

How important is tourism for the international transmission of cyclical fluctuations? Evidence from the Mediterranean.

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1 Introduction

Business cycles in the Mediterranean peculiar relative to ROW:

- Heterogeneous with a non-negligible idiosyncratic components (Canova and Ciccarelli, 2012, JIE).
- Each country more correlated with the EU than the neighbors, but
- Time variations are unrelated to preferential trade and financial agreements signed with EU (Canova and Schlaepfer, 2014, JOAE).
- Macro indicators, geography, institutions, etc. partially matter for cyclical synchronization.
- Cultural indicators seem important for durations and amplitudes (Altug and Canova, 2013, OER).

What other factors explain the peculiar business cycles of the region?

- Study the international propagation of cyclical fluctuations to the Mediterranean through the lenses of tourism flows. Three main questions:

1. Do output fluctuations originating abroad propagate to the Mediterranean basin via the tourism channel?

2. How important shocks impinging on tourism flows are for cyclical fluctuations in the Mediterranean?

3. Can we rationalize the findings with a model?

- **Why tourism?**

- Tourism flows to the region are growing rapidly. Compounded growth rate of international tourist arrivals in 1990-2010: 325% vs. 214% worldwide.

- Tourism is crucial for local economies:

- i) Tourism related activities is around 10% of GDP.

- ii) Employment in the tourism sector is around 13.5% of total employment (in Tunisia and Egypt about 35%).

- iii) Tourism receipts is above 50% over total service receipts.

- iv) Since Arab spring tourists to Egypt, Tunisia, Syria dropped almost to zero. GDP growth dropped by 60-80 percent.

- Take bilateral tourism data
 - Look at reduced form evidence (static and dynamic correlations).
 - Use structural VARs.
 - Conduct a counterfactual.

- Take a International RBC model
 - Add tourism flows
 - Measure transmission with and without tourism channel.

Results

- Correlations between source country output cycles and tourism flows are modest, except in recessions. Correlations between tourism flows and cyclical activity in the destination countries are large.
- Unexpected source country output and tourist flows disturbances have important output effects in the destination country. Second round effects via investment.
- Imported shocks account for up to 80% of destination country fluctuations in output, consumption and investment; tourism shocks responsible for about 2/3 of it. Some cross country heterogeneity.
- Without the tourism channel, the effect of source country output shocks on domestic output would be, on average, about 30% smaller at all horizons.
- The model can account for some transmission facts.

Destination country	Source country	Arrivals	Nights	Pc Expenditure
Cyprus	Euro Area	1980 - 2010	- - - -	1995 - 2010
	United Kingdom	1980 - 2010	- - - -	1995 - 2010
	Russia	1994 - 2010	- - - -	1995 - 2010
Morocco	Euro Area	1992 - 2009	- - - -	- - - -
	United Kingdom	1992 - 2009	- - - -	- - - -
	France	1992 - 2009	- - - -	- - - -
Syria	Euro Area	1985 - 2008	- - - -	- - - -
	United Kingdom	1985 - 2008	- - - -	- - - -
	Russia	1995 - 2008	- - - -	- - - -
Tunisia	Euro Area	1988 - 2010	1987 - 2010	- - - -
	United Kingdom	1988 - 2010	1987 - 2010	- - - -
	France	1988 - 2010	- - - -	- - - -
Turkey	Euro Area	1984 - 2011	- - - -	- - - -
	United Kingdom	1984 - 2011	- - - -	- - - -
	Russia	1998 - 2011	- - - -	- - - -

- Need bilateral data. Total flows available for other countries, i.e. Albania, Croatia, Egypt, etc.
- Annual data. Quarterly data available only for Cyprus and Turkey.

Which variable to use?

- Core analysis: **Number of tourist arrivals** from the Euro area to Cyprus, Morocco, Syria, Tunisia and Turkey.
- Case studies: Cyprus-United Kingdom, Tunisia-France, Turkey-Russia.
- Robustness: **Number of nights** in Tunisia and **per-capita expenditure** in Cyprus.

Output in SC & Arrivals in MED	Static Lags or leads (in years)					Dynamic Frequencies	
	-2	-1	0	1	2	0	$\frac{\pi}{2}$
EA - CY	0.35*	0.109	0.20*	0.00	-0.28*	0.45*	0.11
UK - CY	0.04	-0.01	0.21*	0.18	0.11	0.31	0.27
EA - MA	0.03	0.20*	0.14	0.12	0.19	0.30	0.08
FR - MA	0.027	0.26*	0.29*	0.40*	0.29*	0.63*	0.19
EA - SY	0.41*	-0.05	-0.09	-0.27*	-0.20	-0.34	-0.19
RU - SY	-0.09	-0.11	0.50*	0.62*	0.57*	0.69*	0.26
EA - TN	0.30*	-0.04	0.02	-0.04	-0.13	0.18	-0.16
FR - TN	0.34*	-0.01	0.14*	-0.06	-0.30	0.23	0.01
EA - TR	0.23*	-0.16*	0.06	0.14	-0.04	0.42*	-0.06
RU - TR	-0.17	-0.23	0.38*	0.29*	-0.20	0.49*	0.47*
Arrivals in MED & Output in MED	Lags or leads (in years)					Frequencies	
	-2	-1	0	1	2	0	$\frac{\pi}{2}$
EA - CY	0.03	-0.16	0.58*	0.02	0.36*	0.75*	0.32
UK - CY	0.33*	0.02	0.70*	0.22*	0.27*	0.90*	0.53*
EA - MA	0.71*	0.25	0.11	0.23	0.19	0.73*	-0.37
FR - MA	0.60*	0.13	-0.00	0.18	0.23*	0.56*	-0.43*
EA - SY	0.41*	0.15	0.23*	-0.32*	0.17	0.61*	-0.05
RU - SY	0.18*	0.05	0.29	0.69*	0.18*	0.85*	0.15
EA - TN	0.34*	-0.11	0.42*	-0.47	0.06	0.51*	0.09
FR - TN	0.39*	-0.10	0.35*	-0.49*	0.08	0.62*	-0.00
EA - TR	0.05	-0.23*	0.34*	-0.19	0.10	0.21	0.14
RU - TR	-0.20	-0.01	0.55*	-0.27	0.45	0.64*	0.38
Output in SC & Output in MED	Lags or leads (in years)					Frequencies	
	-2	-1	0	1	2	0	$\frac{\pi}{2}$
EA - CY	0.27*	0.16*	0.63*	0.36*	-0.16	0.86*	0.58*
UK - CY	-0.11	0.03	0.42*	0.37*	0.09	0.38	0.52*
EA - MA	-0.27*	0.01	0.05	-0.04	0.24	0.02	0.11
FR - MA	-0.27*	0.05	0.07	-0.07	0.19	0.03	0.13
EA - SY	-0.18	-0.39*	-0.05	-0.06	0.14*	-0.36	0.03
RU - SY	0.26*	0.18	-0.05	0.67*	0.30*	0.76*	-0.37
EA - TN	-0.25*	-0.18*	0.30*	0.41*	-0.04	0.23	0.37
FR - TN	-0.09	-0.25*	0.28*	0.39*	0.02	0.37	0.26
EA - TR	0.17*	0.11	0.22	-0.12	-0.27	0.09	0.30
RU - TR	-0.01	0.16	0.52*	-0.20	-0.35*	0.33	0.65*

- Contemporaneous comovements between source country output and tourism flows low. Many confounding factors: time lags related to booking process; substitutability of destination countries; marketing strategies; etc.
- Connection between the flow of tourists and output in the destination country is stronger.
 - i) Largest contemporaneous values between UK arrivals and Cyprus output (0.70) and Russian arrivals with Turkey's output (0.55).
 - ii) Correlation tourist arrival/output destination country often larger than the correlation between source and destination country output.
- Comovements tourist arrivals/output destination country always larger in the long run: the beneficial effects of tourism flows are long lasting. Why?

2 Structural VAR analysis

Multi-country random coefficients Bayesian VAR model (N countries):

$$y_{n,t} = \Gamma'_n z_{n,t} + B'_n y_{n,t-1} + u_{n,t} \quad (1)$$

$$p(\beta_n | \bar{\beta}, \tau, O_n, \Sigma_n) = N(\bar{\beta}, \tau \times O_n) \quad (2)$$

$$p(\Sigma_n) \propto |\Sigma_n|^{-0.5(N+1)} \quad (3)$$

$$p(\bar{\beta}_i) \propto 1 \quad i = 1, 2, \dots \quad (4)$$

$$p(\tau) \propto 1 \quad (5)$$

$$p(\gamma_{ni}) \propto 1 \quad i = 1, 2, \dots \quad (6)$$

$\gamma_n = \text{vec}(\Gamma_n)$ country specific intercepts.

$\beta_n \equiv \text{vec}(B'_n)$: country-specific slopes.

$\bar{\beta}$: cross-sectional average slope.

τ : dispersion from common slope.

$O_n \equiv \text{diag} \left(\sigma_{n,i}^2 \otimes \frac{1}{\sigma_{n,n}^2} \right)$: scaling factor.

Slope coefficients in different countries are different but drawn from a distribution whose mean is constant across countries

Alternatives:

- Mean group estimator (Pesaran and Smith, 1996). Consistent estimates of average effects **if T is large** - we do not have this.
- Pooled estimator. Consistent parameters estimates **only under dynamic homogeneity** - suspect homogeneity is not a great assumption.
- GMM (Arellano and Bond). Difficult to find appropriate instruments.
- Bayesian RC approach. Efficiently combine unit-specific and cross-sectional information. Useful when samples are short and panel potentially dynamically heterogeneous. Can jointly compute posterior of average and individual coefficients.

Specification and identification of the VAR

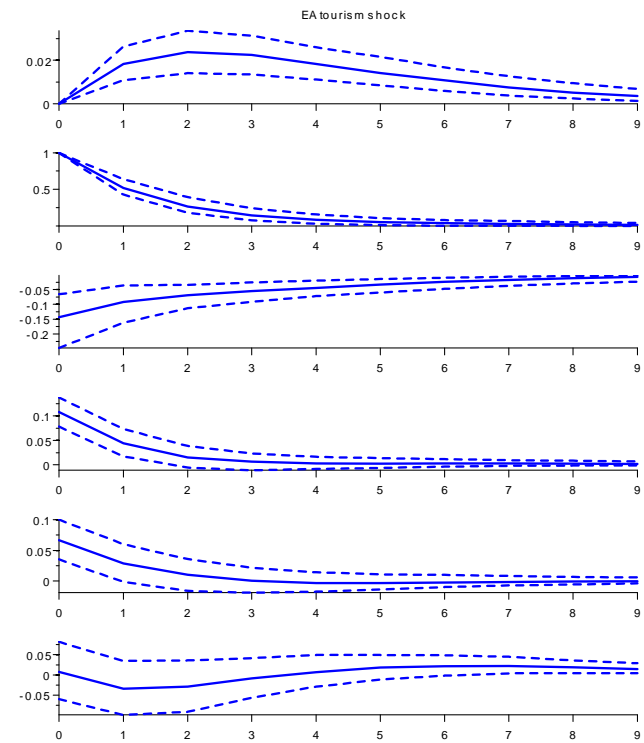
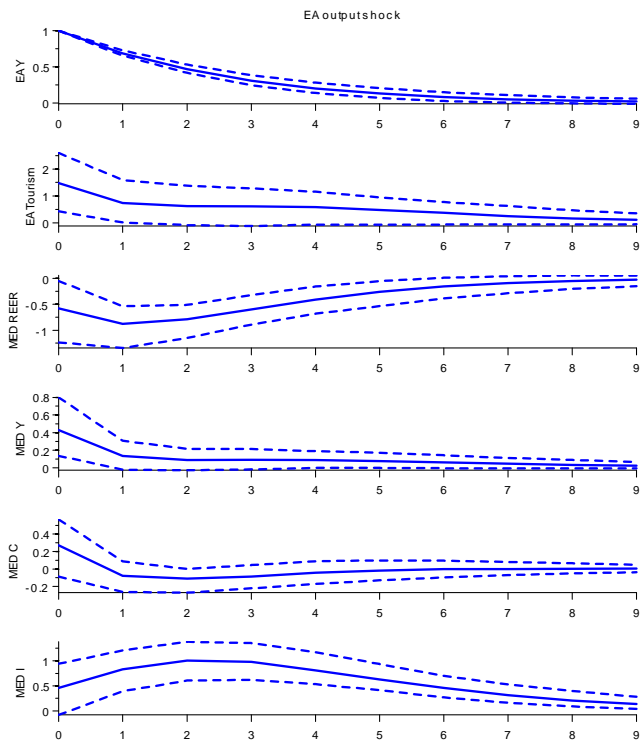
Each country VAR includes:

- constant and time trend.
- log of Euro area output, log number of tourist arrivals, log of REER, log of destination country $Y-G$, C , I .

Shock identification:

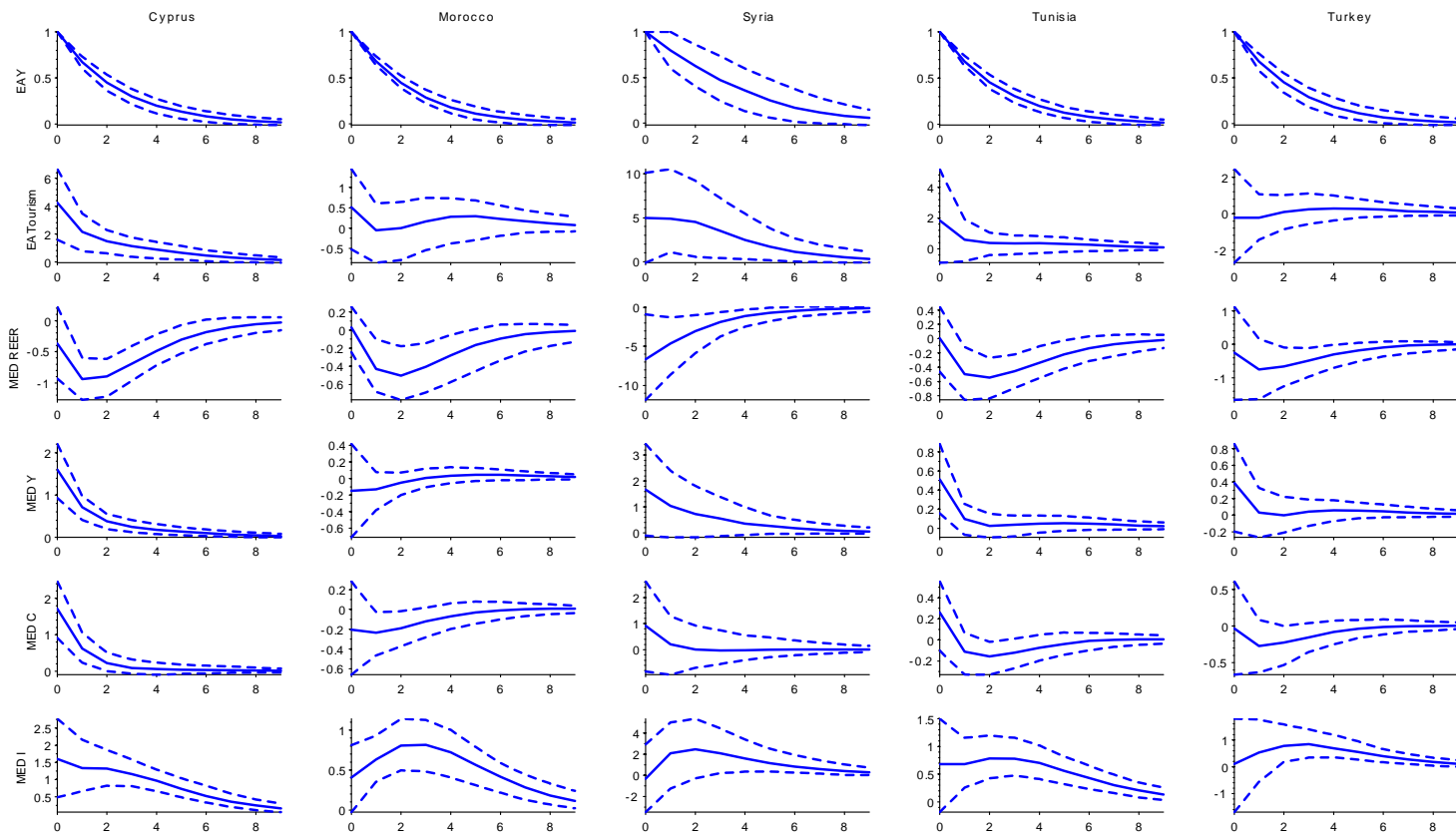
- Source country output and tourism flows predetermined relative to destination country variables (no Arab spring in the sample).
- Source country output predetermined with respect to tourism flows.

Estimation is via MCMC (Gibbs sampling).

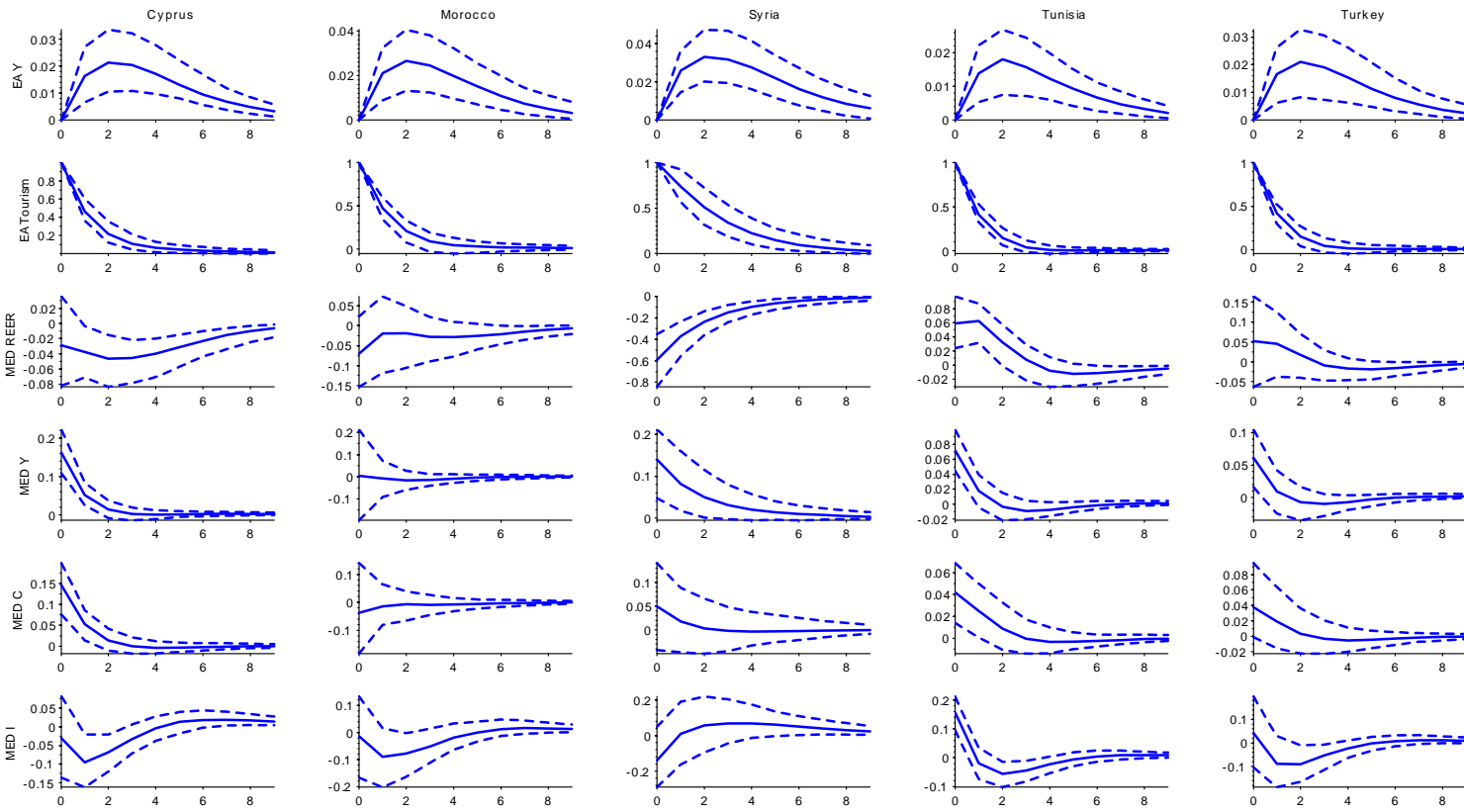


Average responses

- Tourism flows react positively and significantly to output shocks; REER falls on impact.
- Domestic output, consumption, investment in the representative country grow on impact; effect is persistent.
- Investments reacts strongly and have a humped shaped dynamic.
- Tourism shock generates similar dynamics but magnitude smaller. No effects on investments.



Output shock



Tourism shock

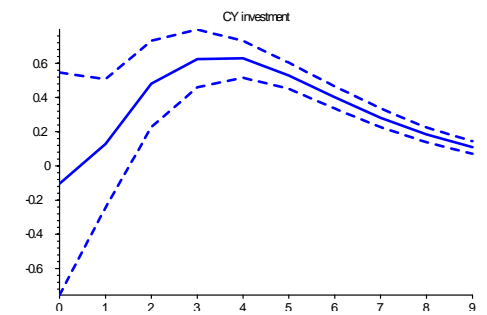
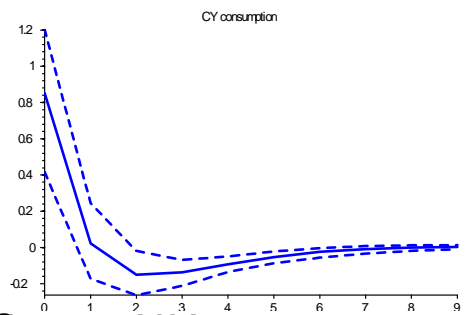
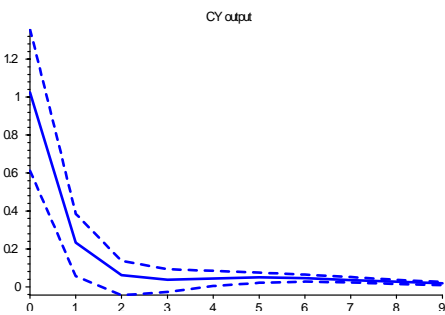
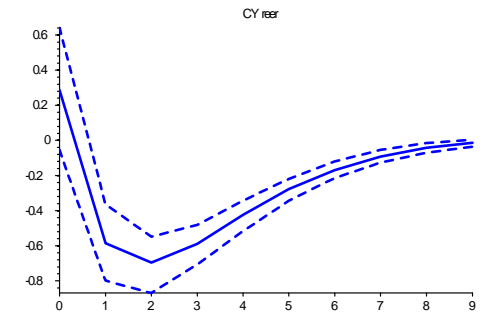
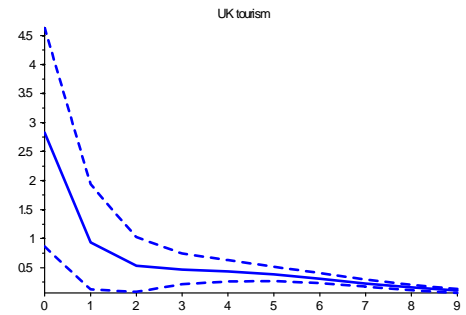
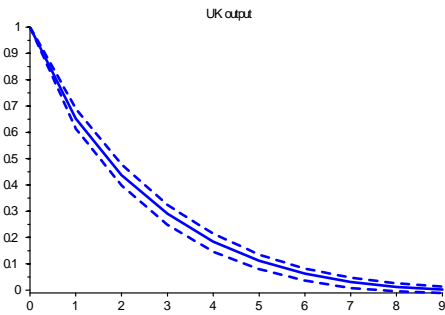
- Shape of responses similar across countries but quantitative heterogeneities.
- Response of tourist arrivals to output shocks is positive in Syria and Cyprus; REER falls.
- Output up in Cyprus, Syria, Tunisia.
- Consumption responses muted. Investment response typically delayed.
- Tourism shock make output go up in Cyprus, Syria, Tunisia and Turkey.
- Some effects on consumption. No effect on investments, except in Tunisia.

Punchline:

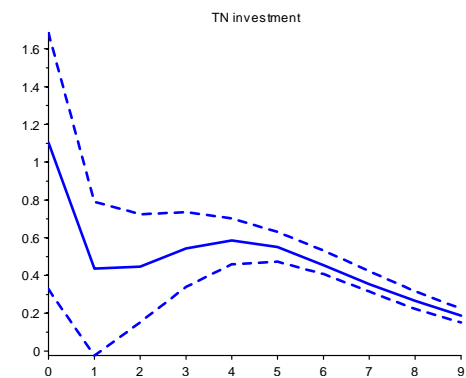
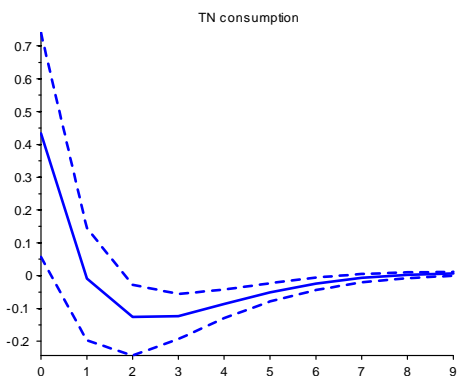
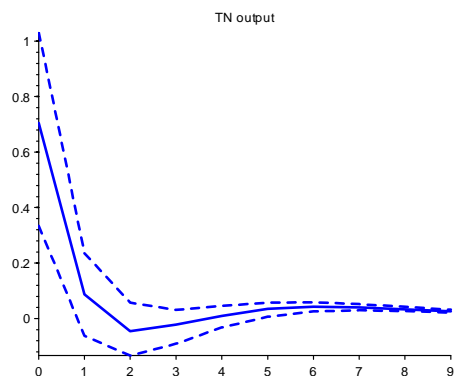
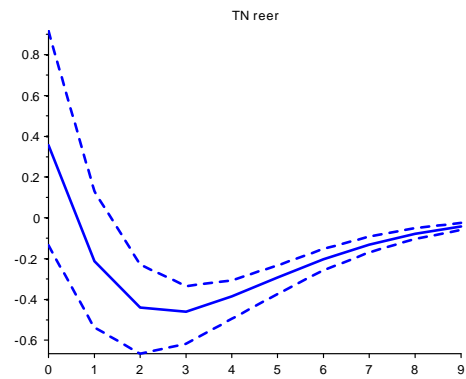
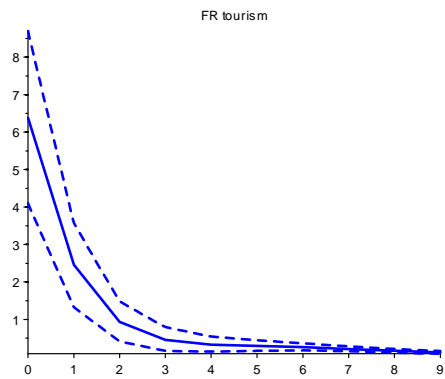
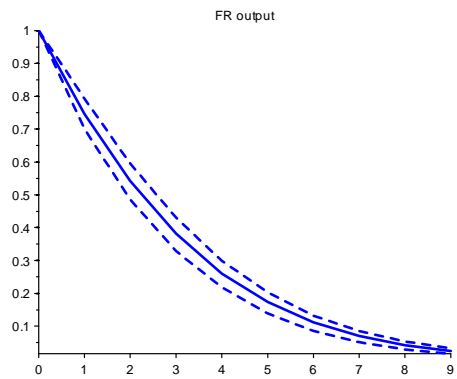
Source country output shocks have positive destination country effects because of a persistent increases in local demand (primarily driven by investments).

Tourism shocks also have effects on destination country output, but not very persistent.

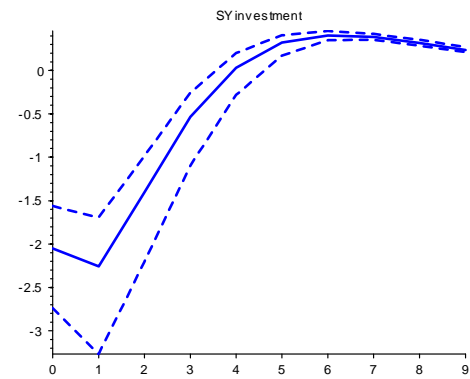
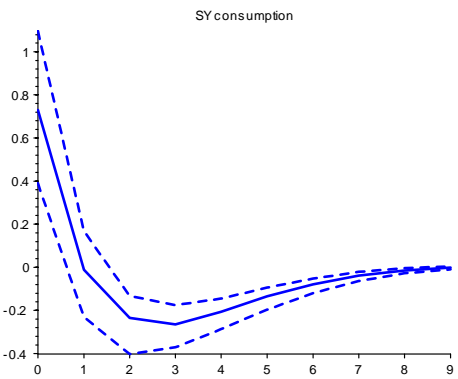
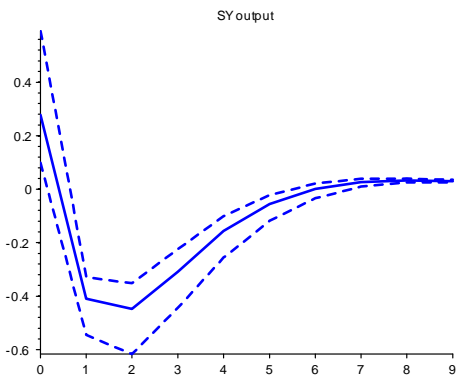
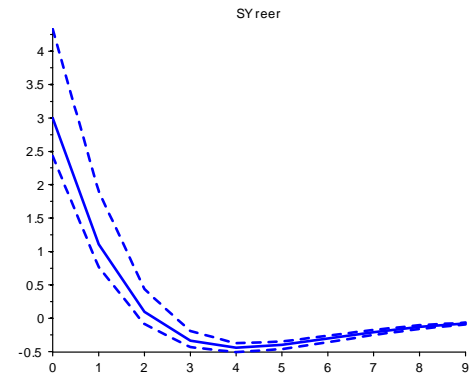
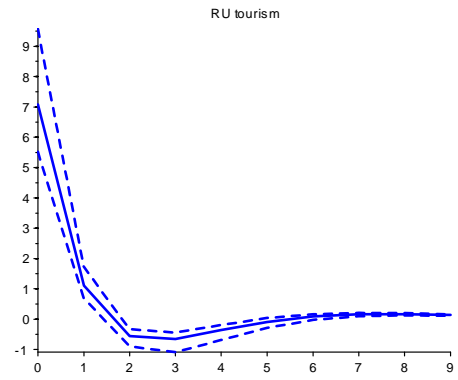
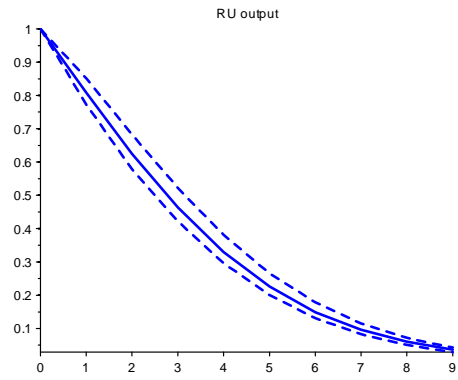
2.1 Some special pairs



Cyprus-UK output responses



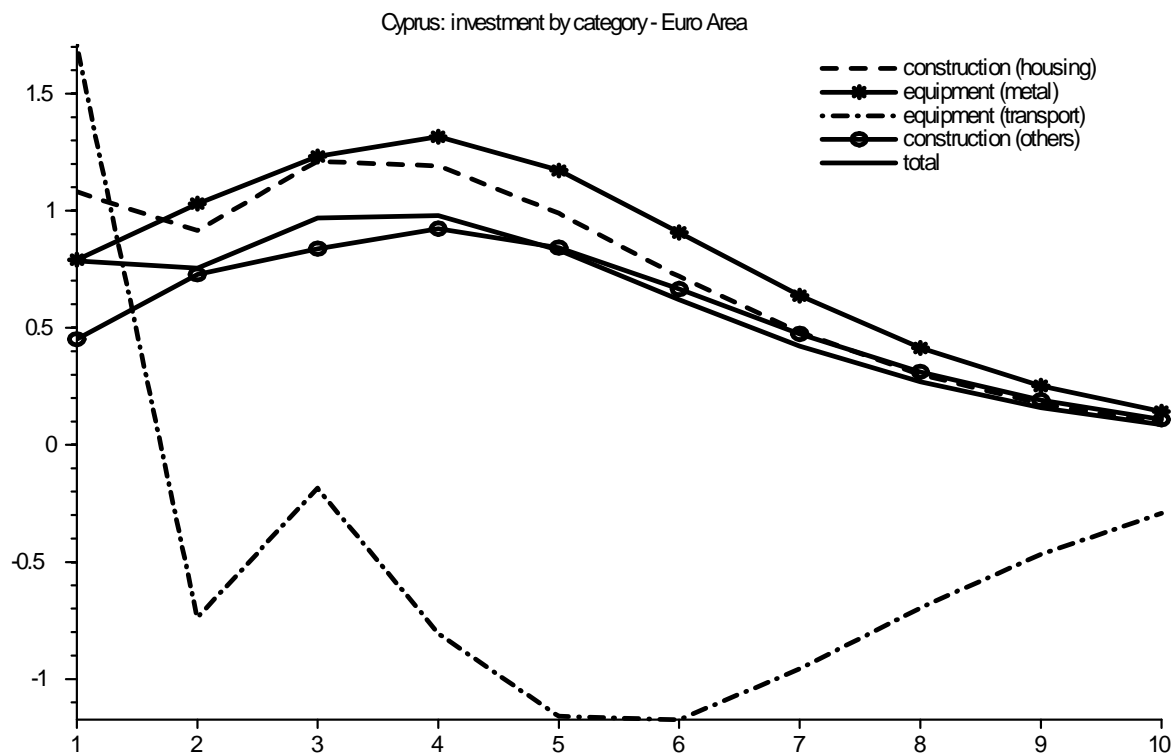
Tunisia-France output responses



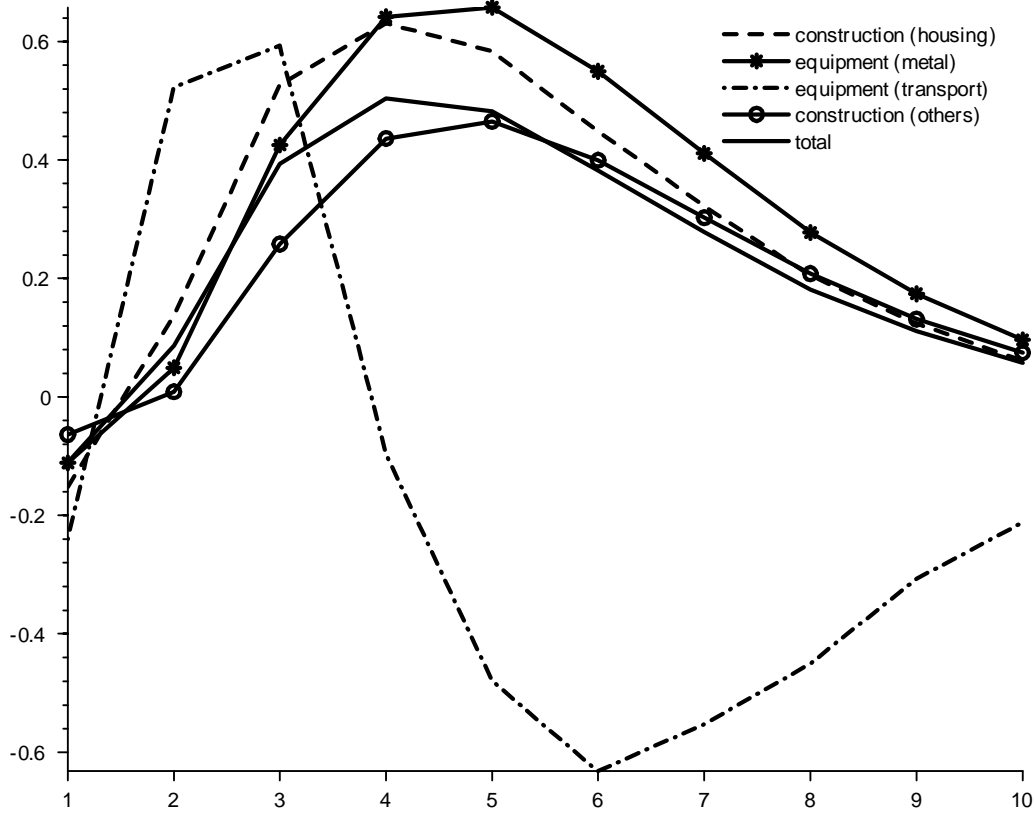
Syria-Russia output responses

- Cyprus-UK much stronger tourism response to output shocks. Very delayed investment effect
- Tunisia-France: very strong effects on destination country.
- Syria-Russia: strong response of tourism. Perverse response of REER and investment.

2.2 What drives investments?



Cyprus: investment by category - UK



2.3 How important are foreign shocks?

Table 1: Forecast error variance decomposition, average result

	Time horizon (in years)			
	0	1	4	8
EA tourism				
Shock1	6 (3,12)	6 (3,11)	6 (3,10)	6 (3,11)
Shock2	94 (88,97)	87 (82,91)	83 (78,87)	83 (78,87)
MED reer				
Shock1	5 (1,10)	6 (2,11)	6 (2,11)	6 (2,11)
Shock2	4 (2,8)	6 (4,10)	7 (4,11)	7 (4,11)
MED output				
Shock1	17 (5,31)	14 (6,26)	13 (6,24)	13 (6,24)
Shock2	76 (60,88)	60 (48,72)	57 (46,70)	58 (46,70)
MED consumption				
Shock1	23 (5,45)	30 (17,47)	32 (23,45)	32 (23,45)
Shock2	67 (40,85)	61 (39,74)	59 (43,71)	59 (44,71)
MED investment				
Shock1	21 (2,68)	7 (2,16)	10 (4,20)	11 (5,20)
Shock2	21 (2,66)	12 (5,23)	8 (3,17)	8 (3,17)

	Cyprus		Morocco		Syria		Tunisia		Turkey	
Time (in years)	0	8	0	8	0	8	0	8	0	8
EA tourism										
Shock1	29 (15,43)	28 (15,42)	3 (0,10)	14 (9,22)	66 (54,75)	43 (32,54)	2 (0,11)	4 (2,13)	4 (0,16)	14 (7,25)
Shock2	71 (57,85)	70 (57,84)	97 (90,100)	82 (74,88)	34 (25,46)	26 (18,34)	98 (89,100)	94 (86,97)	96 (84,100)	80 (69,88)
MED reer										
Shock1	16 (4,29)	41 (29,53)	38 (18,55)	34 (14,51)	31 (17,49)	33 (19,50)	2 (0,8)	3 (1,10)	2 (0,7)	2 (0,7)
Shock2	1 (0,5)	30 (23,40)	2 (0,8)	3 (1,9)	17 (8,30)	17 (8,29)	28 (13,42)	24 (11,37)	2 (0,7)	2 (1,7)
MED output										
Shock1	36 (18,52)	35 (18,50)	29 (6,52)	30 (7,52)	72 (48,92)	39 (22,61)	23 (3,46)	20 (5,37)	7 (1,23)	14 (3,31)
Shock2	61 (46,80)	62 (48,79)	11 (1,30)	18 (6,37)	6 (1,24)	7 (3,17)	68 (45,90)	72 (54,86)	13 (2,34)	30 (19,51)
MED consumption										
Shock1	50 (33,64)	48 (33,62)	27 (6,60)	30 (9,57)	39 (13,72)	30 (17,50)	37 (10,68)	36 (18,57)	9 (1,25)	15 (4,32)
Shock2	36 (22,53)	37 (24,53)	18 (2,43)	25 (9,49)	10 (2,34)	18 (6,34)	17 (2,45)	34 (21,51)	3 (0,12)	8 (4,18)
MED investment										
Shock1	29 (3,66)	25 (8,50)	42 (18,65)	24 (10,40)	4 (0,19)	12 (4,25)	11 (2,29)	22 (12,34)	8 (0,24)	9 (2,25)
Shock2	20 (3,50)	47 (26,69)	3 (0,14)	42 (28,58)	14 (2,40)	5 (2,13)	75 (58,88)	64 (50,75)	6 (0,24)	22 (11,42)

Cyprus	Time horizon (in years)			
	0	1	4	8
UK tourism				
Shock1	14 (2,31)	13 (2,29)	12 (2,29)	12 (2,29)
Shock2	86 (69,98)	86 (70,97)	86 (69,96)	85 (69,96)
CY reer				
Shock1	7 (1,17)	17 (11,27)	27 (18,38)	28 (19,38)
Shock2	2 (0,7)	3 (1,9)	3 (1,9)	4 (1,9)
CY output				
Shock1	28 (12,46)	27 (11,45)	27 (11,44)	27 (11,44)
Shock2	27 (14,44)	26 (14,43)	25 (14,42)	25 (14,42)
CY consumption				
Shock1	30 (10,52)	28 (11,51)	30 (15,51)	30 (15,51)
Shock2	18 (5,38)	18 (5,38)	17 (5,35)	17 (6,35)
CY investment				
Shock1	11 (1,40)	13 (2,34)	27 (12,45)	31 (16,48)
Shock2	29 (5,69)	30 (11,58)	28 (13,46)	26 (13,44)

Cyprus	Time horizon (in years)			
	0	1	4	8
UK expenditures				
Shock1	38 (21,56)	35 (19,52)	34 (19,49)	34 (19,49)
Shock2	62 (44,79)	60 (44,75)	56 (42,70)	56 (41,70)
CY reer				
Shock1	5 (1,16)	7 (3,14)	11 (6,18)	11 (6,19)
Shock2	2 (0,9)	2 (0,8)	3 (1,8)	3 (1,8)
CY output				
Shock1	34 (16,54)	33 (15,52)	31 (15,51)	31 (15,51)
Shock2	15 (6,28)	16 (7,28)	15 (7,28)	15 (7,28)
CY consumption				
Shock1	30 (14,53)	27 (12,49)	24 (11,44)	24 (12,44)
Shock2	5 (1,15)	6 (1,16)	6 (2,16)	6 (2,16)
CY investment				
Shock1	31 (12,59)	31 (12,55)	39 (20,59)	39 (22,59)
Shock2	2 (0,13)	4 (1,15)	4 (1,14)	5 (1,13)

- Volatility of tourism flows not much due to income effects.
- From 40 to 80% of fluctuations in domestic Y , C , I can be attributed to foreign shocks. However:
 - i) Tourism shock explain a larger portion of domestic Y and C (in aggregate, Cyprus, Tunisia)
 - ii) Output shocks explain larger portion of domestic Y and C for Morocco and Turkey.
 - iii) Results robust to change in tourism variable.
 - iv) Volatility of REER not due to source country income or tourism shocks.

3 Counterfactual

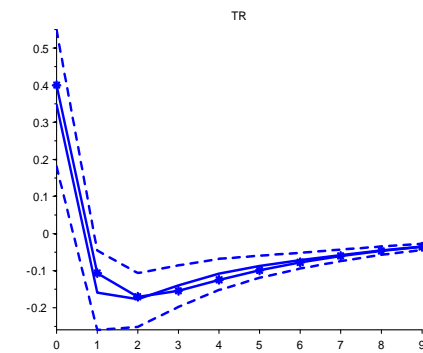
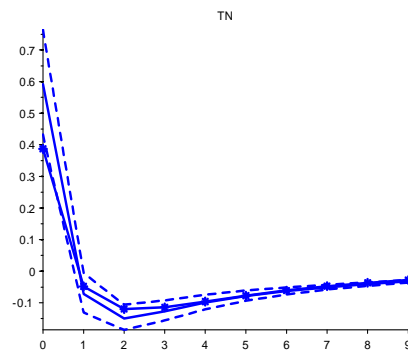
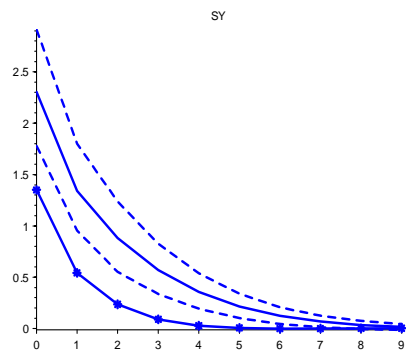
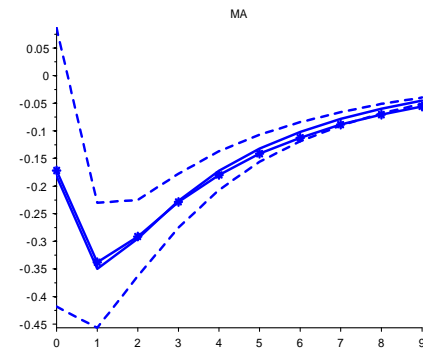
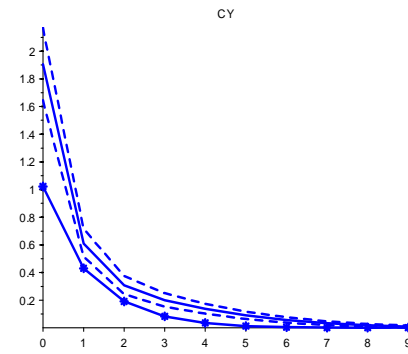
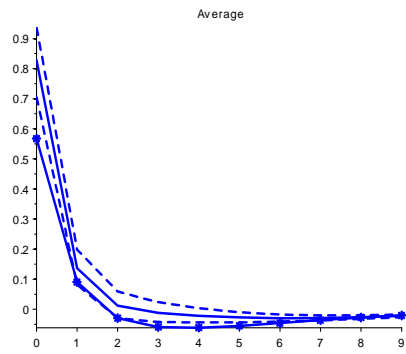
Structural responses are the sum of two distinct effects:

- 1.) A pure output shock effect - common shocks.
 - 2.) An effect due to changes in tourism flows- international transmission.
- Disentangle 1.) and 2.) to measure the "multiplier" effect that tourism has for output in destination countries.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ \mathbf{a}_{2,1} & 1 & 0 & 0 & 0 & 0 \\ a_{3,1} & a_{3,2} & 1 & a_{3,4} & a_{3,5} & a_{3,6} \\ \mathbf{a}_{4,1} & \mathbf{a}_{4,2} & a_{4,3} & 1 & a_{4,5} & a_{4,6} \\ a_{5,1} & a_{5,2} & a_{5,3} & a_{5,4} & 1 & a_{5,6} \\ a_{6,1} & a_{6,2} & a_{6,3} & a_{6,4} & a_{6,5} & 1 \end{bmatrix} \begin{bmatrix} y_{n,t}^{EU} \\ \tau_{n,t}^{EU} \\ REE_{n,t}^{MED} \\ y_{n,t}^{MED} \\ c_{n,t}^{MED} \\ i_{n,t}^{MED} \end{bmatrix} = B'_n \begin{bmatrix} y_{n,t-1}^{EU} \\ \tau_{n,t-1}^{EU} \\ REE_{n,t-1}^{MED} \\ y_{n,t-1}^{MED} \\ c_{n,t-1}^{MED} \\ i_{n,t-1}^{MED} \end{bmatrix} + \begin{bmatrix} u_{n,t}^{y,EU} \\ \tau_{n,t}^{EU} \\ u_{n,t}^{R,MED} \\ u_{n,t}^{y,MED} \\ u_{n,t}^{c,MED} \\ u_{n,t}^{i,MED} \end{bmatrix}$$

- $a_{4,1}$: instantaneous effect of EU output shock on MED output.
- $a_{2,1}$: instantaneous effect of EU output shock on EU tourism flows.
- $a_{4,2}$: instantaneous effect of EU tourism shock on MED output.
- $a_{2,1} \times a_{4,2}$: **indirect effect of EU output shock on MED output.**

Generate an artificial tourism shock series offsetting tourism flows responses to a source country output shock ("conditional forecast", "scenario analysis").



Actual and Counterfactual

- Median impact response of domestic output in the typical destination country would fall from 0.8 to 0.6 when the tourism channel is shut down. Change significant up to 4 years.
- Effects large for Cyprus and Syria. Marginal for Tunisia.
- Effects for Tunisia and Turkey become significant with France and Russia as source country.

4 The Model

Large Country: Consumers

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \frac{[D_t^\theta (1 - N_t)^{1-\theta}]^{1-\sigma}}{1 - \sigma} \quad (7)$$

where

$$D_t = \left[\psi^\zeta c_t^{1-\zeta} + \nu_t (1 - \psi)^\zeta b_t^{1-\zeta} \right]^{(1-\zeta)^{-1}} \quad (8)$$

$$b_t = \left[\int_0^1 \xi_i^\kappa (b_{it})^{1-\kappa} di \right]^{(1-\kappa)^{-1}} \quad \int_0^1 \xi_i di = 1 \quad (9)$$

where ν_t is a preference shock; $(\theta, \sigma, \psi, \zeta, \kappa, \xi)$ are parameters.

Capital accumulation:

$$x_t \left(1 - \frac{\Xi}{2} \left(\frac{x_t}{x_{t-1}} - 1 \right)^2 \right) \nu_t = k_{t+1} - (1 - \delta)k_t \quad (10)$$

ν_t is an investment shock and Ξ an adjustment cost parameter.

Large Country: Producers

Intermediate goods:

$$K_t^\alpha N_t^{1-\alpha} \exp(e_t) = d_t^* + f_t^* \quad (11)$$

where e_t is a TFP shock. Total exports $f_t^* = \int_0^1 f_{it}^* di$.

Final goods:

$$y_t^* = \left(\theta_2^\eta d_t^{*1-\eta} + (1 - \theta_2)^\eta f_t^{1-\eta} \right)^{(1-\eta)^{-1}} \quad (12)$$

where $f_t = \left(\int_0^1 \gamma_i^\rho f_{it}^{1-\rho} di \right)^{(1-\rho)^{-1}}$ and $\int_0^1 \gamma_i di = 1$.

Aggregate demand (g_t is random) is

$$Z_t = c_t + x_t + g_t \quad (13)$$

Prices

Price of the consumption bundle is

$$p_t^D = \left[\psi (p_t^c)^{\frac{\zeta-1}{\zeta}} + (1 - \psi) (p_t^b)^{\frac{\zeta-1}{\zeta}} \right]^{\frac{\zeta}{\zeta-1}} \quad (14)$$

The price of the tourism bundle is

$$p_t^b = \left(\int_0^1 \xi_i (\nu_{it} p_{it}^b)^{\frac{\kappa-1}{\kappa}} di \right)^{\frac{\kappa}{\kappa-1}} \quad (15)$$

The price of intermediate goods is

$$p_t^* = p_t^{d*} = p_t^{f*} = \left(\alpha^\alpha (1 - \alpha)^{1-\alpha} \exp(e_t) \right)^{-1} (p_t^{k*})^\alpha (w_t^*)^{1-\alpha} \quad (16)$$

where p_t^{k*} is the rental rate of capital; w_t^* the rental rate of labor.

The price of the final good is

$$p_t^{y*} = \left(\theta (p_t^{d*})^{\frac{\eta-1}{\eta}} + (1-\theta) (p_t^f)^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{\eta-1}} \quad (17)$$

Price of imported bundle is

$$p_t^f = \left(\int_0^1 \gamma_i (p_{it}^f)^{\frac{\rho-1}{\rho}} di \right)^{\frac{\rho}{\rho-1}} \quad (18)$$

National accounts

$$y_t^* p_t^{y^*} = Z_t p_t^{z^*} - \int_0^1 \frac{\vartheta^i}{\vartheta^*} (p_{it}^f f_{it} + p_{it}^b b_{it}) di + \left(\int_0^1 f_{it}^* di \right) p_t^{f^*} \quad (19)$$

- $\frac{\vartheta^i}{\vartheta^*}$ is the ratio of populations.

The trade balance is

$$- \int_0^1 (p_{it}^f f_{it} + p_{it}^b b_{it}) di + \left(\int_0^1 f_{it}^* di \right) p_t^{f^*} = L_t p_t^{f^*} - L_{t+1} p_t^L \quad (20)$$

where L_t one period debt in zero net supply, paying one unit of good f^* in period t , with price p_t^L .

Exogenous processes

$$\log \nu_t = \rho_\nu \log \nu_{t-1} + \epsilon_{\nu t} \quad (21)$$

$$\log v_t = \rho_v \log v_{t-1} + \epsilon_{vt} \quad (22)$$

$$e_t = \rho_e e_{t-1} + \epsilon_{et} \quad (23)$$

$$\log g_t = (1 - \rho_g) \log \bar{g} + \rho_g \log g_{t-1} \quad (24)$$

Small Countries

Monopolistically competitive in the tourism market. Consumer preferences:

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{[C_{it}^{\theta} (1 - N_{it})^{1-\theta}]^{1-\sigma}}{1 - \sigma} \quad (25)$$

Can work in two sectors: good producing (a) and tourism (b):

$$N_{it} = \left[\mu^{\chi} N_{t,b}^{1-\chi} + (1 - \mu)^{\chi} N_{t,a}^{1-\chi} \right]^{(1-\chi)^{-1}} \quad (26)$$

Capital aggregator:

$$K_{it} = \left[\phi^{\omega} K_{t,b}^{1-\omega} + (1 - \phi)^{\omega} K_{t,a}^{1-\omega} \right]^{(1-\omega)^{-1}} \quad (27)$$

Capital accumulation

$$x_{it} \left(1 - \frac{\Xi}{2} \left(\frac{x_{it}}{x_{it-1}} - 1 \right)^2 \right) v_{it} = k_{it+1} - (1 - \delta)k_{it} \quad (28)$$

Production

Intermediate goods:

$$K_{t,a}^\gamma N_{t,a}^{1-\gamma} \exp(e_{it}) = d_{it} + \hat{f}_{it} \quad (29)$$

e_{it} country specific TFP shock; \hat{f}_{it} = percapita export.

Final goods:

$$y_{it} = \left[\theta_i^\iota d_{it}^{1-\iota} + (1 - \theta_i)^\iota \left(\hat{f}_{it}^* \right)^{1-\iota} \right]^{(1-\iota)^{-1}} \quad (30)$$

Tourism goods production:

$$\hat{b}_{it} = K_{t,b}^\varsigma N_{t,b}^{1-\varsigma} \exp(u_{it}) - \Delta_{it} \quad (31)$$

where Δ_{it} is an stochastic fixed cost making zero monopolistic profits; u_{it} country specific TFP shock. Aggregate demand (g is random) is:

$$Z_{it} = c_{it} + g_{it} + x_{it}$$

Prices

The price of y_{it} is

$$p_{it}^y = \left[\theta_i (p_{it}^d)^{\frac{\iota-1}{\iota}} + (1 - \theta_i) (p_{it}^{f*})^{\frac{\iota-1}{\iota}} \right]^{\frac{\iota}{\iota-1}}$$

The prices of the intermediate goods are

$$p_{it}^d = p_{it}^f = \left(\gamma^\gamma (1 - \gamma)^{1-\gamma} \exp(e_{it}) \right)^{-1} (p_{ait}^k)^\gamma (w_{ait})^{1-\gamma} \quad (32)$$

The (local) price of tourism is a mark-up over the marginal costs

$$\tilde{p}_{it}^b = \frac{1}{1 - \kappa} \left(\varsigma^\varsigma (1 - \varsigma)^{1-\varsigma} \exp(u_{it}) \right)^{-1} (p_{bit}^k)^\gamma (w_{bit})^{1-\gamma}$$

P_{jit}^k, w_{jat}^k rental price of capital and labor in sector $j = a, b$. Final price:

$$p_{it}^b = \tilde{p}_{it}^b + \pi_{it} \quad (33)$$

National accounts

Per-capita national account identity

$$y_{it}p_{it}^y + b_{it}p_{it}^b = Z_{it}p_{it}^Z + \frac{v^*}{v^i} f_{it}^* p_{it}^{f^*} - f_{it}^f p_{it}^f$$

The trade balance is:

$$-\hat{f}_{it}^* p_{it}^{f^*} + \hat{f}_{it}^f p_{it}^f + \hat{b}_{it} p_{it}^b = \hat{L}_{it} p_t^{f^*} - \hat{L}_{it+1} p_t^L$$

International prices

- TOT = price of export / price of import:

$$TOT_{it} = \frac{p_{it}^f f_i^{ss} + p_{it}^b b_i^{ss}}{(f_i^{ss} + b_i^{ss}) p_{it}^{f*}}$$

- REE = price consumption at home / relative to price of consumption abroad:

$$REE_{it} = \frac{p_{it}^z}{p_t^{z*}} = \frac{p_{it}^y}{p_t^{y*}}$$

Exogenous variables

$$\begin{aligned}\log v_{it} &= \rho_{vi} \log v_{it-1} + \epsilon_{vit} \\ e_{it} &= \rho_{ei} e_{it-1} + \epsilon_{eit} \\ \log g_{it} &= (1 - \rho_{gi}) \log \bar{g}_i + \rho_{gi} \log g_{it-1} \\ \log \Delta_{it} &= (1 - \rho_{\Delta i}) \log \bar{\Delta}_i + \rho_{\Delta i} \log \Delta_{it-1} \\ u_{it} &= \rho_u u_{it-1} + \epsilon_{ut}\end{aligned}$$

International markets equilibrium

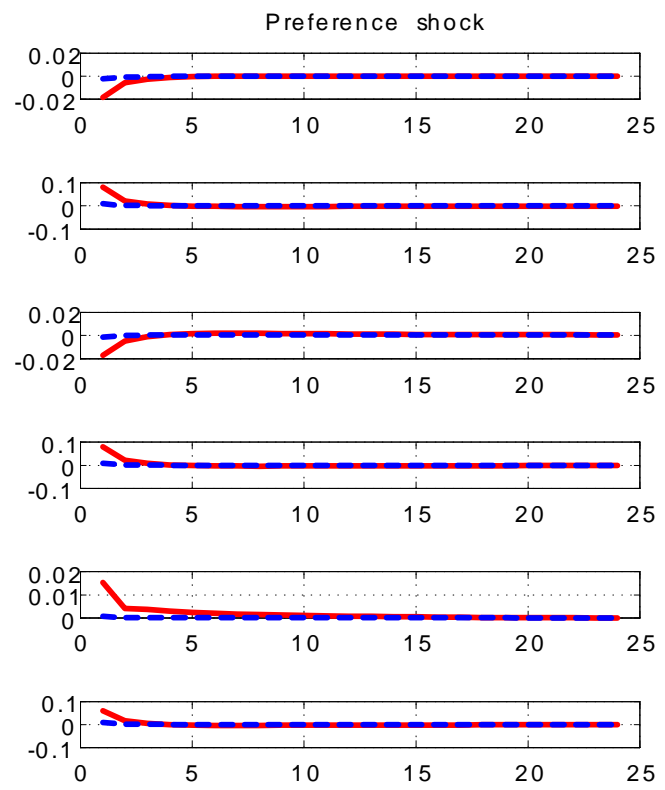
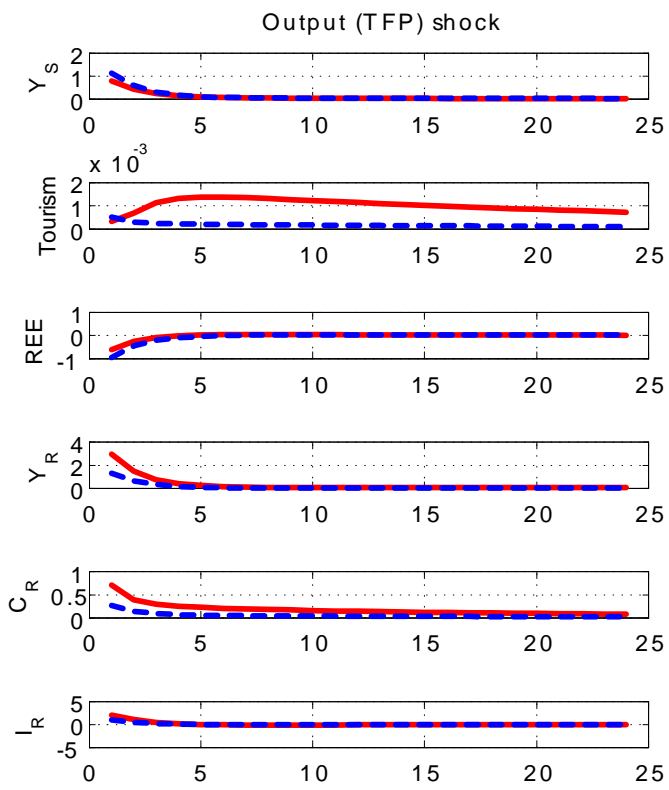
Equalization of demand and supply for the traded goods b_{it}, f_{it}, f_{it}^* :

$$\begin{aligned}p_{it}^f &= 1 \\ v^* b_{it} &= v^i \hat{b}_{it} \\ v^* f_{it}^* &= v^i \hat{f}_{it}^*\end{aligned}$$

- Study two cases: one with and one without tourism.

$$\begin{aligned} D_t &= \left[\psi^\zeta c_t^{1-\zeta} + \nu_t (1-\psi)^\zeta \left(\xi_i^\kappa (b_{it})^{1-\kappa} \right)^{\frac{1-\zeta}{(1-\kappa)}} \right] (1-\zeta)^{-1} \\ &= c_t \end{aligned} \tag{34}$$

- Consider two shocks: TFP (output) and preference shocks.



quarters after shock

— with Tourism
 - - - without Tourism

- Tourism does not react much to income shocks.
- Without tourism output receiving country 50 percent lower.
- REER unaffected by tourism channel.
- Receiving country output effect larger with TFP shocks; effect is more persistent than with tourist shocks.
- Quantitative failures: response of investment not humped shaped; REER reacts to income shocks.

5 Conclusions

- Tourism is an important channel of international transmission of output shocks.
 - Source country output shocks generate important fluctuations in destination country variables via tourist flows. Demand effect is via investments.
 - Shocks to tourist arrivals unrelated to source country income fluctuations are also important for destination countries output. Effect less persistent
 - Simple IRBC can explain the qualitative features of transmission. Some failure about quantitative effects.

Policy recommendations

- Fostering the tourist relationships may help to integrate faster Mediterranean economies with the EU.
- It may also have long lasting beneficial output effects because of the virtuous investment cycle they produce. Tourism based growth policies? e.g. Montenegro.
- Transport subsidies? Advertisement tilting?
- Make tourism flows more predictable - see effects in Egypt, Tunisia, Syria.