* before foreign competition penetrates the market.
- While this outcome may be justified on political grounds in the short run, it is second-best in the long run from the perspective of the entire economy because these delays generate more pronounced *trade imbalances*.

Remark

Note

Model is consistent with the view that trade liberalisation ought to take longer if domestic firms are expected to be hindered by fierce competition from abroad, but not if the economy is already open to international competition (Moser and Rose, 2012).

- Since the model, unlike standard literature, is dynamic, our framework admits comparisons of reductions in trade costs:
  - permanent versus temporary,
  - anticipated versus unanticipated.

Outline

Supply Side

- There are $n = 1, 2, ..., N$ economies evolving over discrete time $t = 0, 1, 2, ...$, populated by a unit mass of consumers and firms, $\omega \in [0, 1]$, operating in a continuum of sectors, $s \in [0, 1]$.
- An imperfectly substitutable variety operates labour-intensive technology.
- Delivering a unit of commodity costs a stochastic proportion $d_{in,t} - 1 \in (0, 1)$ such that $d_{in,t} = d_{in,t-1}^{\phi_{in}} \tau_{in}^{1-\phi_{in}} \exp(\sigma_{d,n} \epsilon_{d,n,t})$, where $\sigma_{d,n} > 0$, and $\phi_{in} \in [0, 1)$.
- CES aggregator augmented by deep relative habits à la Ravn et al. (2006):

$$X_{in,t}(s) = \left[\int_0^1 \left(M_{in,t}(s, \omega) A_{in,t-1}(\omega)^{\chi_{in}} \right)^{1-1/\eta} d\omega \right]^{1/(1-1/\eta)},$$

where $\eta > 1$ intra-temporal elasticity of substitution, $\chi_{in} \geq 0$ the intensity of relative habits, $M_{in,t}(s, \omega)$ the contemporaneous sectoral output of commodities, $A_{in,t}(\omega) = M_{in,t}(\omega)/z_{n,t}$ the effective stock of habit. In fact, similar to allowing for adjustment costs in consumption.

- The optimal nominal price and output set by the firms follow from:

$$\max_{\{P_{in,t}(\omega),\, M_{in,t}(\omega)\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \zeta_{i,t,t+1} \sum_{i=1}^{N} \left[\frac{P_{in,t}(\omega)}{P_{n,t}} - mc_{in,t} \right] M_{in,t}(\omega)$$

$$\text{s.t.} \quad \underbrace{M_{in,t}(\omega) = X_{in,t} \left[\frac{P_{in,t}(\omega)}{P_{in,t}} \right]^{-\eta} A_{in,t-1}(\omega)^{\chi_{in}(\eta-1)}}_{\text{A dynamic demand schedule for imports}},$$

  where $mc_{in,t}$ the real unit costs of production, $P_{n,t}$ the aggregate deflator, and $\zeta_{i,t,t+1}$ the stochastic discount factor.

- The first order condition of the firm:

$$\frac{P_{in,t}(\omega)}{P_{n,t}} = mc_{in,t} \left(\frac{\eta}{\eta - 1} \right) - \chi_{in} \mathbb{E}_t \underbrace{\left[\frac{\zeta_{i,t,t+1} P_{in,t+1}(\omega) M_{in,t+1}(\omega)}{P_{n,t+1} M_{in,t}(\omega)} \right]}_{\text{PV of future sales growth}}.$$

Demand Side

- The consumer minimises the nominal value of expenditure $P_{n,t}C_{n,t} - \sum_{i=1}^{N} P_{in,t}X_{in,t}$, subject to:

$$C_{n,t} = \left[\sum_{i=1}^{N} X_{in,t}^{1-1/\eta}\right]^{1/(1-1/\eta)}.$$

- This gives rise to a static demand schedule:

$$X_{in,t} = C_{n,t}\left(\frac{P_{in,t}}{P_{n,t}}\right)^{-\eta}.$$

- Lifetime utility subject to budget constraints:

$$\max_{\{C_{n,t},H_{n,t},B_{n,t+1}\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \log\left(\frac{C_{n,t}}{z_{n,t}}\right) - \frac{\psi_n H_{n,t}^{1+\varphi}}{1+\varphi},$$

$$\text{s.t.} \quad C_{n,t} + \mathbb{E}_t[\zeta_{n,t,t+1}B_{n,t+1}] = B_{n,t} + W_{n,t}H_{n,t} + \Pi_{n,t},$$

$B_{n,t}$ is the stock of internationally-traded Arrow-Debreu bonds priced $\zeta_{n,t,t+1}$.

- The Euler equation, the inverse labour supply schedule, and the perfect consumption risk sharing relationship, respectively:

$$1 = \beta \mathbb{E}_t \left[\frac{C_{n,t}}{\zeta_{n,t,t+1} C_{n,t+1}} \right], \tag{1}$$

$$W_{n,t} = \psi_n C_{n,t} H_{n,t}^{\varphi}. \tag{2}$$

$$q_{in,t} = \frac{Q_{in,t} P_{i,t}}{P_{n,t}} = \frac{z_{i,t} C_{n,t}}{z_{n,t} C_{i,t}}. \tag{3}$$

- Complete financial market structure and symmetric initial condition for the net foreign asset positions give rise to the standard consumption risk-sharing relationship à la Backus and Smith (1993) as shown in equation (3).

- In equilibrium, the dynamic demand for imports and the optimal price mark-up are:

$$m_{in,t} = \frac{M_{in,t}}{z_{n,t}} = x_{in,t} m_{in,t-1}^{-\chi_{in}},$$

$$\mu_{in,t} = \frac{p_{in,t}}{mc_{in,t}} = \left(\frac{\eta}{\eta - 1}\right) \frac{1}{1 + \chi_{in}\beta \mathbb{E}_t[\tilde{\alpha}_{in,t+1}] \tilde{m}_{in,t}^{-\chi_{in}}},$$

  where $\tilde{\alpha}_{in,t} = \alpha_{in,t}/\alpha_{in,t-1}$ and $\tilde{m}_{in,t} = m_{in,t}/m_{in,t-1}$.
- The optimal price mark-up is **increasing in the contemporaneous growth of demand for imports** $\tilde{m}_{in,t}$, but **decreasing in anticipation of a rise in the import penetration ratio** $\tilde{\alpha}_{in,t+1}$.
- Long-run trade imbalances may be sustained by a corresponding imbalance in the capital account, which in this model corresponds to a permanent inflow or outflow of bonds.

Outline

Proposition

If consumers form deep relative habits over consumption preferences, then the average trade elasticity is lower than $1/(1-\eta) < 0$ *and increasing in the price mark-up* $\mu_{nn,t}$*, with an endogenous component of the trade elasticity given by:*

$$\Gamma_{n,t} = 1 - \frac{(1-\eta)(1-\chi_{nn})[\eta + (1-\eta)\mu_{nn,t}]}{\eta - \chi_{nn}[\eta + (1-\eta)\mu_{nn,t}]} > 1.$$

- The rationale similar to the pro-competitive effects in trade liberalisation and business cycle literature, associated with firm entry and exit (see Jaimovich and Floetotto (2008) and Feenstra (2018b)).
- A rise in the trade costs $d_{in,t}$ increases the demand for domestic goods $m_{nn,t}$ and decreases the demand for foreign goods $m_{in,t}$: domestic producers gain more market power at home and increase domestic price mark-ups $\mu_{nn,t}$. The greater is the deep habit parameter χ_{nn}, the lower and the more unstable is the economy-wide average price mark-up.

Proposition

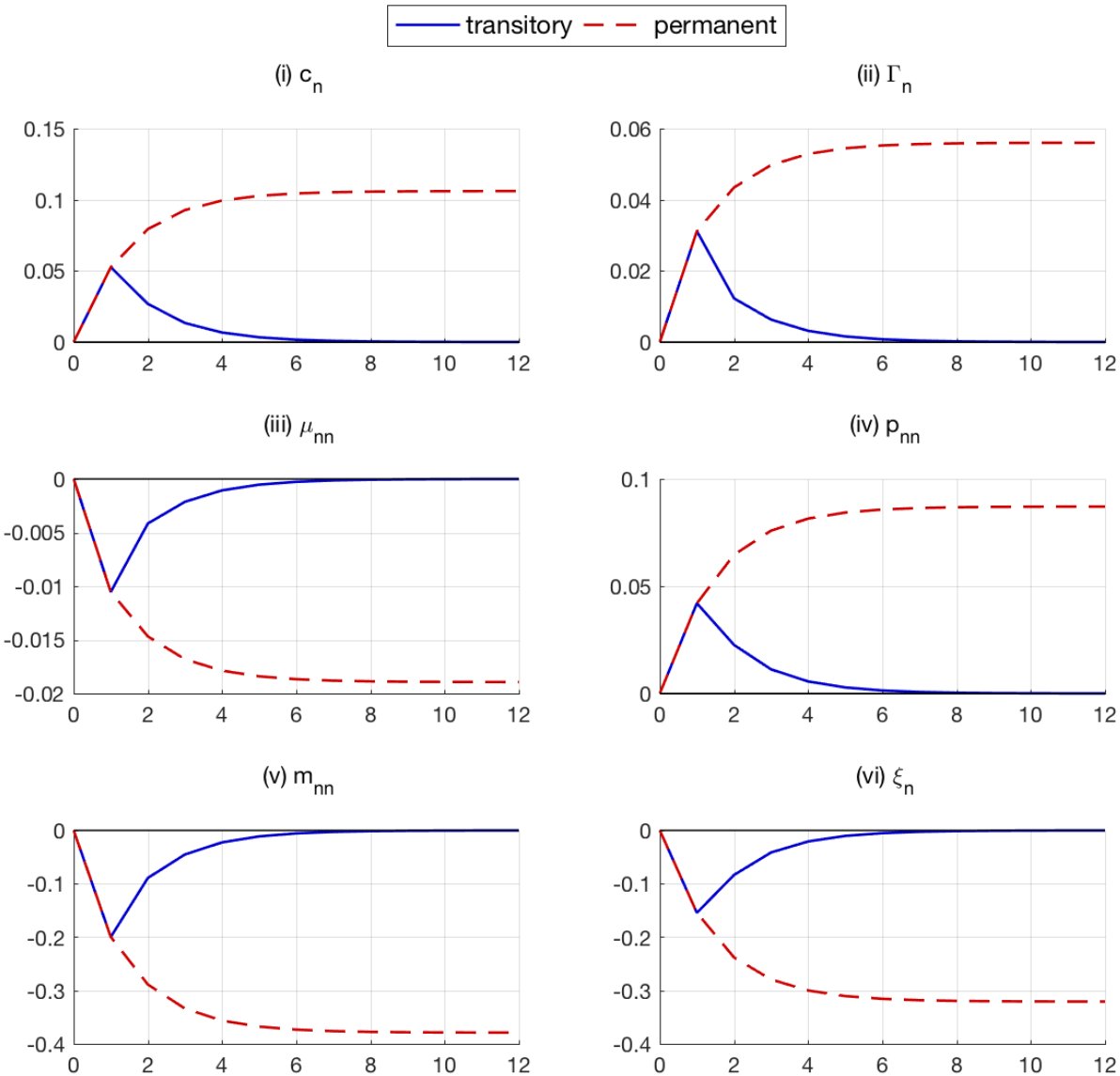
If the firm price mark-ups are time-varying due to deep relative habits, then the welfare gains from trade are quantified by scaling the home-bias with the trade elasticity and a new, ***smoothing term****:*

$$\hat{c}_{n,t} = \hat{\alpha}_{nn,t}^{(\Gamma_{n,t}+\Theta_{n,t})/(1-\eta)},$$

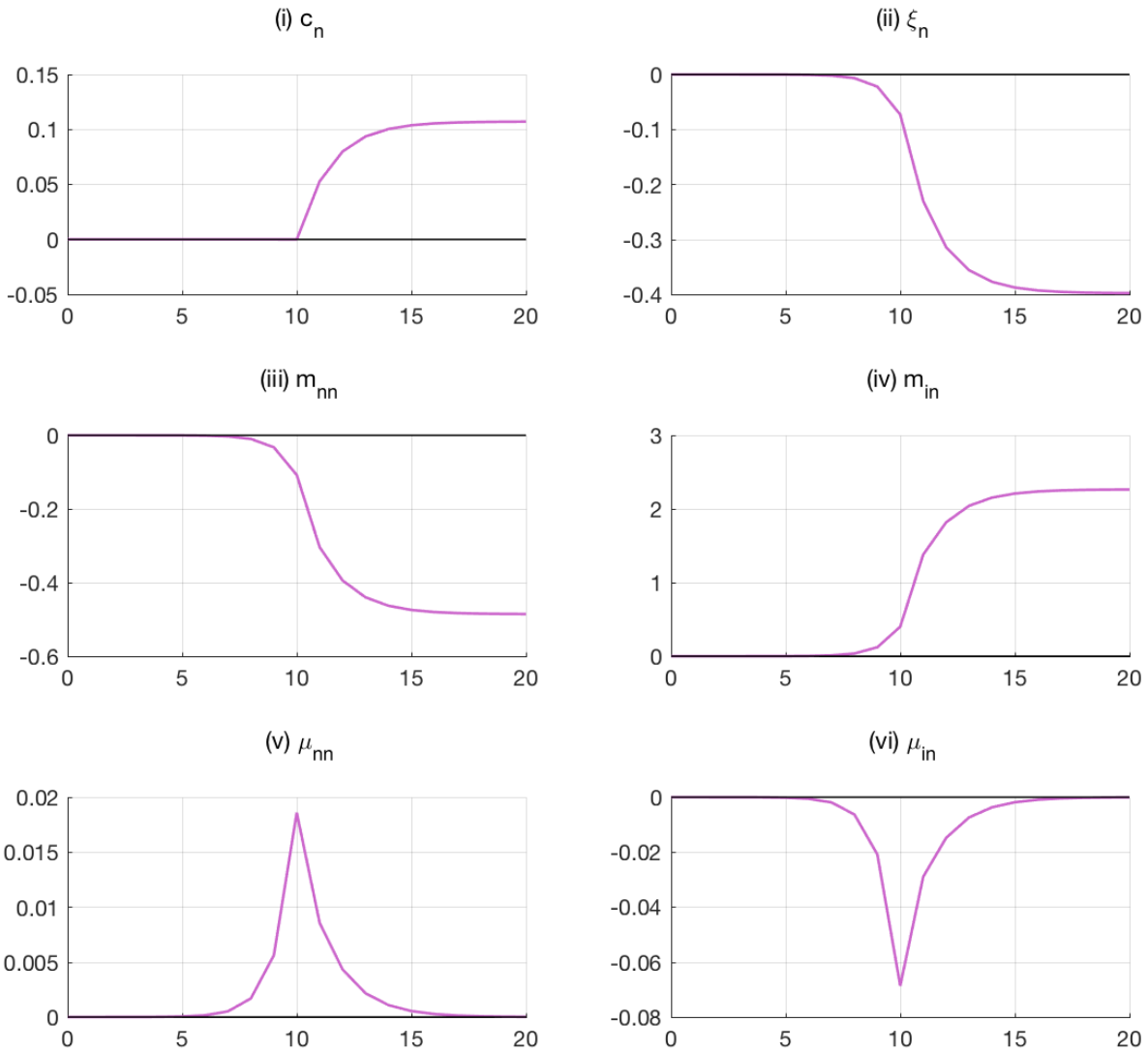
where $\Theta_{n,t} = \sum_{j=1}^{T}(-\ln(\hat{\mu}_{nn,t}))^j \Delta_{n,t}^{(j)}$, *while* $\Delta_{n,t}^{(j)} = \mu_{nn,t}(\partial \Delta_{n,t}^{(j-1)}/\partial \mu_{nn,t})$ *for all* $j > 1$, *and* $\Delta_{n,t}^{(1)} = \mu_{nn,t}(\partial \Gamma_{n,t}/\partial \mu_{nn,t})$.

- We coin the term $\Theta_{n,t} \geq 0$ as the ***smoothing term***. It captures two distinct dimensions:
  - The **direct income effect** associated with the shifts in the terms of trade upon realised innovations in trade costs.
  - The **indirect effect of counter-cyclical price mark-up adjustments**, which induce counter-cyclical variation in the trade elasticity.
- It introduces **state-dependence**.

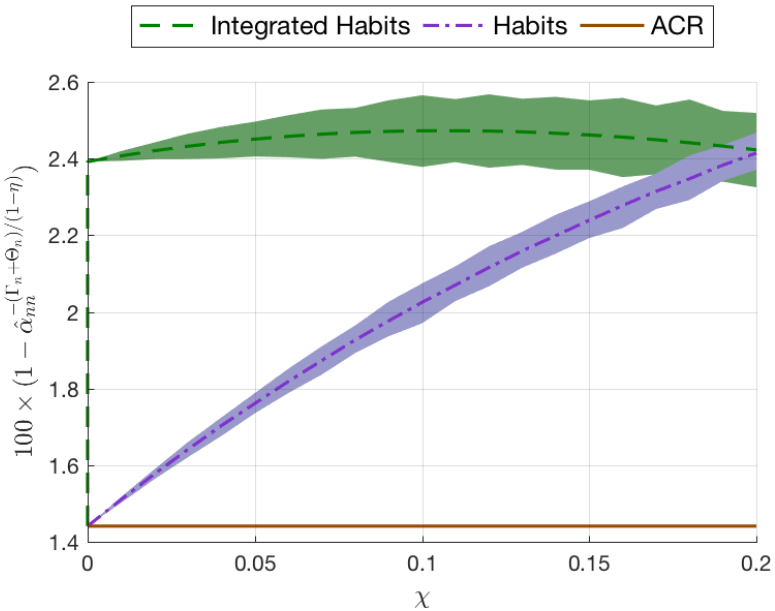
Unanticipated 5% Decline in Trade Costs

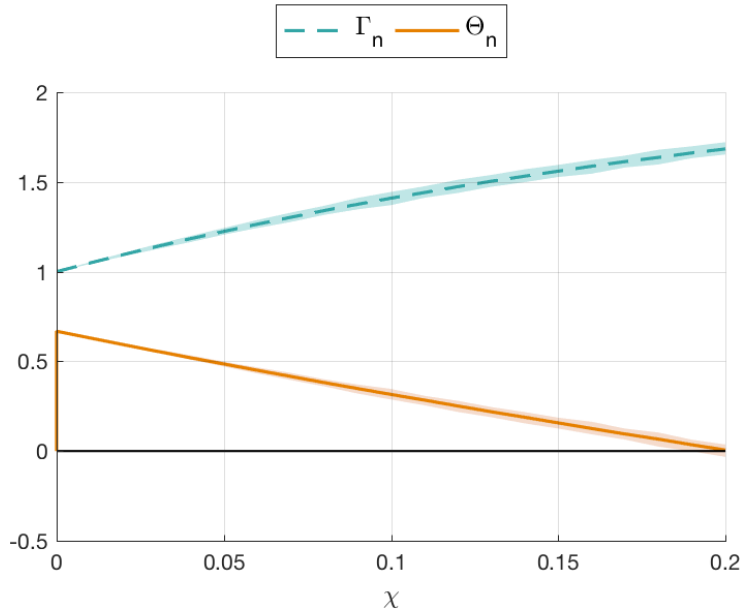


Anticipated 5% Decline in Trade Costs



Habit Intensity & Welfare Gains From Trade





The welfare gains from trade are expressed in percentage points of real effective consumption per capita. They are measured relative to the state of autarky when the home bias parameter $\hat{\alpha}_{nn} = 0.93$ and the elasticity of substitution $\eta = 6$. The integral terms Γ_n and Θ_n are sample averages over 1000 synthetic data points. The shaded areas represent the range between the minimum and the maximum obtained for any given value of the deep relative habit.

Outline

Conclusions

- We extend the workhorse quantitative trade model to a dynamic and stochastic setting, where consumers form deep relative habits in their consumption preferences.
- The correctly anticipated habit formation by the firms leads to counter-cyclical and persistent price mark-up adjustment in response to an unanticipated innovation in trade costs: introduction of an additional smoothing term.
- Simulations of the parsimonious model predict that the counter-cyclical adjustment of the mark-up due to deep relative habits enhances the welfare gains from trade up to around 2.4% of consumption per capita, compared to 1.4% if the model was static and deterministic (or by more than 70%).

- Results compatible with the view that once trade liberalisation heavily involves influential import competing sectors, the process usually takes longer to admit an adjustment period.
- In order to maximise the immediacy of the real effects of trade liberalisation policies, the model suggests that they should be implemented as rapidly as possible before the supply-side reforms take place.
- By contrast, if one were to impose trade sanctions with the goal of minimising welfare losses, then those policy measures ought to be anticipated and implemented gradually.

- Contrast results with alternative ways to allow for imbalanced trade and induced time variation in markups.
- Important real world relevant additions include:
  - Extension to the asymmetric multi-country world to evaluate the importance of the proposed channel for the synchronised set of economies.
  - An incorporation of simultaneous changes in import and export barriers.
  - An incorporation of repeated changes in trade costs with an imperfect learning mechanism.
  - Endogenous shifts in market structure for purely domestic and domestic+trading heterogeneous firms.

Questions / Comments / Suggestions

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