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**The Takayama and Judge Price and Allocation Models and its application
in non-linear Price Transmission Analysis Approaches**

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*Poster prepared for presentation at the Agricultural & Applied Economics Association’s
2011 AAEA & NAREA Joint Annual Meeting, Pittsburgh, Pennsylvania, July 24-26, 2011*

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Introduction

Although price transmission analysis has gained much attention, still the linkage between the economic theory (the Takayama and Judge Allocation models) and the econometric techniques (the threshold vector error correction models) used on the analysis of the economic phenomena deserves more attention.

Aim

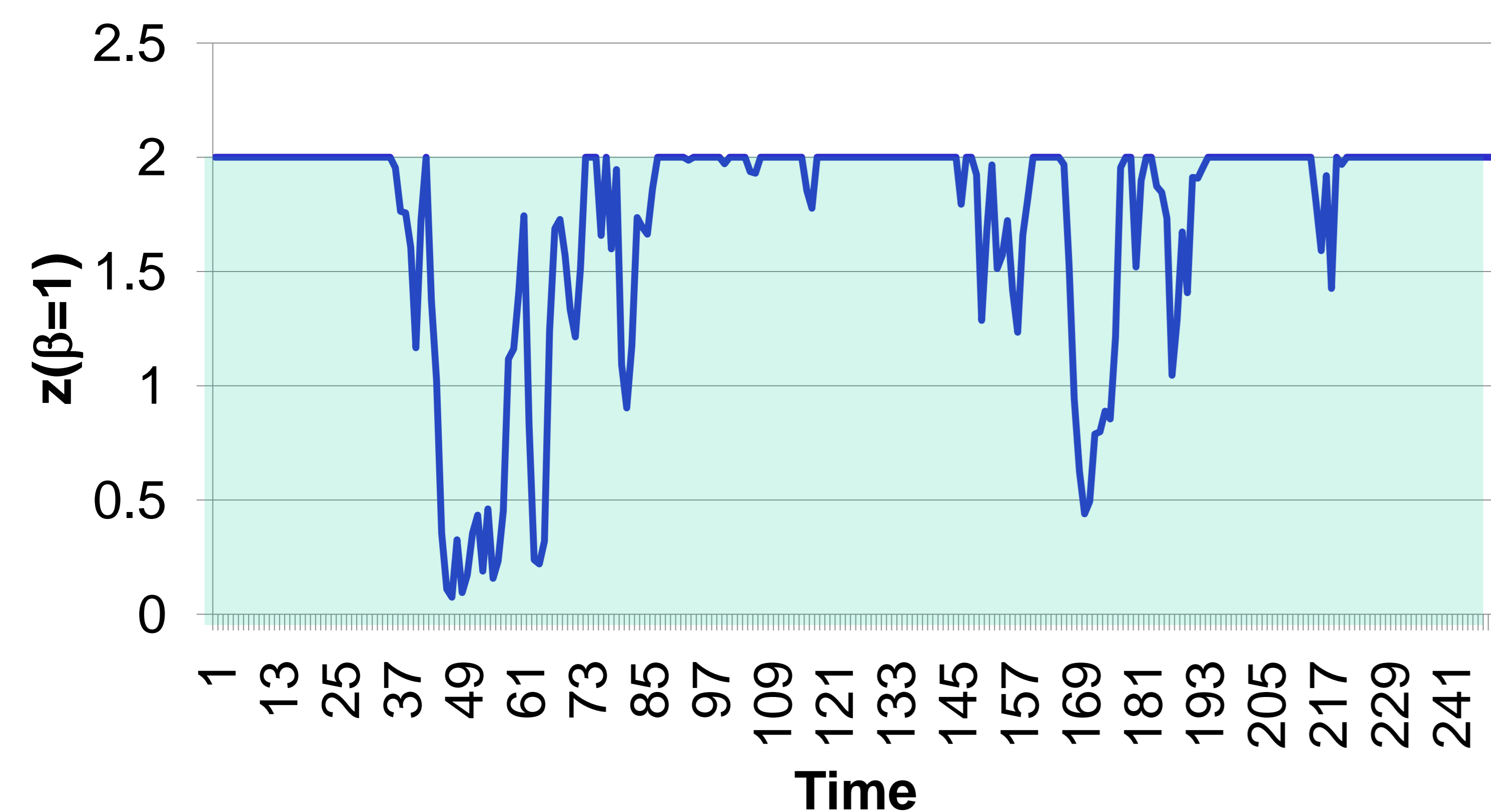
Generate artificial economic data under an economic framework to investigate how well it performs on the econometric models

Theoretical Background

The spatial equilibrium condition or Law of One Price (LOP) bounds prices in an equilibrium region (delimited by transaction costs) on which profits are not possible.

$$p_i - p_j \leq t_{ji}$$

Figure 1. Law of One Price



Threshold Vector Correction Models (TVECM) consider a long run relationship such that

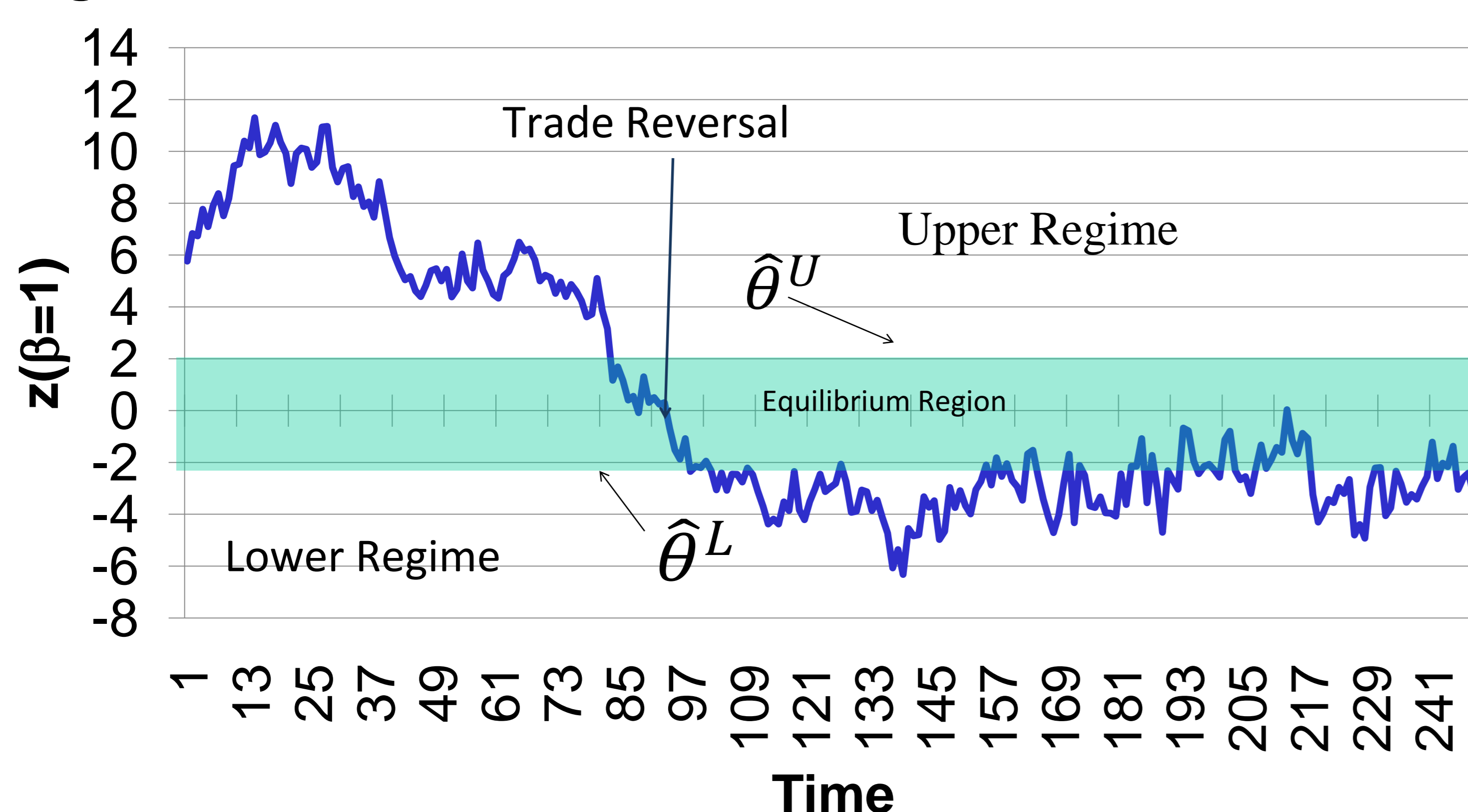
$$z_t = \beta P_{j,t} - P_{i,t} \quad \text{and} \quad z_t = \rho^{(i)} z_{t-1} + \varepsilon_t$$

Where the error correction term z has a threshold value (regimes)

$$\rho^{(i)} = \begin{cases} \rho^{(M)} & \text{if } |z_{t-1}| \leq \theta \\ \rho^{(U)} & \text{if } |z_{t-1}| > \theta \end{cases}$$

In the middle regime: z has a unit root; in the upper regime z is a stationary process

Figure 2. Threshold Vector Error Correction Model



Method and Simulations

1. Generate artificial prices using the Takayama & Judge models
 - By construction $\theta=2$, and $\beta=1$
 - Impose a restriction on trade and model prices as a $I(1)$

Table 1. Simulations (1000 repetitions with 250 time periods)

	Case 1	Case 2	Case 3	Case 4
Equilibrium	X	X	X	X
Disequilibrium		X		X
Trade Reversal			X	X

2. Use the artificial prices to estimate TVECM using a the grid search proposed by Hansen and Seo

Table 2. TVECM estimated models ($\pi_0 = 0.05, 0.10$, and 0.15)

	M1	M2	M3	M4	M5
Two regimes	Case 1	Case 2			
Three regimes			Case 2	Case 3	Case 4

3. Compare the true parameters versus the estimated parameters (bias on the estimates) and test if the estimated parameters are normally distributed

Results

1. The number of feasible solutions for the TVECM depends on variation of z_{t-1}
2. The parameters are not normally distributed
3. Underestimation of the equilibrium region affected by π_0
 - As π_0 increases $\hat{\theta}^U$ decrease
 - As π_0 increases $\hat{\theta}^L$ increase
 - The symmetry of the middle band is lost
4. Bias on $\hat{\beta}$
 - No influence of π_0 on M1, M2 and M3
 - In M4 and M5 as π_0 increases $\hat{\beta}$ decreases
5. The effect of the restriction is unclear

Conclusions

1. Conceptual problem between the economic theory and the econometric methods
2. Estimation of the TVECM using the grid search proposed by Hansen & Seo produce bias on the estimated parameters
3. The bias is linked to the selection of the trimming parameter value for the thresholds estimates.
4. Unclear what causes bias on the cointegration vector
5. Further research on the restriction effect

Acknowledgements: The author would like to thank the Courant Research Centre “Poverty, Equity and Growth in Developing countries” at the Georg-August Göttingen Universität for the financial support, as well as the colleagues from the Agricultural Policy Chair